



GRAND BAY NATIONAL ESTUARINE RESEARCH RESERVE  
2023-2027 Management Plan



*Grand Bay*  
National Estuarine  
Research Reserve

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## Executive Summary

### Plan Purpose and Scope

The Grand Bay National Estuarine Research Reserve (GNDNERR) is operated by the Mississippi Department of Marine Resources (MDMR) in partnership with NOAA's Office for Coastal Management as part of the National Estuarine Research Reserve System (NERRS). The NERRS are authorized under Section 315 of the Coastal Zone Management Act of 1972 (CZMA), which recognizes the significance of coastal resources and established the Coastal Zone Management Program and the NERRS to manage these resources for long-term conservation in partnership with the states. In 1973 the Mississippi Legislature also recognized the importance of Mississippi's coastal resources and passed the Coastal Wetlands Protection Act. Subsequently, the Mississippi Coastal Program (MCP) was established in 1980. The GNDNERR was designated in 1999 as the 24<sup>th</sup> reserve in the NERRS. The purpose of this management plan is to provide a guiding document for the GNDNERR for the next five years (2023-2027). The scope of this plan is the programmatic actions that the GNDNERR will pursue to address our vision and mission. The program at the GNDNERR includes five sectors: Administration, Research and Monitoring, Stewardship, Education, and Training.

### Reserve Context

The reserve is the largest estuarine and coastal wetland system in the state of Mississippi. Located in Jackson County, immediately adjacent to the Mississippi-Alabama state line, the reserve includes a variety of wetland types, including tidal estuary and non-tidal wetlands. The emergent tidal marshes are dominated by black needlerush with a narrow fringe of cordgrass along the lower elevation edges. The landward wetlands are mostly wet pine savanna. The reserve size is 18,063 acres and is a mix of open water and public and private lands. In 2018, there was a change in land under state ownership with 937 acres transferred from private ownership to MDMR ownership. The reserve supports a highly diverse community of plants and animals. Estuarine ecosystems serve as vital nursery areas for a large portion of our commercial and recreational species of fish and shellfish, serve as filters to enhance coastal water quality and serve to provide a degree of resilience to buffer human built and natural communities from severe storm events. The GNDNERR is a retrograding delta with no direct freshwater input from a mainstem river and thus a unique ecosystem among the NERRS and in our region. The state lead for the reserve is the MDMR, which was created in 1994 by the Mississippi Legislature, with the mission to enhance, protect and conserve the state's marine interests. The agency manages all marine life, public trust wetlands, adjacent uplands, and waterfront areas for Mississippi to provide optimal commercial, recreational, educational, and economical uses of these resources in accordance with the agency mission to enhance, protect, and conserve.

### Coastal Management Issues and Reserve Goals

***The mission of the GNDNERR is to be a leader in science and outreach, in service to our community.***

This mission reflects our vision of inspiring our community to value, support, and practice ecosystem conservation. Staff and partners will work collaboratively to address focus areas, relating to habitat protection, environmental change, and water quality, established in the NERRS Strategic Plan. Our specific goals to support this work include: 1) Systematically collect quality data and answer relevant questions that inform management; 2) Conserve, restore, and manage natural resources to improve ecosystem function and protect cultural resources; 3) Build community connections and relationships to share understanding of coastal ecosystems and inspire people to protect them; 4) Communicate efficiently and effectively; and 5) Streamline administrative functions. These goals and strategies meet our vision of serving the community through science and outreach that informs and inspires communities to support ecosystem conservation. Priority coastal management issues will be addressed,

including wet pine savanna restoration, marsh conservation and protection, habitat improvements, hydrological and sediment flow improvements, improved understanding of ecosystem function, including water quality, fisheries and human values, contamination and remediation, outreach in the form of translating science and research for coastal managers and applying that knowledge to address problems, and education for the community and students of all ages.

### Reserve Programs Overview

The GNDNERR has a wide array of programs within each sector to address our local coastal management priorities and serve our community. These include: collaborative research projects to better understand ecosystem function; large-scale wet pine savanna restoration and management through the actions of invasive species control, mechanical clearing, and prescribed burning; water quality, weather monitoring, marsh elevation, vegetation, shoreline erosion as part of the System-wide Monitoring Program with the NERRS; installation and education on green infrastructure to address stormwater flooding issues; research information transfer and technical trainings in statistics, natural history, geographic information systems (GIS), and other subjects; and, a variety of community education programs for all ages from classroom and field experiences, art workshops, kayaking for veterans, and large-scale community events like the Star Party Open House, Celebrate the Gulf Marine Education Festival, and National Estuaries Day celebrations.

## Introduction to National Estuarine Research Reserve System

The National Estuarine Research Reserve System (NERRS) is a network of 30 protected estuarine areas that represent different biogeographic regions and estuarine types within the United States (Figure 1). Reserves are protected for long-term research, monitoring, education, and coastal stewardship. The Reserve System, created by the Coastal Zone Management Act of 1972 (CZMA), currently protects over one million acres of estuarine lands and waters. The system is managed in accordance with code of federal regulations (CFR) at 15 CFR Part 921 (Appendix 1).

Each reserve has a unique boundary based on the nature of its ecosystem. The boundaries include the land and water areas needed to protect an intact ecological unit. Reserves classify their land and water areas as either “core” or “buffer,” which determines the level of protection and the types of activities allowed within each area. Each reserve develops the programming most appropriate for its location while also delivering required system-wide programs focused on research and monitoring, education, training, and stewardship.

The Reserve System is a partnership program between the National Oceanic and Atmospheric Administration (NOAA) and the coastal states. NOAA provides funding, national guidance, and technical assistance for reserve operations and system-wide programs, facilities construction and land acquisition, graduate fellowships, and collaborative science projects. The state partner manages the reserve on a daily basis and works collaboratively with local and regional partners. NOAA also leads projects that integrate data or support decision-making at the national level.

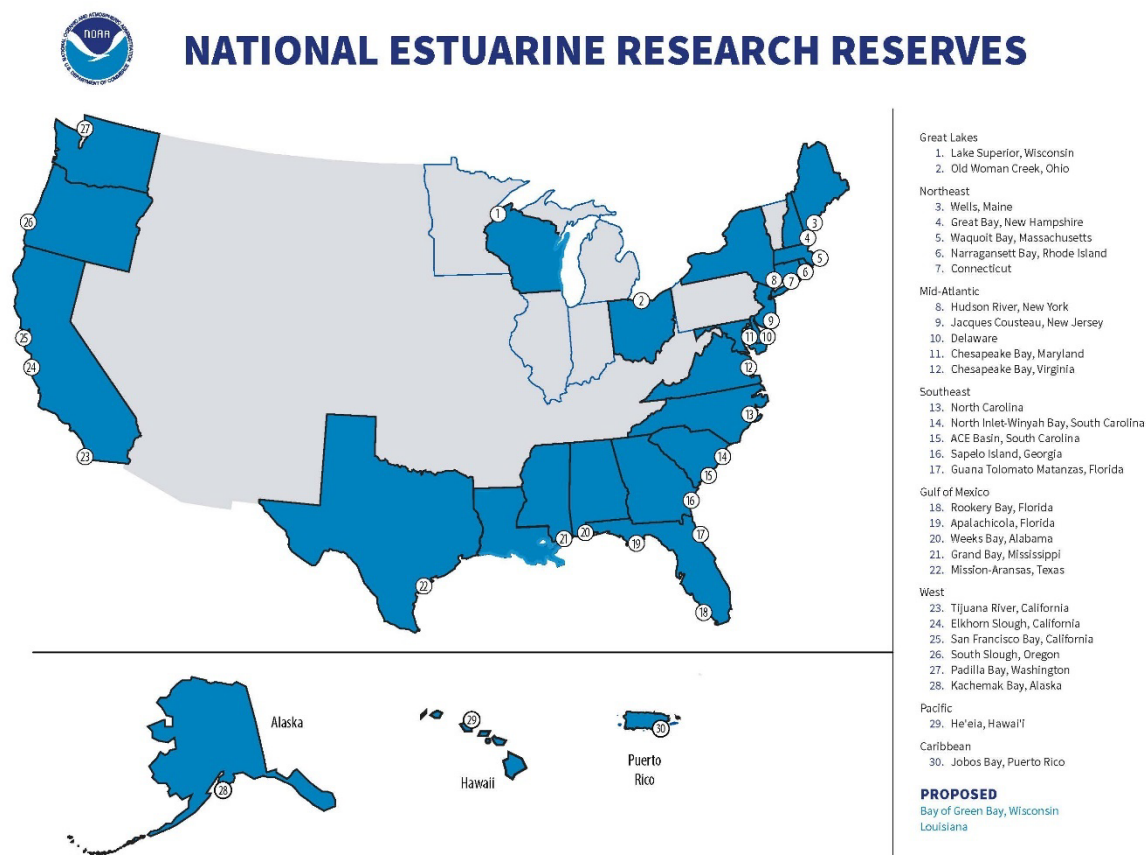


Figure 1. National Estuarine Research Reserve System (NERRS) Map.

Each reserve is required to develop a management plan that contains the goals, objectives, and strategies for that reserve. Management plans are updated every five years and must be approved by NOAA. These plans enable the reserves and NOAA to track progress and realize opportunities for growth. Each plan describes how the reserve will carry out its foundational research, education, and training programs. Each plan also outlines administration, resource protection, public access, land acquisition, and facility plans, as well as restoration and resource manipulation plans, if applicable. The plans also incorporate strategies designed to help the reserve contribute to the system's national goals. NOAA periodically evaluates reserves for compliance with federal requirements and their approved management plan.

The most recent strategic plan for the NERRS can be found at [coast.noaa.gov/data/docs/nerrs/StrategicPlan.pdf](https://coast.noaa.gov/data/docs/nerrs/StrategicPlan.pdf). It describes the following goals for the system.

**Protecting Places:** Enhance and inspire stewardship, protection, and management of estuaries and their watersheds in coastal communities through place-based approaches.

**Applying Science:** Improve the scientific understanding of estuaries and their watersheds through the development and application of reserve research, data, and tools.

**Educating Communities:** Advance environmental appreciation and scientific literacy, allowing for science-based decisions that positively affect estuaries, watersheds, and coastal communities.

## Introduction to the Grand Bay National Estuarine Research Reserve Overview

The Grand Bay National Estuarine Research Reserve (GNDNERR) is operated by the Mississippi Department of Marine Resources (MDMR) in partnership with NOAA's Office for Coastal Management (OCM) as part of the NERRS. The NERRS are authorized under Section 315 of the CZMA, which recognizes the significance of coastal resources and established the Coastal Zone Management Program and the NERRS to manage these resources for long-term conservation in partnership with the states. The GNDNERR was designated in 1999 as the 24<sup>th</sup> reserve in the NERRS. In 1973 the Mississippi Legislature also recognized the importance of Mississippi's coastal resources and passed the Coastal Wetlands Protection Act. Subsequently, the Mississippi Coastal Program (MCP) was established in 1980.

The GNDNERR is located on the Mississippi-Alabama state line in Jackson County, MS, about 30 miles east of Biloxi, MS and 30 miles southwest of Mobile, AL, and is part of the Grand Bay Savanna Complex, which is the largest area of intact coastal habitats in the state of Mississippi. The GNDNERR is co-located with the United States Fish and Wildlife Service's (USFWS) Grand Bay National Wildlife Refuge (GNDNWR) and the Grand Bay Coastal Preserve. The GNDNWR, as well as its acquisition boundary, extends into Alabama. There are lands in conservation acquired by The Nature Conservancy and Forever Wild lands within and adjacent to the acquisition boundary (Figure 2). *This area is the largest expanse of wild coastland in Mississippi and Alabama.*

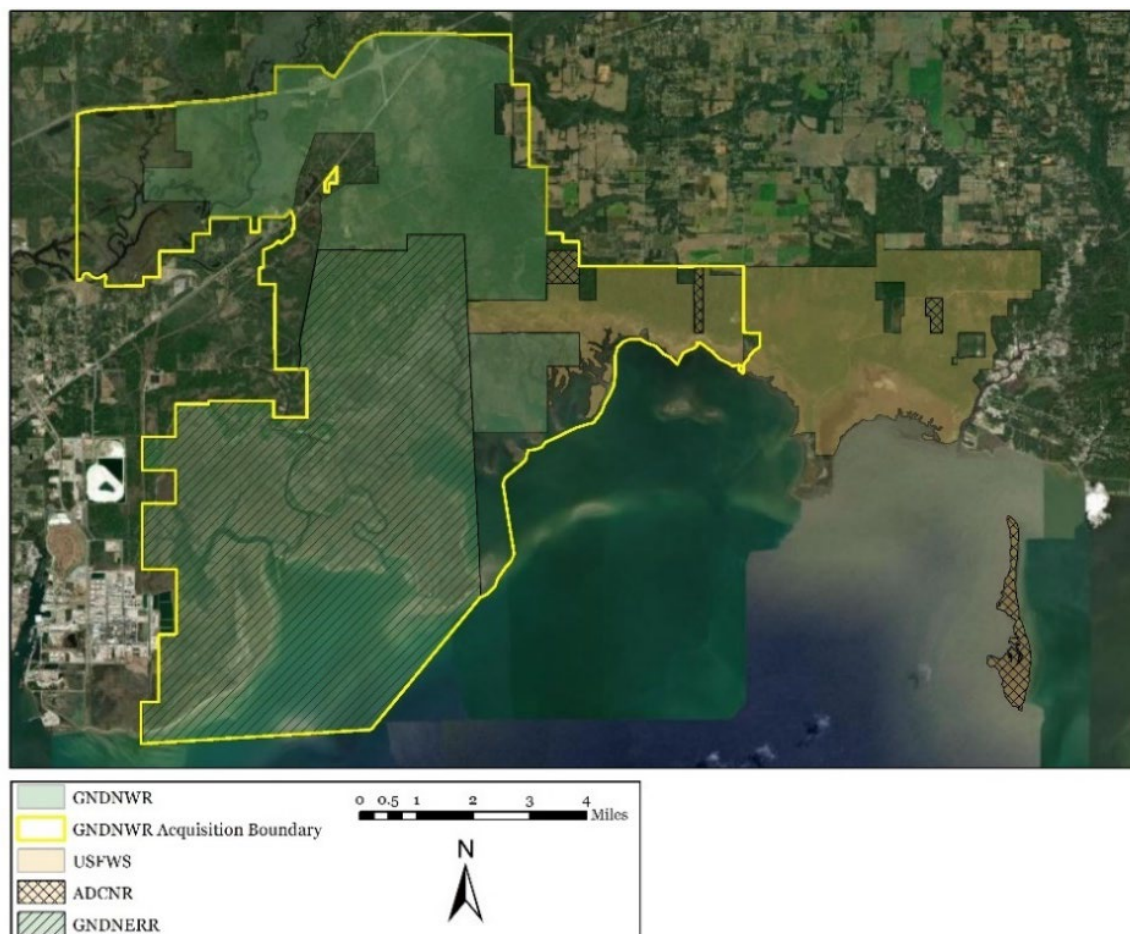


Figure 2. The GNDNERR vicinity map.



This large area is under conservation to protect the function of the Grand Bay estuary across both states. The main functions of the GNDNERR include habitat and nursery areas for fish and shellfish, areas for recreational and commercial fishing and hunting, protection of water quality, and flood protection. The following provides a basic description of aspects of the site, and additional details can be found in the Grand Bay Site Profile (Peterson et al. 2007). Primary reserve facilities, referred to as the Grand Bay Coastal Resources Center (CRC), are located on Bayou Heron Road, Moss Point, MS (Figure 3). The Grand Bay CRC houses staff for the GNDNERR, GNDNWR, USFWS' Coastal Program and Ecological Services, and Wildlife Mississippi.



Figure 3. The Grand Bay Coastal Resources Center.

The GNDNERR is representative of the Louisianan biogeographic region, within the NERRS biogeographical regions structure, and is in the Mississippi Deltaic subregion. No other reserve currently exists within the Louisianan region, which comprises portions of Texas, Louisiana, Mississippi, and Alabama west of Mobile Bay, although Louisiana is in the designation process. Designation of the GNDNERR did not establish new state or federal regulations or alter the traditional uses of the area. Current uses include boating, fishing, hunting, photography, bird watching, and other recreational activities. Waters are closed to oyster harvest due to water quality (bacteria levels), but other uses continue, with limited restrictions that may apply to significant habitats or other areas of special interests (e.g., facilities, trails) and in accordance with Mississippi and USFWS regulations.

### History and Local Management

The area around the GNDNERR has been of conservation interest since the early 1990s when the GNDNWR was established. The impetus for establishing the GNDNERR was local interest in the

conservation of rare wet pine savanna, wet pine flatwoods, and emergent marsh habitats, which have been dramatically impacted across the Mississippi coast. The parties involved in the designation included local landowners, conservation groups, federal, state agency and university personnel. These stakeholders followed the usual process to designate the reserve including a request from the Governor to NOAA and used vital habitat connectivity and synergy created by co-locating the reserve with the GNDNWR as rationale. The designation created a permanent partnership between the GNDNERR and the GNDNWR. The MDMR is the state partner and controls the management of the GNDNERR. The MDMR works in coordination with the GNDNWR.

Restoration efforts additional to current work have occurred north of the GNDNERR boundary, which have included land acquisition and structure removal, but none have occurred within the boundary. Just north of the GNDNERR boundary was a community along Pecan Road. After Hurricane Katrina in 2005, the houses in this community were bought out by the Army Corp of Engineers (ACOE) as part of the Mississippi Coastal Improvements Program (MsCIP) that aimed to stop recurrent losses from flooding in this area and gain the benefits of returning these homesites to a natural landscape. Some of the residents in this area were those who were instrumental in the establishment of the GNDNERR. The land acquired by ACOE through MsCIP was returned to the State of Mississippi and this area is currently part of an ongoing restoration project.

In April 2010, an explosion on the *Deepwater Horizon* led to the largest oil spill in the history of the Gulf Coast. Impacts to the GNDNERR were minimal in terms of direct oiling, however marsh scarring from response efforts including the use of booms, remain visible today. Funds from the *Deepwater Horizon* incident associated with the Natural Resources Damages Assessment (NRDA) are currently being used for the restoration and acquisition of additional habitat through the Grand Bay Land Acquisition and Land Management Project. The state's trustee, Mississippi Department of Environmental Quality (MDEQ), the Mississippi Trustee Implementation Group (MS TIG), USFWS GNDNWR, and the federal trustee, the Department of Interior, are all partners in this project. Restoration activities associated with this project occur in the GNDNERR, the GNDNWR, and on those state lands acquired through MsCIP and returned to state ownership. Recently, as part of this project, another small structure was removed in the Pecan area and several Jackson County parcels within this area (north of the GNDNERR boundary) were also transferred from county to state ownership and titled to the MDMR.

## Ecological Characteristics

### *Geography and Geology*

The GNDNERR lies within the gently sloping, lower Gulf coastal plain and was part of the previous deltas of the Escatawpa and Pascagoula rivers. The geomorphic evolution of this area is characterized by a long, complex sequence of events and processes evidenced by extensive marsh headlands and riverine scarring across the landscape. The Escatawpa River became a large tributary of the Pascagoula River through a process of stream piracy after the formation of the delta. As a result, the Grand Bay area is characterized as a retrograding delta with limited freshwater inflow and sediment load. Headland erosion of the delta front caused the development of flanking barriers referred to as the Grand Batture Islands and two open embayment areas, Grand Bay to the east and Point Aux Chenes to the west. The Grand Batture Islands are now eroded and mostly submerged. Sediment in the area consist of sands, silts, and clays of coastal and riverine origin. Sediment substrate of the marshes is rich in organic material and clays but also has a sizeable sand/silt component.

### *Hydrology*

The Grand Bay area is a shallow, estuarine area with an average water depth of approximately 0.9 m (3 ft). Water depths can range from zero at some low tides to 3.1 m (10 ft) in the channel connecting Point



Aux Chenes Bay with the Mississippi Sound. Average water depth in Bangs Lake and Middle Bay is less than 0.9 m (3 ft). Dominant water movement results from the flood and ebb of the tide except during heavy rain events when freshwater discharge from the bayous is significant. Both astronomical and meteorological tides influence the Grand Bay area. Astronomical tides are diurnal, i.e., usually one high and one low water per day with an average tidal range of approximately 0.6 m (2 ft). Tidal range fluctuates seasonally with a minimal range of 0-0.5 m (0-1.5 ft) during the winter months and a maximum range of 0.6-0.9 m (2-3 ft) during the summer months (Peterson et al. 2007). Because of the minimal tide range of the area, meteorological conditions often exert a strong influence on local tide levels, making this a wind dominated tidal system. Strong southerly winds push water into the area, exaggerating and often maintaining high water conditions. Strong northerly winds push water out of the area, exaggerating and maintaining low water conditions and often resulting in the exposure of large mudflats and sandy shoals.

Bayous Cumbest and Heron are the primary watercourses discharging into Point Aux Chenes Bay and the Grand Bay/Middle Bay complex, respectively. Both bayous are relatively small with slow flowing waters rich in tannic acid from their forested watersheds. Freshwater flow originates in large part from localized rainfall. Much of the reserve would be connected to the Escatawpa River watershed during moderate rainfall events by overland flows; however, this connection is interrupted by Highway 90 and the CSX Railway, which prevent sediment and flooding exchange between the river and the bay. The loss of connectivity is likely contributing to marsh erosion (due to restrictions in sediment flow in addition to sea level, wave action factors, see Threats and Stressors below) and degraded water quality that restricts oyster harvest (due to reduced water quantity contributing to high bacterial loads). Additionally, urban flooding frequency north of the highway may be increased due to restriction from natural drainage and this problem has an unknown extent, but likely extends into the city of Moss Point. Crucial hydrological and ecological processes are disrupted by infrastructure for this estuarine system.

### Water Quality

Reserve water temperatures recorded at the four current System-wide Monitoring Program (SWMP) stations ranged between a low of 1.8°C (35.2°F) in the winter to a high of 36.7°C (98.0°F) in the summer from 2005-2020. Average water temperatures at these sites ranged from 22.5°C (72.5°F) to 23.2°C (73.8°F). Salinity values vary along a gradient from bayou to bay and decrease with rainfall events. Salinity values have been recorded from fresh or oligohaline conditions (0.0-5.0 ppt) to polyhaline conditions (18-30+ ppt). Salinity is generally highest during the late fall to winter (November – December) and lowest during the early spring wet season (March – April). Median salinity across all SWMP stations from 2005-2020 was 20 ppt. Nitrogen, phosphorous, and chlorophyll measurements from reserve water quality stations are generally low (Figure 4).

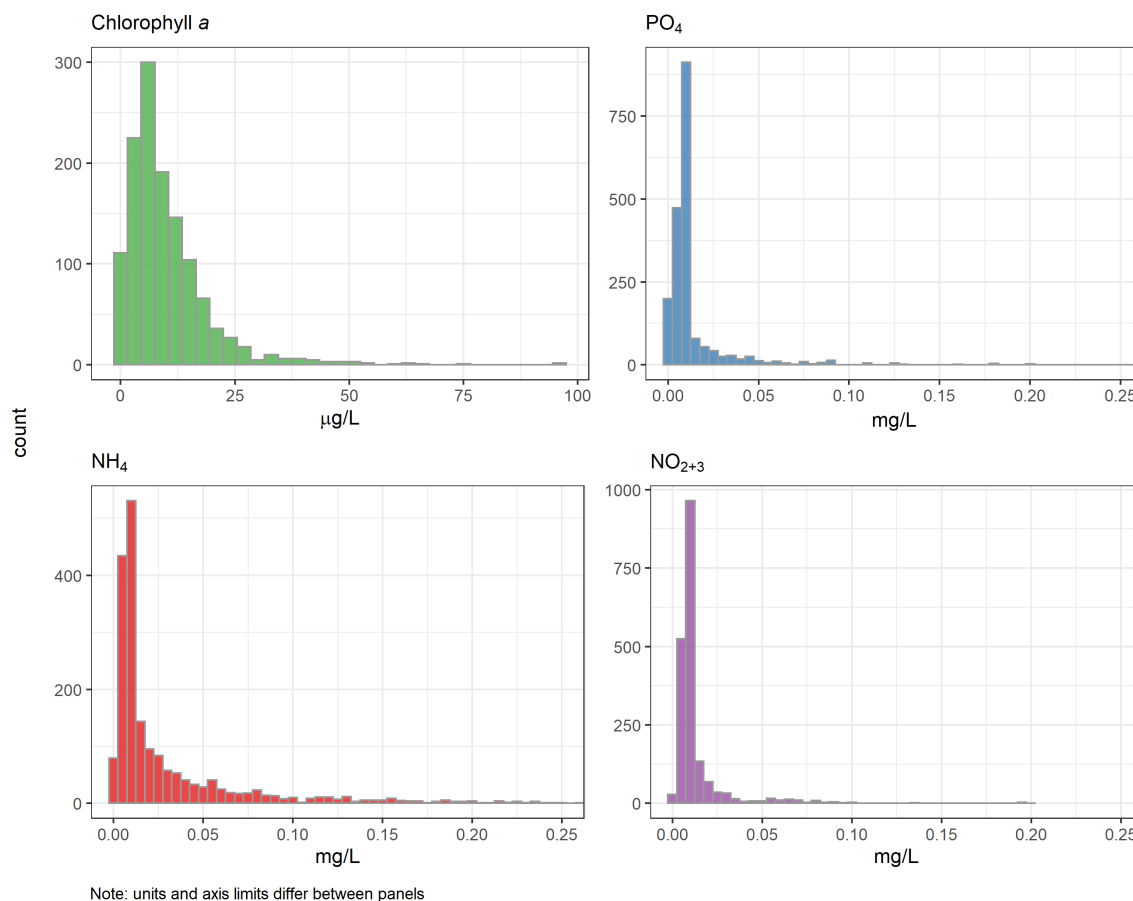


Figure 4. Distribution of measured chlorophyll *a* from 2011-2020, and other SWMP nutrients from 2004-2020. Nutrient values above 0.25 mg/L are rare and have been excluded from this plot.

### *Climate and Weather*

The Grand Bay area has a subtropical climate. The Bermuda High exerts the greatest influence on the climate of this area. During spring and summer when the Bermuda High intensifies, warm, humid, south, and southeast winds dominate. Wind speeds of spring and summer are generally less than those of fall and winter. Storms are common and result in heavy rainfall and violent storm conditions locally. During fall and winter, the Bermuda High diminishes in strength, allowing continental pressure systems and associated cold fronts to move south. During this time, the dominant winds are frequently from the north. Summer is hot and humid, characterized by afternoon thunderstorms. Average annual maximum temperature as reported from nearby Pascagoula, MS is 24.7°C (76.5°F) with July averages reaching 32.0°C (89.7°F). Winters are mild, with annual minimum temperatures averaging 14.7°C (58.5°F) and January averages at 5.8°C (42.4°F). Light freezes are common and hard freezes occur occasionally. Average annual rainfall is approximately 1.6 m (63 in). Extreme rainfall events may result in 0.25-0.76 m (10-30 in) of rainfall over a short period of time. Such events have caused major flooding on the nearby Escatawpa River. This flooding causes issues at the reserve, impeding vehicular access to the facilities and boat ramp.

Grand Bay is situated within an active hurricane zone. Hurricane season is from June through November with most hurricanes occurring during August and September. Eleven hurricanes have made landfall in

Mississippi since 1960 (Ethel – 1960, Camille – 1969, Bob – 1979, Frederic – 1979, Elena – 1985, Georges – 1998, Katrina – 2005, Nate – 2017, Gordon – 2018). The Grand Bay area is also frequently affected by tropical systems in the Northern Gulf of Mexico; most notably Rita in 2005 and Isaac in 2012. All these tropical events dramatically impacted the human and natural communities on the Mississippi Coast. The GNDNERR was most dramatically affected in August 2005 by Hurricane Katrina. Depth recorders measured a maximum water depth of 5.5 m (18 ft) at the reserve in Bayou Heron, a station where water depth is typically < 2 m (6 ft). The entire reserve and most of the surrounding landscape was flooded under several feet of water. Approximately 2.4 m (8 ft) of water destroyed the GNDNERR temporary offices during the storm. The planning for the permanent facility was underway at the time, and architectural plans were revised due to the storm. The building was elevated and redesigned to be more resilient to future storms. Impacts from hurricanes will provide continued disturbance to the landscape through flooding, erosion, storm surge, sediment deposition, direct and indirect species mortality, and debris. As the climate changes, it is expected that the emergent marshes will move landward with sea level rise (SLR), which is an impetus for wet pine savanna restoration in Grand Bay. Research from Grand Bay has suggested that landward movement of marsh may depend on the existence of grasslands versus an overgrown woody understory associated with unmanaged habitat (Hacker 2018). Other changes expected are increasing road flooding, which will impact access to the building and boat launch area. Some models describe the conversion of all emergent marsh to open water by 2100 (Alizad et al. 2018) and other models identify barriers to upslope marsh migration (Borchert et al. 2018).

## Biological Resources

### *Habitat Types*

The GNDNERR is composed of wet pine savanna, emergent marshes, maritime forests, salt pannes, and open water environments. These habitats are known for their diverse plant communities and the existence of rare bird species. Wet pine savanna is an ecosystem that has mostly been lost across the southeast United States, and few intact examples exist along the Gulf Coast. The emergent marshes are known to be important nurseries for juvenile fish among other important functions. Interconnected habitats are thought to enhance coastal water quality and support these critical ecosystem functions. The classification of habitat types within the reserve is reflected in our current habitat map that follows the NERRS habitat classification scheme (Figure 5).

The most common species in the emergent marsh is black needlerush. Wet pine savannas and flatwoods are composed of many species of herbaceous vegetation, several species of shrubs, and are interspersed with mostly slash pine trees. The most common animal species are fox squirrels, white-tailed deer, ospreys, bald eagles, black racer, green tree frogs, oak toads, cottonmouths, feral hogs, raccoons, Gulf Coast box turtles, and alligators. Henslow's sparrows occur in the reserve along with many other rare birds. The listed species within the GNDNERR includes West Indian Manatee, Piping Plover, Red Knot, Wood Stork, Alabama Red-bellied Turtle, Gopher Tortoise, Hawksbill Sea Turtle, Kemp's Ridley Sea Turtle, Leatherback Sea Turtle, Loggerhead Sea Turtle, and Atlantic Sturgeon. Of these species, we have some likelihood to encounter are Alabama Red-bellied Turtle and Gopher Tortoise.

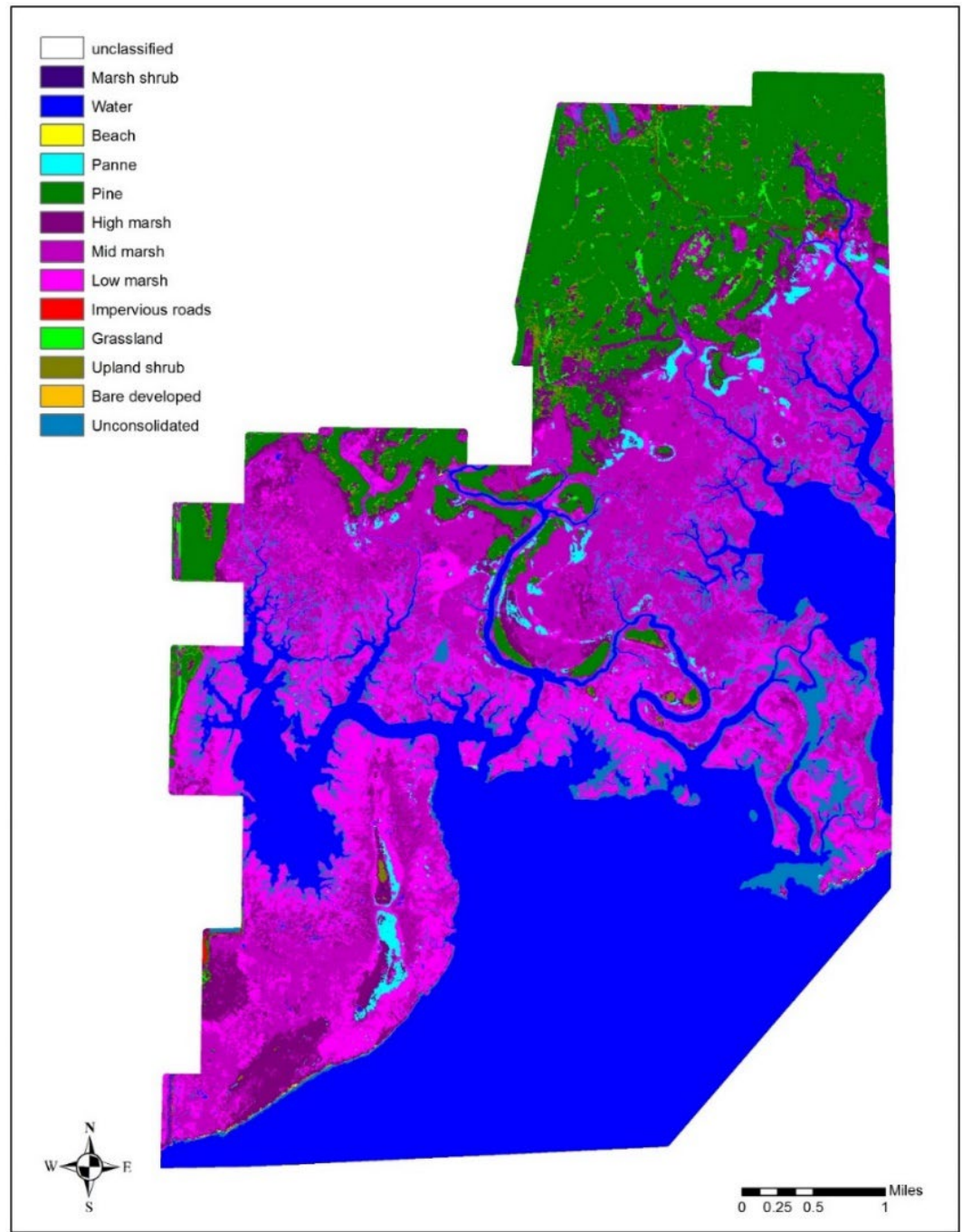


Figure 5. GNDNERR habitat map.

### Socioeconomic Attributes

#### *Population Demographics*

According to U.S. census data, the human population in the zip code of the reserve (39562) was 17,912 in 2020. The median age was 46 and the median household income was \$50,833 with 17.5% of the population living at or below the poverty level as compared to the national average of 11.4% (U.S. Census Bureau 2020; 2020 American Community Survey (ACS)). The median home value was \$138,500 and 83.5% of homes were owner occupied (2021 ACS). Median gross rent was \$840 (2021

ACS). There were 149 businesses in the area code in 2020 (2020 Economic Surveys Business Patterns). In 2017, in Jackson County, 33% of the total jobs were related to the ocean (NOAA OCM Economics: National Ocean Watch), and 25.4% of jobs were related to tourism and recreation.

### *Archaeological and Cultural Resources*

The reserve contains archaeological and cultural resources, including most notably, the shell middens. There are more than 16 shell middens in the reserve that are of various ages ranging from the relics of the recent past to ancient shell middens. These middens exist in many locations across the reserve. Archaeological study of these middens has revealed artifacts from 100 years to 5,000 years old (Huey 2014). The reserve collaborates with the state historic preservation office if any use or impact to these areas is anticipated by any project, but there are no ground disturbing activities occurring in these locations and protection of these cultural resources is among the goals of the reserve.

### Threats and Stressors

#### *Natural and Anthropogenic Stressors*

A variety of threats and stressors are impacting the habitats at the reserve. Most notably is the shoreline retreat Grand Bay experiences as a retrograding delta which may be exacerbated by wave action and SLR. An analysis of shoreline change from 1848-2017 was conducted by the United States Geological Survey (USGS) in partnership with the GNDNERR using our ongoing erosion monitoring data. Wave action and SLR-related erosion leads to the loss of marsh edge with a loss of up to 2.00 – 6.55 m a year in some areas (Figure 6; Terrano et al. 2019).

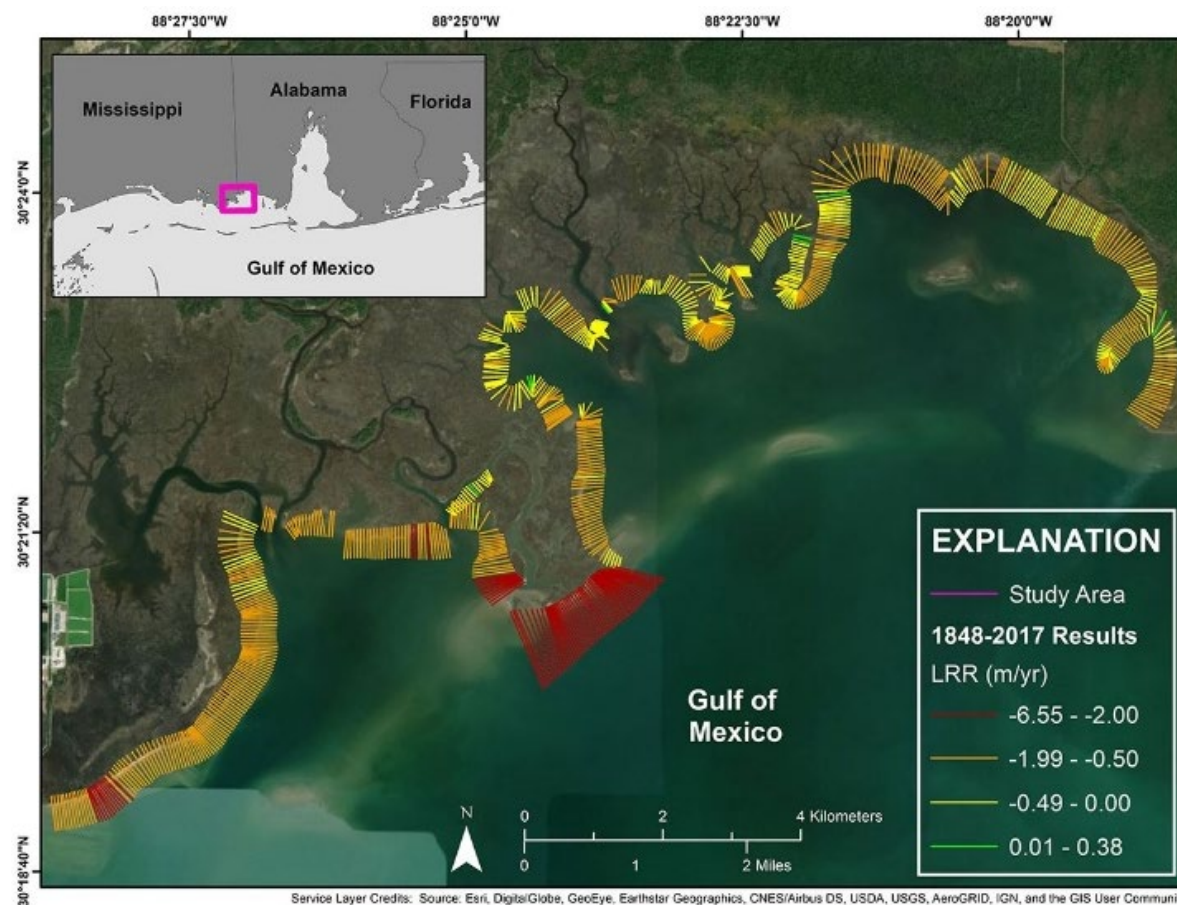


Figure 6. Shoreline change analysis (Terrano et al. 2019).



An analysis of surface elevation table (SET) data from 2012 – 2016 suggests that marshes in Grand Bay are experiencing varied responses to SLR along the elevation gradient (Pitchford et al. 2022). Generally, marshes lower in the estuary are increasing in elevation at higher rates than marshes higher in the estuary. Comparisons of elevation change rates with long-term SLR rates (1966 – 2016: 3.5 mm/yr) generally suggest that GNDNERR marshes are keeping pace with SLR; however, comparisons with short-term SLR (1998 – 2016: 6.97 mm/yr; Sweet et al. 2017) suggest marshes may not be keeping pace (Smith et al. 2021).

Invasive species are also impacting the marshes and upland areas of the GNDNERR, mostly feral hogs. Tracks and vegetation damage have been traced to the hogs in several locations. Invasive plant species also impact the landward wet pine savanna, including Cogongrass, Chinese tallow tree, Japanese climbing fern, and others. However, the largest impact to the wet pine savanna is the lack of fire. Fire suppression leads to the overgrowth of the understory and the degradation of the diverse wet pine savanna plant community.

Contaminants are anthropogenic stressors in the reserve, although conditions have dramatically improved since 2017 (see below). The Bayou Casotte Industrial Complex, which contains the Chevron Pascagoula Refinery, Chemours Chemical Plant, and the defunct Mississippi Phosphates fertilizer facility, is found to the west of the GNDNERR. Mississippi Phosphates began making fertilizer in the 1950s. The manufacturing process resulted in large mounds of phosphogypsum waste, known as gypsum stacks. The west gypsum stack was capped in 2002, when the newer east stack became active (Garrard 2016). The east gypsum stack has caused multiple wastewater inputs into GNDNERR via Bangs Lake. Phosphogypsum and associated process wastewater are known to be acidic (pH ~2.4) and high in nutrients including phosphate and ammonia (Garrard 2016). In 2005, a breach in the dike around the wastewater pond at the east gypsum stack caused 17.5 million gallons of this wastewater to be discharged into nearby waterways. An unknown amount of this reached Bangs Lake, dropping pH at the sampling station to 3.7 from a typical range of 7-8 and causing more than \$2 million in damage by killing fish, shellfish, oysters, and vegetation in the area (Viskup 2005; State of Mississippi 2008; Beck et al. 2018). A large algal bloom also developed in Bangs Lake. A new nutrient monitoring station in North Bangs Lake was established and the water quality datalogger in Bangs Lake was connected to telemetry following these events. As a result of the 2005 spill and subsequent Agreed Order with MDEQ, Mississippi Phosphates Corporation began to enact better management practices, such as having more pH-neutralizing chemicals on-hand.

Following Hurricane Isaac in 2012, phosphate concentrations in Bangs Lake again rose to problematic levels (>1 mg/L measured by GNDNERR and 7 mg/L measured by Darrow 2015), though there were no fish kills. Phosphate concentrations slowly decreased over several months but remained above baseline concentrations for more than two years (Beck et al. 2018). In 2014, Mississippi Phosphates Corporation filed for Chapter 11 Bankruptcy, and ceased fertilizer production in December 2014. Minimal staff were kept on-site to manage wastewater operations. In February 2017, the Environmental Protection Agency (EPA) took over operations of the site, and in January 2018, the site was added to the Superfund National Priorities List (EPA 2021). Capping of the east gypsum stack started in October 2018 and has been completed (D. Shirley, pers. comm.). Phosphate levels in Bangs Lake are near zero and the risk of catastrophic spills has been dramatically reduced if not eliminated.

The other areas adjacent to the reserve are sparsely populated but where a population exists, treatment and disposal of domestic wastewater is dependent on individual septic systems. Potential problems with residential wastewater, the risk of industrial sources to the east, other industry and shipping from the Bayou La Batre and Mobile Bay, AL area, and natural levels of bacteria in the waters may contribute to degraded water conditions. Area VIII oyster-growing waters within the reserve are currently classified as

“prohibited”. Even though the growing water classification is listed as “prohibited”, the origin of periodic high bacteria levels is unknown. National Pollutant Discharge Elimination System (NPDES) permits at the MDEQ indicated that most point source discharges from the adjacent industrial sites are located and discharged to the west of the GNDNERR and do not impact the site directly (Coastal Environments, Inc. 1992). As of December 2020, no active NPDES permits listed on the MDEQ website regulate discharges into any tributaries of reserve waters. As of September 2022, a graduate research assistant funded by the Margaret A. Davidson fellowship has been working on bacterial source tracking in the GNDNERR to better understand contaminants.

Management efforts in the reserve focus on restoring landscape connectivity, understanding shoreline retreat, reduction of invasive species, reintroduction of fire, and understanding and mitigating impacts from contaminants.

### *Climate Change Phenomena and Impacts*

Several studies have looked at the expected environmental changes in the reserve, notably from SLR and climate change (Enwright et al. 2015, Wu et al. 2017; Borchert et al. 2018; Alizad et al. 2018). There are anticipated changes with the position and extent of emergent marsh from these studies, including transition to open water and upslope retreat of emergent marsh. The GNDNERR Sentinel Site work is evaluated periodically to understand and assess changes associated with increases in water levels across several marsh types in the reserve. Collaboration with these researchers from USGS, USM, and the Ecological Effects of Sea Level Rise project includes work to understand how mitigative actions (e.g., shoreline protection, barrier island nourishment, infrastructure revision, etc.) might influence the outcome for marshes. Management actions are being assessed in detailed workshops with researchers and stakeholder partners as part of this management plan. Although resurfacing of Bayou Heron Road in 2018 improved flooding frequency in some areas, increased road flooding along Bayou Heron Road and at the boat launch is common. The reserve includes road flooding in emergency management procedures. The CRC is in a higher area that is not expected to flood except with the most intense storm surges, however access to the center is restricted routinely during flood events. Sea level rise will likely increase flooding events especially south of the CRC at the boat ramp. Additionally, climate driven SLR drives upslope migration of marsh and physical barriers (i.e., HWY 90 and CSX infrastructure) are recognized as restricting upslope migration and reducing ecosystem function (Enwright et al. 2015). Alizad et al. (2018) indicates that the area of the CRC will be flooded in 80 years.

## Reserve Boundary

### *Boundary Map*

The administrative boundaries of the GNDNERR include lands and waters in southeasternmost Jackson County, MS (Figure 7). Of the 18,063 acres within this boundary there are 2,576 acres of private inholdings and 15,487 acres of public lands and waters. The reserve includes Middle Bay, Point Aux Chenes Bay, Bayou Cumbest, Crooked Bayou, Bayou Heron and associated coastal wetland habitats and selected portions of tidal and non-tidal habitats including lands and waters. It is bounded on the east by the waters of Grand and Middle Bay, and Bayou Heron on the Mississippi-Alabama state line, on the west by Bangs Lake bordering the Bayou Cassotte Industrial Park, on the north by the communities of Bayou Cumbest, Pecan, Kreole and Orange Grove and on the south by the Mississippi Sound. There have been no changes to the reserve boundary since the last management plan update, although some parcels (937 acres) within the boundary that were formerly privately owned now belong to the reserve.

### *Core and Buffer*

The core area of the GNDNERR is comprised of approximately 13,334 acres of estuarine tidal marsh, tidal creek, shallow open-water habitats, oyster reefs, sea grass beds, maritime forest (pine, live oak),

salt pannes, sandy beach, shell beach and shell middens (see Figure 5). The remaining lands of the GNDNWR serve as a functional buffer, including state lands which are within the GNDNWR boundary but outside of the GNDNERR boundary. Additionally, other functional buffers in the vicinity include GNDNWR lands in Alabama, a Mississippi Phosphates Mitigation Bank and a Jackson County Mitigation Bank (included in Figure 7), all located to the north of the GNDNERR buffer area.

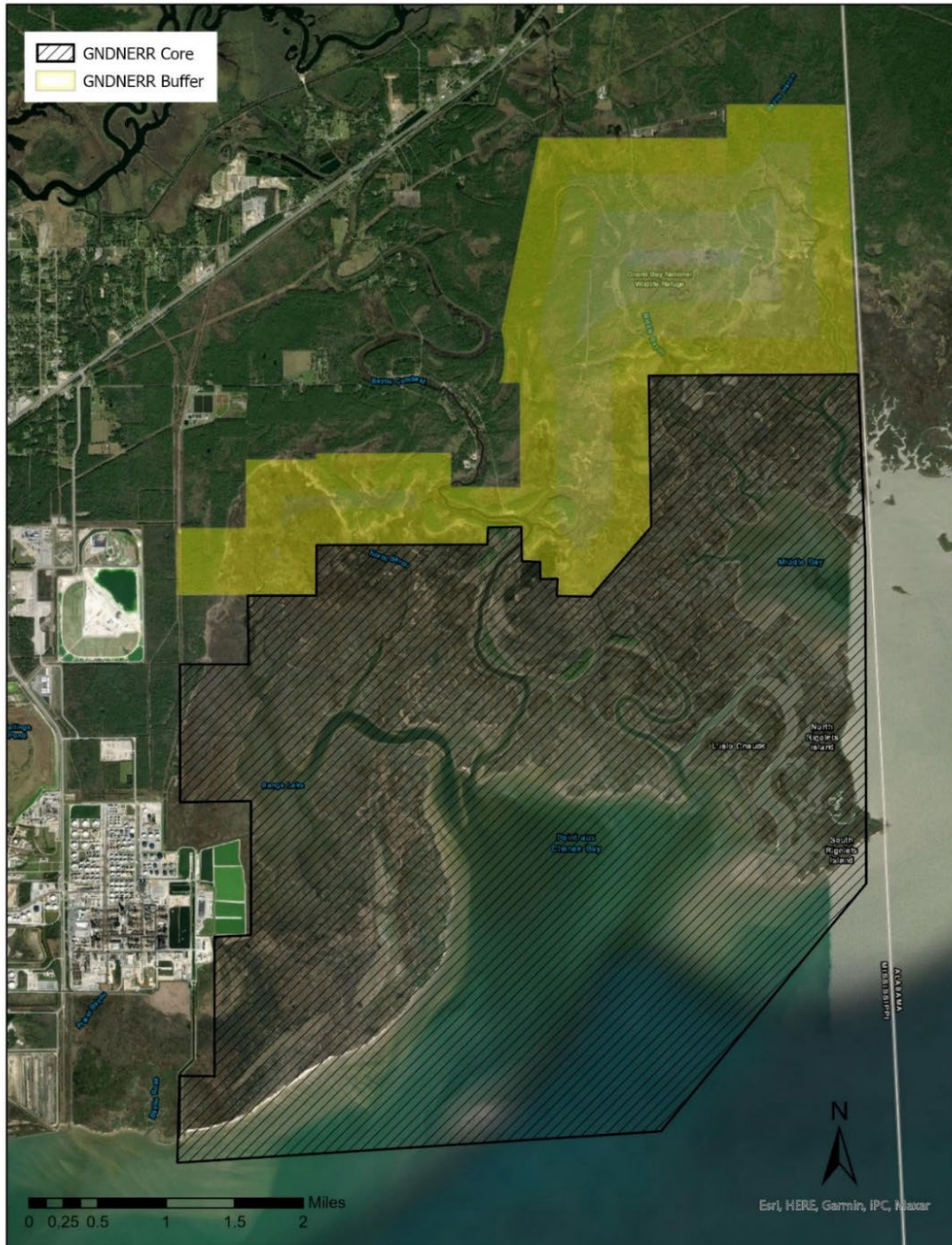


Figure 7. The GNDNERR boundary map with core and buffer.



### Land Ownership and Land Use Type

Property ownership within the reserve boundary is state, federal, and private (Figure 8). There are many private parcels among the parcels in public ownership. Land use for most of the private parcels is housing, small businesses, or unmanaged lands. There is a privately-owned shooting range south of the reserve facility on Bayou Heron Road and a bait shop at the Bayou Heron Boat Launch. There is also a county boat launch, private boat launch and camping facility, and a limited number of houses on Bayou Cumbest.

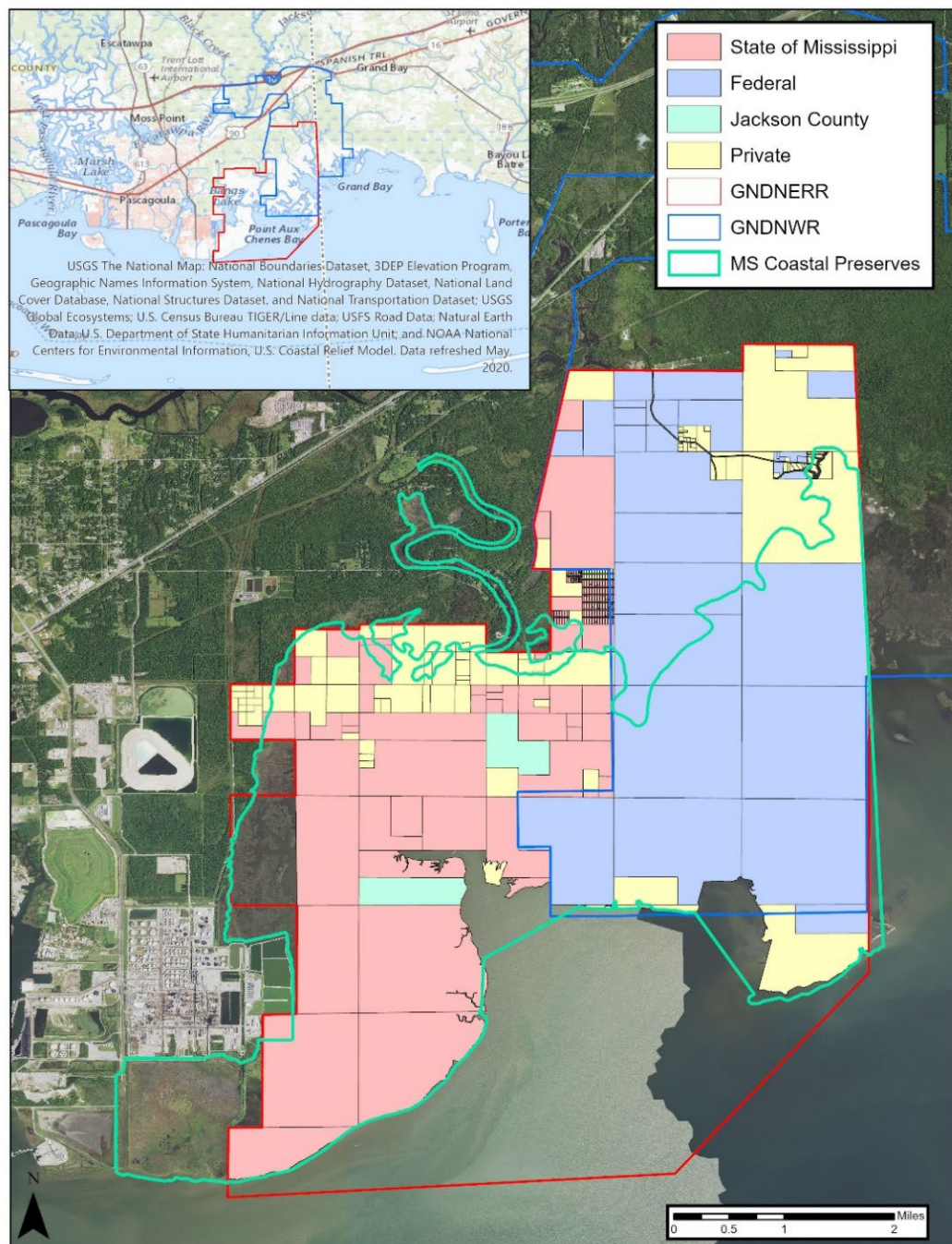


Figure 8. The GNDNERR and MDMR Coastal Preserves boundaries and property parcel ownership information.

### *Targeted Watershed Boundary*

The reserve's watershed boundary is based on the subwatershed affecting the lands within the reserve boundary and our local community; HUC 03170009, HUC 03170008, and HUC 03170006, have been identified to the Central Data Management Office (CDMO) and OCM as the targeted watershed for GNDNERR (partially shown in Figure 9). The watershed boundary is impacted by Highway 90 and the CSX railway that disconnects the reserve from the Escatawpa River. There are efforts from GNDNERR and ACOE to evaluate the disconnect, its impacts, and potential restoration of the landscape connection between the river and the estuary.

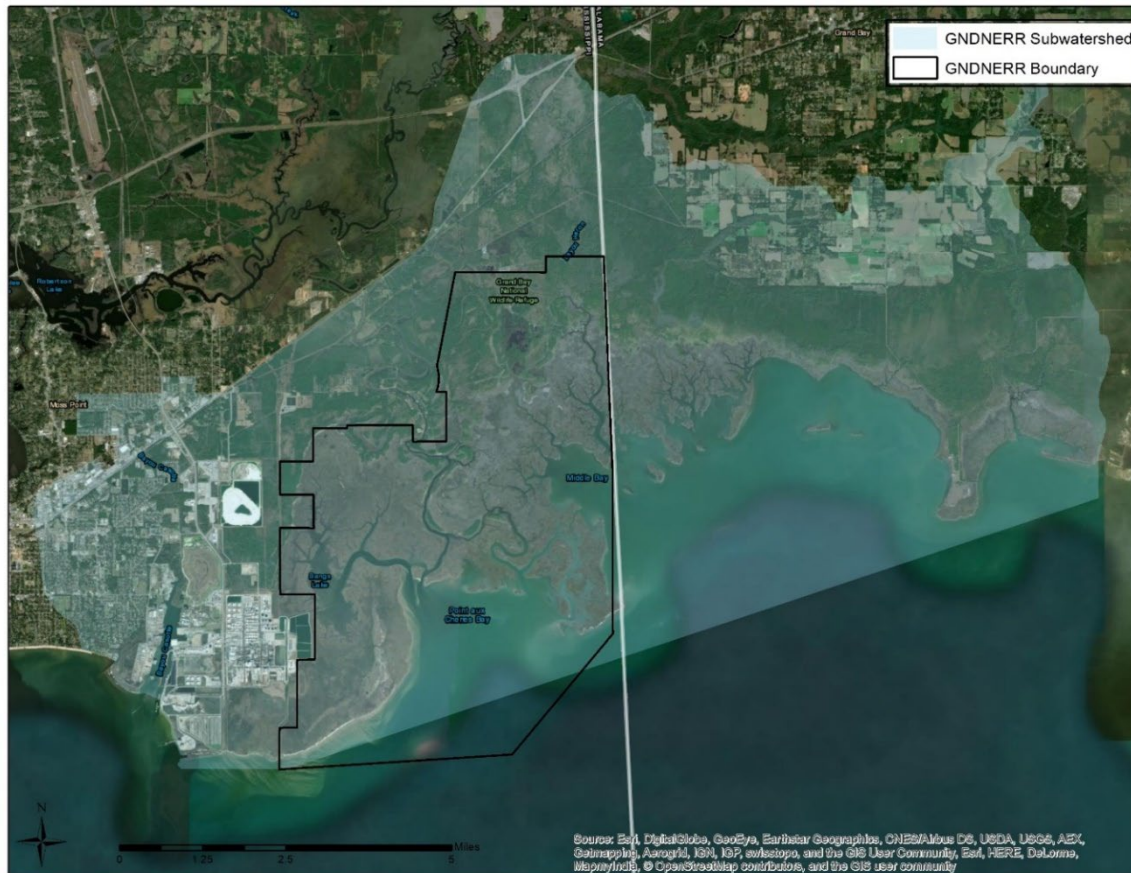


Figure 9. The GNDNERR with part of one targeted watershed boundary.

## Grand Bay National Estuarine Research Reserve Strategic Plan

The GNDNERR staff worked together to determine a vision, mission, and five goals as a framework for addressing the priority issues at the reserve. All reserve program sectors will work within this strategic planning framework. Each sector will identify specific actions associated with each goal, which will guide our pursuits. The sectors are identified as follows: A, Administration; R, Research and Monitoring; S, Stewardship; E, Education; and, CTP, Coastal Training Program.

### Reserve Vision

**Our vision is to inspire our community to value, support, and practice ecosystem conservation.**

### Reserve Mission

**The GNDNERR is a leader in science and outreach, in service to our community.**

### Reserve Priority Coastal Management Issues

- Wetland conservation
- Ecosystem restoration
- Water quality protection
- Cultural resource protection
- Understanding ecosystem function, including fisheries and human values
- Understanding contamination (point and non-point source pollution)
- Improved coastal management
- Outreach and education

### Reserve Goals, Objectives, and Actions

#### ***Goal 1: Systematically collect quality data and answer relevant questions that inform management***

**Objective 1.1: Systematically collected data informs our understanding of Grand Bay NERR ecosystems (flora, fauna, and ecological conditions) (R, S, E, CTP)**

Action: Conduct quantitative monitoring of Grand Bay's flora, fauna, and ecological conditions

Action: Collect qualitative data to address specific questions of GNDNERR's flora, fauna, and ecological conditions

Action: Maintain infrastructure and equipment, for both field and lab needs; and upgrade as necessary

Action: Develop and implement a data management framework

Action: Develop periodic summaries of data for target audiences

Action: Analyze and interpret monitoring data to answer relevant questions to support management needs

Action: Work with MDMR and partners to ensure that long-term monitoring efforts are supported with trained personnel

Action: Actively mentor intern and student researchers



Action: Seek opportunities to weave reserve-generated data into other national monitoring networks

Action: Disseminate data and research conclusions through workshops and research symposia

**Objective 1.2: Systematically collected social science data improves our understanding of GNDNERR resource uses, users, and human values over time (R, E, CTP)**

Action: Determine social science indicators to track over time

Action: Develop and implement a data management framework

Action: Develop periodic summaries and communications of data for target audiences

Action: Use data to enhance the reserve's existing activities, products, and services

Action: Work with partners to develop proposals and projects that incorporate use of social science data

**Objective 1.3: Reserve monitoring data analyses are used to answer relevant management questions and form future questions (R, S, E, CTP)**

Action: Develop relevant questions based on management priorities

Action: Use analyses of reserve data to address resource management questions

Action: Form future questions based on results and management applications

Action: Create products to share knowledge (e.g., summaries, peer-reviewed publications, newsletter articles, social media materials, curricula)

**Objective 1.4: Researchers and others can easily access reserve data and collaborate (all)**

Action: Disseminate quality information to improve management of resources through the GNDNERR website, CDMO, and providing GNDNERR data (referenced in Objective 1.1 above) by request

Action: Provide consistent access to reserve monitoring data to students, researchers, and managers

Action: Keep NERRS Research Database and GNDNERR Publication List updated and track the number of active research projects occurring in the reserve each year

Action: Reserve staff provide opportunities for researchers to collaborate on reserve management questions or issues

Action: Write and/or co-author grant proposals, scientific publications, and technical reports with external researchers and partners

**Objective 1.5: External researchers conduct projects that contribute information to supporting reserve management priorities (R, S)**

Action: Support external research by providing staff assistance and facilities to outside researchers interested in working at the GNDNERR

Action: Reserve research priorities are communicated to external researchers

Action: Promote reserve capabilities and research opportunities to researchers at external events, conferences, and at regional universities and colleges

**Objective 1.6: Reserve-specific data and scientific knowledge comprise 50% of reserve's outreach programming (E, CTP)**

Action: Develop new reserve science-based outreach programs focused on GNDNERR management priorities, e.g., ecosystem restoration, water quality and weather, marsh vulnerability to sea level rise, fire ecology, and bird populations

Action: Integrate reserve-specific data and scientific knowledge into existing outreach programs

Action: Reserve data is translated to support outreach programs

Action: Visual aids for target audiences are developed using reserve data and knowledge

***Goal 2: Conserve, restore, and manage natural resources to improve ecosystem function and protect cultural resources***

**Objective 2.1: Propose and obtain new projects to restore and manage natural resources to improve ecosystem function (R, S)**

Action: Coordinate with partners to develop proposals, fund and manage new projects

**Objective 2.2: By 2023, land management activities occur on at least 1,000 acres of land within the GNDNERR/GNDNWR to improve ecological function of upland habitats (S)**

Action: Staff coordinate with NRDA partners to strategically implement land management activities funded by the NRDA Project

Action: Implement land management activities to improve ecological functions on upland habitats, such as mechanical clearing, herbicide treatments, and prescribed fire

Action: Staff vary land management treatments to test relevant hypotheses about restoration

**Objective 2.3: Private lands are acquired from willing sellers and effectively managed/restored (S)**

Action: Work with partners on identifying appropriate target parcels and supporting activities associated with land acquisition

Action: Annually, the reserve evaluates and revises (if necessary) land acquisition plans

Action: Create mapping products to support land acquisition and restoration planning

Action: Reserve staff track land acquisitions, science needs/priorities, and develop restoration and/or management plans for newly acquired lands

**Objective 2.4: Effectiveness monitoring of restored reserve habitats evaluates changes in ecosystem function (R, S)**

Action: Staff coordinate monitoring activities with restoration project partners

Action: Pre- and post-monitoring plans are developed and implemented for restoration projects within the GNDNERR/GNDNWR

Action: Staff use monitoring data and analyses to identify changes in ecosystem function

Action: Staff report on methods and results of effectiveness monitoring in the form of presentations, reports, and peer-reviewed publications

Action: Changes in management actions are evaluated based on conclusions from effectiveness monitoring data

**Objective 2.5: Coastal managers and researchers are knowledgeable about GNDNERR's natural resource management actions and changes to ecosystem function due to restoration (all)**

Action: Coordinate and share natural resource management activities and results about changes in ecosystem functions of restored coastal ecosystems to partners

Action: Solicit partnerships to conduct research and leverage land management work

Action: Staff actively participate in the broader scientific conversation through society memberships, stakeholder meetings, workshops, and/or conferences where they share protocols, data, and knowledge with peers at least annually.

Action: Conduct training workshops to share management activities and results from the GNDNERR/GNDNWR

**Objective 2.6: Conserve cultural resources and provide information on anthropogenic uses of the Grand Bay estuary (all)**

Action: Coordinate with partners to conserve and protect cultural resources

Action: Should land management activities occur with federal funds the GBCC will be strategic partners in the planning and implementation

***Goal 3: Build community connections and relationships to share understanding of coastal ecosystems and inspire people to protect them***

**Objective 3.1: Increase Coastal Mississippi and Alabama citizens with knowledge of GNDNERR and its work (all)**

Action: Implement GNDNERR-specific and general estuarine science programming to targeted audiences and communities

Action: Plan and conduct K-12 and adult classroom and/or field-based programs on relevant coastal resources and resource management

Action: Conduct science-based community events to promote conservation of GNDNERR resources

Action: Collaboration with Friends of the Grand Bay NERR increases volunteer participation

**Objective 3.2: Broaden reserve visitors' knowledge of Grand Bay ecosystems (all)**

Action: Engage visitors through dynamic interpretive center displays and kiosk surveys to gain feedback on experience

Action: Implement citizen science programming to involve the local community in reserve activities

Action: Create new visitor experiences such as new trails (e.g., pollinator garden) with interpretive signs and materials

Action: Develop interpretive materials for distribution

**Objective 3.3: Inspire people to act on coastal conservation issues (all)**

Action: Enhance the visitor experience by removing trash and debris on public trails, roadsides, and waterways

Action: Train and manage volunteer workforce in coordination with the Friends of the Grand Bay NERR

Action: Purposefully incorporate volunteer activities into new projects and programs when possible

Action: Staff engages with visitors to inspire interest and ownership in conservation and conservation action in communities

#### Objective 3.4: Students and groups participate in programs at the GNDNERR that inspire and teach environmental leadership (E, CTP)

Action: Incorporate middle schools and high schools of local communities into education activities

Action: Develop opportunities for students and volunteers to gain experience in leadership roles

Action: Conduct at least one Teacher's on the Estuary (TOTE) professional development workshop per year

Action: Develop and strengthen connections with local communities using advisory boards and committees

Action: Annually, staff implement thirty (30) K-12 education and training programs focused on coastal ecosystems

#### Objective 3.5: Partners work with GNDNERR to enhance the understanding and conservation of coastal resources (all)

Action: Expand reserve training and outreach efforts to new targeted CTP audiences (e.g. real estate agents, developers, businesses) and broaden reach into the communities in Hancock, Harrison and Mobile counties.

Action: Staff establish and maintain partnerships with the research community and resource managers

Action: Staff inform national, state, and local elected and/or appointed officials about reserve mission and goals

Action: Staff participate in regional partnerships such as Gulf of Mexico Alliance (GOMA) or GNDNERR regional partnerships

Action: Create a collaborative atmosphere where existing and future partners, community businesses, organizations, and citizens work towards shared or common goals

Action: Staff work in partnership with local communities and technical experts to expand use of green infrastructure to alleviate stormwater flooding issues

#### Objective 3.6: The Grand Bay Community Collaborative (GBCC) contributes to the management of the reserve (A, CTP)

Action: Regular GBCC meetings provide opportunities to inform partners about reserve actions and priorities and solicit feedback and direction

Action: Reserve staff communicate to and receive feedback from GBCC members

Action: Hold meetings of the GBCC each year

Objective 3.7: The GNDNERR is recognized as a reliable source for experts in natural resource science and land management, relevant scientific tools, and current scientific information (all)

Action: Staff lend their expertise to partners working on similar issues in natural resource science, land management, monitoring, outreach, or other relevant areas

Action: Staff continually participate in professional development trainings, workshops, and conferences

Action: Staff conduct research and effectiveness monitoring projects to better understand the Grand Bay ecosystem

Action: Staff publish results from research and monitoring projects as summary reports and peer-reviewed publications

#### ***Goal 4: Communicate efficiently and effectively***

Objective 4.1: Staff demonstrate their ability to effectively communicate using established platforms (all)

Action: Update and maintain reserve signage, promotional materials, and field guides

Action: Update and maintain reserve website

Action: Reserve social media platforms are updated and maintained

Action: Effectiveness of website and social media presence is evaluated using analytics

Action: Staff participate in communication trainings to build skills

Action: Periodically evaluate whether there are opportunities to improve communication

Objective 4.2: Reserve audiences promote community awareness and stewardship of coastal resources (all)

Action: The GNDNERR staff disseminate quality scientific information and data to external audiences through events, workshops, projects, and partnerships

Action: Scientific outreach information disseminated by GNDNERR staff to local communities has been reviewed by Science staff for accuracy based on current knowledge

Action: Ensure two-way communication between the community and the reserve by establishing pathways to hear from community (e.g., surveys, feedback forms, solicitations)

Action: Use a variety of communication platforms to reach external audiences (e.g., signage, promotional materials, field guides, newsletters, website, social media)

#### ***Goal 5: Streamline administrative functions***

Objective 5.1: Staff meetings effectively communicate and coordinate GNDNERR activities and events (A)

Action: Hold regular briefings and provide meeting minutes to update staff, make announcements, share schedules, and coordinate equipment and facilities use

Action: Hold Coordinators, Outreach, and Science meetings to coordinate team activities

Objective 5.2: The GNDNERR administration works directly with MDMR to have ample fiscal and human resources to accomplish its mission and goals (A)

Action: Streamline communication pathways to accomplish administrative tasks



Action: Communicate administrative decisions to relevant staff as needed

**Objective 5.3: Facilities are managed and maintained in optimal conditions (A)**

Action: Implement annual maintenance agreements and schedule regular maintenance, including building inspections every five (5) years

Action: Reserve staff identify ways to improve how infrastructure is managed and maintained

Action: Prepare for an aging building, vehicles, and vessels with renovation and fleet planning

Action: Protect facilities, infrastructure and employees from weather and wildland hazards

Action: Maintain, repair, and upgrade facilities and infrastructure

**Objective 5.4: Emergency planning and management activities are coordinated with MDMR (A)**

Action: Update and exercise disaster response and recovery planning

Action: Work with MDMR on emergency management and recovery

**Objective 5.5: The GNDNERR has administrative tools (general office equipment, budget tracking processes, office manager) to accomplish mission and goals (A)**

Action: Use pre-planning for annual activities to refine budgets

Action: Update office equipment as needed

Action: Work with MDMR finance department to track spending

Action: Create Office Manager position to help with financial processing, facilities maintenance contracts, and large-scale procurements

## Program Foundations – Science and Outreach

### Science Program: Research, Monitoring, and Stewardship

#### Research and Monitoring

Reserves are created to provide a stable platform for long-term research on estuarine conditions and relevant coastal management issues. The SWMP delivers standardized measurements of short-term variability and long-term changes in water quality and biological systems, and maps land use and land cover characteristics across all reserves. The effort is focused on three ecosystem characteristics: abiotic characteristics (water temperature, salinity and quality, and weather); biotic characteristics (habitat types and species); and watershed and land use characteristics (land cover, hydrology and elevation changes). Reserve-generated data meet federal geographical data standards and are available via the Reserve System's CDMO. Reserves also serve as sentinel sites for observing how coastal habitats respond to changing water levels. This program is guided by the reserves' System-wide Monitoring Program Plan, the Reserve Habitat Mapping and Change Plan, and Sentinel Sites Guidance.

The Reserve System also supports applied research through its Science Collaborative program and the Margaret A. Davidson Graduate Fellowship program. The Science Collaborative funds competitive research projects that engage end-users in the project design and address system-wide NERRS research and management needs. The goal of the Davidson Fellowship is to build the next generation of leaders in estuarine science and coastal management. Appendix 2 provides a comprehensive list of fellows at the GNDNERR since 1999. The fellowship provides opportunities for graduate students to conduct research within a reserve under the guidance of a mentor who also supports their professional development. The Reserve System Strategic Plan outlines research objectives to maintain and expand biophysical and socioeconomic monitoring to track environmental change, increase the use of collaborative research to address decision-maker needs, and ensure that scientific, education, and management audiences can use the data, research results, and tools developed by the system.

#### Research

##### *Research Program Context*

##### *Setting and Context*

The GNDNERR serves as a living laboratory for on-site staff, visiting scientists and graduate students who study coastal ecosystems, including wet pine savanna and emergent tidal marsh. The area within the GNDNERR and GNDNWR has been a platform for long-term research and monitoring for more than 20 years. The GNDNERR has been involved in the NERRS Sentinel Site Program since 2011, which is focused on understanding the impacts of climate change on estuaries. Also, because Grand Bay is an intact estuarine to upland ecosystem, the GNDNERR is used as a reference site for many research projects. More recently, the Grand Bay watershed has been selected for NRDA projects resulting from the *Deepwater Horizon* oil spill. This includes the NRDA Grand Bay Land Acquisition and Habitat Management Project and Restoring Subtidal and Intertidal Reefs in Mississippi Estuaries, part of NRDA Phase IV Early Restoration.

The GNDNERR research sector has evolved since the designation of Grand Bay in 1999. Prior to designation, very few research efforts were conducted within the reserve boundaries or vicinity. The GNDNERR now supports on average, approximately 15-20 discrete research and monitoring projects annually. Nearly 200 projects have taken place at GNDNERR over the past 20 years, resulting in 197 peer-reviewed publications (129 journal articles, 55 theses/dissertations, 5 book chapters, and 8 technical reports; Appendix 3). The GNDNERR Ecological Characterization, or Site Profile, includes a basic overview of the Grand Bay ecosystem and a comprehensive list of specific research, monitoring, and management needs (Peterson et al. 2007). An important objective of the reserve is to encourage and facilitate the use of the reserve by external researchers. Thus, staff assists or collaborates with

many researchers, frequently as co-principal investigators, as well as provides a variety of ecological data sets to visiting scientists to enhance their monitoring and research efforts. Internal research and monitoring projects are conducted as staff time and resources are available. The GNDNERR additionally participates in multi-reserve research projects and regional partnerships to address various management needs.

The major existing partners are the USFWS GNDNWR, Mississippi State University (MSU), MDEQ, University of Southern Mississippi (USM), USGS, and other colleges and universities in the region.

### Priority Issues

The GNDNERR Science staff have developed several research priorities or focus areas that address critical coastal management issues for Grand Bay. These focus areas are based in part, on several elements: increased understanding of the Grand Bay ecosystem through reserve-focused projects, monitoring and research needs and data gaps identified in the Site Profile, areas of expertise of reserve staff, opportunities for collaboration with universities, research laboratories, and government scientists, and research needs arising from the impacts of the *Deepwater Horizon* oil spill. While there are interests in a variety of topics, including plant ecology, phytoplankton population dynamics, nutrient inputs, ecosystem services valuation, fish nursery function, and the potential for aquaculture, the following topics are the research/management thematic priorities for the GNDNERR.

**Restoration effectiveness monitoring:** Coastal habitats are being restored throughout the northern Gulf of Mexico, and many of these efforts have well-defined end points that can be used to determine restoration success, but effectiveness monitoring is rarely conducted and/or monitoring data is not often available for synthesis. Therefore, more information on the effectiveness of restoration approaches in both upland and estuarine systems to guide future management efforts in the region is needed.

**Physical and ecological processes:** The GNDNERR marshes are affected by several ecological and physical processes, and are slowly being converted to open water, but the physical processes driving this conversion and how critical ecological functions are affected is not well understood. Therefore, studies to better understand overland flow, water circulation patterns, and sediment dynamics (e.g., erosion, transport, deposition) in the GNDNERR are needed to assess management actions with the potential to better conserve estuarine ecosystem function.

**Sources and impacts of contaminants:** The GNDNERR has experienced impacts from contaminants (industrial spills, see Water Quality) and the waters are currently closed to oyster harvest due to fecal coliform bacteria loads in excess of acceptable levels (per the National Shellfish Sanitation Program). While some sources and problems are understood (e.g., MS Phosphates), sources of fecal contamination or the potential impacts of contaminants from other nearby sources are not well understood; therefore, better information about the sources and impacts of contaminants across the reserve are needed to develop effective mitigation strategies.

**Population distribution and ecology:** The GNDNERR is a reference site for many research studies and on-going restoration projects across the Mississippi Coast, but management questions remain specifically in terms of feral hog management, terrapin nesting success, mammal populations and interactions, seed bank dynamics, occurrence of rare and endangered species, etc. Therefore, population distribution and ecological studies for plants and terrestrial and aquatic vertebrates are needed to increase understanding of these species' population dynamics in GNDNERR and allow GNDNERR to serve in its role of a reference estuary.

**Socio-economic impacts of ecosystem restoration:** Due to the impacts of the *Deepwater Horizon* oil spill, restoration of coastal habitats is occurring throughout the northern Gulf of Mexico, and many of these efforts are expected to improve the socio-economic condition of the Gulf Coast communities as well as the environmental condition. However, few research efforts focus on ecosystem valuation in terms of the socio-economic impacts of restoration; therefore, more information is needed on how and if restoration to the local environment impacts local communities and economies.

Research and monitoring studies are actively designed by GNDNERR staff to contribute to the scientific or management community, and major outcomes of the reserve research and monitoring program are expected to be used as a reference for ongoing monitoring, conservation, and restoration work. Better understanding of ecosystem dynamics will improve resource management and restoration techniques/approaches.

### Priority Audiences

The target audiences for data and information generated from research at the reserve are our state partners (MDMR, MDEQ), federal partners (USFWS, USGS), academic community (MSU, USM, other university researchers), the educators who translate GNDNERR research into curricula and programming for students, and trainers who develop research-based workshops for local and regional coastal managers. Over the course of this management plan, our partner audiences will expand by building relationships with additional universities, research stations, resource managers, and municipal partners.

### Research Program Capacity

The research sector at the GNDNERR is led by the Research Coordinator, a Research Associate with the MSU Coastal Research and Extension Center (CREC), and MDMR contractor. Activities for the research sector are supported by the GNDNERR facilities, including the labs and dorm, and the facilities at CREC. The Research Coordinator supervises the SWMP Manager (who supervises the SWMP Specialist), Research Assistant (also MSU contractor), and any interns or graduate students at the GNDNERR whose work relates to research sector objectives. The Research and Monitoring and Stewardship sectors at GNDNERR function under the umbrella of a Science program, which allows for efficient and effective coordination of science-based activities. The Science program works with a wide array of partners to accomplish its research objectives. Regular “Science Staff” meetings are the typical mechanism for communication and coordination of project activities across the reserve staff. The primary role of the Research Coordinator is to develop new research projects with staff and partners, manage SWMP activities, promote and coordinate research activities among the GNDNERR Science staff and external researchers (including mentoring students), communicate research and monitoring results to external audiences, and integrate the scientific information obtained into the other GNDNERR sectors. In addition, they are responsible for initiating, promoting, supporting, and tracking priority research activities at the reserve. Through the Research Coordinator’s connection to MSU, the GNDNERR benefits from direct connections to researchers with diverse backgrounds relevant to reserve research needs. Further, this relationship gives reserve staff access to university software, as well as physical resources such as boats and laboratory equipment at CREC facilities.

### Research Program Delivery

The research sector will implement the required (core) elements of SWMP using the Science team. The Research Coordinator’s primary responsibilities are described in the above section. The SWMP Manager reports to the Research Coordinator and oversees the day-to-day requirements of the water quality and weather monitoring, including equipment deployment and maintenance, nutrient analyses, data management and quality checks, and coordinating with the CDMO on data upload requirements. The

SWMP Specialist assists the SWMP Manager with all these tasks. The nutrient analyses are performed in-house, using our spectrophotometer, autoanalyzer, and other associated equipment to prepare and store samples. The reserve will provide funding for this work as part of the operations award annually. The reserve will also support annual technician training to further the knowledge and skills of the Science team.

Additional reserve monitoring activities, including the Sentinel Site Application Module 1 (SSAM-1), are implemented by collaboration between the research and stewardship sector and are described below. If additional components of SWMP are developed they will be managed and maintained within the research sector.

The Science staff excel at effectively delivering the results of their research to the scientific and management communities as well as sharing them with the public. Reserve staff use a variety of venues and formats for sharing their work. These include giving oral and poster presentations at international, national, regional, and local scientific conferences. Science staff members are also actively involved in publishing their research through peer-reviewed literature, technical bulletins, and popular, or public-oriented publications such as outdoor magazines and newsletters. To facilitate the distribution and application of their publications, the reserve provides a list of GNDNERR-related science publications on their website and maintains a searchable publications spreadsheet for use by researchers and educators. The research sector also maintains the GNDNERR portion of the National NERRS Research Database.

The Science staff also frequently participate in Outreach events and workshops. Staff participate in the annual National Estuaries Day celebration “Seaside with the Scientists”, present on research and management topics and lead field trips for the TOTE workshops, and mentor undergraduate interns and direct graduate student research projects, including serving as the student’s major professor/advisor. Finally, in collaboration with the education sector and Coastal Training Program (CTP), the staff organizes and hosts a GNDNERR Research Symposium every other year, typically during the fall. This collaborative effort facilitates the sharing of information and development of collaborative research projects through scientific presentations and workshop formats. Attendees are a mix of scientists, land managers, and program managers, which provides ample opportunity for discussions across groups.

#### *Research Future Needs and Opportunities*

The research sector has many opportunities for growth over the next five years, particularly associated with ongoing large-scale restoration projects. For example, the NRDA Land Acquisition and Habitat Management Project is funded until the end of 2029 and currently includes the restoration of 3,000 acres of wet pine savanna. This project provides an enormous opportunity to answer research questions regarding the change in the ecosystem and downslope effects. Funding opportunities are also plentiful (e.g., National Academy of Sciences Gulf Research Program, NERRS Science Collaborative, RESTORE-associated funding streams, and state-specific opportunities like the Tidelands Trust Fund), as are local and regional partnership opportunities. Challenges include developing competitive projects to acquire funding and ensuring sufficient staffing levels to accomplish project goals.

Additional needs and priorities are in the development process. In the next five years, as part of this management plan, communications with stakeholders will include an ecosystem-wide assessment of the Grand Bay estuary with the objective of determining research needs. Those needs may include studies associated with the restoration of the Grand Battures, hydrologic restoration by elevating HWY 90, and/or the implementation of off-bottom oyster aquaculture in the GNDNERR. These needs have yet to be determined and will be based on collaborative workshops on these topic areas.

## Monitoring

### *Monitoring Program Context*

#### *Setting and Context*

The SWMP provides standardized data on national estuarine environmental trends while allowing the flexibility to assess coastal management issues of regional or local concern and is guided by the Reserve System-Wide Monitoring Program Plan. The geographic scope of the GNDNERR SWMP program is four water quality monitoring stations in Bayou Heron, Bayou Cumbest, Point Aux Chenes, and Bangs Lake; a weather station in Crooked Bayou; fifteen surface elevation tables (SETs) along the estuarine gradient with associated vegetation monitoring transects; and erosion monitoring at stations on exposed shorelines in the reserve (Figure 10). Additionally, habitat maps of vegetation classification by spatial extent have been developed reserve wide (see Figure 5).

#### *Priority Issues*

The principal mission of the monitoring sector is to develop quantitative measurements of short-term variability and long-term changes in water quality, biological systems, and land use/ land cover characteristics of estuaries and estuarine ecosystems for the purposes of informing effective coastal management. The sector is designed to enhance the value of the reserve as a regional and national reference site. The priority issues for the monitoring sector mirror those in the research sector and can be found above. The GNDNERR's monitoring currently encompasses abiotic SWMP (water quality, weather, and nutrients), SSAM-1 (SETs, marker horizons, and vegetation monitoring), erosion monitoring, and limited atmospheric mercury monitoring. The SWMP is currently overseen by the SWMP Manager and Research Coordinator, and the other monitoring projects are overseen collaboratively by the Stewardship and Research coordinators. The Stewardship Coordinator oversees field work and protocols, and the Research Coordinator oversees data and metadata management. A map of GNDNERR's monitoring stations is included at the end of this section (Figure 10). The scope of the monitoring sector is the entire reserve boundary. Since the last management plan, our monitoring data has contributed to the following: confirmation of nitrogen limitation in our estuary (Amacker 2013; Baine 2017), and a local and national analyses of SET data (Cressman et al. 2020, Pitchford et al. 2021), additional information and publication about phosphate inputs into Bangs Lake (Beck et al. 2018), a publication on atmospheric mercury (Ren et al. 2020), additional information on above- and below-ground biomass (Archer et al. 2021), completion of sample processing, data entry and quality checks, analysis, and a draft final report for a 10-year fish monitoring project, digital elevation models for reserve sentinel sites, a new habitat map, and the design of new effectiveness monitoring for NRDA-related projects, and a publication on crafting statistical analysis plans (Cressman & Sharp 2022).

#### *Priority Audiences*

The target audiences for the monitoring sector are fellow researchers for whom our monitoring data provides a baseline for intensive research questions. Others include resource managers, such as those who are interested in the effects of the opening of the Bonnet Carré spillway, and educators, who can use the monitoring data to develop curricula for science classes.

#### *Monitoring Program Capacity*

The support for the monitoring sector overlaps with the research sector. Science staff work collectively to conduct long-term monitoring of GNDNERR resources. This includes atmospheric mercury, SSAM-1, and restoration monitoring. The SWMP Manager and SWMP Specialist perform the abiotic sampling.



### *Monitoring Program Delivery*

There are several components to the GNDNERR monitoring sector, including those that are a formal part of the SWMP and those that are specific to GNDNERR (Figure 10).

#### *Abiotic SWMP*

The GNDNERR has four water quality SWMP stations (Bayou Heron, Bayou Cumbest, Point aux Chenes Bay, Bangs Lake), one meteorological station (Crooked Bayou), and six nutrient stations (Figure 10). The nutrient stations consist of the four water quality stations plus additional nutrient-only sites at Bangs Lake North (due to the 2005 phosphate spill) and Bayou Heron Surface (because the water column at the SWMP station is frequently stratified; Bayou Heron Bottom is the primary SWMP station for water quality and nutrients). Water quality stations were established in 2004; weather and nutrient monitoring began in 2005. Two of the water quality stations (Bangs Lake and Bayou Heron) and the weather station are currently telemetered and transmit data hourly to NOAA's Geostationary Satellite Server east satellite. Nutrients are analyzed in GNDNERR's in-house laboratory following in-house laboratory standard operating procedures (SOPs). All SWMP activities are performed in accordance with SWMP SOPs, the CDMO's Data Management Manual, and standard analysis methods. Primary staff contributing to SWMP are the SWMP Manager and SWMP Specialist; interns and other staff members assist when needed. Field infrastructure for SWMP includes pilings and platforms at the water quality stations and additional pilings in each bayou in case of program expansion, YSI EXO2s, YSI 6600s (formerly the primary water quality instrumentation; replaced by EXOs), YSI Storm3 telemetry systems at two water quality stations, a weather station platform on pilings in Crooked Bayou, and Campbell Scientific weather station equipment (including telemetry equipment). The laboratory includes basic equipment for SWMP nutrient and chlorophyll analysis such as a discrete autoanalyzer, spectrophotometer, fluorometer, centrifuge, autoclave, deionized and ultrapure water systems, drying ovens, and various refrigerators and freezers.

#### *SSAM-1*

The GNDNERR installed 15 SETs along a coastal elevation transect in 2010-2011 as part of the Sentinel Site Monitoring Program. Each SET also has three associated marker horizon plots. Infrastructure includes boardwalks to reach the sites, platforms around the sites, SET heads attached to stainless steel rods driven into the sediment to refusal, a portable SET arm with pins that are used to take measurements, real-time kinematic (RTK) global position system (GPS) units, and a Sprinter level. The SET and marker horizon readings were taken quarterly from 2011-2016, and since 2017 are taken twice per year. Vegetation monitoring transects, associated with each SET, have been monitored every year since 2014, and will be monitored every two years after 2020. Stewardship staff, overseen by the Stewardship/Research Coordinator, are primarily responsible for this monitoring. Other SSAM-1 electives include shoreline erosion monitoring (performed quarterly at GNDNERR since 2006), which was monitored with benchmarks and a measuring tape until 2010, a Total Station from 2010 – 2012, and RTKs since 2012. Another elective is digital elevation model monitoring using RTK GPS, which occurs every five years (2013 and 2018). Science staff are responsible for this monitoring.

#### *Atmospheric Mercury*

A trailer and tower near the Bayou Heron boat ramp have been in place since September 2006, but ongoing monitoring of dry deposition of atmospheric mercury was discontinued in March 2020. The trailer and tower were removed from the reserve in December 2021. The NOAA Air Resources Lab (ARL) and the GNDNERR continue to collect and maintain infrastructure to monitor wet deposition of mercury. Samples are sent to the National Atmospheric Deposition Program's Program Office at the Wisconsin State Laboratory of Hygiene at the University of Wisconsin-Madison.

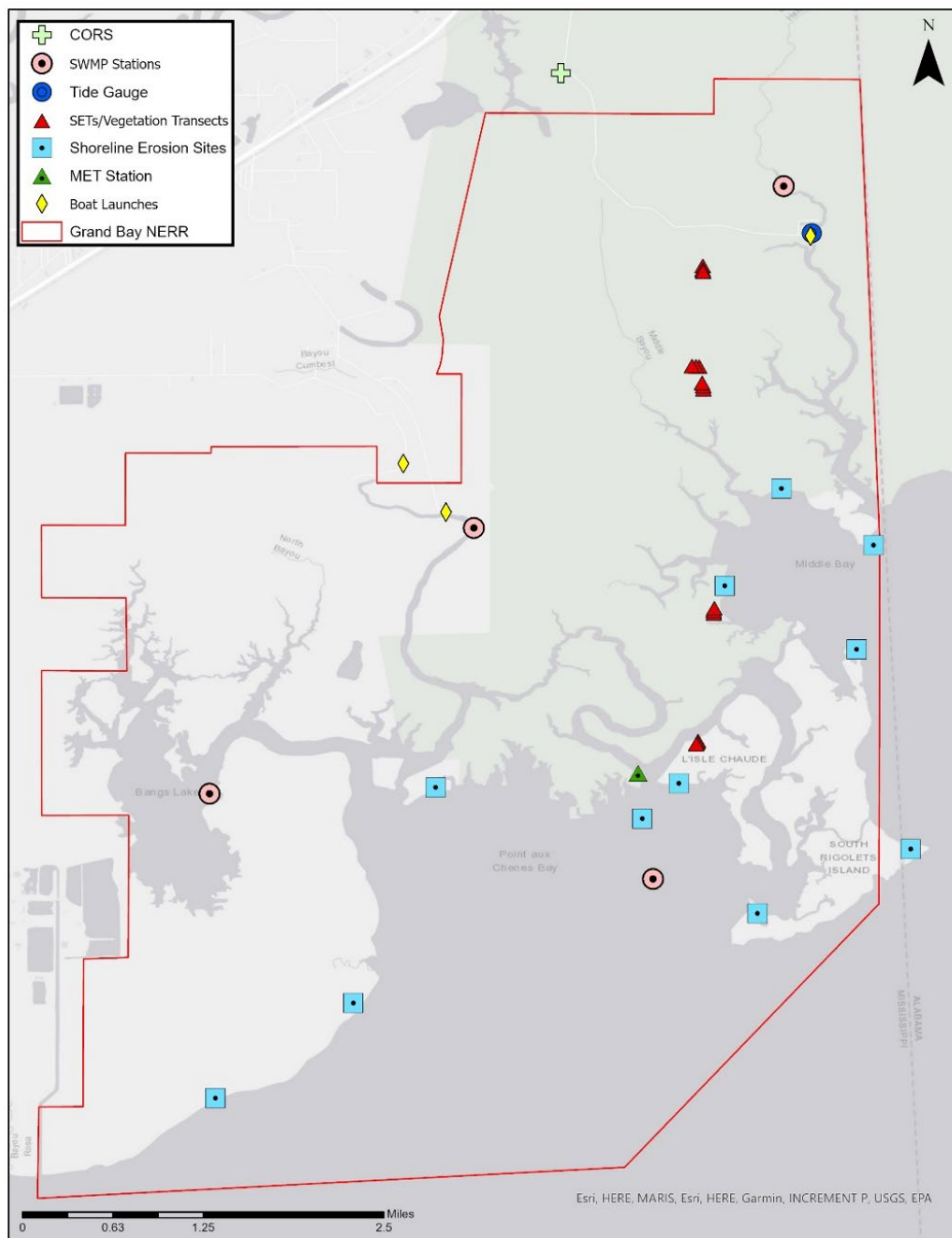


Figure 10. GNDNERR monitoring locations.

### *Monitoring Future Needs and Opportunities*

There are a variety of needs and opportunities in the monitoring sector that are evident for the next five years. These include a need for continued funding for infrastructure maintenance and repairs, the need for continued consistent data management, metadata structures, and continued updates to the data sharing plan. Maintaining functioning equipment in difficult weather conditions, along with aging field infrastructure, is challenging and expensive. Hurricane season in 2020 destroyed the Point Aux Chenes water quality station, the Bangs Lake telemetry equipment, and the weather station. Opportunities for



the monitoring sector include collecting and analyzing long-term datasets to improve the understanding of baseline conditions in water quality or biological conditions, especially as they relate to restoration activities. Information from these analyses can be shared with wide audiences through coordination with other sectors and external researchers. For example, SWMP status reports may be shared with teachers and community groups, and lessons from long-term monitoring projects can be applied to our recent restoration effectiveness monitoring. There are also opportunities to explore technology such as flow cytometers for phytoplankton monitoring, and ample opportunities to work with the Outreach team on volunteer monitoring and citizen science projects.

## Stewardship

The mission of the NERRS as stated in the 2017-2022 Strategic Plan is “To practice and promote stewardship of coasts and estuaries through innovative research, education, and training using a place-based system of protected areas.” A key component of this mission is to promote stewardship within the reserves and in adjacent coastal areas, to maintain water quality and healthy habitats along our nation’s coastlines. Specific goals and objectives of the national program relating to protected areas emphasizes that estuaries and coastal watersheds are better protected and managed by implementing place-based approaches that:

- Increase permanent protection and restoration of key areas in reserve watersheds to improve coastal habitat quantity, quality, and resiliency to environmental change,
- Enhance the connection of the community to stewardship of coastal resources, and
- Strategically expand the number of reserves to serve coastal communities’ needs.

### *Stewardship Program Context*

#### *Setting and Context*

The geographic scope of the reserve’s stewardship sector extends beyond the GNDNERR boundary to the north and includes the boundary of the GNDNWR and state lands adjacent to Pecan Road (see Figure 7) due to state ownership of these lands and the scope of the upland restoration work. The GNDNERR Site Profile (Peterson et al. 2007) provides an excellent summary of historical stewardship and resource use along the Mississippi Coast including areas of the reserve. Many of the historical land practices had ecological benefits for the landscape. Lightning-ignited fires naturally shaped the landscape and were only interrupted by wet cypress drains and bayous. Early residents of the area used fire to drive game animals and to promote new vegetation for grazing. While somewhat more difficult to accomplish today because of habitat fragmentation, smoke management concerns, and private in-holdings, prescribed fire remains one of the most important habitat management tools at GNDNERR. The wet pine savanna and emergent marshes are the primary habitats being restored and studied in partnership with the GNDNWR and MDEQ.

#### *Priority Issues*

The priority issues for the stewardship sector mirror those in the research sector and can be found [above](#). Most current and projected stewardship sector work is focused on wet pine savanna and marsh restoration and sentinel site monitoring.

#### *Priority Audiences*

The priority audiences for the work include the MDMR, GNDNWR, MDEQ, MS TIG, USGS, and a variety of university researchers and partners.

### *Stewardship Program Capacity*

The support for the stewardship sector has much overlap with the research and monitoring sectors, and the following staff, facilities, and infrastructure support the work, including a Stewardship Coordinator

to lead and manage activities, Natural Resource Manager to direct and advise on management actions, and several natural resource specialists with various expertise. The infrastructure and equipment used include a tractor, all-terrain vehicle, RTKs, sprint leveling device, game cameras, and field supplies. An herbarium has been established by the stewardship sector and is helpful with cataloging and plant identification. The stewardship sector is also the primary user of geographic information systems. The sector works with a variety of partners to accomplish a range of land management and restoration activities including the USFWS, MDMR's Coastal Program, local university researchers from MSU and University of Alabama, and scientists across the NERRS.

### *Stewardship Program Delivery*

There are several components to the GNDNERR stewardship sector including land management and associated effectiveness monitoring, trail management and debris removal, and testing concepts associated with restoring marshes. Other activities that are coordinated with the GNDNWR include trail development and maintenance, invasive species mapping and treatment, fire management, mechanical treatment (e.g., chain sawing, mulching), habitat assessments and mapping, and restoration planning.

### *Mastication, Invasive Treatments, Prescribed Burning*

The GNDNERR, GNDNWR, and other partners are currently involved in a comprehensive effort to manage upland and estuarine resources on a landscape scale at Grand Bay (Figure 11). These efforts include multiple funding sources and involve many partners. A specific upland restoration effort funded by the MS TIG through the NRDA funding stream as a result of the 2010 *Deepwater Horizon* oil spill is detailed in the Restoration Plan.



Figure 11. Prescribed burn of the wet pine savanna east of the Coastal Resources Center.

### Effectiveness Monitoring

Stewardship sector work at GNDNERR includes effectiveness monitoring (to measure results of management actions) and research, land protection, ecological restoration, and resource enhancement. An important aspect of the reserve's work is to demonstrate best management practices that other professionals, local decision-makers, and the public can apply in their own communities. Additionally, it is vital that stewardship and resource management activities are consistent with maintaining the

integrity of the site for long-term research and monitoring. The reserve is a laboratory for examining landscape changes related to human population growth, natural disasters, and impacts from sea level rise. Our resource management efforts are based upon the principles of adaptive management and seek to apply current methods in restoration science to enhance impaired habitats with a focus on improving ecological function. Long-term monitoring allows an evaluation of the effectiveness of restoration activities and functional integrity of natural processes. As such, all restoration activities have a monitoring component designed to help understand restoration effects over the long-term.

### *Trail Management and Debris Removal*

Another component of stewardship at GNDNERR relates to the establishment and maintenance of public areas. There are three established public trails at the reserve, plans to create a pollinator garden, and re-establish native wetland vegetation at a stormwater wetland at the CRC. These areas all require periodic maintenance (e.g., mowing, chain sawing, invasive species removal and treatment, etc.) to ensure that they remain in good condition. This includes creation and maintenance of informational signs to educate visitors to the reserve.

Another focus of the stewardship sector is to actively remove debris and develop strategies to prevent future dumping within the reserve. Current upland restoration efforts are focused on areas within the reserve that contain large caches of debris that need to be removed prior to initiation of land management activities. A pro-active approach to debris removal that includes monthly trips with participation by all GNDNERR staff is being used to help combat debris issues. Further, we are working to limit access to several abandoned roads by establishing gates and signage in appropriate areas to discourage dumping and littering. Work continues with GNDNWR, MDMR, and Jackson County Sheriff's Department and includes reporting illegal dumping. This work also occurs in partnership with MSU CREC, the Coastal Cleanup Program, and volunteers to provide the public with opportunities to participate in debris removal and learn more about this important issue at the GNDNERR. The Education and Training sectors include programs focused on marine debris and its impact on coastal habitats.

### *Marsh Protection / Restoration*

The focus of estuarine habitats is primarily on resource monitoring and demonstration of best management practices such as construction of living shorelines. As part of the NRDA Phase IV Early Restoration efforts, the Restoration of Subtidal and Intertidal Reefs in Mississippi Estuaries project was initiated that included components in GNDNERR. Those components included three acres of subtidal reef and 7.5 acres of intertidal reef composed of crushed limestone and oyster shell. The project was designed to allow for experimental analysis of the effectiveness of various approaches and an effectiveness monitoring study was designed to assess the project. Graduate students are also encouraged to develop projects associated with reef installation and include the Davidson fellow. The project was installed in March 2021.

### *Stewardship Future Needs and Opportunities*

Science staff work to increase the number of external research projects started at the reserve by facilitating research activities. This primarily occurs through provision of lab space and field equipment, advice on field sampling locations, and may involve field assistance for projects relevant to GNDNERR monitoring and research programs. Future needs and opportunities for the Science staff include assisting in the development of workshops to evaluate large-scale restoration efforts in Grand Bay, including the restoration of the Grand Battures and evaluation of the marsh migration pathways and landscape barriers. The Science staff will also be integral in evaluating the potential implementation of off-bottom oyster aquaculture.

More specific information about other Stewardship activities and the related management plan objectives and actions can be found in the [Public Access and Visitor Use](#), [Land Acquisition](#), [Resource Protection](#), [Restoration](#), and Sentinel Site Monitoring Plans.

## Outreach: Education and Training

### Education

The NERRS seeks to enhance public awareness and understanding of estuarine areas and provide suitable opportunities for public education and interpretation. The NERRS increases estuary literacy among students, teachers, and the public through the K-12 Estuarine Education Program (KEEP) and Conservation Action Education programs.

The KEEP helps educators bring estuarine science into the classroom through hands-on learning, experiments, fieldwork, and data explorations using grade-appropriate lessons, activities, and videos. Reserves also offer teacher development programs that use established coastal and estuarine science curricula aligned with state and national science education standards. Teachers on the Estuary (TOTE) workshops give teachers the opportunity to explore coastal habitats and conduct field investigations, learn how to integrate local and national monitoring data into the classroom, and gain hands-on experience using estuary education resources.

As part of the Conservation Action Education initiatives, reserves conduct formal and informal education activities and outreach activities that target educators, students, and environmental professionals; people who use these natural resources for work or play; and the public. Reserves integrate research and monitoring into their educational and outreach efforts, providing a multi-faceted, locally focused approach aimed at engaging the community.

The Reserve System Strategic Plan outlines education objectives designed to increase the public's awareness of and participation in stewardship activities; improve educators' and students' understanding and use of the system and NOAA resources for place-based and inquiry-based learning; and grow and motivate the next generation of coastal professionals through programs and research, resource management, and educational opportunities.

### *Education Program Context*

#### Setting and Context

The educational programming at GNDNERR seeks to strengthen connections and understanding of coastal ecosystems within the local communities in Jackson, Harrison, Hancock, and George counties in Mississippi and Mobile County, AL. The ecological and socioeconomic context for the education program is described in previous sections. The reserve's education programs are linked to the reserve focus areas and priority issues and through an integrative process that involves regular coordination with reserve research and stewardship staff members. Programs accurately demonstrate the value and significance of coastal and estuary ecosystems to our audiences. The CRC provides a venue for a variety of learning experiences for many K-12 students, teachers, collegiate, and community audiences. Additionally, the varied habitats and associated plants and animals found at the reserve provide an excellent "living laboratory" for all types of outdoor educational activities. The reserve also promotes, produces, and participates in several educational and outreach activities at schools, community events and other programs with various partners. Field trips and community programs are hosted at the CRC and feature activities such as guided walking and boat tours, art workshops, and community education events. Another opportunity for new education programming comes with the addition of a large outreach vessel, *Miss NERR*. She will provide opportunities to engage our community in aspects of estuarine ecology from the water, for example a ship-side trawl can gather live organisms for display in a see-through tank on board.



Over the course of this five-year management plan, the education sector will develop new programs on habitat restoration and effectiveness monitoring. Programs will educate our community on wet pine savanna ecology restoration practices, and restoration monitoring. Working with teachers, these topics will be introduced into classrooms across our service area, and students will visit the reserve for field trips to experience the habitats and monitoring work firsthand. Community education programming will also highlight restoration topics with an aim of creating broad engagement while restoration work transforms the landscape.

### Priority Issues

The reserve staff work in an integrated manner to support, plan, and deliver effective, place-based educational programs and partnerships that align with the NOAA Education Strategic Plan, the 2017-2022 NERRS Strategic Plan, and other national and state guidance. The education sector's main priority issue is to create a science-informed community based on the science priorities detailed above. As our education program is integrated with the Science staff, this goal is addressed by our various activities that translate and communicate reserve science to the public. Programs are created that highlight research and monitoring sector activity, and promote stewardship education to conserve, restore, and protect natural and cultural resources. Education staff also work to create school and community programs that improve preparedness, response, and resilience to the challenges of hazardous weather.

To address these issues, the education sector creates school and community programs, builds relationships with local teachers, and aligns GNDNERR programs with local and national educational standards. The programs highlight fire ecology, wet pine savanna vegetation restoration, marsh restoration, stormwater management, and Mississippi Coast natural history. Most programs are framed on the importance of estuaries and coastal habitats, the biodiversity associated with them, and the importance of being good coastal stewards. Education staff work with Science staff to accomplish this by creating opportunities for audiences to participate in conservation and stewardship activities, including debris cleanups. Education staff also deliver and support hands-on educational programs that explore the influences of human activity on the environment. Education staff work with teachers through teacher professional development workshops (e.g., TOTE) to integrate these focus areas into their classroom by developing curriculum that integrates use of GNDNERR data, highlights science and conservation, stewardship of habitats, and restoration science. By developing a relationship with the teachers, more opportunities are created to engage with students in the classroom and at the reserve.

The education sector aligns programs with the 2018 Mississippi College- and Career-Readiness Standards for Science that highlight different areas of restoration and management from 5<sup>th</sup> to 12<sup>th</sup> grade. Educational programming is supported by the NOAA Education Strategic Plan and the NERRS Strategic Plan which emphasize creating a science-informed society that is actively involved in inquiry-based learning, conservation, preparedness, and training the next generation of scientists, coastal management professionals, and estuary stewards. College- and career-readiness standards and cross-concept disciplines are integrated into curriculum and activities to better prepare students for pursuits in science fields. These actions align with giving teachers and students knowledge and understanding of resources for place-based and inquiry-based learning, and encourages participants to become better stewards, providing audiences with the knowledge, appreciation, and skills to act as stewards of coastal resources to improve the resilience of estuaries.

### Priority Audiences

The target audiences for the reserve education programming include the community in our service area, K-12 students, teachers, and non-traditional audiences (i.e., artists, veterans, seniors, pre-K, people with disabilities, and other non-traditional groups) within our geographic scope and outside our geographic



area as opportunities arise. The On the Road program is focused on the K-12 student audience. By engaging with non-traditional audiences, the reach of our conservation and sense of place work is broadened outside of the community generally served by environmental education programming.

### K-12 Students

The K-12 program activities focus on elementary, middle school, and high school audiences within our geographic area. Students are engaged primarily through our On the Road program in their schools. The On the Road program engages students in the classroom and with interactive field trips. Over the next five years, the education program will continue working with local schools and students who have a need for environmental education opportunities. The On the Road program reflects reserve priorities and recent scientific inquiry at the reserve and is aligned with Mississippi College- and Career-Readiness Standards for Science, making it useful and impactful programming for our local schools.

Additionally, due to COVID-19, a shift in service led to more virtual programming. Outreach videos such as the 'Seaside with a Scientist' virtual event (2020, 2021) provided additional resources for students in the classroom and connects them with GNDNERR research. Integrating virtual resources with our live, hands-on programming increases our ability to reach outside of our geographic area. These additional resources provide added value to the On the Road program and increased the audience reach for the GNDNERR.

### Teachers

Teachers are a priority audience for the GNDNERR. The teachers' grade-levels and subjects taught vary based on the theme of the TOTE workshop. There are K-12 formal educators, college professors, and informal educators across a variety of subjects attending workshops. From 2017-2021, teacher attendance at TOTE workshops was: 10% Elementary (K-5), 39% Middle (6-8), 39% High (9-12), 2% College, and 10% Informal educators. At least one professional development workshop is provided each year and teachers earn continuing education credits by attending.

### Non-traditional Audiences

The GNDNERR focuses on non-traditional audiences to broaden the scope of people who learn about estuaries and conservation beyond communities generally served by environmental educators. Art programs are developed in partnership with the Director, local artists, the Walter Anderson Museum of Art (WAMA), and other partners (Figure 12). Programs in partnership with the Veterans Administration for local veterans incorporate outdoor and classroom learning about the estuary, with kayaking, hikes in the reserve, art and photography workshops, and lessons on natural history, ecosystem restoration, and conservation with GNDNERR staff and other experts. Programs with the Grand Bay Community Center in Alabama engage seniors in the local area, including a few unique opportunities with the youngest school-aged students and the oldest seniors in programs that focus on water quality, natural history, and conservation. Over the next five years, new non-traditional audiences will be added with programs that focus on pre-K audiences, people with disabilities, additional programs for seniors, and other groups. New programs will create opportunities for people who do not typically use the reserve or participate in events involving environmental education, nature, or science. For example, a Story Time YouTube playlist was created to engage younger audiences in GNDNERR priorities, including stories to teach young audiences about stewardship and the environment. Pre-K audiences are tactile learners and benefit from hands-on and experiential programs, including Scavenger Hunts and introduction to animals. People with disabilities generally have limited access to our programming. The reserve already works with mentally and physically disabled peoples through our Veterans program. New programs will be developed that are disability-specific, for example birding by sound for the blind.



Figure 12. Artwork created by participants at a Director-led batik class (a), volunteer-led botanical watercolor class (b), and block printing class (c), in partnership with WAMA.

Additional programming for seniors may use reserve facilities and partners to provide tailored outdoor learning experiences. Developing programs for these audiences requires creativity and forethought to consider the special needs, extra safety requirements and precautions, and information that is appropriate, but adding non-traditional audiences will give everyone in the community a sense of place at the GNDNERR.

### *Education Program Capacity*

#### *Internal and External Resources*

The support for the education sector includes the following staff, facilities, and infrastructure. The sector is led by the Education Coordinator who is supported by the K-12 Education Specialist, Program Development Specialist, Special Programs and Communications Manager, and contractors as grant

funding allows. Additionally, an Education Assistant has been described in the Administrative Plan for future positions and would work to increase education sector capacity. The Grand Bay CRC is the main facility for programming and includes a large and small classroom, outdoor screened in area with a sink, a large porch with amphitheater-type seating, and our Interpretive Center. The work is also supported by the Savanna Trail boardwalk and beaten trail through the wet pine savanna restoration area, the Oak Grove birding trail, and the new Grand Bay NERR Blueway kayak trail. There are 10 kayaks and our large outreach vessel, *Miss NERR*, to support water-based activities. The equipment and supplies available for use include classroom audio-visual equipment; laptops, microphones, and webcams; books, workbooks, and field guides; laminator, binding equipment, copier; handheld YSIs; microscopes; dipnets, buckets, and critter containers; art supplies; a live Mississippi diamondback terrapin exhibit; and a wide range of biological specimens. The education sector also has access to the biological laboratory for demonstrations such as shark dissections. The GNDNERR has the capacity and resources it needs to meet all strategic objectives of hosting a TOTE workshop.

### Strategic Partnerships

Building networks and partnerships is key to the success of educational efforts. Coordination with our local partners allows us to design and implement more programs and fill identified gaps in environmental education along the north-central Gulf Coast. The sector works with a variety of local partners to accomplish the work, including, but not limited to, the USM's Marine Education Center, Dauphin Island Sea Lab, GOMA, MDEQ, MDMR, and other NERR educators. The education staff also partner with regional and national professional education organizations such as National Science Teacher Association, its local chapter, Mississippi Science Teacher Association, and the National Marine Educators Association, and its local chapter, the Southern Association of Marine Educators, to stay up-to-date on current teaching methods and educational technology, new funding opportunities, and to promote the products and programs that are developed within the NERRS. Walter Anderson Museum of Art, local artists, Art in the Pass, the Grand Bay Community Center, and the Veterans Administration are also partners. Coordination with our partners also allows us to design and implement more programs and fill identified gaps in environmental education along the north-central Gulf Coast.

Education and Science staff work closely together to align outreach programming with the research and initiatives occurring at the reserve. Education and Science staff partner to produce K-12 education programs that teach students science concepts and the scientific method that fosters critical thinking and can help them pursue future careers. Science staff also take active roles in TOTE workshops. Past evaluations show teachers benefit from learning directly from the scientists who conduct the research.

### Education Program Alignment and Delivery

The following describes the major activities and methodologies the education sector will implement in the next five years. The education sector is supported by all reserve sectors and works seamlessly with GNDNERR staff. Reserve scientists and university research partners are regularly incorporated into the education programs. The education sector delivers programs using a variety of means, locations, and resources including in-school, field trips and tours, extracurricular workshops, and off-site events. Internal evaluations improve and refine programming. Major impacts and outcomes include increased knowledge of Mississippi natural history, estuarine conservation, restoration science, and increased program reach in terms of audiences. The reserve also implements programs to change behavior in terms of plastic pollution and other debris reduction. The education program's overall objective is to engage our local community with their environment through enjoyable experiences that feed their curiosity and improve their sense of place.

## Community Education

The education staff will provide community education programs to help further the reserve's mission of instilling a sense of place. Environmental education programs that combine direct-place experiences with instructional interpretation foster, nurture, and strengthen sense of place. Individuals with a sense of place are more likely to implement and engage in behaviors that support coastal conservation and restoration efforts (Kudryavtsev et al. 2012). Education staff will work closely with other reserve staff to create place-based and science-based community programs. Staff will continue to offer community education favorites developed in previous years and will develop new programs as opportunities arise. Potential programs include birdwatching, coastal heritage, kayak tours, ecology, habitat restoration, monitoring, and stewardship. Activities will be implemented through field trips, tours, and weekend programs. Monthly community education programs (Adventure Quenchers) relating to reserve focus areas will continue to be offered. The focus will be on the biodiversity, ecology, restoration science, emerging issues and/or cultural heritage found in the coastal and estuarine watersheds within and adjacent to the reserve. Targeted audiences include individuals, families, clubs, civic organizations, local community centers, churches, and visitors to our region.

## Teachers on the Estuary

One of the objectives of the education sector is to design, develop and implement teacher professional development opportunities that align with TOTE criteria (at least 15 hours long, nationally advertised, locally relevant, etc.). The TOTE workshops are designed to educate teachers on local research-based science applicable to the classroom. A new component of TOTE workshops is to incorporate more reflection practices (e.g., reflection bubbles, group discussions, visible thinking routines) (Ferreira et al. 2013). Reflective practice requires a conscious effort to think about events and develop insights from them. This technique gives TOTE participants an opportunity to reflect on the different aspects of the workshop and how to best incorporate information into classrooms. Education staff provide direction on how to adapt curriculum and programming to better suit teachers' needs. Reflective practices are shared with the teachers during the workshop and presented so they may be used in the classroom to help students. At the end of the workshops, teacher evaluations are collected that provide important feedback and help design future programming.

## Non-traditional Audiences

The education staff will develop outreach programs for non-traditional audiences to capture their interest and highlight the local-based science conducted at the reserve. Staff will continue to offer previous programs and create new programs that provide opportunities for non-traditional audiences to participate in events at the reserve. These programs typically occur through partnerships with organizations in the community. Current program partners include the Veterans' Administration and WAMA. Current non-traditional audiences include veterans, artists, and seniors. Educational programming will expand in the next five years to include pre-K and disabled people.

## On the Road Program

The education staff will continue to coordinate and implement reserve educational programming with area schools, school groups, home schooled students, and others through the On the Road program. This program provides classroom instruction and onsite field trips. Field trips to the reserve provide students with an outdoor experience. The program also partners with nearby environmental centers and youth camps to facilitate onsite field experiences for their spring and summer camps. The education staff will continue to work with the Science staff to develop new curriculum for the On the Road program based on the ongoing scientific research and restoration activities at GNDNERR. Evaluation feedback from teachers and students will be used to refine and improve the program. New topic areas



for the On the Road program will follow major initiatives in GNDNERR Science such as fire ecology, wet pine savanna vegetation restoration, and green infrastructure.

### **Delivery and Evaluation**

The education staff will continue to develop a wide-range of new curricula and educational programs for the GNDNERR focused on K-12 students, walk-in visitors, families, and young children. Curriculum needs are based on surveys from our TOTE workshops, new topical initiatives associated with ongoing Science staff work, and other sources. These programs will include school-based curricula for classrooms based on the reserve research activities, field-based activities at the reserve, a variety of short programs for walk-ins, and other activities. Programs will be piloted during development and may be used as regular Saturday Adventure Quenchers or given in coordination with local schools. Virtual programming will be hosted on the reserve's YouTube channel. The education staff will implement both formal and informal assessments to improve reserve staff's understanding of local school and community audiences. The staff will develop and/or adapt tools for assessing educational programs and attendees' experiences. To assess the attendee's experiences and to adaptively manage and design future events, either a written or verbal assessment will be given and analyzed. Assessments from teachers will determine the curriculum designed in the following year. Staff will provide short summaries, or updates of assessments and analyses, regarding what was learned and how it was incorporated into programming.

### **Impacts and Goals**

The education sector aims to enhance public awareness and understanding of estuarine areas and provide suitable opportunities for public education and interpretation. The education staff will employ place-based approaches to connect people to science and nature. The TOTE program enhances capacity and the skills of teachers to understand the use of NERRS data and to use it in the classroom. The On the Road program will provide students with science-based, inquiry-based opportunities to foster student excitement for learning, to enhance their retention of information, and to help ready them for the workplace. Among public and non-traditional audiences, estuary literacy will increase, and active stewardship will be promoted through the development and delivery of tools and programs that address the reserve priorities. The objective is to inspire people to practice informed stewardship to protect and conserve the Grand Bay estuary and all of Mississippi's coastal resources.

### ***Education Future Needs and Opportunities***

The GNDNERR emphasizes place-based learning. Students, teachers, non-traditional audiences, and the community are engaged by on-site, hands-on learning experiences. Additionally, some programs are virtual. Training needs for the staff have been identified as some programming requires technical expertise, and efforts to fill those training gaps will be pursued in the next five years. The limitations of the program include limited capacity to fill the community demand, but these limitations are also future opportunities. With more virtual programs, the reach of GNDNERR education can increase within existing capacity. Future opportunities also include updates and new curricula added to the On the Road program, programs based on active wet pine savanna restoration work and results, and more opportunities for students to participate in stewardship and other citizen science projects.

### **Coastal Training Program**

The CTP provides up-to-date scientific information and skill-building opportunities to coastal decision-makers on relevant coastal management issues. Target audiences may vary for each reserve, but generally include local elected or appointed officials, managers of both public and private lands, natural resource managers, coastal and community planners, and coastal business owners and operators. They may also include such audiences as farmers, watershed councils, professional associations, recreation enthusiasts, researchers, and others.

The place-based nature of reserves makes them uniquely positioned to deliver pertinent information to these audiences. Each reserve conducts an analysis of the training market and assessment of audience needs to identify how best to deliver relevant training on priority issues to their area.

Partnerships are integral to the program's success. Reserves work closely with a host of local partners, as well as several NOAA programs, to determine key coastal resource issues and the appropriate target audiences and expertise needed to deliver relevant and accessible programs.

The Reserve System Strategic Plan outlines coastal training objectives designed to ensure that coastal decision-makers and environmental professionals understand and effectively apply science-based tools, information, and planning approaches that support resilient estuaries and coastal communities.

### *Coastal Training Program Context*

The GNDNERR CTP is tasked with providing professional trainings to resource managers and decision makers whose actions and decisions impact coastal resources and habitats. The CTP attempts to bridge the gap between science and decision making by translating science generated by GNDNERR and others to local stakeholders to address coastal management issues. The CTP also provides technical assistance to a variety of diverse audiences. As communities begin embracing the concept of "community resilience" a shift is happening from having conversations to taking action to become more resilient, including work on green infrastructure for stormwater flooding issues. The GNDNERR CTP is positioned to support these actions as resiliency will continue to be the top priority of the CTP in the coming years.

### *Ecological and Socioeconomic Setting and Context*

A description of the ecological and socioeconomic setting and context within which the CTP functions can be found in the [Introduction](#) of this plan.

### *Priority Issues*

Specific training needs are assessed on an ongoing basis through post-training evaluations, periodic surveys, and discussion with the reserve's partners (Appendix 4), CTP Advisory Committee (Appendix 5), and GBCC members. Also, at the beginning of each new management plan the GNDNERR CTP conducts a needs assessment. This is usually done in partnership with Weeks Bay NERR CTP. The feedback received helps in planning and design of future workshops and gaining a better understanding of the issues facing our local audiences. The results of the 2019 assessment indicated that flood mitigation and community resilience is a high priority for many of the local municipalities. The GNDNERR CTP will work with Weeks Bay NERR CTP to look at the effectiveness of implementing green infrastructure for reducing peak flows to mitigate flooding. Other topics of interest for municipalities that will be a focus of GNDNERR CTP relate to the National Flood Insurance Program (NFIP) and Community Rating System (CRS), erosion and sediment control, base flood elevation, building codes, and coastal construction standards. Other topics of high priority for target audiences include wetlands delineation and protection, watershed management and planning, and SLR and adaptation. Grant writing, GIS training, courses in statistics using R and R studio, and living shoreline installation are examples of technical trainings that are of interest to target audiences. The GNDNERR CTP will also design trainings for invasive species, habitat restoration, coastal and estuarine processes, marsh and uplands ecology, coastal habitats, and SLR. These are just a few of the topics that CTP will tackle in the next five years. More trainings may be added as specific needs arise.

Looking forward, the GNDNERR CTP can be most effective working with nearby disadvantaged communities. These communities are disproportionately affected by the issues mentioned above compared to the more advantaged communities. They generally lack resources and expertise for combating issues relating to the impacts of flooding. In the coming years, the CTP will focus on these



communities to transfer skills and knowledge relating to flood mitigation including the importance of wetland conservation and protection, open space preservation and conservation, impacts of development, sustainable development, CRS, retaining rainwater where it falls, and much more.

### Priority Audiences

The CTP target audience includes those whose focus is on the above priority issues. These groups also overlap as many of the issues are interrelated. At times, these different audiences work together to address a specific issue. The CTP builds time into programming to allow for networking among participants. Examples of CTP audiences include: elected and appointed officials and staff at the municipality, county, state and federal government levels with priority issues of flood mitigation, community resilience, NFIP, CRS SLR adaptation, grant writing, and green infrastructure; resource managers and researchers, academia with priority issues of watershed management, habitat restoration, invasive species, coastal processes, marsh and upland ecology, GIS, and grant writing; private businesses (e.g., developers, contractors, eco-tour operators) with priority issues of erosion control, green infrastructure, sustainable development, community resilience, ecosystems, and flora and fauna; industry (e.g., Chevron, Chemours) with priority issues of wetland delineation, SLR adaptation, and green infrastructure; non-governmental organizations, landowners, and community members with priority issues of grant writing, green infrastructure, GIS, community resilience, flood mitigation, NFIP, and easement regulation. Audiences are identified by surveys, participant feedback, through conversations, and learning about who is involved or needs to be involved on issues and what trainings might benefit their work. The CTP is about providing trainings needed by professionals so they can be more effective in their work. An emerging audience that the CTP will explore and place more emphasis on in the coming years is the real estate industry, with priority issues of green infrastructure, flood mitigation, NFIP, CRS, resilient communities, wetland protection and related regulations. This includes developers, lending institutions and insurance companies, and real estate agencies and agents. Lending institutions can influence how coastal areas develop by requiring and defining sustainable practices as part of the terms to loan agreements. These industries are positioned to influence how coastal communities are built out. The CTP could provide a convincing message to assist lenders in understanding their potential role in this process by designing a series of trainings for this audience. These trainings will include topics covering the benefits and value of wetlands and the importance of why and how to build sustainably. Also included will be information about flood mitigation, non-point source pollution, benefits of green infrastructure and the NFIP.

### Alignment with the Reserve

Good communication flow between sectors is important for aligning CTP programs with other GNDNERR activities. Staff from other sectors are tapped to provide lectures as subject matter experts or provide input and direction on specific topics and trainings when applicable. All reserve sectors have common goals set by the Director with staff input and work together as a team to accomplish these goals. Staff meetings are held on a regular basis. This provides an opportunity for keeping staff informed of upcoming programming and allows them to take advantage of opportunities to work across sectors when activities align. An example of how programs align is a living shorelines project near a public boat launch that was installed by the stewardship sector. This demonstration site can be incorporated into a CTP workshop showing contractors or homeowners what a living shoreline is and the benefits it can provide. Staff that participated in the installation can provide first-hand knowledge of installation, lessons learned, and the benefits. Workshops can also be developed so CTP audiences can participate side-by-side with staff during the installation for hands-on learning.

## *Coastal Training Program Capacity*

### *Capacity*

The GNDNERR CTP is staffed by the CTP Coordinator, the Program Development Specialist, and intern (when available). The CTP Coordinator is responsible for the overall administration of the program. The Program Development Specialist is tasked with searching for outside funding and securing grants. The specialist also assists the CTP Coordinator in developing new programming. When an intern is available, they will assist in meeting preparations and other activities associated with conducting workshops. Also, due to limited staffing capacity, CTP will enlist other GNDNERR staff, MDMR staff, or partners (e.g., personnel from local universities and colleges, federal agencies, non-profit organizations, municipality staff, and private industry) to fill the gaps that may exist due to the lack of program staffing or expertise. There are many different issues and needs that exist within the CTP audience that require a level of knowledge and expertise that CTP staff may not possess. In these situations, the CTP relies on other GNDNERR staff, guest speakers from partner organizations and/or for hire professionals (i.e., wetland delineation consultants). These speakers are an important component of the program.

### *Strategic Partnerships*

Strategic partnerships for the GNDNERR referenced in the introduction include MDMR, OCM, USFWS, Mississippi Secretary of State's Office (SOS), and MDEQ. Funding is one aspect of the important contribution these partners make to the CTP program. The Tidelands Trust Fund which comes through SOS to MDMR provides 30% of program funds for GNDNERR while NOAA provides the other 70%. MDMR also acts as the grant's administrator for potential outside funding as well as conducting any legal review that may be necessary for contracts, activities, and grants. MDMR staff is also available as subject matter experts. NOAA provides guidance on a national scale, supports program planning through the CTP Oversight Committee, and provides expertise on an array of workshop topics such as Meeting Facilitation and Planning, Introduction to Green Infrastructure, etc. NOAA also facilitates an annual meeting for the whole of the system, which allows for CTP staff from each reserve to collaborate and network on future projects to gain benefit by learning from more experienced coordinators in the system.

### *Training Partnerships*

Coastal Mississippi is rich with organizations that are working together to address common issues found on the Gulf Coast such as building resilient communities, planning for the impacts of SLR, habitat protection, and restoration. The GNDNERR CTP works with many of these organizations to provide professional trainings and education related to the many issues affecting coastal Mississippi. This coordination helps to eliminate duplication of trainings and messaging and extends the reach by combining resources. It also is a way of reducing "workshop fatigue" among participants. Examples of training partners include MS-AL Sea Grant Consortium, MSU CREC, USM Marine Education Center, NOAA OCM Digital Coast, local municipalities, The Nature Conservancy, GOMA, and private industries (e.g., Chevron, Chemours). In the coming years, the CTP is looking forward to working more closely with the Association of Floodplain Managers Mississippi chapter and national chapter, and the Realtors Association to continue building capacity to make an impact along the coast. A full list of partners can be found in Appendix 4. The CTP currently works with these groups when it makes sense and looks forward to continuing collaborations in the future.

The GNDNERR CTP partners with other reserves within the national system. One example is through the NERRS Science Collaborative program. The GNDNERR CTP participates as a co-lead or co-collaborator on projects and received funding for two projects in 2018. This is an excellent opportunity to work with other reserves throughout the country and GNDNERR will continue to participate in the future. The

GNDNERR also works on a smaller regional scale with Gulf Coast reserves. Over the years, a good working relationship has developed among the other programs and GNDNERR continues to look for opportunities to collaborate with the Gulf reserves on regional issues. Also, due to proximity, the GNDNERR CTP works closely with the CTP at Weeks Bay reserve in Alabama. This is a valued partnership as the two reserves share many of the same audiences with the same needs. The GNDNERR CTP looks forward to continuing the work with Weeks Bay on issues that impact coastal Mississippi and Alabama.

Finally, the GNDNERR CTP works across all sectors when projects are aligned with the needs of CTP audiences. Many grants being sought by the other sectors require a stakeholder engagement component. Generally, these stakeholders already make up the CTP audience so incorporating CTP into these projects is a logical step. The CTP will continue to incorporate all relevant reserve research, management, and monitoring activity into trainings.

### *Coastal Training Program Delivery*

Training delivery systems that will be utilized include classroom style lectures, audio/visual technology, and field-based and hands-on training where participants can tour an established project or participate in installing one (e.g., living shorelines). The use of virtual platforms for conducting workshops will also be utilized in future trainings. The reserve is somewhat remote, so conducting online trainings provides participants with busy schedules the ability to also participate. This venue also allows virtually anyone with an interest and a connection to participate in meetings. A hybrid, virtual and in-person meeting can also be utilized. Having different meeting options available allows participants flexibility in the way they would like to participate. Lunch-and-Learn lectures, short one-hour meetings held during the lunch hour, may be useful in getting the message to municipal staff or officials that have limited time for attending meetings. The GNDNERR also organizes research symposiums every other year. These meetings allow researchers to showcase their work by providing a venue for interested researchers and practitioners to meet and discuss projects and create an atmosphere for networking and planning future collaborations. Another delivery style is one-on-one conversations or small group meetings. The CTP can provide technical advice on certain topics or connect someone needing assistance to an expert who can provide information. In the future, CTP will incorporate peer-to-peer training so audiences can learn from colleagues that have shared experiences or situations. For example, engaging a developer that has experience installing green infrastructure. The developer would present an overview of the project, the lessons learned, and then the class would tour the project. Another potential training style to include in the future will be building relationships with prominent, well respected community members or leaders and enlisting their help to engage others. Finally, all meetings are designed with time for networking among participants to build relationships among audiences, partners, and GNDNERR staff.

### *Coastal Training Program Needs and Opportunities*

The program addresses training needs on an ongoing basis through engagement with a dedicated advisory committee. This committee includes four or five individuals representing a mix of CTP training partners and representatives from prominent target audience groups (see Appendix 5 for current list of members and affiliations). Through the advisory committee, surveys, evaluations, and one-on-one conversations, the CTP can ascertain ongoing training needs in the community and provide the best service. The emerging issues and training needs we anticipate in the next five years include stormwater management, the use of green infrastructure, storm preparedness, resilient development, and marine debris. Also, to fully understand the erosion issues in GNDNERR and to evaluate management actions taken to address them, CTP will conduct at least two in-depth workshops during this management plan timeframe. Expected outputs will include report summaries and recommendations.

### *Training Related Objectives and Actions*

The CTP objectives and actions can be found starting on page 23 following the Reserve Vision, Mission, and the Priority Coastal Management Issues. The Objectives and Actions direct activities undertaken by each sector to achieve the goals that are set out in the plan. If “CTP” is found in parentheses at the end of an objective, then the objective and actions are specific to the training program.

### *Monitoring, Evaluation, and Marketing Strategies*

The CTP will continue to use post-training questionnaires to evaluate the programs. These evaluations include questions required for the CTP performance measures but also provide a mechanism to determine training effectiveness and future topics. These evaluations are used to better understand what trainings and skills are needed and used as a basis for future planning. Follow up surveys can be utilized to determine if participants find trainings useful and integrate learned skills and/or information into their work. Finally, input from the CTP advisory committee and GBCC will continue to help guide programming. The marketing and promotion of CTP programming is important for reaching our audiences. Using the established network of partners, professional associations (i.e., Association of Floodplain Managers of MS, etc.) and local organizations (i.e., Coastal Hazard Outreach Strategy Team, Audubon, Master Naturalists) to disseminate information about upcoming trainings is effective. An email list is maintained of past training participants and will be used to send out training notifications. The GNDNERR CTP works with professional associations to obtain continuing education credits for participants, which is an avenue for participants to fulfill professional education requirements. Trainings are also posted on the GNDNERR website, as well as the Gulf Coast Regional Training website and other social media platforms.

## Administrative Plan

### Organizational Framework and Management Authorities

The Administrative Plan describes the context in which the reserve is housed within the MDMR and establishes the framework by which staff address reserve priorities. The MDMR administers reserve personnel, fiscal and grant management, and day-to-day operations, under applicable state and agency policies and procedures. Staffing, volunteer, partner, and advisory group support for the reserve are described in this chapter. The administrative function at the reserve seeks to provide adequate operational support and integration of programming and staff.

The GNDNERR operates as a federal-state partnership. The State of Mississippi, through MDMR manages the operations of the GNDNERR. Mississippi Department of Marine Resources is a separate governing agency, created in 1994 by the Mississippi Legislature, with the mission to enhance, protect and conserve the state's marine interests. The mission of the MDMR is in alignment with the mission of the GNDNERR and the NERRS. The federal government, represented by NOAA OCM, provides overall system policies, guidelines, guidance, and funding support. Pursuant to the CZMA, Section 312, NOAA periodically conducts performance evaluations of the operation and management of reserves. Section 315 of the CZMA is the foundation for the creation of the NERRS.

The GNDNERR is managed by the Executive Director of the MDMR and represents the seventh program as identified in the MDMR Strategic Plan. A revised Memorandum of Understanding (MOU) between NOAA and MDMR was signed in 2013 detailing the state-federal roles in the operation of the GNDNERR (Appendix 6). An MOU also was extended on April 20, 2020, between the MDMR and SOS for the management of state held properties at the GNDNERR (Appendix 7). This provides the MDMR with the authority to take management actions on the state held properties along Bayou Heron and Pecan roads. These properties are outside of the GNDNERR boundary but exist within the boundary for the GNDNWR and are managed by direction from the GNDNERR staff.

### Current Staff and Future Needs

#### Overview

This section outlines the number of staff members currently employed to support reserve programs and their roles and responsibilities. The administrative structure of the GNDNERR within MDMR is in Figure 13 and current GNDNERR staff is detailed in Figure 14. The descriptions for each current position are described below.

#### Current Staffing

To achieve the goals and objectives of the GNDNERR's strategic plan, a staffing framework has been established that supports every sector and our capacity to accomplish additional work with external grant funded partners. The staff is comprised of a management team that guides operations led by the Director. The management team consists of the Director, Research Coordinator (MSU contractor), Stewardship Coordinator, CTP Coordinator, and Education Coordinator. Core staff, as required by NOAA, includes the manager (Director) and the Research and Education coordinators. The Grand Bay staff is operationally divided into two teams: Science and Outreach. Each team includes a variety of scientists and educators, and various contract positions, which are created as needed to achieve specific tasks. The Administrative Assistant, Special Programs and Communications Manager, and Facilities Manager are direct administrative support to the Director and all the staff. The following descriptions include all current positions. All positions are currently MDMR employees unless otherwise specifically stated below.

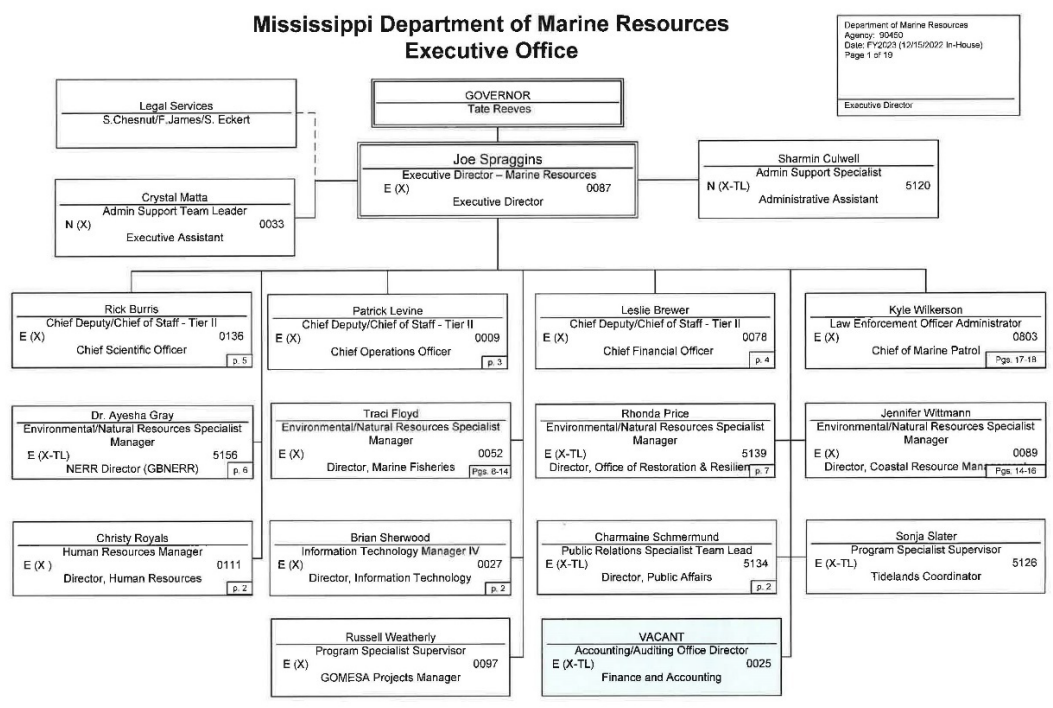


Figure 13. Mississippi Department of Marine Resources organizational chart.

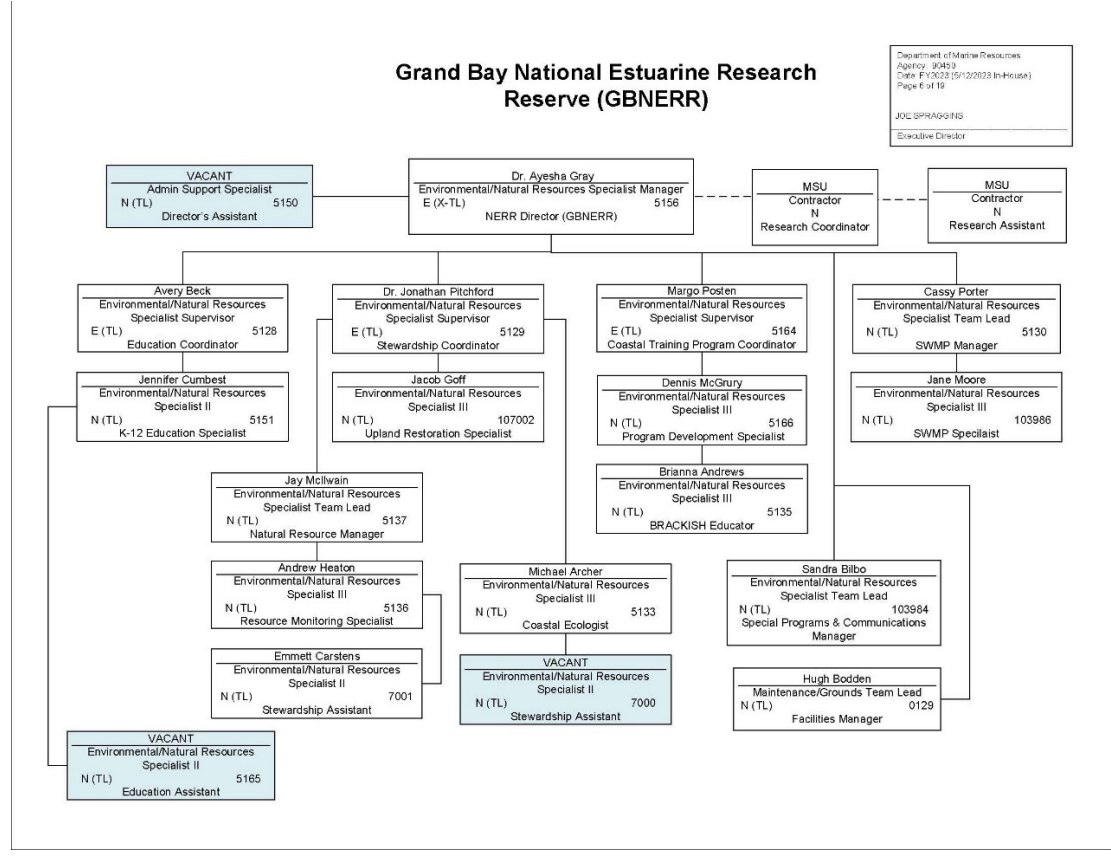


Figure 14. GNDNERR 2021 organizational chart.



### *Current Position Descriptions*

#### *Director*

The Director oversees and manages all aspects of the GNDNERR and reports to the Executive Director at MDMR. This includes reserve administration, funding, federal and state liaison activities, personnel, and the direction of all program efforts. The Director seeks feedback from the GBCC and the main liaison with the Friends of the Grand Bay NERR; serves on the NERRA Board of Directors, NERRA committees (including the Bylaws Committee) and other board assignments; and is on the MDMR senior management team. The Director is the main point of contact for emergency management activities and the press (after approval from MDMR Public Relations and Executive Director).

#### *Administrative Assistant*

The Administrative Assistant provides support to the Director and to the staff, including logistics and administrative functions. The Administrative Assistant is the main point of contact for dorm visitors, conducts orientation for new employees, schedules building use by outside entities, coordinates day-to-day financial administrative processes and smaller procurements, and supports communications. This position reports to the Special Programs and Communications Manager.

#### *Special Programs and Communications Manager*

The Special Programs and Communications Manager coordinates all aspects related to special programs and communications including the development and execution of externally funded education projects, the MDMR internship program, re-design of the interpretive center, design and development of outreach materials including GNDNERR field guides, coordination with MDMR on agency outreach activities, development and maintenance of the GNDNERR website and social networking strategy, and other opportunities as they arise or are developed. The Special Programs and Communications Manager reports to the Director.

#### *Facilities Manager*

The Facilities Manager coordinates all aspects of the facility including the electrical and mechanical systems, develops maintenance schedules, establishes relationships with vendors and contractors providing support services, maintains the grounds, conducts inventory with MDMR, and maintains all vehicles and vessels. The Facilities Manager reports to the Director.

#### *Research Coordinator*

The Research Coordinator oversees the research sector. This includes conducting and funding research studies to address management priorities, coordinating with local and regional university faculty, developing projects and providing scientific mentorship to staff and graduate students, overseeing the SWMP water quality and sentinel site monitoring, coordinating the Davidson Fellowship program, communicating research results on a variety of platforms, and assisting with translating research into management actions or activities. The Research Coordinator works to integrate their work with all reserve sectors. The Research Coordinator represents the interests of the GNDNERR in the national research sector and promotes the NERRS Science Collaborative and other national initiatives locally and regionally. The Research Coordinator is a contractor through the MSU and is an MSU employee. The Research Coordinator reports to the Director.

#### *Stewardship Coordinator*

The Stewardship Coordinator oversees the stewardship sector. This includes conducting and funding research studies, conducting ecosystem restoration efforts and associated effectiveness monitoring, all land management and resource use activities, assisting with monitoring efforts associated with sentinel sites, facilitation of research efforts, and coordination with land management partners. The Stewardship

Coordinator coordinates with NOAA OCM on the sector work and national initiatives and serves on MDMR's Restoration Coordination Team (RCT). The Stewardship Coordinator reports to the Director.

#### *Education Coordinator*

The Education Coordinator oversees the education sector at the GNDNERR including community education, the On the Road program which is in-class and field experiences for students at local schools, regional environmental education initiatives with partners, teacher professional development workshops, and other aspects of informal estuary education. The Education Coordinator works with the CTP Coordinator and the Science team to translate GNDNERR science into curricula and programs for all ages. The Education Coordinator also works with community partners to engage non-traditional audiences, including veterans, artists, the disabled, and programs for all age groups from toddlers to the elderly. The Education Coordinator maintains the NOAA education database and represents GNDNERR in the national education sector. The Education Coordinator reports to the Director.

#### *Coastal Training Program Coordinator*

The CTP Coordinator develops the initiatives of the training sector, including communicating GNDNERR science to local stakeholders, developing and providing workshops in technical assistance, working with MDMR and other partners to improve coastal management using various approaches including green infrastructure, and interfacing with local governments and decision-makers regarding their needs for information and science. The CTP Coordinator builds partnerships with local groups, including the Friends of the Grand Bay NERR, to establish sources for volunteers, citizen science projects, planning and logistics for GBCC meetings, and other types of outreach activities. The CTP Coordinator manages the development of new outreach program initiatives, develops external grants to fund projects related to the goals and objectives of the GNDNERR, and coordinates activities with the national system, regional NERRs, and other partners. The CTP Coordinator reports to the Director.

#### *Natural Resource Manager*

The Natural Resource Manager reports to the Stewardship Coordinator and is mainly responsible for land management activities at the GNDNERR. This includes all aspects of prescribed burning and wildland firefighting in coordination with USFWS GNDNWR, invasive species treatment and removal, mastication, timber stand improvements, clearing of fire lanes and underbrush, equipment operation and maintenance, assistance with field studies, coordination and leadership of land management volunteer groups, and trail maintenance. For the period of this management plan this position is partially funded by the NRDA Grand Bay Land Acquisition and Habitat Management project.

#### *Resource Monitoring Specialist*

The Resource Monitoring Specialist reports to the Natural Resource Manager and is mainly responsible for effectiveness monitoring associated with land management activities, such as vegetation and vertebrate response to prescribed burns, invasive removal, and clearing. This position develops and reports on this work and other associated research studies. This position is also trained in prescribed burning and assists the Natural Resource Manager with land management activities. For the period of this management plan this position is partially funded by the NRDA Grand Bay Land Acquisition and Habitat Management project.

#### *Upland Restoration Specialist*

The Upland Restoration Specialist reports to the Stewardship Coordinator and is mainly responsible for assisting with the planning efforts and partner coordination associated with the upland restoration efforts. This position also works on wetland restoration projects and is trained in prescribed burning and assists the Natural Resource Manager with land management activities. This position also works on control of invasive species (i.e., feral hogs, invasive plants).

### *Coastal Ecologist*

The Coastal Ecologist reports to the Research Coordinator and is mainly responsible for monitoring activities associated with the sentinel sites and developing research projects associated with activities in the emergent marshes, including the determination of above- and below-ground biomass and studies on the Phase IV NRDA Restoration of Intertidal and Subtidal Reefs in Mississippi Estuaries project. The Coastal Ecologist pursues studies under the guidance of the Research Coordinator that address the GNDNERR management priorities and coordinates with university partners and may or may not be associated with external grant funds.

### *Stewardship Assistants*

There are two Stewardship Assistant positions at the GNDNERR. One reports to the Resource Monitoring Specialist and aids all stewardship initiatives associated with the effectiveness monitoring for the NRDA project, designs and conducts vertebrate ecology studies, internal research projects, and other work to address the GNDNERR management priorities. The position also maintains the GNDNERR herbarium. The other reports to the Upland Restoration Specialist and assists with uplands restoration planning, stakeholder communications and engagement, and other stewardship initiatives associated the Stewardship sector. Funding sources for these positions vary.

### *SWMP Manager*

The SWMP Manager coordinates the day-to-day activities associated with water quality, weather and nutrient monitoring and reports to the Research Coordinator. This includes equipment maintenance, collecting and analyzing samples, troubleshooting, and calibrating systems, quality checking data in accordance with standard operating procedures, and following all other guidance from the CDMO. The SWMP Manager also works with MDMR as part of the Harmful Algal Bloom Response Team.

### *SWMP Specialist*

The SWMP Specialist assists the SWMP Manager with all monitoring activities and reports. This includes activities associated with water quality, weather and nutrient monitoring and assisting other staff and visiting researchers as needed. This position reports to the SWMP Manager. The SWMP Specialist also works on internal research projects to address reserve management priorities with the Research Coordinator.

### *Research Assistant (SWMP)*

The Research Assistant works with the SWMP Specialist on activities associated with water quality, weather and nutrient monitoring and assisting other staff and visiting researchers as needed. This position is a MSU contractor and reports to the SWMP Manager.

### *Program Development Manager*

The Program Development Manager reports to the CTP Coordinator and works on developing new programs for the GNDNERR, including development of green infrastructure projects, grant funded environmental education with various partners, and other informal education opportunities. The Program Development Manager also assists the CTP Coordinator with training workshop logistics and planning.

### *BRACKISH Educator*

The BRACKISH Educator works on an externally funded education program and provides in-school and on-site environmental education opportunities for eight graders in Moss Point. This position reports to the Program Development Manager.

### *K-12 Education Specialist*

The K-12 Education Specialist mainly works on the On the Road education program and provides in-school and on-site environmental education opportunities for surrounding school districts. This position reports to the Education Coordinator.

### *Other Team Members*

The GNDNERR will employ a variety of contractors to assist with various projects, including internships, graduate students, and others.

### *Future Needs*

By the end of this management plan, efforts will be made to fill these additional five positions as funding allows. Figure 15 is an organizational chart for staffing at GNDNERR by the end of the management plan period, and the following descriptions provide information on the roles and responsibilities of future positions.

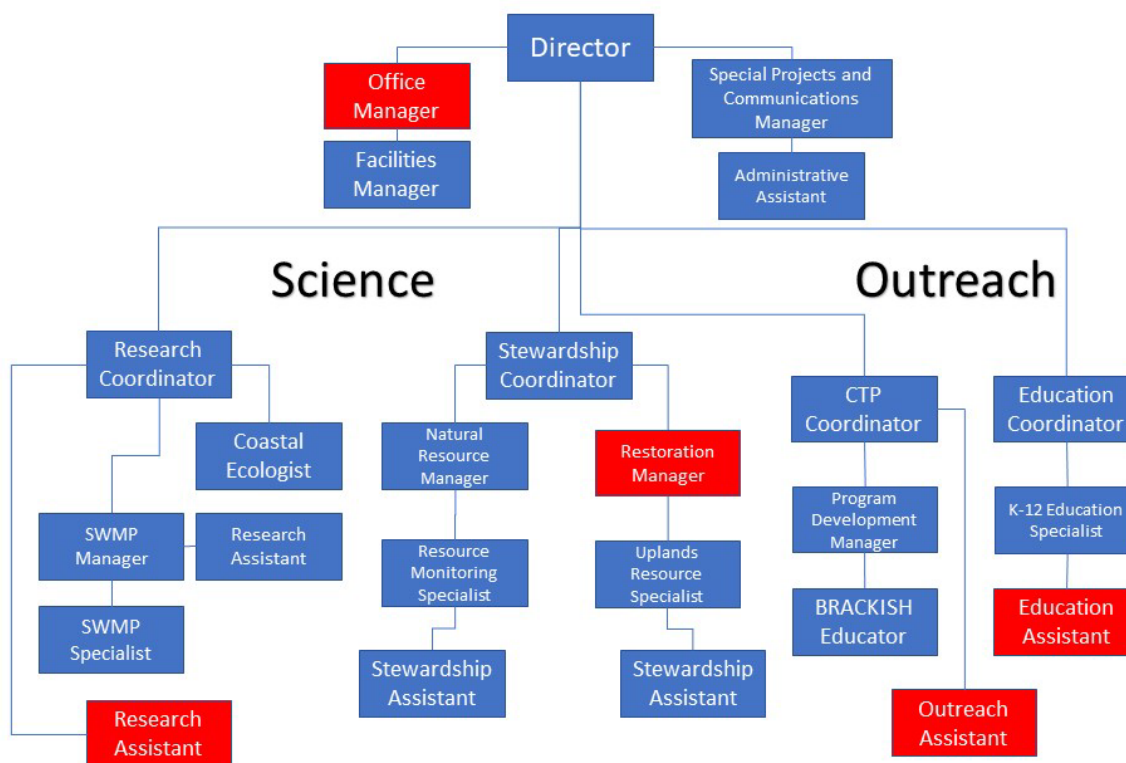


Figure 15. Future GNDNERR organizational chart.

### *Office Manager*

The Office Manager position will assist the Director in certain tasks associated with the administration and management of the GNDNERR, specifically with finance processing, personnel support, facility management projects, coordinating large procurements, and day-to-day operations. The Office Manager will report to the Director.

### *Restoration Manager*

A supervisory Restoration Manager is needed to lead the initiatives associated with landscape-scale restoration in the GNDNERR including wetlands and uplands restoration, and development and management of projects potentially associated with infrastructure revision, hydrological restoration, etc. The Restoration Manager position will report to the Stewardship Coordinator. This position will supervise the Uplands Restoration Specialist, one of the Stewardship Assistants, and periodic internship positions.

### *Outreach Assistant*

The Outreach Assistant will work on all aspects of outreach including green infrastructure projects, community relations and the GBCC, outreach materials, and short-term outreach associated with external grants. This position will be responsible for enhancing and coordinating volunteer efforts and be responsible for logistics associated with training workshops and other events. The position reports to CTP Coordinator.

### *Education Assistant*

The Education Assistant will report to the Education Coordinator and assist with all aspects of the education sector including community education events, science fair, and short-term education initiatives associated with external grants. The Education Assistant will provide support for the On the Road program and increase the capacity and reach of the education sector.

### *Research Assistant*

The Research Assistant will report to the Research Coordinator and assist with all types of internal and external research projects. This position will exist as a contract with a university partner (most likely) and be in pursuit of a graduate degree on a project that addresses the management concerns of the reserve.

## **Strategic Partnerships**

The administration of the GNDNERR works through many collaborative partnerships with various agencies, organizations, and individuals at many levels of engagement from sponsoring events to teaching workshops, establishing contractual relationships, coordinating activities, and many more things. These partnerships leverage many participants and community support to achieve the core functions of the reserve more efficiently.

### **Key partnerships and opportunities for administration**

In addition to the state partnership with MDMR, MSU is a key partner to the GNDNERR in that they provide our Research Coordinator, Research Assistant, and have provided avenues to train graduate students who sit at the GNDNERR and work on projects funded by MDMR. Future partnerships with the Friends of the Grand Bay NERR who provide a source of volunteers, promotion for our work, and limited support for events in the form of food, support, and supplies are anticipated during this management plan. Chevron Pascagoula Refinery partners with the GNDNERR on outreach events where they provide boats, refreshments, a booth at the Peter Anderson Festival, and other promotion for our program. New partnerships to further the goals and objectives of the GNDNERR are anticipated in the next five years.

## **Advisory Committees**

Reserve advisory committees are a collection of stakeholders from the community who assist in guiding the programs at the reserve to ensure our service to the community. The main advisory committee for the GNDNERR is called the Grand Bay Community Collaborative (GBCC). The GBCC is made up of a variety of stakeholders from various local agencies including USFWS, MDMR, SOS, MDEQ, EPA, Desoto National Forest, and tribes, local teachers, university researchers, community members from the Friends



of the Grand Bay NERR, and representatives from other non-governmental organizations, such as The Nature Conservancy and Chevron (Table 1). The purpose of the group is to review our plans and initiatives, and to provide feedback. They meet annually and review our management plans, trail construction projects, outreach projects and plans, research initiatives, large- and small-scale restoration, and other initiatives.

Table 1. Grand Bay Community Collaborative participant list, 2023.

	<u>Name</u>	<u>Email</u>	<u>Title and/or Affiliation</u>
1	Rick Burris	<a href="mailto:rick.burris@dmr.ms.gov">rick.burris@dmr.ms.gov</a>	Chief Science Officer, MDMR
2	Jennifer Wittman	<a href="mailto:jennifer.wittmann@dmr.ms.gov">jennifer.wittmann@dmr.ms.gov</a>	Director, Coastal Resources Management, MDMR
3	Ray Carter	<a href="mailto:raymond.carter@sos.ms.gov">raymond.carter@sos.ms.gov</a>	MS Secretary of State Office
4	Marian Hanisko	<a href="mailto:marian.hanisko@noaa.gov">marian.hanisko@noaa.gov</a>	Gulf Learning Services Coordinator, NOAA Office for Coastal Management
5	Tina Nations	<a href="mailto:Tnations@deq.ms.gov">Tnations@deq.ms.gov</a>	NRDA/NFWF Program Manager, MDEQ
6	Jeremy Edwardson	<a href="mailto:jeremy_edwardson@fws.gov">jeremy_edwardson@fws.gov</a>	USFWS Refuge Manager, Bon Secour (MOU partner)
7	Vacant		Sandhill Crane Wildlife Refuge
8	Patric Harper	<a href="mailto:patric_harper@fws.gov">patric_harper@fws.gov</a>	Northern Gulf Program Coordinator, USFWS Coastal Program
9	Eric Sparks	<a href="mailto:eric.sparks@msstate.edu">eric.sparks@msstate.edu</a>	Director of Coastal and Marine Extension, Mississippi State University (MSU)
10	Mark Woodrey	<a href="mailto:mark.woodrey@msstate.edu">mark.woodrey@msstate.edu</a>	Research Professor, MSU
11	Kelly Lucas	<a href="mailto:Kelly.Lucas@usm.edu">Kelly.Lucas@usm.edu</a>	University of Southern Mississippi (USM)
12	Kevin Dillon	<a href="mailto:kevin.dillon@usm.edu">kevin.dillon@usm.edu</a>	Professor, USM Gulf Coast Research Lab
13	Stephen Deal	<a href="mailto:scdeal@olemiss.edu">scdeal@olemiss.edu</a>	Professor, University of Mississippi
14	Tate Thriffiley	<a href="mailto:tatethriffiley@fs.fed.us">tatethriffiley@fs.fed.us</a>	Ecologist, DeSota National Forest, U.S. Forest Service
15	Jeanne Allen	<a href="mailto:jeanne.allen@epa.gov">jeanne.allen@epa.gov</a>	U.S. Environmental Protection Agency
16	Linda Nix	<a href="mailto:linda.nix@mgccc.edu">linda.nix@mgccc.edu</a>	Education Representative (Mississippi Gulf Coast Community College)
17	Tina Miller-Way	<a href="mailto:tmiller-way@disl.org">tmiller-way@disl.org</a>	Education Representative (DISL Discovery Hall Program)
18	Debrail Crosby	<a href="mailto:DCrosby@harrison.k12.ms.us">DCrosby@harrison.k12.ms.us</a>	Education Representative (Harrison County Schools)
19	Vacant		Tribal Representative(s)
20	Will Underwood	<a href="mailto:will.underwood@dcnr.alabama.gov">will.underwood@dcnr.alabama.gov</a>	Alabama Department of Conservation and Natural Resources
21	Johanna Gertsch	<a href="mailto:johanna.gertsch@dcnr.alabama.gov">johanna.gertsch@dcnr.alabama.gov</a>	CTP Coordinator, Weeks Bay NERR
22	Dale Shirley	<a href="mailto:Dshirley@Chevron.com">Dshirley@Chevron.com</a>	Public Affairs, Chevron / President, Friends of the GNDNERR
23	Robert Smith	<a href="mailto:rsmith@wildlifemiss.org">rsmith@wildlifemiss.org</a>	Coastal Program Coordinator, Wildlife MS
24	LaDon Swann	<a href="mailto:Ladon.Swann@usm.edu">Ladon.Swann@usm.edu</a>	Director, MS-AL Sea Grant Consortium
25	Roberta Swann	<a href="mailto:rswann@mobilebaynep.com">rswann@mobilebaynep.com</a>	Director, Mobile Bay NEP
26	Tom Mohrman	<a href="mailto:tmohrman@tnc.org">tmohrman@tnc.org</a>	MS Marine Program Manager, The Nature Conservancy
27	Tim Smith		Community Member
28	Vacant		Community Member
29	Laura Bowie	<a href="mailto:Laura.Bowie@gomxa.org">Laura.Bowie@gomxa.org</a>	Executive Director, Gulf Of Mexico Alliance
30	Paul Mickle	<a href="mailto:pmickle@gri.msstate.edu">pmickle@gri.msstate.edu</a>	Director, Northern Gulf Institute

## Administrative Objectives and Actions

The reserve has identified objectives and actions for the administrative plan that ensure we have adequate administrative, operational, and financial capacity to address our goals. These are included in the strategic plan under **Goal 4: Communicate efficiently and effectively** and **Goal 5: Streamline administrative functions**. These two goals including the objectives and actions detailed in the strategic plan ensure adequate administrative and operational capacity and lend themselves to building financial capacity through efficient planning and use of resources, leveraging existing projects, and developing new external grants. Integrated administrative objectives and actions are essential to supporting all the goals of the reserve.

## Volunteer Plan

### Planning for Volunteers

Volunteer programs are common throughout the reserve system and provide an invaluable resource for accomplishing project outcomes. Developing a volunteer plan is helpful in strengthening connections with the local community, providing learning opportunities, and increasing staff capacity. Existing

volunteer efforts will be enhanced in the next five years with the assistance of Friends of the Grand Bay NERR and the addition of an Outreach Assistant position.

### Recruiting and Organizing Volunteers

The responsibility for training, mentoring, and overseeing volunteers is shared across the staff. There are recruitment and organizing efforts that are incorporated into outreach activities and events, such as sign up for interested individuals, etc., and advertisements for field volunteers that include field protocols, expectations, and other information. Staff use a variety of resources to make initial contact and gauge interest and time availability.

### Volunteer Activities

Volunteers assist with restoration projects, cleanups, field sampling, administrative support, laboratory activities, trail construction, field trip support, training event assistance and teaching, etc. Volunteers are also recruited to assist in large community outreach events such as National Estuaries Day, Star Party, and Celebrate the Gulf Marine Education Festival. Several event volunteers return each year. Volunteer guidelines and a volunteer interest form are found on the GNDNERR website. Volunteer hours are tracked through self-reporting and staff reporting in a volunteer binder. Hours and tasks are then captured on a spreadsheet and categorized as 'administrative,' 'education,' or 'research/stewardship.' Volunteer hours are used in reporting and help identify needs for future opportunities. There are also citizen science opportunities available, including the Phenology Trail, which is on the Savanna Trail and linked to Nature's Notebook. Visitors input information associated with the Phenology Trail (e.g., presence/absence of flowers, leaves, etc.), but do not log their time as "volunteer hours" in that case.

### Supervising, Evaluating, and Retaining Volunteers

Volunteers are ambassadors for GNDNERR. The Special Programs and Communications Manager will manage and direct the volunteer program and will work with the Administrative Assistant to give new volunteers an orientation on GNDNERR, which will include a building tour, staff introductions, and an overview of logging hours. The training and supervising of volunteers are the responsibility of the person on staff who is being assisted. Volunteers are trained specifically for each job.

### Friends of the Grand Bay NERR

The Friends of the Grand Bay NERR was established in 2019 and a MOU with the MDMR was executed in 2021 (Appendix 8). This group contributes to the GNDNERR volunteer program by providing a source of volunteers to support our activities. The group also provides support for our larger outreach initiatives like Celebrate the Gulf. Working with the Friends group will continue to enhance opportunities for volunteer engagement in the next five years and the capacity of our outreach programs. Coordination with the Friends group will lead to a system of recruiting and organizing volunteers built on our existing structure. Engagement with volunteers fosters a greater appreciation and knowledge of coastal resources by the local community and serves the mission of ecosystem conservation.

### Vessel and Vehicle Plan

The GNDNERR is supported by a fleet of vehicles and vessels including our newest addition, the *Miss NERR* (Table 2). Most of these vessels and vehicles have been provided by MDMR to support the GNDNERR program. The *Miss NERR* was custom built in 2018 according to specifications provided by the Director and staff, and the build was fully funded with state resources. Replacement boat motors have periodically been purchased for some vessels. The staff and MDMR conduct a portion of boat, trailer, and vehicle maintenance. Occasionally local service providers are needed to service equipment. As with all equipment, regular maintenance schedules are in place for our vessels and vehicles. The reserve uses several kayaks for education and research projects. All the equipment will depreciate and experience normal wear. The two vehicles already experiencing issues are the 2006 F-250 and the 2007 F-150,

which are due to be replaced in 2023. There is a new motor on the 20' Lynn, and a motor in good condition on the 18' Lynn. The 20' trailer will probably need to be replaced within this five-year period. The 18' trailer has new springs and axle, and the tongue was replaced recently. A new trailer was recently purchased for *Miss NERR* that will be used for transport and storage during larger storms. *Miss NERR* is in good condition but needs ongoing, minor maintenance. New motors for the *Miss NERR* were purchased in 2023 with state resources and are expected to operate in good condition throughout this five-year period. The 16' G3 is in good condition and is beneficial for many activities. The Gator is in good condition.

Table 2. The GNDNERR vehicle/vessel equipment inventory.

Make	Model	Year	Motor	Trailer	Notes
Lynn	Aluminum Flat Bottom - 18 Foot	2003	70 HP Yamaha F70LA 2015 18' Lynn	19' Sport Trail 19' Trailer 1819 2012 18' Lynn MP	
Lynn	Aluminum Flat Bottom - Marine Patrol	2003	115 HP Mercury N/A N/A 18' Lynn MP	18' Magic Tilt SKT-2070 2800 2015 18' Lynn	
Lynn	Aluminum Flat Bottom - 20 Foot	2004	150 HP Yamaha VF150LA 2019 20' Lynn	20' Magic Tilt ALSK2028 2011 20' Lynn	
Silverships	Custom Estuary Traveler - Miss NERR	2018	Yamaha F300XCB Motor 6KFX-1009070	Sport Trail CTTAL35 2021 (new)	New motors, state funded, 2023
			Yamaha F300XCB Motor 6KGX - 1001297		New motors, state funded, 2023
Jackson	8 Tandem sit on top	2014	NA	KT Trailex Trailex UT 1000 6 2007 Kayak Trailer	
Jackson	2 Single sit on top	2014	NA		
Pelican	1 Single sit on top		NA		
Ford	3/4 T 4x4 F-250 RCAB	2006			Major issues, due for replacement 2023
Ford	1/2 T 4x2 F-150 RCAB	2007			Major issues, due for replacement 2023
Ford	1/2 T 4x4 F-150 Crew Cab	2010			Does well
Ford	1/2 T 4x4 F-150 KCAB	2010			Does well
Chevrolet	12-Passenger Van, full size Express	2010			Major issues, due for replacement 2023
Ford	Fusion Hybrid Sedan	2011			Does well
Chevrolet	Utility/SUV Tahoe	2012			Does well
Chevrolet	SUV Traverse	2017			Excellent
John Deere	Gator ATV 825i S4	2016	50hp – 812cc- 3 cylinder- EFI- DOHC- Gas	NA	Off road transportation, supports research

For natural disaster (i.e., tropical storms) preparation, vessels and vehicles are moved to predetermined locations for protection, as stated in the 2013 GNDNERR Disaster Response Plan (Appendix 9). Small engine vehicles are transported to the top of CRC amphitheater and locked, with a security camera positioned at the vehicles. Larger passenger vehicles and vessels (boats and kayaks) are relocated to a locked compound north of Interstate 10, which makes them available when road flooding blocks access to the CRC, and the compound is protected from storm surge flooding that the CRC may experience depending on the size of the storm. The trucks and boats are staged for use by MDMR Marine Patrol in case emergency response needs arise. The GNDNERR Director oversees emergencies and communicates with staff, MDMR, and other agencies.

## Communications Plan

Good communication is essential to our mission. Communication with various audiences in many ways from providing essential and interesting information in field guides and general promotional materials to using short movies with inspiring visuals to communicate about a specific topic, finding, or discovery helps achieve our mission. Social media provides opportunities to find and connect with new audiences and followers. Audiences include local teachers and coastal managers, and this community is served by

developing opportunities that provide lessons, information, and experiences. The main communication method is presentations at scientific conferences to communicate scientific findings, project actions, or research. Other venues are used to promote our program and the national system including visits by local government officials, state representatives, high level administrators, and national congressional staff and members, which requires being adept at communicating what the GNDNERR does and why it is important to the community. The Special Programs and Communications Manager develops information about our science work for outreach to our audiences. The GNDNERR Social Media Strategy (Appendix 10) provides a plan to stay consistent with our use of social media platforms and a GNDNERR Branding Guide (Appendix 11) assists in the development of all our materials and ensures consistent design. The following is an outline of communications products in use and planned for the next five years:

### General

General avenues of public communication include digital and printed information. Our website, [grandbaynerr.org](http://grandbaynerr.org), was updated in 2022 and provides a stable, fully functional platform for communication information on our vision, mission, programs, events, and staff. Event flyers are used to promote events online and by physical distribution. Collaboration with MDMR results in a newsletter that is produced and distributed to our local stakeholders through print and electronic means, such as email or posted on our website. Sector one-pagers will be used in the Interpretive Center to provide details on each sector, and available as hard copies for walk-in visitors and participants of events and workshops.

### Social Media Presence

In the last five years, our social media presence has increased by making intentional educational Facebook posts, engaging with audiences through Twitter, and adding accounts and content on visual platforms such as Instagram and YouTube. Social media provides opportunities for online engagement and education while also recruiting individuals to visit or participate in events at GNDNERR. The GNDNERR Social Media Strategy (Appendix 10) was created in 2018 and will be updated in the next five years. Field guides are developed and distributed to increase knowledge of natural history.

### Public Presentations by Audience

Interacting with various audiences are avenues for communicating GNDNERR work. All GNDNERR staff participate in public presentations from short conversations with walk-in visitors to booths are events to on-site presentations in schools to formal presentations at national scientific and educational conferences. The following list highlights target audiences and modes of public presentations they may encounter with GNDNERR staff:

- Walk-in Visitors and Families – Interpretive Center and building tours, open house events
- General Public – Booths at festivals, events, county fairs, etc.
- Scientists and Educators – Conference presentations, professional development workshops
- Pre-K – Story Time and other children engagement activities
- K-12 Students – Field trips, in-school presentations, virtual programming
- College Students – Field trips, volunteer work
- Retired Audiences – Local community centers outreach, volunteer work
- Veterans – Outreach programming
- Artists – Nature-based art workshops
- Administrators, Policy Makers, Local Officials – Briefings, site visits, event engagement

## Facility Development and Improvement Plan

### Purpose of Facilities and Construction Principles

The Grand Bay CRC is the main facility for the reserve and its overall purpose is to support our programs, our partners' research, and conservation efforts, and to provide a place for community events (Figure 16). The vision for the Grand Bay CRC is that it provides an example of sustainability for the Mississippi Coast and houses estuarine science and coastal management experts in partnership with the MDMR in service to our local community. Our facility includes offices, dormitory space, classrooms and meeting space, research laboratories, and an interpretive area. The Grand Bay CRC exists on the GNDNWR, i.e., a state-owned building on federal land. The building is a representation of a permanent partnership between the GNDNERR and the GNDNWR, and a portion of the building is rented to USFWS and houses Refuge employees and other USFWS program's employees, such as the Coastal Program and the Ecological Services Program. A Memorandum of Agreement with the USFWS details the Rental Agreement for use of the Grand Bay CRC with MDMR (Appendix 12). The facility is a key part of our programming both through allowing visitors to be immersed in the habitats being restored and protected, and by encouraging use of the building by our community for meetings and functions. The facility is owned and maintained by the MDMR.



Figure 16. Map view of the Coastal Resources Center.

### Description of Current Facilities

#### Grand Bay Coastal Resources Center

The location of the Grand Bay CRC is 6005 Bayou Heron Road, Moss Point, MS 39562. In 2004 initial funding was secured through a NOAA construction award to design and build permanent GNDNERR



facilities. Over time, additional state and federal funds were obtained to meet total facility costs. Construction of the Grand Bay CRC began in November 2007. Prior to that time, from 2000 until facilities were completed, the reserve offices and labs were housed in on-site modular office space. The facilities dedication was held December 7, 2009, also marking the 10th Anniversary of the reserve's original designation. The nearly 16,000 square foot facility is headquarters for the GNDNERR, GNDNWR, other USFWS programs, and Wildlife Mississippi (Figure 17). The CRC has an average of 2,000 visitors per year.

A boat shed and workshop was constructed in 2011 and in 2017 a 1,000 ft boardwalk was completed as part of the Savanna Trail. The trail visits a freshwater wetland behind the building called Hawk's Marsh, and a beaten trail circles through a restored wet pine savanna to the north of the building. These features not only enhance the ability of staff and partners to conduct research activities with storage for equipment and vehicles, it also greatly enhances the ability to engage the public on projects and activities supporting reserve priorities, such as citizen science. The GNDNERR also uses a USFWS pavilion and other lands located on Gautier Bayou for educational programs, and GNDNWR allows use of a storage facility north of I-10 on Independence Road.



Figure 17. East facing view of the Grand Bay Coastal Resources Center.

### Green Building Design

A major consideration in planning for the facility was to design in the most environmentally sustainable manner possible. Goals for such a design were to reduce operational costs, reduce construction material waste, reduce the carbon footprint, conserve water and energy and demonstrate resilience. The green design of the building focused on standards established by the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED) certification program. The CRC achieved a GOLD LEED Certification (Appendix 13), the second highest level possible, for the implementation of its sustainable

design. A 7,000-watt solar power system was added to the CRC power grid, the first of its kind in the local power cooperative's service area. In 2015, all the exterior and interior building lighting was converted to LED, which saves energy and reduces replacement costs. In 2017, the deck of the building was also remodeled using composite decking. This is a recycled material with a long-life span. This re-decking was fully funded by the State of Mississippi.

Following these original intents in the building of the facility, the Grand Bay CRC has been used as an example in architecture and design for several buildings in the local area including the Pascagoula River Audubon Center and the USM's Marine Education Center. The facility was also used as an example for a Louisiana State University architecture class that was doing a design project for the future Louisiana NERR. The teachers and students made an overnight visit to the Grand Bay facility and used the building and the environment as inspiration for their designs.

### Facility Challenges and Gaps

The most prevalent current facility gap to providing for programmatic activities is the limitation in office space. Reserve operations and leveraging capabilities for other projects has grown since the building was completed in 2009, and as of 2023, all available office space for the GNDNERR is in use. Additional office space is necessary to increase our programmatic and external grant capacity. Substantial remodeling of the building could accommodate this need by removing an air exchange system, energy recovery ventilator (ERV) which substantially increases electricity costs in the building and has not been used since 2014. A cost-to-benefit analysis will be completed with this management plan to fully understand the practicality, costs and benefits of remodeling and converting the space occupied by the ERV to additional offices.

Other challenges with the Grand Bay facility include cost, operation, and failure of the rainwater collection system, failure of some of the sustainability features (e.g., the Watt Stopper), problems associated with aging buildings (e.g., wind and water damage), and pest infestations. In 2016, the rainwater collection system was taken offline after numerous repairs, including replacing or repairing the collection liners, the gutter systems, and the control panel. Plumbing problems under the collection units and additional problems with the control panel prompted a reevaluation of the use of the system. The rainwater collection was used exclusively for boat water washdown and toilet water flushing. The costs associated with maintaining the system were not appropriate considering the building well could provide for both uses at no cost.

In 2019, the stormwater overflow pond in front of the building was restored with native vegetation and enhanced to collect runoff. This pond provides adequate collection of the stormwater runoff created by the building, an accessory function of the rainwater collection system, and therefore provides similar functionality with dramatically lower cost. This pond is now commonly used for outreach programs and workshops since it is filled with native plant species, many wild recruits, and a plethora of fauna.

Sustainability features, such as the failed Watt Stopper, were replaced with simple solutions such as a timer. The timer is set to turn on and off the outside lights with the sunrise and sunset. It serves the same function as the Watt Stopper, but at a fraction of the cost. The timer was installed in 2015.

The facility has several problems associated with aging, including cracks and cosmetic problems associated with beams twisting, but the most serious problem is associated with the settling that has caused numerous gaps where the walls and ceilings meet. The design of the building has made addressing this problem exceptionally challenging as the equipment needed to access the high relief roofs is not available from every vendor. These gaps have led to pest infestations including our current Guinea wasp infestation that has proved quite disruptive to staff and events. The wasps are aggressive, and many visitors and staff have been stung. This problem is exacerbated by our remote location which

has a response time of at least 10-15 minutes for emergency services. Currently, the problem is being addressed by treating the outside of the building with traditional pesticides to reduce the infestation. Remote facilities may enhance visitor experiences in several ways, but they also present important and practical challenges (such as response time) that should be included in any site evaluation.

There are gaps in facilities needed to support our programmatic activities and reserve operations, including new construction, repairs, and remodeling. The gaps include: making repairs to the building to prevent pest infestations; enhancement of our storage facility for the outreach vessel, *Miss NERR*; adding a platform at the end of the Savanna Trail boardwalk for education programming; resurfacing the parking lot to prevent ponding and eliminate source of foreign sediment (from trucked in gravel); improving our exhibits; water filtration system; and remodeling the dorms to add more living space.

## Planned Facilities and Infrastructure

The following provides the detailed description of the facilities in the planning process. Some have designs ready for bid and construction, and others are only identified as needs. The following list is prioritized by the highest need.

### Facility Project Descriptions

#### *Renovations to the building to improve resilience to water/wind damage and prevent wasp infestation*

The Coastal Resources Center needs improvements to be more resilient to storms. Due to the design of the building and normal aging and settling, many gaps have occurred between the rafters and the ceiling. These gaps allow heat to escape in the wintertime, and insects, mostly wasps, to enter and nest. There has been an ongoing problem with wasp infestations since 2014, but the species of wasp changed in 2019 to the more aggressive, Guinea wasp. These wasps have a terrible sting, and many people are allergic to the sting. There is a potential for an anaphylaxis reaction which is especially troubling considering the emergency response time to the facility is at least 10-15 minutes. The recommendation for solving the problem is to seal all the cracks in the building. This sealing will also help with energy efficiency. Additionally, upon inspection, many areas of the building have been found to suffer from water and wind damage due to age and storm frequency. To make the building more resilient, these problems will also need to be fixed. The timeline for construction is within the next 2-3 years, and the estimated cost is \$500,000.

#### *Bayou Heron boat launch upgrades and storage facility for the Miss NERR*

The Bayou Heron boat launch is heavily used by hunters, fisherman, and kayakers as one of the main access points for the GNDNERR. The pier and boardwalk are in disrepair and there are problems with shoreline erosion. *Miss NERR* is a large outreach vessel that is housed in the boat lift at the Bayou Heron boat launch. She needs additional boardwalk space for loading/unloading, better security and protection from the sun. An access launch for kayaks would also improve the visitor experience. This project would repair and enhance the pier and boardwalk, add a kayak launch, reinforce the area with green infrastructure, and build a roof over the boathouse with storage space for the vessel's accessories, such as a large Plexiglas viewing tank, crane, and haul seine. The timeline for construction is in the next 2-3 years and the estimated cost is \$300,000.

#### *Improving the GNDNERR Interpretive Center exhibits*

There is a need to improve the exhibits at the GNDNERR. In 2016, a terrapin live display was added and in 2017 a large viewing tank was built. This one live display greatly improved the quality of our outreach in the center. While our other displays are beautiful and tell an interesting story about the reserve and the refuge, they are ageing and suffering from wear and tear. Many of the aspects of the displays are also outdated and unworking. There is a need to improve the displays at the GNDNERR, to update them, and add more live displays. Interactive live displays would greatly enhance the experience in the

Interpretive Center. Collaborative work is occurring in 2023 through an external grant to do planning and design for this work. The estimated timeframe is within the next 2-3 years and the estimated cost is \$500,000.

#### *Removal of the ERV and creation of additional office space*

The ERV, in addition to requiring a large amount of energy to operate, also takes up a significant amount of space in the building (approximately 500 square feet). Depending on the results of the cost-to-benefit analysis, removal, and remodeling of the ERV can provide additional space for offices. The timeline for potential construction is in the next 3-4 years with an estimated cost of \$500,000.

#### *Bird blind and viewing platform on Hawk's Marsh*

The Savanna Trail was completed in 2017 and has attracted many visitors in addition to providing many opportunities for outreach and citizen science. Enhancements to the trail would include a bird blind and viewing platform overlooking the freshwater marsh and providing access to the water's edge. Through a collaborative process in 2016, working with the GBCC, plans for these structures were developed. Those plans were put out to bid twice, but on both occasions the bids were higher than available funds, so the project was not completed. The timeline for construction is in the next 3-4 years and the estimated cost is \$200,000.

#### *Expansion and resurfacing the parking lot and installation of green infrastructure at the CRC*

The parking lot at the facility was originally planned as porous asphalt but due to restrictions in available funds, only the handicap spaces were surfaced with this product. The parking lot is currently gravel and has significant issues with sedimentation and ponding, in addition to associated problems with bringing in foreign gravel and sediment to the area. Working with USFWS, in 2017, a proposal was developed to resurface the parking lot to reduce the sediment input, but the proposed project was not funded. In the next 5 years, we would like to expand and resurface the parking lot and add green infrastructure. The estimated cost is \$350,000.

#### *Water filtration system*

The water for the facility is provided by an on-site well, and due to the wet pine savanna environment, that surrounds the facility, that water is high in tannins. The water is functional and made potable by monthly treatments, but it is not the best to drink and does stain sinks, toilets, etc. A water filtration system could be installed to treat and filter the well water to eliminate problems with staining and flavor. The estimated timeframe is within the next 5 years and the cost is \$45,000.

#### *Remodeling the dorms to add more living space*

The GNDNERR dorm is heavily used by visiting researchers, workshop participants, collaborating scientists, and others. Our occupancy rate is on average 200 days per year (before 2020). The dorm has sleeping space for 20, but only sitting space for eight. A remodeling of the dorms could improve the living space while keeping the same amount of sleeping space. The timeline for remodeling the dorms is within the next 5 years and the cost is \$300,000.

#### *Water quality and weather monitoring station upgrades and additions*

The SWMP stations are aging and suffering impacts from storm events. Renovation and storm resilient upgrades of the water quality and weather monitoring stations is necessary and can include the addition of new sites located closer to the Sentinel Site monitoring and storm resilient design features. The timeline for these upgrades and additions is within the next five years and the cost is \$150,000.

## Resource Protection Plan

### Overview

The primary aim of GNDNERR staff is to protect the integrity of the Grand Bay landscape to sustain the area's long-term ecological viability and to provide a stable environment for research, monitoring, and education programs (see Appendix 1). While existing federal and state regulations provide significant protection to the resources of the reserve, the potential still exists for activities to be proposed that could have a negative ecological impact. For example, shoreline protection measures and sediment management activities, while well-intentioned, must be scrutinized for consistency with the management philosophies of reserve and NOAA regulations (15 CFR 921.1 (d-e)).

{15 CFR 921.1 (d-e)} states: (d) Habitat manipulation for research purposes is allowed consistent with the following limitations. Manipulative research activities must be specified in the management plan, be consistent with the mission and goals of the program (see paragraphs (a) and (b) of this section) and the goals and objectives set forth in the reserve's management plan and be limited in nature and extent to the minimum manipulative activity necessary to accomplish the stated research objective. Manipulative research activities with a significant or long-term impact on reserve resources require the prior approval of the state and NOAA. Manipulative research activities which can reasonably be expected to have a significant adverse impact on the estuarine resources and habitat of a reserve, such that the activities themselves or their resulting short- and long-term consequences compromise the representative character and integrity of a reserve, are prohibited. Habitat manipulation for resource management purposes is prohibited except as specifically approved by NOAA as: (1) A restoration activity consistent with paragraph (e) of this section; or (2) an activity necessary for the protection of public health or the preservation of other sensitive resources which have been listed or are eligible for protection under relevant federal or state authority (e.g., threatened/endangered species or significant historical or cultural resources) or if the manipulative activity is a long-term pre-existing use (i.e., has occurred prior to designation) occurring in a buffer area. If habitat manipulation is determined to be necessary for the protection of public health, the preservation of sensitive resources, or if the manipulation is a long-term pre-existing use in a buffer area, then these activities shall be specified in the reserve management plan in accordance with Section 921.13(a)(10) and shall be limited to the reasonable alternative which has the least adverse and shortest-term impact on the representative and ecological integrity of the reserve.

(e) Under the Act an area may be designated as an estuarine reserve only if the area is a representative estuarine ecosystem that is suitable for long-term research. Many estuarine areas have undergone some ecological change as a result of human activities (e.g., hydrological changes, intentional/unintentional species composition changes—introduced and exotic species). In those areas proposed or designated as NERRs, such changes may have diminished the representative character and integrity of the site. Although restoration of degraded areas is not a primary purpose of the system, such activities may be permitted to improve the representative character and integrity of a reserve. Restoration activities must be carefully planned and approved by NOAA through the reserve management plan. Historical research may be necessary to determine the "natural" representative state of an estuarine area (i.e., an estuarine ecosystem minimally affected by human activity or influence). Frequently, restoration of a degraded estuarine area will provide an excellent opportunity for management-oriented research.



## State Management and Statutory Authorities

The protection of the GNDNERR relies on state and federal management and other regulatory authorities. In this section, we describe all the existing federal, state, and local authorities related to the protection and use of reserve resources, including the rules and regulations governing access and activities and the key partners in upholding these authorities. Existing state, federal and local regulatory agencies and programs that are relevant to the GNDNERR are summarized below.

### State Programs and Agencies

#### *Mississippi Department of Marine Resources*

The MDMR is the state Coastal Zone Management agency in Mississippi. The MCP was established and approved in 1980 under provisions of state and federal statutes: Enabling legislation for Department of Marine Resources (57-15), Mississippi Coastal Wetland Protection Law (49-27-1 to 69), the federal CZMA of 1972, as amended. The MDMR is also responsible for establishing and enforcing regulations regarding commercial and recreational fishing including shellfish harvesting. The MDMR's Coastal Resources Management (CRM) Division administers various portions of the MCP, including wetland permitting and federal consistency (Appendix 14). Likewise, CRM and Marine Fisheries divisions both played an important role in site selection and reserve management plan development. The MDMR Marine Fisheries office manages the Scientific Collection Permits for research on GNDNERR. As a unit of the MDMR, the GNDNERR staff regularly interacts and coordinates management, research, training, and public outreach activities. Resource programs and policies are consistent to the maximum extent practical with the MCP.

#### *Mississippi Department of Environment Quality*

The MDEQ evaluates and permits regulated activities that affect air and water quality and dredge and fill projects in Mississippi including NPDES permits. As a Coastal Program agency, the MDEQ will continue to coordinate evaluation of these activities in eastern Jackson County. Various divisions within MDEQ have provided, and will continue to provide, technical assistance to the GNDNERR. The MDEQ also is the State Trustee for hazardous material spills along the coast and coordinated state efforts during *Deepwater Horizon* and the phosphates spill. MDEQ Office of Restoration is currently a partner on the NRDA Grand Bay Land Acquisition and Habitat Management Project, funded by the MS TIG through the NRDA funding stream as a result of the 2010 *Deepwater Horizon* oil spill.

#### *Mississippi Secretary of State*

The SOS is the trustee of Public Trust Tidelands and charged with the policy of preservation of all state-owned water bottoms in the public interest. The SOS is a primary partner in the Coastal Preserves Program and jointly holds title to lands within the preserves. A Tidelands lease is required for all aquaculture projects, whether they are for production or research, within the reserve boundary. Tidelands leases require the written permission of the adjacent landowner.

#### *Mississippi Department of Archives and History (MDAH)*

The MDAH has oversight of the State Antiquities Act (Mississippi Code Section 39- 7-3) and serves as an advisory agency to assist in the management and protection of all historical and cultural sites located within the GNDNERR through the MCP. The MDAH is a Coastal Program agency.

#### *Mississippi State Department of Health (MSDH)*

The MSDH enforces state and local regulations relating to sanitation and individual wastewater treatment systems (i.e., septic systems). Under its authority, the MSDH approves and permits the siting of residential septic systems.

### *Mississippi Department of Wildlife, Fisheries and Parks (MDWFP)*

The MDWFP has primary responsibilities for management of the wildlife and fisheries resources of the state including its boat registration, hunting, fishing, and boating licensing programs. The MDWFP also provides enforcement of these programs, primarily in freshwater areas of the state. They work closely with USFWS on hunting enforcement at the GNDNWR and GNDNERR.

### *Mississippi Oil and Gas Board/Mississippi Development Authority (MDA)*

The Mississippi Oil and Gas Board acts as the permitting agency for development of oil and gas resources within the state. The MDA promotes development activities across the state and establishes certain rules and regulations pertaining to oil and gas exploration and production in marine waters.

## Federal Programs and Agencies

### *U.S. Fish and Wildlife Service (USFWS)*

The USFWS is the primary GNDNERR partner. Approximately one quarter of the reserve acreage is located within the GNDNWR, the CRC is located on federal land, and the GNDNERR works in close partnership with the GNDNWR on all wet pine savanna and flatwoods management and restoration efforts. The USFWS has the regulatory authority (shared with NOAA Fisheries) regarding the Endangered Species Act of 1973 and is the primary regulatory authority on the Migratory Bird Treaty Act of 1918. Under the Marine Mammal Protection Act, USFWS is responsible for the protection of walrus, manatees, sea otters, and polar bears. These acts apply to reserve research and outreach activities. The USFWS is also responsible for the protection of several other protected, threatened, and endangered plants and animals that may potentially be found in the reserve. An exhaustive list of all protected, threatened, and endangered species is provided in Appendix 15.

The USFWS also makes recommendation to the ACOE regarding wetland permits. An MOU with USFWS will address these joint activities as well as enforcement within the GNDNERR. This MOU is currently in development. The GNDNWR completed a Comprehensive Conservation Plan in 2008 (USFWS 2008) to guide activities and works cooperatively with the GNDNERR staff on portions of that plan. The GNDNWR and other USFWS staff are housed in the CRC, including USFWS enforcement.

### *U.S. Army Corps of Engineers (ACOE)*

The ACOE administers the federal wetland permitting program for tidal and non-tidal wetlands within the GNDNERR and on adjacent waters and wetlands through its Mobile, Alabama District Office. The ACOE also manages the MsCIP across the Mississippi coast. This program includes the Franklin Creek Ecosystem Restoration which acquired property, removed infrastructure, and conducted some land management activities in the Pecan and Bayou Cumbest communities just north of the reserve boundaries. The properties bought by the ACOE were transferred to the SOS and are currently included in the NRDA Grand Bay Land Acquisition and Habitat Management Project. The ACOE remains interested in continuing work in the area through MsCIP specifically land acquisitions near Franklin Creek and the studies of the Escatawpa River drainage and barriers that prevent flow into Grand Bay.

### *NOAA Fisheries*

NOAA Fisheries has the regulatory authority regarding the Magnuson-Stevens Fishery Conservation and Management Act and shared regulatory authority with USFWS on the Endangered Species Act (ESA) of 1973. Under the Marine Mammal Protection Act, NOAA Fisheries is responsible for whales, dolphins, porpoises, seals, and sea lions. The regulatory authority includes identifying and mitigating impacts to essential fish habitat for regulated species, preventing impacts to species listed under ESA, and protecting marine mammals. The Marine Mammal Commission provides independent, science-based oversight of policies and actions of federal agencies as they address human impacts on marine mammals

and their ecosystems. Further, under the Endangered Species Act, the National Marine Fisheries Service (NMFS) helps protect threatened and endangered species such as sea turtles. The NMFS is also responsible for marine mammal protection under the Marine Mammal Protection Act and makes recommendations to the ACOE on wetlands permits under the Clean Water Act.

#### *NOAA/Office of Response and Restoration/Disaster Response Center (DRC)*

The DRC is the lead office for NOAA in preparing for and responding to oil and chemical releases in marine waters. The reserve was funded by the DRC to develop a Disaster Response Plan (see Appendix 9) for GNDNERR and the four other Gulf NERRs to address response and coordination relating to the trust resources of these reserves. This integrated plan is coordinated with other local, state, and federal responders and will serve as a template for similar plans for other protected areas. This will aid efforts to protect reserve resources in the event of hazardous releases or other emergencies. The GNDNERR is considered a federal trust resource in the context of a NRDA, which is jointly addressed by NOAA and other federal agencies.

#### *U.S. Environmental Protection Agency (EPA)*

The EPA has enforcement and commenting authority for the federal wetlands permitting program in addition to joint responsibilities with the MDEQ for administering the Clean Air and Clean Water acts in Mississippi.

### Local Programs and Agencies

#### *Jackson County, Mississippi*

The boundaries of the GNDNERR are located entirely within the Mississippi political subdivision of Jackson County. All local ordinances and restrictions will be followed on the reserve as applicable, however refuge lands are exempted. The Jackson County Sheriff's Department provides routine local enforcement. The reserve has maintained a close working relationship with several county offices and administrators, including the District 1 Supervisor, Board Attorney, Emergency Response Coordinator and Fire Coordinator.

### Allowable and Unallowable Uses

The reserve relies on the enforcement authorities of the USFWS, MDMR, MDWFP, and Jackson County Sheriff's Office to enforce regulations pertaining to public safety, traffic, hunting, fishing, and boating. Current regulations allow hunting on the reserve in compliance with special regulations, which are posted on the GNDNWR website and are available to the public at the CRC. All upland uses are restricted to daylight use only. Fishing within freshwaters of the GNDNWR and all-terrain vehicle use within the GNDNERR/GNDNWR are completely restricted. There are no reserve restrictions or use restraints on outside researchers; however, permits are required by USFWS and MDMR. Recreational activities such as bird watching and hiking (on two designated trails ONLY) are encouraged. Kayaking is also encouraged, especially on the Grand Bay Blueway. Fisheries within the GNDNERR include crabbing and oystering. Commercial and recreational crabbing is allowed within the GNDNERR and follows the same regulations as other areas within Mississippi waters. This includes periodic closures of the fishery and removal of all crab traps during derelict crab trap removal programs. Oyster harvest is currently restricted in GNDNERR because fecal coliform counts exceed maximum concentrations for approved waters. Should water quality improve in the future, reserve waters may become conditionally approved for recreational and commercial tonging following the same regulations as other approved oyster harvest areas within Mississippi waters as specified in Title 22, Part 1.

### Off-bottom aquaculture

Stakeholders in the GNDNERR have shown interest in allowing commercial off-bottom oyster aquaculture within the GNDNERR if the waters were approved for conditional harvest. To address this potential use of GNDNERR resources, staff have begun discussions related to potential areas for off-bottom aquaculture and have identified several pre-determined conditions that must be met by farmers, should this program be enacted. These include, but are not limited to:

- All required leases and permits are obtained from MDMR,
- An MDMR oyster check station is established,
- Off-bottom aquaculture training offered by the MDMR is successfully completed,
- No permanent structures are established,
- Appropriate Environmental Impact Assessments are conducted,
- Best farming practices are always used,
- All gear is tagged with the owner information and permitting requires all gear maintain in owner's possession, i.e., retrieval due to a storm would be the responsibility of the owner,
- No gear is staged in the marsh and if any gear enters the marsh (e.g., due to storm) the GNDNERR would be contacted for assistance with recovery,
- Activities are conducted from a boat only,
- Detailed descriptions of all activities are periodically submitted and approved by MDMR,
- Detailed hurricane plans are submitted and approved by GNDNERR,
- No impacts occur to resources (e.g., seagrasses) within the GNDNERR,
- There are no conflicts with other uses of the reserve, and
- A portion of the designated off-bottom area is used for educational purposes.

Further discussions of the potential to open an area for off-bottom aquaculture will occur in the next five years and be documented in meetings of the GBCC.

### Surveillance and Enforcement Capacities

The MDMR Marine Patrol and USFWS Law Enforcement officers are responsible for the surveillance and enforcement of rules regarding resource use within the reserve and refuge boundaries. The Director and Stewardship Coordinator regularly interface with the Marine Patrol, and the USFWS Enforcement officer is housed in the facility. There are regular communications among all parties, and the staff document and report all suspicious activity to one or both entities that then coordinate on response. The facility has a video surveillance system to record all activities occurring near the building 24 hours a day and seven days a week. Also, USFWS and MDMR law enforcement reserve the right to use surveillance equipment within the GNDNERR/GNDNWR to detect illegal activities including, but not limited to dumping, poaching, and hunting or fishing out of season or at night. Game cameras are also regularly used by the GNDNERR at several rotating locations within the reserve. These activities are always coordinated with enforcement entities and are used to support surveillance and enforcement as needed. Ongoing problems exist at the CRC with dumping, vandalism, and theft.

### Resource Protection Challenges

There is limited development within and surrounding the reserve, so most resource protection challenges are often related to misuse of reserve resources. For example, public dumping in the reserve,

or trampling of marsh vegetation during duck hunting season are two common challenges. Other challenges to resource protection include natural processes associated with erosion of marsh habitats. This is very common in marshes in the southern portion of the reserve and is being addressed in part by research efforts to understand sediment movement as it relates to marsh erosion, suspension and redeposition of sediment on the marsh platform. This is also addressed by conducting research and monitoring to better understand the longevity and function of artificial reefs and living shorelines within the reserve. To better understand the impacts of SLR and erosion, we have a well-established sentinel site monitoring program, which is detailed in the Sentinel Site Plan. Continued discussions about erosion are encouraged by the reserve and the GBCC plans to take on those discussions in the next five years. The objective is to better understand the prevailing conditions and processes in GNDNERR through research, and then to assemble natural resource managers for discussions regarding potential management actions. In the next five years, at least two in depth workshops will be completed to evaluate management actions related to problems with erosion and summarize those workshop findings into a report that includes recommended actions.

Another resource protection challenge relates to the application of prescribed fire. This is one of the most important restoration tools available to manage properties in the GNDNERR, but there are several important considerations related to wildland fire that can prevent timely application. These include weather, smoke management, proximity to major roads, and availability of qualified staff. The best way for us to address these challenges is to strengthen partnerships and develop a team of trained personnel to use prescribed fire safely and effectively. An example of our efforts includes partnerships with MDMR Coastal Preserves and GNDNWR to develop a well-qualified team of wildland firefighters that have demonstrated experience and success with the landscape-scale application of prescribed fire. There are also efforts to acquire lands that are a barrier to the application of prescribed fire across the landscape, which is detailed in the Land Acquisition Plan.



## Public Access and Visitor Use Plan

Public use of the reserve provides opportunities to develop and strengthen connections with local communities, promote awareness and conservation of coastal resources, and improve understanding of coastal restoration practices. Our philosophy is that providing visitors with positive and memorable experiences will encourage positive behavioral changes related to the valuation and use of natural resources. For these reasons, staff are continually striving to increase public use and visitor experience through innovative programming and enhancement of habitats.

### Current Public Access

Access to the GNDNERR via land is limited to Bayou Heron Road, which leads to the Grand Bay CRC at the northern boundary of the reserve (Figure 18). The CRC contains an interpretive center designed to teach visitors about the history, ecology, management, and conservation of reserve habitats. The CRC includes two classrooms that are used for education and outreach programs, and a dormitory for overnight guests (e.g., researchers, workshop participants, students). Current hours of operation at the CRC are Monday through Friday 9:00 a.m. to 3:00 p.m.

Water access to the GNDNERR includes a public boat launch owned by USFWS at the terminus of Bayou Heron Road, a public boat launch at the end of Bayou Cumbest Road owned by Jackson County, and a private boat ramp located at the end of Grand Bature Road at Point O’Pines. The reserve maintains two parking areas along Bayou Heron Road, the O’Sullivan and Hunter’s parking lots, that provide hunters with parking and access to GNDNWR and state lands. The reserve also contains several public use trails listed below.

The **Grand Bay NERR Boardwalk** is located directly west of the CRC. This 1,000 ft boardwalk was constructed in 2016 and provides visitors with views of pine flatwoods, pine savanna and an emergent freshwater marsh called Hawk’s Marsh. The boardwalk is also the location of the GNDNERR Phenology trail, which is a citizen science program developed in partnership with the National Phenology Network to document long-term changes in phenology of several common flora and fauna.

The **Savanna Trail** stems from the boardwalk and continues in a one-mile loop that passes through a wet pine savanna to the CRC parking lot. This site is considered a pristine wet pine savanna and is collectively managed by GNDNWR and GNDNERR staff since 2008. The Savanna Trail and boardwalk both contain informational signs to educate visitors on native habitats.

The **Oak Grove Birding Trail** is a 0.5-mile loop trail through oak hammock, pine savanna, and pine flatwoods habitats located approximately one mile south of the CRC on Bayou Heron Road. This trail is an active restoration site receiving prescribed fire and invasive species treatments, which should enhance visitor experience in the future.

The **Grand Bay NERR Blueway** was established with the MDMR’s Mississippi Gulf Coast National Heritage Area Program in 2017 and provides kayakers with 12 miles of paddling from Bayou Heron boat launch to the Jackson County boat launch on Bayou Cumbest Road. Signage along the trail guides kayakers across the reserve. Points of interest include Bayou Heron, Middle Bay, Catch ‘em All Bar, and the GNDNERR’s SWMP weather and water quality monitoring stations.



Figure 18. Public use and access points of interest within the GNDNERR.

### Public Access Challenges

There are some challenges with public access related to dumping, poaching and other illegal activity. The reserve staff removes debris and tracks the pounds of trash as an evaluation metric. There is also dumping of animals, especially dogs, that are taken to the Jackson County Animal Shelter. A law enforcement officer is stationed at the reserve and Bayou Heron Road and associated waterways are patrolled by the MDMR Marine Patrol division. There have been gates installed on several dead-end roads on the state lands north of the reserve and this has alleviated some of the dumping problem.

## Public Access Opportunities and the Visitor Experience

Current pine savanna and flatwoods restoration in the reserve has been carefully planned to increase visibility and public access potential. These efforts include application of mechanical and prescribed fire treatments to reduce woody mid- and overstory vegetation and promote pyrophytic vegetation (e.g., longleaf pine), and application of herbicides to reduce invasive vegetation. Many of the restoration areas were purposefully selected because of their visibility and potential for future public use. For example, there are restoration areas along Highway 90, Pecan Road, and Bayou Heron Road with the intention of increasing interest in savanna restoration and use by visitors who want to see the restored habitats. It is anticipated that restoration will increase wildlife viewing opportunities, hunting access and success, and overall aesthetic value leading to enhanced visitor experience. Several other projects are currently being developed that will lead to increased public use and visitor experience. These include establishment of a pollinator garden and wildlife viewing trail within a restoration area north of the CRC, invasive species removal and re-establishment of native wetland vegetation at the stormwater retention pond at the CRC, gating of abandoned roads to limit undesirable activity and dumping, and debris removal activities to enhance visitor experience. Themes related specifically to upland restoration will be used in outreach efforts primarily through collaborations between Science and Outreach staff (e.g., signage, workshops, StoryMaps, etc.) to maximize the opportunity to engage our community about these projects.

## Land Acquisition Plan

### Acquisition Context and Values

The administrative boundaries of the GNDNERR include approximately 18,063 acres of lands and waters in southeasternmost Jackson County, MS within the Mississippi Coastal Watershed (0317009). The GNDNERR includes Middle Bay, Point Aux Chenes Bay, Bayou Cumbest, Crooked Bayou, Bayou Heron and associated coastal wetland habitats and selected portions of coastal habitats within the boundaries of the GNDNWR (Figure 19). It is bounded on the east by the waters of Grand Bay and Middle Bay at the Mississippi-Alabama state line, on the west by Bayou Cassotte Industrial Park, on the north by Bayou Cumbest, Pecan, Kreole and Orange Grove, and on the south by the Mississippi Sound. Of the total acreage within the administrative boundary of the site, approximately 86% (15,487 acres) is publicly owned. On many of the publicly owned parcels, an undetermined acreage is at or below the mark of mean high tide and is thus considered to be Public Trust Tidelands, which are owned in trust by the State of Mississippi Coastal Wetlands Protection Act and the Public Trust Doctrine. The MS SOS documents a general determination of Tidelands status while detailed determinations are generally considered as individual parcels change ownership.

Habitats within the GNDNERR include estuarine tidal marsh, tidal creeks, shallow open-water habitats, oyster reefs, sea grass beds, salt flats, sandy beach, shell beach, shell middens, maritime forest, wet pine savanna and flatwoods, and freshwater marshes. The GNDNERR overlaps with the GNDNWR, which includes over 17,000 acres of upland habitats including wet pine savannas, pine flatwoods, oak hammocks, cypress drains, and freshwater marshes. These areas serve as a functional buffer for the estuarine habitats within the GNDNERR and provide an intact upland to estuarine ecosystem with limited development that is rare along the northern Gulf of Mexico coast. Additionally, other functional buffers in the vicinity include GNDNWR lands in Alabama, the Jackson County Mitigation Bank to the north of the GNDNERR, and several properties in Alabama east of the GNDNERR/GNDNWR that are owned by The Nature Conservancy or are part of the State of Alabama Grand Bay Forever Wild preserve. The entire GNDNERR/GNDNWR is located within the Grand Bay Savanna project area, which is an outstanding landscape in The Nature Conservancy's "Last Great Places" campaign because of the rarity and biological significance of the extensive and intact estuarine to upland ecosystem.

Public lands within the GNDNERR/GNDNWR are owned by a combination of state, federal, and local agencies, including the MDMR, SOS, Jackson County, and USFWS. The state lands are part of the Grand Bay Coastal Preserve, and the federal lands are part of the GNDNWR. Approximately 2,576 acres within the boundary of the reserve is in private ownership. Many of the public parcels include large expanses of black needlerush marsh and open water, both of which are at, or near the level of mean high tide that are considered to be public tidelands owned in trust by the State of Mississippi. Future acquisitions will be evaluated as described below to facilitate ongoing, broad-scale restoration efforts, protect an intact ecosystem, and facilitate upland migration of marshes.

### Priority Acquisition Areas

The objective of acquisition efforts is to acquire private lands from within the boundary of the reserve with priority given to those parcels that are barriers to landscape-scale restoration and conservation initiatives. Priority parcels are typically identified in partnership with GNDNWR and acquisition is always dependent on availability of funding and landowners that are willing to sell. During the 2023 – 2027 timeframe, funds will be available for land acquisition through the NRDA Grand Bay Land Acquisition and Habitat Management Project, which is funded by the MS TIG through the NRDA funding stream because of the 2010 *Deepwater Horizon* oil spill. The reserve's role in acquisition is to conduct periodic prioritization of private inholdings with GNDNWR and generate a prioritized list of parcels to share with



project partners. This includes identifying private lands within the reserve boundary and prioritizing them based on their proximity to land management activities (e.g., prescribed fire) or estuarine project areas (e.g., reef deployment areas), if the parcel is owned by a willing seller, or for other reasons such as parcel size, development risk, impediment to restoration, or conservation of imperiled species or important reserve habitat.

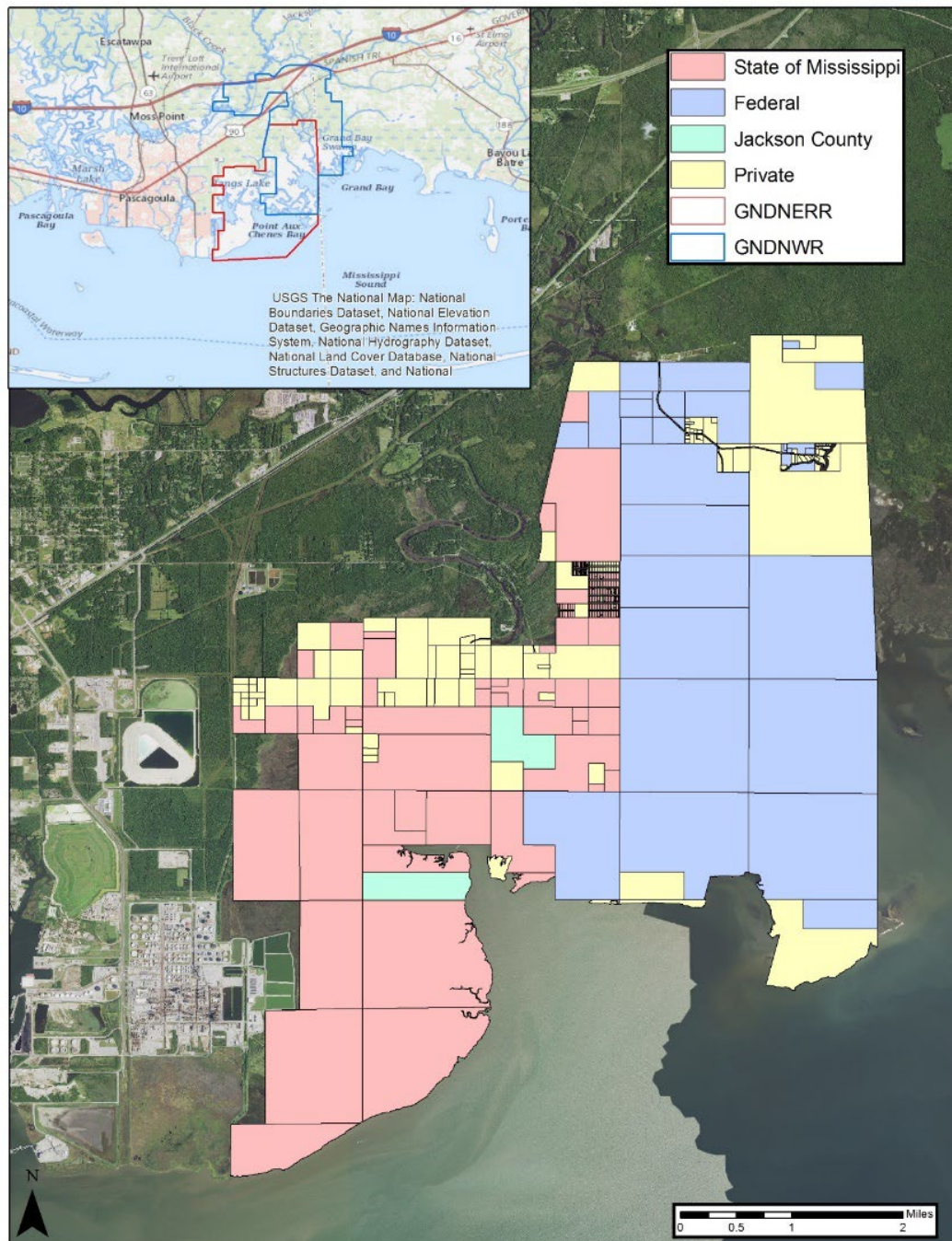


Figure 19. Boundary and land ownership within the GNDNERR.

A current approach for acquiring properties is to share our priority parcels with MDEQ, who communicates these priorities to non-governmental organizations (i.e., local land trusts who then work



directly with landowners to facilitate land acquisitions) or pursue the purchase of the lands themselves. For these lands to be transferred to the State of Mississippi, MDEQ will follow the procedures set forth by the SOS for acquisitions, which includes due diligence for all acquisitions (e.g., Phase I Environmental Assessment, surveys, etc.) and limitations on purchase price for target parcels (i.e., purchase price must be at or below appraised “Yellow Book” value). The most recent land acquisition that serves as a model for future acquisitions occurred in 2018 and included 1,573 acres that was purchased by The Conservation Fund (TCF) from a private landowner as part of the NRDA Grand Bay Land Acquisition and Habitat Management Project. This land was purchased from TCF by MDEQ and was later transferred to the MDMR following procedures set forth by the MS SOS.

### Prioritization Process and Criteria

Following NERRS regulations (§921.13), which state there should be a ranking of ecologically key land and water areas by their relative importance, GNDNERR and GNDNWR rank priority parcels targeted for acquisition. The prioritization process includes criteria such as size, location relative to active management units, potential for development, etc. All areas within the prioritization are either emergent marshland or wet pine savanna which contribute to the overall ecosystem restoration of GNDNERR and GNDNWR and include parcels along the estuarine/upland boundary to facilitate marsh migration. The prioritization of parcels is rated by A (Highest priority), B (Medium priority), and C (Lowest Priority) and agreed upon by GNDNWR and GNDNERR. A prioritized list is only made available to other agencies actively working on land acquisition projects.

### Descriptions of Priority Acquisition Areas

Prioritized acquisition areas mostly consist of pine savanna and flatwoods, but also includes emergent marshes.

### Priority Areas Acquisition Strategy

After determining the priority acquisition areas, the GNDNERR considered how to acquire lands within a priority acquisition area (waters already belong the State of Mississippi). For the next five years, the strategy consists of working with partners such as MDEQ and the MS TIG to help identify and prioritize lands, and then to work with GNDNWR to move newly acquired lands into management units.

### Tract Acquisition Strategy

In general, the tract acquisition strategy relies on learning of willing sellers, determining potential funding sources, and working with partners to approach landowners. For the next five years, the majority of effort for tract acquisition will be with our project partners at GNDNWR and MDEQ. All land sales will go through the SOS and titled to the MDMR, if acquired with state funds and occurring within the boundary of the GNDNERR. Land management will mirror existing land management efforts. Our partners may or may not also work with conservation organizations and land trusts.

### Fair Market Value Estimates

All lands to be acquired will be appraised by an appraiser approved by the state and project partners, and no land shall be acquired above appraised value.

### Estimated Acquisition Timeline

Land is currently being acquired and active acquisitions are expected to continue until 2029.

### Potential Acquisition Partners

Our main partners in acquisitions are the GNDNWR, MDEQ, SOS, and MS TIG.

### Funding Sources

The current potential funding sources are associated with the NRDA Grand Bay Land Acquisition and Habitat Management Project, which has funding until 2029.

## Restoration Plan

### Priority Restoration Areas

The highest priority management areas within the GNDNERR are wet pine savannas and flatwoods, which often have overgrown mid- and overstory vegetation due to fire suppression for the last several decades. Some of these areas are previous homesites, or roadbeds with extensive invasive species infestations. Prescribed fire is being applied to these areas to reduce mid-story vegetation and spatial coverage of invasive species, thereby increasing habitat quality for many fire-dependent species of plants and animals. Management priority is also given to estuarine-upland ecotones where marsh vegetation transitions to slash pine flatwoods. Fire management along the marsh-upland ecotone will facilitate upland migration of marshes by reducing the barrier created by overgrown mid- and overstory vegetation as sea level rises. In addition to fire, mechanical treatments in the form of mulching and select cutting, and herbicide treatments targeting invasive vegetation are used as needed to modify fuel density and distribution to initiate restoration of fire-dependent habitats where fire treatments alone would take longer to produce desirable effects. Restoration efforts within the reserve are linked with long-term monitoring of vegetation and avian community structure to help inform future restoration plans in the GNDNERR and similar restoration efforts occurring along the Gulf Coast.

Another restoration priority includes experimental efforts to protect eroding shorelines and re-establish a viable oyster population within the GNDNERR. The GNDNERR is considered a retrograding deltaic system due to the absence of river input to the estuary. Marsh edges that are exposed to wind and high-energy waves experience erosion rates as high as 6.5 meters/year (Terrano et al. 2019). Potentially contributing to shoreline loss is a decline in oyster reefs, which were historically abundant along marsh edges throughout the reserve. Oysters have declined across the Mississippi Sound due to stressors associated with freshwater inputs and loss of structured habitats (i.e., historical oyster beds). The implementation of RESTORE projects across the Gulf has resulted in many efforts to restore oysters that include components to reduce shoreline erosion. As such, the GNDNERR will implement and comprehensively monitor, in collaboration with partner agencies and universities, different strategies to increase the abundance of oysters and reduce shoreline erosion within the timeframe of this management plan.

Assessment of infrastructure revision for the upper watershed barriers and potential to use beneficial use material to reduce erosion and support habitat development for diamondback terrapins are also consideration as part of the landscape-scale restoration efforts at Grand Bay.

### Description of Restoration Areas

A large area from the northern boundary of the GNDNERR to the salt marsh ecotone is currently part of a broad-scale effort to restore wet pine savanna and flatwoods habitats (Figure 20). These efforts include restoration and habitat management with funding made available from multiple sources (e.g., NRDA, National Fish and Wildlife Foundation, GNDNERR), all in partnership with USFWS. The level of intervention needed in each area differs depending on the fire history, coverage by invasive species, etc., but the goal across the landscape is the same: to restore intact, functional wet pine savanna and flatwoods habitats as evidenced by biological community monitoring.

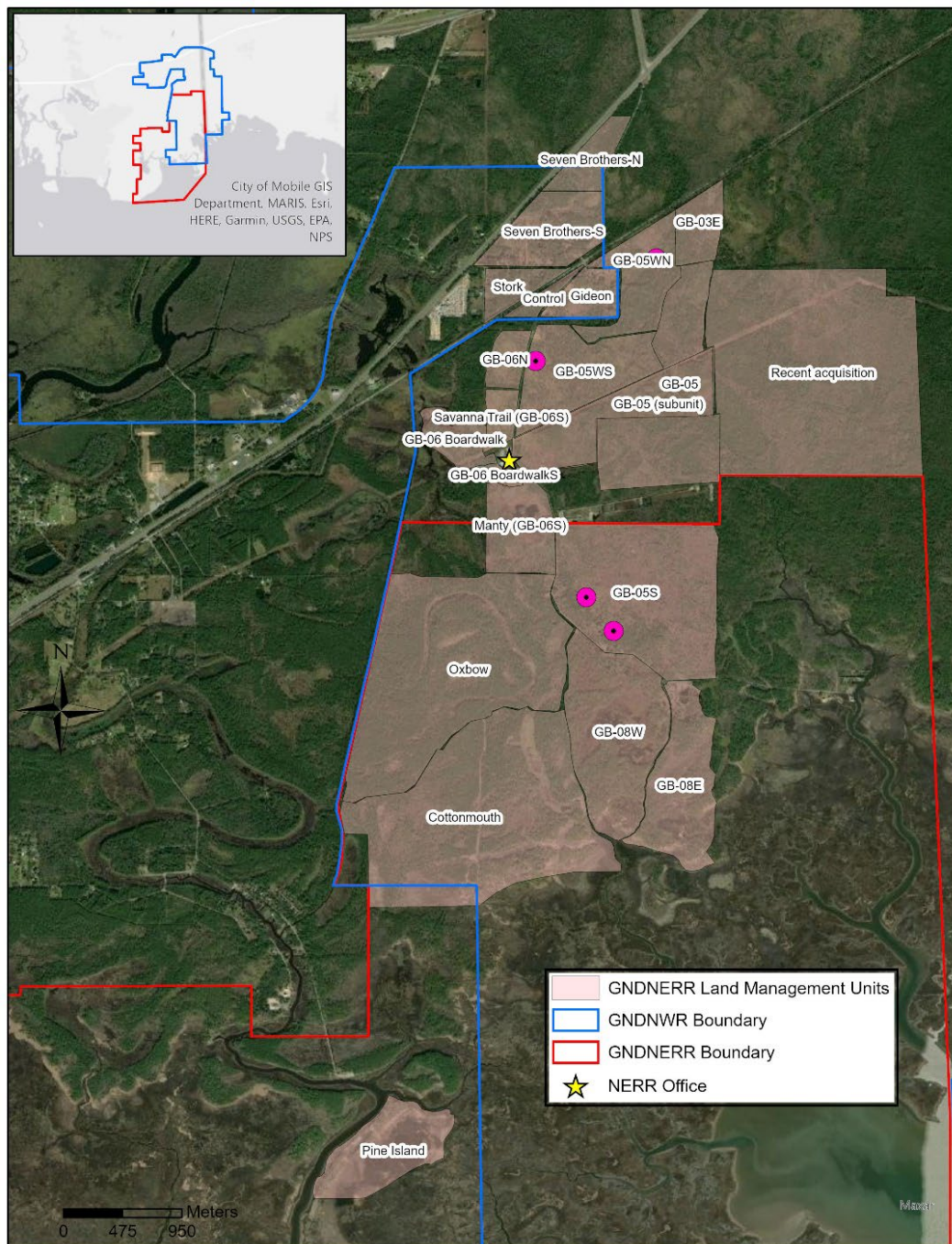


Figure 20. Active restoration areas in relation to the GNDNERR and GNDNWR and names of the 22 management units within the larger restoration footprint. Note that the “Recent Acquisition” will be subdivided into smaller management units in the future.

Areas selected for testing shoreline protection and oyster restoration strategies include an eroding shoreline at Point Aux Chenes Bay and a portion of Bangs Bayou selected for reef construction in 2021. Other areas may be selected to test strategies to reduce shoreline erosion and/or restore oyster habitat during the timeframe of this management plan; however, staff will focus on comprehensive monitoring of current projects to improve decision making about future projects (e.g., location, approach, etc.)

within the GNDNERR. This should also help to inform decisions about projects outside the GNDNERR, primarily through staff involvement with the RCT at MDMR and through outreach efforts and involvement in management application teams for restoration projects along the Gulf Coast.

### Factoring Climate and Non-climate Stressors into Restoration Planning

Recently modeled projections showed that sea level rise will have large effects on the GNDNERR (Wu et al. 2017, Alizad et al. 2018). While there are a range of potential scenarios, it is highly probable that the reserve will be affected and that the ability for marshes to migrate upslope will be important for their persistence into the future. Our upland restoration plans include areas adjacent to the salt marsh/upland ecotone that would serve as corridors or zones for upland migration of marshes. The approaches previously mentioned for upland restoration (e.g., prescribed burning, mastication, etc.) will reduce the density of mid- and overstory vegetation to facilitate this process.

As previously mentioned, our estuarine restoration efforts are designed to increase secondary productivity and reduce erosion of marsh habitats. Stressors associated with shoreline loss (e.g., increased wave energy and exposure of seaward marsh habitats, etc.) are related to climate, but may also stem from other sources (e.g., boat wakes, natural retrograding state). In either case, biotic and abiotic responses to restoration are closely monitored to ensure the complex interactions between interventions and response are understood. For example, there is evidence that reducing headland erosion may result in decreases in sediment accretion on the marsh platform. Our partners at USGS are closely looking at the relation between shoreline erosion and sediment accretion before and after reef deployments to better understand marsh response to inform future interventions within the GNDNERR and beyond.

Anthropogenic development is always a threat to Gulf Coast habitats, but our efforts to acquire and protect lands within the GNDNERR/GNDNWR are our best defense against such threats. As previously mentioned, the GNDNERR is part of the Grand Bay Savanna Complex, which is an expansive, intact ecosystem that will remain in conservation in perpetuity. Even so, there is adjacent industry and remnants of previous anthropogenic development (e.g., septic systems) that impact reserve resources. While no current projects are aimed specifically at abating these threats, resource monitoring efforts (e.g., SWMP, MDMR fecal coliform monitoring) will be used to better understand sources of pollutants and design mitigation strategies as needed. Further, the long-term impacts of hydrological barriers to the reserve (e.g., Highway 90, CSX Railroad) will also be explored as funding allows and may include designing comprehensive restoration plans to increase hydrological connectivity from upland to estuary.

### Determining Restoration Priorities

Our utmost priority for restoration is to protect and restore wet pine savanna and flatwoods, including dependent native flora and fauna, which are imperiled habitats across their historic range. Funding exists to continue land acquisition, restoration, and monitoring of these habitats through 2029. Through this work, upland migration of marsh habitats in the future will be facilitated. Other restoration priorities are identified as opportunities and funding allows. These include efforts to enhance structured habitats for oysters and protect marsh habitats through placement of artificial reefs. This project was selected for funding by several partner agencies within the NRDA Phase IV Early Restoration Program many years ago. This provided us with a unique opportunity to comprehensively monitor this project with our partners as previously mentioned. Other approaches that are currently available for marsh protection (e.g., thin layer placement of dredged materials), or efforts to restore hydrologic connectivity may also be explored in the future as opportunities and funding allows.



## Priority Restoration Project Planning

A variety of restoration projects are being discussed among GNDNERR staff and within the MDMR RCT. As such, involvement is anticipated in several restoration efforts at GNDNERR during the timeline within this management plan. Our main current focus is on understanding the effects of ongoing restoration projects, detailed below, to inform future project design and implementation.

### Grand Bay Land Acquisition and Habitat Management Project

In 2018, NRDA monies were allocated to the Grand Bay Land Acquisition and Habitat Management Project, which was initiated by the MS TIG to partially restore birds and wetland, coastal, and nearshore habitats in the project area. Objectives of this project include habitat management to restore the structure and function of target habitats within the project boundary. Staff from GNDNERR and partners from GNDNWR are working together to develop and carry out land management activities. Staff from GNDNERR are also conducting monitoring of avian and vegetation communities to inform adaptive management of the project area. Land management includes mechanical clearing to reduce woody vegetation, chemical treatments to reduce invasive species, and prescribed fire to top kill woody vegetation, decrease light attenuation and support pyrogenic vegetation. All monitoring is being designed and implemented in accordance with the *Monitoring and Adaptive Management Plan for the Deepwater Horizon NRDA Project: Grand Bay Acquisition and Management* and monitoring data will be used by MDEQ for annual trustee reporting. Further, monitoring and management staff will work closely throughout the project to understand treatment effects on vegetation structure and composition, distribution of invasive vegetation, and abundance and distribution of selected avian species and to adaptively manage project lands. The project area (currently 3,138 acres) contains lands within the GNDNERR/GNDNWR, lands only within the GNDNWR, and 17 established monitoring plots (Figure 21). Future acquisitions resulting from this project may result in an increased project footprint.



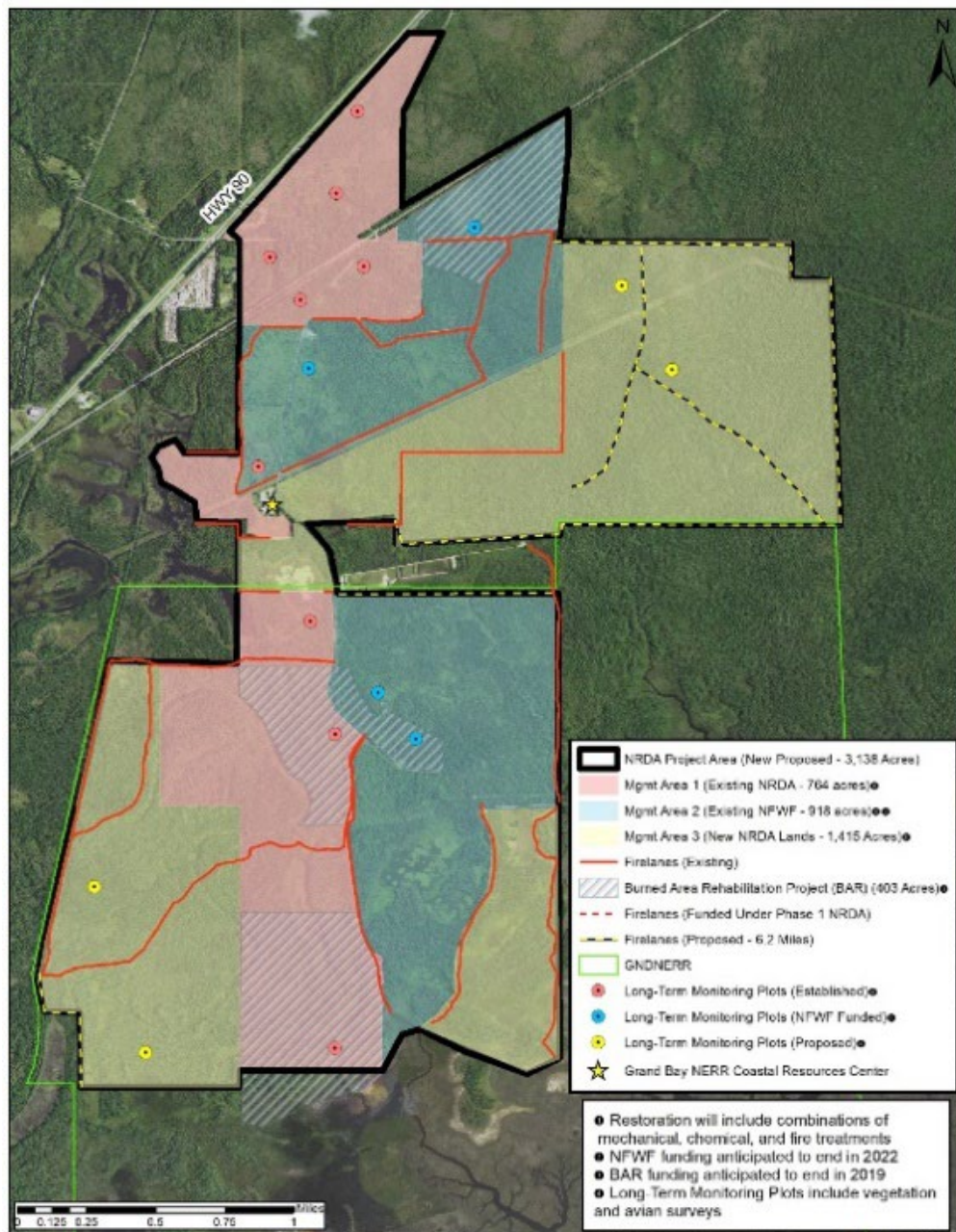


Figure 21. Priority areas and long-term monitoring stations for wet pine savanna restoration within the GNDNERR and GNDNWR.

### Comprehensive monitoring of NRDA Phase IV sub- and intertidal reefs

A current effort is underway to quantify the effectiveness and functioning of artificial reefs at GNDNERR. Artificial reefs are funded by the NRDA Phase IV Early Restoration Program and include 6.5 acres of subtidal reef along an eroding shoreline at Point Aux Chenes Bay and three acres on intertidal reef in Bangs Bayou (Figure 22). The primary material selected for the reefs is graded limestone aggregate with varying applications of crushed oyster shell and oyster bags. Material size will range from 1-inch to 4-inch stone (i.e., reef aggregate). This gradation is readily made and available from a variety of vendors. Based on experiences in Texas and Louisiana, the coarseness of this reef aggregate gradation provides a

greater surface area for shellfish spat attachment and growth. The arrangement of the subtidal reefs will include a multiple ridge design (0.2 – 3 ft) across the reef footprint. The intertidal reefs will be constructed in roughly six, 0.5-acre units. Three units will be composed of either 100% oyster shell in wire mesh bags or 30% oyster shell bags and 70% subtidal reef aggregate (i.e., limestone). Oyster shell bags will be constructed using recently shucked shell packaged in a chicken wire basket that measures 2-foot by 2-foot by 4-6 inches thick. The primary objectives of the project are to increase secondary production and reduce shoreline erosion. Monitoring for the project began in 2019 and includes multiple components including wave energy, shoreline erosion, sedimentation, shoreline vegetation, and benthic and fish communities. Project partners include USGS and MSU. The GNDNERR Davidson Fellow, an MSU master's student is also involved. Reef deployments took place in March 2021.



Figure 22. Priority areas selected for construction of sub- and intertidal reefs within the GNDNERR. The polygons show the areas being permitted for reef construction, which are larger than the final project area.

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## List of Acronyms and Definitions

GNDNERR	Grand Bay National Estuarine Research Reserve
MDMR	Mississippi Department of Marine Resources
NERRS	National Estuarine Research Reserve System
CZMA	Coastal Zone Management Act of 1972
CFR	Code of Federal Regulations
MCP	Mississippi Coastal Program
GIS	Geographic Information Systems
NOAA	National Oceanographic and Atmospheric Association
OCM	NOAA's Office for Coastal Management
USFWS	U.S. Fish and Wildlife Service
GNDNWR	Grand Bay National Wildlife Refuge
CRC	Coastal Resources Center
ACOE	Army Corps of Engineers
McCIP	Mississippi Coastal Improvements Program
NRDA	Natural Resources Damage Assessment
MDEQ	Mississippi Department of Environmental Quality
MS TIG	Mississippi Trustee Implementation Group
SWMP	System-wide Monitoring Program
ACS	American Community Survey
EPA	U.S. Environmental Protection Agency
NPDES	National Pollution Discharge Elimination System
SLR	Sea level rise
USGS	U.S. Geologic Survey
SET	Surface elevation tables
CDMO	Central Data Management Office
TOTE	Teachers on the Estuary
MSU	Mississippi State University
USM	University of Southern Mississippi
CREC	Coastal Research and Extension Center
SSAM-1	Sentinel Site Application Module 1
CTP	Coastal Training Program

NFIP	National Flood Insurance Program
CRS	Community Rating System
SOPs	Standard Operating Procedures
RTK	Real time kinematic
GPS	Global positioning system
ARL	NOAA's Air Resources Laboratory
KEEP	K-12 Environmental Education Program
WAMA	Walter Anderson Museum of Art
GBCC	Grand Bay Community Collaborative
MOU	Memorandum of Understanding
SOS	Mississippi Secretary of State's Office
RCT	Restoration Coordination Team
LEED	Leaders in Energy Efficiency and Design
ERV	Energy Recovery Ventilator
MDAH	Mississippi Department of Archives and History
MSDH	Mississippi State Department of Health
MDWFP	Mississippi Department of Wildlife, Fisheries, and Parks
MDA	Mississippi Development Association
ESA	Endangered Species Act of 1973
NMFS	National Marine Fisheries Service
TCF	The Conservation Fund

## Appendix 1: Code of Federal Regulations

### PART 921 - NATIONAL ESTUARINE RESEARCH RESERVE SYSTEM REGULATIONS

Authority: Section 315 of the Coastal Zone Management Act, as amended (16 U.S.C. 1461).

Source: 58 FR 38215, July 15, 1993, unless otherwise noted.

#### Subpart A - General

##### § 921.1 Mission, goals and general provisions.

(a) The mission of the National Estuarine Research Reserve Program is the establishment and management, through Federal-state cooperation, of a national system (National Estuarine Research Reserve System or System) of estuarine research reserves (National Estuarine Research Reserves or Reserves) representative of the various regions and estuarine types in the United States. National Estuarine Research Reserves are established to provide opportunities for long-term research, education, and interpretation.

(b) The goals of the Program are to:

- (1) Ensure a stable environment for research through long-term protection of National Estuarine Research Reserve resources;
- (2) Address coastal management issues identified as significant through coordinated estuarine research within the System;
- (3) Enhance public awareness and understanding of estuarine areas and provide suitable opportunities for public education and interpretation;
- (4) Promote Federal, state, public and private use of one or more Reserves within the System when such entities conduct estuarine research; and
- (5) Conduct and coordinate estuarine research within the System, gathering and making available information necessary for improved understanding and management of estuarine areas.

(c) National Estuarine Research Reserves shall be open to the public to the extent permitted under state and Federal law. Multiple uses are allowed to the degree compatible with each Reserve's overall purpose as provided in the management plan (see § 921.13) and consistent with paragraphs (a) and (b) of this section. Use levels are set by the state where the Reserve is located and analyzed in the management plan. The Reserve management plan shall describe the uses and establish priorities among these uses. The plan shall identify uses requiring a state permit, as well as areas where uses are encouraged or prohibited. Consistent with resource protection and research objectives, public access and use may be restricted to certain areas or components within a Reserve.

(d) Habitat manipulation for research purposes is allowed consistent with the following limitations. Manipulative research activities must be specified in the management plan, be consistent with the mission and goals of the program (see paragraphs (a) and (b) of this section) and the goals and objectives set forth in the Reserve's management plan and be limited in nature and extent to the minimum manipulative activity necessary to accomplish the stated research objective. Manipulative research activities with a significant or long-term impact on Reserve resources require the prior approval of the state and the National Oceanic and Atmospheric Administration (NOAA). Manipulative research activities which can reasonably be expected to have a significant adverse impact on the estuarine resources and habitat of a Reserve, such that the activities themselves or their resulting short- and long-term consequences compromise the representative character and integrity of a Reserve, are prohibited.

Habitat manipulation for resource management purposes is prohibited except as specifically approved by NOAA as:

(1) A restoration activity consistent with paragraph (e) of this section; or

(2) an activity necessary for the protection of public health or the preservation of other sensitive resources which have been listed or are eligible for protection under relevant Federal or state authority (e.g., threatened/endangered species or significant historical or cultural resources) or if the manipulative activity is a long-term pre-existing use (i.e., has occurred prior to designation) occurring in a buffer area. If habitat manipulation is determined to be necessary for the protection of public health, the preservation of sensitive resources, or if the manipulation is a long-term pre-existing use in a buffer area, then these activities shall be specified in the Reserve management plan in accordance with § 921.13(a)(10) and shall be limited to the reasonable alternative which has the least adverse and shortest term impact on the representative and ecological integrity of the Reserve.

(e) Under the Act an area may be designated as an estuarine Reserve only if the area is a representative estuarine ecosystem that is suitable for long-term research. Many estuarine areas have undergone some ecological change as a result of human activities (e.g., hydrological changes, intentional/unintentional species composition changes - introduced and exotic species). In those areas proposed or designated as National Estuarine Research Reserves, such changes may have diminished the representative character and integrity of the site. Although restoration of degraded areas is not a primary purpose of the System, such activities may be permitted to improve the representative character and integrity of a Reserve. Restoration activities must be carefully planned and approved by NOAA through the Reserve management plan. Historical research may be necessary to determine the “natural” representative state of an estuarine area (i.e., an estuarine ecosystem minimally affected by human activity or influence). Frequently, restoration of a degraded estuarine area will provide an excellent opportunity for management-oriented research.

(f) NOAA may provide financial assistance to coastal states, not to exceed, per Reserve, 50 percent of all actual costs or \$5 million whichever amount is less, to assist in the acquisition of land and waters, or interests therein. NOAA may provide financial assistance to coastal states not to exceed 70 percent of all actual costs for the management and operation of, the development and construction of facilities, and the conduct of educational or interpretive activities concerning Reserves (see subpart I). NOAA may provide financial assistance to any coastal state or public or private person, not to exceed 70 percent of all actual costs, to support research and monitoring within a Reserve. Notwithstanding any financial assistance limits established by this Part, when financial assistance is provided from amounts recovered as a result of damage to natural resources located in the coastal zone, such assistance may be used to pay 100 percent of all actual costs of activities carried out with this assistance, as long as such funds are available. Predesignation, acquisition and development, operation and management, special research and monitoring, and special education and interpretation awards are available under the National Estuarine Reserve Program. Predesignation awards are for site selection/feasibility, draft management plan preparation and conduct of basic characterization studies. Acquisition and development awards are intended primarily for acquisition of interests in land, facility construction and to develop and/or upgrade research, monitoring and education programs. Operation and management awards provide funds to assist in implementing, operating and managing the administrative, and basic research, monitoring and education programs, outlined in the Reserve management plan. Special research and monitoring awards provide funds to conduct estuarine research and monitoring projects with the System. Special educational and interpretive awards provide funds to conduct estuarine educational and interpretive projects within the System.



(g) Lands already in protected status managed by other Federal agencies, state or local governments, or private organizations may be included within National Estuarine Research Reserves only if the managing entity commits to long-term management consistent with paragraphs (d) and (e) of this section in the Reserve management plan. Federal lands already in protected status may not comprise a majority of the key land and water areas of a Reserve (see § 921.11(c)(3)).

(h) To assist the states in carrying out the Program's goals in an effective manner, NOAA will coordinate a research and education information exchange throughout the National Estuarine Research Reserve System. As part of this role, NOAA will ensure that information and ideas from one Reserve are made available to others in the System. The network will enable Reserves to exchange information and research data with each other, with universities engaged in estuarine research, and with Federal, state, and local agencies. ***NOAA's objective is a system-wide program of research and monitoring capable of addressing the management issues that affect long-term productivity of our Nation's estuaries.***

*[58 FR 38215, July 15, 1993, as amended at 62 FR 12540, Mar. 17, 1997; 63 FR 26717, May 14, 1998]*

### § 921.2 Definitions.

(a) Act means the Coastal Zone Management Act of 1972, as amended, 16 U.S.C. 1451 et seq.

(b) Assistant Administrator means the Assistant Administrator for Ocean Services and Coastal Zone Management or delegee.

(c) Coastal state means a state of the United States, in or bordering on, the Atlantic, Pacific, or Arctic Ocean, the Gulf of Mexico, Long Island Sound, or one or more of the Great Lakes. For the purposes of these regulations the term also includes Puerto Rico, the Virgin Islands, Guam, the Commonwealth of the Northern Marianas Islands, the Trust Territories of the Pacific Islands, and American Samoa (see 16 U.S.C. 1453(4)).

(d) State agency means an instrumentality of a coastal state to whom the coastal state has delegated the authority and responsibility for the creation and/or management/operation of a National Estuarine Research Reserve. Factors indicative of this authority may include the power to receive and expend funds on behalf of the Reserve, acquire and sell or convey real and personal property interests, adopt rules for the protection of the Reserve, enforce rules applicable to the Reserve, or develop and implement research and education programs for the reserve. For the purposes of these regulations, the terms "coastal state" and "State agency" shall be synonymous.

(e) Estuary means that part of a river or stream or other body of water having unimpaired connection with the open sea, where the sea water is measurably diluted with fresh water derived from land drainage. The term also includes estuary-type areas with measurable freshwater influence and having unimpaired connections with the open sea, and estuary-type areas of the Great Lakes and their connecting waters (see 16 U.S.C. 1453(7)).

(f) National Estuarine Research Reserve means an area that is a representative estuarine ecosystem suitable for long-term research, which may include all of the key land and water portion of an estuary, and adjacent transitional areas and uplands constituting to the extent feasible a natural unit, and which is set aside as a natural field laboratory to provide long-term opportunities for research, education, and interpretation on the ecological relationships within the area (see 16 U.S.C. 1453(8)) and meets the requirements of 16 U.S.C. 1461(b). This includes those areas designated as National Estuarine Sanctuaries or Reserves under section 315 of the Act prior to enactment of the Coastal Zone Act Reauthorization Amendments of 1990 and each area subsequently designated as a National Estuarine Research Reserve.

### § 921.3 National Estuarine Research Reserve System biogeographic classification scheme and estuarine typologies.

(a) National Estuarine Research Reserves are chosen to reflect regional differences and to include a variety of ecosystem types. A biogeographic classification scheme based on regional variations in the nation's coastal zone has been developed. The biogeographic classification scheme is used to ensure that the National Estuarine Research Reserve System includes at least one site from each region. The estuarine typology system is utilized to ensure that sites in the System reflect the wide range of estuarine types within the United States.

(b) The biogeographic classification scheme, presented in appendix I, contains 29 regions. Figure 1 graphically depicts the biogeographic regions of the United States.

(c) The typology system is presented in appendix II.

### § 921.4 Relationship to other provisions of the Coastal Zone Management Act, and to the Marine Protection, Research and Sanctuaries Act.

(a) The National Estuarine Research Reserve System is intended to provide information to state agencies and other entities involved in addressing coastal management issues. Any coastal state, including those that do not have approved coastal management programs under section 306 of the Act, is eligible for an award under the National Estuarine Research Reserve Program (see § 921.2(c)).

(b) For purposes of consistency review by states with a federally approved coastal management program, the designation of a National Estuarine Research Reserve is deemed to be a Federal activity, which, if directly affecting the state's coastal zone, must be undertaken in a manner consistent to the maximum extent practicable with the approved state coastal management program as provided by section 1456(c)(1) of the Act, and implementing regulations at 15 CFR part 930, subpart C. In accordance with section 1456(c)(1) of the Act and the applicable regulations NOAA will be responsible for certifying that designation of the Reserve is consistent with the state's approved coastal management program. The state must concur with or object to the certification. It is recommended that the lead state agency for Reserve designation consult, at the earliest practicable time, with the appropriate state officials concerning the consistency of a proposed National Estuarine Research Reserve.

(c) The National Estuarine Research Reserve Program will be administered in close coordination with the National Marine Sanctuary Program (Title III of the Marine Protection, Research and Sanctuaries Act, as amended, 16 U.S.C. 1431-1445), also administered by NOAA. Title III authorizes the Secretary of Commerce to designate discrete areas of the marine environment as National Marine Sanctuaries to protect or restore such areas for their conservation, recreational, ecological, historical, research, educational or esthetic values. National Marine Sanctuaries and Estuarine Research Reserves may not overlap, but may be adjacent.

### *Subpart B - Site Selection, Post Site Selection and Management Plan Development*

#### § 921.10 General.

(a) A coastal state may apply for Federal financial assistance for the purpose of site selection, preparation of documents specified in § 921.13 (draft management plan (DMP) and environmental impact statement (EIS)), and the conduct of limited basic characterization studies. The total Federal share of this assistance may not exceed \$100,000. Federal financial assistance for preacquisition activities under § 921.11 and § 921.12 is subject to the total \$5 million for which each Reserve is eligible for land acquisition. Notwithstanding the above, when financial assistance is provided from amounts recovered as a result of damage to natural resources located in the coastal zone, such assistance may be

used to pay 100 percent of all actual costs of activities carried out with this assistance, as long as such funds are available. In the case of a biogeographic region (see appendix I) shared by two or more coastal states, each state is eligible for Federal financial assistance to establish a separate National Estuarine Research Reserve within their respective portion of the shared biogeographic region. Each separate National Estuarine Research Reserve is eligible for the full complement of funding. Financial assistance application procedures are specified in subpart I.

(b) In developing a Reserve program, a state may choose to develop a multiple-site Reserve reflecting a diversity of habitats in a single biogeographic region. A multiple-site Reserve allows the state to develop complementary research and educational programs within the individual components of its multi-site Reserve. Multiple-site Reserves are treated as one Reserve in terms of financial assistance and development of an overall management framework and plan. Each individual site of a proposed multiple-site Reserve shall be evaluated both separately under § 921.11(c) and collectively as part of the site selection process. A coastal state may propose to establish a multiple-site Reserve at the time of the initial site selection, or at any point in the development or operation of the Reserve. If the state decides to develop a multiple-site National Estuarine Research Reserve after the initial acquisition and development award is made for a single site, the proposal is subject to the requirements set forth in § 921.33(b). However, a state may not propose to add one or more sites to an already designated Reserve if the operation and management of such Reserve has been found deficient and uncorrected or the research conducted is not consistent with the Estuarine Research Guidelines referenced in § 921.51. In addition, Federal funds for the acquisition of a multiple-site Reserve remain limited to \$5,000,000 (see § 921.20). The funding for operation of a multiple-site Reserve is limited to the maximum allowed for any one Reserve per year (see § 921.32(c)) and preacquisition funds are limited to \$100,000 per Reserve. Notwithstanding the above, when financial assistance is provided from amounts recovered as a result of damage to natural resources located in the coastal zone, such assistance may be used to pay 100 percent of all actual costs of activities carrier out with this assistance, as long as such funds are available.

*[58 FR 38215, July 15, 1993, as amended at 63 FR 26717, May 14, 1998]*

#### § 921.11 Site selection and feasibility.

(a) A coastal state may use Federal funds to establish and implement a site selection process which is approved by NOAA.

(b) In addition to the requirements set forth in subpart I, a request for Federal funds for site selection must contain the following programmatic information:

- (1) A description of the proposed site selection process and how it will be implemented in conformance with the biogeographic classification scheme and typology (§ 921.3);
- (2) An identification of the site selection agency and the potential management agency; and
- (3) A description of how public participation will be incorporated into the process (see § 921.11(d)).

(c) As part of the site selection process, the state and NOAA shall evaluate and select the final site(s). NOAA has final authority in approving such sites. Site selection shall be guided by the following principles:

- (1) The site's contribution to the biogeographical and typological balance of the National Estuarine Research Reserve System. NOAA will give priority consideration to proposals to establish Reserves in biogeographic regions or subregions or incorporating types that are not

represented in the system. (see the biogeographic classification scheme and typology set forth in § 921.3 and appendices I and II);

(2) The site's ecological characteristics, including its biological productivity, diversity of flora and fauna, and capacity to attract a broad range of research and educational interests. The proposed site must be a representative estuarine ecosystem and should, to the maximum extent possible, be an estuarine ecosystem minimally affected by human activity or influence (see § 921.1(e)).

(3) Assurance that the site's boundaries encompass an adequate portion of the key land and water areas of the natural system to approximate an ecological unit and to ensure effective conservation. Boundary size will vary greatly depending on the nature of the ecosystem. Reserve boundaries must encompass the area within which adequate control has or will be established by the managing entity over human activities occurring within the Reserve. Generally, Reserve boundaries will encompass two areas: Key land and water areas (or "core area") and a buffer zone. Key land and water areas and a buffer zone will likely require significantly different levels of control (see § 921.13(a)(7)). The term "key land and water areas" refers to that core area within the Reserve that is so vital to the functioning of the estuarine ecosystem that it must be under a level of control sufficient to ensure the long-term viability of the Reserve for research on natural processes. Key land and water areas, which comprise the core area, are those ecological units of a natural estuarine system which preserve, for research purposes, a full range of significant physical, chemical and biological factors contributing to the diversity of fauna, flora and natural processes occurring within the estuary. The determination of which land and water areas are "key" to a particular Reserve must be based on specific scientific knowledge of the area. A basic principle to follow when deciding upon key land and water areas is that they should encompass resources representative of the total ecosystem, and which if compromised could endanger the research objectives of the Reserve. The term buffer zone refers to an area adjacent to or surrounding key land and water areas and essential to their integrity. Buffer zones protect the core area and provide additional protection for estuarine-dependent species, including those that are rare or endangered. When determined appropriate by the state and approved by NOAA, the buffer zone may also include an area necessary for facilities required for research and interpretation. Additionally, buffer zones should be established sufficient to accommodate a shift of the core area as a result of biological, ecological or geomorphological change which reasonably could be expected to occur. National Estuarine Research Reserves may include existing Federal or state lands already in a protected status where mutual benefit can be enhanced. However, NOAA will not approve a site for potential National Estuarine Research Reserve status that is dependent primarily upon the inclusion of currently protected Federal lands in order to meet the requirements for Reserve status (such as key land and water areas). Such lands generally will be included within a Reserve to serve as a buffer or for other ancillary purposes; and may be included, subject to NOAA approval, as a limited portion of the core area;

(4) The site's suitability for long-term estuarine research, including ecological factors and proximity to existing research facilities and educational institutions;

(5) The site's compatibility with existing and potential land and water uses in contiguous areas as well as approved coastal and estuarine management plans; and

(6) The site's importance to education and interpretive efforts, consistent with the need for continued protection of the natural system.

(d) Early in the site selection process the state must seek the views of affected landowners, local governments, other state and Federal agencies and other parties who are interested in the area(s) being

considered for selection as a potential National Estuarine Research Reserve. After the local government(s) and affected landowner(s) have been contacted, at least one public meeting shall be held in the vicinity of the proposed site. Notice of such a meeting, including the time, place, and relevant subject matter, shall be announced by the state through the area's principal newspaper at least 15 days prior to the date of the meeting and by NOAA in the Federal Register.

(e) A state request for NOAA approval of a proposed site (or sites in the case of a multi-site Reserve) must contain a description of the proposed site(s) in relationship to each of the site selection principals (§ 921.11(c)) and the following information:

- (1) An analysis of the proposed site(s) based on the biogeographical scheme/typology discussed in § 921.3 and set forth in appendices I and II;
- (2) A description of the proposed site(s) and its (their) major resources, including location, proposed boundaries, and adjacent land uses. Maps are required;
- (3) A description of the public participation process used by the state to solicit the views of interested parties, a summary of comments, and, if interstate issues are involved, documentation that the Governor(s) of the other affected state(s) has been contacted. Copies of all correspondence, including contact letters to all affected landowners must be appended;
- (4) A list of all sites considered and a brief statement of the reasons why a site was not preferred; and
- (5) A nomination of the proposed site(s) for designation as a National Estuarine Research Reserve by the Governor of the coastal state in which the state is located.

(f) A state proposing to reactivate an inactive site, previously approved by NOAA for development as an Estuarine Sanctuary or Reserve, may apply for those funds remaining, if any, provided for site selection and feasibility (§ 921.11a) to determine the feasibility of reactivation. This feasibility study must comply with the requirements set forth in § 921.11 (c) through (e).

#### § 921.12 Post site selection.

(a) At the time of the coastal state's request for NOAA approval of a proposed site, the state may submit a request for funds to develop the draft management plan and for preparation of the EIS. At this time, the state may also submit a request for the remainder of the predesignation funds to perform a limited basic characterization of the physical, chemical and biological characteristics of the site approved by NOAA necessary for providing EIS information to NOAA. The state's request for these post site selection funds must be accompanied by the information specified in subpart I and, for draft management plan development and EIS information collection, the following programmatic information:

- (1) A draft management plan outline (see § 921.13(a) below); and
- (2) An outline of a draft memorandum of understanding (MOU) between the state and NOAA detailing the Federal-state role in Reserve management during the initial period of Federal funding and expressing the state's long-term commitment to operate and manage the Reserve.

(b) The state is eligible to use the funds referenced in § 921.12(a) after the proposed site is approved by NOAA under the terms of § 921.11.

#### § 921.13 Management plan and environmental impact statement development.

(a) After NOAA approves the state's proposed site and application for funds submitted pursuant to § 921.12, the state may begin draft management plan development and the collection of information



necessary for the preparation by NOAA of an EIS. The state shall develop a draft management plan, including an MOU. The plan shall set out in detail:

- (1) Reserve goals and objectives, management issues, and strategies or actions for meeting the goals and objectives;
- (2) An administrative plan including staff roles in administration, research, education/interpretation, and surveillance and enforcement;
- (3) A research plan, including a monitoring design;
- (4) An education/interpretive plan;
- (5) A plan for public access to the Reserve;
- (6) A construction plan, including a proposed construction schedule, general descriptions of proposed developments and general cost estimates. Information should be provided for proposed minor construction projects in sufficient detail to allow these projects to begin in the initial phase of acquisition and development. A categorical exclusion, environmental assessment, or EIS may be required prior to construction;
- (7)(i) An acquisition plan identifying the ecologically key land and water areas of the Reserve, ranking these areas according to their relative importance, and including a strategy for establishing adequate long-term state control over these areas sufficient to provide protection for Reserve resources to ensure a stable environment for research. This plan must include an identification of ownership within the proposed Reserve boundaries, including land already in the public domain; the method(s) of acquisition which the state proposes to use - acquisition (including less-than-fee simple options) to establish adequate long-term state control; an estimate of the fair market value of any property interest - which is proposed for acquisition; a schedule estimating the time required to complete the process of establishing adequate state control of the proposed research reserve; and a discussion of any anticipated problems. In selecting a preferred method(s) for establishing adequate state control over areas within the proposed boundaries of the Reserve, the state shall perform the following steps for each parcel determined to be part of the key land and water areas (control over which is necessary to protect the integrity of the Reserve for research purposes), and for those parcels required for research and interpretive support facilities or buffer purposes:
  - (A) Determine, with appropriate justification, the minimum level of control(s) required [e.g., management agreement, regulation, less-than-fee simple property interest (e.g., conservation easement), fee simple property acquisition, or a combination of these approaches]. This does not preclude the future necessity of increasing the level of state control;
  - (B) Identify the level of existing state control(s);
  - (C) Identify the level of additional state control(s), if any, necessary to meet the minimum requirements identified in paragraph (a)(7)(i)(A) of this section;
  - (D) Examine all reasonable alternatives for attaining the level of control identified in paragraph (a)(7)(i)(C) of this section, and perform a cost analysis of each; and
  - (E) Rank, in order of cost, the methods (including acquisition) identified in paragraph (a)(7)(i)(D) of this section.

(7)(ii) An assessment of the relative cost-effectiveness of control alternatives shall include a reasonable estimate of both short-term costs (e.g., acquisition of property interests, regulatory program development including associated enforcement costs, negotiation, adjudication, etc.) and long-term costs (e.g., monitoring, enforcement, adjudication, management and coordination). In selecting a preferred method(s) for establishing adequate state control over each parcel examined under the process described above, the state shall give priority consideration to the least costly method(s) of attaining the minimum level of long-term control required. Generally, with the possible exception of buffer areas required for support facilities, the level of control(s) required for buffer areas will be considerably less than that required for key land and water areas. This acquisition plan, after receiving the approval of NOAA, shall serve as a guide for negotiations with landowners. A final boundary for the reserve shall be delineated as a part of the final management plan;

(8) A resource protection plan detailing applicable authorities, including allowable uses, uses requiring a permit and permit requirements, any restrictions on use of the research reserve, and a strategy for research reserve surveillance and enforcement of such use restrictions, including appropriate government enforcement agencies;

(9) If applicable, a restoration plan describing those portions of the site that may require habitat modification to restore natural conditions;

(10) If applicable, a resource manipulation plan, describing those portions of the Reserve buffer in which long-term pre-existing (prior to designation) manipulation for reasons not related to research or restoration is occurring. The plan shall explain in detail the nature of such activities, shall justify why such manipulation should be permitted to continue within the reserve buffer; and shall describe possible effects of this manipulation on key land and water areas and their resources;

(11) A proposed memorandum of understanding (MOU) between the state and NOAA regarding the Federal-state relationship during the establishment and development of the National Estuarine Research Reserve, and expressing a long-term commitment by the state to maintain and manage the Reserve in accordance with section 315 of the Act, 16 U.S.C. 1461, and applicable regulations. In conjunction with the MOU, and where possible under state law, the state will consider taking appropriate administrative or legislative action to ensure the long-term protection and operation of the National Estuarine Research Reserve. If other MOUs are necessary (such as with a Federal agency, another state agency or private organization), drafts of such MOUs must be included in the plan. All necessary MOU's shall be signed prior to Reserve designation; and

(12) If the state has a federally approved coastal management program, a certification that the National Estuarine Research Reserve is consistent to the maximum extent practicable with that program. See §§ 921.4(b) and 921.30(b).

(b) Regarding the preparation of an EIS under the National Environmental Policy Act on a National Estuarine Research Reserve proposal, the state and NOAA shall collect all necessary information concerning the socioeconomic and environmental impacts associated with implementing the draft management plan and feasible alternatives to the plan. Based on this information, the state will draft and provide NOAA with a preliminary EIS.

(c) Early in the development of the draft management plan and the draft EIS, the state and NOAA shall hold a scoping meeting (pursuant to NEPA) in the area or areas most affected to solicit public and government comments on the significant issues related to the proposed action. NOAA will publish a

notice of the meeting in the Federal Register at least 15 days prior to the meeting. The state shall be responsible for publishing a similar notice in the local media.

(d) NOAA will publish a Federal Register notice of intent to prepare a draft EIS. After the draft EIS is prepared and filed with the Environmental Protection Agency (EPA), a Notice of Availability of the draft EIS will appear in the Federal Register. Not less than 30 days after publication of the notice, NOAA will hold at least one public hearing in the area or areas most affected by the proposed national estuarine research reserve. The hearing will be held no sooner than 15 days after appropriate notice of the meeting has been given in the principal news media by the state and in the Federal Register by NOAA. After a 45-day comment period, a final EIS will be prepared by the state and NOAA.

### *Subpart C - Acquisition, Development and Preparation of the Final Management Plan*

#### **§ 921.20 General.**

The acquisition and development period is separated into two major phases. After NOAA approval of the site, draft management plan and draft MOU, and completion of the final EIS, a coastal state is eligible for an initial acquisition and development award(s). In this initial phase, the state should work to meet the criteria required for formal research reserve designation; e.g., establishing adequate state control over the key land and water areas as specified in the draft management plan and preparing the final management plan. These requirements are specified in § 921.30. Minor construction in accordance with the draft management plan may also be conducted during this initial phase. The initial acquisition and development phase is expected to last no longer than three years. If necessary, a longer time period may be negotiated between the state and NOAA. After Reserve designation, a state is eligible for a supplemental acquisition and development award(s) in accordance with § 921.31. In this post-designation acquisition and development phase, funds may be used in accordance with the final management plan to construct research and educational facilities, complete any remaining land acquisition, for program development, and for restorative activities identified in the final management plan. In any case, the amount of Federal financial assistance provided to a coastal state with respect to the acquisition of lands and waters, or interests therein, for any one National Estuarine Research Reserve may not exceed an amount equal to 50 percent of the costs of the lands, waters, and interests therein or \$5,000,000, whichever amount is less, except when the financial assistance is provided from amounts recovered as a result of damage to natural resources located in the coastal zone, in which case the assistance may be used to pay 100 percent of all actual costs of activities carried out with this assistance, as long as such funds are available.

*[58 FR 38215, July 15, 1993, as amended at 62 FR 12540, Mar. 17, 1997; 63 FR 26717, May 14, 1998]*

#### **§ 921.21 Initial acquisition and development awards.**

(a) Assistance is provided to aid the recipient prior to designation in:

- (1) Acquiring a fee simple or less-than-fee simple real property interest in land and water areas to be included in the Reserve boundaries (see § 921.13(a)(7); § 921.30(d));
- (2) Minor construction, as provided in paragraphs (b) and (c) of this section;
- (3) Preparing the final management plan; and
- (4) Initial management costs, e.g., for implementing the NOAA approved draft management plan, hiring a Reserve manager and other staff as necessary and for other management-related activities. Application procedures are specified in subpart I.

(b) The expenditure of Federal and state funds on major construction activities is not allowed during the initial acquisition and development phase. The preparation of architectural and engineering plans, including specifications, for any proposed construction, or for proposed restorative activities, is permitted. In addition, minor construction activities, consistent with paragraph (c) of this section also are allowed. The NOAA-approved draft management plan must, however, include a construction plan and a public access plan before any award funds can be spent on construction activities.

(c) Only minor construction activities that aid in implementing portions of the management plan (such as boat ramps and nature trails) are permitted during the initial acquisition and development phase. No more than five (5) percent of the initial acquisition and development award may be expended on such activities. NOAA must make a specific determination, based on the final EIS, that the construction activity will not be detrimental to the environment.

(d) Except as specifically provided in paragraphs (a) through (c) of this section, construction projects, to be funded in whole or in part under an acquisition and development award(s), may not be initiated until the Reserve receives formal designation (see § 921.30). This requirement has been adopted to ensure that substantial progress in establishing adequate state control over key land and water areas has been made and that a final management plan is completed before major sums are spent on construction. Once substantial progress in establishing adequate state control/acquisition has been made, as defined by the state in the management plan, other activities guided by the final management plan may begin with NOAA's approval.

(e) For any real property acquired in whole or part with Federal funds for the Reserve, the state shall execute suitable title documents to include substantially the following provisions, or otherwise append the following provisions in a manner acceptable under applicable state law to the official land record(s):

(1) Title to the property conveyed by this deed shall vest in the [recipient of the award granted pursuant to section 315 of the Act, 16 U.S.C. 1461 or other NOAA approved state agency] subject to the condition that the designation of the [name of National Estuarine Reserve] is not withdrawn and the property remains part of the federally designated [name of National Estuarine Research Reserve]; and

(2) In the event that the property is no longer included as part of the Reserve, or if the designation of the Reserve of which it is part is withdrawn, then NOAA or its successor agency, after full and reasonable consultation with the State, may exercise the following rights regarding the disposition of the property:

(i) The recipient may retain title after paying the Federal Government an amount computed by applying the Federal percentage of participation in the cost of the original project to the current fair market value of the property;

(ii) If the recipient does not elect to retain title, the Federal Government may either direct the recipient to sell the property and pay the Federal Government an amount computed by applying the Federal percentage of participation in the cost of the original project to the proceeds from the sale (after deducting actual and reasonable selling and repair or renovation expenses, if any, from the sale proceeds), or direct the recipient to transfer title to the Federal Government. If directed to transfer title to the Federal Government, the recipient shall be entitled to compensation computed by applying the recipient's percentage of participation in the cost of the original project to the current fair market value of the property; and

(iii) Fair market value of the property must be determined by an independent appraiser and certified by a responsible official of the state, as provided by Department of Commerce regulations at 15 CFR part 24, and Uniform Relocation Assistance and Real Property Acquisition for Federal and Federally assisted programs at 15 CFR part 11.

(f) Upon instruction by NOAA, provisions analogous to those of § 921.21(e) shall be included in the documentation underlying less-than-fee-simple interests acquired in whole or part with Federal funds.

(g) Federal funds or non-Federal matching share funds shall not be spent to acquire a real property interest in which the state will own the land concurrently with another entity unless the property interest has been identified as a part of an acquisition strategy pursuant to § 921.13(7) which has been approved by NOAA prior to the effective date of these regulations.

(h) Prior to submitting the final management plan to NOAA for review and approval, the state shall hold a public meeting to receive comment on the plan in the area affected by the estuarine research reserve. NOAA will publish a notice of the meeting in the Federal Register at least 15 days prior to the public meeting. The state shall be responsible for having a similar notice published in the local newspaper(s).

#### *Subpart D - Reserve Designation and Subsequent Operation*

##### **§ 921.30 Designation of National Estuarine Research Reserves.**

(a) The Under Secretary may designate an area proposed for designation by the Governor of the state in which it is located, as a National Estuarine Research Reserve if the Under Secretary finds:

- (1) The area is a representative estuarine ecosystem that is suitable for long-term research and contributes to the biogeographical and typological balance of the System;
- (2) Key land and water areas of the proposed Reserve, as identified in the management plan, are under adequate state control sufficient to provide long-term protection for reserve resources to ensure a stable environment for research;
- (3) Designation of the area as a Reserve will serve to enhance public awareness and understanding of estuarine areas, and provide suitable opportunities for public education and interpretation;
- (4) A final management plan has been approved by NOAA;
- (5) An MOU has been signed between the state and NOAA ensuring a long-term commitment by the state to the effective operation and implementation of the area as a National Estuarine Research Reserve;
- (6) All MOU's necessary for reserve management (i.e., with relevant Federal, state, and local agencies and/or private organizations) have been signed; and
- (7) The coastal state in which the area is located has complied with the requirements of subpart B.

(b) NOAA will determine whether the designation of a National Estuarine Research Reserve in a state with a federally approved coastal zone management program directly affects the coastal zone. If the designation is found to directly affect the coastal zone, NOAA will make a consistency determination pursuant to § 307(c)(1) of the Act, 16 U.S.C. 1456, and 15 CFR part 930, subpart C. See § 921.4(b). The results of this consistency determination will be published in the Federal Register when the notice of designation is published. See § 921.30(c).



(c) NOAA will publish the notice of designation of a National Estuarine Research Reserve in the Federal Register. The state shall be responsible for having a similar notice published in the local media.

(d) The term state control in § 921.30(a)(3) does not necessarily require that key land and water areas be owned by the state in fee simple. Acquisition of less-than-fee simple interests e.g., conservation easements) and utilization of existing state regulatory measures are encouraged where the state can demonstrate that these interests and measures assure adequate long-term state control consistent with the purposes of the research reserve (see also §§ 921.13(a)(7); 921.21(g)). Should the state later elect to purchase an interest in such lands using NOAA funds, adequate justification as to the need for such acquisition must be provided to NOAA.

#### § 921.31 Supplemental acquisition and development awards.

After National Estuarine Research Reserve designation, and as specified in the approved management plan, a coastal state may request a supplemental acquisition and/or development award(s) for acquiring additional property interests identified in the management plan as necessary to strengthen protection of key land and water areas and to enhance long-term protection of the area for research and education, for facility and exhibit construction, for restorative activities identified in the approved management plan, for administrative purposes related to acquisition and/or facility construction and to develop and/or upgrade research, monitoring and education/interpretive programs. Federal financial assistance provided to a National Estuarine Research Reserve for supplemental development costs directly associated with facility construction (i.e., major construction activities) may not exceed 70 percent of the total project cost, except when the financial assistance is provided from amounts recovered as a result of damage to natural resources located in the coastal zone, in which case the assistance may be used to pay 100 percent of the costs. NOAA must make a specific determination that the construction activity will not be detrimental to the environment. Acquisition awards for the acquisition of lands or waters, or interests therein, for any one reserve may not exceed an amount equal to 50 percent of the costs of the lands, waters, and interests therein of \$5,000,000, whichever amount is less, except when the financial assistance is provided from amounts recovered as result of damage to natural resources located in the coastal zone, in which case the assistance may be used to pay 100 percent of all actual costs of activities carrier out with this assistance, as long as such funds are available. In the case of a biogeographic region (see appendix I) shared by two or more states, each state is eligible independently for Federal financial assistance to establish a separate National Estuarine Research Reserve within their respective portion of the shared biogeographic region. Application procedures are specified in subpart I. Land acquisition must follow the procedures specified in §§ 921.13(a)(7), 921.21(e) and (f) and 921.81.

*[58 FR 38215, July 15, 1993, as amended at 62 FR 12540, Mar. 17, 1997; 63 FR 26717, May 14, 1998]*

#### § 921.32 Operation and management: Implementation of the management plan.

(a) After the Reserve is formally designated, a coastal state is eligible to receive Federal funds to assist the state in the operation and management of the Reserve including the management of research, monitoring, education, and interpretive programs. The purpose of this Federally funded operation and management phase is to implement the approved final management plan and to take the necessary steps to ensure the continued effective operation of the Reserve.

(b) State operation and management of the Reserves shall be consistent with the mission, and shall further the goals of the National Estuarine Research Reserve program (see § 921.1).

(c) Federal funds are available for the operation and management of the Reserve. Federal funds provided pursuant to this section may not exceed 70 percent of the total cost of operating and

managing the Reserve for any one year, except when the financial assistance is provided from amounts recovered as a result of damage to natural resources located in the coastal zone, in which case the assistance may be used to pay 100 percent of the costs. In the case of a biogeographic region (see Appendix I) shared by two or more states, each state is eligible for Federal financial assistance to establish a separate Reserve within their respective portion of the shared biogeographic region (see § 921.10).

(d) Operation and management funds are subject to the following limitations:

(1) Eligible coastal state agencies may apply for up to the maximum share available per Reserve for that fiscal year. Share amounts will be announced annually by letter from the Sanctuary and Reserves Division to all participating states. This letter will be provided as soon as practicable following approval of the Federal budget for that fiscal year.

(2) No more than ten percent of the total amount (state and Federal shares) of each operation and management award may be used for construction-type activities.

*[58 FR 38215, July 15, 1993, as amended at 62 FR 12541, Mar. 17, 1997]*

### § 921.33 Boundary changes, amendments to the management plan, and addition of multiple-site components.

(a) Changes in the boundary of a Reserve and major changes to the final management plan, including state laws or regulations promulgated specifically for the Reserve, may be made only after written approval by NOAA. NOAA may require public notice, including notice in the Federal Register and an opportunity for public comment before approving a boundary or management plan change. Changes in the boundary of a Reserve involving the acquisition of properties not listed in the management plan or final EIS require public notice and the opportunity for comment; in certain cases, a categorical exclusion, an environmental assessment and possibly an environmental impact statement may be required. NOAA will place a notice in the Federal Register of any proposed changes in Reserve boundaries or proposed major changes to the final management plan. The state shall be responsible for publishing an equivalent notice in the local media. See also requirements of §§ 921.4(b) and 921.13(a)(11).

(b) As discussed in § 921.10(b), a state may choose to develop a multiple-site National Estuarine Research Reserve after the initial acquisition and development award for a single site has been made. NOAA will publish notice of the proposed new site including an invitation for comments from the public in the Federal Register. The state shall be responsible for publishing an equivalent notice in the local newspaper(s). An EIS, if required, shall be prepared in accordance with section § 921.13 and shall include an administrative framework for the multiple-site Reserve and a description of the complementary research and educational programs within the Reserve. If NOAA determines, based on the scope of the project and the issues associated with the additional site(s), that an environmental assessment is sufficient to establish a multiple-site Reserve, then the state shall develop a revised management plan which, concerning the additional component, incorporates each of the elements described in § 921.13(a). The revised management plan shall address goals and objectives for all components of the multi-site Reserve and the additional component's relationship to the original site(s).

(c) The state shall revise the management plan for a Reserve at least every five years, or more often if necessary. Management plan revisions are subject to (a) above.

(d) NOAA will approve boundary changes, amendments to management plans, or the addition of multiple-site components, by notice in the Federal Register. If necessary NOAA will revise the designation document (findings) for the site.

*Subpart E - Ongoing Oversight, Performance Evaluation and Withdrawal of Designation*

**§ 921.40 Ongoing oversight and evaluations of designated National Estuarine Research Reserves.**

(a) The Sanctuaries and Reserve Division shall conduct, in accordance with section 312 of the Act and procedures set forth in 15 CFR part 928, ongoing oversight and evaluations of Reserves. Interim sanctions may be imposed in accordance with regulations promulgated under 15 CFR part 928.

(b) The Assistant Administrator may consider the following indicators of non-adherence in determining whether to invoke interim sanctions:

- (1) Inadequate implementation of required staff roles in administration, research, education/interpretation, and surveillance and enforcement. Indicators of inadequate implementation could include: No Reserve Manager, or no staff or insufficient staff to carry out the required functions.
- (2) Inadequate implementation of the required research plan, including the monitoring design. Indicators of inadequate implementation could include: Not carrying out research or monitoring that is required by the plan, or carrying out research or monitoring that is inconsistent with the plan.
- (3) Inadequate implementation of the required education/interpretation plan. Indicators of inadequate implementation could include: Not carrying out education or interpretation that is required by the plan, or carrying out education/interpretation that is inconsistent with the plan.
- (4) Inadequate implementation of public access to the Reserve. Indicators of inadequate implementation of public access could include: Not providing necessary access, giving full consideration to the need to keep some areas off limits to the public in order to protect fragile resources.
- (5) Inadequate implementation of facility development plan. Indicators of inadequate implementation could include: Not taking action to propose and budget for necessary facilities, or not undertaking necessary construction in a timely manner when funds are available.
- (6) Inadequate implementation of acquisition plan. Indicators of inadequate implementation could include: Not pursuing an aggressive acquisition program with all available funds for that purpose, not requesting promptly additional funds when necessary, and evidence that adequate long-term state control has not been established over some core or buffer areas, thus jeopardizing the ability to protect the Reserve site and resources from offsite impacts.
- (7) Inadequate implementation of Reserve protection plan. Indicators of inadequate implementation could include: Evidence of non-compliance with Reserve restrictions, insufficient surveillance and enforcement to assure that restrictions on use of the Reserve are adhered to, or evidence that Reserve resources are being damaged or destroyed as a result of the above.
- (8) Failure to carry out the terms of the signed Memorandum of Understanding (MOU) between the state and NOAA, which establishes a long-term state commitment to maintain and manage the Reserve in accordance with section 315 of the Act. Indicators of failure could include: State action to allow incompatible uses of state-controlled lands or waters in the Reserve, failure of the state to bear its fair share of costs associated with long-term operation and management of the Reserve, or failure to initiate timely updates of the MOU when necessary.

#### § 921.41 Withdrawal of designation.

The Assistant Administrator may withdraw designation of an estuarine area as a National Estuarine Research Reserve pursuant to and in accordance with the procedures of section 312 and 315 of the Act and regulations promulgated thereunder.

#### *Subpart F - Special Research Projects*

#### § 921.50 General.

(a) To stimulate high quality research within designated National Estuarine Research Reserves, NOAA may provide financial support for research projects which are consistent with the Estuarine Research Guidelines referenced in § 921.51. Research awards may be awarded under this subpart to only those designated Reserves with approved final management plans. Although research may be conducted within the immediate watershed of the Reserve, the majority of research activities of any single research project funded under this subpart may be conducted within Reserve boundaries. Funds provided under this subpart are primarily used to support management-related research projects that will enhance scientific understanding of the Reserve ecosystem, provide information needed by Reserve management and coastal management decision-makers, and improve public awareness and understanding of estuarine ecosystems and estuarine management issues. Special research projects may be oriented to specific Reserves; however, research projects that would benefit more than one Reserve in the National Estuarine Reserve Research System are encouraged.

(b) Funds provided under this subpart are available on a competitive basis to any coastal state or qualified public or private person. A notice of available funds will be published in the Federal Register. Special research project funds are provided in addition to any other funds available to a coastal state under the Act. Federal funds provided under this subpart may not exceed 70 percent of the total cost of the project, consistent with § 921.81(e)(4) ("allowable costs"), except when the financial assistance is provided from amounts recovered as a result of damage to natural resources located in the coastal zone, in which case the assistance may be used to pay 100 percent of the costs.

*[58 FR 38215, July 15, 1993, as amended at 62 FR 12541, Mar. 17, 1997]*

#### § 921.51 Estuarine research guidelines.

(a) Research within the National Estuarine Research Reserve System shall be conducted in a manner consistent with Estuarine Research Guidelines developed by NOAA.

(b) A summary of the Estuarine Research Guidelines is published in the Federal Register as a part of the notice of available funds discussed in § 921.50(c).

(c) The Estuarine Research Guidelines are reviewed annually by NOAA. This review will include an opportunity for comment by the estuarine research community.

#### § 921.52 Promotion and coordination of estuarine research.

(a) NOAA will promote and coordinate the use of the National Estuarine Research Reserve System for research purposes.

(b) NOAA will, in conducting or supporting estuarine research other than that authorized under section 315 of the Act, give priority consideration to research that make use of the National Estuarine Research Reserve System.

(c) NOAA will consult with other Federal and state agencies to promote use of one or more research reserves within the National Estuarine Research Reserve System when such agencies conduct estuarine

research.

### *Subpart G - Special Monitoring Projects*

#### *§ 921.60 General.*

(a) To provide a systematic basis for developing a high quality estuarine resource and ecosystem information base for National Estuarine Research Reserves and, as a result, for the System, NOAA may provide financial support for basic monitoring programs as part of operations and management under § 921.32. Monitoring funds are used to support three major phases of a monitoring program:

- (1) Studies necessary to collect data for a comprehensive site description/characterization;
- (2) Development of a site profile; and
- (3) Formulation and implementation of a monitoring program.

(b) Additional monitoring funds may be available on a competitive basis to the state agency responsible for Reserve management or a qualified public or private person or entity. However, if the applicant is other than the managing entity of a Reserve that applicant must submit as a part of the application a letter from the Reserve manager indicating formal support of the application by the managing entity of the Reserve. Funds provided under this subpart for special monitoring projects are provided in addition to any other funds available to a coastal state under the Act. Federal funds provided under this subpart may not exceed 70 percent of the total cost of the project, consistent with § 921.81(e)(4) ("allowable costs"), except when the financial assistance is provided from amounts recovered as a result of damage to natural resources located in the coastal zone, in which case the assistance may be used to pay 100 percent of the costs.

(c) Monitoring projects funded under this subpart must focus on the resources within the boundaries of the Reserve and must be consistent with the applicable sections of the Estuarine Research Guidelines referenced in § 921.51. Portions of the project may occur within the immediate watershed of the Reserve beyond the site boundaries. However, the monitoring proposal must demonstrate why this is necessary for the success of the project.

*[58 FR 38215, July 15, 1993, as amended at 62 FR 12541, Mar. 17, 1997]*

### *Subpart H - Special Interpretation and Education Projects*

#### *§ 921.70 General.*

(a) To stimulate the development of innovative or creative interpretive and educational projects and materials to enhance public awareness and understanding of estuarine areas, NOAA may fund special interpretive and educational projects in addition to those activities provided for in operations and management under § 921.32. Special interpretive and educational awards may be awarded under this subpart to only those designated Reserves with approved final management plans.

(b) Funds provided under this subpart may be available on a competitive basis to any state agency. However, if the applicant is other than the managing entity of a Reserve, that applicant must submit as a part of the application a letter from the Reserve manager indicating formal support of the application by the managing entity of the Reserve. These funds are provided in addition to any other funds available to a coastal state under the Act. Federal funds provided under this subpart may not exceed 70 percent of the total cost of the project, consistent with § 921.81(e)(4) ("allowable costs"), except when the financial assistance is provided from amounts recovered as a result of damage to natural resources located in the coastal zone, in which case the assistance may be used to pay 100 percent of the costs.



(c) Applicants for education/interpretive projects that NOAA determines benefit the entire National Estuarine Research Reserve System may receive Federal assistance of up to 100% of project costs.

*[58 FR 38215, July 15, 1993, as amended at 62 FR 12541, Mar. 17, 1997]*

#### *Subpart I - General Financial Assistance Provisions*

##### **§ 921.80 Application information.**

(a) Only a coastal state may apply for Federal financial assistance awards for preacquisition, acquisition and development, operation and management, and special education and interpretation projects under subpart H. Any coastal state or public or private person may apply for Federal financial assistance awards for special estuarine research or monitoring projects under subpart G. The announcement of opportunities to conduct research in the System appears on an annual basis in the Federal Register. If a state is participating in the national Coastal Zone Management Program, the applicant for an award under section 315 of the Act shall notify the state coastal management agency regarding the application.

(b) An original and two copies of the formal application must be submitted at least 120 working days prior to the proposed beginning of the project to the following address: Sanctuaries and Reserves Division Ocean and Coastal Resource Management, National Oceanic and Atmospheric Administration, 1825 Connecticut Avenue, NW., suite 714, Washington, DC 20235. Application for Federal Assistance Standard Form 424 (Non-construction Program) constitutes the formal application for site selection, post-site selection, operation and management, research, and education and interpretive awards. The Application for Federal Financial Assistance Standard Form 424 (Construction Program) constitutes the formal application for land acquisition and development awards. The application must be accompanied by the information required in subpart B (predesignation), subpart C and § 921.31 (acquisition and development), and § 921.32 (operation and management) as applicable. Applications for development awards for construction projects, or restorative activities involving construction, must include a preliminary engineering report, a detailed construction plan, a site plan, a budget and categorical exclusion check list or environmental assessment. All applications must contain back up data for budget estimates (Federal and non-Federal shares), and evidence that the application complies with the Executive Order 12372, "Intergovernmental Review of Federal Programs." In addition, applications for acquisition and development awards must contain:

- (1) State Historic Preservation Office comments;
- (2) Written approval from NOAA of the draft management plan for initial acquisition and development award(s); and
- (3) A preliminary engineering report for construction activities.

##### **§ 921.81 Allowable costs.**

(a) Allowable costs will be determined in accordance with applicable OMB Circulars and guidance for Federal financial assistance, the financial assistance agreement, these regulations, and other Department of Commerce and NOAA directives. The term "costs" applies to both the Federal and non-Federal shares.

(b) Costs claimed as charges to the award must be reasonable, beneficial and necessary for the proper and efficient administration of the financial assistance award and must be incurred during the award period.

(c) Costs must not be allocable to or included as a cost of any other Federally-financed program in either the current or a prior award period.

(d) General guidelines for the non-Federal share are contained in Department of Commerce Regulations at 15 CFR part 24 and OMB Circular A-110. Copies of Circular A-110 can be obtained from the Sanctuaries and Reserves Division; 1825 Connecticut Avenue, NW., suite 714; Washington, DC 20235.

The following may be used in satisfying the matching requirement:

(1) Site selection and post site selection awards. Cash and in-kind contributions (value of goods and services directly benefiting and specifically identifiable to this part of the project) are allowable. Land may not be used as match.

(2) Acquisition and development awards. Cash and in-kind contributions are allowable. In general, the fair market value of lands to be included within the Reserve boundaries and acquired pursuant to the Act, with other than Federal funds, may be used as match. However, the fair market value of real property allowable as match is limited to the fair market value of a real property interest equivalent to, or required to attain, the level of control over such land(s) identified by the state and approved by the Federal Government as that necessary for the protection and management of the National Estuarine Research Reserve. Appraisals must be performed according to Federal appraisal standards as detailed in Department of Commerce regulations at 15 CFR part 24 and the Uniform Relocation Assistance and Real Property Acquisition for Federal land Federally assisted programs in 15 CFR part 11. The fair market value of privately donated land, at the time of donation, as established by an independent appraiser and certified by a responsible official of the state, pursuant to 15 CFR part 11, may also be used as match. Land, including submerged lands already in the state's possession, may be used as match to establish a National Estuarine Research Reserve. The value of match for these state lands will be calculated by determining the value of the benefits foregone by the state, in the use of the land, as a result of new restrictions that may be imposed by Reserve designation. The appraisal of the benefits foregone must be made by an independent appraiser in accordance with Federal appraisal standards pursuant to 15 CFR part 24 and 15 CFR part 11. A state may initially use as match land valued at greater than the Federal share of the acquisition and development award. The value in excess of the amount required as match for the initial award may be used to match subsequent supplemental acquisition and development awards for the National Estuarine Research Reserve (see also § 921.20). Costs related to land acquisition, such as appraisals, legal fees and surveys, may also be used as match.

(3) Operation and management awards. Generally, cash and in-kind contributions (directly benefiting and specifically identifiable to operations and management), except land, are allowable.

(4) Research, monitoring, education and interpretive awards. Cash and in-kind contributions (directly benefiting and specifically identifiable to the scope of work), except land, are allowable.

#### [§ 921.82 Amendments to financial assistance awards.](#)

Actions requiring an amendment to the financial assistance award, such as a request for additional Federal funds, revisions of the approved project budget or original scope of work, or extension of the performance period must be submitted to NOAA on Standard Form 424 and approved in writing.

## Appendix 2: List of Graduate Research Fellows and Davidson Fellows since designation in 1999

Grand Bay NERR Graduate Research Fellows (pre-2012) and Margaret A. Davidson Fellows (2020-present)

Graduate Research Fellows:

2001-2002: Guillermo Sanchez, University of Southern Mississippi. Habitat mapping of oyster resources and submerged vegetation for the Grand Bay National Estuarine Research Reserve, Mississippi.

2002: Donna Drury, University of Southern Mississippi. Effects of invertebrate grazer density manipulations on wigeongrass, *Ruppia maritima*, exposed to nutrient enrichment.

2003: Virginia Shervette, Texas A&M University. Assessment of essential fish habitats in Grand Bay as nurseries for economically important fishes: tools for management and conservation.

2004-2005: Zhijun Lui, Mississippi State University. Guidelines for the development of a Grand Bay hydrology and water quality simulation model: Criteria and data assessments.

2004-2006: Megan Hughes, University of Southern Mississippi. Assessing the value of coastal hammocks as stopover habitat for passerine migrants: Habitat selection and resource acquisition on the Grand Bay NERR.

2006-2007: Gabe Langford, University of Nebraska. Parasite biodiversity of amphibians and reptiles from the Grand Bay NERR.

2007-2008: Scott Rush, University of Georgia. Ecology of Mississippi's tidal marsh birds: Perspectives gained through the application of surveys, telemetry and ecological tracers.

2008: Becca Cripps, University of Alabama. Reconstruction of vegetation history and accretion rates in coastal marshes: Understanding past responses to sea-level rise at Grand Bay.

2009-2010: Christina Nica, Jackson State University. Ecological modeling of potential habitat for submerged aquatic vegetation at Grand Bay National Estuarine Research Reserve, Mississippi.

2011-2012: Jessica Dean Carrier, University of South Alabama. Differences in Herbivore Pressure Across Northern Gulf of Mexico Salt Marsh Habitats.

2011-2014: Adam Chupp, Southern Illinois University at Carbondale. Multi-trophic consequences of an emerging disease: sources of functional redundancy and ecosystem resilience.

2011-2014: Kelly Darnell, University of Texas at Austin. Assessing reproductive dynamics of four dominant seagrass species in the Mission Aransas and Grand Bay National Estuarine Research Reserves for development of effective conservation and management strategies.

Davidson Fellows:

2020-2022: Matt Virden, Mississippi State University. Evaluating the Effectiveness of Restoration Approaches for Nearshore Habitat.

2022-2024: Amanda Free, Mississippi State University. Utilizing microbial source tracking to evaluate temporal and spatial variation of fecal coliform sources in the Grand Bay NERR.

## Appendix 3: List of Peer-reviewed Publications Resulting from Research at GNDNERR

1. Abbott, M. J. (2017). Conditions Responsible for the Success of Carnivorous Plants in Nutrient-Poor Wetlands [Ph.D. Dissertation, The University of Mississippi].  
<https://www.proquest.com/docview/1925634275/abstract/3DE88247D4A94DC7PQ/95>
2. Akpovo, C., Martinez Jr., J. A., Lewis, D., Branch, J., Schroeder, A., Edington, M., & Johnson, L. (2013). Regional discrimination of oysters using laser-induced breakdown spectroscopy. *Analytical Methods*, 5. <https://doi.org/10.1039/C3AY40491A>
3. Alizad, K., Hagen, S. C., Medeiros, S. C., Bilskie, M. V., Morris, J. T., Balthis, L., & Buckel, C. A. (2018). Dynamic responses and implications to coastal wetlands and the surrounding regions under sea level rise. *PLOS ONE*, 13(10), e0205176. <https://doi.org/10.1371/journal.pone.0205176>
4. Alizad, K., Medeiros, S. C., Foster-Martinez, M. R., & Hagen, S. C. (2020). Model Sensitivity to Topographic Uncertainty in Meso- and Microtidal Marshes. *IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing*, 13:807–814.  
<https://doi.org/10.1109/JSTARS.2020.2973490>
5. Allen, L. (2015). Spatiotemporal Patterns in Biomarkers of Polycyclic Aromatic Hydrocarbon (PAH) Exposure in Livers and Bile of Fish from the Northern Gulf of Mexico after the Deepwater Horizon Oil Spill [Ph.D. Dissertation, Florida Agricultural and Mechanical University].  
<https://www.proquest.com/docview/2054278545/abstract/3DE88247D4A94DC7PQ/72>
6. Amacker, K. S. (2013). Comparison of nutrient and light limitation in three Gulf of Mexico Estuaries [Master's Thesis]. University of West Florida.
7. Andrews, B. (2022). The effects of short-term sea level rise on vegetation communities in coastal Mississippi [Master's Thesis]. Mississippi State University.
8. Archer, M. J., Pitchford, J. L., Biber, P., & Underwood, W. (2021). Assessing Vegetation, Nutrient Content and Soil Dynamics Along a Coastal Elevation Gradient in a Mississippi Estuary. *Estuaries and Coasts*, 45:1217–1229. <https://doi.org/10.1007/s12237-021-01012-2>
9. Bass, M. G. (2019). Compositional Differences in Bacterial Communities in Fresh and Saltwater Wetlands of the Gulf Coast [Undergraduate Thesis, The University of Mississippi].  
<http://thesis.honors.olemiss.edu/1509/>
10. Battaglia, L., Woodrey, M., Peterson, M., Dillon, K., & Visser, J. (2012). Wetlands of the northern gulf coast. In D. Batzer & A. Baldwin (Eds.), *Wetland Habitats of North America: Ecology and Conservation Concerns* (pp. 75–88). University of California Press.
11. Baine, G. C. (2017). Effects of Nutrient Input and Microzooplankton Grazing on Phytoplankton Productivity in the Grand Bay Estuary, Mississippi [Master's Thesis]. University of West Florida.
12. Beck, M. W., Cressman, K., Griffin, C., & Caffrey, J. (2018). Water Quality Trends Following Anomalous Phosphorus Inputs to Grand Bay, Mississippi, USA. *Gulf and Caribbean Research*, 29(1): 1–14. <https://doi.org/10.18785/gcr.2901.02>
13. Blackburn, B. R. (2000). The effects of industrial and cultural development on phytoplankton community dynamics within three bayou systems of Jackson County, Mississippi [Master's Thesis]. University of Southern Mississippi.

14. Boswell, C. G. (2005). Nitrogen economy of the purple pitcher plant, *Sarracenia purpurea* L., in the Gulf of Mexico coastal plain [Ph.D. Dissertation, Tulane University].  
<https://www.proquest.com/docview/305391217/abstract/B293D0F516094E8CPQ/25>
15. Braswell, A. E. (2010). The interactive effects of hurricanes and fire on plant productivity, accretion and elevation of a saltwater marsh at Grand Bay NERR, Mississippi [Master's Thesis]. University of Alabama.
16. Braswell, A. E., May, C. A., & Cherry, J. A. (2019). Spatially-dependent patterns of plant recovery and sediment accretion following multiple disturbances in a Gulf Coast tidal marsh. *Wetlands Ecology and Management*, 27(2/3):377–392. <https://doi.org/10.1007/s11273-019-09666-3>
17. Caffrey, J. M., Murrell, M. C., Amacker, K. S., Harper, J. W., Phipps, S., & Woodrey, M. S. (2014). Seasonal and Inter-annual Patterns in Primary Production, Respiration, and Net Ecosystem Metabolism in Three Estuaries in the Northeast Gulf of Mexico. *Estuaries and Coasts*, 37(1):222–241. <https://doi.org/10.1007/s12237-013-9701-5>
18. Carrier, J. M. (2013). Differences in herbivore pressure across northern Gulf of Mexico salt marsh habitats [Master's Thesis]. University of South Alabama.
19. Carrier, J., Sparks, E. L., Woodrey, M. S., Cebrian, J., & Boettcher, A. (2020). Small-scale variation in herbivore abundance and grazing on *Juncus roemerianus* dominated salt marshes. *Wetlands Ecology and Management*, 28(6):983–991. <https://doi.org/10.1007/s11273-020-09755-8>
20. Chen, Y. (2011). Relationship between coastal vegetation biomass with elevation and salinity gradients [Master's Thesis, The University of Mississippi].  
<https://www.proquest.com/docview/905163048/abstract/B293D0F516094E8CPQ/15>
21. Cho, H. J., & Biber, P. D. (2010). Seed Propagation Protocol for Wigeongrass (*Ruppia maritima*) (Mississippi). *Ecological Restoration*, 28(2):135–137.
22. Cho, H. J., & Biber, P. D. (2016). Habitat Characterization for Submerged and Floating-Leaved Aquatic Vegetation in Coastal River Deltas of Mississippi and Alabama. *Southeastern Geographer*, 56(4):454–472. <https://doi.org/10.1353/sgo.2016.0046>
23. Cho, H. J., Biber, P. D., Darnell, K. M., & Dunton, K. H. (2017). Seasonal and Annual Dynamics in Seagrass Beds of the Grand Bay National Estuarine Research Reserve, Mississippi. *Southeastern Geographer*, 57(3):246–272. <https://doi.org/10.1353/sgo.2017.0024>
24. Cho, H. J., Biber, P., & Nica, C. (2009). The rise of *Ruppia* in seagrass beds: Changes in coastal environment and research needs. In E. K. Drury & T. S. Pridgen (Eds.), *Handbook on Environmental Quality* (p. 15). Nova Science Publishers, Inc.
25. Cho, H. J., & May, C. A. (2006a). An Initial Restoration Tool for Submersed Aquatic Vegetation. *National Wetlands Newsletter*, 28(6), Article 6.
26. Cho, H. J., & May, C. (2008). Short-term Spatial Variations in the Beds of *Ruppia maritima* (Ruppiaceae) and *Halodule wrightii* (Cymodoceaceae) at Grand Bay National Estuarine Research Reserve, Mississippi, USA. *Journal of the Mississippi Academy of Sciences*, 53:133–145.
27. Chupp, A. D. (2015). Predicting multi-trophic consequences of an emerging disease [Ph.D. Dissertation]. Southern Illinois University at Carbondale.



28. Chupp, A. D., & Battaglia, L. L. (2014). Potential for host shifting in *Papilio palamedes* following invasion of laurel wilt disease. *Biological Invasions*, 16(12):2639–2651. <https://doi.org/10.1007/s10530-014-0693-2>
29. Chupp, A. D., & Battaglia, L. L. (2017). Sprouting capacity of *Persea borbonia* and maritime forest community response to simulated laurel wilt disease. *Plant Ecology*, 218(4):447–457. <https://doi.org/10.1007/s11258-017-0702-5>
30. Chupp, A. D., Battaglia, L. L., Schauber, E. M., & Sipes, S. D. (2015). Orchid–pollinator interactions and potential vulnerability to biological invasion. *AoB PLANTS*, 7(plv099), Article plv099. <https://doi.org/10.1093/aobpla/plv099>
31. Cimprich, D. A., Woodrey, M. S., & Moore, F. R. (2005). Passerine migrants respond to variation in predation risk during stopover. *Animal Behaviour*, 69(5):1173–1179. <https://doi.org/10.1016/j.anbehav.2004.07.021>
32. Cohen, E. B., Barrow, W. C., Buler, J. J., Deppe, J. L., Farnsworth, A., Marra, P. P., McWilliams, S. R., Mehlman, D. W., Wilson, R. R., Woodrey, M. S., & Moore, F. R. (2017). How do en route events around the Gulf of Mexico influence migratory landbird populations? *The Condor*, 119(2):327–343. <https://doi.org/10.1650/CONDOR-17-20.1>
33. Comyns, B. H., Rakocinski, C. F., Peterson, M. S., & Shiller, A. M. (2008). Otolith chemistry of juvenile spotted seatrout *Cynoscion nebulosus* reflects local natal regions of coastal Mississippi, USA. *Marine Ecology Progress Series*, 371:243–252. <https://doi.org/10.3354/meps07604>
34. Conroy, M. J., Cooper, R. J., Rush, S. A., Stodola, K. W., Nuse, B. L., & Woodrey, M. S. (2010). Effective use of Data from Marshbird Monitoring Programs for Conservation Decision-Making. *Waterbirds*, 33(3):397–404. <https://doi.org/10.1675/063.033.0318>
35. Cranford, M. M. (2002). Seasonally ponded isolated wetlands of Grand Bay Savanna, Mississippi [Master's Thesis, University of South Alabama]. <https://www.proquest.com/docview/230797800/abstract/B293D0F516094E8CPQ/3>
36. Cressman, K. A., & Sharp, J. L. (2022). Crafting Statistical Analysis Plans: a Cross-Discipline Approach. *Stat*, e528.
37. Cripps, R. M. (2009). Past responses to climate change: Reconstruction of vegetation histories in three brackish marshes [Master's Thesis]. University of Alabama.
38. Dailey, M. (2012). Temporal and Spatial Assessment of PAHs in Water, Sediment, and Oysters as a Result of the Deepwater Horizon Oil Spill [Master's Thesis, The University of Mississippi]. <https://www.proquest.com/docview/1095358498/abstract/3DE88247D4A94DC7PQ/79>
39. Darrow, E. S. (2015). Biogeochemical and microbial indicators of land-use change in a Northern Gulf of Mexico Estuary [Ph.D. Dissertation]. University of South Alabama.
40. Darrow, E. S., Carmichael, R. H., Andrus, C. F. T., & Jackson, H. E. (2017). From middens to modern estuaries, oyster shells sequester source-specific nitrogen. *Geochimica et Cosmochimica Acta*, 202:39–56. <https://doi.org/10.1016/j.gca.2016.12.023>
41. Darrow, E. S., Carmichael, R. H., Calci, K. R., & Burkhardt, W. (2017). Land-use related changes to sedimentary organic matter in tidal creeks of the northern Gulf of Mexico: Land-use change and sediment organic matter. *Limnology and Oceanography*, 62(2):686–705. <https://doi.org/10.1002/lno.10453>

42. Delfeld, B. M. (2019). *Movin' on Up: Mycorrhizal Mutualisms and Assisted Migration of Coastal Plant Species* [Master's Thesis, Southern Illinois University at Carbondale].  
<https://www.proquest.com/docview/2306303748/abstract/3DE88247D4A94DC7PQ/73>
43. DeLorme, D. E., Kidwell, D., Hagen, S. C., & Stephens, S. H. (2016). Developing and managing transdisciplinary and transformative research on the coastal dynamics of sea level rise: Experiences and lessons learned. *Earth's Future*, 4(5):194–209. <https://doi.org/10.1002/2015EF000346>
44. Dillon, K. S., Peterson, M. S., & May, C. A. (2015). Functional equivalence of constructed and natural intertidal eastern oyster reef habitats in a northern Gulf of Mexico estuary. *Marine Ecology Progress Series*, 528:187–203. <https://doi.org/10.3354/meps11269>
45. Drury, D. M. (2004). Effects of grass shrimp (*Palaemonetes* spp.) density manipulations and nutrient enrichment on widgeongrass (*Ruppia maritima*) condition, epiphyte load, and epiphyte functional groups [Ph.D. Dissertation, The University of Southern Mississippi].  
<https://www.proquest.com/docview/305122840/abstract/3DE88247D4A94DC7PQ/81>
46. Ehmen, B. W. (2012). *Seagrass abundance and population structure in Grand Bay National Estuarine Research Reserve, Mississippi* [Master's Thesis]. University of South Alabama.
47. Ellis, A. M., & Smith, C. G. (2021). Emerging dominance of *Paratrochammina simplissima* (Cushman and McCulloch) in the northern Gulf of Mexico following hydrologic and geomorphic changes. *Estuarine, Coastal and Shelf Science*, 255:107312. <https://doi.org/10.1016/j.ecss.2021.107312>
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<https://doi.org/10.1007/s12237-014-9912-4>
49. Ennis, B., Peterson, M. S., & Strange, T. P. (2014). Modeling of Inundation Characteristics of a Microtidal Saltmarsh, Grand Bay National Estuarine Research Reserve, Mississippi. *Journal of Coastal Research*, 30(3):635–646. <https://doi.org/10.2112/JCOASTRES-D-13-00041.1>
50. Enwright, N. M., Cheney, W. C., Evans, K. O., Thurman, H. R., Woodrey, M. S., Fournier, A. M. V., Gesch, D. B., Pitchford, J. L., Stoker, J. M., & Medeiros, S.C. (2023). Elevation-based probabilistic mapping of irregularly flooded wetlands along the northern Gulf of Mexico coast. *Remote Sensing of Environment*, 287:113451.
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52. Fan, Z. (2018). Spatial Analyses of Invasion Patterns of Chinese Tallow (*Triadica sebifera*) in a Wet Slash Pine (*Pinus elliottii*) Flatwood in the Coastal Plain of Mississippi, USA. *Forest Science*, 64(5):555–563. <https://doi.org/10.1093/forsci/fxy014>
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## Appendix 4: Full List of GNDNERR CTP Partners

Mississippi Department of Marine Resources  
NOAA's Office of Coastal Management and Digital Coast  
USFWS Grand Bay and Sandhill Crane National Wildlife Refuge  
Mississippi Department of Environmental Quality  
Gulf of Mexico Alliance  
Gulf Coast NERRS – Weeks Bay, Mission-Aransas, Apalachicola, Rookery Bay  
Mississippi State University – Dr. Eric Sparks, Renee Collini, David Perks  
Southern Illinois University – Dr. Loretta Battaglia  
University of Alabama – Dr. Julia Cherry  
University of Southern Mississippi – Dr. Wei Wu, Dr. Patrick Biber  
U.S. Coast Guard  
U.S. Forest Service  
MS-AL Sea Grant – Tracie Sempier, Stephen Deal  
Mississippi and Florida Chapter Association of Floodplain Managers  
Wildlife Mississippi  
The Nature Conservancy – Tom Mohrman  
USGS Wetlands & Aquatics Research Center – Beth Middleton  
Christian Preus Landscape Architecture – Oliver Preus  
Hal Needham Marine Weather and Climate LLC  
Nature's Notebook Phenology Network, University of Arizona  
Pascagoula River Audubon Center  
Chevron Pascagoula Refinery  
Chemours Delisle Plant  
Jackson County  
City of Ocean Springs – Ocean Springs Environmental Committee  
City of Moss Point  
City of Pascagoula  
South Alabama Flood Engagement Team (SAFE-T)  
South Alabama Regional Planning Commission  
Longleaf Wilderness Medicine

## Appendix 5: List of CTP Advisory Committee Members, Roles and Responsibilities

<b><u>Member</u></b>	<b><u>Affiliation</u></b>	<b><u>Responsibilities</u></b>
Mike Shelton, Coastal Training Coordinator	Weeks Bay NERR	Mentoring, Program Development
Ann Weaver (retired), Training and Development Coordinator	NOAA/NMFS	Meeting Facilitation
Dale Shirley, Chevron	Chevron	Industry Perspective
Carolyn Martin, City Planner and Grants Administrator	City of Ocean Springs	Municipal codes & Process
<i>Del Schwalls, Director of Region 4 ASFPM*</i>	<i>Schwalls Consulting, LLC</i>	<i>CRS/NFIP/Elevation Certificates</i>
<i>*pending</i>		

## Appendix 6: Memorandum of Understanding (MOU) between NOAA and MDMR

MAY 13 2013

Memorandum of Agreement  
Between the  
National Oceanic and Atmospheric Administration  
And the  
Mississippi Department of Marine Resources  
Detailing the state-federal roles in the  
Management of the Grand Bay National Estuarine Research Reserve

This Memorandum of Agreement states the provisions for the cooperative management of the Grand Bay National Estuarine Research Reserve (NERR) in the state of Mississippi, between the Department of Marine Resources (DMR) and the National Oceanic and Atmospheric Administration's (NOAA) Office of Ocean and Coastal Resource Management (OCRM).

WHEREAS, this Memorandum of Agreement supersedes the previous "Memorandum of Understanding between NOAA and Mississippi DMR regarding the Grand Bay NERR made on February 8, 1999.

WHEREAS, the state of Mississippi has determined that the waters and related coastal habitats of Grand Bay provide unique opportunities for study of natural and human processes occurring within the estuarine ecosystems of the state to contribute to the science of estuarine ecosystem processes, enhance environmental education opportunities, and provide scientific information for effective coastal zone management in state of Mississippi; and

WHEREAS, the state of Mississippi has determined that the resources of the Grand Bay NERR and the values they represent to the citizens of Mississippi and the United States will benefit from the management of these resources as part of the National Estuarine Research Reserve System; and

WHEREAS, the National Oceanic and Atmospheric Administration has concurred with that finding and pursuant to its authority under section 315 of the Coastal Zone Management Act of 1972, as amended (CZMA, 16 U.S.C. 1461) and in accordance with implementing regulations at 15 CFR 921.30 has designated the Grand Bay; and

WHEREAS, the Mississippi DMR as the agency designated by the Governor of Mississippi is responsible for managing the Grand Bay NERR and acknowledges the value of state-federal cooperation for the long-term management of the reserve in a manner consistent with the purpose of their designation; and

WHEREAS, the management plan describes the goals, objectives, strategies/actions, administrative structure, and institutional arrangements for the reserve, including this MOA and others;

NOW THEREFORE, in consideration of the mutual agreements herein, NOAA and (state agency) agree to the following:



## ARTICLE I: TERRITORIAL-FEDERAL ROLES IN RESERVE MANAGEMENT

### A. State Role in Reserve Management

The Mississippi Department of Marine Resources shall:

1. be responsible for compliance with all federal laws and regulations, and ensure that the Grand Bay NERR management plan is consistent with the provisions of the CZMA and implementing regulations;
2. ensure protection of the natural and cultural resources of the reserve, and ensure enforcement of the provisions of state law, including rules and regulations of the (state coastal management program);
3. ensure adequate, long-term protection and management of lands included within the reserve boundary;
4. annually apply for, budget, and allocate funds received for reserve operations, research and monitoring, education and stewardship; and as necessary, land acquisition and reserve facility construction;
5. conduct and coordinate research and monitoring programs that encourage scientists from a variety of institutions to work together to understand the ecology of the reserve ecosystem to improve coastal management;
6. conduct and maintain programs that disseminate research results via materials, activities, workshops, and conferences to resource users, state and local agencies, school systems, general public, and other interested parties;
7. provide staff, and endeavor to secure state funding for the manager, education coordinator and research coordinator;
8. secure facilities and equipment required to implement the provisions within the reserve management plan;
9. ensure adequate funding for facilities operation and maintenance;
10. maintain effective liaison with local, regional, state, and federal policy makers, regulators and the general public;
11. serve as principal contact for issues involving proposed boundary changes and/or amendments to the reserve management plan;

12. respond to NOAA's requests for information, particularly cooperative agreement and grant progress reports and evaluation findings, including necessary actions and recommendations, made pursuant to Section 312 of the CZMA; and
13. expend funds in accordance with federal and state laws, the reserve management plan, and annual funding guidance from NOAA.

#### B. Federal Role in Reserve Management

NOAA's Office of Ocean and Coastal Resource Management shall:

1. administer the provisions of the Sections 315 and 312 of the CZMA to ensure that the reserve operates in accordance with goals of the reserve system and the Grand Bay NERR reserve management plan;
2. review and process applications for financial assistance from the Mississippi DMR consistent with 15 CFR 921, for management and operation, and as appropriate, land acquisition and facility construction;
3. advise Mississippi DMR of existing and emerging national and regional issues that have bearing on the reserve and reserve system;
4. maintain an information exchange network among reserves, including available research and monitoring data and educational materials developed within the reserve system;
5. to the extent possible, facilitate NOAA resources and capabilities in support of reserve goals and programs.

#### C. General Provisions

1. Nothing in this agreement or subsequent financial assistance awards shall obligate either party in the expenditure of funds, or for future payments of money, in excess of appropriations authorized by law.
2. Upon termination of this agreement or any subsequent financial assistance awards to Mississippi DMR any equipment purchased for studies to further this agreement will be disposed of in accordance with 15 CFR 24.32.
3. A free exchange of research and assessment data between the parties is encouraged and is necessary to ensure success of cooperative studies.

#### D. Other Provisions

1. Nothing in this agreement diminishes the independent authority or coordination responsibility of either party in administering its respective statutory obligations. Nothing in this agreement is intended to conflict with current written directives or

policies of either party. If the terms of this agreement are inconsistent with existing written directives or policies of either party entering this agreement, then those portions of the agreement which are determined to be inconsistent with such written directives and policies shall be invalid; but the remaining terms not affected by the inconsistency shall remain in full force and effect. At the first opportunity for revision of this agreement, all necessary changes shall be made by either an amendment to this agreement or by entering in a new superseding agreement, whichever is deemed expedient to the interested parties. Should disagreement arise on the interpretation of the provisions and/or amendments of this agreement that cannot be resolved by negotiations at the operating level of each party, the area(s) of disagreement shall be stated in writing by each party and promptly presented to a mutually approved mediator for non-binding mediation. If the parties cannot agree on the choice of a mediator or if the mediation does not resolve the dispute to the mutual approval of the parties, the parties are free to pursue any other legal remedies that are available.

#### ARTICLE II: REAL PROPERTY ACQUIRED FOR PURPOSE OF THE RESERVE

As well as acknowledging the rest of the requirements set forth at 15 CFR 921, Mississippi DMR specifically acknowledges and will fully comply with conditions set forth at 15 CFR 921.21 (e), which specify the legal documentation requirements concerning the use and disposition of real property acquired for reserve purposes with federal funds under Section 315 of the CZMA.

#### ARTICLE III: PROGRAM EVALUATION

The Office of Ocean and Coastal Resource Management Division of NOAA will schedule periodic evaluations of Mississippi DMR performance in meeting the terms of this agreement, financial assistance awards, and the reserve management plan. Where findings of deficiency occur, NOAA may initiate action in accordance with the designation withdrawal or interim sanctions procedures established by the CZMA and applicable regulations at 15 CFR 921.40-41.


#### ARTICLE IV: EFFECTIVE DATE, REVIEW, AMENDMENT AND TERMINATION


- A. This agreement is effective on the date of the last signature on this agreement and shall be in effect until terminated by either party.
- B. The Parties will review this Agreement at least once every five years to determine whether it should be revised or terminated. The Agreement may only be amended by the mutual written consent of both parties.
- C. This agreement may be terminated by mutual consent of both parties, or by NOAA if NOAA withdraws designation of the reserve within the reserve system, pursuant to applicable provisions of the CZMA and its implementing regulations as described under 15 CFR 923 Subpart L, or if NOAA finds that Mississippi DMR fails to comply with this MOA. The agreement may be terminated by Mississippi DMR with or without cause. Should this agreement be terminated, reimbursement of unexpended funds from financial assistance awards shall be determined on a pro rata basis according to the amount of work done by the

parties at the time of termination. Additionally, reimbursement for land purchased and facilities constructed with NOAA funds shall be consistent with terms and special award conditions of financial assistance awards.

- D. If any clause, sentence or other portion of this MOA shall become illegal, null or void for any reason, the remaining portions of this MOA shall remain in full force and effect.
- E. No waiver of right by either party of any provision of this MOA shall be binding unless expressly confirmed in writing by the party giving the waiver.

IN WITNESS THEREOF, the parties have caused this agreement to be executed.

  
\_\_\_\_\_  
Margaret A. Davidson  
Acting Director  
Office of Ocean and Coastal  
Resource Management  
National Ocean Service  
National Oceanic and  
Atmospheric Administration  
U.S. Department of Commerce  
5/30/13  
Date

  
\_\_\_\_\_  
Jamie M. Miller  
Executive Director  
Mississippi Department of Marine  
Resources  
4.10.2013  
Date

## Appendix 7: MOU between MDMR and SOS for Management of State Held Properties at GNDNERR



**STATE OF MISSISSIPPI**

Tate Reeves  
Governor

**MISSISSIPPI DEPARTMENT OF MARINE RESOURCES**

Joe Spraggins, Executive Director

**EXTENSION OF MEMORANDUM OF UNDERSTANDING**

**BETWEEN THE**

**MISSISSIPPI DEPARTMENT OF MARINE RESOURCES**

**AND**


**MISSISSIPPI SECRETARY OF STATE**

**FOR THE MANAGEMENT OF STATE HELD PROPERTIES AT GRAND BAY  
NATIONAL ESTUARINE RESEARCH RESERVE**

**MOU-MSOS-NERR-01**

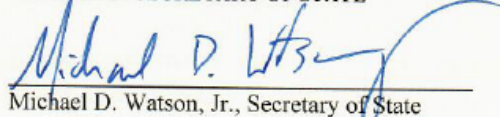
The Memorandum of Understanding ("MOU") between the Mississippi Department of Marine Resources ("MDMR"), and the Mississippi Secretary of State ("MSOS") for the management of state held properties located at the Grand Bay National Estuarine Research Reserve ("GBNERR") and entered April 9, 2019 is hereby extended by the MDMR and MSOS for a period of one year to April 9, 2021. All other terms and conditions of the MOU entered on April 9, 2019, remain in full effect.

**MISSISSIPPI DEPARTMENT OF MARINE RESOURCES**

  
\_\_\_\_\_  
Joe Spraggins, Executive Director

3-12-2020  
\_\_\_\_\_  
Date

**MISSISSIPPI SECRETARY OF STATE**

  
\_\_\_\_\_  
Michael D. Watson, Jr., Secretary of State

4/20/2020  
\_\_\_\_\_  
Date



## Appendix 8: MOU between GNDNERR and Friends of the Grand Bay NERR



**STATE OF MISSISSIPPI**

Tate Reeves  
Governor

**MISSISSIPPI DEPARTMENT OF MARINE RESOURCES**

Joe Spraggins, Executive Director

**MEMORANDUM OF UNDERSTANDING  
BETWEEN  
THE MISSISSIPPI DEPARTMENT OF MARINE RESOURCES  
AND  
FRIENDS OF THE GRAND BAY NATIONAL ESTUARINE RESEARCH  
RESERVE**

This Memorandum of Understanding (MOU) is between the Mississippi Department of Marine Resources (MDMR), and Friends of the Grand Bay National Research Reserve (hereinafter "FGBNERR").

**BACKGROUND**

The MDMR manages the Grand Bay National Estuarine Research Reserve (hereinafter "NERR") as part of the National Oceanic and Atmospheric Administration's Office for Coastal Management. The mission of the Reserve is to practice and promote informed stewardship of the Grand Bay NERR and Mississippi coastal resources through innovative research, education and training.

The FGBNERR is a Mississippi non-profit corporation focused on engaging local and regional citizens and communities about the value of the Reserve and the work that it does to support conservation and stewardship of estuarine environments, locally and regionally. It is dedicated to promoting and supporting the vision and mission of the NERR through activities as requested by the MDMR.

**DESCRIPTION OF COOPERATIVE EFFORT**

The MDMR and the FGBNERR, each respectively, understand the need to promote a strong partnership to enhance the NERR's research, education and stewardship capabilities locally and regionally.

The FGBNERR agrees to assist the NERR by providing a pool of available volunteers to assist



with events and programs, participate in limited fund raising through the printing and selling of promotional items approved by the MDMR, and assist with projects that enhance the NERR facilities and/or capabilities. The FGBNERR also agrees to sponsor food services at events mutually agreed upon, in advance, by both parties. These activities will be provided voluntarily by the FGBNERR at no cost to the MDMR.

**TERMS OF AGREEMENT**

This agreement shall remain valid unless cancelled by one of the parties in writing. Either party may terminate this agreement by giving a 30-day written notice to the other party. This agreement may be modified by the parties if agreed to in writing.

**INDEMNIFICATION**

To the fullest extent allowed by law, FGBNERR shall indemnify, defend, save and hold harmless, protect, and exonerate the MDMR, its commissioners, board members, officers, employees, agents, and representatives, and the State of Mississippi from and against all claims, demands, liabilities, suits, actions, damages, losses, and costs of every kind and nature whatsoever including, without limitation, court costs, investigative fees and expenses, and attorney's fees, arising out of or caused by FGBNERR and/or its partners, principals, agents, employees and/or subcontractors in the performance of this agreement.

**SEVERABILITY**

If any term or provision of this agreement is prohibited by the laws of the State of Mississippi or declared invalid or void by a court of competent authority, the remainder of this agreement shall not be affected thereby and each term and provision of this agreement shall be valid and enforceable to the fullest extent permitted by law.

**COMPLIANCE WITH LAWS**

This agreement shall be governed by and construed in accordance with the laws of the State of Mississippi, excluding its conflicts of laws provisions, and any litigation with respect thereto shall be brought in the state courts of Harrison County, Mississippi.

**ENTIRE AGREEMENT**

This agreement constitutes the entire agreement of the parties with respect to the subject matter contained herein and supersedes and replaces all prior negotiations, understandings, and agreements, written or oral, between the parties relating hereto.

**NO THIRD-PARTY BENEFICIARIES**

This agreement is for the sole benefit of the parties and nothing herein, express, or implied, is intended to or shall confer upon any other person or entity any legal or equitable right, benefit, or remedy of any nature whatsoever, under or by reason of this agreement.

**NOTICES**

All notices required or permitted to be given under this agreement must be in writing and personally delivered or sent by Certified United States mail, postage prepaid, return receipt requested, to the party to whom the notice should be given at the address set forth below. Notice shall be deemed given when received or when refused. The parties agree to promptly notify each other in writing of any change of address.

**For the MDMR:**

Dr. Ayesha Gray, Director  
6005 Bayou Heron Road  
Moss Point, MS 39562  
[ayesha.gray@dmr.ms.gov](mailto:ayesha.gray@dmr.ms.gov)

**For the FGBNERR**

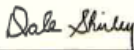
Dale Shirley, Incorporator  
250 Industrial Road  
Pascagoula, MS 39581  
[DShirley@chevron.com](mailto:DShirley@chevron.com)

**AUTHORITY**

The parties hereby represent and warrant that the execution of this agreement has been duly authorized by the requisite authorities and the parties, and that this agreement will be valid and legally binding upon the parties and enforceable in accordance with its terms when executed and delivered.

  
\_\_\_\_\_  
Joe Spraggins, Executive Director  
Mississippi Department of Marine Resources

5-20-2021  
Date

  
\_\_\_\_\_  
Dale Shirley, Incorporator  
Friends of the Grand Bay Estuarine Research Reserve

5-18-21  
Date

## Appendix 9: GNDNERR Disaster Response Plan 2013



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# Grand Bay National Estuarine Research Reserve Disaster Response Plan

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May 2013





*Funding for this project was provided by the NOAA's Office of Response and Restoration, Gulf of Mexico Disaster Response Center through a cooperative agreement between the NOAA's Office of Ocean and Coastal Resource Management under NOAA Grant NA10NOS420007 and the Mississippi Department of Marine Resources Grant #12-038.*

*Tetra Tech, Inc., provided technical support to the Grand Bay NERR to complete this plan through a contract with the Mississippi Department of Marine Resources.*



## FOREWORD

The need for a Grand Bay NERR Disaster Response Plan has become obvious over the past several years in light of a series of natural and man-made disasters that have impacted Reserve resources. A comprehensive approach to disaster planning has been undertaken to address health and safety concerns and the desire to protect resources. This plan is part of broader Gulf of Mexico-wide effort to develop disaster response plans for all five Reserves in the Gulf and a model Disaster Response Plan template for use at other Reserves and protected areas nationwide. The work is supported by the National Oceanic and Atmospheric Administration's Estuarine Reserves Division and their Office of Response and Restoration's Disaster Response Center along with the host organizations of the individual Gulf Reserves at Mission-Aransas, Weeks Bay, Apalachicola Bay, Rookery Bay along with Grand Bay.

In the past, the Reserve has worked most closely with the Mississippi Department of Marine Resources on disaster response, mostly in preparing and responding to hurricanes. However, the need to work closely with other local, state and federal agencies and emergency responders has become apparent and this coordination is incorporated into this planning effort.

The development and implementation of this plan will allow Grand Bay NERR staff to be more conscientious regarding health and safety issues, disaster planning and response and the incident command framework on both large and small scales. In addition, area emergency responders will be more aware of Reserve priorities and the natural resources that make the Grand Bay NERR such a special place. Reserve staff are not preparing to become seasoned first responders, but rather to become more attentive of hazardous or emergency situations that may occur onsite, and how to best deal with such events. Staff will be more knowledgeable of incident command, be better trained for emergencies and understand the capabilities and responsibilities of first responders.

Planning is key to being prepared to handle most situations. Planning ahead and working with emergency responders will aid us in protecting staff, visitors and the natural resources of the Reserve. We look forward to increased interactions with area responders in future planning activities and response to emergency and hazardous situations as they may occur.

David Ruple

A handwritten signature in cursive script that reads "David Ruple".

Grand Bay NERR Manager





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## Plan Acknowledgements and Distribution

The following stakeholder agencies and organizations contributed to development of this plan and represent the various relationships and collaboration necessary to maintain disaster preparedness. Each organization listed has received a copy of this plan and is welcome to both lend and request support which may become necessary for the protection of life, health, property, the environment, and the economy in and around the Grand Bay National Estuarine Research Reserve (NERR).

National Oceanic and Atmospheric Administration (NOAA), Estuarine Research Division

NOAA, Office of Response and Restoration, Disaster Response Center

United States Coast Guard (USCG), Sector Mobile

United States Environmental Protection Agency (EPA), Region 4

United States Fish and Wildlife Service (FWS), Grand Bay National Wildlife Refuge and Mississippi Sandhill Crane Refuge

Mississippi Department of Marine Resources

Mississippi Department of Environmental Quality

Mississippi State Department of Health – Public Health District 9 – Coastal / Plains

Mississippi Emergency Management Agency

Jackson County Emergency Management

Jackson County Sheriff's Office

Jackson County Fire District / Forts Lake Volunteer Fire Department



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## Record of Changes

The following is a record of changes to this plan. This plan includes a base plan and appendices. Changes to the base plan and list of appendices will be recorded here. Changes to specific appendices will occur more often (e.g., updates to contact information) and will not affect overall disaster response policy, so they will not be recorded here. However, as people responsible for maintaining appendices make those changes, each change needs to be relayed to the appropriate stakeholder agencies.

Each stakeholder organization listed on the Plan Acknowledgements and Distribution page receives a copy of the plan and plan revisions.

Date	Description of Change	Page or Section



## Acronyms and Abbreviations

USACE	United States Army Corps of Engineers
AAR	After Action Report
CDMO	Centralized Data Management Office
CELCP	Coastal and Estuarine Land Conservation Program
CFR	<i>Code of Federal Regulations</i>
COOP	Continuity of operations plan
Co-Ops	Center for Operational Oceanographic Products and Service
CORS	Continuously Operating Reference Station
CPR	Cardiopulmonary resuscitation
CZMA	Coastal Zone Management Act
DOI	United States Department of the Interior
DRP	Disaster Response Plan
EOC	Emergency Operations Center
EOP	Emergency Operations Plan
EPA	United States Environmental Protection Agency
ET	Emergency Team
FEMA	Federal Emergency Management Agency
FWS	U.S. Fish and Wildlife Service
GRP	Geographic Response Plan
HAB	Harmful Algal Bloom
HazMat	Hazardous Material
HIRA	Hazard Identification and Risk Assessment
HSEEP	Homeland Security Exercise and Evaluation Program
IAP	Incident Action Plan
IC	Incident Commander
ICP	Incident Command Post
ICS	Incident Command System
LEPC	Local Emergency Planning Committee
MDEQ	Mississippi Department of Environmental Quality



MDMR	Mississippi Department of Marine Resources
MEMA	Mississippi Environmental Management Agency
MPA	Marine Protected Area
MS	Mississippi
NERR	National Estuarine Research Reserve
NERRS	National Estuarine Research Reserve System
NIMS	National Incident Management System
NOAA	National Oceanic and Atmospheric Administration
NRDA	Natural Resource Damage Assessment
NRF	National Response Framework
NWR	National Wildlife Refuge
NWRS	National Wildlife Refuge System
OCRM	Office of Ocean and Coastal Resource Management (NOAA)
PDA	Preliminary Damage Assessment
PIO	Public Information Office
POC	Point of Contact
RAWS	Remote Automatic Weather Station
SET	Sediment/Surface Elevation Table
SOP	Standard Operating Procedures
SOS	Secretary of State
SWMP	System-wide Monitoring Program
TBD	To Be Determined
TIPS	Tidal Inlet Protection Strategies
TNC	The Nature Conservancy
U.S.C.	<i>United States Code</i>
USCG	United States Coast Guard
UXO	Unexploded ordnance
VHF	Very High Frequency





<b>Grand Bay National Estuarine Research Reserve Disaster Response Plan Quick Links to Procedures, Tools, Maps and Contacts</b>	
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<a href="#">Natural Resources</a>	15
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<a href="#">Emergency Contact List</a>	Appendix B
<b>Hazard Specific Procedures and Quick Reference Tool</b>	
<a href="#">Hurricane</a>	Appendix D
<a href="#">Severe Storms/Lightning/Tornado</a>	Appendix D
<a href="#">Oil Spill</a>	Appendix D
<a href="#">Riverine Flooding</a>	Appendix D
<a href="#">Invasive Species</a>	Appendix D
<a href="#">Vessel Grounding</a>	Appendix D
<a href="#">HazMat Spill (Industrial)</a>	Appendix D
<a href="#">Wildland Fire</a>	Appendix D
<a href="#">Medical Emergency</a>	Appendix D
<a href="#">HazMat Spill (Rail Lines)</a>	Appendix D
<a href="#">Quick Reference Tool</a>	Appendix K
<b>Maps and Other Information</b>	
<a href="#">NERR Fire Evacuation Procedures and Maps</a>	Appendix L
<a href="#">MDMR Hurricane Plan and Reserve Hurricane Procedure</a>	Appendix L
<a href="#">USCG ACP Geographic Response Plan Maps (A-1, A-2)</a>	Appendix L



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## 1.0 Introduction

The Grand Bay National Estuarine Research Reserve (NERR) in Jackson County, Mississippi is part of the National Estuarine Research Reserve System (NERRS). The NERRS is a network of 28 federally designated sites where natural resources are protected, monitored, studied, and shared with the public. The system was created by the federal Coastal Zone Management Act (CZMA) of 1972 and codified as Title 15, Code of Federal Regulations (CFR). The National Oceanic and Atmospheric Administration (NOAA) provides partial funding, program guidance, and technical assistance to maintain the system. Each NERR is managed by a state partner with input from local stakeholders. As identified at 15 CFR Part 921.1(b), five goals have been defined for NERRs (NOAA Undated and 2012a):

1. Ensure a stable environment for research through long-term protection of NERR resources.
2. Address coastal management issues identified as significant through coordinated estuarine research within the System.
3. Enhance public awareness and understanding of estuarine areas and provide suitable opportunities for public education and interpretation.
4. Promote federal, state, public, and private use of one or more Reserves within the System when such entities conduct estuarine research.
5. Conduct and coordinate estuarine research within the System, gathering and making available information necessary for improved understanding and management of estuarine areas.

The vision of work at the Grand Bay NERR over the next five years is to contribute to the broader effort that:

*“Coastal ecosystems of the Gulf of Mexico will be conserved and valued.”*

The mission of the Grand Bay NERR is:

*“To practice and promote informed stewardship of Grand Bay NERR and Mississippi coastal resources through innovative research, education, and training.”* (Grand Bay NERR 2013)



Staff and partners will work collaboratively to address focus areas relating to habitat protection, climate change and water quality. Reserve priorities and specific goals that will support this work include: (1) increase scientific understanding and management of coastal resources, (2) increase appreciation for the significance of coastal resources, and (3) improve science-based decision-making regarding management of coastal resources. The Reserve will address these priorities on a local and regional context and will pursue projects and collaborations relating to promoting resilient communities, promoting sustainable development, monitoring biodiversity, water quality monitoring, conducting habitat restoration and enhancement, understanding impacts of climate change and understanding the impacts of watershed development on natural communities. Reserve education and training activities will share the results of these projects with the public and local decision-makers.

Federal regulations require each NERR to prepare and maintain a NOAA-approved management plan. The plan must describe the NERR's strategies and actions for research, education/interpretation, public access, construction, acquisition and resource preservation, restoration, and manipulation. Staff roles in each of these areas must also be defined. Additional information on the Grand Bay NERR is available at: <http://grandbaynerr.org/>. The Grand Bay NERR Management Plan was revised in 2013 and will be posted to the Grand Bay NERR web site upon finalization; it is also available from the Grand Bay NERR points of contact identified in this Disaster Response Plan.

Effectively managing emergencies is important to protecting natural resources and continuing the work of each NERR; this plan addresses NERR emergency management.

## 1.1 Purpose

Grand Bay NERR has developed this DRP to guide internal response actions and coordinate response actions with partner agencies during disaster response operations. The DRP provides a flexible framework for response and operational guidance to protect the Reserve area ecosystems and help ensure the health and safety of all involved parties. This DRP fulfills the following objectives:

- Describes the resources at risk at the Reserve (people, infrastructure, and natural resources)
- Provides policy and guidance for operations, specifically detailing capabilities
- Presents a concept of operations, and actions, roles, and responsibilities involved with incident management
- Supports effective use of government resources during response operations.





***This DRP focuses on actions to prepare for potential future disaster events, as well as appropriate response actions following confirmation of a disaster and request for response assistance.*** It provides general information regarding the major components of any response effort, and presents specific procedures for general and hazard-specific response (Appendices A and D). Its primary focus does not include issues associated with prevention, post-response recovery, or reporting.

## 1.2 List of Plans

Federal regulations require each NERR to prepare and maintain a NOAA-approved management plan. The management plan must describe the Reserve's strategies and actions for research, education/interpretation, public access, construction, acquisition, and resource preservation, restoration, and manipulation. Staff roles in each of these areas must also be defined. The Grand Bay Management Plan has recently been updated (Grand Bay 2012).

This DRP complements the Grand Bay Management Plan by describing the policies, capabilities, and activities necessary for Reserve staff to respond to both internal and external emergencies. This DRP is not intended to supplant existing plans or policies; it addresses Reserve-specific disaster response planning in line with existing frameworks to strengthen preparedness for future events and to share capabilities to support natural resource protection within the existing emergency management framework. This DRP may also serve as a Reserve-specific annex to the plans of local, state, and federal response agencies, if they choose to incorporate it. Area plans relevant to the area of the Reserve are listed below and in the references section (Appendix M):

- U.S. Coast Guard Area Contingency Plan Sector Mobile (Draft) (USCG 2012) (selected maps included in Appendix L)
- Mississippi Comprehensive Emergency Management Plan (Mississippi Emergency Management Agency (MEMA 2012)
- Mississippi State Hazard Mitigation Plan: 2010 State Hazard Mitigation Plan Update (MEMA 2010)
- Mississippi Department of Marine Resources Tropical Storm and Hurricane Contingency Plan (MDMR 2012, included with Appendix L)
- Jackson County Emergency Management and Mitigation Plans (not available on line) (JCEMA 2011); the NERR communicates regularly with county and other local stakeholders regarding these plans.



The Reserve's Emergency Planner will maintain the list of area plans and update this list when the DRP is periodically updated.

### **1.3 NERR Emergency Management**

NERRs are exposed to many of the same hazards that threaten the built and natural environment in urban, suburban, and rural areas. Emergency planning and other preparedness activity can improve Reserve-related outcomes.

Unlike other jurisdictions responsible for managing emergencies, Grand Bay NERR does not have this authority and does not maintain staff dedicated to emergency management, law enforcement, emergency medical, or other public health and safety-related services. The Reserve largely depends on other agencies to conduct emergency response. However, the Reserve can add efficacy to local response and better ensures preservation of natural resources and infrastructure by contributing to emergency preparedness in the following ways: providing real-time local knowledge of resources to be protected, maintaining planning activities with the support of stakeholders, training staff, and conducting exercises. This DRP also enhances the Reserve's disaster preparedness by cultivating interest and shared responsibility within all Reserve staff, and supports coordination with managing partners and area response authorities to strengthen preparedness and improve future response outcomes.

### **1.4 Grand Bay NERR Basic Information**

The Grand Bay NERR represents an exceptional part of the local southeastern Mississippi coastal community (Jackson County) and the Gulf of Mexico region. The administrative boundaries of the Reserve include approximately 18,049 acres of lands and waters in south easternmost Jackson County, MS. The Reserve includes Middle Bay, Point Aux Chenes Bay, Bayou Cumbest, Crooked Bayou, Bayou Heron and associated coastal wetland habitats and selected portions of tidal and non-tidal habitats including lands and waters within the boundaries of the Grand Bay National Wildlife Refuge (NWR). The reserve is bounded on the east by the waters of Grand Bay and Middle Bay at the Mississippi-Alabama state line. On the west, the Bangs Lake system borders the Bayou Cassotte Industrial Park, on the north by the communities of Bayou Cumbest, Pecan, Kreole and Orange Grove and on the south by the Mississippi Sound. The Grand Bay NERR is part of the Mississippi Coastal Watershed. The reserve has developed a sub-watershed depiction that more accurately reflects the surrounding lands and waters that influence the reserve. This information is described in more detail in the NERR's Management Plan and Appendix L - Maps and Other Information. Table 1



provides summary information about the Reserve and Figure 1 shows the NERR location and boundaries.

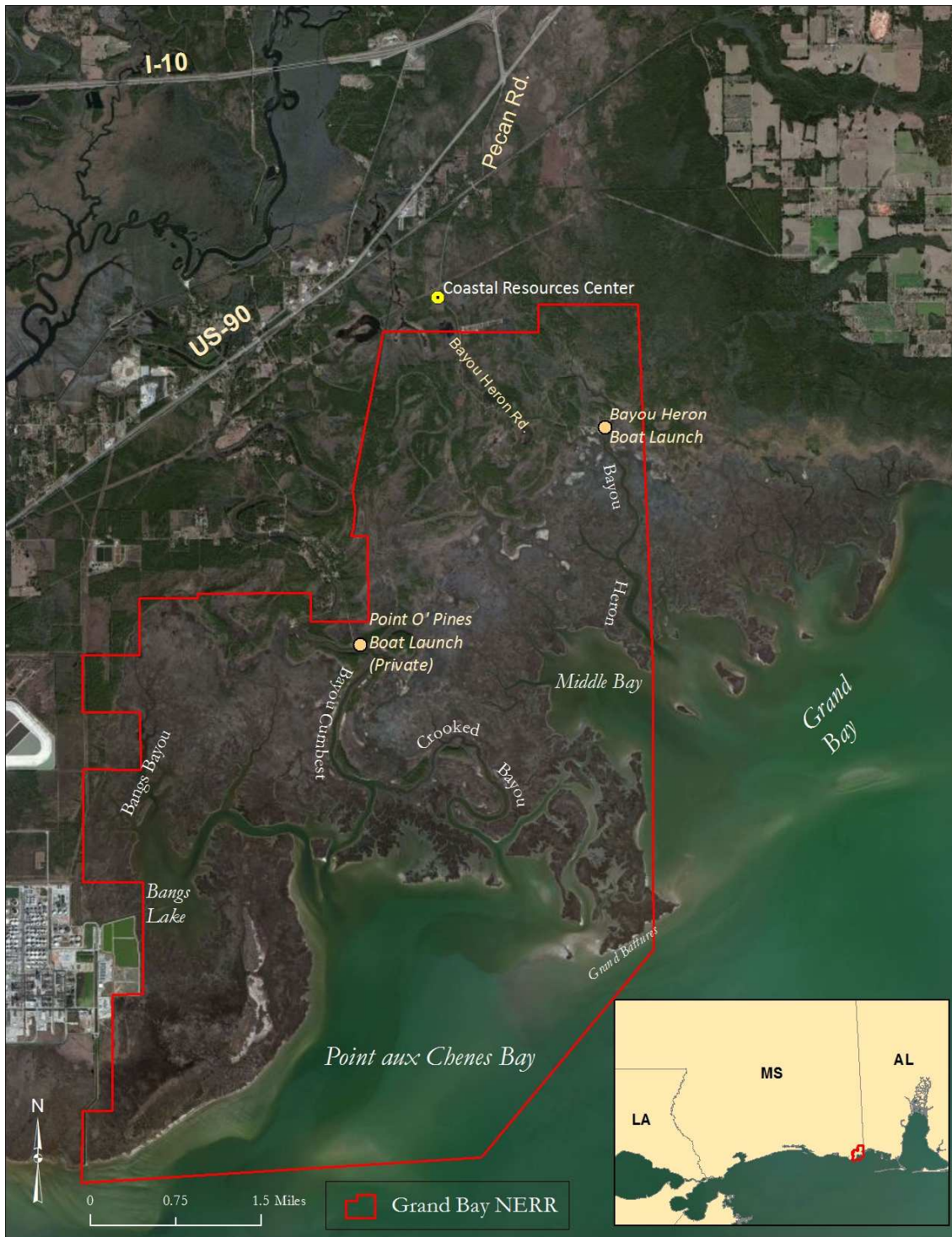
**Table 1 - Summary Information for Grand Bay NERR**

<b>Category</b>	<b>Information</b>
Mailing Address:	Grand Bay National Estuarine Research Reserve, 6005 Bayou Heron Road, Moss Point, MS 39562
Acres:	About 18,000 acres
Summary Description:	The reserve is located on the Mississippi/Alabama state line in Jackson County, MS. The reserve includes about 18,049 acres of lands and waters, stretching from Grand Bay and Bayou Heron in the east to Bangs Lake to the west. The reserve is located primarily within the Grand Bay National Wildlife Refuge and the Grand Bay Savanna Coastal Preserve. This reserve is a marine protected area and includes a variety of wetland habitats, both tidal and non-tidal, such as pine savannas, salt marshes, saltpannes, bays and bayous as well as terrestrial habitats that are unique to the coastal zone such as maritime forests. The reserve supports a highly diverse community of plants and animals and includes one of the largest estuarine systems in Mississippi.
Primary Managing Entity:	The reserve is administered through the Mississippi Department of Marine Resources (MDMR) whose offices are located in Biloxi, MS.
Stakeholders with Ownership or Land Management Responsibilities:	<p>The reserve was established in 1999 and is managed through a unique local, state and federal partnership designed to promote estuarine research and education within MS's Coastal Zone and its adjacent ecosystems. Public lands within the reserve are owned by two state agencies, the county, and one federal entity, including the MDMR, the Mississippi Secretary of State (SOS), Jackson County (JC), and the U.S. Fish and Wildlife Service (FWS). The state lands are part of the Grand Bay Coastal Preserve, a state-designated system of key estuarine areas, while the federal lands are part of the Grand Bay National Wildlife Refuge. In addition, the Grand Bay NERR is located completely within The Nature Conservancy's (TNC) Grand Bay Savanna project area. Reserve ownership by percentage includes: federal (33%), state land (24%), state open water (14%), private (27%) and county (2%).</p> <p>Major partners include the MDMR, the MS SOS, Mississippi State University, TNC, the FWS and the University of Southern Mississippi. Additionally, a Citizens Advisory Board has been established to assure that the concerns of the local citizens are adequately addressed by the Management Board. In addition, the National Oceanic and Administration Agency (NOAA) provides funding and support.</p>
County or Counties:	Jackson County, MS (located near town of Pecan and Moss Point, MS). The reserve lies about 30 miles east of Biloxi, MS and 30 miles southwest of Mobile, AL.
Disater Response Plan Point of Contact:	Will Underwood, Stewardship Coordinator and DRP POC: <a href="mailto:will.underwood@dmr.ms.gov">will.underwood@dmr.ms.gov</a> ; phone: 228-475-7047

- Sources: Grand Bay NERR web site and draft Grand Bay NERR Management Plan (Grand Bay Undateda, Undatedb, 2009, and 2013).

Figure 1 shows the location of the NERR.

Figure 1 – Location Map for Grand Bay NERR



Source: Prepared by NERR GIS Specialist, 2013. .





## 1.5 Authorities

Laws and executive orders that form the statutory basis of the NERR are as follows:

Coastal Zone Management Act (CZMA) – Section 315 of the CZMA of 1972, as amended, initiated the NERR system. The Act is administered by NOAA's Office of Ocean and Coastal Resource Management (OCRM); specifies principles and procedures for management of the nation's coastal resources, including the Great Lakes; and balances economic development with environmental conservation. The CZMA outlines two national programs—the National Coastal Zone Management Program and the NERRS. The 34 coastal programs aim to balance competing land and water issues in the coastal zone. The 28 NERRs serve as field laboratories to provide a greater understanding of estuaries and how humans affect these. The overall program objectives of CZMA remain balanced to "preserve, protect, develop, and where possible, to restore or enhance the resources of the nation's coastal zone" (NOAA 2012b).

Each NERR is intended to operate as a federal/state partnership. In Mississippi, the Mississippi Department of Marine Resource (MDMR) is the state level partner for Grand Bay NERR.

National Wildlife Refuge System (NWRS) Improvement Act – Public Law 105-57 (1997) amends the NWRS Administration Act of 1966 and ensures that the Refuge System is managed as a national system of related lands, waters, and interests for the protection and conservation of national wildlife resources. The NWRS is a network of over 545 national wildlife refuges (NWR) and thousands of waterfowl production areas across the U.S. supporting millions of migratory birds, serving as havens for hundreds of endangered species, and hosting an enormous variety of other plants and animals. At least 39 million people visit units of the NWRS each year. Because parts of the Grand Bay NWR are found within or located near Grand Bay NERR boundaries, this act serves as a relevant authority (USFWS 2012). Primary components of the NWRS Improvement Act include (1) a strong and singular wildlife conservation mission for the Refuge System; (2) a requirement that the Secretary of the Interior maintain the biological integrity, diversity, and environmental health of the Refuge System; (3) a new process for determining compatible uses on refuges; (4) a recognition that wildlife-dependent recreational uses (such as hunting, fishing, wildlife observation, photography, and environmental education and interpretation) are legitimate and appropriate public uses of the Refuge System, when determined to be compatible; (5) compatible wildlife-dependent recreational uses are the priority general public uses of the Refuge System;



and (6) a requirement for preparing a comprehensive conservation plan for each refuge (FWS 2012).

State and NERR Emergency Management Authorities - The State partner for Grand Bay NERR is the Mississippi Department of Marine Resources (MDMR). MDMR was created by the legislature as a new state agency in 1994 and manages coastal resources in the state through the authority of the Commission on Marine Resources. The MDMR is dedicated to enhancing, protecting and conserving the marine interests of the state for present and future generations. It manages all marine life, public trust wetlands, adjacent uplands and waterfront areas for the long-term recreational, educational, commercial and economic benefit of everyone. In addition to serving as the state managing agency for the Reserve, the MDMR and the Commission on Marine Resources play an important role in administering MS Seafood Laws, the MS Coastal Wetlands Protection Act, the Public Trust Tidelands Act, the Boat and Water Safety Act, the Derelict Vessel Act, the Non-Point Source Pollution Act, the Magnuson Act, the Wallop-Breaux Sportfish Restoration Act, Marine Litter Act and other state and federal mandates (MDMR Undatedb).

In emergency and disaster situations, the Grand Bay NERR Manager directs immediate notifications and actions to protect life, property, and natural resources at the reserve until appropriate response authorities arrive to assume the lead role. The NERR Manager also coordinates NERR decisions through its parent agency, the MDMR and the state trustee agency MDEQ. The Grand Bay NERR is a NOAA federal trust resource and as such, the GBNERR manager will notify NOAA's Office of Response and Restoration when hazardous spills or other disasters may affect the integrity of the Reserve. Longer-term decisions on NERR closures, participation in NRDA efforts, and consultation for response actions are managed through the MDMR Executive Director or MDMR Director of Coastal Ecology. The Grand Bay NERR Manager will follow procedures identified in this Disaster Response Plan (DRP) and established MDMR procedures and policies. In most disaster situations, the Grand Bay NERR Manager and reserve personnel will support response actions and incident command (ICs) established by the authorized response authority. The Grand Bay NERR personnel will provide consultation support and may provide staffing to IC structures (if appropriately trained and so directed by MDMR).

Where oil or hazardous material spills impact natural resources, MDMR and the Reserve may be called upon to support the NRDA process. In Mississippi, the Governor has designated the Mississippi Department of Environmental Quality (MDEQ) Executive Director, as the state's natural resource trustee for coastal areas. MDEQ has the





regulatory authority to assess damages to natural resources and to collect compensation for those injured natural resources and associated services lost. When appropriate, MDMR may direct the Reserve Manager and staff to support NRDA-related activities such as pre- and post-impact sampling, natural resource research, and other activities to document disaster impacts to natural resources at the Reserve or other areas in Mississippi (MDEQ Undated).

This DRP aligns with existing MDMR procedures and is not intended to supplant or replace any existing policies, guidelines, regulations or and requirements. The DRP addresses specific NERR preparedness and response procedures and demonstrates its commitment to preparedness efforts. Table 2 provides examples of emergency actions and agency authorities for various emergencies. Response procedures for specific hazards are address in the remainder of this DRP and Appendix D.

**Table 2 – Emergency Actions and Agency Authorities for Grand Bay NERR**

<b>Emergency Action</b>	<b>Agency with Authority</b>
Grand Bay Coastal Resources Center closure or emergency restriction of activities	NERR Manager for immediate decisions at the Center in coordination with MDMR-Biloxi, FWS
NERR area closures or emergency restriction of activities	NERR Manager for immediate decisions at the Reserve following County emergency management agency (EMA) warnings and coordinating with MDMR-Biloxi, FWS, and area response agencies or U.S. Coast Guard (USCG)
Area-wide NERR evacuation or shelter-in-place decision	NERR Manager, following County EMA warnings and coordinating area response agencies (see also Fire Evacuation Procedures and Maps included in Appendix L) in coordination with MDMR-Biloxi
Road closures and evacuation routes	County EMA decides on road closures and evacuations. Grand Bay NERR Manager coordinates with MDMR-Biloxi on decisions impacting the Reserve. NERR personnel will call 911 if Reserve personnel or visitors are stranded due to flood or blocked roads.
Navigable waterway closures	USCG Mobile Sector; MDMR-Biloxi may provide consultation and support for decisions related to waterways within the Reserve.
Arrests or reports of trespassers or those harming wildlife, stealing timber, committing vandalism, or initiating wildfires (arson), or other illegal activities	NERR Manager notifies Local Sheriff or Enforcement Divisions of MDMR and FWS. MDMR Marine Patrol provides enforcement related to aquatic life and associated coastal resources. The Marine Patrol also enforces federal laws pertaining to boating safety and provides emergency assistance to marine boaters. The MS Forestry Commission and FWS addresses arson/wildfire (MDMR Undateda).
Response decisions involving environmental trade-offs (e.g., sacrificing certain habitat to protect higher priority habitat)	Local, state, or Federal incident command (IC) lead agency makes response decisions, consulting with the NERR Manager and MDMR, as feasible. The Reserve can consult with these agencies to share information, resources, and local knowledge regarding natural resource priorities and protection strategies.
Determination of oil/hazmat clean-up endpoint (i.e., “how clean is clean?”)	Local, state, or Federal IC lead agency makes decisions, consulting with MDMR, MDEQ, FWS and NERR Manager, as feasible, for decisions within the Reserve’s boundaries.

## 1.6 Scope

This Disaster Response Plan is a comprehensive emergency management plan. As such, it serves as a primary, albeit general, guide for mitigating the full range of emergencies and disasters that may impact the NERR. As a comprehensive emergency plan, it also addresses the full range of activities that may be implemented before, during, and after emergency.

*A **comprehensive emergency management plan** addresses all hazards and phases of related planning—including mitigation, preparedness, response, and recovery. It also addresses issues such as planning for business continuity.*

Most importantly, it provides a framework for effective cooperation among local, state, federal, private and other non-governmental organizations during emergency response. Specifically, this DRP:

- Defines the Reserve’s emergency management policy.
- Identifies the people, natural resources and supporting research infrastructure at risk and methods to protect these.
- Describes a framework, organization, capabilities, and processes needed to implement disaster operations.
- Recognizes National Incident Management System (NIMS) and the National Response Framework (NRF) as the national framework used for response efforts.
- Represents the first effort to formalize an all hazards emergency management program at the Reserve.

***This DRP was developed to support a NOAA and state interest to establish fundamental emergency management programs at several reserves and for the NERRS as a whole.*** This plan uses the terms “emergency” and “disaster” interchangeably. Generally, the term “emergency” describes any situation that requires immediate, extraordinary action to save life, health, property, or the environment. Emergencies can require minutes, hours, or days to overcome. The term “disaster” refers to incidents that result in profound loss, recovery from which can require months, years, or even decades. Both emergencies and disasters require extraordinary response, so the terms are used synonymously in this plan. When it becomes necessary to distinguish between the two terms, this plan explains why a certain term is used.

Grand Bay NERR is committed to support emergency responses on site as so requested by emergency response agencies based on staff availability and training. This plan is separated into a “base plan” and “appendices.” The base plan uses numbered sections



to describe disaster policy and planning. Appendices provide additional information and the tools necessary to implement NERR emergency-related policy.

## 1.7 Assumptions

Planning assumptions provide a foundation for subsequent emergency management program efforts. Planning assumptions related to this plan are listed below:

1. Emergencies and disasters may occur with or without warning. The NERR's primary daily functions are research and monitoring, stewardship, and education. The NERR has responsibility to protect staff, visitors, property, and natural resources from injury or damage within available capabilities.
2. Local, state, federal, and other response organizations will function according to the National Incident Management System (NIMS) and the National Response Framework (NRF) to achieve inter-agency coordination.
3. The NERR staff will be familiar with NIMS to assist or cooperate with other agencies during multi-agency responses.
4. This plan is intended to provide dual functionality: (a) as a detailed document to be used for pre-disaster planning, exercise, and preparation purposes, or (b) as a quick reference guide for response personnel in the event a disaster or emergency situation occurs at the NERR.
5. The NERR will manage some emergencies, whenever possible, without outside assistance. Outside assistance will be requested when capabilities are inadequate or inappropriate to the task.
6. Outside assistance will generally be requested from local emergency authorities or through MDMR.
7. Priorities for incident response will generally be lifesaving, infrastructure protection, natural resource protection, and community resiliency.
8. The NERR and local partner agencies will regularly review planning efforts, conduct training, and engage in exercises to maintain disaster preparedness.

## 2.0 Emergency Planning Factors

Emergency planning for the NERR addresses three critical factors:

1. People, infrastructure, and physical and biological natural resources (along with their vulnerabilities) must be identified so that they can be effectively protected from disaster.



2. Hazards that may affect resources at the NERR must be analyzed to anticipate and mitigate potential impacts of those hazards.
3. To support the timeliest return to normal operations after a disaster, emergency capabilities necessary to respond to that disaster must be identified, maintained, and otherwise readied.

Each of these factors is addressed in the sections that follow; additional information is provided in the appendices.

## 2.1 NERR Resources at Risk

The Grand Bay NERR has identified people, infrastructure, and natural resources that must be protected. General emergency management plans primarily focus on protecting people and infrastructure. Protecting the people and infrastructure at the NERR is understood to be important, but this plan places additional emphasis on protecting the natural resources that are the center of the NERR's mission.

During a response event at the NERR, NERR Emergency Contacts identified in Appendix B should be consulted regarding (1) people, infrastructure, and natural resources to be protected, (2) areas appropriate for staging activities, and (3) NERR emergency capabilities that can support an effective and protective response effort. As part of ongoing preparedness effort, the Grand Bay NERR coordinates with appropriate agencies (such as those identified in Appendices B and G) so that relationships are developed before hazard events that can impact the Grand Bay NERR resources identified in this section.

### 2.1.1 People

Life-saving is the top priority for emergency planning at the reserve. People expected to need protection during an emergency at the NERR include full-time and part-time staff, researchers, visitors to the NERR facility, volunteers, and recreational users. Table 3 presents an overview of the people at risk at the Reserve.



**Table 3 - People at the Grand Bay NERR**

Category	Description
Full Time Staff:	1 NERR Manager, 1 Administrative Assistant, 4 Program Coordinators, 5 Support Specialists, 1 ECSC Site Coordinator. In addition, various U.S. Fish and Wildlife Service Staff (FWS) share the Grand Bay NERR offices.
Part Time Staff:	1 Facilities Manager
Temporary Researchers and Visitors:	1-5 scientists at any time, in conjunction with joint projects and specific grants. AmeriCorps Teams of 10-15 at any one time. 10-15 Students at any one time volunteering for alternative spring break during Spring season.
Annual Visitors:	4,000 visitors annually, with high visitor rates for days of K-12 programs, Other high traffic days include but are not limited to are monthly educational programs for the public, boating activities at the Bayou Heron Boat Launch, Oak Grove Birding Trail (during migration), and Coastal Cleanup (October). Volunteers also support reserve activities.
Potential non-counted users:	Non-registered researchers, commercial fishers, recreational users on boats, etc.

Sources: Updated by NERR from Grand Bay NERR Staff and Management Plan (Grand Bay NERR 2013).

Identifying people within the Grand Bay Coastal Resource Center, outbuildings and grounds is relatively straightforward. However, some scientists and researchers may be in the field when a hazard event occurs. In addition, all of the lands within the reserve boundary are not under the management of the MDMR. Public lands within the site are owned by a combination of two state and one federal entity, including MDMR, the MS Secretary of State (SOS), Jackson County and the U.S. Fish and Wildlife Service (FWS). The state lands are part of the Grand Bay Coastal Preserve, a state-designated system of key estuarine areas, while the federal lands are part of the Grand Bay National Wildlife Refuge (NWR). Current uses within the Reserve include boating, fishing, hunting, photography and other recreational activities. Traditional uses will continue, with limited restrictions that may apply to significant habitats or other areas of special interests (e.g., facilities, trails) and in accordance with Mississippi fish and game regulations. Research and recreational uses are encouraged, but must be balanced with protecting natural resources and goals to reduce impacts to persons during hazard events.

Planning considerations to protect reserve staff and other persons are incorporated into emergency response communication protocols, preparedness activities, and training & exercises referenced in this DRP. The reserve works with stakeholders identified in Appendix G, Disaster Management Planning Stakeholders, on considerations for notifying the public when a hazard event is pending or has occurred. Immediate evacuation and hazard procedures for personnel and visitors in or near the



Grand Bay Coastal Resource Center are addressed in this plan (see Appendix D, Hazards Specific Procedures and Appendix L, Maps and Other Information).

### 2.1.2 Infrastructure

Infrastructure includes physical structures and equipment that support operations of the NERR. Infrastructure to be protected includes primary and support buildings and structures, utilities, and other systems (e.g., communications, information technology). Protecting permanent and temporary monitoring stations is also a priority because these stations support ongoing research critical to the mission of the NERR. Loss of data collection stations could interrupt research efforts or result in an irreplaceable loss of data. Section 2.1.3 presents monitoring stations supporting the NERR's mission; Appendix B identifies emergency contacts that can provide information on these stations. Table 4 summarizes infrastructure at the Reserve.

**Table 4 - Infrastructure at Grand Bay NERR**

Category	Description
Primary Buildings:	Main Building (the Grand Bay Coastal Resources Center) at 6005 Bayou Heron Road, includes: Visitor Center, bathrooms, two training/conference rooms, offices, a small conference room, research laboratories, an interpretive area and an attached dormitory building for visiting researchers and agency personnel.
Support Structures:	Workshop and boat shed for staff only, 1 on-site storage shed, 2 off-site storage sheds, FWS Pavilion on Gautier Bayou used for educational programs.
Utilities:	3-ph-208volts, 400 amps Electric Power (Singing River Electric), 60kw backup diesel generator with 4 day fuel supply 2 - 6500 gallon cisterns for collecting rain water for sanitary purposes and fire suppression, potable water from 2- 4" submersible deep wells cased above flood risk internet and phone (AT&T), 3600 watt portable gasoline generator
Support Equipment:	4 - Trucks, 1 - SUV, 1 - 12 Passenger Van, 2 - Cars, 2 - 20' Skiffs, 2 - 18' Skiffs, 1 - 16' Skiff, 1 - 15' Skiff, 4 - Canoes, 8 - Tandem Kayaks, 2 - Single Kayaks, 1 - UTV, 1 - ATV, 1 - Riding Lawnmower, 5- Boat Trailers
Other Infrastructure:	1 - Public Boat Launch with two ramps, Oak Grove Birding Trail,
Long-term and Permanent Monitoring Stations:	See text and Figure 4 in Section 2.1.3 (Natural Resources) for details and locations. 4 - Permanent Water Quality Monitoring Stations, 1 - Nearshore Meteorological Station, 1 - Upland RAWS Fire Weather Station near the Coastal Resources Center.

Source: Modified Grand Bay NERR Staff and Management Plan (Grand Bay Undateda and 2013).

The NERR works to protect infrastructure by using proper construction techniques and implementing preparedness efforts and hazard procedures identified in this DRP. The Main Building was constructed with a number of protective measures for hurricane, fire, and flood events. It has been equipped with solar power panels to supplement the electric supply grid and generators are maintained for use during power outages.





### 2.1.3 Natural Resources

The NERR's mission includes protecting the physical and biological natural resources within its boundaries. This section describes natural resources to be protected within the NERR boundaries.

Grand Bay is characterized by a broad variety of estuarine and non-estuarine wetland habitats that together form a largely intact coastal watershed. The open-water estuarine areas support declining oyster reefs and extensive seagrass habitats. The intertidal portion of the site includes a wide variety of marsh types (low, mid-level and high elevation zones across a wide range of salinity) as well as some of the most extensive, unvegetated salt flats in this part of the Mississippi Sound. The non-tidal areas include wet pine savannas, coastal bayhead and cypress swamps, freshwater marshes and maritime forests.

Bayous Cumbest and Heron are the primary water courses discharging into Point Aux Chenes Bay and Grand Bay/Middle Bay complex respectively. Both bayous are relatively small with slow flowing waters rich in tannic acid from their forested watersheds. Except in extreme flood events it is believed that freshwater in these waters originates in large part from localized rainfall and groundwater. During moderate flood events the area is connected to the Escatawpa River watershed. This information is described in more detail in the NERR's Site Profile. Table 5 provides a summary of habitats at the reserve. Table 6 provides a breakout of habitat types by land area.



**Table 5 - Natural Resources at the Grand Bay NERR**

<b>Category</b>	<b>Description</b>
Extent of NERR:	The reserve is a marine protected area located in extreme southeastern Mississippi in Jackson County near the small community of Pecan. The reserve is comprised of approximately 18,000 acres, primarily within the Grand Bay National Wildlife Refuge and the Grand Bay Savanna Coastal Preserve.
Habitat Types:	The Reserve contains a variety of wetland habitats, both tidal and non-tidal, such as pine savannas, salt marshes, saltpannes, bays and bayous as well as terrestrial habitats that are unique to the coastal zone (e.g., maritime forests). Healthy estuarine salt marshes and fire-maintained pine savannas are some of the most biodiverse habitats in North America; the reserve includes considerable amounts of both. These habitats support many important species of fish and wildlife, including commercially and recreationally important species of finfish and shellfish (like brown shrimp, speckled trout and oysters). Sea turtles, bottlenose dolphin and, on occasion, manatees can be found in the deeper waters of the reserve. Many species of carnivorous plants and orchids can be found in the higher savanna habitats.
Endangered Species:	Manatee – <i>Trichechus manatus</i>
Critical or Essential Habitat	Salt Marsh; Submerged Aquatic Vegetation (SAV - Seagrasses)
Cultural Resources:	American Indian shell middens located throughout the Reserve
Value:	The reserve is a large, relatively intact area of coastal wetlands and includes a range of wetland types, including tidal estuary and non-tidal wetlands. The reserve supports a highly diverse community of plants and animals and includes one of the largest estuarine systems in MS. These estuarine communities in the northern Gulf of Mexico are vital to many important commercial and recreational species of fish and shellfish. The NERR, therefore, supports resources that have intrinsic natural and cultural resource value; aesthetic, educational and recreational value; and ongoing value to the larger community's tourism, recreation, and economic enterprises.

- Source: Modified Grand Bay NERR 10-Year Report, Web Site, and Grand Bay and Management Plan (Grand Bay Undated and 2013).

Table 6 lists habitat types at the Grand Bay NERR; descriptions of these habitat types are included in Appendix L - Maps and Other Information.



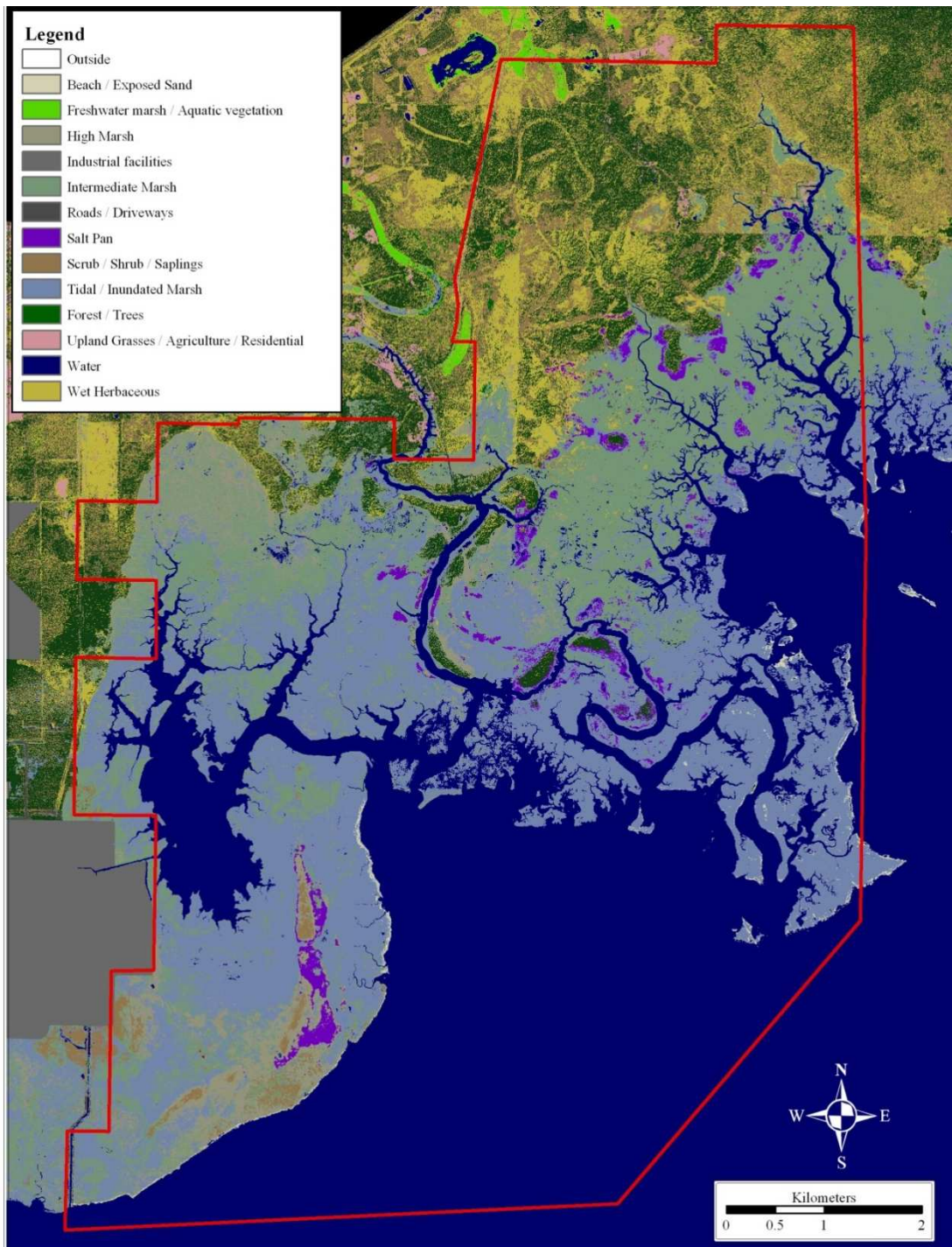
**Table 6 - Habitat Types at the Grand Bay NERR**

Habitat Type	Hectares	Acres
<b>Primarily Water-Based or Mixed Land/Water</b>		
Wet Herbaceous	463.9	1,145.7
Freshwater Marsh/Aquatic Vegetation	8.2	20.2
Tidal/Inundated Marsh	1,611.0	3,979.1
High Marsh	297.2	734.0
Intermediate Marsh	1,129.2	2,789.2
Salt Panne	105.7	261.0
Water	2,835.1	7,002.7
<b>Primarily Land-Based</b>		
Upland Grasses/Agriculture/Residential	7.9	19.4
Scrub/Shrub/Saplings	343.2	847.8
Beach/Exposed Sand	22.6	55.9
Forest Trees	476.3	1,176.5
<b>Other Areas</b>		
Roads/Driveways	3.2	7.8
Industrial Facilities	4.0	9.9

Source: Grand Bay NERR Management Plan (Grand Bay 2013).

Figure 2 shows the habitat types across the Grand Bay NERR. Figure 3 shows natural resource habitat areas overlain with managing entities.

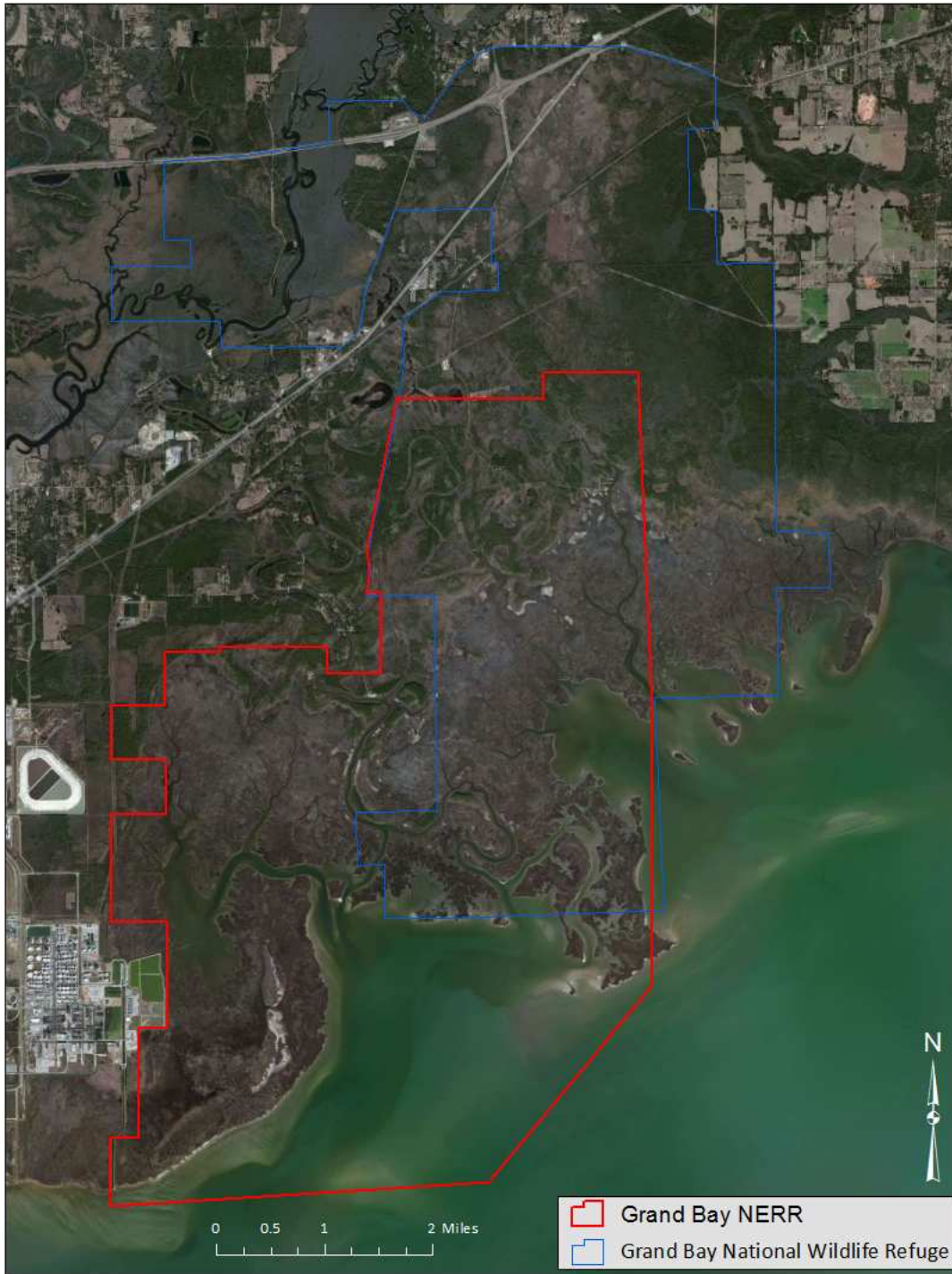
**Figure 2 - Natural Resource Habitats at the Grand Bay NERR**



Source: Prepared by NERR GIS Specialist, 2013.



Figure 3 - Grand Bay NERR and National Wildlife Refuge Boundaries



Source: Prepared by NERR GIS Specialist, 2013.



Core and Buffer Areas - NOAA regulations define key land and water areas or “core” areas as areas which contain “ecological units of a natural estuarine system which preserves, for research purposes, a full range of significant physical, chemical, and biological factors contributing to the diversity of fauna, flora, and natural processes occurring within the estuary.” The core area is “so vital to the functioning of the estuarine ecosystem that it must be under a level of control sufficient to ensure the long term viability of the reserve for research on natural processes...[These areas] should encompass resources that are representative of the total ecosystem which, if compromised, could endanger the research objectives of the reserve.” A buffer area is defined as an “area adjacent to or surrounding key lands and water areas and essential to their integrity. Buffer zones protect the core area and provide additional protection for estuarine-dependent species.” The buffer area may include areas for research and education facilities.

For the Grand Bay NERR site, the core area was defined by a block of continuous estuarine habitats and waters within the area bounded by the state line to the east, the Industrial Complex to the west. The buffer area was defined generally as a portion of the non-estuarine habitats within the Grand Bay NWR to the north of the estuarine habitats. While not defined specifically, the remaining lands of the Grand Bay NWR serve as a functional buffer, given their protective status. Additionally, other functional buffers in the vicinity included federal buyout properties currently owned by the government agencies, Grand Bay NWR lands in Alabama, a Mississippi Phosphate Mitigation Bank and a Jackson County Mitigation Bank all located to the north of the NERR buffer areas.

The core area of the Grand Bay NERR is comprised of approximately 12,800 acres of estuarine tidal marsh, tidal creeks, shallow open-water habitats, oyster reefs, sea grass beds, maritime forest (pine, live oak), salt flats, sandy beach, shell beach and shell middens. The 5,600 acre buffer area within the Grand Bay NERR boundary is primarily located to the north and consists of tidal marsh, scrub-shrub, pine flatwood and wet pine savanna habitats. Potential buffer expansion includes tidal marsh, scrub-shrub, pine flatwoods, wet pine savanna, coastal bayhead, cypress swamps and freshwater marshes to the north and west. The majority of these properties has been previously identified in past state grant requests or are located within the boundaries of the Grand Bay NWR. Several properties in Alabama just east of the reserve and refuge are part of the State of Alabama Grand Bay Forever Wild preserve.

Water Quality – The Grand Bay NERR is bounded on the west by the Bayou Cassotte Industrial Complex. Nonpoint source pollution associated with improperly treated





sewage from malfunctioning individual septic systems is a potential source of contaminants to the site. These and residential and industrial sources to the east from the Bayou LaBatre and Mobile Bay, AL area, plus natural levels of bacteria in the waters may contribute to various levels of impaired water.

A search of National Pollutant Discharge Elimination System (NPDES) permits at the Mississippi Department of Environmental Quality indicated that the majority of point source discharges from the adjacent industrial sites are located and discharge to the west of the Grand Bay NERR and do not impact the site directly (Coastal Environments, Inc., 1992). However, one industrial NPDES permit allows discharge into an unnamed tributary to Bangs Lake. This permit regulates total suspended solids discharging from a settling pond. There are no permitted domestic discharges within the NERR.

The Grand Bay area is sparsely populated but where population exists, treatment and disposal of domestic wastewater is dependent on individual septic systems. There are no municipal sewage facilities in this area. The major sources of impact to the water quality are the relatively small communities of Kreole and Pecan located to the north, particularly the 50-60 homes located along Bayou Cumbest. A late 1990's effort by a coalition of state, federal and local government entities to reduce the levels of septic discharge from these homes into the Bayou Cumbest and Bangs Lake area led to many modifications to individual wastewater systems. However, many of these systems have not been properly maintained or are abandoned. Many additional homes and small businesses previously located within and adjacent to the boundaries have been removed, potentially reducing human impacts to the area. Several homes damaged by recent hurricanes were not rebuilt or purchased as part of federal buyout programs to remove structures from repetitively flooded areas.

In 1999, when the Reserve was designated, shellfish growing waters within the NERR (Area VIII) were rated as conditionally approved for shellfish harvesting, based on criteria established by the National Shellfish Sanitation Program and followed by the DMR. Conditionally approved waters allow shellfish to be harvested when water quality standards are met. Malfunctioning residential septic systems or other sources of contamination may cause elevated fecal coliform bacteria counts during periods of heavy rainfall. The elevated bacterial counts degrade the water quality and result in the periodic closure of otherwise healthy oyster reefs. In 2008, the DMR recommended permanently closing these waters for shellfish harvest based upon high fecal coliform counts. The area remains closed. DMR and NERR partners are seeking answers to why bacteria levels have increased after 2005 while many of the area residents moved



because of Hurricane Katrina damage. Bacterial source identification and tracking studies will help determine where these bacteria are originating.

Research and Monitoring of Natural Resources - The Grand Bay NERR conducts environmental monitoring and research efforts related to stewardship and research regarding the natural resources at the reserve. Researchers collect this data using monitoring and sampling stations that should be protected. Damage to these stations could represent significant loss of data and compromise the value of long-term studies. In addition to the direct costs of replacing the stations, the loss of data collected at these stations or interruption of studies associated with these stations could reduce the quality of long-term research products, including baseline data necessary to support post-disaster litigation (see Section 3.4.1). Monitoring activities and stations include:

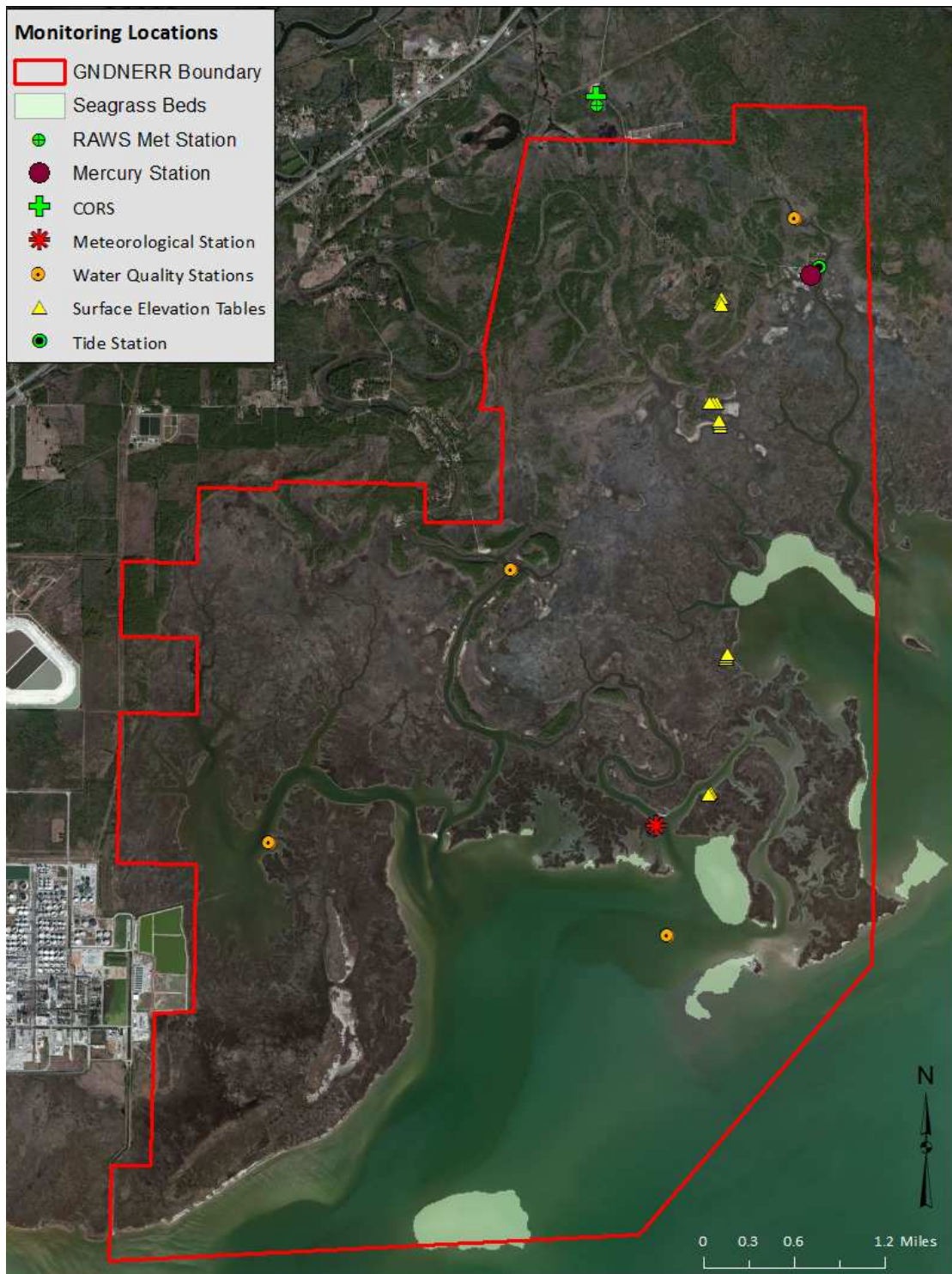
- Remote Automatic Weather Station (RAWS) - This is one of a network of strategically located RAWs in the U.S. These stations track weather data that assists land management agencies with monitoring air quality, rating fire danger, and providing information for research applications. The station was installed in 2009 and is maintained by the FWS/MS Sandhill Crane NWR. The data from the GRBM6 RAWS Station can be found at: [http://raws.wrh.noaa.gov/cgi-bin/roman/meso\\_base.cgi?stn=TS770&time=GMT](http://raws.wrh.noaa.gov/cgi-bin/roman/meso_base.cgi?stn=TS770&time=GMT) . Additional information is available at: <http://raws.fam.nwcg.gov/> .
- Meteorological and Water Quality Monitoring Stations – These support SWMP efforts and include 1 meteorological station and 4 water quality stations that have operated since 2004 at the reserve. Data is managed through the Centralized Data Management Office (CDMO) located in South Carolina. This includes system-wide monitoring program (SWMP) data collection that is provided used to help evaluate overall NERR system health. Real-time conditions are available at: <http://cdmo.baruch.sc.edu/get/realTime.cfm?stationCode=GNDCRMET> . Additional information on SWMP is available at: <http://cdmo.baruch.sc.edu/>
- Mercury Station – This monitoring station has been a cooperative effort between NOAA, MSDEQ and the Grand Bay NERR since 2006. The station measures dry atmospheric mercury deposition, carbon monoxide, sulfur dioxide, nitrogen oxides, ozone, and black carbon. The data from this project are publicly available, and are used to find trends in atmospheric mercury concentrations, estimate dry deposition for the region, trace atmospheric mercury back to potential sources, and to evaluate atmospheric models.
- Three efforts implemented to support vertical change monitoring associated with potential climate change impacts –



- Continuously Operating Reference Station (CORS) – This is one of a network of points that collects data for the National Geodetic Survey (NGS), an office of NOAA's National Ocean Service. CORS provide Global Navigation Satellite System (GNSS) data (carrier phase and code range measurements) to support 3-D positioning, meteorology, space weather, and geophysical applications throughout the United States, its territories, and a few foreign countries. The CORS at Grand Bay NERR (Station ID MSGB) was established in 2010 and the data is managed by the University of Southern Mississippi Gulf Coast Geospatial Center <http://vrsnet.gcgcum.org/>.
- Marsh Surface Elevation Tables – These permanent stations allow for fine-scale measurement of marsh elevation and associated marsh processes. They are sensitive to disturbance from response vehicles and should be avoided. 15 of these collection points have been established. They have been monitored since 2010 and the data is managed internally.
- Tidal Station – This is a temporary NOAA water level station (Grand Bay NERR, Mississippi Sound, MS) (Station ID 8740166). It was established in 2010 and the data is managed by NOAA CO-OPS. Data is available at [www.tidesandcurrents.noaa.gov](http://www.tidesandcurrents.noaa.gov).

Information on the locations and activities at research stations across the NERR also is available from Grand Bay NERR representatives (see Appendix B, Emergency Contact List). These stations can provide early indicators of spills or changes in water quality. During a response action, they should be protected if possible to allow ongoing monitoring to continue. Loss of these stations would incur costs for replacement; however, data losses or interruptions in studies could be irreplaceable. Figure 4 shows monitoring stations at the reserve; Table 4 lists the monitoring station infrastructure.

**Figure 4 - Monitoring Stations at Grand Bay NERR**



Source: Prepared by NERR GIS Specialist, 2013.



Oceanography and Water Depths at Grand Bay NERR – The Grand Bay area is a shallow, estuarine area with an average water depth of approximately 3 ft. (0.9 m). Water depths can range from 0 ft. at some low tides to 10 ft. (3.1 m) in the channel connecting Point Aux Chenes Bay with the Mississippi Sound. Average water depth in Bangs Lake and Middle Bay is less than 3 ft. (0.9 m). Dominant water movement results from the flood and ebb of the tide except during heavy rain events when freshwater discharge from the bayous is significant. Both astronomical and meteorological tides influence the Grand Bay area. Astronomical tides are diurnal, i.e. usually one high and one low water per day with an average tidal range of approximately 2 ft. (0.6 m). Tidal range fluctuates seasonally with a minimal range of 0 to 1.5 ft. (0.5 m) during the winter months and a maximum range of 2 to 3 ft. (0.6 to 0.9 m) during the summer months. Because of the minimal tide range of the area, meteorological conditions often exert a strong influence on local tide elevations, making this a wind dominated tidal system. Strong southerly winds push water into the area exaggerating and often maintaining high water conditions. Strong northerly winds push water out of the area exaggerating and maintaining low water conditions often resulting in the exposure of large mudflat and sandy shoal areas. Due to the shallow characteristic of some of these near shore areas, snags associated with uprooted trees, large branches and destroyed docks/piers occur frequently but in particular after tropical cyclone events. These hazards are dangerous because they can be barely visible above the water surface and can relocate with shifting tides and winds.

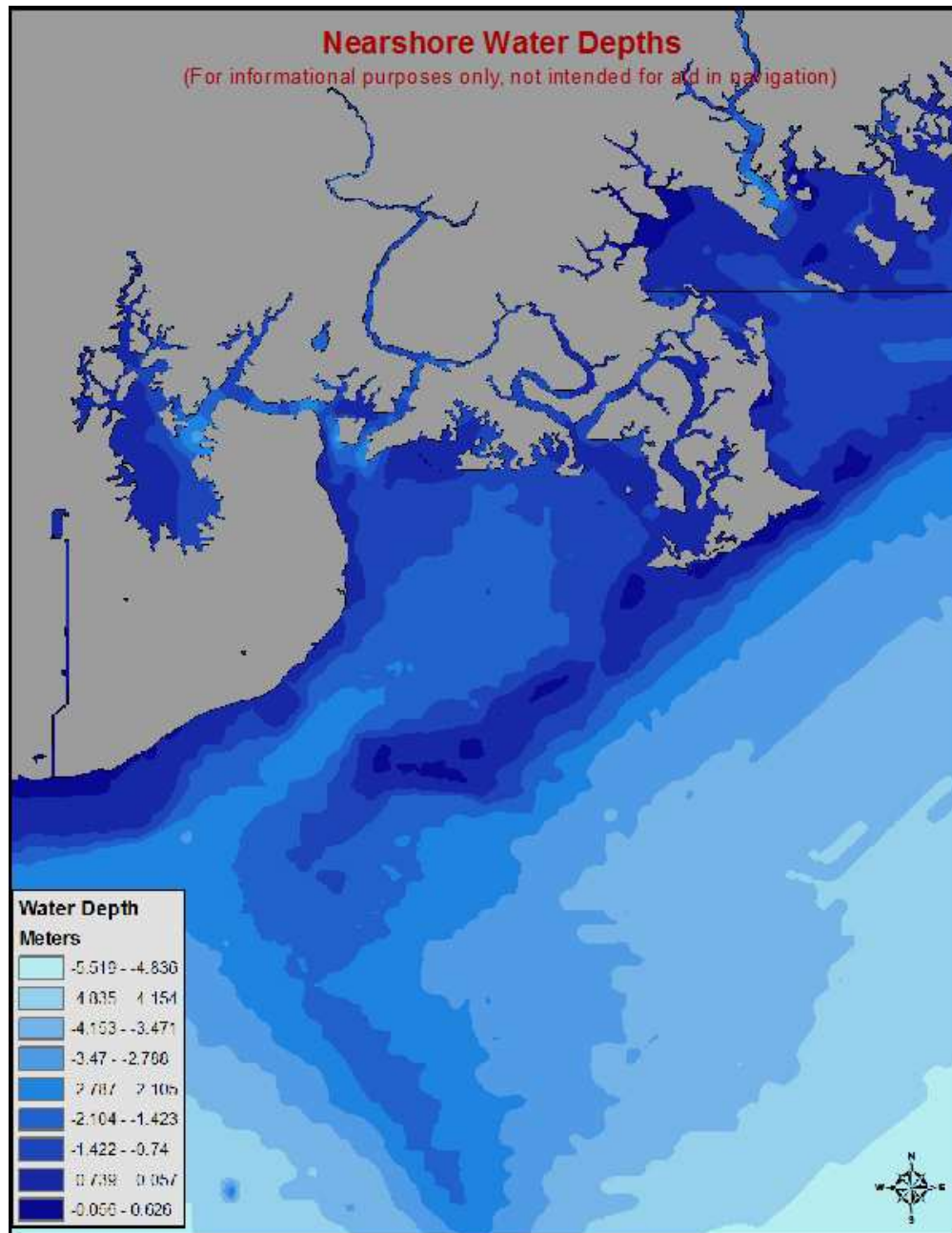
Knowledge of the water depths, tide stage and wind intensity and direction (water flow) is essential to safe navigation. During and after an emergency, Grand Bay NERR personnel can provide consultation information to responders if water-based response actions are required. In addition, Grand Bay NERR personnel will work with area response agencies to ensure that downed trees and debris are removed from to support safe use of the water following a disaster event. Figure 5 shows the water depths for near shore areas of the reserve. Note, this map is provided for information purposes and is not intended to support navigation. Grand Bay NERR personnel can provide information to support navigation or entry by water to support response actions during an emergency or disaster situation.

Reserve water temperatures recorded at the four current SWMP stations ranged between a low of 34.7o F (1.5 o C) in the winter to a high of 96.6o F (35.9o C) in the summer. Average water temperatures at these sites ranged from 72.5 o F (22.5o C) to 73.6o F (23.1 o C).



Salinity values vary along a gradient from bayou to bay and with rainfall events. Salinity values can change from fresh or oligohaline conditions (0.0 to 5.0 ppt) to polyhaline conditions (18 to 30+ ppt). Salinity is generally highest during the late summer dry season and lowest during the winter to early spring wet season.

**Figure 5 - Near Shore Water Depths around Grand Bay NERR**



Source: Prepared by NERR GIS Specialist, 2013.





The Grand Bay NERR Management Plan (Grand Bay 2013) provides additional information on the types of natural resources located at the NERR. Reserve personnel are knowledgeable about the natural resources of the reserve and can assist in identifying sensitive habitats and associated response considerations based on their knowledge, NERR mapping data, and the Quick Reference Tool included in Appendix K of this plan.

NOAA and the Grand Bay NERR collaborate to produce Environmental Sensitivity Index (ESI) maps and Tidal Inlet Protection Strategies (TIPS) for oil spill response. These data can be used to identify sensitive fish, wildlife, and habitat and recommended protection strategies in the event of an oil spill within the area. The ESI data and maps can be found at <http://response.restoration.noaa.gov/maps-and-spatial-data/environmental-sensitivity-index-esi-maps.html>. Grand Bay NERR participates in U.S. Coast Guard led Area Committee planning for oil spills. This includes providing updated data to the USCG Area Contingency Plan Geographic Response Plan (GRP) for the Grand Bay NERR area. Two figures taken from the USCG ACP that address areas of the NERR are included in Appendix L, Maps and Other Information. The USCG Area Contingency Plan GRP includes information and maps on protection strategies for environmentally sensitive areas and is available at: <https://homeport.uscg.mil/mycg/portal/ep/portDirectory.do?tabId=1&cotpId=37>. Select maps addressing the reserve's area (A-1 and A-2) are included in Appendix L, Maps and Other Information for quick reference.

## 2.2 Hazards

The Grand Bay NERR regularly identifies hazards and their potential impacts, and estimates relative risk using a Hazard Identification and Risk Assessment (HIRA) tool. Table 7 lists the hazards identified as most significant to the NERR in order of descending priority.

Results of the most recent HIRA are provided in Appendix F – Hazard Identification and Risk Assessment. Section 3.0 of this DRP addresses preparedness and mitigation actions for priority hazards.

**Table 7 - NERR Hazards and Relative Priority for Hazard Mitigation**

<b>Events/Hazards</b>	<b>Risk Ranking Outcome</b>
Hurricane	High
Severe Storms (including lightning/tornado)	High
Oil Spill*	Medium
Riverine Flooding	Medium
Invasive Species	Medium
Vessel Grounding	Medium
Hazardous Material (HazMat) (Industrial)	Medium
Wildland Fire	Medium
Structure Fire*	Medium
Medical Emergency	Medium
HazMat Spill (Rail Lines)	Medium
Earthquake	Low
Tornado*	Low
Aircraft Crash	Low
Law Enforcement Emergency	Low
Unexploded Ordnance (UXO)/Live Fire	Low

\*Structure fire addressed with Wildland Fire and Tornado addressed with Severe Storms in Appendix D – Hazard Specific Procedures.

The HIRA and mitigation actions are reviewed by the NERR annually. While the NERR’s DRP helps improve preparedness for all hazards, identifying high and medium hazard priorities assists in focusing planning and mitigation resources.

### **2.3 Emergency Capabilities**

Emergency management resources (called emergency capabilities in this plan) are critical for protecting natural resources, people, and property during an emergency. Capabilities include facilities, equipment, supplies, and personnel. NIMS includes standard definitions and categories for cataloging these items (FEMA 2012). Note that this Disaster Response Plans uses the term “capabilities” rather than “resources” to avoid confusion with discussions of the NERR’s natural resources. Representative NERR emergency capabilities are summarized below:



- Equipment – The NERR includes a range of equipment that can support localized or area responses, including: boats, sampling equipment, supplies, radios, log books, GPS/GIS units, computers, cameras, and other equipment.
- Facilities – The NERR includes buildings, boat ramp, support structures (e.g., laboratory space, classroom, secured parking/staging areas, dormitory) and other facilities that can support emergency response personnel during a response effort.
- Supplies – The NERR includes supplies that are used to support day-to-day operations (e.g., laboratory supplies, sample bottles, fuel, tags, etc.) as well as emergency supplies (e.g., water, first aid, etc.).
- Personnel – The NERR includes trained personnel that can support emergency response operations in an Emergency Operation Center (EOC) or in the field. The NERR also includes other personnel that may be able to support ancillary needs during an emergency event or share local knowledge and experience of the area (as appropriate to the emergency response).

The NERR personnel, facilities, and equipment also generate information and data that can support emergency response activities. These include:

- Information on NERR users – The reserve’s researchers, scientists, and administrators understand the NERR area, persons that use the area, entities operating within the NERR boundaries, and particular considerations regarding life-saving concerns that could expedite emergency operations during a hazard event.
- Information on NERR infrastructure – The reserve’s researchers, scientists, and administrators can provide information on buildings, support structures, utilities and other systems (e.g., information technology, communications) that can support prioritization of response efforts at the reserve in the event of a hazard incident.
- Information on NERR natural resources – The reserve’s personnel have significant knowledge and mapping data regarding priority habitats for protection (e.g., booming), cultural and historic resources, oyster beds, coastal areas, endangered species and nesting areas, environmentally sensitive areas, and related natural resource information that can assist response, while protecting resources.
- Data – The NERR mission includes research, stewardship, and education. Therefore, NERR personnel can share data on water quality, tides, water depths and telemetry, areas that present a wildfire risk, endangered or invasive species, safe areas for staging activities, access routes, and other NERR-specific information that can support responders during an emergency event. This information can support emergency



response planning agencies before events as well as during post-emergency assessment and recovery. Typical roles for Grand Bay NERR staff might include providing:

- Biological and oceanographic technical specialists to support NRDA efforts directed by federal and state natural resource trustees.
- Scientific support for fish and wildlife and habitat protection concerns.
- Water, soil, and sediment sampling supporting for spill surveillance and monitoring.
- Consulting on placement of protective booms within Grand Bay NERR boundaries or to protect reserve natural resources.
- Transportation or guides within Grand Bay NERR boundaries.

Appendix B provides an Emergency Contact List; NERR emergency contacts can provide additional information on emergency capabilities to support localized or area response efforts. Appendix C provides a list of emergency capabilities that can support emergency response.



### 3.0 Concept of Operations

Although the Grand Bay NERR does not employ a full-time or part-time emergency manager, maintaining disaster preparedness at the NERR is a priority, and is managed with a Concept of Operations that describes how different emergency activities are to be coordinated.

The NERR Manager assumes primary responsibility for all disaster preparedness and serves as the de facto NERR Emergency Manager. The NERR Manager has assigned emergency management program support activities as described in Table 8.

**Table 8 - NERR Emergency Management Team Assignments**

Support Activity	Assigned To	Title
Attends emergency planning meetings, develops plans and procedures, and supports the Emergency Team	Stewardship Associate	Emergency Planner and Response Coordinator <b>(Emergency Planner)</b>
Facilitates training, maintains an annual training plan, facilitates exercises, and maintains a multi-year training and exercise plan.	Coastal Training Program Coordinator/ Stewardship Coordinator	Emergency Training and Exercise Coordinator <b>(Emergency Training Coordinator)</b>
Maintains the Hazard Identification and Risk Assessment (HIRA). This person also maintains a list of capabilities (supplies and equipment that can be used during emergencies) and serves as a backup to the Emergency Training and Exercise Coordinator and Emergency Manager.	Stewardship Coordinator	Emergency Risk Manager and Emergency Capability Coordinator <b>(Emergency Coordinator)</b>
Develops emergency management policy for the NERR, maintains an emergency management program annual work plan, maintains program notes, and reports progress and serves as manager for response activities.	NERR Manager	<b>Emergency Manager</b>

Individuals assigned roles listed in the table above, together with the NERR Manager, comprise the Grand Bay NERR Emergency Team (ET). This team meets quarterly to discuss relevant events, plan, review progress, and discuss resource needs to support future work. The NERR Manager may add other NERR staff and members of external



agencies to the ET. The role of this expanded ET is to plan and manage response activity.

Each year, the ET performs work in the following four areas: mitigation, preparedness, response, and recovery. The work of each area is described in the following sections.

### **3.1 Mitigation**

Mitigation is activity designed to eliminate or reduce vulnerability before an emergency occurs.

The Grand Bay NERR maintains a HIRA that identifies hazards and considers the probability of occurrence of, vulnerability to, and impacts associated with these hazards. The HIRA output is a list of hazards and relative priorities that drive mitigation strategies and serves as the basis for establishing a list of projects to reduce risk, meet the specified priorities for mitigation, and implement other preparedness activities (see Table 7). Appendix F – Hazard Identification and Risk Assessment documents the hazard review and prioritization process. Past mitigation activities have included building the Coastal Resources Center with hurricane resistant and fire-wise construction elements. This section identifies mitigation actions that the Grand Bay NERR is focusing on to address those hazard priorities, including:

- Increasing readiness through staff training
- Upgrading first-aid equipment
- Increasing wildfire protection capacity through equipment upgrades and enhanced fire breaks at Coastal Resources Center

The NERR Emergency Coordinator maintains the HIRA and works with the ET to identify appropriate mitigation strategies. At times, general fund and grant monies may become available to mitigate risk identified during the HIRA and mitigation planning process.

### **3.2 Preparedness**

Preparedness refers to readiness for response to an emergency or disaster that cannot be entirely mitigated. Preparedness involves planning, training, exercising, equipping, and supplying. Each of these preparedness activities is described below.

#### **3.2.1 Planning**





Emergency planning involves developing plans and procedures to respond to an emergency, including:

- Emergency operations plan (EOP) – This specifies policies and practices associated with an emergency. The elements of an EOP are addressed in Section 3.3.
- Standard operating procedures (SOP) – These describe the roles, responsibilities, resources, and activities of people and organizations assigned to an emergency. The elements for SOPs are referenced in this plan for specific hazards in Appendix D. Additional forms, tools, and procedures are included in Appendices K and L.
- Continuity of operations plan (COOP) – A document that describes how essential services and research will continue despite an emergency. The elements of a basic COOP are addressed in Section 4 and Appendix E.
- Other Emergency Plans – Various agencies prepare emergency and related plans that affect the NERR. The Grand Bay NERR maintains awareness of these plans through cooperation, training, and exercising with stakeholders listed in Appendix D. Representative area plans are listed in Section 1.2.

The NERR Planner periodically may participate in the Sector Mobile Area Committee meetings and coordinate and meet with other area response agencies.

### **3.2.2 Training and Exercising**

Training and exercising familiarizes people with the policies, plans, tools, and procedures for conducting response. The NERR considers the knowledge and experience people gain from training and exercising critical to a successful response, so the NERR maintains an Annual NERR Training Plan. The plan specifies training for each responder, when that training will be available, and where it will take place. The NERR works to provide adequate training so that anyone responding to an incident can do so safely and proficiently.

Training recommended for NERR personnel and the Annual NERR Training Plan are attached as Appendix I – Emergency Training Plan, respectively. The NERR encourages staff to undergo as much training as possible, and maintains a copy of all emergency management training certificates within individual personnel files.



Exercising is an important complement to training. It develops proficiency and allows individuals and organizations to practice what they have learned. Regular exercising is also important to maintain proficiency and NERR preparedness.

The NERR conducts at least one exercise each year using local protocols and/or U.S. Homeland Security Exercise and Evaluation Program (HSEEP) guidelines. HSEEP provides a standard method for designing, conducting, and evaluating exercises. The Federal Emergency Management Agency (FEMA) maintains a HSEEP toolkit ([https://hseep.dhs.gov/pages/1001\\_toolk.aspx](https://hseep.dhs.gov/pages/1001_toolk.aspx)) that provides forms and guides to help plan, conduct, and evaluate exercise activity. The NERR maintains a multi-year exercise plan attached as Appendix J – Emergency Exercise Plan.

The NERR, when invited, participates in the National Preparedness for Response exercise program for oil and hazardous substance spills conducted by USCG Sector Mobile.

Following exercises and responses to emergencies, the NERR develops after-action reports (AAR) (see Appendix K). The AAR notes strengths and weaknesses in response activity and identifies opportunities for improvement. The NERR retains copies of completed AARs so these may be referenced for subsequent program development efforts.

The Emergency Training Coordinator facilitates all training and exercise work for the NERR and maintains associated documentation.

### **3.2.3 Equipping and Supplying**

Various equipment and supplies are typically needed during an emergency. Necessary equipment can range from small or specialized personal protective equipment to boats, to generators and other large equipment. Supplies include batteries for handheld radios and emergency supplies of food and water for those who may have to work for extended times or at remote locations during an emergency.

Many pieces of equipment and supplies are used day-to-day; others are obtained and stored for special use during emergencies (e.g., protective clothing, food, and extra sampling supplies). Still others may be requested from other organizations in the area. The NERR works with internal and external stakeholders to identify and track key equipment and supplies that might be needed during an emergency. This catalog of equipment and supplies is attached as Appendix C – Emergency Capability Catalog.



The NERR Emergency Coordinator facilitates all emergency equipment and supply preparations.

### 3.3 Response

Response is activity that immediately follows an emergency or that occurs when an emergency is imminent. Response begins with notifying response agencies and dispatching responders. Emergencies can quickly overwhelm available resources and can necessitate extraordinary coordination efforts. This section details how the NERR provides the extraordinary level of direction, control, coordination, and communication necessary during NERR emergencies. The NERR Manager is ultimately responsible for the conduct of emergency response activity at the NERR.

#### 3.3.1 National Incident Management System

Homeland Security Presidential Directive 5 and Presidential Policy Directive 8 require use of the National Incident Management System (NIMS) to coordinate interagency response activity. Since 2005, NIMS has been implemented throughout the U.S. from the local government and special district levels all the way to federal agencies and the White House. Advantages of using NIMS include:

- Common terminology – ensuring that responders use the same lexicon. Under NIMS, the terms “Incident Commander (IC),” “Incident Command Post (ICP),” and “Emergency Operations Center (EOC)” carry the same meaning throughout the U.S. Some of these key terms have been included in Appendix N – Glossary; potential responders are introduced to more terms during NIMS training.
- Capability typing – categorizing equipment reduces confusion when people request assistance. For example, when organizations use NIMS to request a small all-terrain brush fire engine with a certain capability and crew, they request a “Type 4 Engine.”
- Model organization – providing a clear, consistent framework to staff and manage an emergency.
- Standard processes and tools – providing methods and tools to conduct important processes like situation reporting, action planning, and resource (termed emergency capability in this plan) ordering (FEMA Undated).

The NIMS is part of a larger set of federal policy, guides, and tools within the National Response Framework (NRF). In general, the NRF includes:



- National Preparedness Goal – a document that describes a national vision of emergency management, defines core capabilities, and identifies scenarios for which the nation should be prepared.
- NIMS – policy, practices, and tools that support interagency response.
- Numerous plans, appendices, guides, and resources – tools to help local and state emergency management organizations conduct their work.

NIMS implementation is scalable and flexible and can support small, isolated response efforts to large-scale, multi-agency, multi-jurisdictional responses. Figure 6 shows that NIMS can address incidents ranging from short-duration Type 5 responses using a handful of resources (e.g. medical emergency), to large, complex Type 1 multi-agency, multi-jurisdiction emergencies (e.g., hurricanes, major oil spills) that may require hundreds or thousands of resources deployed for months.

## Figure 6 - NIMS Scales Response to Incident Complexity

### Incident Complexity

Incident and/or event complexity determines emergency and incident response personnel responsibilities as well as recommended audience for NIMS curriculum coursework delivery. The *NIMS Training Program* training recommendations reflect the following five levels of complexity:

Type 1	<ul style="list-style-type: none"> <li>This type of incident is the most complex, requiring national resources for safe and effective management and operation.</li> <li>All command and general staff positions are filled.</li> <li>Operations personnel often exceed 500 per operational period and total personnel will usually exceed 1,000.</li> <li>Branches need to be established.</li> <li>A written incident action plan (IAP) is required for each operational period.</li> <li>The agency administrator will have briefings, and ensure that the complexity analysis and delegation of authority are updated.</li> <li>Use of resource advisors at the incident base is recommended.</li> <li>There is a high impact on the local jurisdiction, requiring additional staff for office administrative and support functions.</li> </ul>
Type 2	<ul style="list-style-type: none"> <li>This type of incident extends beyond the capabilities for local control and is expected to go into multiple operational periods. A Type 2 incident may require the response of resources out of area, including regional and/or national resources, to effectively manage the operations, command, and general staffing.</li> <li>Most or all of the command and general staff positions are filled.</li> <li>A written IAP is required for each operational period.</li> <li>Many of the functional units are needed and staffed.</li> <li>Operations personnel normally do not exceed 200 per operational period and total incident personnel do not exceed 500 (guidelines only).</li> <li>The agency administrator is responsible for the incident complexity analysis, agency administration briefings, and the written delegation of authority.</li> </ul>
Type 3	<ul style="list-style-type: none"> <li>When incident needs exceed capabilities, the appropriate ICS positions should be added to match the complexity of the incident.</li> <li>Some or all of the command and general staff positions may be activated, as well as division/group supervisor and/or unit leader level positions.</li> <li>A Type 3 IMT or incident command organization manages initial action incidents with a significant number of resources, an extended attack incident until containment/control is achieved, or an expanding incident until transition to a Type 1 or 2 IMT.</li> <li>The incident may extend into multiple operational periods.</li> <li>A written IAP may be required for each operational period.</li> </ul>
Type 4	<ul style="list-style-type: none"> <li>Command staff and general staff functions are activated only if needed.</li> <li>Several resources are required to mitigate the incident, including a task force or strike team.</li> <li>The incident is usually limited to one operational period in the control phase.</li> <li>The agency administrator may have briefings, and ensure the complexity analysis and delegation of authority is updated.</li> <li>No written IAP is required but a documented operational briefing will be completed for all incoming resources.</li> <li>The role of the agency administrator includes operational plans including objectives and priorities.</li> </ul>
Type 5	<ul style="list-style-type: none"> <li>The incident can be handled with one or two single resources with up to six personnel.</li> <li>Command and general staff positions (other than the incident commander) are not activated.</li> <li>No written IAP is required.</li> <li>The incident is contained within the first operational period and often within an hour to a few hours after resources arrive on scene.</li> <li>Examples include a vehicle fire, an injured person, or a police traffic stop.</li> </ul>

Source: FEMA 2011.

In most cases, NERR personnel will support a NIMS organization established by another agency. Familiarity with NIMS practices and principles will enhance the NERR’s ability to undertake initial response actions until primary response agencies arrive on-scene and to integrate into an Incident Command/Unified Command led by another agency, when appropriate. As an event grows in size and complexity, the Incident Commander may delegate functions to incident staff from a range of agencies. NIMS standardizes primary staff positions within the functions of Operations, Planning, Logistics, and Finance/Administration; Figure 7 illustrates the standard this NIMS organizational structure. For responses led by other agencies, NERR personnel may provide technical support in the operations, planning, or logistics sections.

**Figure 7- Standard NIMS Implementation**

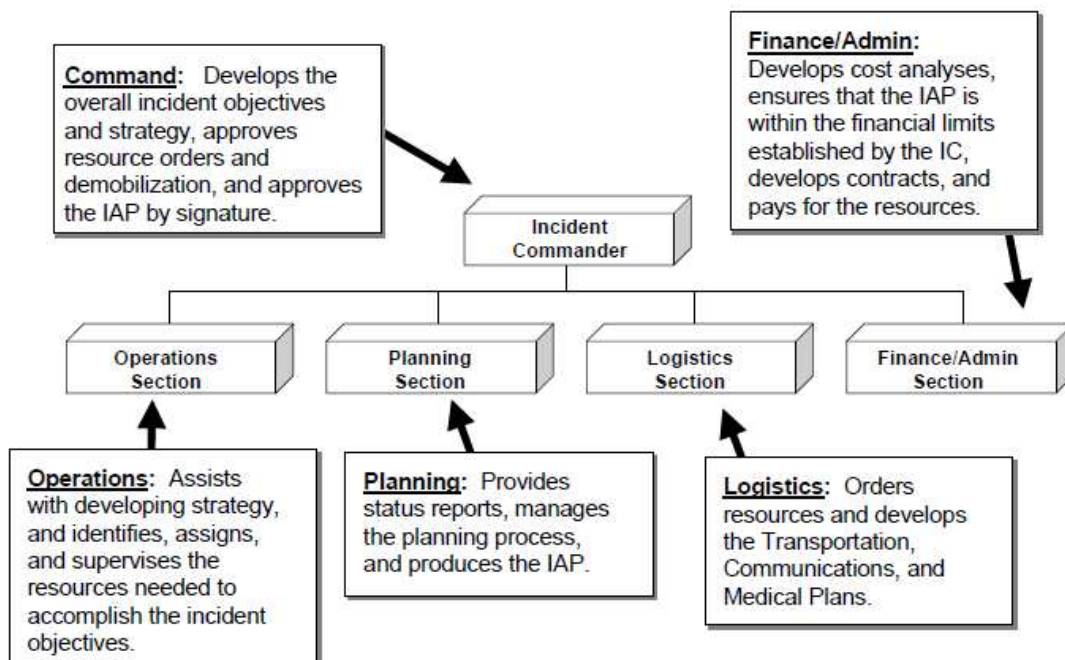


Figure Notes: IC indicates Incident Commander. IAP indicates Incident Action Plan. NIMS implementation will be scaled based on the magnitude of the response. For small events, one party may fulfill multiple NIMS roles.





### 3.3.2 Essential Facilities

For response activities located at the NERR, the NERR will manage or support another agency's management of disaster from the Grand Bay Coastal Resource Center at Grand Bay National Estuarine Research Reserve, 6005 Bayou Heron Road, Moss Point, MS 39562. The Reserve provides access to equipment and supplies identified in Appendix C - Emergency Capability Catalog. In some cases, the Grand Bay NERR may provide trained personnel to support operations at an essential facility maintained and operated by a local, state, or federal emergency management entity. When operating to support a response effort led by another agency, reserve personnel would use essential facilities of agencies identified in Appendix B (e.g., associated with local fire department or county, state, NOAA DRC and other federal emergency management agencies).

### 3.3.3 Situation Awareness

Effectively planning and, when necessary, managing emergencies that could result from a range of potential hazards within a large, remote, and environmentally sensitive region requires (1) a good understanding of conditions that affect the NERR and (2) close coordination among response agencies. The Emergency Planner serves as the day-to-day duty officer and monitors information pertinent to a potential or actual emergency. When an emergency occurs, the Emergency Coordinator also performs initial notification and coordination tasks under the general direction of the NERR Manager. The Emergency Coordinator serves as the duty officer during periods of the Emergency Coordinator's absence (unless the NERR Manager assigns another alternate). When information received by the duty officer warrants notification of others, the duty officer uses Appendix B – Emergency Contact List to carry out notifications. Under the general direction of the NERR Manager, the duty officer may also support initial response and coordination activity.

The NERR Manager may elect to assign a weekly emergency duty officer when the pace of emergency operations requires a distribution of workload. The duty officer maintains contact with pre-identified members of the Reserve and response community. Remaining in contact means that the duty officer has at least two methods of viable communication available at any one time. Forms of communication include land-line telephone, cellular telephone, smart phone, or conventional radio. E-mail is not considered one of two required forms of communication unless linked to a smart phone that is enabled to alert on receipt of an email.



The duty officer reviews weather forecasts, the NOAA, U.S. Geological Survey (USGS), and other relevant websites daily to remain aware of potential or actual emergencies that can affect the NERR. For potential emergencies (where lead time allows) and actual emergencies, the Emergency duty officer should provide a verbal or written Situation Report (Appendix K) for the NERR Manager and MDMR that incorporates:

- A description of the actual or potential emergency, area impacted, and potential health and safety hazards.
- A description of current and planned actions taken to minimize the hazards.
- A description of response resources or field teams deployed and identification of the lead organization.

An example Situation Report is attached in Appendix K – Forms and Tools. As an alternative, the ICS-201 (Appendix K) and companion ICS forms can be used for documentation and reporting (FEMA 2010). When current emergencies are detailed in a Situation Report, documentation includes a description of action(s) by the Reserve or other agencies that the Reserve may be supporting in an emergency.

### **3.3.4 Roles, Responsibilities, and Assignments**

Management of an emergency that has occurred (or is about to occur) may involve any one of five roles for the NERR, depending on the nature of the emergency and the capability of the NERR. Potential roles include the following:

- Calling for assistance and taking immediate actions to stabilize an emergency within the Reserve until emergency response organizations arrive and assume Incident Command.
- Serving as a technical specialist (e.g., natural resource impacts, GIS data, etc.) or field responder (e.g., wildland firefighter) within an Incident Command (IC) or Unified Command (UC) led by another agency.
- Assisting the lead Natural Resource Trustees engaging in Natural Resource Damage Assessment or advising IC/UC on environmental impacts and strategies.
- Serving as Incident Commander for NERR-led responses (e.g., hurricane, invasive species).
- Supporting an incident outside the NERR with specific capabilities.

Generally, responsibility for managing an incident falls on the organization with jurisdiction, authority, and the ability to respond. Table 8 shows the likely role of the NERR for the anticipated range of hazards at the Reserve. Within its capabilities, the



NERR will take actions to stabilize an incident as much as possible while awaiting the arrival of emergency responders. For events led by the NERR, the NERR Manager will designate an Incident Commander and a location (the Grand Bay Coastal Resource Center) or a boat/vehicle to serve as an Incident Command Post (ICP) from which operations will be directed. Under NIMS, the responsible agency may assign an individual with greater authority and experience to relieve the initial Incident Commander, who may then assume another role within the Incident Command.



**Table 9 - Lead and Supporting Agency Roles for NERR Hazard Events**

<b>Events/Hazards within NERR</b>	<b>Lead Agency</b>	<b>NERR Role</b>
Hurricane (NERR facilities only)	County EMA	Incident Commander for NERR facilities.
Severe Storms (NERR facilities only)	County EMA	Incident Commander for NERR facilities.
Oil Spill	MDEQ, Coast Guard, or EPA	Cooperating or assisting agency
Riverine Flooding	County EMA	Cooperating or assisting agency
Invasive Species	MDMR/FWS	Incident Commander for NERR
Vessel Grounding	Coast Guard or MDMR	Cooperating or assisting agency
Hazardous Material (HazMat) (Industrial Facilities)	MDEQ, Coast Guard, or EPA	Cooperating or assisting agency
Wildland Fire	FWS/Fire Dept.	IC and suppression responsibilities are delegated annually to the Fire Program at Gulf Coast Complex.
Structure Fire	Fire Dept.	Cooperating or assisting agency.
Medical Emergency	EMS	Cooperating or assisting agency.
HazMat (Rail Lines)	Fire Dept.	Cooperating or assisting agency.
Tsunami	County EMA	Cooperating or assisting agency.
Earthquake	County EMA	Cooperating or assisting agency.
Aircraft Crash	Fire Dept.	Cooperating or assisting agency.
Law Enforcement Emergency	Sheriff's Office/FWS LE/MDMR – Marine Patrol	Cooperating or assisting agency.
Unexploded Ordnance (UXO)/Live Fire	Sheriff's Office	Cooperating or assisting agency.

Since NIMS is flexible and scalable, for NERR-led responses, the NERR manager will establish the Incident Command, where warranted, and assign responsibilities to NERR personnel. Figure 8 is an example of how the NERR might organize for a localized Type 4 or 5 incident requiring only an Incident Commander and Operations Section Chief along with field teams.

**Figure 8 - Example Response Organization for NERR-led Incident (Hurricane)**

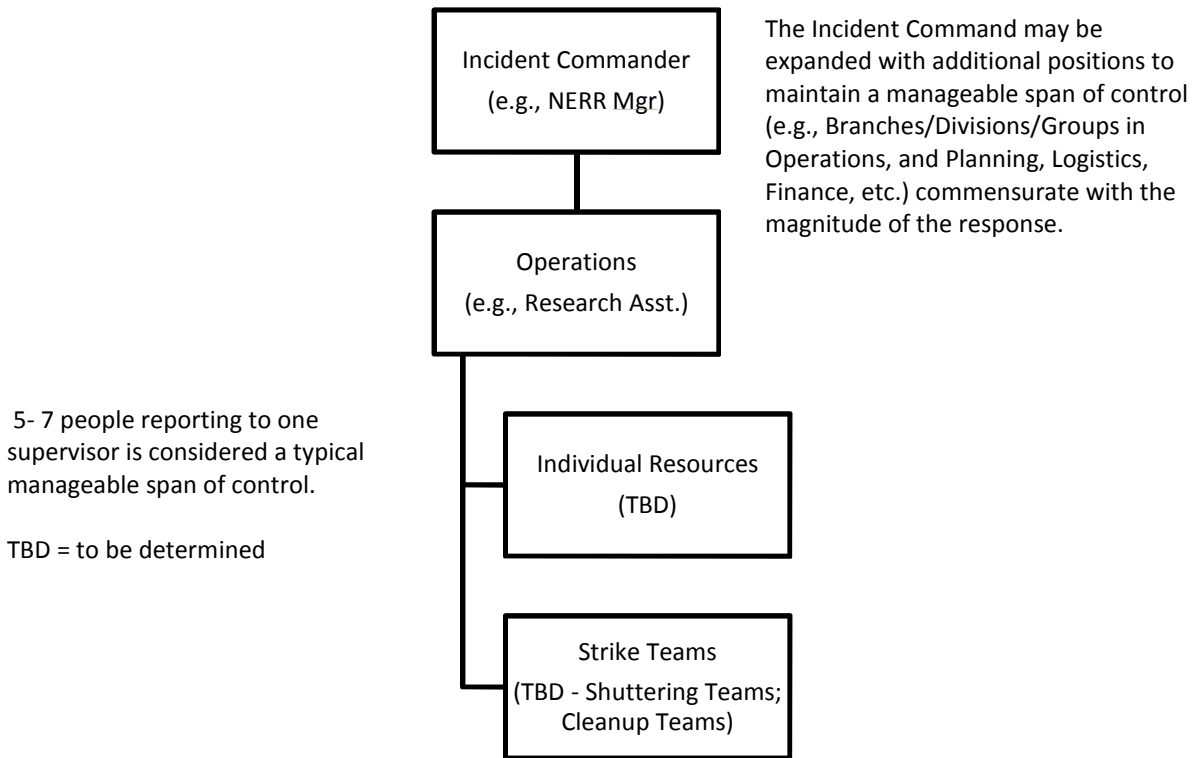
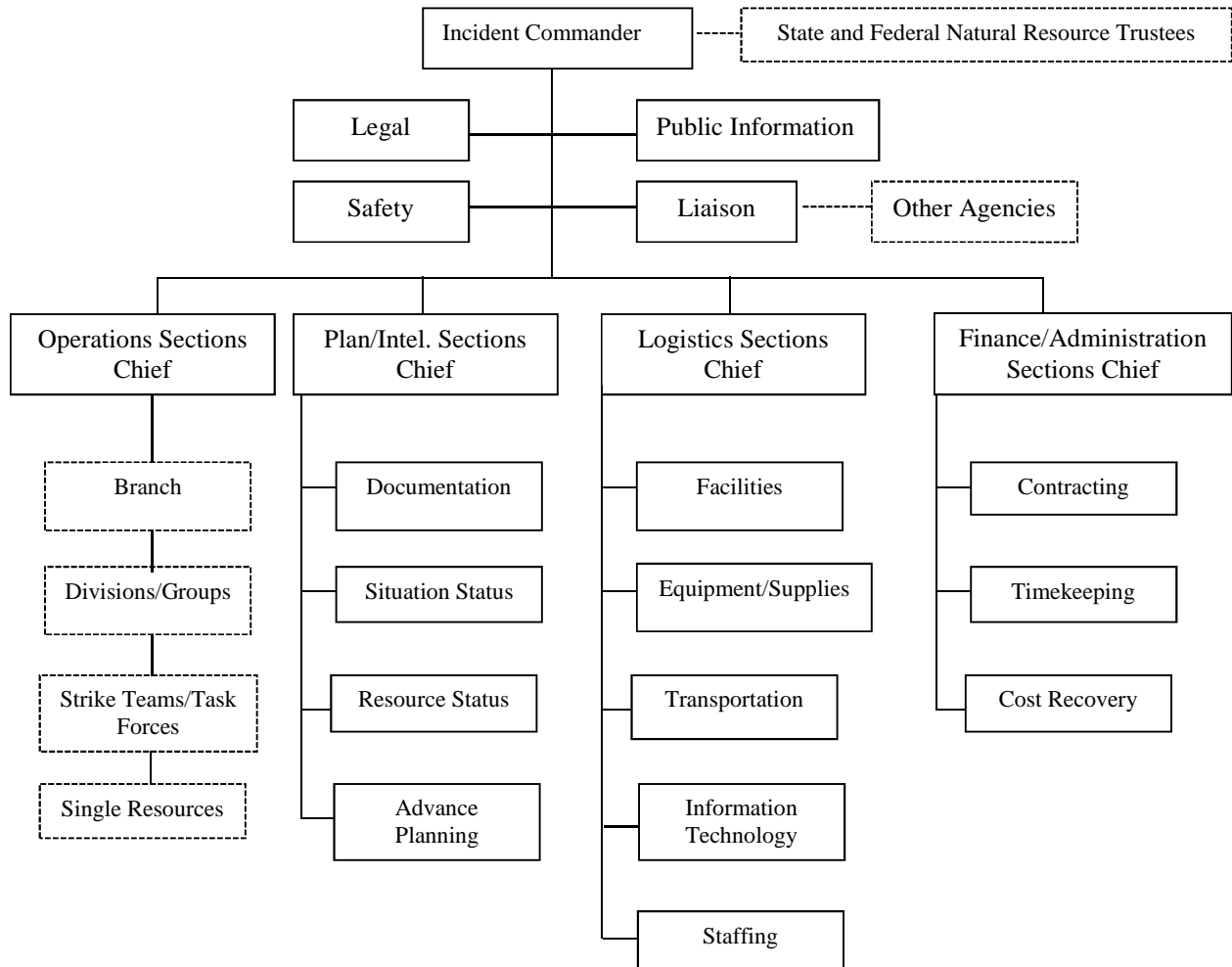


Figure 9 shows the typical expanded NIMS organizational model for larger and more complex events requiring multi-agency staffing. These larger responses would be led by the appropriate emergency response agency and a qualified Type 1, 2, or 3 Incident Commander. For these larger events, NERR staff may be called upon to (1) provide input through the lead State Trustee agencies or Liaison Officer; or (2) support Operations, Planning, or Logistics sections based on the specific capabilities and qualifications they bring to the event.

**Figure 9 - NIMS Expanded Organizational Chart**



Note: Within the National Incident Management System (NIMS), one person can function in several roles. Dotted lines indicate “to be determined” based on the needs of the incident.





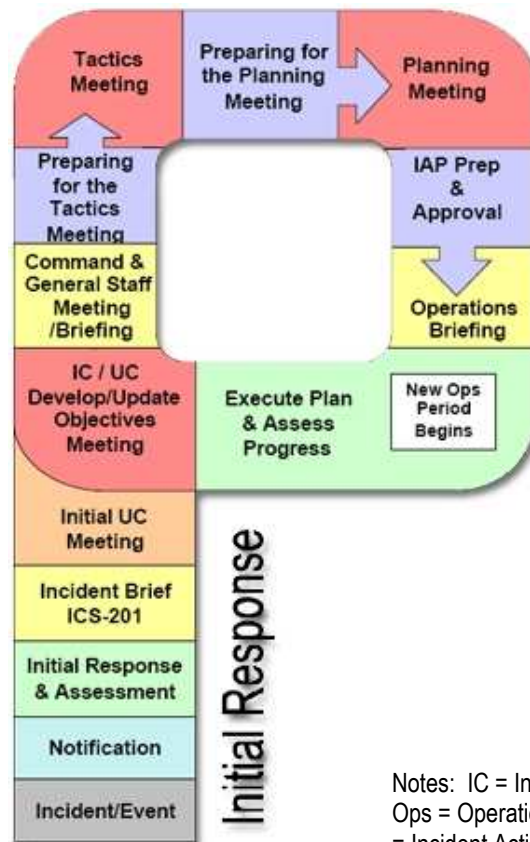
### 3.3.5 Priorities and Action Planning

Effective response results from establishing priorities, developing incident action plans (IAP), and carefully executing plans. Generally, NERR priorities during an emergency or disaster involve protection of the following elements:

1. Life
2. Human health and safety
3. Property, especially critical infrastructure
4. The environment
5. Economic interests

The NERR provides particular knowledge and capabilities to support environmental protection activities. The Reserve follows the general ICS/NIMS process to guide response actions (represented by the “Planning P” shown in Figure 10). General and hazard-specific procedures for the NERR are identified in Appendices A and D. Forms and Tools that support response activities by the Reserve are included in Appendix K.

Figure 10 - ICS/NIMS Planning P



Notes: IC = Incident Command; UC = Unified Command; Ops = Operations; ICS = Incident Command System; IAP = Incident Action Plan

### 3.3.6 Communications

Communications affect emergency management outcomes. To help ensure effective internal and external communications, the NERR will maintain the following forms of communication. This capability will be tested on a quarterly basis.

- One commercial Internet connection (secured hardwired and wireless network for NERR, secured wireless for public)
- Three land-based phone lines
- Five mobile hand held Very High Frequency (VHF) radios (use for watercraft)
- Four 800 MHz Motorola Jack County Fire and Emergency handheld radios (note: Jackson County is switching from 800 MHz in the future- upgrades will be made accordingly)
- One dedicated fax line
- Work and personal cell phones used for communication on site



### 3.3.7 Information Sharing

Sharing information during an emergency with agencies, government leaders, and the public is an important part of response. The Reserve uses the abbreviated Situation Report or, optionally, the ICS forms listed in Appendix K to share information internally and with MDMR.

During an emergency, the NERR Manager and reserve personnel will communicate incident facts and details to responders and the public, as necessary to protect human health, property and the environment. For public communication beyond immediate needs, the MDMR Public Information Office (PIO) will lead communications with external parties. Information shared with the media by the PIO will be carefully developed and approved using established MDMR communication authorities and protocols. The PIO will work to provide accurate, timely, and informative. When supporting a response managed by others, NERR personnel are not expected to play a role in communication with the public.

### 3.3.8 Emergency Capabilities

Capabilities are specific resources like people, facilities, systems, equipment, and supplies needed to respond to an emergency. Effectively managing capabilities during a disaster is critical to success. Failure to fill capability requests can lead to serious impacts. Requests delayed, even by minutes, can result in serious effects as well. Under NIMS, the response community uses "Resource Requests" to expand or sustain deployed capabilities.

When an emergency or disaster occurs, the NERR acts as follows:

- Evaluate information provided by the Emergency Coordinator, duty officer, or other source to make a decision whether to respond or call for assistance.
- Notify the State Warning Point, NERR staff, and other relevant agencies of NERR status and intended action.
- Recall staff to perform emergency functions.
- Establish a NERR ICP (if warranted) or deploy appropriate personnel to another location.
- Use general and hazard-specific procedures (Appendices A and D) and forms/tools (Appendix K) to perform emergency duties or call for assistance.



The NERR will follow MDMR guidance to request additional agency resources when are needed. Typically, this involves an e-mail or telephone call to the MDMR Director; however, in large disasters lead agencies may establish more formalized NIMS “Resource Request” processes that any Reserve personnel would support, if so directed by MDMR.

If the Reserve receives a Resource Request from another agency during an emergency, the NERR Manager will attempt to fulfill the request using its available emergency capabilities; the NERR Manager will consult with the MDMR Director as soon as it is practicable to do so.

### 3.4 Recovery

Recovery is the process of returning an area affected by an emergency to normal conditions. Recovery may sometimes occur in a matter of hours—for example, restoration of electricity and telephone service. Following disasters, complete recovery can take years. Two keys to effective recovery are to complete a plan for recovery before an emergency occurs and to begin recovery as soon as possible.

Appropriate recovery activities will depend on the circumstances of each emergency. Using ICS and NIMS, the ICP Planning Section (whether led by NERR or another agency) is responsible for initiating recovery. In a Reserve- only emergency, the planning section will be staffed by Reserve personnel. During a regional emergency or disaster, the Reserve will likely provide support to another ICP planning section (e.g., serving as Technical Specialists within a planning section).

#### 3.4.1 Damage Assessment

Damage assessment involves identifying, recording, compiling, and analyzing damage information to determine what recovery action and assistance may be needed. Following major disasters, a process known as a Preliminary Damage Assessment (PDA) is used by FEMA and states to determine to what extent state and federal assistance may be available. States can assist with the FEMA recovery process typically used to recover overtime, the cost of rebuilding infrastructure, and other costs associated with disaster.

When injuries to natural resources are caused by oil or chemical spills, the NRDA process may apply. Concurrent with, but separate from the initial response to protect life and property, natural resource trustee agencies such as NOAA and the U.S. Fish and



Wildlife Service (FWS) initiate a NRDA to determine the type and extent of injury to natural resources, the strategies necessary for recovery, and the estimated cost and schedule for recovery. The NRDA characterizes pre-spill or baseline conditions so that financial damages can be assessed to the party responsible for the spill and resulting injury to natural resources. The NRDA process does not apply to injury caused by natural disasters (such as hurricanes), but may apply to oil or chemical releases resulting from a natural disaster. The NRDA process will be led by a group of natural resource trustees known as the Trustee Council, which may include federal and state natural resource agencies such as the coastal state trustee, the MDEQ. Grand Bay NERR staff may support NRDA efforts. Trustee representatives work in parallel with the USCG or EPA ICs during the initial stages of a major spill, then continue data collection after the clean-up to document residual injuries to natural resources. Whereas the initial incident response may wind down after a few weeks or months, it may take years to collect the data necessary to support a NRDA claim. To the extent practicable, NERR staff should contribute to the NRDA process by collecting baseline environmental data prior to the hazard event, if so directed by MDMR. They may also be called upon by MDMR to support post-event data collection under the direction.

NERR staff should be proficient in responding to disasters resulting from both accidental and natural events in ways that support recovery. Consequently, both FEMA and NRDA processes are addressed in NERR training and exercise recommendations included in Appendices I and J.

### 3.4.2 Short-Term Recovery

Establishing priorities is just as important in recovery as in response, ensuring a timely and orderly return to pre-disaster conditions. Short-term recovery objectives will be established by the NERR Manager for Reserve facilities and natural resources before response activities cease. Short-term recovery objectives typically include the following:

- Implementing immediate environmental protection measures
- Restoring monitoring infrastructure and real-time telemetered data streams
- Opening access routes
- Restoring utility service
- Securing damaged areas for safety
- Removing HazMat and debris



- Providing temporary work or housing facilities
- Accomplishing cost recovery
- Establishing long-term recovery objectives
- Completing a damage assessment

Recovery activities during a response will be managed by the Incident Commander (which may be a Reserve or other agency representative). NERR-specific recovery activities after response are managed by the NERR Manager.

### 3.4.3 Long-Term Recovery

Long-term recovery objectives are generally not met until long after the cessation of response and closure. Long-term recovery activities include the following:

- Restoring the natural environment (i.e., removing hazards to navigation and wildlife; implementing restoration of impacted habitats)
- Rebuilding infrastructure (i.e., docks, offices, interpretive center)
- Replacing lost equipment and supplies (i.e., water monitoring stations, boats)
- Monitoring the environment for signs and effects of recovery.

The NERR Manager is responsible for coordinating all long-term recovery activity at the NERR.





## 4.0 Continuity of Operations

Emergencies can threaten to destroy or delay the NERR's ability to provide essential services and continuity of research programs. Therefore, the NERR also develops a Continuity of Operations Plan (COOP) that includes the following:

- A line of succession for department leadership
- A list of essential services (including research), tolerances for interruption, and strategies to maintain continuity
- Assignment of responsibility for continuity activity
- Directions for preserving vital records, including historical research data, and a strategy for ensuring access to these following an emergency.

Because continuity of operations is vital to natural resource protection efforts, the NERR incorporates continuity of operations objectives in emergency planning, training, and exercise work. Roles, processes, and tools to help maintain NERR continuity of operations are described further in Appendix E – Continuity of Operations Plan.



## 5.0 Plan Maintenance

This DRP will be maintained by the Grand Bay NERR and reviewed by the ET annually. As changes are needed to the plan or its appendices, the NERR Manager will assign this work to one or more ET members and provide the support necessary to accomplish that work.

Annual training on the DRP will be provided as orientation for new staff or as refresher training for staff who have already received an orientation to this plan and their potential roles. A record of this training will be retained in employee records.

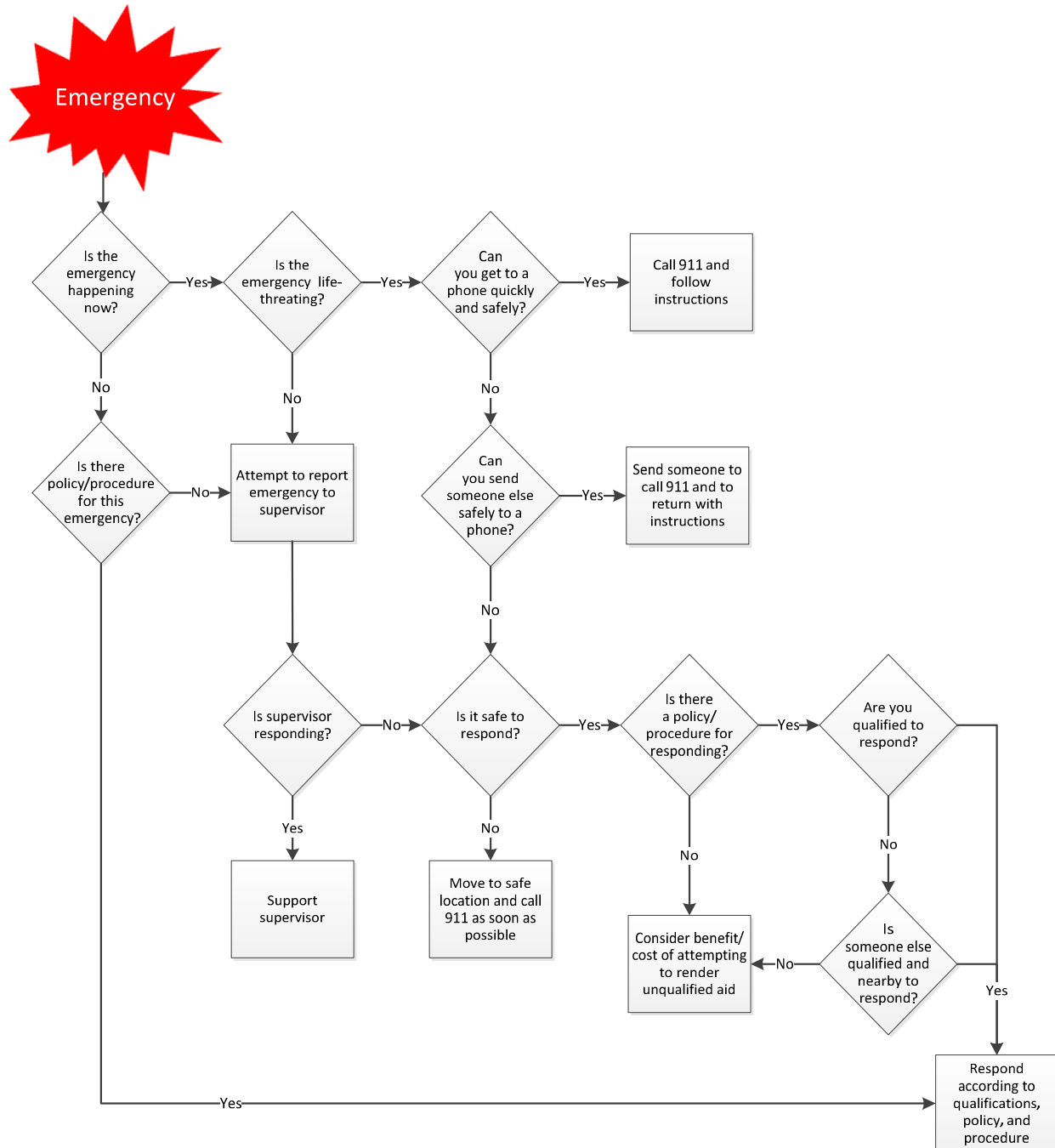
An annual exercise will be conducted to maintain and validate planning, and to maintain and improve proficiency in performing emergency and disaster activities. The NERR may develop and conduct internal exercises, including those that prepare for interagency coordination. Annual exercises may be table-top, functional, or full-scale exercises, although a functional exercise will occur at least every 3 years. Appendices J, K, and L address training and exercise recommendations and plans (Appendix I - Emergency Training Plan, and Appendix J - Emergency Exercise Plan).



## Appendices

- Appendix A - General Response Procedures
- Appendix B - Emergency Contact List
- Appendix C - Emergency Capabilities Catalog
- Appendix D - Hazard Specific Procedures
- Appendix E - Continuity of Operations Planning (COOP)
- Appendix F - Hazard Identification and Risk Assessment
- Appendix H - Annual Work Plan
- Appendix I - Emergency Training Plan
- Appendix J - Emergency Exercise Plan
- Appendix K - Forms and Tools
- Appendix L - Maps and Other Information
- Appendix M - References
- Appendix N - Glossary

## Appendix A - General Response Procedures





## Appendix B - Emergency Contact List

Name	Agency	Title/ Role	Office Location	Office Phone	Other Phone	Alternate Phone	Email	Notes
<b>ANERR EMERGENCY CONTACTS</b> (use phone tree notify activate staff for emergency or disaster)								
David Ruple	MDMR NERR	NERR and ER Mgr	6005 Bayou Heron Road, Moss Point, MS 39562	228-475-7047	228-697-0039	See NERR phone tree	<a href="mailto:David.Ruple@dmr.ms.gov">David.Ruple@dmr.ms.gov</a>	Leads NERR emergency management decisions for the NERR.
Will Underwood	MDMR NERR	Stewardship Coordinator	6005 Bayou Heron Road, Moss Point, MS 39562	228-475-7047	228-697-0415	See NERR phone tree	<a href="mailto:will.underwood@dmr.ms.gov">will.underwood@dmr.ms.gov</a>	Member of NERR Emergency Team (ER); supports NERR Manager
Jay McIlwain	MDMR NERR	Stewardship Associate	6005 Bayou Heron Road, Moss Point, MS 39562	228-475-7047	NA	See NERR phone tree	<a href="mailto:jay.mcilwain@dmr.ms.gov">jay.mcilwain@dmr.ms.gov</a>	Member of NERR Emergency Team (ER); supports NERR Manager and SC
Jan Boyd	MDMR	Director Coastal Ecology	1141 Bayview Avenue, Biloxi, MS 39530	228-523-4102	NA	Oil Spill Response Env./ Community Hotline: 866- 448-5816	<a href="mailto:Jan.Boyd@dmr.ms.gov">Jan.Boyd@dmr.ms.gov</a>	NERR Manager consults with MDMR Coastal Ecology Director and MDMR Director for longer- term response actions/decisions.
James McClelland	FWS – MS Sandhill Crane Refuge	Complex Law Enforcement Officer	7200 Crane Lane Gautier, MS 39553	228-217-0751	NA	NA	<a href="mailto:James_McClelland@fws.gov">James_McClelland@fws.gov</a>	Lead for law enforcement activities Refuge/Reserve
Patrick Levine	MDMR	Lt., Marine Patrol	1141 Bayview Ave., Biloxi, MS 39530	228-760-0502	NA	NA	<a href="mailto:Patrick.Levine@dmr.ms.gov">Patrick.Levine@dmr.ms.gov</a>	Lead for enforcement of boating, fishing.
Charlie Henry/ Michele Finn	NOAA DRC	Director	7344 Zeigler Blvd., Mobile, AL 36608	251-544-5006 (general)	NA	NA	<a href="mailto:Charlie.henry@noaa.gov">Charlie.henry@noaa.gov</a> ; <a href="mailto:michele.a.finn@noaa.gov">michele.a.finn@noaa.gov</a> ;	Charlie Henry attended DRP workshop; NOAA DRC connects to science and other support.



Name	Agency	Title/ Role	Office Location	Office Phone	Other Phone	Alternate Phone	Email	Notes
<b>EXTERNAL NOTIFICATIONS AND PRIMARY CONTACTS</b>								
Not applicable (NA)	Public Safety Answering Point	NA	NA	911	NA	NA	Report any spill to the 24-hour State Warning Point: 1-800-222-6362	First contact for most emergency/disaster notifications.
NA	National Response Center	NA	c/o United States Coast Guard (CG-5335) - Stop 7581, 2100 2nd Street, SW Washington, DC 20593-0001	800-424-8802	NA	NA	<a href="http://www.nrc.uscg.mil/">http://www.nrc.uscg.mil/</a> (web site, on line incident reporting tool); Duty Officer Email: <a href="mailto:HQS-DG-1st-NRCINFO@uscg.mil">HQS-DG-1st-NRCINFO@uscg.mil</a>	For oil spill, hazmat, and America Waterways Watch notifications
Duty Officer	Local Fire Dept – Moss Point	NA	4204 Bellview Street, Moss Point, MS	Emergency: 911	NA	NA	Fire Chief - Clarence Parks: <a href="mailto:clarence.parks@cityofmosspoint.org">clarence.parks@cityofmosspoint.org</a> ;	Fire emergencies (can be reached through 911). website: <a href="http://cityofmosspoint.org/fire-department/">http://cityofmosspoint.org/fire-department/</a>
Doug Winters	Forts Lake Volunteer Fire Dept.	Fire Chief	10701 Forts Lake Road Moss Point, MS 39562	Emergency: 911 Office: 228-474-2424	NA	228-623-5398	<a href="mailto:Doug.Winters@gmail.com">Doug.Winters@gmail.com</a> Or <a href="mailto:Doug.Winters401@gmail.com">Doug.Winters401@gmail.com</a>	Fire emergencies (can be reached through 911).
Donald Langham	Jackson County EMA	Director	600 Convent St, Pascagoula, MS	Emergency 911: Office 228-769-3111	NA	Emergency Number: 228-769-3063	<a href="mailto:Donald.Langham@co.jackson.ms.us">Donald.Langham@co.jackson.ms.us</a>	County EM Director at DRP Workshop
Mike Byrd	Jackson County Sheriff's Office	Sherriff	P.O. Box 998 Pascagoula, MS 39568-0998	Emergency: 911; Office: 228-769-3024	NA		<a href="mailto:Mike.Byrd@co.jackson.ms.us">Mike.Byrd@co.jackson.ms.us</a> ; <a href="http://www.co.jackson.ms.us/officials/sheriff/">http://www.co.jackson.ms.us/officials/sheriff/</a>	Law enforcement matters (can be reached through 911).





Name	Agency	Title/ Role	Office Location	Office Phone	Other Phone	Alternate Phone	Email	Notes
Tony Wilder	Incident Fire Mgmt. Officer	Sandhill Crane NWR	7200 Crane Lane Gautier, MS 39553	Fire center: 228- 497-5780	General office: 228-497-6322	NA	Tony_Wilder@fw s.gov	Contact for wildfire issues and events.
Caroline Nelson	MS Emergency Mgmt. Agency (MEMA)	Area Coordinator	P.O. Box 5644 Pearl, MS 39288	Nelson: 601- 398-6881	General line: 601-933- MEMA	Emergency: 800-222-MEMA (6362)	<a href="mailto:CNelson@mema.ms.gov">CNelson@mema. ms.gov</a> ; Website: <a href="http://www.msema.org/">http://www.msema a.org/</a>	Emergency line is 24- hour number. Attended DRP workshop.
Earl Etheridge	MSDEQ	Emergency Response	MDEQ, Office of Pollution Control Emerg. Services Div, P. O. Box 2261, Jackson, MS 39225	228-326-6401	NA	NA	<a href="mailto:Earl_Etheridge@deg.state.ms.us">Earl_Etheridge@ deg.state.ms.us</a>	Attended DRP Workshop.
Duty Officer	USCG Sector Mobile, District 8	NA	1500 15Th St., Brookley Complex, Mobile, AL 36615-1300	Emergency: 251-441-6211	251-441-5720	877-24-WATCH (America waterway watch)	<a href="https://homeport.uscg.mil/mycg/port/ep/portDirector.y.do?tabId=1&amp;cotpld=37">https://homeport.u scg.mil/mycg/port al/ep/portDirector y.do?tabId=1&amp;cot pld=37</a>	Web site provides links to plan, schedule for meetings, river conditions, etc.
Commanding Officer	USCG Station Gulfport	NA	USCG Station Gulfport, 991 23rd Ave., Gulfport, MS 39501	228-868-3743	NA	Emergency: 228-863-5818	<a href="http://www.uscg.mil/d8/staGulfport/">http://www.uscg. mil/d8/staGulfport /</a>	Listed on MDMR web site emergency contacts list for MS.
Commanding Officer	USCG Pascagoula Station	NA	USCG Station Pascagoula, 108 Singing River Is., Pascagoula, MS 39595	228-769-5600	NA	Emergencies: 911	<a href="http://www.uscg.mil/d8/staPascagoula/default.asp">http://www.uscg. mil/d8/staPascag oula/default.asp</a>	Listed on MDMR web site emergency contacts list for MS.
Duty Officer	Mississippi Forestry Commission	Southeast Dispatch	600 North Street, Suite 300, Jackson, MS 39202	800-240-5161	NA	601-359-1386	<a href="mailto:lharris@mfc.state.ms.us">lharris@mfc.state. ms.us</a> ; <a href="http://www.mfc.ms.gov">www.mfc.ms.gov</a>	Addresses arson enforcement and other laws related to forestry protection.



Name	Agency	Title/ Role	Office Location	Office Phone	Other Phone	Alternate Phone	Email	Notes
Duty Officer	MDMR	Report Oiled or Injured Wildlife	NA	886-557-1401	NA	NA	<a href="http://www.dmr.state.ms.us/emergency-contacts">http://www.dmr.state.ms.us/emergency-contacts</a>	Numbers listed on MDMR web site for Emergency Contacts and 2010 Oil Spill Incident Response web site.
Duty Officer	MDMR	Report Stranded Dolphins or Sea Turtles	NA	888-767-3657	NA	NA	<a href="http://www.dmr.state.ms.us/2010-oil-spill-response-and-information">http://www.dmr.state.ms.us/2010-oil-spill-response-and-information</a>	
Duty Office	MDMR	Report Stranded Marine Mammals	NA	888-806-1674	NA	NA	NA	
Duty Officer	MDMR	Report Oil on Land	NA	866-448-5816	NA	NA	NA	
Duty Officer	American Association of Poison Control Centers	NA	NA	Emergency: 800-222-1222	NA	NA	<a href="http://www.aapcc.org/">http://www.aapcc.org/</a>	Provides information and referrals for poison concerns, 24-hours per day/7-days per week
Duty Officer	American Red Cross	South MS Chapter - Pascagoula Office	1096 Jackson Ave., Pascagoula, MS 3956	228-762-2455	NA	NA	NA	<a href="http://www.redcross.org/mississippi/about/chapters/south-mississippi/offices">http://www.redcross.org/mississippi/about/chapters/south-mississippi/offices</a>



### Appendix C - Emergency Capabilities Catalog

Resource	Description	Quantity	Location	Owner/POC	Notes
<b>General Infrastructure</b>	This includes: Grand Bay Coastal Resource Center, other buildings, boat ramps, lifts, docks, helicopter pads (paved or unpaved), paved and unpaved parking areas (suitable for staging)				
Main Building Facilities (Grand Bay Coastal Resources Center)	Includes 15 offices, Public office space for 4, two large classrooms, two conference rooms, interpretive/visitor center, 1 biological lab, 1 chemistry lab, 1 microbiology lab, 20 person capacity dorm, public restrooms, 2 screened outdoor wet labs, 1 amphitheater space, 5 space boat shed, workshop, 1 storage shed	1 main building with dorms connected to main building footprint	6005 Bayou Heron Rd., Moss Point MS 39562	NERR Manager	Additionally there is FWS office space located on the south wing. NERR facility owned by state, located on federal land.
Boat Launches	Bayou Heron Boat Launch (Public) – 2 launch capability, 1 fishing pier, 10-12 vehicle/trailer parking; Point O Pines Boat Ramp (Private) – 2 launch capable (\$3 launching fee) located at the end of Grand Battures Rd.	2	Bayou Heron Boat Launch – located at end of Bayou Heron Rd.; Point O Pines Boat Launch – located at end of Grand Battures Rd.	<ul style="list-style-type: none"> <li>– Bayou Heron Launch, NERR Manager</li> <li>– Point O Pines, David Glennon</li> </ul>	Area Maps are available upon request. Special use of Point O Pines Boat Launch will need special permission from Point O Pines POC.
<b>Communication Assets</b>	This includes: EOC communications or dispatch center (if there is one), wired communications (telephone, internet), and wireless communications (radios, cellular phones, etc.)				
Internet	One commercial internet connection with wireless capability.	(1 Staff network and 1 visitor network)	6005 Bayou Heron Rd, Moss Point MS 39562	NERR Manager/Admin Assistant	Contact POC for access.
Phone/Fax	Land line service phone service to main facility (NERR and FWS wings); dedicated fax line (main building); cell phones dedicated or personal use (phone tree maintained with staff cell phone #s)	3 land lines; 1 dedicated fax line; staff cell phones (various)	Main building  With owner for cell phones	NERR Manager/Admin. Assistant	Contact POC for use.



Resource	Description	Quantity	Location	Owner/POC	Notes
Radios	5 Mobile handheld VHF Radios for use with watercraft, 4 – 800 Mhz Motorola Jackson County Fire and Emergency handheld radios	9 Total	See Description	Stewardship Associate	Jackson County is switching from 800 Mhz system to an updated system soon.
<b>Emergency Power Supply</b>	This includes: Fixed emergency generators and portable (provide KW power rating)				
Generators	60 KW Kohler Diesel Generator to power emergency back-up lighting and outlets (Tested weekly) for Main Building, 250 gallons fuel (~4 day supply); 1 portable Craftsman 3600 Watt Generator	2	Main Building – Vehicle Compound and Workshop	Facilities Manager	
<b>Emergency Medical Assets</b>	This includes: number of first aid/CPR trained staff, number of EMT, RN, LPN trained staff, AED, and first aid kits				
CPR/First Aid Trained Personnel	<ul style="list-style-type: none"> <li>All reserve field personnel are trained in CPR/First Aid;</li> <li>First aid kits in various locations in main building and vehicles</li> </ul>	~10	Main Building	Field Staff	CPR and First Aid certified staff will need to be re-certified summer of 2013
First aid kits and related equipment	First aid kits in various locations. Eyewash and shower stations in biological and chemistry laboratories, and eyewash station in large classroom	3	Main building labs	Stewardship/Research/Education Coordinators	1 ventilation hood in each of the bio and chem laboratories
<b>Emergency Supplies</b>	This includes: food (number of days for how many people), water (number of days for how many people), cots/blankets				
Bottled water	Bottled water stored in most areas	Multiple, no formal count	Main building	Stewardship Associate	Not designated as “emergency supply;” maintained for day-to-day use
Other	No other emergency supplies are maintained (food, water, blankets, etc.) at this time.	0	Not applicable	Not applicable	
<b>Environmental and Data Assets</b>	This includes laboratories, field soil/water sampling gear, GPS, research libraries, GIS and natural resource data, SWMP data loggers/data, weather stations (fixed and portable)				
Laboratories (Research Section)	1 biological lab, 1 chemistry lab, 1 microbiology lab, 2 screened outdoor wet labs, resources include: stereo microscopes, centrifuge, vacuum pump filtration system (for water samples), data loggers, sample bottles, stirrers, hot plates, 1 dryer oven, computer with microscope	2 wet labs, 2 dry lab	Main Building	Stewardship Coordinator – Bio Lab; Research Coordinator – Chemistry/Micro Lab	



Resource	Description	Quantity	Location	Owner/POC	Notes
GPS Units	Handheld Global Positioning System (GPS) units, including 3 - Trimble GeoXT unit, handheld Garmins for field staff, 1 – R8 RTK/RTN, 1 – Tornado Antenna, 1 – Total Station, Large format printer	Various	Main building	Stewardship Coordinator/Stewardship Associate	All GPS units used portably
GIS Software and Personnel	Computers for data storage and management; various layers covering natural resource information (habitats, estuarine species, listed species), research information, land use and cover maps, ArcGIS 9.3, 10,10.1; Global Mapper	ESRI Software	Main building	Stewardship Coordinator/Stewardship Associate	GIS-equipped computers in GIS labs and on 4 staff computers.
GIS Personnel	Trained GIS personnel	4	Main Building	Stewardship Coordinator/Stewardship Associate	Other personnel can support data collection and map use
Field Sampling Gear (RS)	Bottles, Samplers, Meters, Seine Nets, 1 – 16' Trawl, Nets, Cameras; Water sampling bottles, grab sampler, handheld YSI 85 water quality meters, plankton nets, waterproof digital cameras. Automatic water sampler used monthly to collect data (portable).	Multiple items	Main Building	Research Coordinator	1 underwater camera, 1 automated camera
SWMP Dataloggers and Associated Water Quality Baseline and Trend Data	YSI 6600 EDS multi-parameter programmable data loggers. Measuring: specific conductivity, salinity, dissolved oxygen (percent and mg/l), pH, water level and turbidity every fifteen minutes. Some data also telemetered to CDMO.	4 deployed in field at all times	North Bayou Heron, Point aux Chene Bay, Bangs Lake, Bayou Cumbest	SWMP Technician	
Stewardship Data	Items being monitored include: habitat mapping; invasive species mapping; photo monitoring; and vegetation monitoring (rare plants, emergent marsh); Submerged Aquatic Vegetation Monitoring, Erosion Monitoring, Dedicated GIS Server	Various locations	Stewardship Section	Stewardship Coordinator/Stewardship Associate	
Weather Station and Associated Weather Data	Measures air temperature, relative humidity, wind speed/direction, barometric pressure, rainfall, and photo-synthetically active radiation. Stores data every 15 minutes and downloaded monthly. The site has also been telemetered.	1 (fixed location)	North Rigolets/Crooked Bayou Mouths	SWMP Technician	Telemetered data goes to CDMO; backup data collected each month by NERR; solar powered unit. Access data at: <a href="http://cdmo.baruch.sc.edu/get/realTime.cfm">http://cdmo.baruch.sc.edu/get/realTime.cfm</a>



Resource	Description	Quantity	Location	Owner/POC	Notes
Research Library	Publications pertaining to research and monitoring studies conducted within GNDNERR and Northern Gulf Of Mexico, and other related topics; Organized using a computerized bibliographic indexing system..	1 library	Main Building	Research Coordinator	None
Other Tools and Data	Quarterly Fish Monitoring Data, Shoreline Data, and Seagrass Data. statistical software, including: SPSS and MS Excel	Various	Main Building	Research Coordinator/Research Assistant	None
<b>Firefighting</b>	This includes: number of professional or volunteer certified firefighters, if any; fixed firefighting system installations (sprinklers, hose), and portable or mobile firefighting systems				
Wildland fire	All wildland fire response is under jurisdiction of Gulf Coast Refuge Complex (FWS)			Stewardship Associate	Stewardship Associate has working relationship with MSCNWR Fire Team
Building Fire Suppression	16,500 gallon Fire Tank; 500 gpm, Fire Department Hookups, Auxiliary Water Hookup connected to two 6,500 rainwater cisterns connected to fire		Main Building – Vehicle Compound	Facilities Manager	Fire Tank filled by well
Fire Gear	2 – 5 gallon Indian Pumps (backpack pumps), 2 – Rogue Hoes, 2 – Fire Rakes, 2 – Pulaskis, 5 – Flappers, 5 – Fire Shovels, 1 - Combi Tool, All Personal Protective Equipment for 4 firefighters (excluding fire boots), 3 – Firebroom Rakes, 2 – Brush Torches, 1 – Drip Torch, 1 – Chainsaw, 2 – Chainsaw Chaps, 4 – Felling Wedges, Box of Fuzees,	Various	Storage Shed at Main Building	Stewardship Associate	None
Wildland fire trained staff	Several fire-trained individuals may be available (varies over time); the NERR Manager can provide additional information	2	GNDNERR	Stewardship Associate	None
<b>Oil/Hazmat Spill Response</b>	This includes: number of Hazwoper trained staff, booms, sorbents, sampling bottles for oil related sampling, anything else that is relevant				
Trained Hazwoper Personnel	24 hour HAZWOPER	Various	Main Building	n/a	All staff with 24 HAZWOPER need refresher to maintain currency
Wildlife stranding kits	Remaining kits from BP Deepwater Horizon are available.	Various No formal count	Main Building – Storage Shed	Stewardship Associate	
<b>Transportation</b>	This includes: boats, trailerable, boats, non-trailerable, vehicles, on-site fuel capacity (if any)				





Resource	Description	Quantity	Location	Owner/POC	Notes
Vehicles	Ford Expedition, 1997 Ford F-150 2x4 Regular Cab, 1997 Ford F-150 4x4 Crew Cab, 2010 Ford F-150 4x4 Crew Cab, 2010 Ford F-150 4x4 Extended Cab, 2010 Ford Fusion, 2003 Toyota Prius, 2010 Chevy 15 Passenger Van	8	Main Building – Vehicle Compound	NERR Manager	All trucks are used for trailering, other vehicles are for personnel transport
All-Terrain Vehicles	1 – Kubota UTV With dump bed (Diesel), 1 – Honda ATV (Gasoline)	2	Main Building – Boat and ATV/UTV shed	Stewardship Associate	None
Boats/Vessels	2 – 20' Lynn Flat bottom skiffs(one with Mercury 115hp 4-Stroke, one with Evinrude E-Tech 115hp), 2 – 18' Lynn Flat bottom skiffs (with Evinrude E-Tech 60hp), 1– G3 16' Skiffs(with Yamaha 50hp 4-Stroke) 4 – Canoes, 8 – Tandem Kayaks, 2 – Single Kayaks, 1 – 26' Pontoon Boat with Observation Deck	13	Main Building Boat Storage Shed and Vehicle Compound	NERR Manager/Facilities Manager	None
Boat drivers and Training personnel	11 Staff members with Boating License	11	Main Building	NA	
<b>Wildlife Care and Cleaning</b>	This includes: veterinarians or trained wildlife care specialists, cages or pens (unoccupied) (if any), wildlife cleaning materials (for oil spills)				
Equipment	Portable cage	2	Main Building – Storage Shed	Stewardship Associate	NERR does not generally implement wildlife care and cleaning
Personnel	Various Staff trained in wildlife strandings	3	Main Building	Stewardship Associate	
<b>Other Equipment</b>	This includes: dozers, fork lists, crane loaders (if any)				
Trailers/Tractors	1 Utility Trailer, 1 – Gravely Zero Turn Lawnmower	2	Main Building – Vehicle Compound	Stewardship Associate	None
Ice Machines	1 – 250lbs/day; 1 – 150lbs/day	2	Main building	n/a	



## Appendix D - Hazard Specific Procedures

Hazard specific procedures are included for:

1. Hurricane
2. Severe Storms (Including Lightning/Tornado)
3. Oil Spill
4. Riverine Flooding
5. Invasive Species
6. Vessel Grounding
7. Hazmat Event (area industry/pipelines and rail)
8. Wildland Fire
9. Medical Emergency
10. Structure Fire (addressed in association with wildland fire procedures)
11. Hazmat Event (addressed in association with Hazmat Event area industry/pipelines)

## Hazard 1 - Hurricane

**Scenario: Hurricane**

**What you should do:** This hurricane preparation procedure addresses the Grand Bay Resources Center, Grand Bay NERR/National Wildlife Refuge (NWR).

The Reserve Manager will coordinate Hurricane Planning with the Mississippi Department of Resources (MDMR) and will follow preparations directed in the Department's Hurricane Plan (included in Appendix L and referenced in this procedure). The Reserve Manager will integrate considerations specific to the Reserve and Grand Bay Coastal Resources Center as identified in this procedure.

**Preparatory Conditions – Condition 4**

1. Brief all NERR staff, FWS staff and dorm occupants about storm preparations.
2. Ensure all staff has an updated Grand Bay NERR Emergency Contact List (Phone Tree) with phone numbers for NERR staff, FWS staff, dorm occupants and emergency notification numbers (maintained internally by Administrative Assistant).
3. Ensure emergency generator is full of fuel at beginning of hurricane season.

**Hurricane/Tropical Storm Watch - Condition 3**

1. All vehicles and boats should be full of fuel.
2. Move boats and vehicles to FWS Independence Road compound.
3. Clean out refrigerators and ensure freezers and refrigerators are plugged into emergency outlets.
4. Brief staff to prepare to backup all computers prior to leaving. Begin moving critical items away from windows into an inner room. Cover what cannot be moved, if close to a window.
5. Lower and secure all shutters.
6. Move mercury trailer to compound.
7. Brief staff on storm's progress and give them an expected evacuation date and time.
8. Take flags down/take down entrance sign.
9. Secure chairs outside dorm and chain or tie metal gate by dorm.
10. Secure all loose items in yard and under building.
11. Elevate tools and equipment in shop and outside storage areas as needed.
12. Move mower, Kubota and four-wheeler to front ramp or compound if a trailer is available.
13. Clean out refrigerator in kitchen and dorm.
14. Backup all computers, unplug and cover. Cover lab equipment as needed.
15. Turn off Energy Recovery Ventilator (ERV) unit in main building and dorm.
16. Put up "closed to public" sign at the front door.
17. Turn on magnets and lock all doors prior to leaving.
18. Turn off well.
19. Inform MDMR, FWS, NOAA and janitorial service of the evacuation plans.

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<sup>1</sup> "You" refers to the NERR Manager and designated NERR emergency team personnel (if so directed by NERR Manager).

## Hurricane/Tropical Storm Warning - Condition 2

All Final Preparations are to be completed immediately.

### Post Hurricane Recovery Procedures

1. Follow instructions provided by the MDMR Executive Director.
2. Reserve Manager and Facilities Manager will seek to access facilities as soon as possible after conditions are safe to do so.
3. Specific plans will be relayed to staff as per MDMR procedures taking into considerations for damages and or flooding events at the NERR.
4. Document damages to infrastructure or natural resources if so directed by MDMR based on local impacts.
5. Prepare an After Action Report (Appendix K), as appropriate (based on scale of event).
6. Review and update this procedure, as necessary, based on lessons learned.

### What you can do now to reduce risk:

1. Ensure Grand Bay NERR Emergency Contact Numbers are up-to-date (beginning of hurricane season). The Administrative Assistant maintains and distributes this list.
2. Annually identify and implement hazard mitigation actions (Section 3.1 of Disaster Response Plan).
3. Encourage staff members to maintain a personal Home and Family Hurricane Preparedness Plan and Kit.
4. Sign up for Jackson County EMA Emergency Notifications (email, phone, text): <http://www.co.jackson.ms.us/departments/public-safety/emsignup.php> and check Mississippi's EMA website for weather alerts: <http://www.msema.org/>
5. Review hurricane procedures against recommended actions (e.g., those at NOAA CSC: <http://www.csc.noaa.gov/magazine/2006/03/article4.html>)
6. Participate in NOAA/FEMA Severe Weather Preparedness Week (March/April of each year): <http://www.nws.noaa.gov/com/weatherreadynation/force.html> or local training (for example, Mississippi Emergency Management Agency [MEMA] officers an extensive array of training opportunities): <http://www.msema.org/training/>
7. Conduct annual hurricane evacuation planning meeting, workshop, drill, or tabletop exercise one month prior to hurricane season (May).
8. At the beginning of Hurricane Season (June 1 – November 30):
  - a. Review the Grand Bay NERR hurricane procedure (this document) and the attached MDMR Tropical Storm and Hurricane Contingency Plan (included with Appendix L).
  - b. Instruct staff to monitor for tropical cyclone weather reports; Reserve Manager will maintain contact with MDMR main office regarding potential hurricane or tropical storm development (during hurricane season) (see Where You Can Find More Data below). The Emergency Planner also monitors day-to-day hazard event potential (see example, Situation Awareness in Appendix K of this plan).

### Where you can find more data:

1. Review the MDMR Tropical Storm and Hurricane Contingency Plan (attached in Appendix L).
2. Review NOAA Severe Weather Fact Sheet for the area (Mississippi): <http://www.ncdc.noaa.gov/activities/weather-ready-nation/news/>
3. Review Jackson County EMA web site updates and resources (including Evacuation Routes): <http://www.co.jackson.ms.us/departments/public-safety/emergency-management.php> and Jackson County EMA web site



information and links (MDOT evacuation routes, links to hurricane information, live weather cam): <http://www.co.jackson.ms.us/departments/public-safety/emergency-management.php#hurricanemaps>

4. Review Mississippi Emergency Management Agency (MEMA) Hurricane Information: <http://www.msema.org/be-prepared/hurricanes/> (includes MS Hurricane Preparedness Plan and local surge maps by county).
5. Find information on Mississippi Emergency Operations Plan at: <http://www.msema.org/wp-content/uploads/2012/07/BasicPlan.pdf>
6. Review MEMA Hurricane Incident Annex – Mississippi Comprehensive Emergency Management Plan: <http://www.msema.org/wp-content/uploads/2012/07/MississippiHurricaneIncidentAnnex.pdf>
7. Find information on Home and Family Preparedness Planning at <http://www.redcross.org/prepare/location/home-family>
8. Find information on hurricane preparedness at: <http://www.ready.gov/hurricanes>

**Attachment:**

MDMR Tropical Storm and Hurricane Contingency Plan, Revision 2 (April 2007) – see Appendix L

## Hazard 2- Severe Storms/Lightning/Tornado

### Scenario: Severe Storm/Lightning/Tornado

#### What you should do:

1. The day-to-day duty officer monitors NOAA weather radio and/or other local weather forecasts for severe storm warnings (Emergency Planner or other designated by NERR Manager). If the U.S. Weather Service issues a tornado or severe storm watch or warning for the Moss Point area, the Emergency Planner will work with the NERR Manager to issue instructions to employees.
2. Notify all Grand Bay NERR staff of storm watch or warning (Emergency Planner/NERR Manager). Recall staff in the field or on the water to safe shelter, based on weather alerts and advisements.
3. Document Grand Bay NERR staff and visitors present at the NERR or in the field to the degree feasible (Administrative Assistant).
4. If time permits before storm arrival:
  - a. Secure all loose outside equipment.
  - b. Secure boats at docks, on lifts, or trailers with additional tie-down or mooring lines.
  - c. Charge cell phones and portable radios.
  - d. Unplug all non-essential equipment.
  - e. Back-up the research server and other data; power down computers and networks.
  - f. Prepare generators for potential use.
5. Ensure all staff and visitors take shelter during periods of severe storm/lightning/tornado. All employees and visitors should move to the hallway or center of the building away from windows and doors until the warning has ended. Remember the 30/30 Lightning Safety Rule: "Go indoors if, after seeing lightning, you cannot count to 30 before hearing thunder. Stay indoors for 30 minutes after hearing the last clap of thunder."
6. After the storm passes:
  - a. Account for all Grand Bay NERR staff and visitors (Administrative Assistant).
  - b. Check for injuries. Do not attempt to move seriously injured people unless they are in immediate danger of further injury. Request emergency medical assistance via 9-1-1. First Aid/CPR trained personnel can provide first aid/CPR for injured personnel (see Hazard 9, Medical Emergency). Otherwise, help keep the injured party calm until help arrives.
  - c. Inspect buildings and equipment for damage (Facilities Manager).
  - d. Secure electrical power, water, and gas service to any damaged buildings (Facilities Manager).
  - e. Initiate clean-up and repairs. Clean gutters and drains (Facilities Manager).
7. Document all injuries and damages for potential legal claims or cost reimbursement. The Facilities Manager shall continue to inspect and clear drains and gutters in accordance, as directed by the NERR Manager
8. Conduct incident debrief/lessons learned review; complete an After Action Report (Appendix K), if appropriate (for significant events).
9. Update the Reserve DRP (this procedure) and training, as necessary.



- What you can do now to reduce risk:**
1. Pre-identify a safe room away from windows and flying debris (generally find areas away from windows and in the center of the building).
  2. Ensure Grand Bay Employee Emergency Contacts List (Phone Tree) is up-to-date (Administrative Assistant maintains and distributes this list).
  3. Participate in NOAA Severe Weather Preparedness Week each year: <http://www.nws.noaa.gov/com/weatherreadynation/force.html> or MEMA training: <http://www.msema.org/training/>
  4. Consider signing up for Jackson County EMA emergency notifications (email, phone, text) at: <http://www.co.jackson.ms.us/departments/public-safety/emsignup.php> and check Mississippi's EMA website for weather alerts: <http://www.msema.org/>
  5. Annually identify and implement mitigation actions (see Section 3.1 of DRP).
  6. Have staff learn how to protect themselves in a tornado or thunderstorm/lightning storm (See Tab A and references below.)
- Where you can find more data:**
1. Review NOAA Severe Weather Fact Sheet for your area (Mississippi): <http://www.ncddc.noaa.gov/activities/weather-ready-nation/news/>
  2. Review MEMA Hurricane and Tornado Information: <http://www.msema.org/>
  3. Find information on Home and Family Preparedness Planning at: <http://www.redcross.org/prepare/location/home-family>
  4. Find information on selecting a safe refuge in buildings at: <http://www.fema.gov/library/viewRecord.do?id=1563>
  5. Find information on securing buildings from high winds at: <http://www.fema.gov/library/viewRecord.do?id=3263>.
  6. Find information on Tornado Preparedness at <http://www.ready.gov/tornadoes>
  7. Find information on Thunderstorm and Lightning Preparedness at: <http://www.ready.gov/thunderstorms-lightning>
  8. Find information on lightning safety for boaters at: <http://www.nws.noaa.gov/os/lightning/resources/LightningFactsSheet.pdf>

## Tab A – Tornado Safety

**Source: Mississippi Emergency Management Agency Website: Preparedness** (<http://www.msema.org/be-prepared/tornados/>). The following are some tips to help you prepare your home and family for a tornado:

What to do if you are in your **home** during a Tornado:

- Go to the lowest level of the home, an inner hallway, or smaller inner room without windows, such as a closet or bathroom.
- Get away from windows and go to the center of the room. Avoid corners, because they tend to attract debris.
- Get under a sturdy piece of furniture, such as a workbench or heavy table.

If you are in a **mobile home**:

- Evacuate the mobile home, even if it is equipped with tie-downs. Take shelter in a building with a strong foundation, or if one is not available, lie in a ditch or low-lying area a safe distance away from the mobile home. Tornadoes cannot change elevation quickly enough to pick someone up out of a ditch, especially a deep ditch or culvert.

If you are at **work or school**:

- Go to the basement or to an inside hallway at the lowest level of the building.
- Avoid places with wide-span roofs, such as auditoriums, cafeterias, large hallways or shopping malls.
- Use your arms to protect your head and neck.

If **outdoors**:

- If possible, get inside a sturdy building with a concrete foundation.
- If shelter is not available, or there is no time to get indoors, lie in a ditch or low-lying area or crouch near a strong building.
- Be aware of the potential for flooding.

If you are in a **vehicle**:

- Never try to out drive a tornado in your vehicle. Tornadoes can change direction very quickly and can lift a vehicle and toss it in the air
- Get out of the vehicle and take shelter in a nearby building.
- If there is no time to get indoors, get out of the vehicle and lie in a ditch or low-lying area away from the vehicle.

## Hazard 3 - Oil Spill

### Scenario: Oil Spill

- What you should do:**
1. Report all oil spills that threaten state waterways or hazardous materials spills to the National Response Center at 1-800-424-8802 and 24-hours a day to the Mississippi State Warning Point at 1-800-222-6362. Notify appropriate MDMR personnel.
  2. Contact the U.S. Coast Guard, NOAA Estuarine Reserves Division and NOAA Disaster Response Center, and other state/county agencies, as soon as possible after item 1 notifications (see Emergency Contacts List, Appendix B of this plan). Follow established emergency procedures and direction from lead response agency U.S. Coast Guard, EPA, MS Emergency Management Agency (MEMA), or MDMR. Note: MEMA serves as the coordination point between agencies for spills in Mississippi (<http://www.msema.org/>).
  3. In the unlikely event that the Grand Bay NERR is responsible for a small oil spill on the water:
    - a. Contact HAZWOPER-trained NERR staff (Emergency Planner and Emergency Coordinator).
    - b. Stop or minimize the leak, if possible, using appropriate personnel protective equipment (PPE) and HAZWOPER trained personnel.
    - c. Contain the extent of the spill with oil boom on water, earthen dikes on land, and sorbent materials.
    - d. If there is a threat of fire or explosion, or no trained personnel are available at the reserve, call 9-1-1.
    - e. Coordinate with MDMR and U.S. Coast Guard representatives for spill clean-up.
  4. If there is an oil spill on the water from external source within or threatening the Grand Bay NERR and personnel at the Reserve:
    - a. Notify the appropriate authorities (see item 1 above).
    - b. Evacuate for a safe distance and stay upwind of the spill if there is a potential toxic air hazard.
    - c. Identify priority natural resources for protection given spill location and current conditions; consult with lead response agency as directed by the MDMR.
    - d. Provide technical and logistical support to the Incident/Unified Command for fish and wildlife protection as directed by the MDMR or federal agency in charge if appropriate.
    - e. Provide personnel to assist the Mississippi Department of Environmental Quality (MDEQ) (state natural resource trustee) in conducting the Natural Resources Damage Pre-Assessment prior to spill impact, if so directed by MDMR.
    - f. Assist MDEQ in conducting the Natural Resources Damage Assessment (NRDA) following spill impact, if so directed by MDMR.

5. Document all activities and impacts for potential cost reimbursement.
6. Conduct incident debrief/lessons learned review, prepare After Action Report (Appendix K), if appropriate (for larger events).
7. Update this disaster response plan procedure and Reserve training, as necessary.

**What you can  
do now to  
reduce risk:**

1. Minimize on-site storage of oil/gas and promptly dispose of waste materials at approved disposal sites. Annually, identify and implement any mitigation actions (see Section 3.1 of DRP).
1. Strive to maintain two NERR staff that have HAZWOPER training.
2. Participate in the U.S. Coast Guard (USCG) Sector Mobile Area Committee periodically to support oil/hazardous materials (HazMat) preparedness and to ensure that updated data is provided for the USCG Area Contingency Plan for the Grand Bay NERR area.
3. Periodically, participate in local emergency planning committee (LEPC) meetings or other trainings/meetings to maintain currency on hazmat and oil spill risks, mitigation, and response measures for the Grand Bay NERR area.
4. Consider pre-identifying interested and capable staff in the MS Disaster Reservists Program: <http://www.msema.org/training/disaster-reservists/>, if appropriate (training required for qualifying and participating personnel). This program pre-identifies personnel with special skills and abilities to be called upon during disaster response situations.
5. Participate in oil spill and HazMat training and exercises with the County or other stakeholders, where appropriate and resources allow. For example, MEMA offers an array of training opportunities: <http://www.msema.org/training/>

**Where you can  
find more data:**

1. Become familiar with environmentally sensitive areas and protection strategies in U.S. Coast Guard Sector Mobile Area Contingency Plan at: <https://homeport.uscg.mil/mycg/portal/ep/portDirectory.do?tabId=1&cotpId=37>
2. Find information on Federal Region IV regional response protocols for natural resource trustees, shoreline cleanup, oil spills, and use of response technologies including dispersants, in-situ burning, and bioremediation at: <http://www.rrt4.nrt.org/>.
3. Maintain currency with State of Mississippi Emergency Response contacts and information at: <http://www.dmr.state.ms.us/emergency-contacts>

## Hazard 4 - Riverine Flooding

### Scenario: Riverine Flooding

- What you should do:**
1. Prior to flooding:
    - a. The duty officer (generally, the Emergency Planner) will monitor NOAA weather radio and/or other local weather forecasts for flash flood warnings. River Stages information is also available by phone at: 228.769.6508, Updated daily (Mon-Fri).
    - b. The duty officer will notify Grand Bay NERR Manager and staff of flash flood warnings.
    - c. Evacuate staff and visitors from flood-prone areas (Emergency Coordinator /NERR Manager makes decision; Emergency Planner assists and works with Administrative Assistant to document staff/visitors present).
    - d. If time permits, move critical equipment and vehicles in flood-prone areas to higher ground.
    - e. Secure and evacuate any buildings that are in the flood hazard area. Implement equipment shutdown and computer/data backup procedures. Move equipment to protected location or implement removal as part of evacuation if warranted.
    - f. Consider procuring and using sandbags to protect vulnerable buildings or areas.
  2. During the flood:
    - a. Do not attempt to cross flooded streams or roadways on foot or in vehicles. **Water is often moving faster than it appears** and there is a high risk of being swept away. Move to a safe area and call for help.
    - b. Request assistance via 9-1-1 for anyone who is stranded by flood waters.
  3. After the floodwaters recede:
    - a. Inspect buildings and equipment for damage.
    - b. Inspect shorelines for critical erosion.
    - c. Ensure electrical power, gas service, and water service are shut-off to any flood damaged buildings prior to re-entry. Obtain support for safe resumption of operations.
    - d. Inspect buildings and equipment for damage.
    - e. Initiate clean-up and repairs. The Facilities Manager will inspect and clear gutters and drains.
  4. Document all costs incurred in damage assessment and recovery for potential reimbursement or to guide repair efforts.
  5. Conduct incident debrief/lessons learned review and prepare an After Action Report (Appendix K), as appropriate (for larger events).
  6. Update this plan and training, as necessary.

- What you can do now to reduce risk:**
1. Ensure Grand Bay NERR Employee Emergency Contact List (Phone Tree) phone numbers are up-to-date. (Administrative Assistant maintains and distributes this list).
  2. Annually, identify and implement any mitigation actions (see Section 3.1 of DRP).
  3. Ensure all staff members have a personal Home and Family Preparedness Plan and Kit.
  4. Pre-identify flood risk zones and potential evacuation routes/high ground areas.

Review riverine flooding procedure with NERR staff annually.

5. Participate in training and exercises to improve preparedness for riverine flooding (coordinating with area response agencies/neighborhood facilities and entities).
6. Monitor weather reports for flash flood warnings. Check MEMA's website for weather alerts: <http://www.msema.org/> and sign up for alerts.
7. Participate in NOAA Severe Weather Preparedness Week each year: <http://www.nws.noaa.gov/com/weatherreadynation/force.html> or MEMA training: <http://www.msema.org/training/>

**Where  
you can  
find  
more  
data:**

1. Review NOAA Severe Weather Fact Sheet for your area (Mississippi): <http://www.ncddc.noaa.gov/activities/weather-ready-nation/newis/>
2. Review Jackson County EMA web site updates and resources on hazards, evacuation routes, shelters: <http://www.co.jackson.ms.us/departments/public-safety/emergency-management.php>
3. Review MEMA Flood Information Links: <http://www.msema.org/be-prepared/floods/>
4. Find information on Home and Family Preparedness Planning at <http://www.redcross.org/prepare/location/home-family>
5. Find information on flood preparedness at: <http://www.ready.gov/floods>



## Hazard 5 - Invasive Species

### Scenario: Invasive Species

- What you should do:**
1. Identify any invasive species or symptoms that may indicate invasive species are present. Determine whether this is an “incident” or an “issue.”
    - a. An incident is an isolated introduction of a species that has yet to become established in the ecosystem.
    - b. An issue is ongoing challenge with an established nonindigenous species; for ongoing challenges, implement existing NERR efforts and programs to address invasive species, in cooperation with appropriate partner agencies.
  2. If an incident, notify MDMR, Office Director of Coastal Ecology and Gulf Coast Refuge Complex Manager. If an incident, proceed to item 3.
  3. Establish Incident Command.
  4. Implement established response procedure (e.g., a Rapid Response Plan or similar MDMR/NERR procedure (see links to an example MD plan and template at end of this hazard procedure).
  5. As necessary, obtain funding and establish agreements to execute the plan.
  6. Streamline the permit process, if applicable.
  7. Conduct training for team members.
  8. Conduct education and outreach.
  9. Implement species-specific eradication or control measures as identified in established plans (e.g., MDMR or other MS plans or a pre-developed Rapid Response Plan).
  10. Conduct research for improved rapid response.
  11. Revise the eradication or control measures based on research.
  12. Conduct monitoring for effectiveness.
  13. Demobilize when complete and monitor for species re-introduction.
  14. Prepare an After Action Report, if appropriate (for larger events) and identify lessons learned.
  15. Update this procedure and plan, as appropriate.

- What you can do now to reduce risk:**
1. Monitor Grand Bay NERR for introductions of invasive species.
  2. Note invasive species sightings in adjacent land and water and block potential routes of introduction.
  3. Monitor and take early action to control newly introduced species before they become established.
  4. Annually identify any needed mitigation measures (Section 3.1 of this plan).
  5. Conduct public outreach and education through on-going NERR programs to focus on preventing the introduction and transfer of invasive species into the NERR and surrounding environment. Communicate with responders to prevent transfers of invasive species during response actions.

**Where you  
can find  
more  
information:**

1. See MDMR information on Invasive Species:  
<http://www.dmr.state.ms.us/boating/invasive-species>
2. See USDA National Invasive Species Information Center information:  
<http://www.invasivespeciesinfo.gov/aquatics/detection.shtml>
3. See US Environmental Protection Agency (EPA) information on Invasive Species: [http://water.epa.gov/type/oceb/habitat/invasive\\_species\\_index.cfm](http://water.epa.gov/type/oceb/habitat/invasive_species_index.cfm)
4. Review NOAA Aquatic Invasive Species information:  
<http://www.research.noaa.gov/research/2007/ais.shtml>
5. Review and apply Maryland example of Rapid Response Planning for Aquatic Invasive Species (includes an example and a Word.doc Template)  
<http://www.mdsg.umd.edu/programs/gateway/invasives/rapidresponse/>

## Hazard 6 - Vessel Grounding

### Scenario: Vessel Grounding

- What you should do:**
1. If a vessel is observed or reported as being aground in the Grand Bay NERR:
    - a. If a small pleasure craft, ask if they need assistance contacting the U.S. Coast Guard (USCG) or a vessel towing service.
    - b. For any large or commercial vessel, contact the USCG Marine Safety Office for the Coastal Zone (Mobile, AL) at: 334-441-5121.
    - c. Provide as much information as is readily available to support the response:
      - Vessel name, description, and location
      - Number of persons on-board
      - Signs of damage, fire, leaking oil, etc.
      - Observed weather conditions
  2. If oil or hazardous materials (HazMat) is observed leaking, report all spills that threaten state waterways or HazMat spills to the National Response Center at 1-800-424-8802 and the MDMR Oil Spill Response Environmental/Community Hotline at 1-866-448-5816 or 24-hours per day to the Mississippi State Warning Point at 1-800-222-6362. Notify appropriate MDMR personnel.
  3. If directed by MDMR, assign a NERR staff to the U.S. Coast Guard or other agency's Incident Command to support response efforts and provide data and consultation on NERR sensitive areas and protection strategies.
  4. Be prepared to evacuate the premises should any imminent risks be presented to personnel safety and health (see Appendix L, Evacuation Maps and Procedures).
  5. Assist the Incident Commander, as requested, with Grand Bay NERR staff technical competencies and resources, if so directed by MDMR (e.g., consulting on resources at risk, priorities and tides; sharing equipment; or providing support for pre- and post-event NRDA efforts led by MDEQ).
  6. Monitor for impacts to Grand Bay NERR natural resources. Report natural resource impacts to MDEQ.
  7. Document all injuries and damages for potential legal claims or cost reimbursement or to identify natural resource restoration needs.
  8. Conduct incident debrief/lessons learned review, prepare an After Action Report (Appendix K), as needed (for larger events).
  9. Update this plan and training as necessary.

- What you can do now to reduce risk:**
1. Strive to maintain at least two Reserve staff that have HAZWOPER training.
  2. Periodically participate in the USCG Sector Mobile Area Committee for oil/HazMat preparedness meetings and exercises.
  3. Review USCG Mobile Area Geographic Response Plan data and participate in updates to this data and associated protection strategies for areas within the Grand Bay NERR boundaries (see Maps included in Appendix L).
  4. Participate in area boating safety or emergency response training and consider hosting safe boating practices training for area residents at the NERR in cooperation with area stakeholders.

**Where you  
can find more  
data:**

1. Review and update (as necessary) information on environmentally sensitive areas and protection strategies in USCG Sector Mobile Area Contingency Plan at <https://homeport.uscg.mil/mycg/portal/ep/portDirectory.do?tabId=1&cotpId=37>
2. Find information on Federal Region IV regional response team protocols for natural resource trustees, shoreline cleanup, and use of response technologies including dispersants, in-situ burning, and bioremediation at: <http://www.rrt4.nrt.org/>.
3. Review the Regional Response Team (Region IV) pamphlet, “Vessel Groundings in the Coastal Environment” and become familiar with associated contacts for Grand Bay NERR area (NRC, USCG Marine Safety Office, etc.): [http://www.nrt.org/production/NRT/RRTHome.nsf/Allpages/newrrt\\_iv\\_pamphlets.htm](http://www.nrt.org/production/NRT/RRTHome.nsf/Allpages/newrrt_iv_pamphlets.htm) (see Vessel Groundings in the Coastal Environment link)
4. Read about seagrass impacts and restoration efforts following vessel groundings: <http://sanctuaries.noaa.gov/science/conservation/ncontrol.html>

## Hazard 7 - Hazardous Materials Spill (Industrial, Pipelines, Rail Lines)

### Scenario: Hazardous Material Spill

#### What you should do:

1. Report all Hazardous Material (HazMat) spills that threaten state waterways or HazMat spills to the National Response Center at 1-800-424-8802 and the MDMR's Oil Spill Response Environmental/Community Hotline: 1-866-448-5816 or 24-hours per day to the Mississippi State Warning Point at 1-800-222-6362. Notify appropriate reserve staff and other MDMR personnel.
2. Contact USCG, NOAA ERD, other state/county agencies, as soon as possible after item 1 notifications. Follow established emergency procedures and direction from lead response agency U.S. Coast Guard, EPA, MDMR, or MDEQ. Note: MEMA serves as the coordination point between agencies for spills in Mississippi. (<http://www.msema.org/>)
3. Grand Bay NERR maintains a small amount of HazMat in a laboratory locker. If there is a spill of laboratory HazMat materials:
  - a. Evacuate the area if there is a toxic air hazard; if you are not sure, evacuate. If time allows, turn on the fume hoods and close the laboratory doors as you evacuate.
  - b. Follow laboratory protocols for clean-up using appropriate personnel protective equipment (PPE) and HAZWOPER trained personnel (Emergency Planner and Emergency Coordinator).
  - c. Call 9-1-1 if emergency assistance is needed.
4. In the unlikely event that the Grand Bay NERR is responsible for HazMat spill:
  - a. Contact NERR HAZWOPER-certified NERR staff (Emergency Planner and Emergency Coordinator).
  - b. Stop or minimize the leak, if possible, using appropriate personnel protective equipment (PPE) and HAZWOPER trained personnel.
  - c. Contain the extent of the spill with boom (on water), earthen dikes or sorbent materials (on land or in boat); properly manage and dispose of these materials. If there is a threat of fire or explosion, or no trained personnel are available at the reserve, call 9-1-1.
  - d. Coordinate with responding agency representatives for spill clean-up and further direction.
5. If there is an oil or HazMat spill from external source within or threatening the Grand Bay NERR:
  - a. Notify the appropriate authorities (see item 1 above).
  - b. Evacuate for a safe distance and stay upwind of the spill if there is a potential toxic air hazard, risk for explosion or other concern (use the Emergency Contact Phone Tree to contact staff, as appropriate).
  - c. Identify priority natural resources for protection given spill location and current conditions.
  - d. Provide technical and logistical support to the Incident/Unified

Command for fish and wildlife protection as directed by the MDMR or federal agency in charge if appropriate.

- e. Assist MDEQ (state natural resource trustees) in conducting the Natural Resources Damage Pre-Assessment prior to spill impact, if so directed by MDMR.
  - f. Assist MDEQ in conducting the Natural Resources Damage Assessment (NRDA) following spill impact, if so directed by MDMR.
6. Document all activities for potential cost reimbursement.
  7. Conduct incident debrief/lessons learned review, prepare an After Action Report (Appendix K) if needed, and update this plan and training as necessary.

**What you can  
do now to  
reduce risk:**

1. Maintain the Reserve Emergency Contact Phone Tree (Administrative Assistant maintains and distributes this list).
2. Minimize on-site storage of HazMat and promptly dispose of waste materials at approved disposal sites. Ensure HazMat is stored properly with material safety data (MSDS) available.
3. Strive to maintain at least two NERR staff that have HAZWOPER training.
4. Periodically participate in the U.S. Coast Guard (USCG) Sector Mobile Area Committee for oil/HazMat preparedness and ensure that updated data is provided for the USCG Area Contingency Plan.
5. Periodically, participate in local emergency planning committee (LEPC) meetings or other trainings/meetings to maintain currency on hazmat and oil spill risks, mitigation, and response measures for the Grand Bay NERR area: <http://www.jclepc.org/>
6. Participate in oil spill and HazMat training and exercises with area stakeholders, where appropriate and resources allow. For example, area industry partners with operations, pipelines and rail lines in the area (see those listed in Appendix G). Also, MEMA officers an extensive array of training opportunities: <http://www.msema.org/training/>

**Where you  
can find more  
data:**

1. Ask to review safety plans and procedures, and participate in exercises or training, sponsored by industrial and rail companies that can impact the NERR (see Appendix G list of planning stakeholders and Appendix J exercise plan).
2. Review County information (links to FEMA Ready.gov) information on hazmat spills: <http://www.ready.gov/hazardous-materials-incidents>
3. Learn about LEPC and attend periodic meetings. Information is at: <http://www.jclepc.org/>
4. Find information on environmentally sensitive areas and protection strategies in USCG Sector Mobile Area Contingency Plan at (website address includes "Florida" but site includes Mississippi): <http://ocean.floridamarine.org/ACP/MOBACP/Documents.html>



5. Find information on Federal Region IV regional response protocols for natural resource trustees, shoreline cleanup, oil spills, and use of response technologies including dispersants, in-situ burning, and bioremediation at: <http://www.rrt4.nrt.org/>.
6. Maintain currency with State of Mississippi Emergency Response contacts and information at: <http://www.dmr.state.ms.us/emergency-contacts>

## Hazard 8 - Wildland Fire (and Associated Building Impacts)

### Scenario: Wildland Fire

#### Jurisdiction

All wildland fire response is under jurisdiction of Gulf Coast Refuge Complex (U.S. Fish and Wildlife Service). The Grand Bay NERR Stewardship Associate has a working relationship with the Mississippi Sandhill Crane National Wildlife Refuge (MSCNWR) Fire Team. Under this jurisdictional structure, Grand bay NERR will implement the following:

- Issue a Delegation of Authority letter to the Fire Management Office at the Gulf Coast Complex for Type 4 or 5 fires
- Issue a Delegation of Authority letter to the Incident Command of each Type 3 or higher incident occurring on NERR-owned lands.
- Provide resource advisors to initial attach Incident Command for every fire on NERR-owned lands

#### What you should do:

1. Monitor local weather forecasts and the Mississippi Forestry Commission (MFC) Wildfire Risk and fire weather links: <http://www.mfc.ms.gov/index.php>
2. Notify all Grand Bay NERR staff when wildfire risk conditions are present or if a building fire is observed. In the event of fire on or near Grand Bay NERR lands, notify (9-1-1) and all Grand Bay NERR staff:
  - a. Buildings - Depending on the severity of the fire, notification of the Fire Department will occur as the building is evacuated (dial 9-1-1). The NERR Manager or his/her designee will direct actions until local fire department arrives (Forts Lake Fire Department). The evacuation point for a building fire is at the North end of the visitor parking lot unless directed otherwise.
  - b. Wildfire –Notify MSCNWER Dispatch at 228-497-5780, Extension 21 if within one mile of Refuge boundary and other parties, as appropriate on the Emergency Contact List, Appendix B of this plan. Evacuate the buildings and reserve, as appropriate. The NERR Manager or designee will issue evacuation orders and provide direction until local fire department or responders arrive. Note: evacuation points may be off site for wildfire.
3. Document staff and visitors present, if applicable (pre-evacuation).
4. Assess the fire hazard area and available evacuation routes.
5. Evacuate staff, visitors, and researchers from the immediate fire hazard area, including:
6. If so directed by MDMR, assign a Grand Bay NERR liaison to the Wildfire Incident Commander to provide technical and consultation assistance regarding Grand Bay NERR resources and needs.
7. If so directed by MDMR, support consultations with the Incident Commander, determine if a larger evacuation is necessary.
8. If so directed by MDMR, assist the Incident Commander as requested within Grand Bay NERR staff technical competencies.
9. Monitor on-going wildfire risk and suppression efforts.
10. Upon conclusion of the fire, assess the wildfire damages. Remain alert for re-ignition and hotspots.

11. Assess buildings and areas of Grand Bay NERR for safe re-entry and restart operations upon direction by Incident Commander.
12. Document all injuries and damages for potential legal claims or cost reimbursement. Document staff and visitors post-emergency/evacuation.
13. Conduct incident debrief/lessons learned review and prepare an After Action Report for major fire incidents (Appendix K), as appropriate (for larger events).
14. Update this plan and Reserve training, as necessary.

**What you  
can do now  
to reduce  
risk:**

1. Periodically, conduct a Wildfire Risk Assessment around Grand Bay NERR structures. Conduct an annual building Fire Drill.
2. Maintain training currency for wildfire trained personnel and a current list of trained personnel. Training requirements are summarized in the Appendix J Training Plan.
3. Maintain fire suppression equipment listed in Appendix C (Stewardship).
4. Implement mitigation strategies including maintaining defensible space around Grand Bay NERR structures and fuel management programs on Grand Bay NERR lands. Prescribed Fires are managed by the MS Sandhill Crane NWR. Review mitigation actions annual (Section 3.1 of this plan).
5. Include public education and outreach on fire prevention in Grand Bay NERR programs.
6. Review current evacuation plans and update periodically (see Appendix L for building evacuation routes).
7. Monitor wildfire risk conditions at: <http://www.mfc.ms.gov/index.php>
8. Encourage Grand Bay staff to prepare family preparedness plans.
9. Mississippi Department of Health information at:  
[http://msdh.ms.gov/msdhsite/\\_static/44,4800,122,218.html](http://msdh.ms.gov/msdhsite/_static/44,4800,122,218.html)
10. FEMA hazard, emergency supply recommendations, and communications plan information at: <http://www.ready.gov/wildfires>

**Where you  
can find  
more data:**

1. Mississippi Forest Commission Fire Information: <http://www.mfc.ms.gov/facts-n-data.php>
2. FEMA information on preparedness for wildfire at:  
[http://www.usfa.fema.gov/citizens/home\\_fire\\_prev/wildfire/](http://www.usfa.fema.gov/citizens/home_fire_prev/wildfire/)

Reference: Fire Evacuation Procedures and Maps attached in Appendix L.

## Hazard 9- Medical Emergency

### Scenario: Medical Emergency

#### What you should do:

1. If a medical emergency occurs in or around the NERR facility/main building.
  - a. Remain calm. Assess the situation, making sure the scene is safe.
  - b. Determine if the incident requires external medical assistance or if the victim can safely be transported for help to an area hospital (see attached map of nearest hospital/urgent care). If you are not sure, get external help by calling 9-1-1.
  - c. When calling 9-1-1, provide the following information:
    - Number and location of victim(s)
    - Nature of injury or illness
    - Hazards involved
    - Nearest entrance (emergency access point)
  - d. Alert trained personnel to implement CPR/First Aid until help arrives.
  - e. Do not move the victim unless the victim's location is unsafe. Stay with the victim and help him or her remain calm.
  - f. Control access to the scene.
  - g. Notify the NERR Manager or another emergency team member of the situation if they are available.

2. If a medical emergency is reported elsewhere in the NERR, dial 9-1-1 and request an ambulance. Provide the following information:
  - Number and location of victim(s)
  - Nature of injury or illness
  - Hazards involved
  - Nearest entrance (emergency access point)

Make sure to provide clear and concise information on your location if you are not in the main facility. If access to your location is restricted by road, provide alternate access information or ask for direction from 911 personnel. If appropriate, send someone to meet the ambulance at the main road and guide them to the incident location.

3. Alert trained employees (members of the medical response team/CPR/First Aid trained) to respond to the victim's location and bring a first aid kit or the Automated External Defibrillator (AED, located in the Visitor Center). The NERR Manager or his designee maintains a list of trained personnel.
4. If first aid can safely be implemented, use NERR first aid tools to administer immediate help. Take "universal precautions" to prevent contact with body fluids and exposure to blood borne pathogens.
5. Try to keep the victim calm if they are conscious. Avoid unnecessary conversation about the condition of the victim.
6. Implement CPR/First Aid until help arrives. Note that the response time from the nearest hospital to the NERR main facility will be between 15 and 40 minutes.
7. Assist the response personnel when they arrive. Provide them with map to nearest hospital, if needed.
8. When the victim(s) have been supported. Assess if the threat that caused the incident remains and address it with appropriate support (e.g., power lines,

slipping hazard, etc.). If evacuation is warranted refer to the Fire Evacuation Plan and Maps included in Appendix L, Maps and Other Information.

9. After the emergency, complete an Incident/Accident Report.
1. Maintain first aid kits in appropriate locations. Maintain and test AED unit in Visitor Center as recommended by manufacturer.
2. Provide basic CPR/First Aid Training to staff annually, including review of this procedure. Pre-identify any staff or volunteer medical conditions (e.g., allergies) (note: medical condition information will be collected on a voluntary basis; not required to be provided).
3. Review the emergency procedure included from the Wildfire Protection Plan and associated emergency numbers and hospitals provided at the end of this procedure (including numbers for Medivac and additional area hospitals).
4. Annually review and revise this procedure with Red Cross or external responder personnel, integrating expert input, new information, and lessons learned.
5. Consider implementing Wilderness Safety Training periodically (already performed at Grand Bay?).
6. Develop an alternate evacuation route procedure working with local hospitals and police/fire department personnel.
7. Participate in area training or host a training/exercise related to a Medical Emergency situation at the NERR.

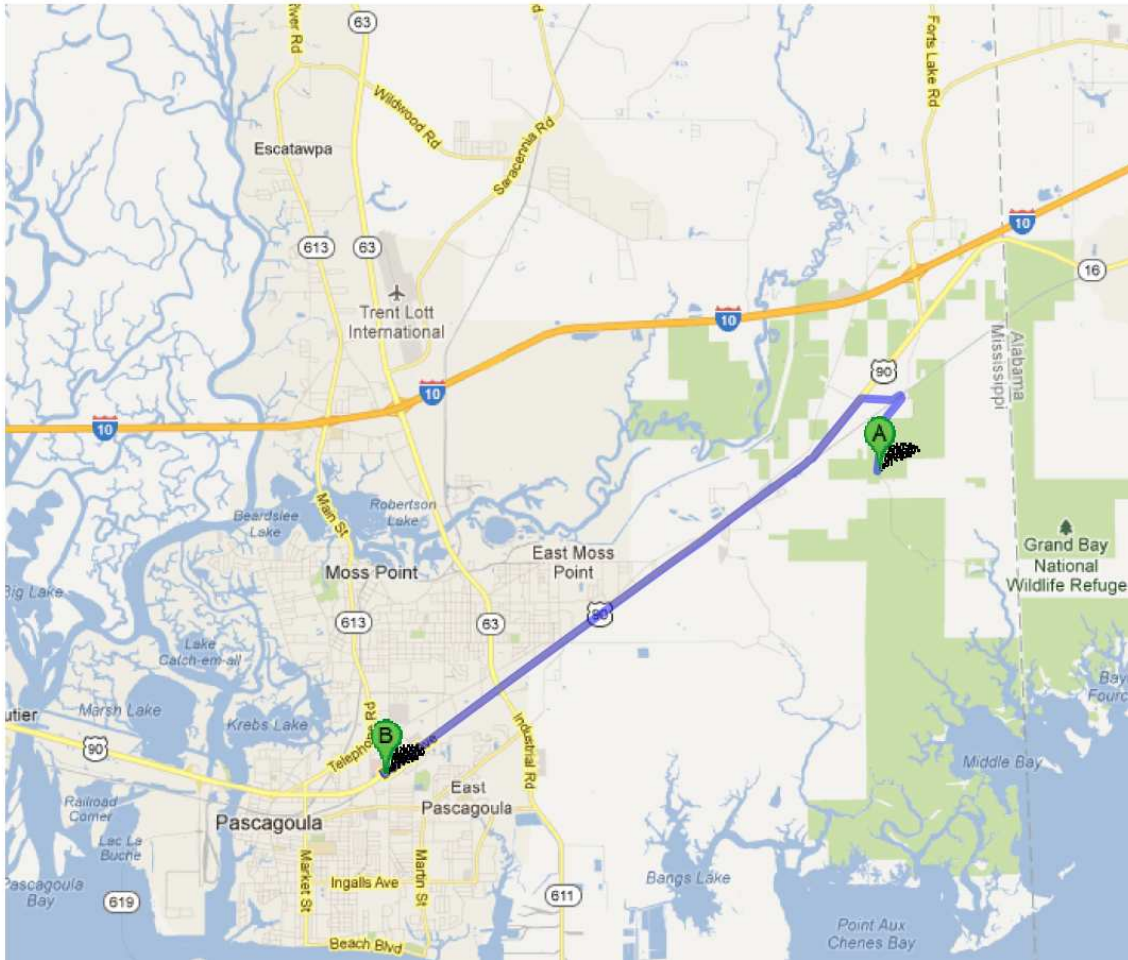
**What you can  
do now to  
reduce risk:**

**Where you can  
find more data:**

1. Review information available from FEMA at:  
[http://www.ready.gov/sites/default/files/documents/files/EmergencyResponsePlan\\_Oct2012.pdf](http://www.ready.gov/sites/default/files/documents/files/EmergencyResponsePlan_Oct2012.pdf)
2. Review Centers for Disease Control information on preparedness planning for businesses and industry (including plans and evacuation drills) at:  
<http://www.cdc.gov/niosh/topics/emres/business.html>

See attached map, route information, and evacuation/hospital numbers.

## Hospital Route Map



Singing River Hospital: Approximately 14 minutes. Phone number 228-809-5000. Additional areas hospitals, capabilities and medivac resources are listed on the next page as provided by Jay MacIlvain from another plan for the area.

**A** 6005 Bayou Heron Rd, Moss Point, MS 39562

- |   |                           |
|---|---------------------------|
| 1. Head <b>north</b> on <b>Bayou Heron Rd</b> toward <b>Missala Rd E</b><br>About 2 mins      | go 1.0 mi<br>total 1.0 mi |
| 2. Turn left onto <b>Missala Rd</b>   | go 190 ft<br>total 1.0 mi |
| 3. Turn left onto <b>Pecan Rd</b><br>About 1 min  | go 0.5 mi<br>total 1.6 mi |
| 4. Take the 2nd left onto <b>US-90 W</b><br>Destination will be on the right<br>About 10 mins | go 7.7 mi<br>total 9.3 mi |

**B** **Singing River Hospital**  
2809 Denny Ave, Pascagoula, MS 39581





Additional information for Grand Bay NERR area (provided to support evacuation/calls for help).

Ambulance Services	Location	Phone	Paramedics
Acadian - Ground	Throughout Jackson County	911 access	Yes
Life Flight	Mobile AL Airport	TBD/Acadian	Yes

**From Wildfire Plan:** (aligns with DRP procedure above)

1. Ensure scene safety
2. Contact supervisor, to modify operations.
3. Begin 1st aid within your training and capabilities.
4. Remember: (1) Airway (2) Breathing (3) Circulation (4) Spinal Stabilization (if possible)
5. All personnel prepare to assist EMT's with patient care and transport as directed.

Hospitals	Location	Phone	Helipad	Burn Center	Distance
Ocean Springs	Hwy 90 and Ocean Springs Road	228-818-1111	Yes	No	24.5 mile
Singing River	Hwy 90 and Hospital Road	228-809-5000	Yes	No	7.7 mile
USA Medical Center	2451 Fillingim Street, Mobile AL 36617	251-471-7000	Yes	Yes	31.7 mile



## Appendix E - Continuity of Operations Planning (COOP)

### Succession: NERR Leadership for Disaster Response

1. NERR Manager (Emergency Manager)
2. Stewardship Coordinator (Emergency Coordinator)

### Continuity: Essential Functions

Essential Function	Consequence of Interruption	Continuity Strategy	Continuity Assigned To
Support visitor access and use of Main Building and facilities	Loss of visitors' services due to impacts or injuries at the Main Building (including the Visitor's Center)	<p>Implement periodic training and awareness of hazard procedures</p> <p>During event, evacuate visitors and implement closure/protection measures (e.g., those identified in Hurricane Procedures).</p>	<p>NERR Manager (decisions) Emergency Coordinator (Stewardship Manager) (coordination of personnel) Facilities Manager (facility shut down steps)</p>
Vehicles and boats for research.	Research and observation delayed until alternate transportation arrange	Evacuate vehicles and boats from harm's way in advance of a known threat.	Emergency Planner – maintain plans for equipment protection
Access to and use of research and monitoring data	Loss of monitoring program and individual researcher data may impact overall success of Grand Bay NERR mission.	<p>4 monitoring stations at the Grand Bay Reserve are telemetered and automatically upload data to the NERR Central Data Management Office.</p> <p>When CDMO telemeters are not working, Reserve collects data manually and loads to CDMO and Grand Bay NERR local servers. Local servers are backed up weekly to MDMR central servers. Discourage use of computers and external hard drives for data backup.</p> <p>Individual researchers and NERR personnel encouraged to work from local area network (servers), which are backed up weekly to MDMR central servers in Biloxi, MS. Hard copy data sheets scanned and stored to local area network.</p>	<p>Lead: Stewardship Coordinator (Emergency Coordinator) – maintain procedures and communication on data continuity precautions</p> <p>Support: Individual Program leads and Facilities Manager (for IT support and cases of facility closure/shut down)</p>

Essential Function	Consequence of Interruption	Continuity Strategy	Continuity Assigned To
<p>Maintain communication capabilities to support response needs and return to operations.</p>	<p>Loss of communication with field teams and outside to request emergency assistance.</p>	<p>Coordinate with U.S. Fish and Wildlife Service. NERR and FWS each have a phone switchboard/ computerized phone routing system. Communicate on how to share resources if one system is lost. Also consider pre-system jack for standard phone as a backup.</p> <p>Maintain phone tree with cell phone numbers and rely on cell phones for communication with field, as needed.</p> <p>Maintain and use battery powered handheld radios. Check batteries are charged when potential events pending (storms); ensure facility generator is maintained and fueled for emergency power during hazard events.</p>	<p>Emergency Coordinator (Stewardship Coordinator)</p> <p>Administrative Assistant (maintain phone tree) and share with relevant personnel.</p> <p>Emergency Planner (Stewardship Associate) (maintain radios and non-land line communication tools)</p> <p>Facilities Manager (maintain emergency generator and fuel – support facility shut down when needed)</p>
<p>Protections of specimens for research and stewardship efforts</p>	<p>Loss of materials collected to support research and stewardship projects and mission</p>	<p>Maintain emergency generator and ensure prepared to provide electricity to laboratory refrigerators and vital equipment during facility shut down, including: (1) check fuel for generator, (2) maintain generator and test as specified by manufacturer</p>	<p>Maintenance Supervisor</p>

**Continuity: Facilities** - In the event of a significant hazard that requires evacuation of Grand Bay NERR facilities, staff will evacuate to their homes or an alternate safe location. They will check-in daily with the NERR Emergency Coordinator or NERR Stewardship Coordinator or via the Emergency Employee Contact List (maintained by the Administrative Assistant) for assignments to work from home or an alternate designated facility until it is safe to return to the office. In the event that facility damage precludes return to Grand Bay facilities, the NERR Manager will consult with Mississippi Department of Marine Resources (MDMR) management to establish alternate worksite arrangements.



**Training and Exercises** - Grand Bay NERR staff should review and drill the Hurricane Hazard Procedure (Appendix D) at least once per year. At the start of hurricane season, the NERR staff will review the Hazard Procedure (Appendix D) at a staff meeting. An actual evacuation of people and preparation of equipment in preparation for a potential or actual tropical storm or hurricane may be substituted for the annual drill.

## Appendix F - Hazard Identification and Risk Assessment

Hazard	Potential Impacts [Focused on National Estuarine Research Reserve (NERR)]								Probability Indicator (0 to 1)	Potential Impact Indicator (0 to 1)	Probability Weight	Potential Impact Weight	Overall Ranking	Relative Priority
	Life	Health	Property	Environment		Economy								
				Physical	Biological	NERR	Natural Resources	Local/Area Business						
Hurricane	3	3	3	1	1	2	2	3	1	0.75	50%	50%	88	High
Severe Storms	2	2	2	1	1	1	1	1	0.75	0.46	50%	50%	60	High
Oil Spill	1	2	2	2	2	2	3	2	0.5	0.67	50%	50%	58	Medium
Riverine Flooding	2	1	2	2	1	1	1	2	0.5	0.50	50%	50%	50	Medium
Invasive Species	1	1	1	2	2	2	2	1	0.5	0.50	50%	50%	50	Medium
Vessel Grounding	1	1	2	1	2	2	2	1	0.5	0.50	50%	50%	50	Medium
HazMat (Industry) Spill	1	2	1	1	2	2	2	1	0.5	0.50	50%	50%	50	Medium
Wildland Fire	1	2	2	1	1	2	2	1	0.5	0.50	50%	50%	50	Medium
Structure Fire	2	2	1	1	1	2	1	1	0.5	0.46	50%	50%	48	Medium
Medical Emergency	3	1	1	1	1	1	1	1	0.5	0.42	50%	50%	46	Medium
HazMat (Rail) Spill	2	2	1	1	1	1	1	1	0.5	0.42	50%	50%	46	Medium
Earthquake	2	1	3	1	1	1	1	1	0.25	0.46	50%	50%	35	Low
Tornado*	2	1	3	1	1	1	1	1	0.25	0.46	50%	50%	35	Low
Aircraft Crash	2	1	1	1	1	1	1	1	0.25	0.38	50%	50%	31	Low
Law Enf. Emergency	2	1	1	1	1	1	1	1	0.25	0.38	50%	50%	31	Low
UXO/Live Fire	1	1	1	1	1	1	1	1	0.25	0.33	50%	50%	29	Low



**Potential Impact Descriptions**

Life	Loss of human life [staff, visitors, researchers (registered, unregistered), persons working or recreating within NERR boundaries].
Health	Human Injury or illness [risk to staff, visitors, researchers (registered, unregistered), persons working or recreating within NERR boundaries]
Property	Damage to buildings and infrastructure (buildings, roads, roofs, vehicles, boats, piers, transformers, power lines, etc.)
<u>Environment</u>	<u>Impacts to the environment</u>
Physical	Coastline, cultural resources, wetlands, barrier islands, rivers, other landforms and waterways
Biological	Animal and plant life (sea grass, protected species, reefs, plankton, etc.)
<u>Economy</u>	<u>Economy considered at three levels</u>
NERR	Impacts to NERR operations and ability to accomplish its mission - research, stewardship, education, outreach
Natural Resources	Impacts to natural resources protected by the NERR in terms of aesthetics, fishing, and other economic uses
Local/Regional Resources	Impacts to NERR natural resources that have an impact on local/regional economy - hotels, gas stations, shops, etc. tied to tourism/fishing/recreational/natural resource driven economy

**Impact Legend**

0 = No Potential Impact

1 = Minimum Potential Impact: little to no potential for loss of life; minor health impacts ( injury, illness), few and minor property impacts (no major repairs needed; no significant impact to operations); injury to environment within range of natural impacts, total recovery expected without human intervention; minor damage to economy (little noticeable impact, short term return to normal economic conditions)

2 = Moderate Potential Impact: potential for loss of life; potential for some health impacts (sickness and injury causing need for first aid; injury to environment reversible with human intervention, no permanent loss; moderate damage to economy (noticeable short- to mid-term impact, requiring some time for recovery)

3 = Major Potential Impact: significant potential for loss of life; major potential for health impacts (sickness and injury, requiring EMT or hospitalization); major potential property losses (requiring replacement before resuming operations); 3. irreversible injury to or loss of environmental resource; not recoverable even with human intervention; major damage to economy (significant impact, long-term to recover and requiring outside assistance)





### **Probability Indicate Legend**

0 = Does not occur

0.25 = Has not occurred but the potential exists

0.5 = Occurred once in recorded history or has not happened but climate change is increasing the future potential

0.75 = Occurred several times in recorded history or occurred once and climate change is increasing the future potential

1 = Occurs chronically/regularly and climate change is increasing future potential

### **Priority Ranges**

Low = 0 to 40

Medium = 41 to 60

High = 61 and above



## Appendix G - Disaster Management Planning Stakeholders

Name	Org./Agency	Title	Address	Office Phone/ Cell Phone	Email	Notes
David Ruple	MDMR, Grand Bay NERR	Manager	6005 Bayou Heron Road, Moss Point, MS 39562	228-475-7047	<a href="mailto:David.Ruple@dmr.ms.gov">David.Ruple@dmr.ms.gov</a>	Attended DRP Workshop
James McClelland	FWS – MS Sandhill Crane Refuge	Complex Law Enforcement Officer	7200 Crane Lane Gautier, MS 39553	228-217-0751	<a href="mailto:James_McClelland@fws.gov">James_McClelland@fws.gov</a>	Attended DRP Workshop
Matt Chasse	NOAA Estuarine Research Div.	Program Specialist	1305 E West Hwy #13632 Silver Spring, MD 20910	301-563-1198	<a href="mailto:matt.chasse@noaa.gov">matt.chasse@noaa.gov</a>	Attended DRP Workshop
Charlie Henry	NOAA Disaster Response Center	Director	7344 Zeigler Blvd., Mobile, AL 36608	251-544-5006 (general)	<a href="mailto:Charlie.henry@noaa.gov">Charlie.henry@noaa.gov</a>	Attended DRP Workshop
Paul Ricketson	USCG Sector Mobile	Not provided	1500 15Th St., Brookley Complex, Mobile, AL 36615-1300	251-441-6857	<a href="mailto:Paul.B.Ricketson@uscg.mil">Paul.B.Ricketson@uscg.mil</a>	Attended DRP Workshop
To be added	EPA	To be added	To be added	To be added	To be added	To be added
To be added	United States Army Corps of Engineers (ACOE)	To be added	To be added	To be added	To be added	
Donald Langham	Jackson County EMA	Director	600 Convent St., Pascagoula, MS	228-769-3111	<a href="mailto:Donald_Langham@co.jackson.ms.us">Donald_Langham@co.jackson.ms.us</a>	Attended DRP Workshop
Not yet identified	Jackson County Health Department & Environment	Not yet identified	4600 Vega Street Pascagoula, MS 39581	Phone: 228-762-1117; Env. Office: 228-762-1173	<a href="http://msdh.ms.gov/msdhsite/static/19.816.166.html#Jackson">http://msdh.ms.gov/msdhsite/static/19.816.166.html#Jackson</a>	
Caroline Nelson	MEMA	Area Coordinator	P.O. Box 5644 Pearl, MS 39288	601-398-6881	<a href="mailto:CNelson@mema.ms.gov">CNelson@mema.ms.gov</a>	Attended DRP Workshop
Earl Etheridge	MDEQ Office of Pollution Control Emergency Services Division	Emergency Response	P. O. Box 2261 Jackson, MS 39225	228-326-6401	<a href="mailto:Earl_Etheridge@deq.state.ms.us">Earl_Etheridge@deq.state.ms.us</a>	Attended DRP Workshop
Larissa Graham	MDMR GB NERR	CTP Coordinator	6005 Bayou Heron Road, Moss Point, MS 39562	228-475-7047	<a href="mailto:Larissa.graham@dmr.ms.gov">Larissa.graham@dmr.ms.gov</a>	Attended DRP Workshop



Name	Org./Agency	Title	Address	Office Phone/ Cell Phone	Email	Notes
Will Underwood	MDMR GB NERR	Stewardship Coordinator	6005 Bayou Heron Road, Moss Point, MS 39562	228-475-7047	<a href="mailto:Will.Underwood@dmr.ms.gov">Will.Underwood@dmr.ms.gov</a>	Attended DRP Workshop
Mark Woodrey	GB NERR	Research Coordinator	6005 Bayou Heron Road, Moss Point, MS 39562	228-475-7047	<a href="mailto:Msw103@ra.msstate.edu">Msw103@ra.msstate.edu</a>	Attended DRP Workshop
Jay McIlwain	MDMR GB NERR	Stewardship Associate	6005 Bayou Heron Road, Moss Point, MS 39562	228-475-7047	<a href="mailto:Jay.McIlwain@dmr.ms.gov">Jay.McIlwain@dmr.ms.gov</a>	Attended DRP Workshop
Ann Weaver	NOAA GCC SC	Program Training Specialist	Not provided	228-688-2061	<a href="mailto:Ann.Weaver@noaa.gov">Ann.Weaver@noaa.gov</a>	Attended DRP Workshop
Marian Hanisko	NOAA GC CSC	Facilitator	Not provided	228-818-8840	<a href="mailto:Marian.Hanisko@noaa.gov">Marian.Hanisko@noaa.gov</a>	Attended DRP Workshop
Tony Wilder	FWS – MS Sandhill Crane Refuge	Commander South Incident Command Team	7200 Crane Lane Gautier, MS 39553	228-497-5780 ext. 22	<a href="mailto:Tony_Wilder@fws.gov">Tony_Wilder@fws.gov</a>	Attended DRP Workshop
Jan Boyd	MDMR	Director Coastal Ecology	1141 Bayview Avenue, Biloxi, MS 39530	228-523-4102	<a href="mailto:Jan.Boyd@dmr.ms.gov">Jan.Boyd@dmr.ms.gov</a>	Attended DRP Workshop
Lt. Patrick Levine	MDMR	Marine Patrol	1141 Bayview Avenue, Biloxi, MS 39530	228-760-0502	<a href="mailto:Patrick.Levine@dmr.ms.gov">Patrick.Levine@dmr.ms.gov</a>	Attended DRP Workshop
Barry Cumbest	Jackson County Board of Supervisors	District 1 Supervisor	P.O. Box 998, Pascagoula, MS 39568	228-769-3403	<a href="mailto:Barry_Cumbest@co.jackson.ms.us">Barry_Cumbest@co.jackson.ms.us</a>	Attended DRP Workshop
Earl Etheridge	Jackson County Fire District	Fire Coordinator	P.O. Box 998, Pascagoula, MS 39568	228-769-3110	<a href="mailto:Earl_Etheridge@co.jackson.ms.us">Earl_Etheridge@co.jackson.ms.us</a>	Attended DRP Workshop
Jeff Mattison	Jackson County Fire District	Director of County Fire District	P.O. Box 998, Pascagoula, MS 39568	228-219-9920	<a href="mailto:Jeff_Mattison@co.jackson.ms.us">Jeff_Mattison@co.jackson.ms.us</a>	At DRP Workshop.
Chad Maxwell	Jackson County Fire District	Fire Fighter	P.O. Box 998, Pascagoula, MS 39568	228-229-7475	<a href="mailto:ChadMaxwell925@gmail.com">ChadMaxwell925@gmail.com</a>	At DRP Workshop.
Roger Gibson	Jackson County Fire District	Fire Fighter	P.O. Box 998, Pascagoula, MS 39568	228-990-8503	<a href="mailto:bigrog392@yahoo.com">bigrog392@yahoo.com</a>	At DRP Workshop.



Name	Org./Agency	Title	Address	Office Phone/ Cell Phone	Email	Notes
Sgt. Jeremy Skipper	Jackson County Sheriff Office	Sergeant	P.O. Box 998, Pascagoula, MS 39568-0998	228-762-4986	Not yet identified	At DRP Workshop.
Terry Jackson	Jackson County EMA	Deputy Fire Coordinator	P.O. Box 998, Pascagoula, MS 39568	228-219-8006	<a href="mailto:Terry.Jackson@co.jackson.ms.us">Terry.Jackson@co.jackson.ms.us</a>	At DRP Workshop.
Doug Winters	Forts Lake Volunteer Fire Dept.	Fire Chief	10701 Forts Lake Road, Moss Point, MS 39562	228-474-2424/228-623-5398	<a href="mailto:Doug.Winters@gmail.com">Doug.Winters@gmail.com</a> OR <a href="mailto:Doug.Winters401@gmail.com">Doug.Winters401@gmail.com</a>	At DRP Workshop
Brandon Saska	Forts Lake Volunteer Fire Dept.	Fire Fighter	10701 Forts Lake Road, Moss Point, MS 39562	228-623-8032	<a href="mailto:BrandonSaska@yahoo.com">BrandonSaska@yahoo.com</a>	At DRP Workshop.
Joy Slaback	BP	USPL (pipeline) Environmental & Emergency Response Coordinator	Not provided (located outside area)	713-323-2168	<a href="mailto:Joy.Slaback@bp.com">Joy.Slaback@bp.com</a>	At DRP Workshop.
Ken Roberts	BP	BP Pipelines & Logistics	Not provided	228-327-1569	<a href="mailto:robertk5@bp.com">robertk5@bp.com</a>	At DRP Workshop.
Rhad Carter	BP	BP Damage Prevention	Not provided	228-761-6277	<a href="mailto:Rhad.Carter@bp.com">Rhad.Carter@bp.com</a>	At DRP Workshop.
Lee Heffernan	BP	BP Damage Prevention	Not provided	228-219-4608	<a href="mailto:Lee.Heffernan@bp.com">Lee.Heffernan@bp.com</a>	At DRP Workshop.
Tyler Merwin	Chevron	Emergency Response Coordinator	Not provided	228-938-4407	<a href="mailto:TylerMerwin@chevron.com">TylerMerwin@chevron.com</a>	At DRP Workshop.

## Appendix H - Annual Work Plan

Objective	Activity	Responsible Party	Est. Cost, Time	Outcome(s)	Notes
Stay connected with response community.	Attend Local Emergency Planning Committee (LEPC) meetings, periodically	Emergency Planner or Emergency Coordinator	40 hrs	<ol style="list-style-type: none"> <li>1. Maintain contact list of regional emergency planners and response agencies.</li> <li>2. Gain access to other response planning capabilities/experience.</li> <li>3. Gain invitations to training and exercising.</li> <li>4. Promote NERR objective to protect natural resources.</li> <li>5. Ensure responders are familiar with NERR resources, hazards, and capabilities.</li> </ol>	Time accounts for attending four, 8-hour quarterly meetings, with 8 hours of pre- and post-meeting work (total). Assume time is covered through salary; travel cost not estimated but would be low.
Stay connected with response community.	Attend Coast Guard Sector Mobile Area Contingency Planning Meetings, periodically	Emergency Planner or Emergency Coordinator	\$1350, 64 hrs	<ol style="list-style-type: none"> <li>1. Maintain contact list of all regional emergency planners and response agencies.</li> <li>2. Gain access to other response planning.</li> <li>3. Gain invitations to training and exercising.</li> <li>4. Promote NERR goals and objectives.</li> <li>5. Ensure responders are familiar with NERR resources, hazards, and capabilities.</li> </ol>	Cost does not account for salary but includes cost of personal vehicle mileage, one night lodging and two days partial per diem. Time accounts for one person to attend four 8-hour quarterly meetings, including 4 hours travel each way and perform 4 hours of pre- and post-meeting work.
Maintain NERR internal awareness.	Report on safety/emergency preparedness status at monthly NERR staff meetings.	Emergency Planner or Emergency Coordinator	NA	<ol style="list-style-type: none"> <li>1. NERR managers can coordinate staff schedules for emergency preparedness activities.</li> <li>2. NERR managers engaged in emergency preparedness.</li> </ol>	Cost and time – Not Applicable (NA); included with regular monthly staff meetings – no additional preparation required

Objective	Activity	Responsible Party	Est. Cost, Time	Outcome(s)	Notes
Maintain NERR emergency preparedness.	Review and update annual training and exercise plan.	Emergency Training Coordinator	4 hrs	<ol style="list-style-type: none"> <li>1. NERR managers can coordinate staff schedules for emergency preparedness activities.</li> <li>2. NERR managers engaged in emergency preparedness.</li> </ol>	Emergency Training Coordinator will work with the Emergency Team annual to review and update Appendices I and J.
Maintain NERR emergency preparedness	Schedule and provide training classes (internally or external), as needed	Emergency Training Coordinator	40 hours	<ol style="list-style-type: none"> <li>1. NERR personnel receive training identified in the plan.</li> <li>2. Emergency Training Coordinator aware of, and documents, training provided.</li> <li>3. NERR aware of available training resources.</li> </ol>	Cost and time for training not included; estimated 3 hours per month time for Emergency Training Coordinator; no additional cost
Maintain NERR emergency preparedness.	Conduct drill/ exercises as needed.	Emergency Coordinator and Emergency Planner	160 hours	<ol style="list-style-type: none"> <li>1. Maintain familiarity with emergency plans and procedures.</li> <li>2. Test equipment.</li> <li>3. Cooperate with partner agencies and neighboring facilities.</li> <li>4. Sustain emergency skills.</li> <li>5. Identify needed improvements in equipment, plans, training, and exercises.</li> </ol>	Includes estimated 16 hrs for 2 people to participate in Wildfire Refresher exercise with MSCNWR; includes 80 hours to plan, participate, and follow up on annual drills/exercises (Appendix J). Additional, one-time exercises not included in estimate.
Maintain NERR emergency preparedness.	Update Disaster Response Plan, Hurricane Plan, and Evacuation Procedure (annual)	Emergency Planner	40 hours	<ol style="list-style-type: none"> <li>1. Emergency contact numbers are up-to-date in plan.</li> <li>2. Hazards, resources at risk, and capabilities updated as changes occur.</li> <li>3. Hazard specific procedures are updated based on lessons learned.</li> </ol>	Emergency Planner will work with the Emergency Team to review and update procedures in Appendix D and Appendix L (Evacuation, Hurricane), as needed.



Objective	Activity	Responsible Party	Est. Cost, Time	Outcome(s)	Notes
Ensure necessary emergency equipment is available and ready.	Coordinate acquisition of new emergency response equipment	Emergency Coordinator	8 hours (review); 24 hours (follow up); cost variable based on needs	<ol style="list-style-type: none"> <li>1. Capabilities assessed periodically and needs identified.</li> <li>2. New equipment purchases based on reducing NERR risk and available resources.</li> <li>3. May require requesting additional funds as part of annual budget process.</li> </ol>	Priority equipment would include those directly supporting protection of human health in the event of a hazard; other equipment to facility response will be obtained as feasible.
Increase NERR long-term disaster resilience	Plan new mitigation projects (annually).	NERR Manager	4 hours (annual review); additional, as needed. Cost variable.	<ol style="list-style-type: none"> <li>1. Identify structural or other mitigation measures and prioritize based on need and risk reduction.</li> <li>2. Reduce losses during disasters.</li> <li>3. Implementation will be dependent on annual funding and potential additional monies/grants that may be available.</li> </ol>	<p>New mitigation projects should be factored into all new construction or major facility repairs.</p> <p>Consider use of FEMA post-disaster mitigation grants, when available and appropriate.</p>

## Appendix I - Emergency Training Plan

Course	Date/ Time	Location	Pre-requisite	This course allows people to	Who takes this
<b>Baseline ICS for Low Complexity Incidents</b> (See Figure 3 and course descriptions in FEMA NIMS Training Program Manual: <a href="https://www.fema.gov/pdf/emergency/nims/nims_training_program.pdf">https://www.fema.gov/pdf/emergency/nims/nims_training_program.pdf</a> )					
ICS 100 (Introduction to the Incident Command System)	Self-guided (estimated 3 hours to complete)	<a href="http://training.fema.gov/IS/NIMS.aspx">http://training.fema.gov/IS/NIMS.aspx</a>	None	Participate as member of Incident Command Post (ICP) at the NERR Headquarters building or another location (as appropriate and needed to support area response efforts). Preparation for low complexity incidents (see Figure 6 in DRP); recommended for Type 5 incidents.	As directed by NERR Manager to gain familiarity with NIMS/ICS terms and procedures. Recommended for Emergency Team members. After initial training, staff should take course as refresher training when directed by NERR Manager.
IS 700 (NIMS, an Introduction)	Self-guided (estimated 3 hours to complete)	<a href="http://training.fema.gov/IS/NIMS.aspx">http://training.fema.gov/IS/NIMS.aspx</a>	None	Participate as member of Incident Command Post (ICP) at the NERR Headquarters building or another location (as appropriate and needed to support area response efforts). Preparation for low complexity incidents (see Figure 6 in DRP); recommended for Type 5 incidents.	As directed by NERR Manager to gain familiarity with NIMS/ICS terms and procedures. Recommended for Emergency Team members. After initial training, staff should take course as refresher training when directed by NERR Manager.
HAZWOPER - 24 hr 29CFR1910.120 29CFR 1926.65	To be determined (TBD)	TBD	None	As directed by the NERR Manager, prepares staff to participate as workers on oil and hazardous materials emergency response or clean-up operations who are on-site occasionally (e.g., ground-water monitoring, land surveying, etc.) and are not expected to exceed permissible exposure levels, or where exposure levels are below the permissible exposure limits.	Determined in consultation with Incident Command at the time of a large oil/hazardous materials spill. NERR Manager will direct which employees need this training based on Reserve needs, available resources, and MDMR input.

Course	Date/Time	Location	Pre-requisite	This course allows people to	Who takes this
HAZWOPER – 8 hr Refresher 29CFR1910. 120 29CFR 1926.65	TBD	TBD	None (but relevant only to HAZWOPER 40- or 24-hour trained staff)	Required annual refresher for those with HAZWOPER training who are involved in emergency response or clean-up operations for oil and hazardous materials spills.	All ANERR staff with initial 24-hr or 40-hr HAZWOPER training who may respond to oil/hazardous materials spills.
First Aid	Annually	Reserve (with MDMR providing training)	None	Provide emergency medical assistance to staff and visitors, while awaiting external medical response personnel (ambulance, EMT)	Required by MDMR for all NERR staff every two years. MDMR provides the training
CPR/AED	Annually	Reserve (with MDMR providing training)	None	Provide emergency medical assistance to staff and visitors, while awaiting external medical response personnel (ambulance, EMT)	Required by MDMR for all NERR staff every two years. MDMR provides the training
Red Cross Ready	Self-Guided	American Red Cross, <a href="http://www.redcross.org/take-a-class">http://www.redcross.org/take-a-class</a>	None	Improve family and individual preparedness for disasters.	Optional –similar introductory hazard awareness courses available on line at no cost (e.g., FEMA, State, local)
Wilderness First Aid	At Reserve, based on offerings and funding availability	Implemented by Outward Bound at the Reserve in the past	Current Adult CPR/AED Certification	Provides preparedness to provide immediate First Aid in the field when professional medical assistance may be far away. May be available through Alabama Outward Bound School which trained various NERR's personnel (251-990-0323) or based on past offering at GBNERR.	As directed by NERR Manager; previously provided to field personnel. Future offerings will be implemented based on need and resource availability.

Course	Date/Time	Location	Pre-requisite	This course allows people to	Who takes this
Wildland Fire Safety Training – Annual Refresher (RT-130)	Implemented at NERR with MSCNWR	National Interagency Fire Center (NIFC), <a href="http://www.nifc.gov/wfstar/index.html">http://www.nifc.gov/wfstar/index.html</a>	Previous Wildland Firefighting Certification	Support immediate response needs for Wildfire at the NERR.	Annually for all Wildland Fire certified staff; current certified staff include the Emergency Planner, who participates annual in this 8-hour recertification
Work Capacity Test (“Pack Test”) (Arduous Level, 45 pound pack, 3 miles, in 45 minutes)	Implemented at NERR with NSCWR	<a href="http://www.fs.fed.us/fire/safety/wct/wct_index.html">http://www.fs.fed.us/fire/safety/wct/wct_index.html</a>	Medically fit to take test. AED should be located in area hosting test.	Safely support wildfire response without endangering responder’s own health.	Annually, for all Wildland Fire certified staff; current certified staff include the Emergency Planner, who participates annual in this 8-hour recertification
Mississippi Boating Safety Course and Exam	On line	Free offering listed at: <a href="http://www.boat-us.org/onlinecourse/Mississippi.asp">http://www.boat-us.org/onlinecourse/Mississippi.asp</a>	None	Operate boats owned or maintained at the NERR	New employees at the NERR that will operate boats.
<b>ICS Training for Long Term Consideration</b> (for Higher Complexity Incidents and for those that May Provide Supervisory Role within a Larger Incident Command) ((See Figure 3 and course descriptions in FEMA NIMS Training Program Manual: <a href="https://www.fema.gov/pdf/emergency/nims/nims_training_program.pdf">https://www.fema.gov/pdf/emergency/nims/nims_training_program.pdf</a> )					
IS 200 (ICS for Single Resources and Initial Action Incidents)	Self-guided (estimated 3 hours to complete)	<a href="http://training.fema.gov/IS/NIMS.aspx">http://training.fema.gov/IS/NIMS.aspx</a>	None	Participate as member of Incident Command Post (ICP) at the NERR Headquarters building or another location (as appropriate and needed to support area response efforts). Preparation for low complexity incidents (see Figure 6 in DRP); recommended to support Type 4 incidents.	As directed by NERR Manager based on annual reviews of response needs and resource availability.

Course	Date/Time	Location	Pre-requisite	This course allows people to	Who takes this
IS 800 (National Response Framework (NRF), an Introduction)	Self-guided (estimated 3 hours to complete)	<a href="http://training.fema.gov/IS/NIMS.aspx">http://training.fema.gov/IS/NIMS.aspx</a>	None	Participate as member of Incident Command Post (ICP) at the NERR Headquarters building or another location (as appropriate and needed to support area response efforts). Preparation for low complexity incidents (see Figure 6 in DRP); recommended to support Type 1, 2, and 3 incidents.	As directed by NERR Manager based on annual reviews of response needs and resource availability.
IS 300 (Intermediate ICS) and 400 (Advanced ICS)	Classroom training	Various off site offerings	ICS 100 and 200	Gain more knowledge and qualifications to support higher complexity incidents and serve with increasing supervisory role in response organizations. Provides training for personnel who require advanced knowledge and will support Type 1, 2, and 3 incidents. These courses build on ICS 200 and 300.	As directed by NERR Manager based on annual reviews of response needs and resource availability.



## Appendix J - Emergency Exercise Plan

The following exercises are planned for annual implementation, based on NERR resource availability, current priorities, and partner interest and schedules. Periodically, the NERR may also participate in other exercises and if resources allow.

Hazard /Exercise Type	Objectives
Hurricane	<ol style="list-style-type: none"> <li>1. Validate disaster response plan (DRP) and hurricane procedures (Appendices D and L).</li> <li>2. Test equipment, communication, and identified responsibilities.</li> <li>3. Raise awareness and skills through practice.</li> <li>4. Identify any needed training, mitigation, or revisions to procedures.</li> </ol> <p><i>Note: If hurricane plan is implemented in a given year, this will count as the "drill." Otherwise, the drill will be implemented at the end of hurricane season. A review of the procedures will be implemented at a staff meeting at the start of each hurricane season.</i></p>
Drill	
Structure Fire	<ol style="list-style-type: none"> <li>1. Validate procedures and maps (see Appendices D and L).</li> <li>2. Test equipment, communication, and identified responsibilities.</li> <li>3. Raise awareness and skills through practice.</li> <li>4. Identify any needed training, mitigation, or revisions to procedures.</li> </ol>
Drill	
Wildfire	<ol style="list-style-type: none"> <li>1. Meet annual 8-hour refresher training requirement for wildland fire certified personnel.</li> <li>2. Practice donning equipment, implementing procedures, and cooperating with Mississippi Sandhill Crane National Wildlife Refuge (FWS) personnel.</li> <li>3. Test communications and refresh skills.</li> <li>4. Identify any needed training, mitigation, or revisions to procedures.</li> </ol> <p><i>Note: Wildfire training and certification for NERR personnel is implemented through training with the FWS.</i></p>
Drill/ Exercise	
Oil Spill *	<ol style="list-style-type: none"> <li>1. Share information on NERR procedures and gain understanding of Chevron facility procedures.</li> <li>2. Raise awareness, test NERR oil spill procedure and communication protocols, and observe Chevron procedures.</li> <li>3. Observe boom deployments of neighboring facility and compare to Area Contingency Plan procedures and strategies.</li> <li>4. Share input and ideas to improve preparedness.</li> </ol> <p><i>Note: The Reserve is an invited observer/participant to an annual Chevron exercise. Generally, this is implemented annually. It provides a good opportunity to share natural resource priorities and goals with Chevron and learn more about booming approaches and capabilities available through Chevron. *Other exercises with partner agencies focusing on other hazards and locations may be implemented based on MDMR and NERR priorities, exercise opportunities available through other agencies, and other factors.</i></p>
Exercise	



## Appendix K - Forms and Tools

This appendix includes the following forms and tools:

1. NERR Situation Report
2. NERR After Action Report
3. NERR Quick Reference Tool
4. List of ICS Forms available from FEMA
5. ICS-201 Form: Incident Report

## NERR Situation Report

*Insert the Date of Incident (Start-Current)*

Date/Time of Report		Duty Officer (Name, Phone, Email)	
<p><b>Describe the Situation and its Current Status</b>  <i>Describe the emergency/disaster conditions, area impacted, and threatened areas. Describe potential incident health and safety hazards.</i></p>			
<p><b>Current and Planned Actions of Response Team</b>  <i>Describe the agencies notified, actions taken at the NERR, NERR responsibilities, and next steps, if any.</i></p>			
<p><b>Response Resources Summary and Organization</b>  <i>Describe NERR resources assigned to the response and NERR role within Incident Command.</i></p>			
/s/	Duty Officer Signature		
Report Distribution: (list the email or fax numbers and contacts provided the report)			

## NERR After Action Report (AAR)<sup>2</sup>

<b>Event/Hazard:</b>		<b>Duration</b>	
<b>Location:</b>		<b>Prepared by:</b>	
<b>Description</b>			
<i>Describe the emergency/disaster, notification procedures, parties involved, lead agency, and areas impacted.</i>			
<b>Applicable FEMA Core Capabilities:</b> <input type="checkbox"/> Planning <input type="checkbox"/> Operational Coordination (Incident Mgt, EOC Support) <input type="checkbox"/> Environmental Response/Health and Safety (Oil/HAZMAT/HAB) <input type="checkbox"/> Public Health & Medical (Emergency Lifesaving) <input type="checkbox"/> Public & Private Services (Firefighting) <input type="checkbox"/> Natural and Cultural Resources <input type="checkbox"/> Other _____			
<b>Lessons Learned</b>			
<i>List things that went well and gaps or problems with the response. Categories can include: plans &amp; procedures, equipment, communication, training requirements, protection strategies, access to data, documentation, restoration activities, and cost recovery.</i>			
<b>Strengths:</b>			
<b>Gaps:</b>			
<b>Improvement Plan</b>			
<i>List actions required and planned to improve preparedness for future events (e.g., revisions to DRP procedures, exercises on particular topics, equipment/supply purchase, protocol development)</i>			
/s/	NERR Manager Signature		
Report Distribution: <i>(list the email or fax numbers and contacts provided the report)</i>			

<sup>2</sup> Condensed from FEMA Homeland Security Exercise and Evaluation Program (HSEEP) After Action Report

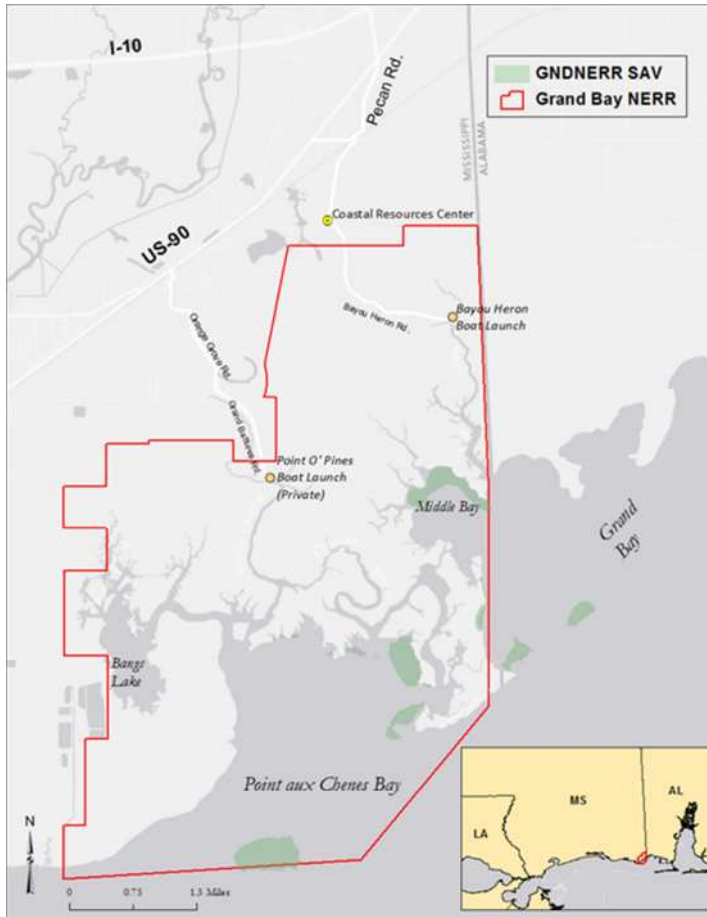
## Grand Bay NERR Quick Reference Tool

Use this as a quick reference that can be marked on and handed to a responder, who is likely to be unaware of natural resource considerations at the NERR. Like any “visitor,” responders need a quick visual aid to alert them to danger, to show them areas and species to protect, and to illustrate invasive species to avoid relocating.

**Front:** Locational map, notes, and emergency contacts.

**Back:** Emergency precautions for the NERR and Responders – things to avoid.

**Mark on this map to communicate locations of hazards and highly sensitive natural resources.**



**Notes:**

**For additional information, consult the following at 228-475-7047:**

NERR Manager: David Ruple (Emergency Manager)

NERR Stewardship Coordinator: Will Underwood (Emergency Coordinator)

NERR Management Plan and GIS Maps – information on NERR habitat and species.

Sector Mobile Geographic Response Plans – pre-planned protection strategies for oil spills.

Environmental Sensitivity Index (ESI) Maps – priorities for species and habitat to be protected.

***Add/delete new precautions as necessary for an incident. May also be laminated for reuse.***

**PROTECT IF AT ALL POSSIBLE – TAKE PRECAUTIONS TO AVOID INJURY**

**HIGHLY SENSITIVE NATURAL RESOURCES – HABITATS AND SPECIES**



**Saltmarsh** – Sensitive habitat; minimize walking, no airboats or marsh buggies allowed.



**Shell Midden** – Do not disturb bird nests and archaeological sites or other culturally significant sites.



**Submersed Aquatic Vegetation** – Sensitive habitat, do not anchor or step here.



**Sandy Beaches** – Do not disturb terrapin and bird nests while walking on beach and do not stage equipment or move it through these areas.

**DANGER – BE OBSERVANT AND ACT QUICKLY**

**INVASIVE SPECIES – DO NOT TRANSPORT**



**Wildfire** - In the event of a wildfire call 911 and evacuate the area.



**Invasive Species** – These include: Chinese Tallow Trees, Camphor Trees, Cogon Grass and Torpedo Grass. Machinery must be washed before and after leaving the site to minimize seed dispersal.

## List of ICS Forms

The following ICS Forms are available on the FEMA website at <http://training.fema.gov/EMIWeb/IS/ICSResource/icsforms.htm>

Notes:

- In the following table, the ICS Forms with an asterisk (\*) are typically included in an IAP.
- Forms identified with two asterisks (\*\*) are additional forms that could be used in an IAP.
- The other ICS Forms are used in the ICS process for incident management activities, but are not typically included in an IAP.
- The date and time entered in the form blocks should be determined by the Incident Command or Unified Command. Local time is typically used.

ICS Form #:	Form Title:	Typically Prepared by:
<a href="#">Form 201 (Word Fillable)</a>	<b>Incident Briefing</b>	Initial Incident Commander
* <a href="#">Form 202 (Word Fillable)</a>	<b>Incident Objectives</b>	Planning Section Chief
* <a href="#">Form 203 (Word Fillable)</a>	<b>Organization Assignment List</b>	Resources Unit Leader
* <a href="#">Form 204 (Word Fillable)</a>	<b>Assignment List</b>	Resources Unit Leader and Operations Section Chief
* <a href="#">Form 205 (Word Fillable)</a>	<b>Incident Radio Communications Plan</b>	Communications Unit Leader
** <a href="#">Form 205A (Word Fillable)</a>	<b>Communications List</b>	Communications Unit Leader
* <a href="#">Form 206 (Word Fillable)</a>	<b>Medical Plan</b>	Medical Unit Leader
<a href="#">Form 207 (Word Fillable)</a>	<b>Incident Organization Chart</b> <i>(wall-mount size, optional 8.5" x 14")</i>	Resources Unit Leader
** <a href="#">Form 208 (Word Fillable)</a>	<b>Safety Message/Plan</b>	Safety Officer
<a href="#">Form 209 (Word Fillable)</a>	<b>Incident Status Summary</b>	Situation Unit Leader
<a href="#">Form 210 (Word Fillable)</a>	<b>Resource Status Change</b>	Communications Unit Leader
<a href="#">Form 211 (Word Fillable)</a>	<b>Incident Check-In List</b> <i>(optional 8.5"x14" and 11"x17")</i>	Resources Unit Leader/Check-In Recorder
<a href="#">Form 213 (Word Fillable)</a>	<b>General Message</b> <i>(3-part form)</i>	Any Message Originator
<a href="#">Form 214 (Word Fillable)</a>	<b>Activity Log</b> <i>(optional 2-sided form)</i>	All Sections and Units
<a href="#">Form 215 (Word Fillable)</a>	<b>Operational Planning Worksheet</b> <i>(optional 8.5"x14" and 11"x17")</i>	Operations Section Chief
<a href="#">Form 215A (Word Fillable)</a>	<b>Incident Action Plan Safety Analysis</b>	Safety Officer
<a href="#">Form 218 (Word Fillable)</a>	<b>Support Vehicle/Equipment Inventory</b> <i>(optional 8.5"x14" and 11"x17")</i>	Ground Support Unit
<a href="#">Form 219s (Word Fillable)</a>	<b>Resource Status Card (T-Card)</b> <i>(may be printed on card stock)</i>	Resources Unit
<a href="#">Form 220 (Word Fillable)</a>	<b>Air Operations Summary Worksheet</b>	Operations Section Chief or Air Branch Director
<a href="#">Form 221 (Word Fillable)</a>	<b>Demobilization/Check-Out</b>	Demobilization Unit Leader
<a href="#">Form 225 (Word Fillable)</a>	<b>Incident Personnel Performance Rating</b>	Supervisor at the Incident

### Incident Briefing (ICS 201)

<b>1. Incident Name:</b>	<b>2. Incident Number:</b>	<b>3. Date/Time Initiated:</b> Date: _____ Time: HHMM
<p><b>4. Map/Sketch</b> (include sketch, showing the total area of operations, the incident site/area, impacted and threatened areas, overflight results, trajectories, impacted shorelines, or other graphics depicting situational status and resource assignment):</p> <div style="background-color: #e0f0ff; height: 400px; width: 100%; margin-top: 10px;"></div>		
<p><b>5. Situation Summary and Health and Safety Briefing</b> (for briefings or transfer of command): Recognize potential incident Health and Safety Hazards and develop necessary measures (remove hazard, provide personal protective equipment, warn people of the hazard) to protect responders from those hazards.</p>		
<b>6. Prepared by:</b>	Name: _____	Position/Title: _____
		Signature: _____
<b>ICS 201, Page 1</b>		Date/Time: _____





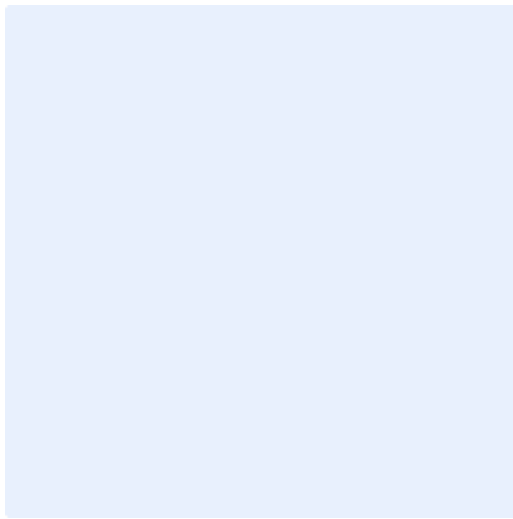
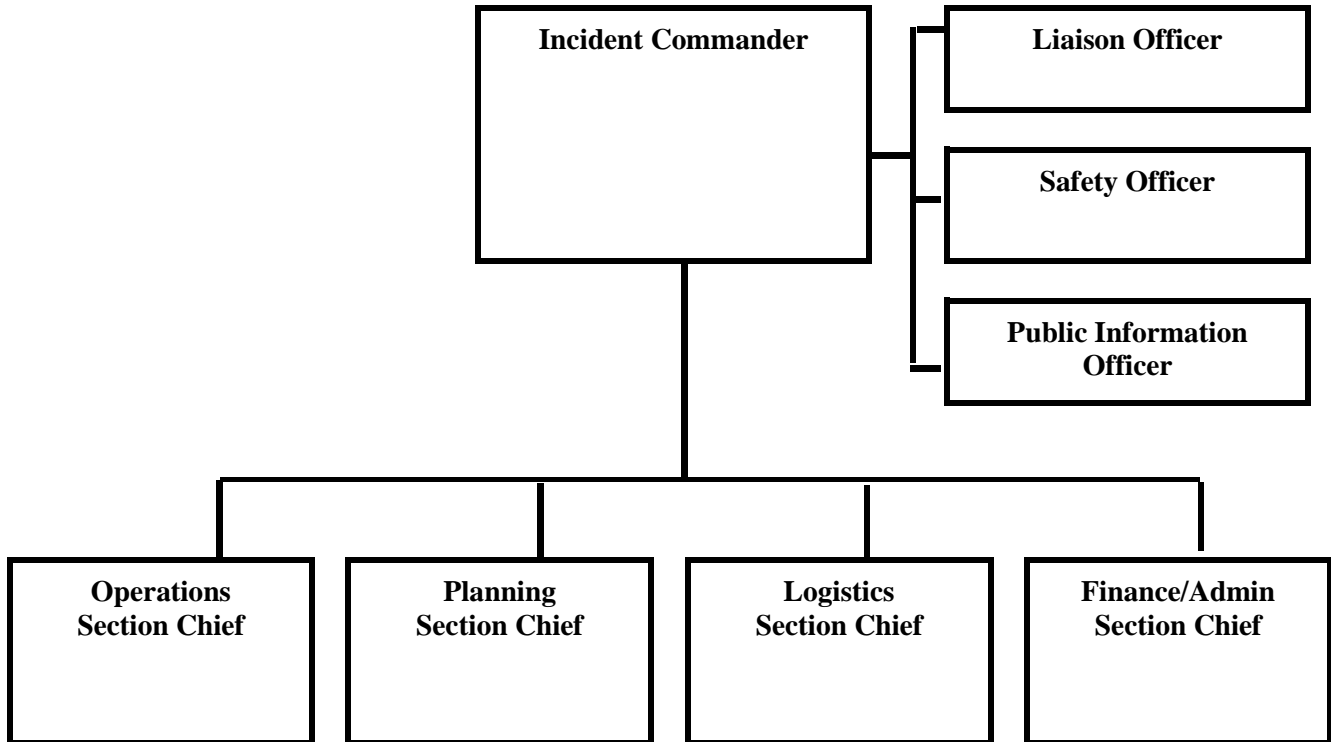
### Incident Briefing (ICS 201)

<b>1. Incident Name:</b>		<b>2. Incident Number:</b>		<b>3. Date/Time Initiated:</b> Date: Date Time: HHMM			
<b>7. Current and Planned Objectives:</b>							
<b>8. Current and Planned Actions, Strategies, and Tactics:</b>							
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<b>6. Prepared by:</b>		Name:		Position/Title:		Signature: _____	
<b>ICS 201, Page 2</b>			Date/Time: Date				

### Incident Briefing (ICS 201)

<b>1. Incident Name:</b>	<b>2. Incident Number:</b>	<b>3. Date/Time Initiated:</b> Date: _____ Time: HHMM
--------------------------	----------------------------	--

**9. Current Organization** (fill in additional organization as appropriate):



<b>6. Prepared by:</b> Name: _____	Position/Title: _____	Signature: _____
<b>ICS 201, Page 3</b>	Date/Time: Date _____	

### Incident Briefing (ICS 201)

<b>1. Incident Name:</b>	<b>2. Incident Number:</b>	<b>3. Date/Time Initiated:</b> Date: _____ Time: HHMM
--------------------------	----------------------------	--

<b>10. Resource Summary:</b>					
Resource	Resource Identifier	Date/Time Ordered	ETA	Arrived	Notes (location/assignment/status)
				<input type="checkbox"/>	
				<input type="checkbox"/>	
				<input type="checkbox"/>	
				<input type="checkbox"/>	
				<input type="checkbox"/>	
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				<input type="checkbox"/>	
				<input type="checkbox"/>	
				<input type="checkbox"/>	
				<input type="checkbox"/>	

<b>6. Prepared by:</b>	Name: _____	Position/Title: _____	Signature: _____
<b>ICS 201, Page 4</b>	Date/Time: Date _____		

## ICS 201 Incident Briefing

**Purpose.** The Incident Briefing (ICS 201) provides the Incident Commander (and the Command and General Staffs) with basic information regarding the incident situation and the resources allocated to the incident. In addition to a briefing document, the ICS 201 also serves as an initial action worksheet. It serves as a permanent record of the initial response to the incident.

**Preparation.** The briefing form is prepared by the Incident Commander for presentation to the incoming Incident Commander along with a more detailed oral briefing.

**Distribution.** Ideally, the ICS 201 is duplicated and distributed before the initial briefing of the Command and General Staffs or other responders as appropriate. The “Map/Sketch” and “Current and Planned Actions, Strategies, and Tactics” sections (pages 1–2) of the briefing form are given to the Situation Unit, while the “Current Organization” and “Resource Summary” sections (pages 3–4) are given to the Resources Unit.

### Notes:

- The ICS 201 can serve as part of the initial Incident Action Plan (IAP).
- If additional pages are needed for any form page, use a blank ICS 201 and repaginate as needed.

Block #	Block Title	Instructions
1	<b>Incident Name</b>	Enter the name assigned to the incident.
2	<b>Incident Number</b>	Enter the number assigned to the incident.
3	<b>Date/Time Initiated</b> <ul style="list-style-type: none"> <li>• Date, Time</li> </ul>	Enter date initiated (month/day/year) and time initiated (using the 24-hour clock).
4	<b>Map/Sketch</b> (include sketch, showing the total area of operations, the incident site/area, impacted and threatened areas, overflight results, trajectories, impacted shorelines, or other graphics depicting situational status and resource assignment)	Show perimeter and other graphics depicting situational status, resource assignments, incident facilities, and other special information on a map/sketch or with attached maps. Utilize commonly accepted ICS map symbology.  If specific geospatial reference points are needed about the incident’s location or area outside the ICS organization at the incident, that information should be submitted on the Incident Status Summary (ICS 209). North should be at the top of page unless noted otherwise.
5	<b>Situation Summary and Health and Safety Briefing</b> (for briefings or transfer of command): Recognize potential incident Health and Safety Hazards and develop necessary measures (remove hazard, provide personal protective equipment, warn people of the hazard) to protect responders from those hazards.	Self-explanatory.
6	<b>Prepared by</b> <ul style="list-style-type: none"> <li>• Name</li> <li>• Position/Title</li> <li>• Signature</li> <li>• Date/Time</li> </ul>	Enter the name, ICS position/title, and signature of the person preparing the form. Enter date (month/day/year) and time prepared (24-hour clock).

Block #	Block Title	Instructions
7	<b>Current and Planned Objectives</b>	Enter the objectives used on the incident and note any specific problem areas.
8	<b>Current and Planned Actions, Strategies, and Tactics</b> <ul style="list-style-type: none"> <li>• Time</li> <li>• Actions</li> </ul>	Enter the current and planned actions, strategies, and tactics and time they may or did occur to attain the objectives. If additional pages are needed, use a blank sheet or another ICS 201 (Page 2), and adjust page numbers accordingly.
9	<b>Current Organization</b> (fill in additional organization as appropriate) <ul style="list-style-type: none"> <li>• Incident Commander(s)</li> <li>• Liaison Officer</li> <li>• Safety Officer</li> <li>• Public Information Officer</li> <li>• Planning Section Chief</li> <li>• Operations Section Chief</li> <li>• Finance/Administration Section Chief</li> <li>• Logistics Section Chief</li> </ul>	<ul style="list-style-type: none"> <li>• Enter on the organization chart the names of the individuals assigned to each position.</li> <li>• Modify the chart as necessary, and add any lines/spaces needed for Command Staff Assistants, Agency Representatives, and the organization of each of the General Staff Sections.</li> <li>• If Unified Command is being used, split the Incident Commander box.</li> <li>• Indicate agency for each of the Incident Commanders listed if Unified Command is being used.</li> </ul>
10	<b>Resource Summary</b>	Enter the following information about the resources allocated to the incident. If additional pages are needed, use a blank sheet or another ICS 201 (Page 4), and adjust page numbers accordingly.
	• Resource	Enter the number and appropriate category, kind, or type of resource ordered.
	• Resource Identifier	Enter the relevant agency designator and/or resource designator (if any).
	• Date/Time Ordered	Enter the date (month/day/year) and time (24-hour clock) the resource was ordered.
	• ETA	Enter the estimated time of arrival (ETA) to the incident (use 24-hour clock).
	• Arrived	Enter an "X" or a checkmark upon arrival to the incident.
	• Notes (location/ assignment/status)	Enter notes such as the assigned location of the resource and/or the actual assignment and status.

## Appendix L - Maps and Other Information

This Appendix includes:

1. Grand Bay NERR Fire Evacuation Procedures and Maps (for Building Fire)
2. Mississippi DMR (MDMR) Hurricane Plan and Reserve Hurricane Procedure
3. USCG Area Contingency Plan Information for
  - a. A-1 (Multiple Pages)
  - b. A-2 (Multiple Pages)

## Fire Alarm Procedures

1. In the event of a fire or fire alarm, proceed to the nearest exit and depart the building without delay. Most areas have more than one possible exit. If fire or smoke blocks us of the closest exit, proceed quickly to the next nearest exit and depart the building.
2. Proceed down the stairs or ramp and get away from the building. Make your way to the northeast corner of the parking lot for a headcount as soon as you can.
3. If you see a fire but the fire alarm has not been activated, proceed to one of the **Red Fire Boxes**, pull the alarm and exit the building.



1

2

3

# Fire Evacuation Plan

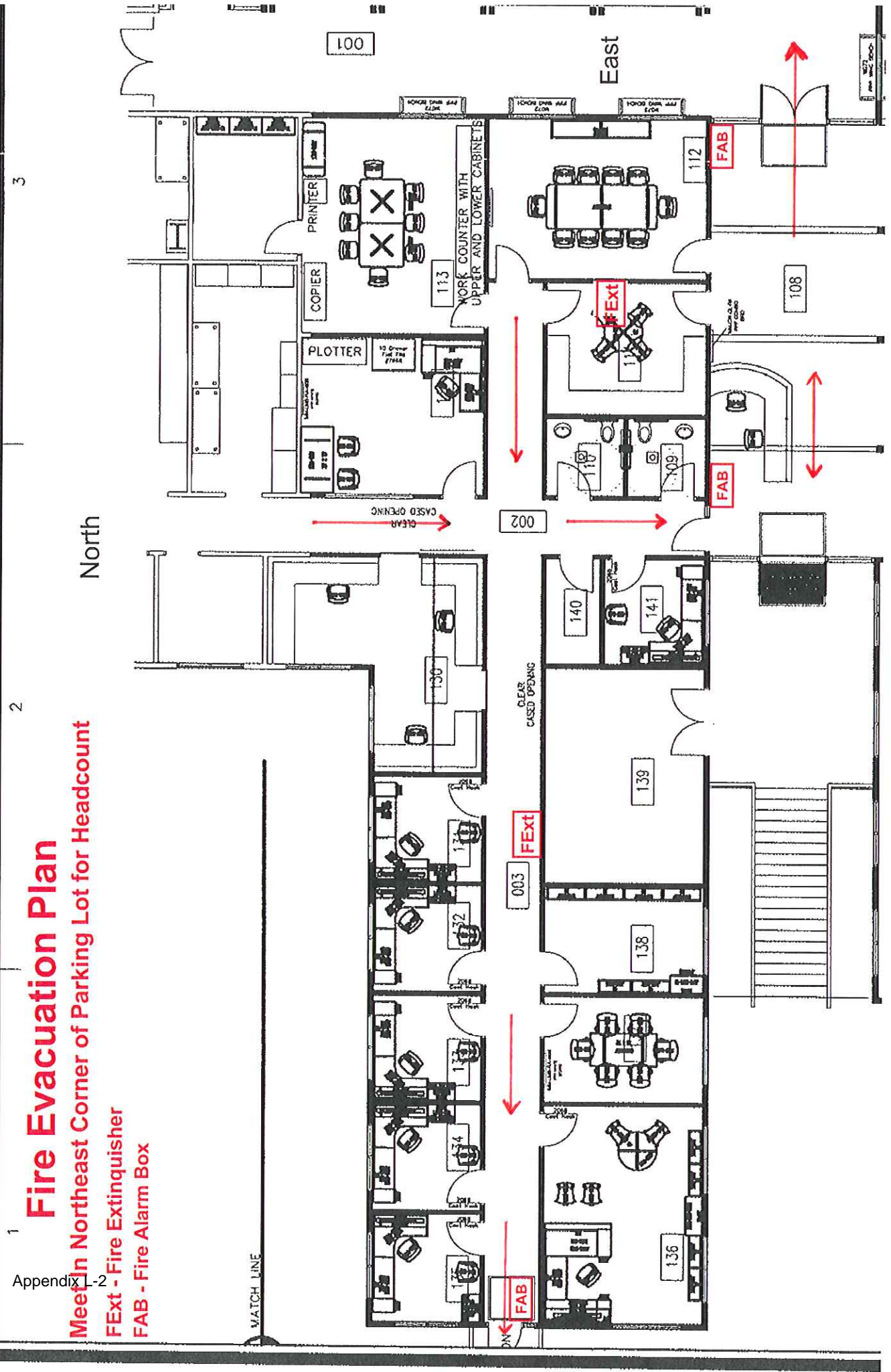
Meet in Northeast Corner of Parking Lot for Headcount

FExt - Fire Extinguisher

FAB - Fire Alarm Box

North

East

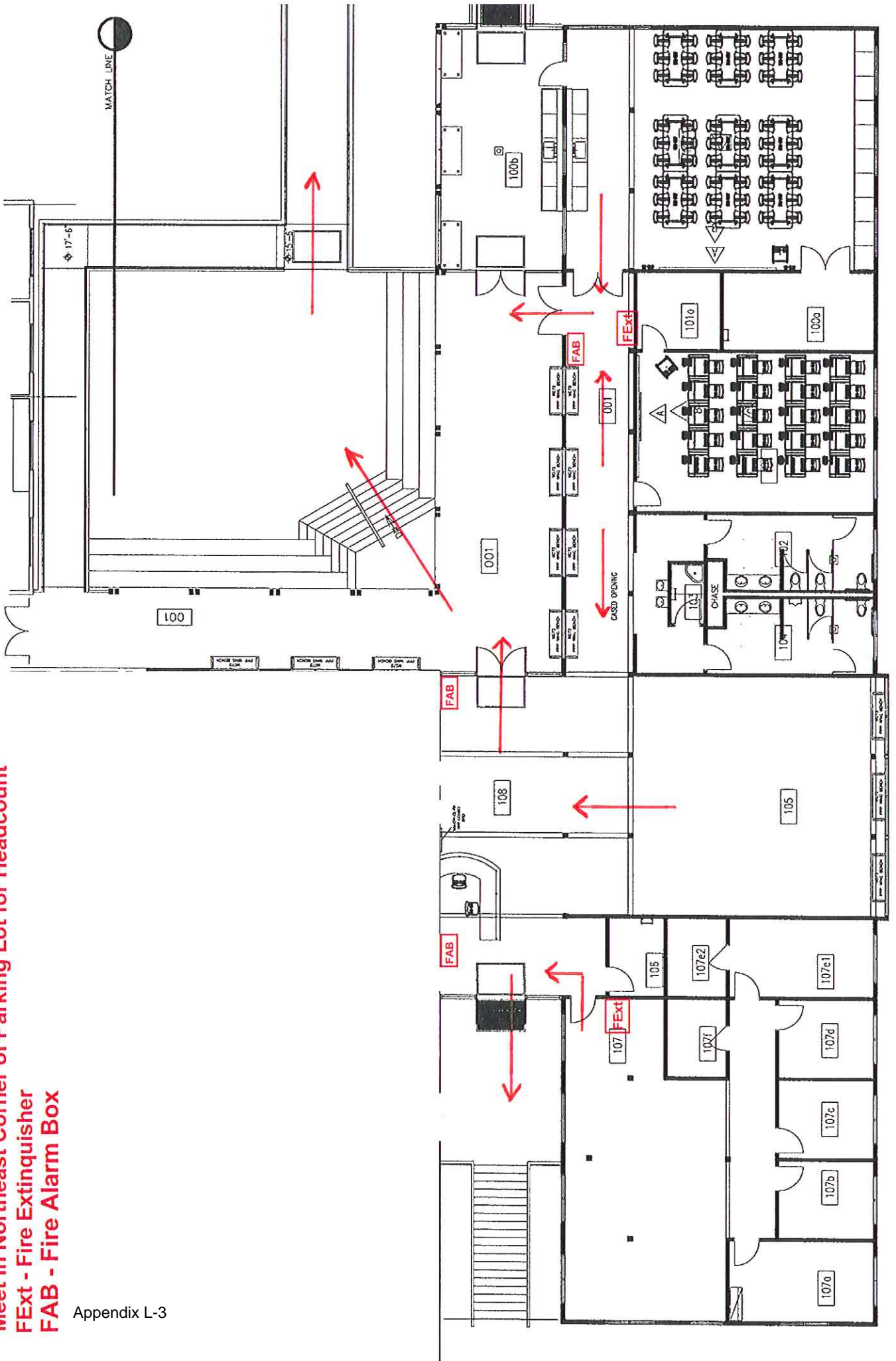


# Fire Escape Plan

Meet In Northeast Corner of Parking Lot for Headcount

FExt - Fire Extinguisher

FAB - Fire Alarm Box



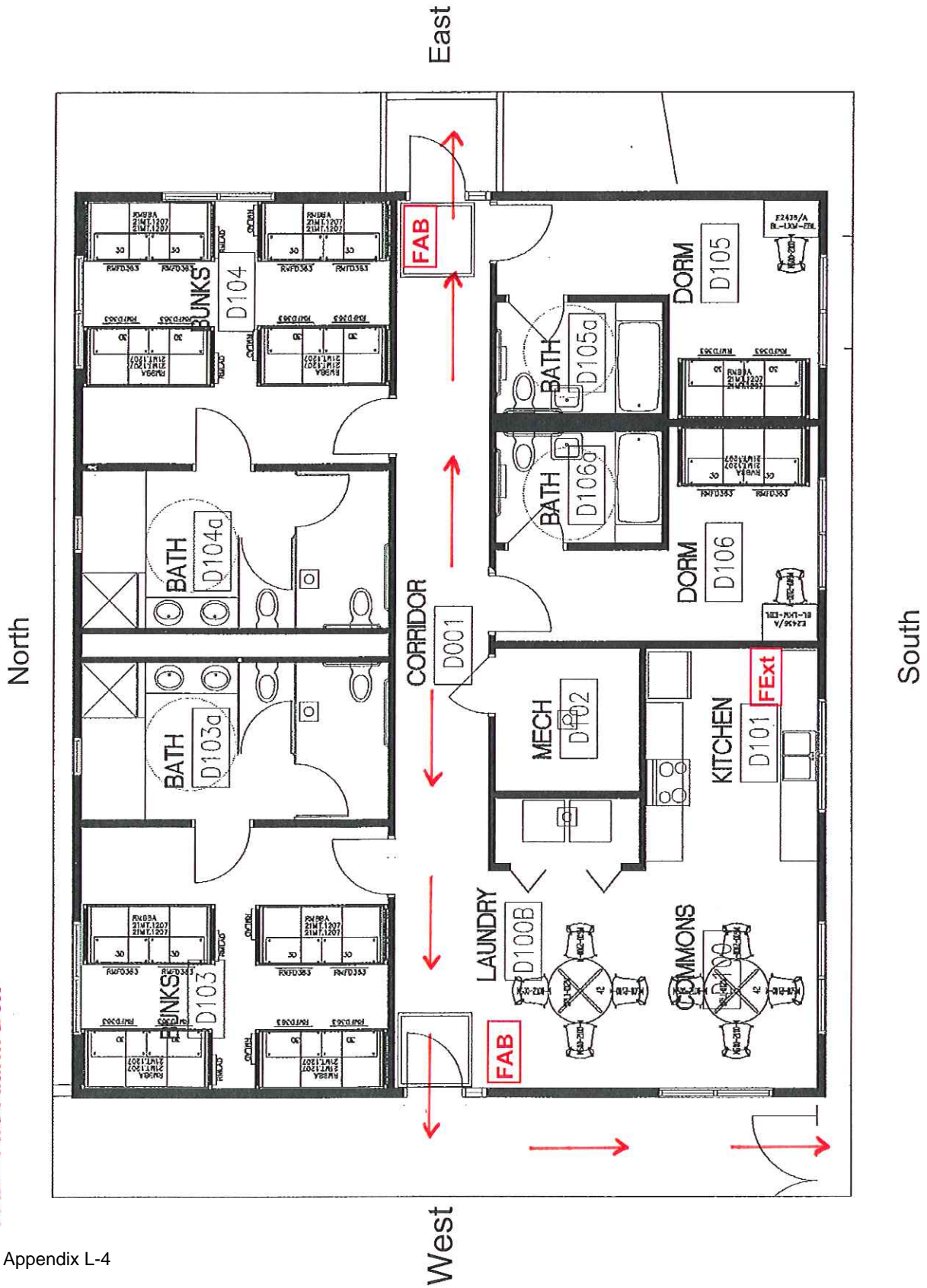


# Fire Evacuation Plan

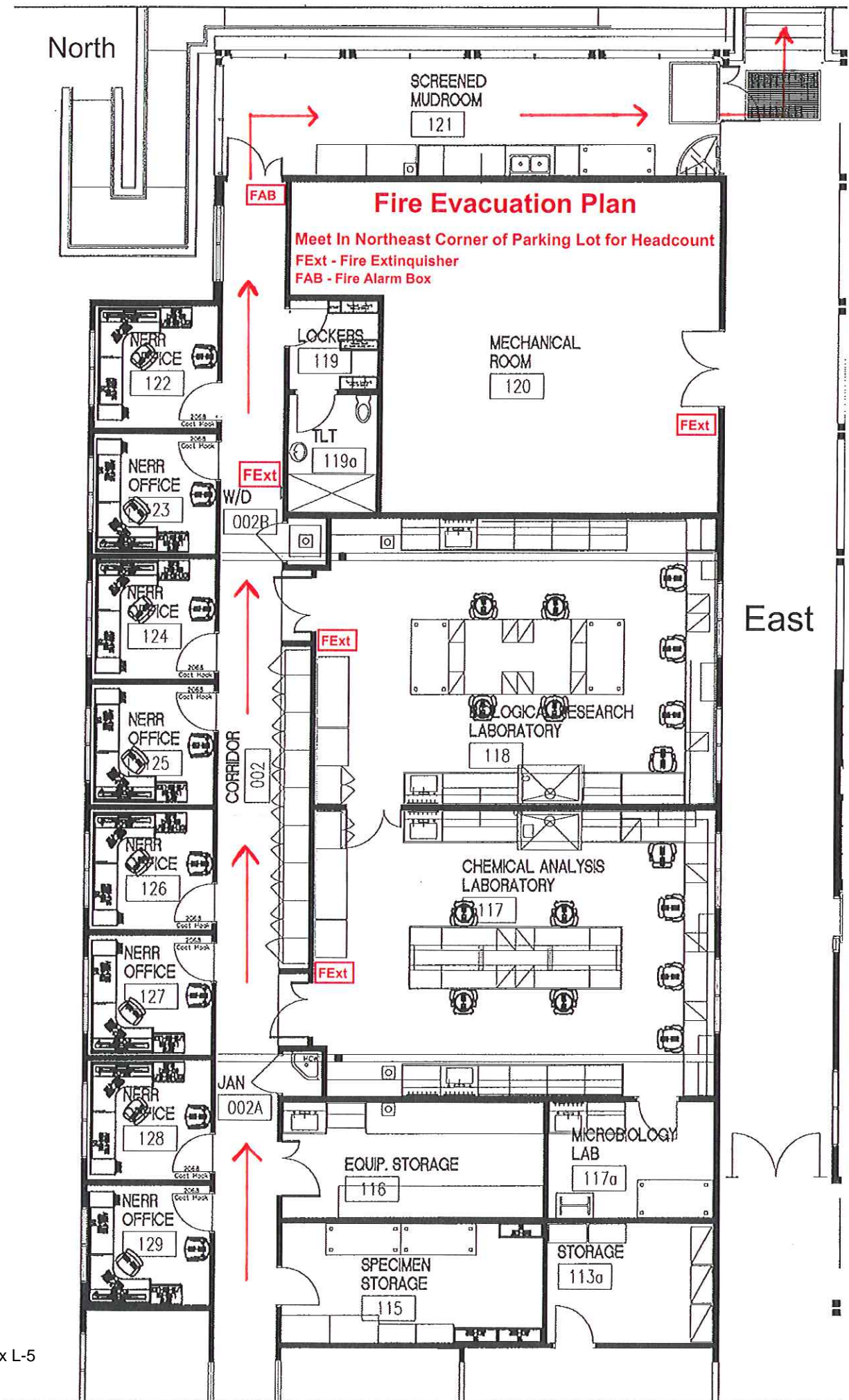
Meet In Northeast Corner of Parking Lot for Headcount

FEExt - Fire Extinguisher

FAB - Fire Alarm Box



North



East



**DEPARTMENT OF MARINE RESOURCES  
TROPICAL STORM AND HURRICANE  
CONTINGENCY PLAN**

**(Revision 2- April 2007)**

**Mississippi Department of Marine Resources  
1141 Bayview Avenue  
Biloxi, MS 39530  
228-374-5000**

# CONTINGENCY PLAN FOR IMPENDING TROPICAL STORMS AND HURRICANES

## DEFINITIONS

**Tropical Depression:** A tropical cyclone in which the maximum sustained surface wind is not greater than 38 mph.

**Tropical Storm:** A tropical cyclone in which the maximum sustained winds are greater than or equal to 39 mph but less than 74 mph.

**Category One Hurricane:** Has winds between 74 and 95 mph and a storm surge of 4-5 feet and results in damage to shrubbery, trees and unanchored mobile homes.

**Category Two Hurricane:** Has winds between 96 and 110 mph and a storm surge of 6-8 feet and results in considerable damage to trees, windows, roofs, etc.

**Category Three Hurricane:** Has winds between 111 and 130 mph and a storm surge of 9-12 feet and results in considerable damage to large trees, most signs, homes and mobile homes.

**Category Four Hurricane:** Has winds between 131- and 155 mph and a storm surge of 13-18 feet and results in complete failure of most roofs, the destruction of mobile homes and extensive window and door damage.

**Category Five Hurricane:** Has winds greater than 155 mph and a storm surge of 18 or more feet and results in complete failure of most roofs and the destruction of small homes and mobile homes.

**Hurricane/Tropical Storm Watch:** A Hurricane/ Tropical Storm may pose a threat to the coast within 36 hours.

**Hurricane/Tropical Storm Warning:** A Hurricane/Tropical Storm may pose a threat to the coast within 24 hours.

**Prep Team:** Consist of the Emergency Response Officer (ERO) and one representative from each office.

## I. PREPARATORY CONDITION 4

The Emergency Response Officer (ERO) will monitor the development of tropical systems that are located near or within the Gulf of Mexico and keep the Executive Director posted on their movements. Once a storm enters the Gulf, the DMR Emergency Prep Team shall meet and begin to make plans for relocation and proper securing of all DMR assets. A pre-designated post storm meeting site shall be agreed upon so that the recovery phase can be set into motion without delay. All DMR vehicles should be filled with fuel in preparation for the storm. Additionally, the 1000 gallon emergency fuel tank shall be checked to make sure that it is full. The 1000 gallon tank shall be filled and fuel stabilizing chemical shall be added at the beginning of hurricane season in June of each year. At the end of hurricane season in November the fuel in the tank shall be utilized in DMR boats and vehicles to prevent fuel spoilage due to prolonged storage.

## II. HURRICANE/TROPICAL STORM WATCH CONDITION THREE

### A. If a Watch is issued during working hours:

The ERO will monitor the progress of the storm. When necessary, the Executive Director, after coordination with the ERO, will order hurricane preparations to begin. Preparations should begin early enough so that they may be completed before a Warning is issued:

1. Each employee shall secure his or her office and assist in the securing of the shared work areas and the offices of the Prep Team, if the team is engaged in other storm preparations. All data on computer hard drives shall be backed up on discs and the discs shall be removed to a place of safe keeping separate from the pc drive units. Computers and electronic equipment shall be **COVERD WITH PLASTIC AND SECURED IN AN INTERNAL OFFICE. ADDITIONALLY, IF A CATEGORY 2 HURRICANE OR GREATER IS ANTICIPATED, THE COMPUTERS MUST BE MOVED TO INTERNAL OFFICES ON AN UPPER FLOOR OF OUR FACILITY;**
2. If deemed necessary by the Executive Director and the ERO, the Prep Team shall begin securing materials within the compound, filling ice chests with ice, etc. Other employees as needed may be recruited to help with this job;
3. Each Office shall be responsible for moving their vehicles to a pre-designated place of safety in an open field or other safe parking area. Boats shall be moved to a safe harbor of refuge and properly moored with adequate anchors and doubled up lines. Trailerable boats shall be moved



to a place of safe refuge. All utility trailers, 4-wheelers, outboard motors, etc. will be removed from the DMR compound. No DMR vehicle, utility trailer, outboard motor, or boat, shall be left on the Bolton Building property if a storm of hurricane strength is anticipated. Non-assigned cars shall be moved by employees designated by the Executive Director's Office;

4. Pertinent documents and records shall be placed in plastic bags and stored in the safe. Back-up copies should be made when possible and stored in a different location in case the building sustains major damages; and
5. If the oyster season is open, the check-in stations and reefs will be closed and evacuated at the time the Executive Director orders hurricane preparations to begin. Oyster season will remain closed until the threat of the tropical system passes and the Executive Director determines that the environmental and physical conditions of the reefs warrant their reopening. (acceptable fecal counts, minimal physical damage, etc.)

**B.** If a watch is issued after normal working hours or on a weekend:

1. The ERO shall advise the DMR Executive Director and all DMR Department Heads of the warning. Department Heads shall institute an emergency recall of personnel so that immediate action may be taken as necessary. The DMR Prep Team shall also be notified by the ERO so that emergency preparations can be set into motion.

### **III. HURRICANE/TROPICAL STORM WARNING CONDITION TWO**

**ALL PREPARATION SHOULD BE FINALIZED IMMEDIATELY**

Once Mississippi has been placed under a Storm Warning and the office has been secured, the Executive Director upon permission of the Governor and in accordance with the State Employee's Handbook, will place all employees on administrative leave until all danger has passed. The Executive Director, Deputy Director, Chief of Staff, ERO, and all Office Directors should take cell phones, State radios, complete set of building keys, and a State vehicle home in order to be able to communicate and travel easier after the storm. Any remaining radios shall be distributed among key staff personnel. Radios shall be monitored during the passage of the storm and as much as practicable, routine radio checks shall be made at the top of each hour.

#### **IV. POST-HURRICANE RECOVERY PROCEDURES**

As soon as possible after the storm, Office Directors shall attempt to contact their employees (and vice versa) in order to see if they need help.

- A.** If no major damage results from the storm in the local area:
  - 1. Employees will return to work during the next regular working shift after the storm warning have been lifted; and
  - 2. Upon returning to work, the entire staff will join in restoring the office to its pre-storm configuration (returning the vehicles to the compound, setting up the computers, etc.)
  
- B.** In the event that major damages have occurred in the local area:
  - 1. Employees shall attempt to contact their Office Director and/or the office as soon as possible.
  - 2. Employees should attempt to gather at a pre-designated meeting place as soon as possible after the storm. Those employees needing help should identify their immediate needs so that more fortunate employees can help out if possible. Those employees living closest to the office should try to visit the office as soon as possible after the passing of the storm to assess the damages.
  - 3. Employees who are able to return to work will:
    - a. First secure the premises and with permission of Office Directors, offer assistance to the other employees;
    - b. Enter the building only after getting the go-ahead by the Executive Director or his designee;
    - c. Upon order of the Executive Director, contribute to the overall recovery process of the local community by cooperating with the Office of Homeland Security, Federal Emergency Management Agency, Mississippi Emergency Management Agency and/or the Federal Food and Drug Administration . Oil spill response, seafood house inspections etc. are examples of recovery activities that should be prioritized;
    - d. Salvage whatever possible from the building if it is damaged;
    - e. If needed, employees will be given permission to work out of t their homes until temporary offices can be set up.

4. If looting is a problem, the Executive Director may request security assistance from the Department of Finance and Administration.
5. Once the emergency phase of the recovery process is complete, employees shall begin documenting damages to critical habitats (oyster and sea grass beds), coastal preserves and waterfront improvements within the coastal zone. This documentation process should be prioritized in order to assess the most crucial matters first.
6. All emergency preparation and response activities will be logged daily and turned in to the DMR Administrative office for possible FEMA/MEMA reimbursement. The preparation and response activities shall also be entered on the monthly time sheet and recorded as Disaster Relief 613 in order to facilitate the recovery of FEMA/MEMA disaster aid.

# USCG Sector Mobile Geographic Response Plan Map Series

Notes:  
Map Numbers Match ESI Map Numbers.  
MAP NOT INTENDED FOR NAVIGATION.



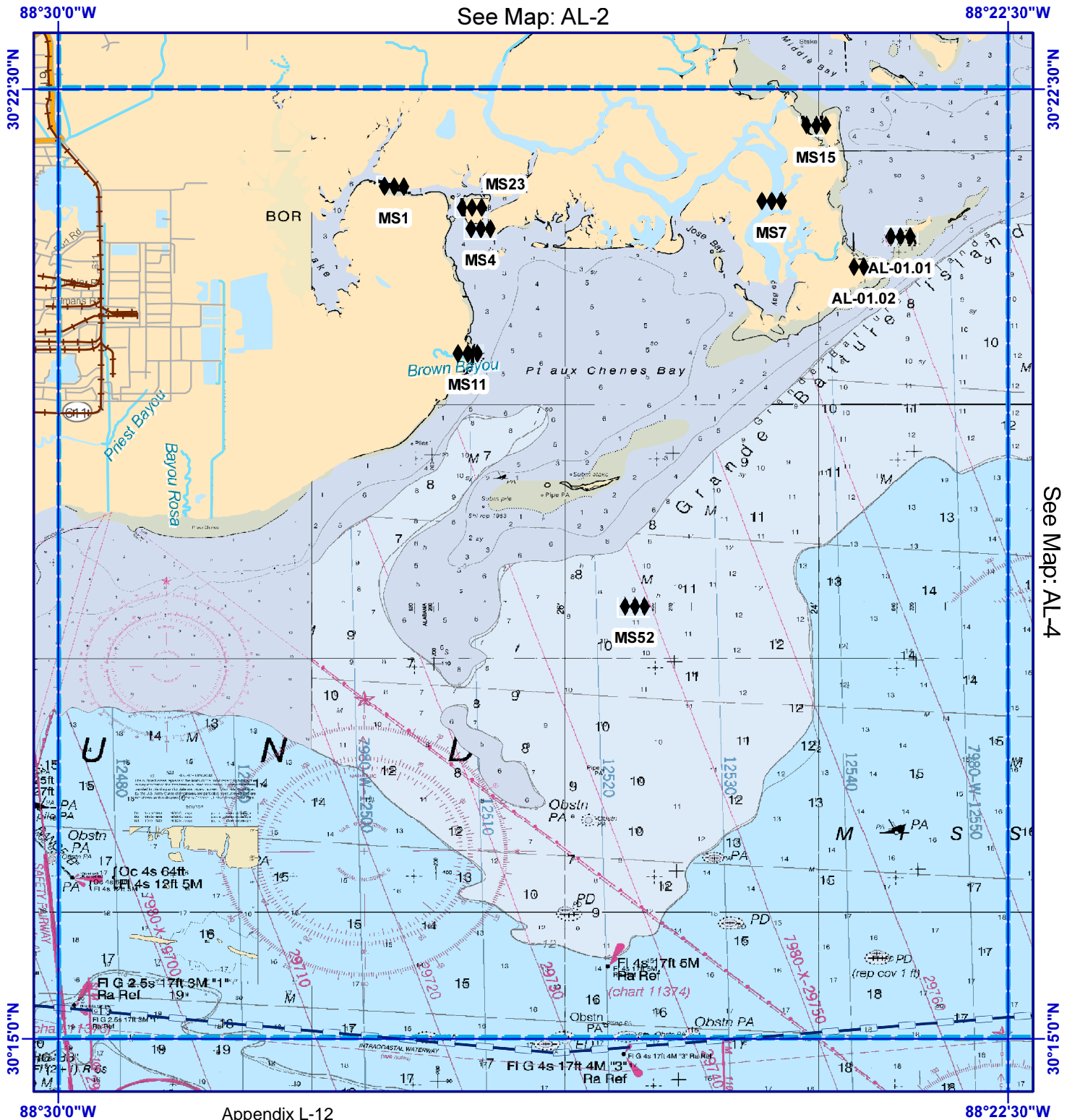
Map #: AL-1  
TOPO NAME: GRAND BAY SW, ALA. (1977)

Legend	
◆◆ Oil Spill Sensitive Areas	Ⓢ Staging Area
Ⓢ Staging Area; Boat Ramp; Marina	Ⓢ Boat Ramp
Ⓢ Staging Area; Boat Ramp	Ⓢ Marina
Ⓢ Boat Ramp; Marina	🏠 Regulated Facilities
🛤 Commercial Shipping Lanes	🚧 USCG-EPA MOU Line Draft - 2008
🚧 GRP Map Boundaries	📏 Sector Boundary

**Kilometers**  
0 0.450.9 1.8

**Miles**  
0 0.5 1 2

Map Produced July 2009 by FWC-FWR1



Name: Bangs Bayou

Site ID:

MS1

Protection Priority (Season): Spring:  Summer:  Fall:  Winter:

Site Description: Shallow water by Bangs Island

**GEOSPATIAL INFORMATION**

Latitude (DMS): 30° 21' 43.72" N

Longitude (DMS): 88° 27' 21.04" W

County:

Latitude (DD): 30.36214417

Longitude (DD): -88.45584499

SCAT Division: MS-1NE

ESI Map: AL-1

ESI Name: Grand Bay SW

NOAA Chart: Unknown

CHART Name: Unknown

USGS Quad: 30088-C4

QUAD Name: GRAND BAY SW, ALA. (1977)

Managed Area (if applicable): State of MISS (open water)

General Location:

**CONTACT INFORMATION**

Contacts: Christopher May Grand Bay Nerr-228-475-7047 Dale Diaz MS DMR-228-523-4064 Frank Wescovich-MS DMR; 228-523-4126/228-326-6153(cell)

**RESOURCES AT RISK INFORMATION**

Shoreline Type: Salt Marsh,

Habitat: Salt Marsh,Oyster Beds, Tidal Bayou,

Wildlife: Fish,Shell Fish, Wading birds, Raptors., ,

Threaten/Endangered Species: ,

Socio-Economic Resources:

**RESPONSE CONSIDERATIONS**

Staging Area: Bayou Casotte(Point of Pinds boat ramp on Bayou Cumbest and boat ramp on Bayou Heron for shallow draft(<1.5ft) boats)

Collection Points: South side of Singing river island

Area Access: From Bayou Casotte,Bayou Cumbest,Bayou Heron,pt.aux Chenes Bay-boat only

Spill Risk: Industries along Bayou Casotte- Chevron, First Chemical, MS Phosphates

Response Resources: ,

**PROTECTION STRATEGY INFORMATION**

Tidal Range (FT): 1.5

Average Current (KTS):

Ease of Protection: Unknown

Min. Boom Length (FT): 3000

Boom Type:

Booming Method: Deflection, Protection/Exclusion

Protection Strategy: Deploy 3000 of boom to protect sensitive areas related to Bangs Bayou



**Name:** Grand Batture Island

**Site ID:**

**AL-01.01**

**Protection Priority (Season):** Spring:  Summer:  Fall:  Winter:

**Site Description:** Shallow shoal just east of MS-AL state line. Intertidal salt marsh shoreline

**GEOSPATIAL INFORMATION**

**Latitude (DMS):** 30° 21' 19.94" N

**Longitude (DMS):** 88° 23' 20.99" W

**County:**

**Latitude (DD):** 30.35553993

**Longitude (DD):** -88.38916303

**SCAT Division:** MS-1NE

**ESI Map:** AL-1

**ESI Name:** Grand Bay SW

**NOAA Chart:** Unknown

**CHART Name:** Unknown

**USGS Quad:** 30088-C4

**QUAD Name:** GRAND BAY SW, ALA. (1977)

**Managed Area (if applicable):** Alabama

**General Location:**

**CONTACT INFORMATION**

**Contacts:** USFWS - Grand Bay NWR (228) 497-6322, USFWS Daphne (251) 441-5781;

**RESOURCES AT RISK INFORMATION**

**Shoreline Type:** Salt and Brackish Water Marsh,

**Habitat:** Salt and Brackish Water Marsh, Piping Plover designated critical habitat, breeding and feeding habitat for numerous juvenile species, Grand Butturre Island, Grand Bay NWR,

**Wildlife:** Throughout Area - Gulf Sturgeon (T), Bald Eagle (T), Manatees (E), Gopher Tortoise (T), Gulls & Terns, Pelagic birds. Waterfowl, Fish, Shrimp, Submerged aquatic vegetation, possible Gulf Sturgeon (T),

**Threaten/Endangered Species:** Throughout Area - Gulf Sturgeon (T), Bald Eagle (T), Manatees (E), Gopher Tortoise (T), Piping Plover,

**Socio-Economic Resources:** OSROs

**RESPONSE CONSIDERATIONS**

**Staging Area:** Bayou Casotte, Bayou LaBatre, \*Bayou Cumbest, point-o-pines located closer but need pitches \*, Jemison Ramp, Alabama Port, Fowl River Marina, 1-NW Middle Bay Port

**Collection Points:** Fowl River

**Area Access:** Boat only, Fowl River Marina, Alabama Port; Shallow area, access difficult in shoreline areas

**Spill Risk:** Shipping channels, offshore oil rigs, sites in Alabama.

**Response Resources:** Mobile CO EMA - (251) 460-8000,

**PROTECTION STRATEGY INFORMATION**

**Tidal Range (FT):** 1.5

**Average Current (KTS):**

**Ease of Protection:** Unknown

**Min. Boom Length (FT):** 10000

**Boom Type:**

**Booming Method:** Deflection, Protection/Exclusion

**Protection Strategy:** Exclusion booming around entire island due to tidal factors, possible diversion boom to south side of island depending on size of spill, current, or tidal range. Refer to Contractor Guidance GSTRP - Mobile Bay (OP - Area) 3 SW



**Name:** S. Rigolets Island

**Site ID:**

**AL-01.02**

**Protection Priority (Season):** Spring:  Summer:  Fall:  Winter:

**Site Description:** Intertidal salt marsh shoreline. Shallow water on approach to south Rigolets Island.

**GEOSPATIAL INFORMATION**

**Latitude (DMS):** 30° 21' 5.71" N

**Longitude (DMS):** 88° 23' 38.31" W

**County:**

**Latitude (DD):** 30.35158696

**Longitude (DD):** -88.39397491

**SCAT Division:** MS-1NE

**ESI Map:** AL-1

**ESI Name:** Grand Bay SW

**NOAA Chart:** Unknown

**CHART Name:** Unknown

**USGS Quad:** 30088-C4

**QUAD Name:** GRAND BAY SW, ALA. (1977)

**Managed Area (if applicable):** Private

**General Location:**

**CONTACT INFORMATION**

**Contacts:** USFWS Grand Bay National Wildlife Refuge - Durwin Carter - (228) 497-6322/ USFWS Daphne FO - (251) 441-5181/ National Response Center: 1-800-424-8802;

**RESOURCES AT RISK INFORMATION**

**Shoreline Type:** Salt & Brackish Water Marsh, Sheltered Tidal Flats, Sand Beaches,

**Habitat:** Sheltered Tidal Flats, Salt/Brackish Marsh, South Rigolet Island,

**Wildlife:** Small Mammals, Shorebirds, Wading Birds, Turtles, Diamondback Terrapin, Fish, Crab, Shrimp, possible Gulf Sturgeon (T),

**Threaten/Endangered Species:** Piping Plover designated critical habitat, Snowy Plover, Throughout Area - Gulf Sturgeon (T), Bald Eagle (T), Manatees (E), Gopher Tortoise (T),

**Socio-Economic Resources:** OSROs

**RESPONSE CONSIDERATIONS**

**Staging Area:** Bayou Casotte, Bayou LaBatre, \*Bayou Cumbest, point-o-pines located closer but need pitches \*, Jemison Ramp, Alabama Port, Fowl River Marina, 1-NW Middle Bay Port

**Collection Points:** Fowl River

**Area Access:** From Bayou Casotte, Bayou Cumbest, Bayou Heron, through MS sound-Boat only, Fowl River Marina, Alabama Port; Shallow area, access difficult in shoreline S

**Spill Risk:** Industries along Bayou Casotte, including shipping channels. Pascagoula Industry, Pipeline, Vessel

**Response Resources:** Mobile Co. EMA (251) 460-8000,

**PROTECTION STRATEGY INFORMATION**

**Tidal Range (FT):** 2

**Average Current (KTS):**

**Ease of Protection:** Unknown

**Min. Boom Length (FT):** 10000

**Boom Type:**

**Booming Method:** Deflection, Protection/Exclusion

**Protection Strategy:** Deploy 10000' of boom to protect sensitive areas that are associated with Rigolets Bayou. Exclusion boom to protect shoreline, diversion boom to natural collection areas.





**Name:** Bangs Island

**Site ID:**

**MS23**

**Protection Priority (Season):** Spring:  Summer:  Fall:  Winter:

**Site Description:** Old Indian Midden. Deepest Water is from pt.aux Chenes Bay. (e 1.5 ft) Boats)

**GEOSPATIAL INFORMATION**

**Latitude (DMS):** 30° 21' 33.72" N

**Longitude (DMS):** 88° 26' 44.04" W

**County:**

**Latitude (DD):** 30.35936649

**Longitude (DD):** -88.44556678

**SCAT Division:** MS-1NE

**ESI Map:** AL-1

**ESI Name:** Grand Bay SW

**NOAA Chart:** Unknown

**CHART Name:** Unknown

**USGS Quad:** 30088-C4

**QUAD Name:** GRAND BAY SW, ALA. (1977)

**Managed Area (if applicable):** Private

**General Location:**

**CONTACT INFORMATION**

**Contacts:** See Contacts for MS1(Bangs Bayou);

**RESOURCES AT RISK INFORMATION**

**Shoreline Type:** Shell Beaches, Salt Marsh,

**Habitat:** Salt Marsh, Shellfish Beds- Archeological site,

**Wildlife:** Shore Birds,Raptors,Gulls& Terns, Wading birds, possible Gulf Sturgeon (T),

**Threaten/Endangered Species:** ,

**Socio-Economic Resources:**

**RESPONSE CONSIDERATIONS**

**Staging Area:** See Entry for MS1(Bangs Bayou)

**Collection Points:** Needs Review

**Area Access:** Boat Only-From Bayou Casotte(or Bayou Cumbest and Bayou Heron for Shallow draft

**Spill Risk:** Industries along Bayou Casotte, including shipping channels.

**Response Resources:** ,

**PROTECTION STRATEGY INFORMATION**

**Tidal Range (FT):** 1.5

**Average Current (KTS):**

**Ease of Protection:** Unknown

**Min. Boom Length (FT):** 7000

**Boom Type:**

**Booming Method:** Deflection, Protection/Exclusion

**Protection Strategy:** Deploy 7000' of Boom to protect sensitive areas associated with Bangs Bayou



**Name:** Bayou Cumbest

**Site ID:**

**MS4**

**Protection Priority (Season):** Spring:  Summer:  Fall:  Winter:

**Site Description:** Shallow water<3 ft at mouth of Bayou and near Point O' Pines Boat Ramp

**GEOSPATIAL INFORMATION**

**Latitude (DMS):** 30° 21' 23.72" N

**Longitude (DMS):** 88° 26' 40.04" W

**County:**

**Latitude (DD):** 30.35658880

**Longitude (DD):** -88.44445549

**SCAT Division:** MS-1NE

**ESI Map:** AL-1

**ESI Name:** Grand Bay SW

**NOAA Chart:** Unknown

**CHART Name:** Unknown

**USGS Quad:** 30088-C4

**QUAD Name:** GRAND BAY SW, ALA. (1977)

**Managed Area (if applicable):** State of Miss.(open water), Private adjacent Marsh, USFWS

**General Location:**

**CONTACT INFORMATION**

**Contacts:** See Contacts on MS1 (Bangs Bayou);

**RESOURCES AT RISK INFORMATION**

**Shoreline Type:** Clay Scraps, Mixed sand and shell beach, Exposed Tidal Flats, Salt Marsh,

**Habitat:** Exposed Tidal Flats, Salt Marsh, Shellfish Beds, Submerged Aquatic Vegetation -Archeological site,

**Wildlife:** Small Mammals, Raptors, Shorebirds, Wadind birds, Diving birds, Fish, Shellfish, possible Gulf Sturgeon (T),

**Threaten/Endangered Species:** Brown Pelican, Piping Plover,

**Socio-Economic Resources:**

**RESPONSE CONSIDERATIONS**

**Staging Area:** See Entry for MS1 (Bangs Bayou)

**Collection Points:** Needs Review

**Area Access:** From Bayou Casotte, Bayou Cumbest, Bayou Heron- Boat only

**Spill Risk:** Industries along Bayou Casotte, including shipping Channels

**Response Resources:** ,

**PROTECTION STRATEGY INFORMATION**

**Tidal Range (FT):** 1.5

**Average Current (KTS):**

**Ease of Protection:** Unknown

**Min. Boom Length (FT):** 3000

**Boom Type:**

**Booming Method:** Deflection, Protection/Exclusion

**Protection Strategy:** To Protect sensitive areas associated with Bayou Cumbest



**Name:** Jose Bayou

**Site ID:**

**MS15**

**Protection Priority (Season):** Spring:  Summer:  Fall:  Winter:

**Site Description:** Shallow water

**GEOSPATIAL INFORMATION**

**Latitude (DMS):** 30° 22' 12.72" N

**Longitude (DMS):** 88° 24' 1.03" W

**County:**

**Latitude (DD):** 30.37019970

**Longitude (DD):** -88.40028729

**SCAT Division:** MS-1NE

**ESI Map:** AL-1

**ESI Name:** Grand Bay SW

**NOAA Chart:** Unknown

**CHART Name:** Unknown

**USGS Quad:** 30088-C4

**QUAD Name:** GRAND BAY SW, ALA. (1977)

**Managed Area (if applicable):** State of Miss.

**General Location:**

**CONTACT INFORMATION**

**Contacts:** See contacts on MS1 (Bangs Bayou);

**RESOURCES AT RISK INFORMATION**

**Shoreline Type:** Salt Marsh, Sheltered Tidal Flats,

**Habitat:** Salt Marsh, Tidal Flats, Shellfish beds,

**Wildlife:** Diving birds, Wading birds, Crabs, Bivalves, Waterfowl, Fish, Shrimp, possible Gulf Sturgeon (T),

**Threaten/Endangered Species:** Brown Pelican, Throughout Area - Gulf Sturgeon (T), Bald Eagle (T), Manatees (E), Gopher Tortoise (T),

**Socio-Economic Resources:**

**RESPONSE CONSIDERATIONS**

**Staging Area:** Bayou Casotte, Bayou LaBatre, \*Bayou Cumbest, point-o-pines located closer but need pitches \*

**Collection Points:** Needs Review

**Area Access:** Boat only- from Bayou Casotte(or Bayou Cumbest and Bayou Heron for shallow draft(<1.5ft) boats)

**Spill Risk:** Industries along Bayou Casotte, including shipping channels. Bayou La Batre

**Response Resources:** ,

**PROTECTION STRATEGY INFORMATION**

**Tidal Range (FT):** 1.5

**Average Current (KTS):**

**Ease of Protection:** Unknown

**Min. Boom Length (FT):** 3000

**Boom Type:**

**Booming Method:** Deflection, Protection/Exclusion

**Protection Strategy:** To protect sensitive areas associated with Jose Bayou



**Name:** L'Isle Chaudre Bay

**Site ID:**

**MS7**

**Protection Priority (Season):** Spring:  Summer:  Fall:  Winter:

**Site Description:** Shallow water from north (Crooked Bayou) and south (Jose Bay)

**GEOSPATIAL INFORMATION**

**Latitude (DMS):** 30° 21' 36.72" N

**Longitude (DMS):** 88° 24' 22.03" W

**County:**

**Latitude (DD):** 30.36019990

**Longitude (DD):** -88.40612072

**SCAT Division:** MS-1NE

**ESI Map:** AL-1

**ESI Name:** Grand Bay SW

**NOAA Chart:** Unknown

**CHART Name:** Unknown

**USGS Quad:** 30088-C4

**QUAD Name:** GRAND BAY SW, ALA. (1977)

**Managed Area (if applicable):** State of Miss. (open water) USFWS (adjacent marsh)

**General Location:**

**CONTACT INFORMATION**

**Contacts:** See contacts on Ms1 ( Bangs Bayou);

**RESOURCES AT RISK INFORMATION**

**Shoreline Type:** Shell beaches ,Sheltered tidal flats,Salt marsh,

**Habitat:** Sheltered tidal flats, salt marsh, Shellfish beds, Shell Middens-Archaeological site,

**Wildlife:** Small Mammals, Raptors, Shorebirds, Wading birds, Fish, Bivalves, Crabs Shrimp,, possible Gulf Sturgeon (T),

**Threaten/Endangered Species:** Brown pelican, Throughout Area - Gulf Sturgeon (T), Bald Eagle (T), Manatees (E), Gopher Tortoise (T),

**Socio-Economic Resources:**

**RESPONSE CONSIDERATIONS**

**Staging Area:** Bayou Casotte, Bayou LaBatre, \*Bayou Cumbest, point-o-pines located closer but need pitches \*

**Collection Points:** Needs Review

**Area Access:** Boat only- shallow draft (<1ft) from Bayou Casotte, Bayou Cumbest, Bayou Heron

**Spill Risk:** Industries along Baoyu Casotte, including shipping channels

**Response Resources:** ,

**PROTECTION STRATEGY INFORMATION**

**Tidal Range (FT):** 1.5

**Average Current (KTS):**

**Ease of Protection:** Unknown

**Min. Boom Length (FT):** 5500

**Boom Type:**

**Booming Method:** Deflection, Protection/Exclusion

**Protection Strategy:** Deploy 5500' of boom to protect sensitive areas associated with ('Isle Chavee Bay



**Name:** Bennett Bayou (North of I-10)

**Site ID:**

**MS52**

**Protection Priority (Season):** Spring:  Summer:  Fall:  Winter:

**Site Description:** Unknown

**GEOSPATIAL INFORMATION**

**Latitude (DMS):** 30° 18' 24.77" N

**Longitude (DMS):** 88° 25' 26.88" W

**County:**

**Latitude (DD):** 30.46108959

**Longitude (DD):** -88.45266270

**SCAT Division:** MS-1NE

**ESI Map:** AL-1

**ESI Name:** Grand Bay SW

**NOAA Chart:** Unknown

**CHART Name:** Unknown

**USGS Quad:** 30088-C4

**QUAD Name:** GRAND BAY SW, ALA. (1977)

**Managed Area (if applicable):** Private

**General Location:**

**CONTACT INFORMATION**

**Contacts:** USFWS- Paul Necaize 228-493-0634;

**RESOURCES AT RISK INFORMATION**

**Shoreline Type:** Rivering Banks with grasses or Trees,

**Habitat:** Riverine- Archeological Site,

**Wildlife:** Gulf sturgeon, Raptors, Fish, Wading birds, possible Gulf Sturgeon (T),

**Threaten/Endangered Species:** Gulf Sturgeon,

**Socio-Economic Resources:**

**RESPONSE CONSIDERATIONS**

**Staging Area:** I-10 Boat launch

**Collection Points:** Needs Review

**Area Access:** Boat ramp located on site

**Spill Risk:**

**Response Resources:** ,

**PROTECTION STRATEGY INFORMATION**

**Tidal Range (FT):** 0

**Average Current (KTS):**

**Ease of Protection:** Unknown

**Min. Boom Length (FT):** 10000

**Boom Type:**

**Booming Method:** Deflection, Protection/Exclusion

**Protection Strategy:** Deploy 10000' of boom to protect sensitive areas associated with Bennett Bayou



Name: Brown Bayou

Site ID:

MS11

Protection Priority (Season): Spring:  Summer:  Fall:  Winter: 

Site Description: Shallow water on approach to shoreline.

## GEOSPATIAL INFORMATION

Latitude (DMS): 30° 20' 24.72" N

Longitude (DMS): 88° 26' 46.04" W

County:

Latitude (DD): 30.34020008

Longitude (DD): -88.44612210

SCAT Division: MS-1NE

ESI Map: AL-1

ESI Name: Grand Bay SW

NOAA Chart: Unknown

CHART Name: Unknown

USGS Quad: 30088-C4

QUAD Name: GRAND BAY SW, ALA. (1977)

Managed Area (if applicable): State of Miss.

General Location:

## CONTACT INFORMATION

Contacts: See entry for MS1 (Bangs Bayou);

## RESOURCES AT RISK INFORMATION

Shoreline Type: Salt marsh, Sheltered tidal flats,

Habitat: Salt marsh, Sheltered tidal flats, Diamondback terrapin habitat, Archaeological site,

Wildlife: Small mammals, Shorebirds, Wading birds, Sankes, Turtles, Crabs, possible Gulf Sturgeon (T),

Threaten/Endangered Species: ,

Socio-Economic Resources:

## RESPONSE CONSIDERATIONS

Staging Area: See entry for MS1 (Bangs Bayou)

Collection Points: Needs Review

Area Access: Boat only, from Bayou Casotte, or Bayou Cumbest for shallow draft (&lt;1.5ft boats)

Spill Risk: Industries along Bayou Casotte, including shipping channels

Response Resources: ,

## PROTECTION STRATEGY INFORMATION

Tidal Range (FT): 1.5

Average Current (KTS):

Ease of Protection: Unknown

Min. Boom Length (FT): 10000

Boom Type:

Booming Method: Deflection,  
Protection/Exclusion

Protection Strategy: Deploy 10000' of boom to protect sensitive areas associated with Brown Bayou



USCG Sector Mobile  
Geographic Response Plan Map Series

Notes:  
Map Numbers Match ESI Map Numbers.  
MAP NOT INTENDED FOR NAVIGATION.



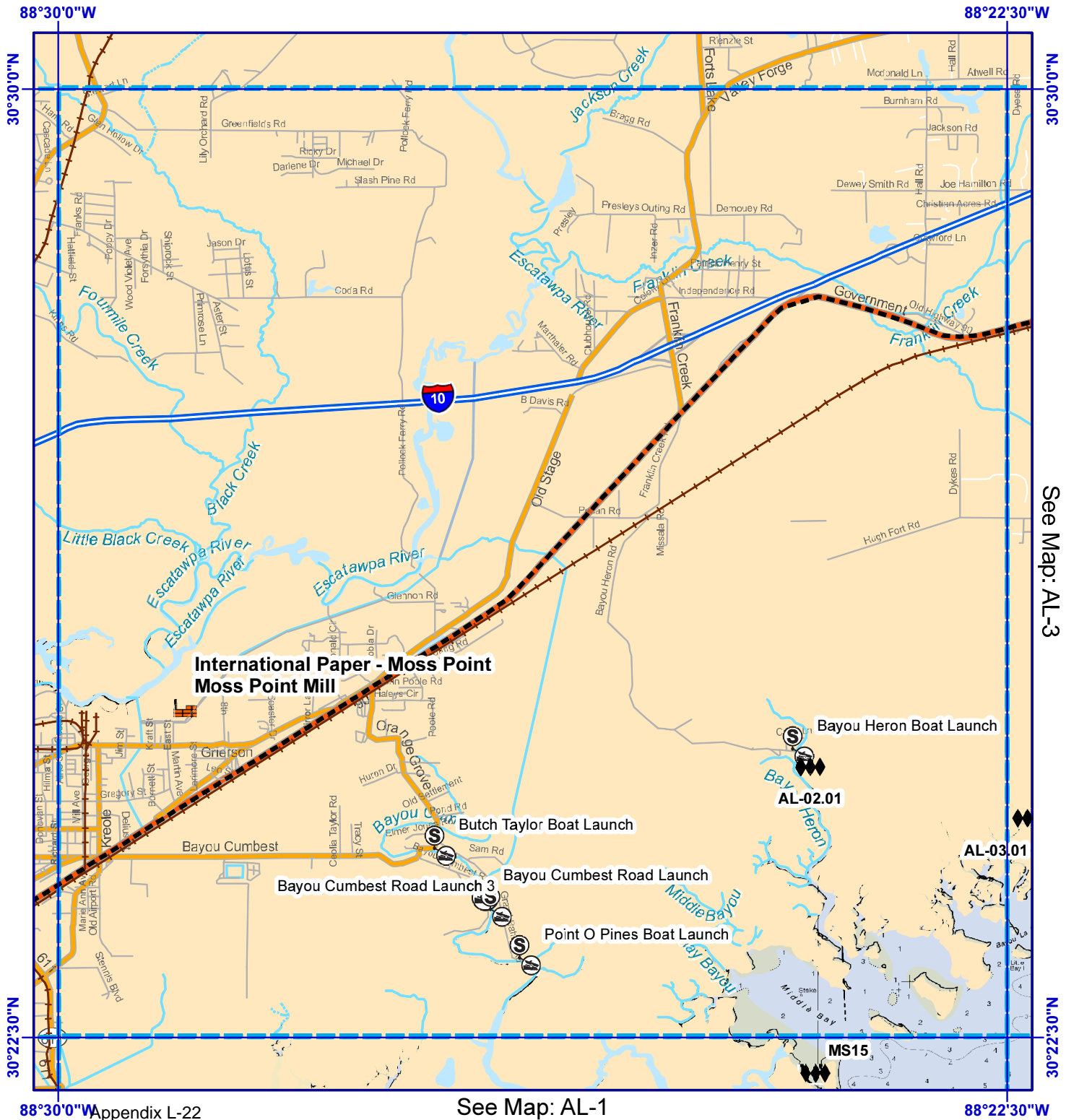
Map #: AL-2  
TOPO NAME: KREOLE, ALA.-MISS. (1977)

Legend	
	Oil Spill Sensitive Areas
	Staging Area; Boat Ramp; Marina
	Staging Area; Boat Ramp
	Boat Ramp; Marina
	Staging Area
	Boat Ramp
	Marina
	Regulated Facilities
	Commercial Shipping Lanes
	USCG-EPA MOU Line Draft - 2008
	GRP Map Boundaries
	Sector Boundary

**Kilometers**  
0 0.40.8 1.6

**Miles**  
0 0.5 1 2

Map Produced July 2009 by FWC-FWR1



88°30'0"W Appendix L-22

See Map: AL-1

88°22'30"W



**Name:** Grand Bay NWR - East

**Site ID:**

**AL-03.01**

**Protection Priority (Season):** Spring:  Summer:  Fall:  Winter:

**Site Description:** Marshland

**GEOSPATIAL INFORMATION**

**Latitude (DMS):** 30° 24' 13.72" N

**Longitude (DMS):** 88° 22' 20.41" W

**County:**

**Latitude (DD):** 30.40381156

**Longitude (DD):** -88.37233581

**SCAT Division:**

**ESI Map:** AL-3

**ESI Name:** Grand Bay

**NOAA Chart:** Unknown

**CHART Name:** Unknown

**USGS Quad:**

**QUAD Name:** GRAND BAY, ALA. (1986)

**Managed Area (if applicable):** USFWS - Grand Bay National Wildlife Refuge

**General Location:**

**CONTACT INFORMATION**

**Contacts:** USFWS - Grand Bay NWR (228) 497-6322, USFWS Daphne (251) 441-578, ADCNR/ National Response Center: 1-800-424-8802;

**RESOURCES AT RISK INFORMATION**

**Shoreline Type:** Salt and Brackish Water Marsh,

**Habitat:** Salt and Brackish Water Marsh, Piping Plover designated critical habitat, breeding and feeding habitat for numerous juvenile species,

**Wildlife:** Throughout Area - Gulf Sturgeon (T), Bald Eagle (T), Manatees (E), Gopher Tortoise (T), Fish, Crab, Shrimp, numerous juvenile fish species, possible Gulf Sturgeon (T),

**Threaten/Endangered Species:** Throughout Area - Gulf Sturgeon (T), Bald Eagle (T), Manatees (E), Gopher Tortoise (T), Alabama Red Belly Turtle (E), Possible Archaeological Site,

**Socio-Economic Resources:** Numerous bird and fish species

**RESPONSE CONSIDERATIONS**

**Staging Area:** Jemison Ramp (See AL-03), Bayou LaBatre (see AL-03), Alabama Port (GSTRP 2 & 3 SW), Fowl River Marina (3 SW & 1 NW), Middle Bay Port (1 NW)

**Collection Points:** Fowl River, Alabama Port

**Area Access:** shallow areas, access difficult in shoreline areas, Apart from channel to Bayou La Batre, water is mostly shallow.

**Spill Risk:** Shipping channels, offshore oil rigs, sites in Alabama.

**Response Resources:** Mobile CO EMA - (251) 460-8000,

**PROTECTION STRATEGY INFORMATION**

**Tidal Range (FT):** 2

**Average Current (KTS):**

**Ease of Protection:** Unknown

**Min. Boom Length (FT):**

**Boom Type:**

**Booming Method:** Deflection, Protection/Exclusion

**Protection Strategy:** Exclusion boom to protect shoreline and diversion boom to natural collection areas



Name: Grand Bay NWR

Site ID:

AL-02.01

Protection Priority (Season): Spring:  Summer:  Fall:  Winter:

Site Description: Intertidal salt marsh shoreline

**GEOSPATIAL INFORMATION**

Latitude (DMS): 30° 24' 38.11" N

Longitude (DMS): 88° 24' 3.45" W

County:

Latitude (DD): 30.41058746

Longitude (DD): -88.40095768

SCAT Division:

ESI Map: AL-2

ESI Name: Kreole

NOAA Chart: Unknown

CHART Name: Unknown

USGS Quad:

QUAD Name: KREOLE, ALA.-MISS. (1977)

Managed Area (if applicable): USFWS - Grand Bay National Wildlife Refuge

General Location:

**CONTACT INFORMATION**

Contacts: USFWS - Grand Bay NWR (228) 497-6322, USFWS Daphne (251) 441-5781/ National Response Center: 1-800-424-8802;

**RESOURCES AT RISK INFORMATION**

Shoreline Type: Salt and Brackish Water Marsh,

Habitat: Salt and Brackish Water Marsh, Piping Plover designated critical habitat, breeding and feeding habitat for numerous juvenile species; Grand Bay NWR,

Wildlife: Throughout Area - Gulf Sturgeon (T), Bald Eagle (T), Manatees (E), Gopher Tortoise (T), Fish, Crab, Shrimp, numerous juvenile fish species, ,

Threaten/Endangered Species: Gulf Sturgeon, Bald Eagle, Manatee, Piping Plover, Gopher Tortoise, Alabama Red Belly Turtle (E),

Socio-Economic Resources: Numerous bird and fish species

**RESPONSE CONSIDERATIONS**

Staging Area: Jemison Ramp (See AL-03), Bayou LaBatre (see AL-03), Alabama Port (GSTRP 2 & 3 SW), Fowl River Marina (3 SW & 1 NW), Middle Bay Port (1 NW)

Collection Points: Fowl River, Alabama Port

Area Access: shallow areas, access difficult in shoreline areas

Spill Risk: Shipping channels, offshore oil rigs, sites in Alabama. Industries along Bayou Casotte, including shipping channels. Pascagoula Industry, Pipeline, Vessel

Response Resources: Mobile CO EMA - (251) 460-8000, OSROs,

**PROTECTION STRATEGY INFORMATION**

Tidal Range (FT): 2

Average Current (KTS):

Ease of Protection: Unknown

Min. Boom Length (FT):

Boom Type:

Booming Method: Deflection, Protection/Exclusion

Protection Strategy: Exclusion boom to protect shoreline and diversion boom to natural collection areas



**Name:** Jose Bayou

**Site ID:**

**MS15**

**Protection Priority (Season):** Spring:  Summer:  Fall:  Winter:

**Site Description:** Shallow water

**GEOSPATIAL INFORMATION**

**Latitude (DMS):** 30° 22' 12.72" N

**Longitude (DMS):** 88° 24' 1.03" W

**County:**

**Latitude (DD):** 30.37019970

**Longitude (DD):** -88.40028729

**SCAT Division:** MS-1NE

**ESI Map:** AL-1

**ESI Name:** Grand Bay SW

**NOAA Chart:** Unknown

**CHART Name:** Unknown

**USGS Quad:** 30088-C4

**QUAD Name:** GRAND BAY SW, ALA. (1977)

**Managed Area (if applicable):** State of Miss.

**General Location:**

**CONTACT INFORMATION**

**Contacts:** See contacts on MS1 (Bangs Bayou);

**RESOURCES AT RISK INFORMATION**

**Shoreline Type:** Salt Marsh, Sheltered Tidal Flats,

**Habitat:** Salt Marsh, Tidal Flats, Shellfish beds,

**Wildlife:** Diving birds, Wading birds, Crabs, Bivalves, Waterfowl, Fish, Shrimp, possible Gulf Sturgeon (T),

**Threaten/Endangered Species:** Brown Pelican, Throughout Area - Gulf Sturgeon (T), Bald Eagle (T), Manatees (E), Gopher Tortoise (T),

**Socio-Economic Resources:**

**RESPONSE CONSIDERATIONS**

**Staging Area:** Bayou Casotte, Bayou LaBatre, \*Bayou Cumbest, point-o-pines located closer but need pitches \*

**Collection Points:** Needs Review

**Area Access:** Boat only- from Bayou Casotte(or Bayou Cumbest and Bayou Heron for shallow draft(<1.5ft) boats)

**Spill Risk:** Industries along Bayou Casotte, including shipping channels. Bayou La Batre

**Response Resources:** ,

**PROTECTION STRATEGY INFORMATION**

**Tidal Range (FT):** 1.5

**Average Current (KTS):**

**Ease of Protection:** Unknown

**Min. Boom Length (FT):** 3000

**Boom Type:**

**Booming Method:** Deflection, Protection/Exclusion

**Protection Strategy:** To protect sensitive areas associated with Jose Bayou



## Appendix M - References

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## Appendix N - Glossary

This glossary includes terms focusing primarily on emergency management. References used for the terms are included at the end of this appendix. Terms are largely presented as provided in the source documents for consistency with relevant standards and frameworks.

**AFTER-ACTION REPORT (AAR):** Reports that summarize and analyze performance in both exercises and actual events. The reports for exercises may also evaluate achievement of the selected exercise objectives and demonstration of the overall capabilities being exercised. (FEMA 2007)

**AREA COMMAND:** (also called, Unified Area Command) An organization established to oversee the management of (1) multiple incidents that are each being handled by an ICS organization, or (2) large or multiple incidents to which several Incident Management Teams have been assigned. Area Command has the responsibility to set overall strategy and priorities, allocate critical resources according to priorities, ensure that incidents are properly managed, and ensure that objectives are met and strategies followed. Area Command becomes Unified Area Command when incidents are multijurisdictional. Area Command may be established at an emergency operations center facility or at some location other than an Incident Command Post. (FEMA Undated)

**AREA COMMITTEE (AC):** Under the Clean Water Act, the entity appointed by the President consisting of members from qualified personnel of federal, state, and local agencies with responsibilities that include preparing an area contingency plan for an area designated by the President. (NCP 1994)

**AREA CONTINGENCY PLAN (ACP):** Under the Clean Water Act, the plan prepared by an Area Committee that is developed to be implemented in conjunction with the National Contingency Plan (NCP) and Regional Contingency Plan (RCP), in part to address removal of a worst case discharge of an oil or hazardous substance, and to mitigate or prevent a substantial threat of such a discharge from a vessel, offshore facility, or onshore facility operating in or near an area designated by the President. (NCP 1994).

**ASSIGNED RESOURCES:** Resources checked in and assigned work tasks on an incident. (ICS Undated)

**ASSIGNMENTS:** Tasks given to resources to perform within a given operational period, based upon tactical objectives in the Incident Action Plan. (ICS Undated)

**ASSISTING AGENCY:** An agency or organization providing personnel, services, or other resources to the agency with direct responsibility for incident management. (FEMA Undated)

**AUTOMATED EXTERNAL DEFIBRILLATOR (AED):** A portable device that checks the heart rhythm. If needed, it can send an electric shock to the heart to try to restore a normal rhythm. AEDs are used to treat [sudden cardiac arrest](#) (SCA). (NIH 2013)

**AVAILABLE RESOURCES:** Resources assigned to an incident, checked in, and available for a mission assignment, normally located in a Staging Area (note: these are categorized as

emergency capabilities for the purposes of this Disaster Response Plan to avoid confusion with the term “natural resources.” (FEMA Undated)

**BRANCH:** The organizational level having functional or geographic responsibility for major parts of incident operations. The Branch level is organizationally between Section and Division/Group in the Operations Section, and between Section and Units in the Logistics Section. Branches are identified by the use of Roman Numerals or by functional name (e.g., medical, security, etc.). (ICS Undated)

**CARDIO-PULMONARY RESPIRATION (CPR):** a procedure designed to restore normal breathing after cardiac arrest that includes the clearance of air passages to the lungs, mouth-to-mouth method of artificial respiration, and heart massage by the exertion of pressure on the chest. (Merriam-Webster 2013)

**CHECK-IN:** The process whereby resources first report to an incident. Check-in locations include: Incident Command Post (Resources Unit), Incident Base, Camps, Staging Areas, Helibases, Helispots, and Division Supervisors (for direct line assignments). (ICS Undated)

**COASTAL ZONE MANAGEMENT ACT (CZMA):** Administered by NOAA's Office of Ocean and Coastal Resource Management (OCRM), the CZMA provides for management of the nation's coastal resources, including the Great Lakes, and balances economic development with environmental conservation.

The CZMA outlines two national programs, the National Coastal Zone Management Program and the National Estuarine Research Reserve System. The 34 coastal programs aim to balance competing land and water issues in the coastal zone, while estuarine reserves serve as field laboratories to provide a greater understanding of estuaries and how humans impact them. The overall program objectives of CZMA remain balanced to "preserve, protect, develop, and where possible, to restore or enhance the resources of the nation's coastal zone." (NOAA 2012)

**COMMAND:** The act of directing and/or controlling resources by virtue of explicit legal, agency, or delegated authority. May also refer to the Incident Commander. (ICS Undated)

**COMMAND POST:** See Incident Command Post.

**COMMAND STAFF:** The Command Staff consists of the Public Information Officer, Safety Officer, and Liaison Officer. They report directly to the Incident Commander. They may have an Assistant or Assistants, as needed. (FEMA Undated)

**COMMUNICATIONS UNIT:** An organizational unit in the Logistics Section responsible for providing communication services at an incident. A Communications Unit may also be a facility (e.g., a trailer or mobile van) used to provide the major part of an Incident Communications Center. (ICS Undated)

**COMPENSATION UNIT/CLAIMS UNIT:** Functional unit within the Finance/Administration Section responsible for financial concerns resulting from property damage, injuries, or fatalities at the incident. (ICS Undated)

**CONTINUITY OF OPERATIONS PLAN (COOP):** The COOP outlines essential functions; orders of succession; delegations of authority; continuity facilities; continuity communications; vital records management; human capital; tests, training, and exercises;



devolution of control and direction; and reconstitution. The plan could be activated in response to a wide range of events or situations – from a fire in the building; to a natural disaster; to the threat or occurrence of a terrorist attack. Any event that makes it impossible for employees to work in their regular facility could result in the activation of the continuity plan. Continuity planning is the practice of ensuring the execution of essential functions through all circumstances. (FEMA 2013c)

**COOPERATING AGENCY:** An agency supplying assistance other than direct operational or support functions or resources to the incident management effort. (FEMA Undated)

**COORDINATION:** The process of systematically analyzing a situation, developing relevant information, and informing appropriate command authority of viable alternatives for selection of the most effective combination of available resources to meet specific objectives. The coordination process (which can be either intra- or interagency) does not involve dispatch actions. However, personnel responsible for coordination may perform command or dispatch functions within the limits established by specific agency delegations, procedures, legal authority, etc. (FEMA Undated)

**COORDINATION CENTER:** A facility that is used for the coordination of agency or jurisdictional resources in support of one or more incidents. (FEMA Undated)

**COST SHARING AGREEMENTS:** Agreements between agencies or jurisdictions to share designated costs related to incidents. Cost sharing agreements are normally written but may also be oral between authorized agency or jurisdictional representatives at the incident. (FEMA Undated)

**COST UNIT:** Functional unit within the Finance/Administration Section responsible for tracking costs, analyzing cost data, making cost estimates, and recommending cost-saving measures. (ICS Undated)

**DEPUTY:** Deputy: A fully qualified individual who, in the absence of a superior, could be delegated the authority to manage a functional operation or perform a specific task. In some cases, a Deputy could act as relief for a superior and therefore must be fully qualified in the position. Deputies can be assigned to the Incident Commander, General Staff, and Branch Directors. (FEMA Undated)

**DEMOBILIZATION UNIT:** Functional unit within the Planning Section responsible for assuring orderly, safe, and efficient demobilization of incident resources. (ICS Undated)

**DIRECTOR:** The ICS title for individuals responsible for supervision of a Branch. (ICS Undated)

**DISASTER:** Incidents that result in profound loss, recovery from which can require months, years, or even decades. (Disaster Response Plan Usage)

**DIVISION:** Divisions are used to divide an incident into geographical areas of operation. A Division is located within the ICS organization between the Branch and the Task Force/Strike Team (See Group). Divisions are identified by alphabetic characters for horizontal applications and, often, by floor numbers when used in buildings. (ICS Undated)

**DOCUMENTATION UNIT:** Functional unit within the Planning Section responsible for collecting, recording, and safeguarding all documents relevant to the incident. (ICS Undated)

**DRILL:** A drill is a type of HSEEP exercise. It is coordinated, supervised activity usually employed to test a single specific operation or function within a single entity (e.g., a fire department conducts a decontamination drill).

**EMERGENCY:** Absent a Presidentially declared emergency, any incident(s), human-caused or natural, that requires responsive action to protect life or property. Under the Robert T. Stafford Disaster Relief and Emergency Assistance Act, an emergency means any occasion or instance for which, in the determination of the President, Federal assistance is needed to supplement State and local efforts and capabilities to save lives and to protect property and public health and safety, or to lessen or avert the threat of a catastrophe in any part of the United States. (FEMA Undated)

**EMERGENCY MANAGEMENT COORDINATOR/DIRECTOR:** The individual within each political subdivision that has coordination responsibility for jurisdictional emergency management. (ICS Undated)

**EMERGENCY MEDICAL TECHNICIAN (EMT):** A health-care specialist with particular skills and knowledge in pre-hospital emergency medicine. (ICS, Undated)

**EMERGENCY OPERATIONS CENTER (EOC):** Emergency Operations Centers (EOCs): The physical location at which the coordination of information and resources to support domestic incident management activities normally takes place. An EOC may be a temporary facility or may be located in a more central or permanently established facility, perhaps at a higher level of organization within a jurisdiction. EOCs may be organized by major functional disciplines (e.g., fire, law enforcement, and medical services), by jurisdiction (e.g., Federal, State, regional, county, city, tribal), or some combination thereof. (FEMA Undated)

**EMERGENCY OPERATIONS PLAN:** The plan that each jurisdiction has and maintains for responding to appropriate hazards. (ICS Undated)

**ENDANGERED SPECIES:** The classification provided to an animal or plant in danger of extinction within the foreseeable future throughout all or a significant portion of its range. (FWS 2013a)

**ENVIRONMENTAL SENSITIVITY INDEX (ESI) MAP:** ESI maps provide a concise summary of coastal resources that are at risk if an oil spill occurs nearby. Examples of at-risk resources include biological resources (such as birds and shellfish beds), sensitive shorelines (such as marshes and tidal flats), and human-use resources (such as public beaches and parks).

When an oil spill occurs, ESI maps can help responders meet one of the main response objectives: reducing the environmental consequences of the spill and the cleanup efforts. Additionally, ESI maps can be used by planners—before a spill happens—to identify vulnerable locations, establish protection priorities, and identify cleanup strategies. (NOAA 2013b)

**ESTUARY/ESTUARINE:** In the most general terms, an estuary is an ecosystem, comprising both the biological and physical environment, which has developed in a region where rivers meet the sea and fresh flowing river water mingles with tidal salt water to become brackish, or partly salty. However, there are also several types of wholly freshwater ecosystems that have many similar characteristics to what we think of as traditional brackish estuaries. Estuaries are connected by water to many different surrounding environments (oceans, lakes, forests, grassy plains) as well as nearby human communities, and they are therefore affected by what takes place in those environments whether it be natural processes or human activities. (NOAA 2013c)

**EVACUATION:** To withdraw from a place in an organized way especially for protection. (Merriam-Webster 2013)

**EVENT:** A planned, non-emergency activity. ICS can be used as the management system for a wide range of events, e.g., parades, concerts, or sporting events. (ICS Undated)

**FACILITIES UNIT:** Functional unit within the Support Branch of the Logistics Section that provides fixed facilities for the incident. These facilities may include the Incident Base, feeding areas, sleeping areas, sanitary facilities, etc. (ICS Undated)

**FIELD OPERATIONS GUIDE:** A pocket-size manual of instructions on the application of the Incident Command System. (ICS Undated)

**FINANCE/ADMINISTRATION SECTION:** The Section responsible for all incident costs and financial considerations. Includes the Time Unit, Procurement Unit, Compensation/Claims Unit, and Cost Unit. (ICS Undated)

**FOOD UNIT:** Functional unit within the Service Branch of the Logistics Section responsible for providing meals for incident personnel. (ICS Undated)

**FUNCTION:** In ICS, function refers to the five major activities in the ICS, i.e., Command, Operations, Planning, Logistics, and Finance/Administration. The term function is also used when describing the activity involved, e.g., the planning function. (ICS Undated)

**FUNCTIONAL EXERCISE (FE):** A functional exercise is a type of HSEEP exercise. It examines and/or validates the coordination, command, and control between various multi-agency coordination centers (e.g., emergency operation center, joint field office, etc.). A functional exercise does not involve any "boots on the ground" (i.e., first responders or emergency officials responding to an incident in real time). (FEMA 2013a)

**FULL-SCALE EXERCISE (FSE):** A full-scale exercise is a multi-agency, multi-jurisdictional, multi-discipline exercise involving functional (e.g., joint field office, emergency operation centers, etc.) and "boots on the ground" response (e.g., firefighters decontaminating mock victims). (FEMA 2013a)

**GAME:** A game is a type of HSEEP exercise. It is a simulation of operations that often involves two or more teams, usually in a competitive environment, using rules, data, and procedure designed to depict an actual or assumed real-life situation. (FEMA 2013a)

**GENERAL STAFF:** The group of incident management personnel reporting to the Incident Commander. They may each have a deputy, as needed. The General Staff consists of:

Operations Section Chief, Planning Section Chief, Logistics Section Chief,  
Finance/Administration Section Chief (ICS Undated)

**GEOGRAPHIC RESPONSE PLAN (GRP):** A site-specific strategy for the initial response to a spill of oil or oil products on water. (Ellis 2009)

**GROUP:** Groups are established to divide the incident into functional areas of operation. Groups are composed of resources assembled to perform a special function not necessarily within a single geographic division (See Division). Groups are located between Branches (when activated) and Resources in the Operations Section. (FEMA Undated)

**HARMFUL ALGAL BLOOM (HAB):** A harmful algal bloom (HAB), also known as a red tide, is the proliferation of toxic nuisance algae that cause a negative impact to natural resources or humans. Currently 85 toxic microalgal species have been documented; of these, 37 live in Gulf of Mexico waters. (EPA 2013f)

**HAZARD:** Something that is potentially dangerous or harmful, often the root cause of an unwanted outcome (FEMA Undated)

**HAZARD IDENTIFICATION AND RISK ASSESSMENT (HIRA):** Hazard Identification is the process of determining whether exposure to a stressor can cause an increase in the incidence of specific adverse health effects (e.g., cancer, birth defects) and whether the adverse health effect is likely to occur in humans. In the case of chemical stressors, the process examines the available scientific data for a given chemical (or group of chemicals) and develops a weight of evidence to characterize the link between the negative effects and the chemical agent. Risk assessment is used to characterize the nature and magnitude of health risks to humans (e.g., residents, workers, recreational visitors) and ecological receptors (e.g., birds, fish, wildlife) from chemical contaminants and other stressors that may be present in the environment. Risk managers use this information to help them decide how to protect humans and the environment from stressors or contaminants. (EPA 2013e) *See also FEMA's Threat and Hazard Identification and Risk Assessment (THIRA).*

**HAZARDOUS MATERIALS (HAZMAT):** Hazardous and toxic substances are defined as those chemicals present in the workplace which are capable of causing harm. In this definition, the term "chemicals" includes dusts, mixtures, and common materials such as paints, fuels, and solvents. OSHA currently regulates exposure to approximately 400 substances. The OSHA [Chemical Sampling Information](#) file contains listings for approximately 1500 substances; the Environmental Protection Agency's (EPA's) Toxic Substance Control Act (TSCA) Chemical Substances Inventory lists information on more than 62,000 chemicals or chemical substances; some libraries maintain files of material safety data sheets (MSDS) for more than 100,000 substances. (OSHA 2013b)

**HAZARDOUS WASTE OPERATIONS AND EMERGENCY RESPONSE (HAZWOPER):** Because of the seriousness of the safety and health hazards related to hazardous waste operations and emergency response, the Occupational Safety and Health Administration (OSHA) issued its Hazardous Waste Operations and Emergency Response (HAZWOPER) standard, Title 29 *Code of Federal Regulations* (CFR) Parts 1910.120 and 1926.65 (*see 54 Federal Register* 9294-9336, March 6, 1989) to protect employees in this environment and to help them handle hazardous substances safely and effectively.

The HAZWOPER standard covers all employers performing the following three general categories of work operations:

- Hazardous waste site cleanup operations [paragraphs (b)-(o)] (e.g., SUPERFUND cleanup),
- Operations involving hazardous waste that are conducted at treatment, storage, and disposal (TSD) facilities [paragraph (p)] (e.g., landfill that accepts hazardous waste), and
- Emergency response operations involving hazardous substance releases [paragraph (q)] (e.g., chemical spill at a manufacturing plant). (OSHA 2008)

**HOMELAND SECURITY EXERCISE AND EVALUATION PROGRAM (HSEEP):** The HSEEP is a capabilities and performance-based exercise program that provides a standardized methodology and terminology for exercise design, development, conduct, evaluation, and improvement planning. HSEEP exercises include workshops, seminars, games, tabletop exercises, functional exercises, and full-scale exercises.

The HSEEP is maintained by the Federal Emergency Management Agency's National Preparedness Directorate, Department of Homeland Security. (FEMA 2013a)

**INCIDENT:** An occurrence or event, natural or human-caused, which requires an emergency response to protect life or property. Incidents can, for example, include major disasters, emergencies, terrorist attacks, terrorist threats, wildland and urban fires, floods, hazardous materials spills, nuclear accidents, aircraft accidents, earthquakes, hurricanes, tornadoes, tropical storms, war-related disasters, public health and medical emergencies, and other occurrences requiring an emergency response. (FEMA Undated)

**INCIDENT ACTION PLAN:** Contains objectives reflecting the overall incident strategy and specific tactical actions and supporting information for the next operational period. The Plan may be oral or written. When written, the Plan may have a number of forms as attachments (e.g., traffic plan, safety plan, communications plan, map, etc.). (ICS Undated)

**INCIDENT COMMANDER:** The individual responsible for all incident activities, including the development of strategies and tactics and the ordering and the release of resources. The IC has overall authority and responsibility for conducting incident operations and is responsible for the management of all incident operations at the incident site. (FEMA Undated)

**INCIDENT COMMAND POST (ICP):** The location at which the primary command functions are executed. The ICP may be collocated with the incident base or other incident facilities. (ICS Undated)

**INCIDENT COMMAND SYSTEM (ICS):** A standardized on-scene emergency management construct specifically designed to provide for the adoption of an integrated organizational structure that reflects the complexity and demands of single or multiple incidents, without being hindered by jurisdictional boundaries. ICS is the combination of facilities, equipment, personnel, procedures, and communications operating within a common organizational structure, designed to aid in the management of resources during incidents. It is used for all kinds of emergencies and is applicable to small as well as large and complex incidents. ICS is used by various jurisdictions and functional agencies, both public and private, to organize field-level incident management operations. (FEMA Undated)



**INCIDENT MANAGEMENT TEAM:** The Incident Commander and appropriate Command and General Staff personnel assigned to an incident. (ICS Undated)

**INCIDENT OBJECTIVES:** Statements of guidance and direction necessary for the selection of appropriate strategy(s), and the tactical direction of resources. Incident objectives are based on realistic expectations of what can be accomplished when all allocated resources have been effectively deployed. Incident objectives must be achievable and measurable, yet flexible enough to allow for strategic and tactical alternatives. (ICS Undated)

**INCIDENT TYPES:** Incidents are categorized by five types based on complexity. Type 5 incidents are the least complex and Type 1 the most complex. (FEMA Undated)

**INFORMATION OFFICER:** A member of the Command Staff responsible for interfacing with the public and media or with other agencies requiring information directly from the incident. There is only one Information Officer per incident. The Information Officer may have assistants. (ICS Undated)

**INITIAL ACTION:** The actions taken by resources which are the first to arrive at an incident. (ICS Undated)

**INITIAL RESPONSE:** Resources initially committed to an incident. (ICS Undated)

**INVASIVE SPECIES:** An invasive species is one that is not native to an ecosystem and which causes, or is likely to cause, economic or environmental harm or harm to human health. In addition to the many invasive species from outside the U.S., there are many species from within the U.S. that are invasive in other parts of the country. (FWS 2013b)

**JURISDICTION:** The range or sphere of authority. Public agencies have jurisdiction at an incident related to their legal responsibilities and authority for incident mitigation. Jurisdictional authority at an incident can be political/geographical (e.g., city, county, state, or federal boundary lines) or functional (e.g., police department, health department, etc.). (See Multijurisdiction.) (ICS Undated)

**JURISDICTIONAL AGENCY:** The agency having jurisdiction and responsibility for a specific geographical area, or a mandated function. (ICS Undated)

**LEADER:** The ICS title for an individual responsible for a Task Force, Strike Team, or functional unit. (ICS, Undated)

**LIAISON OFFICER:** A member of the Command Staff responsible for coordinating with representatives from cooperating and assisting agencies. (ICS Undated)

**LISTED SPECIES:** A species, subspecies, or distinct vertebrate population segment that has been added to the Federal lists of Endangered and Threatened Wildlife and Plants as they appear in sections 17.11 and 17.12 of Title 50 of the Code of Federal Regulations (50 CFR 17.11 and 17.12). (FWS 2013a)

**LOGISTICS SECTION:** The Section responsible for providing facilities, services, and materials for the incident. (ICS Undated)

**LIFE-SAFETY:** Refers to the joint consideration of both the life and physical well-being of individuals. (ICS Undated)

**MANAGERS:** Individuals within ICS organizational units that are assigned specific managerial responsibilities, e.g., Staging Area Manager or Camp Manager. (ICS Undated)

**MANAGEMENT BY OBJECTIVES:** In ICS, this is a top-down management activity which involves a three-step process to achieve the incident goal. The steps are: establishing the incident objectives, selection of appropriate strategy(s) to achieve the objectives, and the tactical direction associated with the selected strategy. Tactical direction includes: selection of tactics, selection of resources, resource assignments, and performance monitoring. (ICS Undated)

**MARINE PROTECTED AREAS (MPA):** special places that protect coastal and marine resources. These resources - like fish, wildlife, big waves, beautiful beaches and clean water - also make them great places for recreation. MPAs provide an opportunity for us to connect with the great outdoors, and they generate billions of dollars to help support coastal communities. (NOAA 2013c)

**MEDICAL UNIT:** Functional unit within the Service Branch of the Logistics Section responsible for the development of the Medical Emergency Plan, and for providing emergency medical treatment of incident personnel. (ICS Undated)

**MITIGATION:** Mitigation is the effort to reduce loss of life and property by lessening the impact of disasters. Mitigation is taking action *now*—before the next disaster—to reduce human and financial consequences later (analyzing risk, reducing risk, insuring against risk). (FEMA 2013b)

**MULTI-AGENCY INCIDENT:** An incident where one or more agencies assist a jurisdictional agency or agencies. May be single or unified command. (ICS Undated)

**MULTI-AGENCY COORDINATION (MAC):** A generalized term which describes the functions and activities of representatives of involved agencies and/or jurisdictions who come together to make decisions regarding the prioritizing of incidents, and the sharing and use of critical resources. The MAC organization is not a part of the on-scene ICS and is not involved in developing incident strategy or tactics. (ICS Undated)

**MULTI-AGENCY COORDINATION SYSTEM (MACS):** The combination of personnel, facilities, equipment, procedures, and communications integrated into a common system. When activated, MACS has the responsibility for coordination of assisting agency resources and support in a multi-agency or multijurisdictional environment. A MAC Group functions within the MACS. (ICS Undated)

**MULTIJURISDICTION INCIDENT:** An incident requiring action from multiple agencies that have a statutory responsibility for incident mitigation. In ICS these incidents will be managed under Unified Command. (ICS Undated)

**MUTUAL AID AGREEMENT:** Written agreement between agencies and/or jurisdictions in which they agree to assist one another upon request, by furnishing personnel and equipment. (ICS Undated)

**NATIONAL CONTINGENCY PLAN (NCP):** The National Oil and Hazardous Substances Pollution Contingency Plan, commonly referred to as the [NCP](#), is the Federal government's strategy for responding to both oil spills and hazardous substance releases. These



requirements outline the steps On-Scene Coordinators must take when responding to situations in which oil is discharged into or upon the navigable waters of the United States, or when hazardous substances, pollutants, or contaminants are released into the environment. (EPA 2013b)

**NATIONAL ESTUARINE RESEARCH RESERVE SYSTEM (NERRS):** The National Estuarine Research Reserve System is a network of 28 areas representing different biogeographic regions of the United States that are protected for long-term research, water-quality monitoring, education and coastal stewardship. Established by the Coastal Zone Management Act of 1972, as amended, the reserve system is a partnership program between the National Oceanic and Atmospheric Administration and the coastal states. NOAA provides funding, national guidance and technical assistance. Each reserve is managed on daily basis by a lead state agency or university, with input from local partners. (NOAA 2013c)

**NATIONAL INCIDENT MANAGEMENT SYSTEM (NIMS):** A system mandated by HSPD-5 that provides a consistent nationwide approach for Federal, State, local, and tribal governments; the private sector; and nongovernmental organizations to work effectively and efficiently together to prepare for, respond to, and recover from domestic incidents, regardless of cause, size, or complexity. To provide for interoperability and compatibility among Federal, State, local, and tribal capabilities, the NIMS includes a core set of concepts, principles, and terminology. HSPD-5 identifies these as the ICS; multiagency coordination systems; training; identification and management of resources (including systems for classifying types of resources); qualification and certification; and the collection, tracking, and reporting of incident information and incident resources. (FEMA Undated)

**NATIONAL RESPONSE FRAMEWORK (NRF):** A guide to how the Nation conducts all-hazards response. It is built upon scalable, flexible, and adaptable coordinating structures to align key roles and responsibilities across the Nation, linking all levels of government, nongovernmental organizations, and the private sector. It is intended to capture specific authorities and best practices for managing incidents that range from the serious but purely local, to large-scale terrorist attacks or catastrophic natural disasters. (FEMA 2013d)

**NATIONAL RESPONSE TEAM (NRT):** Response planning and coordination is accomplished at the federal level through the [U.S. National Response Team \(NRT\)](#), an interagency group co-chaired by the EPA and the [U.S. Coast Guard](#) (also see [NRT Member Roles and Responsibilities](#) for more information on this group). Although the NRT does not respond directly to incidents, it is responsible for three major activities related to managing responses: (1) distributing information; (2) planning for emergencies; and (3) training for emergencies. The NRT also supports the Regional Response Teams. (EPA 2013a)

**NATIONAL WILDLIFE REFUGE:** There are two ways that lands in the National Wildlife System are categorized: 1) Code of Federal Regulations definitions and 2) real property classification. In general these lands include refuges, waterfowl production areas, and coordination areas. The Refuge System does not currently include any of the lands identified as Administrative Sites in the property records. Refuge System lands are

acquired through a variety of acquisition methods such as withdrawal from the public domain, fee title purchase, transfer of jurisdiction, donation, gift, exchange, and partial interest such as agreements, easements, and leases.

By Fish and Wildlife Service definitions in the Title 50 of the Code of Federal Regulations (CFR), lands within the National Wildlife Refuge System include two major categories – National Wildlife Refuges and [Coordination Areas](#). National Wildlife Refuges are defined as all units of the Refuge System except Coordination Areas. Within the National Wildlife Refuge category, a further distinction is made for the subset of units known as [Waterfowl Production Areas](#). (FWS 2012)

**NATURAL RESOURCE:** In both CERCLA and OPA, there are two parts to the "natural resources" definition. First, natural resources are defined broadly to include land, fish, wildlife, biota, air, water, ground water, drinking water supplies, and other such resources. Second, the resource must belong to, be managed by, held in trust by, appertain to, or otherwise be controlled by the United States, any State, an Indian Tribe, a local government, or a foreign government [CERCLA [§101\(16\)](#); OPA [§1001\(20\)](#)]. (EPA 2013d)

**NATURAL RESOURCE DAMAGE ASSESSMENT (NRDA):** [Natural Resource Trustees](#) conduct NRDA to calculate the monetary cost of restoring injuries to natural resources that result from releases of hazardous substances or discharges of oil. Damages to natural resources are evaluated by identifying the functions or 'services' provided by the resources, determining the baseline level of the services provided by the injured resource(s), and quantifying the reduction in service levels as a result of the contamination. Regulations for assessing NRD have been promulgated under both CERCLA and OPA.

If natural resources are injured by a discharge or release of a mixture of oil and hazardous substances, the DOI regulations are used. The NOAA regulations are applicable only in assessing damages which may result from discharges of oil. (EPA 2013d)

**NATURAL RESOURCE TRUSTEES:** CERCLA and OPA authorize the United States, States, and Indian Tribes to act on behalf of the public as Natural Resource Trustees for natural resources under their respective trusteeship [CERCLA [§107\(f\)\(1\)](#); OPA [§1006\(c\)](#)]. OPA also authorizes foreign governments to act as Trustees [OPA [§1006\(b\)\(5\)](#)].

Trustees often have information and technical expertise about the biological effects of hazardous substances, as well as the location of sensitive species and habitats that can assist On-Scene Coordinators in characterizing the nature and extent of site-related contamination and impacts. Coordination at the investigation and planning stages provides the Trustees early access to information they need to assess injury to natural resources. This assists Trustees in making early decisions about whether restoration is needed in light of the response actions, and should generally result in more efficient settlement negotiations and an opportunity to address all liabilities at the site simultaneously. (EPA 2013d)

**NAVIGABLE WATERS:** The term *navigable waters* encompasses more than bodies of water large enough to accommodate a boat. The term may also include streams, creeks, and wetlands that empty into larger rivers and lakes as well as their adjoining shorelines. (USCG 2013)

**OFFICER:** The ICS title for the personnel responsible for the Command Staff positions of Safety, Liaison, and Information. (ICS Undated)

**OIL POLLUTION ACT OF 1990 (OPA90):** The Oil Pollution Act (OPA) was signed into law in August 1990, largely in response to rising public concern following the [Exxon Valdez incident](#). The OPA improved the nation's ability to prevent and respond to oil spills by establishing provisions that expand the federal government's ability, and provide the money and resources necessary, to respond to oil spills. The OPA also created the national [Oil Spill Liability Trust Fund](#), which is available to provide up to one billion dollars per spill incident.

In addition, the OPA provided new requirements for contingency planning both by government and industry. The [National Oil and Hazardous Substances Pollution Contingency Plan \(NCP\)](#) has been expanded in a three-tiered approach: the Federal government is required to direct all public and private response efforts for certain types of spill events; Area Committees -- composed of federal, state, and local government officials - - must develop detailed, location-specific Area Contingency Plans; and owners or operators of vessels and certain facilities that pose a serious threat to the environment must prepare their own Facility Response Plans.

Finally, the OPA increased penalties for regulatory noncompliance, broadened the response and enforcement authorities of the Federal government, and preserved State authority to establish law governing oil spill prevention and response. (EPA 2013a)

**ON-SCENE COORDINATOR (OSC):** The On-Scene Coordinator (OSC) is the federal official responsible for monitoring or directing responses to all oil spills and hazardous substance releases reported to the federal government. The OSC coordinates all federal efforts with, and provides support and information to, local, state and regional response communities. The OSC is an agent of either EPA or the [U.S. Coast Guard](#), depending on where the incident occurs. EPA OSCs have primary responsibility for spills and releases to inland areas and waters, while U.S. Coast Guard OSCs have responsibility for coastal waters and the Great Lakes. In general, the OSC has the following key responsibilities during and after a response to a hazardous substance release or an oil spill: (1) assessment; (2) monitoring; (3) response assistance; and (4) evaluation. (EPA 2013a)

**OPERATIONAL PERIOD:** The period of time scheduled for execution of a given set of operation actions as specified in the Incident Action Plan. Operational Periods can be of various lengths, although usually not over 24 hours. (FEMA 2008b)

**OPERATIONS SECTION:** The Section responsible for all tactical operations at the incident. Includes Branches, Divisions and/or Groups, Task Forces, Strike Teams, Single Resources, and Staging Areas. (FEMA 2008b)

**PERSONAL PROTECTIVE EQUIPMENT (PPE):** Personal protective equipment, commonly referred to as "PPE", is equipment worn to minimize exposure to a variety of hazards. Examples of PPE include such items as gloves, foot and eye protection, protective hearing devices (earplugs, muffs) hard hats, respirators and full body suits. (OSHA 2013c)

**OPERATIONAL PERIOD:** The period of time scheduled for execution of a given set of operation actions as specified in the Incident Action Plan. Operational Periods can be of various lengths, although usually not over 24 hours. (FEMA Undated)

**OPERATIONS SECTION:** The Section responsible for all tactical operations at the incident. Includes Branches, Divisions and/or Groups, Task Forces, Strike Teams, Single Resources, and Staging Areas. (FEMA Undated)

**PLANNING MEETING:** A meeting held as needed throughout the duration of an incident, to select specific strategies and tactics for incident control operations, and for service and support planning. On larger incidents, the Planning Meeting is a major element in the development of the Incident Action Plan. (FEMA Undated)

**PLANNING SECTION:** Responsible for the collection, evaluation, and dissemination of information related to the incident, and for the preparation and documentation of Incident Action Plans. The Section also maintains information on the current and forecasted situation, and on the status of resources assigned to the incident. Includes the Situation, Resources, Documentation, and Demobilization Units, as well as Technical Specialists (FEMA Undated)

**PRELIMINARY DAMAGE ASSESSMENT (PDA):** Following a disaster, a Governor requests PDAs as the first step in the declaration process. Federal representatives, including the U.S. Small Business Administration, join state, tribal, and local officials to form “PDA teams.” PDA teams are responsible for surveying damages in designated counties, and they do this by going city-by-city, street-by-street, door-to-door, until *impacted* areas identified by state, tribal, and local officials have been thoroughly assessed. Along with assessing the damages that affected individuals within a community, PDA teams consisting of state, federal, tribal and local officials will also assess the impact of the incident on public infrastructure. This includes the cost of emergency measures, such as debris removal, and repair or restoration of public facilities such as roads and buildings. (FEMA 2012a)

**PREPAREDNESS:** The range of deliberate, critical tasks and activities necessary to build, sustain, and improve the operational capability to prevent, protect against, respond to, and recover from domestic incidents. Preparedness is a continuous process. Preparedness involves efforts at all levels of government and between government and private-sector and nongovernmental organizations to identify threats, determine vulnerabilities, and identify required resources. Within the NIMS, preparedness is operationally focused on establishing guidelines, protocols, and standards for planning, training and exercises, personnel qualification and certification, equipment certification, and publication management. (FEMA Undated)

**PREVENTION:** The capabilities necessary to avoid, prevent, or stop a threatened or actual act of terrorism. As defined by Presidential Policy Directive 8, the term “prevention” refers to preventing imminent threats. (FEMA 2013d)

**PROCUREMENT UNIT:** Functional unit within the Finance/Administration Section responsible for financial matters involving vendor contracts. (ICS Undated)

**PROTECTION:** The capabilities necessary to secure the homeland against acts of terrorism and manmade or natural disasters. (FEMA 2013d)

**RECOVERY:** The development, coordination, and execution of service- and site-restoration plans; the reconstitution of government operations and services; individual, private-sector, nongovernmental, and public-assistance programs to provide housing and to promote restoration; long-term care and treatment of affected persons; additional measures for social, political, environmental, and economic restoration; evaluation of the incident to identify lessons learned; post incident reporting; and development of initiatives to mitigate the effects of future incidents. (FEMA Undated)

**REGIONAL CONTINGENCY PLAN (RCP):** The Regional Response Teams (RRTs), working with the states, shall develop federal RCPs for each standard federal region, Alaska, Oceania in the Pacific, and the Caribbean to coordinate timely, effective response by various federal agencies and other organizations to discharges of oil or releases of hazardous substances, pollutants, or contaminants. RCPs shall, as appropriate, include information on all useful facilities and resources in the region, from government, commercial, academic, and other sources. To the greatest extent possible, RCPs shall follow the format of the NCP and be coordinated with state emergency response plans, Area Cleanup Plans (ACPs). Such coordination should be accomplished by working with the State Emergency Response Commissions (SERCs) in the region covered by the RCP. RCPs shall contain lines of demarcation between the inland and coastal zones, as mutually agreed upon by USCG and EPA. (Cornell 2013)

**REGIONAL RESPONSE TEAM (RRT):** There are thirteen RRTs in the U.S., each representing a particular geographic region (including the Caribbean and the Pacific Basin). RRTs are composed of representatives from field offices of the federal agencies that make up the [National Response Team](#), as well as state representatives. The four major responsibilities of RRTs are: (1) response; (2) planning; (3) training; and (4) coordination. (EPA 2013a)

**RESOURCES:** Personnel and major items of equipment, supplies, and facilities available or potentially available for assignment to incident operations and for which status is maintained. Resources are described by kind and type and may be used in operational support or supervisory capacities at an incident or at an EOC. (FEMA Undated)

**RESOURCES UNIT:** Functional unit within the Planning Section responsible for recording the status of resources committed to the incident. The Unit also evaluates resources currently committed to the incident, the impact that additional responding resources will have on the incident, and anticipated resource needs. (ICS Undated)

**RESPONSE:** The capabilities necessary to save lives, protect property and the environment, and meet basic human needs after an incident has occurred. (FEMA 2013d)

**SAFETY OFFICER:** A member of the Command Staff responsible for monitoring and assessing safety hazards or unsafe situations, and for developing measures for ensuring personnel safety. The Safety Officer may have assistants. (ICS Undated)

**SCIENTIFIC SUPPORT COORDINATOR (SSC):** OR&R's Emergency Response Division (ERD) consists of an interdisciplinary scientific team that responds to oil and chemical spills in U.S. waters and helps the On-Scene Coordinator make timely operational decisions. The team is headquartered at NOAA's campus in Seattle; however ERD's Scientific Support Coordinators (SSCs), located around the country, lead the team at spills, drawing on the



team's spill trajectory estimates, chemical hazards analyses, and assessments of the sensitivity of biological and human-use resources. OR&R staff members also represent NOAA and the DOC on the [National Response Team](#) and [Regional Response Teams](#). (NOAA 2013b)

**SECTION:** That organization level with responsibility for a major functional area of the incident, e.g., Operations, Planning, Logistics, Finance/Administration. The Section is organizationally between Branch and Incident Commander. (ICS Undated)

**SEMINAR:** A seminar is a type of HSEEP exercise. It is an informal discussion, designed to orient participants to new or updated plans, policies, or procedures (e.g., a seminar to review a new Evacuation Standard Operating Procedure). (FEMA 2013a).

**SHELTER-IN-PLACE:** Selecting an interior room or rooms within your facility, or ones with no or few windows, and taking refuge there. In many cases, local authorities will issue advice to shelter-in-place via TV or radio. (OSH, 2013a)

**SHORELINE CLEAN-UP AND ASSESSMENT TEAM (SCAT):** SCAT teams include people trained in the techniques, procedures, and terminology of shoreline assessment. Teams should include people with knowledge and experience in oil and oil cleanup techniques, geomorphology, ecology, and in some cases, archeology. Members of a SCAT team may include federal representatives (usually from the [NOAA Scientific Support Team](#) or U.S. Coast Guard), state representatives, a representative of the responsible party, and possibly the landowner or other stakeholders. A SCAT coordinator directs the activities of the SCAT teams from the command post and coordinates with people working on other aspects of the response. (NOAA 2013b)

**SINGLE RESOURCE:** An individual, a piece of equipment and its personnel complement, or a crew or team of individuals with an identified work Supervisor that can be used on an incident. (FEMA Undated)

**SITUATION UNIT:** Functional unit within the Planning Section responsible for the collection, organization, and analysis of incident status information, and for analysis of the situation as it progresses. Reports to the Planning Section Chief. (ICS Undated)

**SPAN OF CONTROL:** The supervisory ratio of from three-to-seven individuals, with five-to-one being established as optimum. (ICS Undated)

**STAFFORD ACT:** The Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act) was enacted to support state and local governments and their citizens when their resources are overwhelmed by the effects of a disaster. The law establishes [the process for requesting and obtaining a Presidential disaster declaration](#), defines the type and scope of assistance available under the Stafford Act, and sets the conditions for obtaining assistance. (EPA 2013c)

**STAGING AREA:** Staging Areas are locations set up at an incident where resources can be placed while awaiting a tactical assignment. Staging Areas are managed by the Operations Section. (ICS Undated)

**STANDARD OPERATING PROCEDURES (SOP):** A complete reference document that details the procedures for performing a single function or a number of interdependent functions. (FEMA 2007)

**STATE WARNING POINT (SWP):** A Warning Point is a facility with the responsibility for receipt of warnings and other emergency information over the National Warning System (NAWAS) and disseminating it in accordance with State and local emergency preparedness plans. Each State has a Primary and Alternate SWP. The primary SWP is staffed 24 hours a day, and exercises operational control over NAWAS within the State. The Alternate SWP is generally located in the State EOC. (FEMA 2001)

**STATE WATCH OFFICE (SWO):** Provides efficient and effective communications during normal periods as well as pre-and-post disaster periods and serves as the contact point in some states for communications between local Governments and Emergency Agencies, State Government Agencies and the Federal Government. (Florida Disaster 2013)

**STRATEGY:** The general plan or direction selected to accomplish incident objectives. (ICS Undated)

**SUPERVISOR:** The ICS title for individuals responsible for command of a Division or Group. (ICS Undated)

**TABLETOP EXERCISE (TTX):** A tabletop exercise is a type of HSEEP exercise. It involves key personnel discussing simulated scenarios in an informal setting. TTXs can be used to assess plans, policies, and procedures. (FEMA 2013a)

**TACTICAL DIRECTION:** Direction given by the Operations Section Chief which includes the tactics appropriate for the selected strategy, the selection and assignment of resources, tactics implementation, and performance monitoring for each operational period. (ICS Undated)

**TASK FORCE:** A combination of single resources assembled for a particular tactical need, with common communications and a leader. (ICS Undated)

**TECHNICAL SPECIALISTS:** Personnel with special skills that can be used anywhere within the ICS organization. (FEMA Undated)

**THREAT AND HAZARD IDENTIFICATION AND RISK ASSESSMENT (THIRA):** A comprehensive approach developed by FEMA for identifying and assessing risks and associated impacts to communities. The approach includes assessing the threats and hazards facing a community of any size, assessing the vulnerability of a community to those hazards, estimating the consequences of the hazards, and establishing capability targets to address the overall community risk. (FEMA2012b)

**THREATENED SPECIES:** The term “threatened species” means any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range - - as defined in the Endangered Species Act. (FWS 2013a)

**TIME UNIT:** Functional unit within the Finance/Administration Section responsible for recording time for incident personnel and hired equipment. (ICS Undated)



**UNIFIED COMMAND:** An application of ICS used when there is more than one agency with incident jurisdiction or when incidents cross political jurisdictions. Agencies work together through the designated members of the Unified Command, often the senior person from agencies and/or disciplines participating in the Unified Command, to establish a common set of objectives and strategies and a single Incident Action Plan. (FEMA Undated)**UNIT:** The organizational element having functional responsibility for a specific incident planning, logistics, or finance/administration activity. (ICS Undated)

**UNITY OF COMMAND:** The concept by which each person within an organization reports to one and only one designated person. The purpose of unity of command is to ensure unity of effort under one responsible commander for every objective. (FEMA Undated)

**WORKSHOP** A workshop is a type of HSEEP exercise. It resembles a seminar but is employed to build specific products, such as a draft plan or policy (e.g., a Training and Exercise Plan Workshop is used to develop a Multi-Year Training and Exercise Plan). (FEMA 2013a)

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<http://www.fws.gov/invasives/>

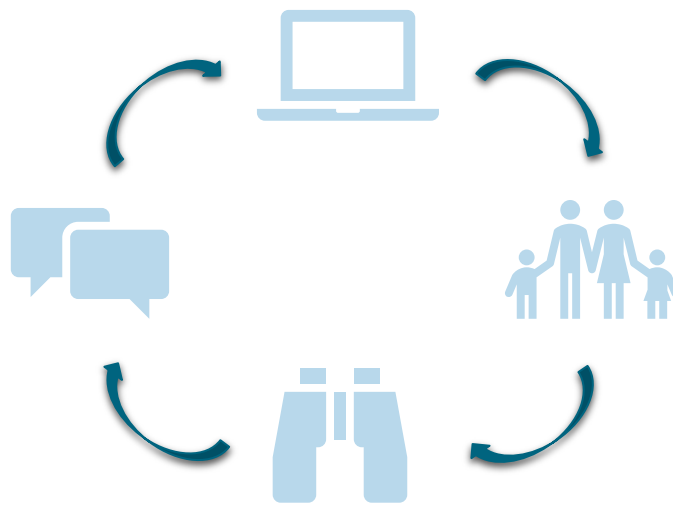
## Appendix 10: GNDNERR Social Networking Strategy

# GRAND BAY NATIONAL ESTUARINE RESEARCH RESERVE

## 2018 SOCIAL NETWORKING STRATEGY

May 7, 2018

Sandra Huynh





## INTRODUCTION

With increased use of social media in today's culture, the Grand Bay NERR embraces social media as a tool to connect and network with audiences. We utilize social media to promote events, keep our followers updated to current happenings at the Reserve, and engage with people using posts that promote inquiry-based approaches to learn new things.

Grand Bay NERR's mission is to practice and promote stewardship of our local coastal resources through our programs. We believe a social networking strategy will help us accomplish this mission. Our primary goal for social networking is two-fold:

- 1) We hope to keep visitors connected with the Grand Bay NERR after their visit.
- 2) We hope Grand Bay NERR social media will bring in potential new visitors.

By increasing numbers in virtual and physical visitors, we encourage repeated visits to the Reserve. Thus, conservation messaging and understanding of scientific and management practices will better resonate with our audiences after multiple visits.

Our 2018 social media strategy outlines our goals, objectives, and accomplishments to date. We discuss our target audiences, appropriate media to post to those audiences, and methods to achieve best responses to our media. We plan to update this strategy as needed.

## GOALS

### TO CREATE AN ONLINE PRESENCE

- Increase our followers and the people we follow to establish a true "network."

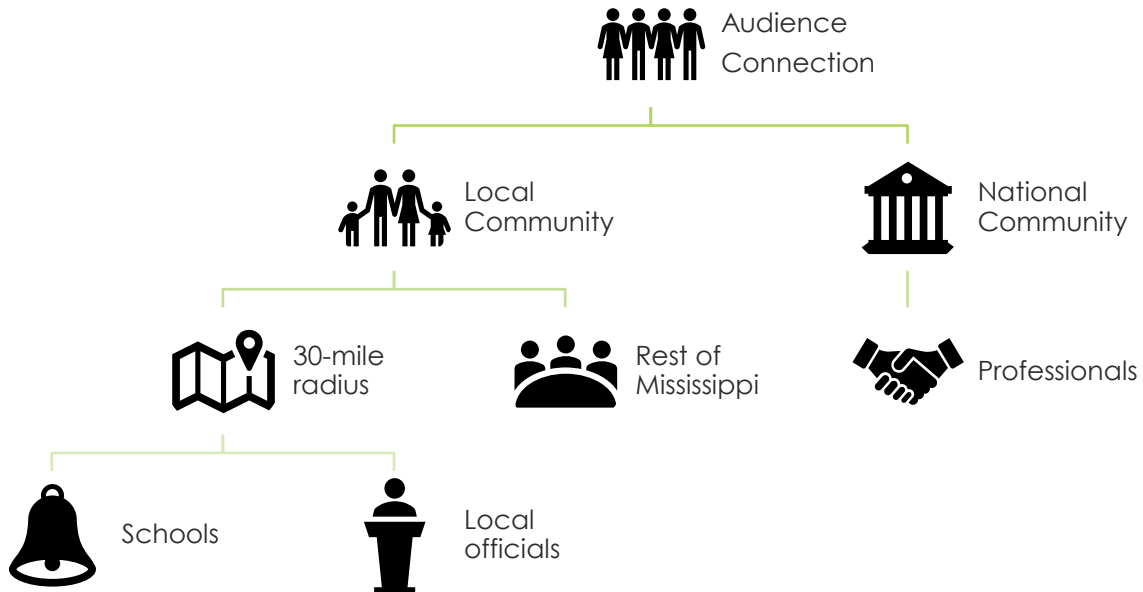
### TO PROMOTE INFORMATION EXCHANGE, EVENTS, SCIENCE, AND BREAKING NEWS

- Maintain an online presence by communicating relevant content

### TO INCREASE SOCIAL AND PHYSICAL ENGAGEMENT

- Increase social networking engagement
- Increase number of physical visitors to the Reserve through events advertising online
- Establish a core group of followers in our online and physical community

## AUDIENCES



Primarily, we focus our efforts to the local community. Seventy-five percent (75%) of our audiences live within 100 miles of the Grand Bay NERR, with most of our audience concentrated within a 30-mile radius of the Reserve, reaching cities such as Ocean Springs and Hurley, MS, and across the state line into Mobile, AL. Typical visitors to the Grand Bay Coastal Resources Center in Moss Point, MS vary seasonally and by visitor type. As we develop and implement a Grand Bay NERR Visitor Use study, results will inform updates for future social media strategies.

## SCHOOL AUDIENCE

In the spring, we have many school field trip groups. Summertime draws in families and children, as well as larger summer camp groups. We see less students at the Coastal Resources Center in the fall, but our staff sees students by going to schools instead, encouraging schools to visit in the springtime.



## HOBBYIST AUDIENCE

In late fall and throughout winter, we have “snowbirders,” or visitors escaping the northern United States for more warmth in the south. Throughout the year, we may have occasional recreational hunters stop in for permits or photography hobbyists stopping in to see what's in bloom or flying around that day.



## FAMILY AUDIENCE

Most of our visitors come in pulses during large Grand Bay NERR Outreach events, such as National Estuaries Day and Star Party. These visitors are typically family groups with children, and family groups average 4 people per group (Star Party, 2017).



## PROFESSIONAL AUDIENCE

The Grand Bay NERR also reaches a professional audience. This audience keeps in touch with Grand Bay NERR all year-round through various onsite- and offsite- workshops and conferences.



## CURRENT SOCIAL NETWORKING PLATFORMS

We currently utilize Facebook and Twitter as our primary social networking platforms. These two platforms can host information, photos, videos, links to events, and most importantly interaction with others through questions, comments, messages, and reposts. We use these two platforms in addition to our official website, [www.grandbaynerr.org](http://www.grandbaynerr.org).

### FACEBOOK

The Grand Bay NERR Facebook page's goal is to encourage inquiry-based science/learning, meaning the posts ask questions that help our followers learn how to get answers. With over 2,000 followers, our Facebook audience is the largest we have. Followers include locals within the community, visitors, teachers, and researchers. Most of our event participants find event information through our Facebook page (based on "How did you hear about this event?" on sign-in sheets).

We currently employ Tuesday Trivia, Creature Feature, Fun Fact Friday, social media campaigns, and create "events" for workshops, trainings, and community outreach programs. Facebook posts are scheduled at peak hours (7pm and 8pm). It is our most interactive and updated platform: <https://www.facebook.com/GrandBayNERR/>.

### TWITTER

The Grand Bay NERR Twitter account was established in August 2013. While Facebook schedules posts and focus on interactive learning, the goal for our Twitter account is to post breaking news or "in-the-moment" posts. With character count limits, photos and quick facts are popular among the Twitter audience. The most interactive Tweets occur during conference travels and participation, with the use of clever hashtags and increased interactions with professional colleagues. Social networking campaigns are most active on Twitter, as it is the preferred platform for other organizations to chime in and participate in campaigns.

Currently, we occasionally retweet other happenings, promote events, post pictures of events/wildlife, and conference travels. The Twitter "voice" we've adopted is personal, clever, and funny (if appropriate). Our goal is to increase followers in both our local and national audiences, and maintain communication and updates with our professional networks.

<https://twitter.com/GrandBayNERR>

## FUTURE SOCIAL MEDIA PLATFORMS

Soon, we would like to use visual platforms such as YouTube and Instagram to reach audiences that are creative and appreciate aesthetic. Both platforms are highly thoughtful, but low maintenance. Unlike Facebook and Twitter, event updates are not as important on YouTube and Instagram. Instead, we would showcase beautiful work created by staff and visitors. Both platforms would highlight media related to **Reserve**, **Habitats**, and **People**.

### YOUTUBE

Grand Bay NERR staff have the interest and talent to produce high-quality and engaging videos for wider networking. Inspired by videos from Mission-Aransas NERR in Texas, we would like to create our own YouTube channel for current and future visitors and stakeholders to watch what's happening at Grand Bay NERR.

Example: <https://www.youtube.com/channel/UCdc705qda7wnTf1QGOq0q3w>

One video will introduce Grand Bay NERR, and highlight the three focus points of **Reserve**, **Habitats**, and **People**. Subsequent videos will incorporate content highlighting at least one of the focus points. Each video will have the Grand Bay NERR logo, and the video caption will include all credits for sound, footage, and production. At Grand Bay, the Director and Director's Assistant will undertake all video projects including capturing footage, writing stories, editing, and publishing.

The advantage of a YouTube channel is having one host site for content, where links can be shared through other outlets (Facebook, Twitter) and video analytics are tracked. This will streamline analytics for the Social Networking Team, as we will be able to access and view data through one account.

### INSTAGRAM

Instagram is a low-maintenance social networking platform that will act as an archive for beautiful Grand Bay imagery. Posts are opportunistic, and many talented photographers within NERR or DMR staff can all contribute to content. Instagram will allow us to share aspects of research and education projects to emphasize the **Reserve's** activities. We will be able to share stunning visual imagery of the NERR's **Habitats**. For **People**, we will share our favorite stories and photos to personalize interactions and connect with various audiences. The goal is to create an awe-inspiring media presence for nature and connecting people with nature.

Currently, the Director's Assistant has been piloting a public page for nature photography on her personal account to experiment with finding an Instagram "voice," knowing what works well with audiences, figuring out how to get followers, finding



creative hashtags, and looking at other pages to see what looks good. Example: [https://www.instagram.com/sandra\\_nature\\_photos/](https://www.instagram.com/sandra_nature_photos/)

## SOCIAL NETWORKING CAMPAIGNS IN 2017

With a new Social Networking Team, we were challenged with vamping our social media game. We participated in internally and externally organized social media campaigns. **Internal campaigns** included Earth Week in April, and Grand Bay NERR Day in June. **External campaigns**, or campaigns driven by a national entity, included: #iheartestuaries in February, and National Estuaries Week in September.

These campaigns have had the biggest impact for engaging Facebook followers and increasing the number of Twitter followers. While Facebook and Twitter posts differ daily, we align the two platforms during large campaigns to administer matching content.

### FEBRUARY: #IHEARTESTUARIES

NERRA encourages all reserves around the country to participate in the #iheartestuaries social media campaign. The goal is to flood social media platforms with reasons why estuaries are loved. This campaign is strategically placed around Valentine's Day, and the campaign itself lasts a week.

In 2017, the Grand Bay NERR social media team held a contest as an incentive for staff participation, which seemed to work very well. We asked staff to submit a photo and caption describing why "iheartestuaries." We aligned Facebook and Twitter for consistent messaging for the week. Each day, a new picture and caption was posted, and the most "likes/retweets" we captured for each post determined our staff winner of that social media campaign.

### APRIL: EARTH WEEK

Earth Week 2017 highlighted staff photos with a contest again, and the theme asked staff why they celebrate Earth Day. We had less staff participation for this campaign, but it was still overall successful online. On Earth Day, we posted a video of the Grand Bay NERR to celebrate our special little corner of earth. The video created by Dr. Ayesha Gray can be found here: What Do Birds See? - <https://youtu.be/Ej4HsUozGzw>.

### JUNE: GRAND BAY NERR DESIGNATION DAY

We celebrated Grand Bay NERR's designation day for the first time in our Reserve's history. While planning for this event, the social media team decided June was appropriate for another miniature social media campaign. This time, we collected video clips from our external partners, who wished us "happy birthday." We used these clips to produce one video, which we added to our event marketing strategy for our



event that Friday, June 16, 2017. The video can be found here:  
<https://twitter.com/GrandBayNERR/status/875734166964457473>.

## SEPTEMBER: NATIONAL ESTUARIES WEEK

The final social media campaign of 2017 was once again led by NERRA. Our strategy for this campaign was to highlight our science staff by finding cool pictures of them in the field or lab, and we created “movie posters” for each scientist for artistic flair. Each day we posted a different scientist, and on each poster, was event information to “meet the scientist” at our National Estuaries Day event. On the Friday before the event, we posted a newly produced video with drone footage of the estuary, trails, buildings, and up-close footage of people at the Coastal Resources Center:  
<https://twitter.com/GrandBayNERR/status/913776121946284035>.

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### \*RADIO SILENCE

In the event of disasters and emergencies, social media platforms will not be utilized unless necessary. We will observe “radio silence” out of respect for the situation, and to open lines (including social media “timelines”) for emergency responders to communicate. This includes cancelling scheduled posts if necessary, and keeping up with breaking news to stay updated and informed. In the event of a disaster response situation at the Grand Bay Coastal Resources Center (NERR and USFWS), we will follow the communications protocol from our Disaster Response Plan.

## ANALYTICS

### WHAT WE KNOW

We know there has been an increase in activity since we started analyzing social media, and since we had two people splitting the social media platforms. Before, one staff member monitored social media accounts and opted to focus more on Facebook.

Facebook activity is geared towards learning, through use of “trivia,” “creature features,” and “fun facts.” Facebook is also our main outlet for advertising events to the mass public.

Most of our virtual connections with other reserves occur on Twitter through large social media campaigns. However, the most personal NERR connections happened in person through the NMEA conference in Charleston, SC, and when visiting NERRs in New England.

### DETAILED ANALYTICS FOR EACH PLATFORM

The data we are most interested in collecting, analyzing, and reporting will help us inform our networking and media strategies. For instance, what time of day does most of our engagements occur? What's the difference between posts that relate to a workshop or event, versus one with a photo? What about activity during a national campaign compared to daily tweets? Which types of posts are most engaging?

To answer these questions, we will pull analytics provided from our social media platforms to compile **semi-annual reports** (see Semi-Annual Reports Outline). In these reports, we hope to include visuals like **maps** and **graphs** that show trends, and we hope to comment on anomalies unusual from daily activities (e.g. national campaigns, conferences). Each of the semi-annual reports will outline **goals** for reporting periods. For instance, did we meet our goals of creating presence, promoting events, engaging with the community? What standards do we choose to say we met those goals? These standards will be set by the Social Networking Team and the Grand Bay NERR Director.

The necessity and longevity of these analytics and reports will be determined by the Grand Bay NERR Director.

### GOOGLE ANALYTICS FOR WEBSITE

Details coming soon.

## SEMI-ANNUAL REPORTS OUTLINE

- I. **Introduction** (highlight main events or successes)
- II. **Goals for this reporting period**
  - a. Statement
  - b. Summary Table with outcomes, met, did not meet
- III. **Website Updates** (ties in anything we've done to improve the website, as far as redesign, content, postings, malware, etc.)
- IV. **Facebook**
  - a. Highlights (expanded from Introduction)
  - b. Reach
    - i. Photos vs Videos
    - ii. Type of Post
      1. Tuesday Trivia
      2. Creature Feature
      3. Fun Fact Friday
      4. Event
  - c. Engagement
    - i. Likes
    - ii. Comments
    - iii. Shares
  - d. Change in number of followers
  - e. Map (s)
- V. **Twitter**
  - a. Highlights
  - b. Reach/Impressions
    - i. Photos vs Videos
    - ii. Type of Post
      1. Retweet (Grand Bay retweets something else)
      2. Mentions (Grand Bay mentions someone else)
      3. Event announcement
      4. Other announcements
      5. Random (anything else not outlined)
  - c. Engagement
    - i. Likes
    - ii. Retweets (someone else retweeted a Grand Bay NERR-created post)
    - iii. Replies (someone as replied to a Grand Bay NERR-created post)
    - iv. Mentions (someone else mentioned Grand Bay NERR)
  - d. Change in number of followers
  - e. Map (s)
- VI. **Visual Platforms Updates (Instagram and YouTube)**
- VII. **Goals for next reporting period**
- VIII. **Appendix of images/best posts**

## Appendix 11: GNDNERR Branding Guide

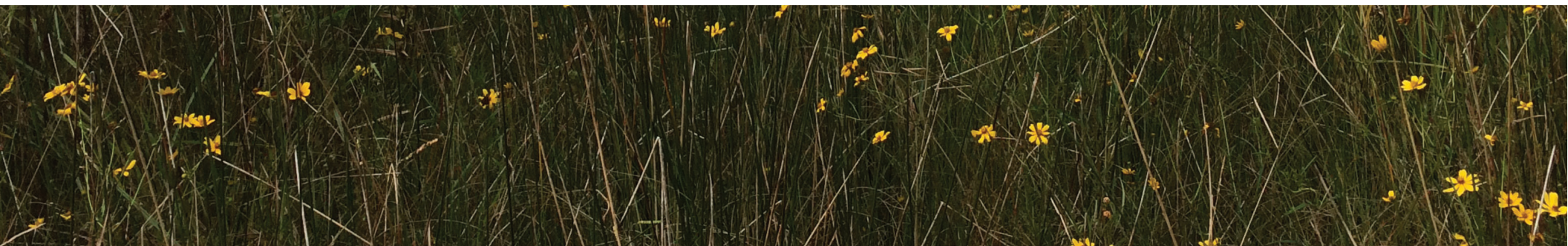




GRAND BAY NATIONAL ESTUARINE RESEARCH RESERVE

# **BRANDING GUIDE**

UPDATED APRIL 2018





# GRAND BAY NERR COLOR PALETTE

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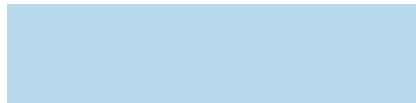
The color palette chosen is reminiscent of the naturalistic colors found along the Savannah Trail. These colors are complimentary to each other and can be used interchangeably with ease.



CMYK Value: C100 M74 Y40 K32  
RGB Value: R0 G58 B93

**Pantone Matching System:**

Spot Color, Coated Paper: 302 C  
Spot Color, Uncoated Paper: 2955U  
Process Color, Coated Paper: 302 CP  
Process Color, Uncoated Paper: 2955 UP



CMYK Value: C26 M6 Y3 K0  
RGB Value: R184 G216 B235

**Pantone Matching System:**

Spot Color, Coated Paper: 290 C  
Spot Color, Uncoated Paper: 290 U  
Process Color, Coated Paper: 290 CP  
Process Color, Uncoated Paper: 290 UP



CMYK Value: C100 M46 Y39 K14  
RGB Value: R0 G100 B127

**Pantone Matching System:**

Spot Color, Coated Paper: 315 C  
Spot Color, Uncoated Paper: 314 U  
Process Color, Coated Paper: 315 CP  
Process Color, Uncoated Paper: 314 UP



CMYK Value: C38 M27 Y27 K0  
RGB Value: R162 G169 B173

**Pantone Matching System:**

Spot Color, Coated Paper: 429 C  
Spot Color, Uncoated Paper: 429 U  
Process Color, Coated Paper: 429 CP  
Process Color, Uncoated Paper: 429 UP



CMYK Value: C47 M61 Y82 K45  
RGB Value: R93 G69 B43

**Pantone Matching System**

Spot Color, Coated Paper: 462 C  
Spot Color, Uncoated Paper: 1545 U  
Process Color, Coated Paper: 462 CP  
Process Color, Uncoated Paper: 1545 UP



CMYK Value: C6 M7 Y35 K0  
RGB Value: R241 G228 B178

**Pantone Matching System**

Spot Color, Coated Paper: 7499 C  
Spot Color, Uncoated Paper: 7499 U  
Process Color, Coated Paper: 7499 C  
Process Color, Uncoated Paper: 7499 U



CMYK Value: C39 M20 Y100 K1  
RGB Value: R168 G173 B0

**Pantone Matching System**

Spot Color, Coated Paper: 383 C  
Spot Color, Uncoated Paper: 397 U  
Process Color, Coated Paper: 383 CP  
Process Color, Uncoated Paper: 397 UP



CMYK Value: C91 M33 Y99 K26  
RGB Value: R0 G105 B55

**Pantone Matching System**

Spot Color, Coated Paper: 349 C  
Spot Color, Uncoated Paper: 348 U  
Process Color, Coated Paper: 349 CP  
Process Color, Uncoated Paper: 348 UP

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# GRAND BAY NERR OFFICIAL FONT

## Primary

It is important to ALWAYS use these primary fonts to maintain a consistent and recognizable Grand Bay NERR brand.

### FUTURA STD

Light  
AaBbCcDdEe  
1234567890  
AaBbCcDdEe  
1234567890

Book  
AaBbCcDdEe  
1234567890  
AaBbCcDdEe  
1234567890

Medium  
AaBbCcDdEe  
1234567890  
AaBbCcDdEe  
1234567890

Heavy  
AaBbCcDdEe  
1234567890  
AaBbCcDdEe  
1234567890

**Bold**  
**AaBbCcDdEe**  
**1234567890**  
**AaBbCcDdEe**  
**1234567890**

**Extra Bold**  
**AaBbCcDdEe**  
**1234567890**  
**AaBbCcDdEe**  
**1234567890**

Condensed Light  
AaBbCcDdEe  
1234567890  
AaBbCcDdEe  
1234567890

Condensed Medium  
AaBbCcDdEe  
1234567890  
AaBbCcDdEe  
1234567890

**Condensed Bold**  
**AaBbCcDdEe**  
**1234567890**  
**AaBbCcDdEe**  
**1234567890**

**Condensed Extra Bold**  
**AaBbCcDdEe**  
**1234567890**  
**AaBbCcDdEe**  
**1234567890**

### CHAPARRAL PRO

Light  
AaBbCcDdEe  
1234567890

*Light Italic*  
AaBbCcDdEe  
1234567890

Regular  
AaBbCcDdEe  
1234567890

*Regular Italic*  
AaBbCcDdEe  
1234567890

**Bold**  
**AaBbCcDdEe**  
**1234567890**

***Bold Italic***  
**AaBbCcDdEe**  
**1234567890**

## Secondary

The secondary font is reserved for limited usage. NEVER use it by itself or in body copy. It must be used in conjunction with Futura STD or Chaparral Pro. Example of usage would be to draw interest in titles.

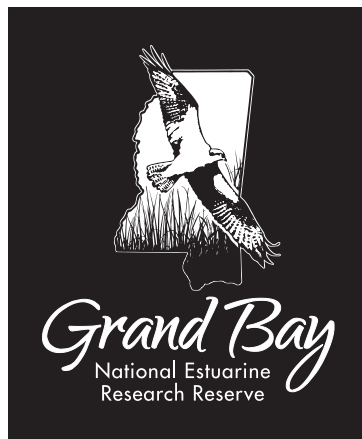
*Quigley*

*Regular*  
AaBbCcDdEe  
1234567890

# GRAND BAY NERR PRIMARY LOGO

The primary logo should always be used to maintain a strong brand. In instances of space limitations, the secondary logo can be used. A horizontal and vertical logo are provided and can be interchangeably used depending on space availability.

## **Vertical**



## **Horizontal**



# GRAND BAY NERR SECONDARY LOGOS

---

Secondary logos are reserved for limited usage. These should only be used when there isn't enough space to print the full logo.

## **Wordmark**

*Grand Bay*  
National Estuarine  
Research Reserve

*Grand Bay*  
National Estuarine  
Research Reserve

## **Image Only**



# GRAND BAY NERR LOGO VARIATIONS

## Spot- 2 Color



## Spot - 1 Color



## Process Color



# GRAND BAY NERR LOGO PROTECTED SPACE

Always provide sufficient protected space around your logo. It is important to provide breathing room around the logo and eliminate visual clutter from surrounding objects (images, text or other logos). Provide the minimum area of the N to prevent competition with surrounding objects. Providing this clear space creates a more impactful and legible logo.



# GRAND BAY NERR LOGO USAGE GUIDELINES

The appearance of the logo should never be altered or edited. The logos should always be used as they exist in the logo files.  
Do not recreate or redraw the logo, change the scale of any elements or change the colors of the logo.

## ***Don't violate the clear space.***



## ***Don't distort.***



## ***Provide sufficient contrast.***



## ***Don't create new logos.***



## ***Don't use an old logo.***







*Grand Bay*  
National Estuarine  
Research Reserve





## Appendix 12: GNDNERR Building Rental Agreement with USFWS



### STATE OF MISSISSIPPI

Phil Bryant  
Governor

### MISSISSIPPI DEPARTMENT OF MARINE RESOURCES

Joe Spraggins, Executive Director

## MEMORANDUM OF AGREEMENT

This Memorandum of Agreement ("Agreement") is between the Mississippi Department of Marine Resources Grand Bay National Estuarine Research Reserve and U.S. Department of Interior, Fish and Wildlife Service.

FWS Agreement: F19MU00032

### SUMMARY

**Purpose:** The Annual Operation and Maintenance of the Grand Bay Coastal Resources Center

**Term:** Five years, with one optional renewal for an additional five years, for a total of ten years

### AUTHORITY

This Agreement is between the Mississippi's Department of Marine Resources Grand Bay Estuarine Research Reserve (MDMR/GBNERR) and the U.S. Department of Interior, Fish and Wildlife Service (Service). The Service is entered into this agreement under the authority of the National Wildlife Refuge System Administration Act, 16 U.S.C. S 668dd (Act). The U.S. Department of Commerce/National Oceanic and Atmospheric Administration (NOAA) has approved a Grand Bay National Estuarine Research Reserve Final EIS and Management Plan that authorizes the Grand Bay National Estuarine Research Reserve under the Coastal Zone Management Act (CZMA) of 1972, as amended, 16 U.S.C. Section 1461. Additionally, a Memorandum of Understanding (MOU) between NOAA and MDMR/GBNERR details the State and Federal (NOAA) Roles in the Grand Bay National Estuarine Research Reserve. There is also an MOU, executed November 22, 2002, among MDMR/GBNERR, Mississippi Secretary of State, the Service, The Nature Conservancy, Mississippi State University and the University of Southern Mississippi forming an Agreement relating to the partnerships at the Grand Bay National Estuarine Research Reserve (MDMR/GBNERR).

## **HISTORY AND BACKGROUND**

The Coastal Zone Management Act establishes National Estuarine Research Reserve System to provide opportunities for long-term research, education and interpretation. Based out of Moss Point, Mississippi, the MDMR/GBNERR is one of the 27 reserves in the National Estuarine Reserve System. In the early 1990's, along with MDMR, a broad-based support group pursued the designation of the Grand Bay site as a National Estuarine Research Reserve to preserve a critical coastal Mississippi ecosystem.

The Grand Bay National Estuarine Research Reserve is comprised of approximately 18,800 acres of coastal wetlands and waters in southeastern Jackson County, Mississippi, with office space located at 6005 Bayou Heron Road, Moss Point, MS.

The Service manages approximately 14,400 acres of coastal wetland and marsh in Jackson County, MS as the Grand Bay National Wildlife, with temporary office space located at 6005 Bayou Heron Road, Moss Point, MS.

Both the MDMR/GBNERR and the Service are federally funded programs with similar goals for conserving, studying and educating the public about wildlife and habitats, including, estuarine and marine resources. The benefits of developing a partnership between these agencies for a facility in Moss Point include sharing costs; obtaining funding from multiple sources; collaborative development and implementation of research, management and education programs; and offering improved and consolidated services and facilities to the public.

The MDMR/GBNERR will be largely funded through NOAA under Section 315 of the Coastal Zone Management Act and the Mississippi Department of Marine Resources. The Service will be funded through the Department of Interior or other sources as appropriated by Congress, both Agencies will meet the administrative requirements associated with those funding sources.

As portions of the Service property have been included in the MDMR/GBNERR boundaries, some lands and waters are intended to be co-managed. The November 22, 2002 partnership MOU outlines commitments of all parties, including:

1. The MDMWGBNERR partner MOU states that the MDMR shall:
  - a. Serve as the NOAA-designated lead agency for the project and will be responsible to NOAA for compliance with federal law and regulations of the national Estuarine Research Reserve System and the goals and objects of the Grand Bay NERR Management Plan.
  - b. Provide for the operation and management of Reserve facilities and equipment.

- c. Serve as the responsible state agency for NERR proposals, funding requests and general administration services, including compliance review and administrative oversight.
  - d. Provide staff, including, but not necessarily limited to the Reserve Manager and/or other staff and other financial support, including operational or matching funds, subject to availability.
  - e. Designate a representative to the Reserve Management Board (Board).
  - f. Provide technical support to assist with resource management, research and monitoring, and educational activities, including legal assistance.
  - g. In conjunction with the Board, implement management activities on State controlled lands or waters of the NERR, consistent with the Reserve Management Plan.
  - h. Assist with the acquisition of lands within the NERR core and buffer boundaries.
2. The MDMR/GBNERR partner MOU states that the US Fish and Wildlife Service shall:
- a. Provide lands and facility support for NERR facilities, as detailed in the MDMR and the Service's SOS Reserve operations MOU, which will identify the Service's land where NERR facilities may be located and/or constructed.
  - b. Coordinate law enforcement activities within the Reserve with the MDMR.
  - c. Designate a representative to the Board.
  - d. Provide technical support as possible and seek funding or in-kind support through the Service for Reserve related activities, including management, research and monitoring, and educational activities in conjunction with the Board.
  - e. In conjunction with the Board, implement management activities on Service controlled lands and waters that are consistent with National Wildlife Refuge compatibility guidelines and are consistent with the Reserve Management Plan.
  - f. Assist with the acquisition of lands located within the MDMWGBNERR that also are within the Grand Bay NWR boundaries.
  - g. Manage Grand Bay National Wildlife Refuge in accordance with the Service's Refuge management policy and the MDMR/GBNERR Management Plan. In the rare instance of conflict, the Service's policy supersedes NERR policy on Refuge lands.

#### **PURPOSE AND OBJECTIVES**

The purpose of this MOA is to establish a working partnership between the MDMR/GBNERR and the Service by providing a framework for occupation, operation

and maintenance of the Grand Bay Coastal Resources Center at the 5-acre site located at 6005 Bayou Heron Road in Moss Point, Mississippi. This facility was built on the Service's lands with funds awarded to and secured by MDMR/GBNERR. Title to the facility shall be vested with the State of Mississippi. Ownership of the facility shall be vested as a capital outlay of the State of Mississippi. Staffs from MDMWGBNERR and the Service will each occupy their own portions of the facility, although various portions will be shared by both entities as shown in Attachment A-Table 1.

#### **RESPONSIBILITIES OF THE PARTIES**

MDMR/GBNERR and the Service agree to the following provisions; The MDMWGBNERR shall:

- a. Provide utilities and support for the operation of the Facility including insurance, telephone system and associated maintenance. electricity, fuel oil, gas, water and waste. and security system.
- b. Provide all services, including janitorial, window cleaning, carpet cleaning, waste removal and grounds keeping.
- c. Provide all service contractors for maintenance and repair of mechanical, electrical, plumbing, cabinetry and other facility components resulting from the general construction of the project.
- d. Provide maintenance staff or contractor for the general maintenance of the Facility.
- e. Ensure compliance with all requirements of any NOAA operations or construction award regarding the use and operation of the Facility.

The Service shall:

- a. Maintain the Service's personal property located in the Facility, including but not limited to audiovisual (AV) equipment, personal computers, scientific equipment, printers, and other office equipment/furnishings. The Service assumes responsibility for payment of all its own monthly obligations incurred for telephone use (e.g., monthly charges for long distance and local service), Internet charges by providers, and/or other communications used in the performance of daily operations and special events (satellite downlinks, broad band telecasts, video conferencing, conference calling, etc.).
- b. Provide funding for the operation and maintenance of the Service's portion of the Facility and one-quarter (1/4) of the shared areas. (See Table 1).
- c. Pay for repair of any damage to the Facility as a result of negligence on the part of the Service employees, volunteers and sponsored agents' actions, to the extent authorized by the Federal Tort Claims Act, 28 USC S 1291 et seq.



All parties agree:

- a. Security for events and functions at the Facility shall be the responsibility of the sponsoring entity.
- b. Third party events will be administered according to the Grand Bay Coastal Resources Center, Space Use and Rental Policy, to be developed jointly as needed.
- c. Responsibility for deferred maintenance needs (e.g., roof or flooring replacement, broken water lines, etc.) shall be allocated between the parties based on the percentage of occupancy as set forth in Operational Costs below.
- d. In the performance of this MOA, employees or agents of each respective party are not to be considered employees of the other party or parties.
- e. The participation of each party to this agreement in activities conducted pursuant to this MOA is not intended to place either party or its representatives in a position of incurring tort liability arising from an action of the other party. Each party is responsible for any injury or property damage to third parties caused by negligence of its own employees acting within the scope of their employment/official duty subject to such limitation as may be prescribed by applicable laws. Specifically, tort liability arising from negligent or wrongful acts or omissions of Service employees acting within the scope of employment shall be adjudicated pursuant to the Federal Tort Claims 28 U.S.C. Section 2671 et seq., the Federal Employees Compensation Act, U.S. Section 8101 et seq., or such other federal legal authority as may be pertinent. Likewise, tort liability arising from negligent or wrongful acts or omissions of the Mississippi State Department of Marine Resources employees while acting within the scope of their employment shall be governed by the Mississippi Tort Claims Act, Mississippi Code S 11-46-1, et seq.
- f. Nothing in the MOA is intended to supersede any laws, regulations, or directives by which the parties must legally abide.
- g. This MOA is neither a fiscal nor a funds obligation document. Nothing in this agreement may be construed to obligate the Service to any current or future expenditure of resources in advance of the availability of appropriations from Congress. Any endeavor involving reimbursement or contribution of funds between the Parties to this MOA will be handled in accordance to applicable regulations, and procedures including those for federal government procurement and printing. Such endeavor will be outlined in separate agreements that shall be made in writing by representatives of the Parties and shall be independently authorized in accordance with appropriate statutory authority. This MOA does not provide such authority.



### **TERM OF AGREEMENT**

This agreement shall be in effect from September 28, 2019, for a period of five (5) years, with one optional renewal for an additional five (5) years, for a total of ten (10) years and replaces the previous agreement executed September 5, 2018 which established the occupancy of the Facility.

### **OPERATIONAL COSTS**

The MDMR/GBNERR and the Service will support the operation and maintenance of the facility, which in total are \$190,632.00 (\$12-individual, \$6-shared per square foot) annually during the Term of Agreement. The MDMR/GBNERR will contribute an amount of \$158,040.00 annually for the operation and maintenance based on its occupation of 9,903 square feet of the facility (62.34 %) and 1/2 of the 4,356 square feet of shared space (2,178 square feet) (13.71 %). The Service will contribute \$32,592.00 annually for the operation and maintenance based on its occupation of 1,627 square feet (10.24 %) of the facility and 1/2 of the 4,356 square feet of shared space (2,178 square feet) (13.71 %).

$(1627 \times 12 = 19,524.00) + (2178 \times 13,068.00) \$32,592.00$ . see Attachment A-Table 1.

As this MOA is renewed MDMR/GBNERR and the Service re-evaluates operation and maintenance costs at the time of renewal of the agreement, the Service will make a determination of whether the cost per square foot of occupied space will be adjusted based on the actual operation and maintenance costs of the facility. This review may include a study of the use and expenses associated with the individual and common spaces. Every two (2) years thereafter, a similar assessment will occur, and the parties will agree to any necessary modifications.

### **PAYMENT**

The MDMR/GBNERR shall be responsible for administering payments for the facility and grounds, excluding those identified as the responsibility of the Service in Responsibilities of the Parties.

The MDMR will invoice the Service for the Services' share annual operational costs outlined above in April each year. The Service will provide payment of operational costs invoiced if appropriations have been made available by Congress.

### **TERMS AND CONDITIONS**

- a. A third-party Space Use and Rental Policy will be developed jointly, as needed, by both parties.
- b. The Service may share its administered space with other partner government and nongovernment organizations if consistent with the mission of the Service and if agreed to by MDMR/GBNERR. Use of the Service's space by such entities is the

responsibility of the Service, which will not be relieved thereby from any obligation under this Agreement.

- c. All parties may, upon reasonable prior notice, enter each other's designated space and all other areas of the Facility. Maintenance staff and contractors will have access to all areas of the Facility at all times.
- d. The MDMR/GBNERR and the Service will work collaboratively to agree on needed improvements and alterations to the shared portions of the facility and grounds. MDMR/GBNERR will have final approval of all improvements and alterations to designated Service space and the Service will carry any financial obligations incurred by the changes. The MDMR/GBNERR will have final authority on all improvements and alterations to designated MDMR/GBNERR space. All changes and or alterations will be consistent with state and local building codes.
- e. The Service shall have use of its portion of the Facility throughout the life of the Facility or until such time as both parties agree that the Service no longer has a use for the assigned spaces. If the Service no longer needs to occupy a specific portion of the space in the facility to support its mission, and thus vacates that portion of the space, this Agreement will be modified to adjust the payments due under Operational Costs, based on the reduced square feet occupied by the Service. The MDMR/GBNERR may not use the vacated space formerly shared, or any part of the facility, for any purpose inconsistent with the NOAA approved MDMR/GBNERR Management Plan without prior written consent from the Service.

Should the Service vacate the Facility entirely, it shall make final operational cost payments under Operational Costs and Payment by the termination date. Additionally, the Service shall at that time offer MDMR/GBNERR the right to purchase the land on which the Facility is located, subject to the approval of the Secretary of the Interior and the Migratory Bird Commission, as required by 16 USC S 668dd(a)(5)(A). The amount MDMWGBNERR shall pay for the land shall be its fair market value, or other value that is consistent with the requirements of 15 USC S 668dd (a) (5) (B).

- f. The MDMR/GBNERR shall not lease the facility or assign any rights under this Agreement without the written approval of the Service. Under no circumstances shall the MDMWGBNERR suffer or permit any lien or encumbrance to be imposed on the Reserve facility. Violation of this provision shall be a default of a material

obligation and this agreement will be subject to termination as provided in Termination.

### **MODIFICATION**

Modifications or renewals of this Agreement may be proposed at any time during the period of performance by either party and shall become effective only when put in writing and signed by all parties. The MDMR Executive Director and the Administrative Services Office Director are the only persons authorized to sign the agreement for the MDMR/GBNERR. The Regional Director and the Contracting Officer are the only persons authorized to sign modifications on behalf of the Service.

### **SPECIAL PROVISIONS**

- a. No member of, or delegate to, Congress, the Mississippi State Legislature or the MDMR Commission on Marine Resources shall be admitted to any share or part of this Agreement or to any benefit that may rise therefrom. This provision shall not be construed to extend to this Agreement if made with a corporation for its general benefit.
- b. Nothing in this Agreement shall obligate any party in the expenditure of funds, or for future payments of money, in excess of provisions of this agreement or appropriations authorized by law.
- c. The parties accept responsibility for any property damage, injury or death, caused by the acts or omissions of their respective employees/volunteers acting within the scope of their employment, to the fullest extent permitted by law.
- d. Both parties agree to comply with all applicable federal or state laws regulating ethical conduct of public officers and employees.
- e. Each party will comply with all applicable laws, regulations and executive orders relative to Equal Employment Opportunity.
- f. Nothing herein is intended to conflict with federal, state or local laws or regulations. If there are conflicts, this Agreement will be amended at the first opportunity to bring it into conformance with conflicting laws or regulations.

### **TERMINATION**

The Service may terminate their participation in this MOA by giving 60-day written notice to the MDMR/GBNERR. Upon delivery and receipt of this notice, the parties will promptly meet to resolve their differences. If such efforts are unsuccessful, the Service shall bring its activities to a prompt and orderly close and vacate the facility at the expiration of the notice period.

Termination or non-renewal of the MOA by the Service shall not affect the use of the grounds and the operation of the facility by the MDMR/GBNERR. In the event that the

Service should vacate, the Service shall offer MDMR/GBNERR the right to purchase the land on which the facility is located, as provided for in Terms and Conditions.

The MDMR/GBERR may terminate their participation in this MOA by giving 60-day written notice to the Service. Upon delivery and receipt of this notice, the parties will promptly meet to resolve their differences. If such efforts are unsuccessful, the MDMR/GBNERR shall bring its activities to a prompt and orderly close and vacate the facility at the expiration of the notice period. In the event that the MDMR/GBNERR elects to vacate the shared facility, the Service may, but is not obligated to, take possession of the facility after compensating the MDMR/GBNERR for the fair market value of the facility. Any disposition of the facility shall be subject to the approval of the Service, MDMR/GBNERR and NOAA.

## **MISCELLANEOUS**

### **Choice of Law**

Each provision of the MOA, as applicable to each agency, is subject to the laws of the State of Mississippi; the laws, regulations, and policies of the Service; and the policies and standard operating procedures of MDMR. Any litigation with respect to this MOA shall be brought in the applicable state or federal court of Mississippi. The Service and its employees are governed by Federal Law.

### **Entire Agreement**

This Agreement expresses the complete understanding of the parties with respect to the subject matter and supersedes all prior proposals, agreements, representations and understandings.

### **Transparency**

This Agreement is subject to the "Mississippi Public Records Act of 1983," Miss. Code Ann. 25-61-1 et seq. and Miss. Code Ann. 79-23-1 and may be shared with the public on request. Information identified by the MDMR as trade secrets, or other proprietary information, including confidential vendor information, or any other information which is required confidential by state or federal law or outside the applicable freedom of information statutes, will be redacted. In the event the MDMR receives a public records request for documents containing information identified by the MDMR as trade secrets or proprietary information, the MDMR will notify the MDMR who will be given a reasonable time to obtain a court order protecting the information. See Miss. Code Ann. 25-61-9(1).

### **Severability**

If a court finds any provision of this Agreement invalid or unenforceable, the remainder of this Agreement shall be interpreted so as best to affect the intent of the parties.



**Statement Regarding Liabilities**

The MDMR and the Service each, respectively, agree to be responsible only to the extent allowed by applicable law for the negligent and intentional acts of their respective employees that arise out of or are related to their performance under this agreement. However, this must not be construed as conflicting with the Mississippi Tort Claims Act (Miss. Code Ann. I 146-1 *et seq.*) or the Federal Tort Claims Act, (28 USC 1291 *et seq.*).

**No Third-Party Beneficiaries**

This agreement is for the sole benefit of the parties and nothing herein, express, or implied, is intended to or shall confer upon any other person or entity any legal or equitable right, benefit, or remedy of any nature whatsoever, under or by reason of this agreement.

**Notices**

All notices required or permitted to be given under this agreement must be in writing and personally delivered or sent by Certified United States mail, postage prepaid, return receipt requested, to the party to whom the notice should be given at the address set forth below. Notice shall be deemed given when received or when refused. The parties agree to promptly notify each other in writing of any change of address.

For the MDMR:  
 Joe Spraggins, Executive Director  
 Mississippi Department of Marine Resources  
 1141 Bayview Avenue  
 Biloxi, MS 39530

For the U.S. Department of Interior, Fish and Wildlife Service:  
 Leopoldo Miranda, Regional Director  
 U.S. Fish and Wildlife Service  
 1875 Century Boulevard  
 Atlanta, GA 30345

**Summary**

The Summary in this Agreement is for convenience only and is not a complete expression of the terms of this Agreement. In any case in which the terms of the Agreement and the Summary conflict, the terms of the Agreement will control.

**Attachment**

The attachment to this Agreement, Attachment A-Table 1, Grand Bay Coastal Resources Center Space Allocation Summary, is incorporated herein by reference.

IN WITNESS WHEREOF, the parties hereto have caused this Memorandum of Agreement to be executed as of the date of the last signature below.

Mississippi Department of Marine Resources

  
\_\_\_\_\_  
Joe Spraggins, Executive Director

12-13-19  
\_\_\_\_\_  
Date

U.S. Fish and Wildlife Service

*For*   
\_\_\_\_\_  
Leopoldo Miranda, Regional Director

12/12/2019  
\_\_\_\_\_  
Date



Attachment A-Table 1

## Grand Bay Coastal Resources Center Space Allocation Summary (Conditioned Space)

Room #	Room Name	Area	USFWS	GBNERR	Shared
100	Classroom	1122		1122	
100A	Classroom Storage	180		180	
101	Computer Classroom	575		575	
101A	Conference Storage	100		100	
102	Women	180			180
103	Janitor	44			44
104	Men	180			180
105	Interpretive Area	935			935
106	Educational Storage	65			65
107	USFW Open Office Area	875	875		
107A	USFW Reserve Manager	172	172		
107B	USFW Office	114	114		
107C	USFW Office	114	114		
107D	USFW Office	114	114		
107E	USFW Law Enforcement	170	170		
107E2	USFW Storage	68	68		
108	Lobb	884			884
109	Men	50			50
110	Women	50			50
111	Kitchen/Breakroom	168			168
112	Meeting Room	290			290
113	Office/Workroom	330		330	

113A	Storage	126	126	
114	GIS Office	238	238	
115	Specimen Storage	200	200	
116	Equipment Storage	196	196	
117	Chemical Analysis Lab	725	725	
117A	Microbiology Lab	124	124	
118	Biological Research Lab	725	725	
119	Lockers	50	50	
119A	Toilet	50	50	
120	Mechanical	780		780
122	NERR Office	96	96	
123	NERR Office	96	96	
124	NERR Office	96	96	
125	NERR Office	96	96	
126	NERR Office	96	96	
127	NERR Office	96	96	
128	NERR Office	96	96	
129	NERR Office	96	96	
130	Tech Work Area	285	285	
131	NERR Office	96	96	
132	NERR Office	96	96	
133	NERR Office	96	96	
134	NERR Office	96	96	
135	NERR Office	96	96	
136	NERR Reserve Manager	280	280	

137	NERR Office	138		138		
138	Resource Room	138		138		
139	Mechanical	280			280	
140	Data	46			46	
141	NERR Office	86		86		
001	Corridor	404			404	
002	Corridor	679		679		
002A	Janitor	12		12		
002B	Washer/Dryer	12		12		
003	Corridor	490		490		
D100	Commons	270		270		
D100B	Laundry	26		26		
D101	Kitchen	112		112		
D102	Mechanical	60		60		
D103	Bunks	236		236		
D103A	Bath	142		142		
0104	Bunks	236		236		
D104A	Bath	142		142		
D105	Dorm	140		140		
D105A	Bath	55		55		
D106	Dorm	140		140		
D106A	Bath	55		55		
D001	Corridor	180		180		
	Parking Lot					
<b>Total Assignable Square Footage</b>		15886	1627	9903	4356	

<b>Percentage of Total Square Footage</b>			10.24%	62.34%	27.42%	
<b>Price Per Square Foot</b>		12	12	12	3.9	
<b>Total</b>		190632				
<b>USFWS</b>			19524		13068	<b>32592</b>
<b>GBNERR</b>				118836	39204	<b>158040</b>
	<b>Unconditioned Space</b>					
<b>121</b>	Screened Mudroom	380		380		
<b>100B</b>	Screened Porch	455		575		

## Appendix 13: Gold LEED Certification in 2010



# LEED-NC

## How to Interpret this Report

**Purpose** The Leadership in Energy and Environmental Design (LEED) Rating System was designed by the US Green Building Council to encourage and facilitate the development of more sustainable buildings.

**Environmental Categories** The report is organized into five environmental categories as defined by LEED including: Sustainable Sites, Water Efficiency, Energy & Atmosphere, Materials & Resources, Indoor Enviro

**LEED Prerequisites** Prerequisites must be achieved. Non-compliant prerequisites must be resolved before a certification can be awarded.

**LEED Credits** The environmental categories are subdivided into the established LEED credits, which are based on desired performance goals within each category. An assessment of whether the credit is earned or denied is made and a narrative describes the basis for the assessment.

**Achieved** The applicant has provided the mandatory documentation which supports the achievements of the credit requirements, achieving the associated points. Currently the project has scored the adjacent points in this category.

45

**Denied** The applicant has applied for a point in a particular credit, but has misinterpreted the credit intent or cannot substantiate meeting the requirements. Currently the project has the adjacent points in this category.

0

**Rating** This Project has achieved enough points for Gold Rating.

**Official Scores** Official LEED v2 Scores: Certified: 26-32 Silver Rating: 33-38 Gold Rating: 39-51 Platinum Rating: 52+



Earned	Denied		
9	0	Sustainable Sites	Possible Points 14
0	0	<b>Erosion &amp; Sedimentation Control</b>	Prerequisite 1-Version 2.1
		<b>Design Application</b>	12/9/2009
		The LEED Submittal Template has been provided stating that the project has followed an erosion and sediment control plan that complies with the referenced EPA standard. Additionally, the project team has provided a list of the measures implemented on-site that includes dust control, permanent seeding and planting, installation of silt fences, and soil retaining measures.	
<input type="checkbox"/>	<input type="checkbox"/>	<b>Site Selection</b>	Credit 1-Version 2.1
<input type="checkbox"/>	<input type="checkbox"/>	<b>Urban Redevelopment</b>	Credit 2-Version 2.1
<input type="checkbox"/>	<input type="checkbox"/>	<b>Brownfield Redevelopment</b>	Credit 3-Version 2.1
<input type="checkbox"/>	<input type="checkbox"/>	<b>Alternative Transportation, Public Transportation Access</b>	Credit 4.1-Version 2.1
0	0		
1	0	<b>Alternative Transportation, Bicycle Storage &amp; Changing Rooms</b>	Credit 4.2-Version 2.1
		<b>Design Application</b>	12/9/2009
		The LEED Submittal Template has been provided stating that the project has provided bicycle storage and shower facilities for 5% of the building non- residential occupants and 15% for residential occupants. A site plan and floor plan have been provided highlighting the location of bike racks for residential and non-residential occupants. One shower facility is available for non-residential occupants. Although FTE calculations do not match the LEEDv2.1 reference guide for visitors, correcting the calculation to be on a daily basis (instead of a weekly basis) shows that the project still is able to earn the credit. The project team should be mindful of consistent FTE values across all credits for future LEED applications.	

1	0	<b>Alternative Transportation, Alternative Fuel Refueling Stations</b>	Credit 4.3-Version 2.1
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**Design Application**

12/9/2009

The LEED Submittal Template has been provided stating that one alternative fuel vehicle has been purchased to accommodate 3% of documented building occupants. A copy of the 2-year purchase agreement and a site plan highlighting the location of the preferred parking has also been provided. Although the building occupancy is inconsistent with SSc4.2, the number of required AFV parking spots does not change.

1	0	<b>Alternative Transportation, Parking Capacity</b>	Credit 4.4-Version 2.1
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**Design Application**

12/9/2009

The LEED Submittal Template has been provided stating that the parking capacity for the project does not exceed the minimum parking zoning requirements for the project. A copy of the zoning requirements have been provided and include parking requirements for offices, classrooms, an auditorium, and others. Together, 57 spaces are allowed. The project has provided a total of 44 parking spaces plus a bus unloading zone.

1	0	<b>Reduced Site Disturbance, Protect or Restore Open Space</b>	Credit 5.1-Version 2.1
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**Design Application**

12/9/2009

The LEED Submittal Template has been provided stating that the site has been previously developed and that 81% of the site area that does not fall within the building footprint has been restored with native planting. A site drawing and calculations have been provided claiming that 12.89 acres (excluding the building footprint) has been planted with native or adaptive species. The site boundary is consistent across credits.

1	0	<b>Reduced Site Disturbance, Development Footprint</b>	Credit 5.2-Version 2.1
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**Design Application**

12/9/2009

The LEED Submittal Template has been provided stating that the project has been developed in an area with no minimum code requirements for open space, and that dedicated open space, greater than or equal in size to the building footprint, has been provided adjacent to the building. Calculations illustrating the development footprint have been provided indicating the project site boundary is 15.68 acres, with 12.89 acres restored. A letter from the Grand Bay Reserve Manager describes the site restoration methodology; however it does not state that the open space will be preserved for the life of the building.

**TECHNICAL ADVICE:**

Please provide a revised letter from the building owner stating that the open space that has been provided adjacent to the building will be conserved for the life of the building.

**Construction Application**

4/12/2010

The project team provided a response narrative, Submittal Template, aerial site plan and a letter from the owner stating their commitment to preserve the designated open space.

1	0	<b>Stormwater Management, Rate or Quantity</b>	Credit 6.1-Version 2.1
		<b>Design Application</b>	12/9/2009
		The LEED Submittal Template has been provided stating that the project has implemented a stormwater management plan that results in no net increase in runoff rate from calculated pre-project conditions, for a 1.5 year, 24 hour peak discharge. Calculations have been provided to demonstrate compliance with the requirements of this credit.	
0	0	<b>Stormwater Management, Treatment</b>	Credit 6.2-Version 2.1
1	0	<b>Landscape &amp; Exterior Design to Reduce Heat Islands, Non-Roof</b>	Credit 7.1-Version 2.1
		<b>Design Application</b>	12/9/2009
		The LEED Submittal Template has been provided stating that a minimum of 30% of the non-roof impervious surfaces on-site are open grid pavement. The project has installed 8" and 12" gravel paving for the access roads and parking stalls respectively. A site plan showing the extents of the gravel pavement have been provided.	
1	0	<b>Landscape &amp; Exterior Design to Reduce Heat Islands, Roof</b>	Credit 7.2-Version 2.1
		<b>Design Application</b>	12/9/2009
		The LEED Submittal Template has been provided stating that 76% of the total roof area consists of an Energy Star rated roofing material. Although emissivity for LEED NC v2.1 compliance could not be confirmed, based on the cutsheet provided the roofing material meets Energy Star rating.	
1	0	<b>Light Pollution Reduction</b>	Credit 8-Version 2.1
		<b>Design Application</b>	12/9/2009
		The LEED Submittal Template has been provided stating that the project's exterior lighting has been designed in accordance with the referenced IESNA guidelines. However, the submitted photometric plan that indicates luminance levels ranging from 0.3-0.6 10' beyond the site boundary on the western and eastern edge. This exceeds credit requirement of maintaining 0.1 footcandles or less 10' beyond the site boundary.	
		TECHNICAL ADVICE: Please provide additional documentation or an applicable CIR showing how the photometric plan meets the credit requirements.	
		<b>Construction Application</b>	4/12/2010
		The project team provided a revised Submittal Template, response narrative, photometric data and reference to a CIR dated on 12-2-06 stating that the light trespass in question falls within a right-a-way zone and does not exceed 0.1 foot candles 15 feet beyond the curb. The project team has demonstrated credit requirements.	

Earned	Denied		
5	0	Water Efficiency	Possible Points 5
1	0	<b>Water Efficient Landscaping, reduce by 50%</b>	Credit 1.1-Version 2.1
		<b>Design Application</b>	12/9/2009
		The LEED Submittal Template has been provided stating that no permanent irrigation system has been installed. A narrative has also been included describing the implementation of fire management to restore native plants back to the site. Additionally cisterns that collect rainwater provide temporary irrigation if needed.	
1	0	<b>Water Efficient Landscaping, No Potable Use or No Irrigation</b>	Credit 1.2-Version 2.1
		<b>Design Application</b>	12/9/2009
		The LEED Submittal Template has been provided stating that no permanent irrigation system has been installed. A narrative has also been included describing the implementation of fire management to restore native plants back to the site. Additionally cisterns that collect rainwater provide temporary irrigation if needed.	
1	0	<b>Innovative Wastewater Technologies</b>	Credit 2-Version 2.1
		<b>Design Application</b>	12/9/2009
		The LEED Submittal Template has been provided stating that 100% of wastewater will be treated to tertiary standards on site. A sanitary system details drawing has been provided, in addition to specs highlighting the operation and maintenance of the on-site wastewater treatment system.	
2	0	<b>Water Use Reduction</b>	Credit 3.1-3.2-Version 2.1
		<b>Design Application</b>	12/9/2009
		The LEED Submittal Template and narrative have been provided stating that the project has reduced potable water use by 76% from a calculated baseline design through the installation of urinals, low flow and flush fixtures, and the collection of rainwater to supplement potable water usage. The female water use calculation for the Caroma Caravelle fixture is incorrect; there should be 1 high flow use and 2 low flow uses per day (this matches the male use of urinals). This reduces the water savings to 71%.	
Earned	Denied		
11	0	Energy & Atmosphere	Possible Points 17

8/6/2010

Construction Application Review

0

0

### **Fundamental Building Systems Commissioning**

Prerequisite 1-Version 2.1

#### **Design Application**

12/9/2009

The LEED Submittal Template has been provided stating that the fundamental commissioning requirements have been completed or is under contract.

0

0

### **Minimum Energy Performance**

Prerequisite 2-Version 2.1

#### **Design Application**

12/9/2009

The LEED Submittal Template has been provided stating that the project complies with the minimum energy performance requirements of ASHRAE 90.1-1999.

0

0

### **CFC Reduction in HVAC&R Equipment**

Prerequisite 3-Version 2.1

#### **Design Application**

12/9/2009

The LEED Submittal Template has been provided stating that base building HVAC&R systems use no CFC-based refrigerants. Additionally, a cutsheet of HVAC unit by Trane have also been submitted.

9

0

**Optimize Energy Performance**

Credit 1.1-1.10-Version 2.1

**Design Application**

12/9/2009

The LEED Submittal Template and supporting documentation have been provided stating that the project has achieved an energy cost savings of 39% using the ASHRAE 90.1-1999 Energy Cost Budget methodology. Energy efficiency measures include an improved thermal envelope, high efficiency glazing, reduced lighting power density, occupancy sensors, full dimming daylight dimming sensor, and dedicated outdoor air units with energy recovery. The provided documentation has shown energy savings of approximately 12.5% due to energy use reductions in lighting. However, three issues should be addressed for the final review.

**TECHNICAL ADVICE:**

1. The list of building energy efficiency measures states that "compressors with variable speed drive" is an energy efficiency measure; however, it is unclear which compressors are being claimed for savings. The comparison chart in the energy model report notes that there are "constant speed" compressors in the baseline case so it is presumed that the air cooled chiller is not the equipment with variable speed compressors. The project has selected HVAC system 9 as the Baseline system in Figure 11.4.3 which indicates that the individual heat pumps in the Grand Bay Center are all single zone units. GBCI is not familiar with single zone heat pump units that have variable speed drive compressors. If, in fact, the project has installed a multi-zone, variable refrigerant flow heat pump system, then the proper comparison for the ASHRAE baseline in Figure 11.4.3 is system 3. Please clarify the source of the variable speed drive compressors, provide a cutsheet if they are single zone heat pump units, and/or update the energy model if the wrong ASHRAE baseline system was selected.

2. The ASHRAE baseline heating & cooling efficiencies do not match Table 6.2.1B in a consistent manner. The energy model report states that the heating efficiency is a COP of 3.2 which matches the air cooled heat pumps in the size range of 5 to 11 tons (cooling capacity). Table 6.2.1B would then require that the ASHRAE baseline cooling capacity be 10.1 EER; however, the energy model report uses a value of 10 SEER. Please provide additional information regarding the size of the heat pumps and update the energy model, as needed, to match the minimum efficiencies required by Table 6.2.1.

3. The energy cost budget method requires that equipment power densities be included in the model (for proper sizing of HVAC equipment) but excluded from the energy cost calculations. The final dollar values shown in the Energy Cost Budget Table (e.g. regulated energy summary by end use) are correct; however, there are several mistakes with the rest of the energy cost summary table. For future (LEED v2.1) reviews, please ensure that the column labels, energy consumption values, and "total including renewable" values reflect the requirement to exclude equipment power from the energy cost.

**Construction Application**

4/12/2010

The project team provided a revised LEED Submittal Template, a brand new energy model, and a narrative clarifying that the original staff person and the original energy model could not be located in order to make the corrections from the preliminary review. The new energy model shows approximately 13.8% energy savings due to lighting so 1 point can be awarded. The remaining energy cost savings of 27% could not be confirmed due to the following issues:

1. The documentation provided by the project team does not follow guidelines for v2.1 EAc1 submittals. BEPU, BEPS, and ES-D output reports are needed from eQUEST. These reports support the modeler's calculations and also demonstrate compliance with Section 11.4.3 (j) regarding unmet load hours. If appealing this credit, please upload copies of these output reports to LEED Online. Make sure to review the "percent of hours any system outside of throttling range" and confirm that it complies with Section 11.4.3 (j).

2. The information in Section D of the "Energy Model Results" report appears to include conflicting information regarding the heat source for the Baseline HVAC system. On the top line of "System Type", it is stated that a hot water electric fuel boiler is provided for HVAC heating. In addition, the Baseline column of the energy output tables show that pumps are modeled. However, under "boiler" in Section D, the baseline column says "N/A". ASHRAE requirements for HVAC System Type 3 are for electric resistance heating inside the packaged HVAC units. This means that no boilers or hot water pumps should be modeled for the baseline HVAC system. However, based on the energy output results it appears that a hot water electric fuel boiler has been installed in the Baseline model. If appealing this credit please review the energy model inputs, make corrections



0	0	<b>Renewable Energy</b>	Credit 2.1-2.3-Version 2.1
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		<b>Additional Commissioning</b>	Credit 3-Version 2.1
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1	0	<b>Ozone Depletion</b>	Credit 4-Version 2.1
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**Design Application** 12/9/2009

The LEED Submittal Template has been provided stating that base building HVAC&R systems use no HCFC-based refrigerants or Halons.

		<b>Measurement &amp; Verification</b>	Credit 5-Version 2.1
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1	0	<b>Green Power</b>	Credit 6-Version 2.1
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**Design Application** 12/9/2009

The LEED Submittal Template has been provided stating that the project has a 2-year purchase agreement to procure 50% of the project's regulated annual electric energy from a power supply that meets the Green-E definition for renewable power. The submitted documentation includes a copy of the two-year contract with Renewable Choice Energy. Although several energy efficiency points have been pending under EA credit 1, addressing these issues should not impact the proposed case regulated annual electricity consumption which is what this credit is based on. Please note that since this project is applying under the LEED versions 2.1 rating system, it is not required to purchase energy to cover the "equipment power" modeled in EA credit 1. It appears that the project has purchased 282 MWh; however, this credit only requires a purchase of 186 MWh.

Earned	Denied	<b>Materials &amp; Resources</b>	<b>Possible Points</b>	<b>13</b>
2	0			

0 0

**Storage & Collection of Recyclables**

Prerequisite 1-Version 2.1

**Design Application**

12/9/2009

The LEED Submittal Template has been provided stating that the project has provided appropriately sized dedicated areas for the collection and storage of recycling materials, including cardboard, paper, plastic, glass, and metals. However, plans highlighting the location of recycling collection areas within the project have not been provided.

TECHNICAL ADVICE

Please provide plans that highlight the location of recycling collection areas within the project.

**Construction Application**

4/12/2010

The project team provided the Submittal Template, response narrative, and plans showing the location of exterior and interior collection and storage areas for recyclables. The project team has demonstrated credit compliance.

0 0

**Building Reuse**

Credit 1.1-1.3-Version 2.1

2 0

**Construction Waste Management**

Credit 2.1-2.2-Version 2.1

**Design Application**

12/9/2009

The LEED Submittal Template has been provided stating that the project has diverted 202.2 tons (82.22%) of on-site generated construction waste from landfill. Calculations and a narrative have been provided documenting Fayard & Son's Waste Services as the receiving agency for the demolition waste and building construction. The significant contributor of diverted materials from the landfill was recycled biomass cleared from the site was used as mulch for habitat restoration on site.

0 0

**Resource Reuse**

Credit 3.1-3.2-Version 2.1

0 0

**Recycled Content**

Credit 4.1-4.2-Version 2.1

0 0

**Local/Regional Materials**

Credit 5.1-5.2-Version 2.1

0 0

**Rapidly Renewable Materials**

Credit 6-Version 2.1

0 0

**Certified Wood**

Credit 7-Version 2.1

Earned	Denied		
13	0	Indoor Environmental Quality	Possible Points 15
0	0	<b>Minimum IAQ Performance</b>	Prerequisite 1-Version 2.1

**Design Application** 12/9/2009

The LEED Submittal Template has been provided stating that the project complies with the minimum IAQ performance requirements of ASHRAE 62-1999 and all approved Addenda. A supplemental narrative has been provided to document the project's compliance with the Ventilation Rate Procedure methods. The project has installed dedicated outdoor air units with energy recovery which provide a total of 2,670 cfm of outside air.

0	0	<b>Environmental Tobacco Smoke (ETS) Control</b>	Prerequisite 2-Version 2.1
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**Design Application** 12/9/2009

The LEED Submittal Template has been provided stating that smoking is prohibited on the campus per Mississippi Code Section 29-5-161 (2). A narrative has been provided stating all government buildings must comply with the no smoking code.

8/6/2010

Construction Application Review

1

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**Carbon Dioxide (CO2) Monitoring**

Credit 1-Version 2.1

**Design Application**

12/9/2009

The LEED Submittal Template has been provided stating that the project has installed a CO2 monitor in one of the DOAS units that provides feedback on space ventilation performance in a form that affords operational adjustments. Additionally, a narrative has been provided that describes the installed sensors, operational parameters, and design conditions. However, several issues should be addressed for the final review:

**TECHNICAL ADVICE:**

1. It appears from the narrative that only 1 of the 2 DOAS units have CO2 controls. This credit requires that regularly occupied spaces are included in the demand controlled ventilation system. Please clarify which spaces are served by the system and provided documentation addressing why any excluded areas should be exempt from this credit.
2. The provided narrative appears to state that the CO2 monitoring system was designed using an FTE of 320 people and ventilation rates from ASHRAE Standard 62.1-2004. Since EQ prerequisite 2 follows the older 1999 standard, this credit must also follow the LEEDv2.1 version of the credit requirements. Please clarify the number of people used to determine the CO2 thresholds. If the number is different from occupancy values used for SS and WE credit, please clarify why the values are different. In general, FTE values must be the same for all LEED credits.
3. Since this project uses 100% outdoor air units, it is not clear how the CO2 sensors are providing feedback to the occupants in a form that affords operational adjustment. The narrative notes that the EMCS trends CO2 levels and provides an alarm. Please clarify who receives the alarm information, how timely the alarms are received, and what action is taken to resolve the high CO2 levels.

**Construction Application**

4/12/2010

The project team provided the Submittal template and response narrative clarifying installed CO2 monitors, consistency of FTE values, and fresh air conditions.

1. The project team clarified the zone in question and stated it is a non-densely occupied space and does not require a CO2 monitor.
2. The project team has revised the FTE values to 40 people rather than 320, as stated in the prelim review, and is consistent across all credits.
3. A DOAS system provides 100% fresh air to all occupied spaces. CO2 monitors are located in the air return ducts and are monitored by a central DDC front end system. When high CO2 is sensed, the building's fan coils increase air flow. Alarms are sent to the building maintenance crew for corrective action.

0

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**Increase Ventilation Effectiveness**

Credit 2-Version 2.1

1

0

**Construction IAQ Management Plan, During Construction**

Credit 3.1-Version 2.1

**Design Application**

12/9/2009

The LEED Submittal Template has been submitted stating that the project developed and implemented a construction IAQ management plan that followed the referenced SMACNA Guidelines. The plan indicates that the air handling equipment was sealed and not operated during construction, and that MERV 13 filtration media was installed prior to occupancy. Photographs, taken on a minimum of 3 different occasions, and a narrative describing the implemented IAQ measures have also been provided.

1

0

**Construction IAQ Management Plan, Before Occupancy**

Credit 3.2-Version 2.1

**Design Application**

12/9/2009

The LEED Submittal Template has been submitted stating that the project conducted a two-week flush out prior to occupancy. The flush out was conducted between 5/13/2009 and 5/27/2009. A narrative has been provided describing the building flush out procedures. Photographs of installed MERV 13 filter media have also been provided.

3

0

**Low-Emitting Materials**

Credit 4.1-4.4-Version 2.1

**Design Application**

12/9/2009

EQC4.1

The LEED Submittal Template has been provided stating that all adhesive and sealant products comply with the VOC limits of the referenced standards for this credit. A summary of all interior adhesive and sealant products has been provided along with VOC data for each product confirming that they comply with the referenced VOC limits.

EQC4.2

The LEED Submittal Template has been provided stating that all indoor paints comply with the VOC and chemical component limits of Green Seal's Standard GS-11 requirements. A summary of all interior paints has been provided along with VOC data for each product confirming that they comply with the referenced VOC and chemical component limits.

EQC4.3

The LEED Submittal Template has been provided stating that installed carpet systems comply with the VOC limits of the Carpet and Rug Institute's Green Label Air Quality Testing Program. The submittal lists Shaw carpet system as the installed product.

1

0

**Indoor Chemical & Pollutant Source Control**

Credit 5-Version 2.1

**Design Application**

12/9/2009

The LEED Submittal Template has been provided stating that the project has installed the required entryway systems, physically separated chemical use areas and copy rooms with deck-to-deck partitions, installed independent exhaust ventilation at 0.50 cfm/square foot, maintained negative pressure differential of 7 PA, and in spaces where water and chemical concentrate mixing occurs, has established drains environmentally appropriate for disposal of liquid waste.

2

0

**Controllability of Systems**

Credit 6.1-6.2-Version 2.1

**Design Application**

12/9/2009

EQc6.1

The LEED Submittal Template has been provided stating that, for all regularly occupied perimeter areas of the building, a minimum of one operable window and one lighting control zone are provided per 200 square feet on average. Calculations and highlighted floor plans have been provided to support this statement.

Please note that the number of thermostats claimed for this credit do not appear to actually be installed. This credit is being awarded based on the number of operable windows and on the assumption that occupants will be able to use them to regulate their thermal comfort.

EQc6.2

The LEED Submittal Template has been provided stating that temperature, airflow, and lighting controls have been provided for a minimum 50% of occupants in regularly occupied, non-perimeter areas. Calculations and highlighted floor plans have been provided to support this declaration. Rooms with floor area beyond 15 feet of the perimeter wall have been calculated appropriately per the reference guide.

1

0

**Thermal Comfort, Comply with ASHRAE 55-1992**

Credit 7.1-Version 2.1

**Design Application**

12/9/2009

The LEED Submittal Template has been provided stating that the project has been designed to maintain indoor comfort within the ranges established by ASHRAE Standard 55-1992, Addenda 1995. A CIR ruling regarding No Lower Humidity Limit has also been submitted stating compliance with ASHRAE 55-2004 in lieu of ASHRAE Standard 55-1992. Additionally, a table listing the control ranges and installed control methods has also been provided.

1

0

**Thermal Comfort, Permanent Monitoring System**

Credit 7.2-Version 2.1

**Design Application**

12/9/2009

The LEED Submittal Template has been provided stating that the project has installed a permanent temperature and humidity monitoring system that will provide control of the building zones within the thermal comfort ranges defined in ASHRAE 55-1992, Addenda 1995. These controls have been commissioned under the scope for Eap1, Fundamental Systems Commissioning and are identified in the Project Manual for Grand Bay Coastal Resources Center, Moss Point, Mississippi, Section 15991, 15992, 15993- Mechanical Systems and Testing.



1	0
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**Daylight & Views, Daylight 75% of Spaces**

Credit 8.1-Version 2.1

**Design Application**

12/9/2009

The LEED Submittal Template has been provided stating that the project has achieved a minimum 2% daylight factor in 75% of all space occupied for critical visual tasks. Calculations have been provided, and although the required drawings highlighting daylit rooms have not been submitted, the floor plan clearly indicates the location and quantities of windows and substantiates credit compliance.

1	0
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**Daylight & Views, Views for 90% of Spaces**

Credit 8.2-Version 2.1

**Design Application**

12/9/2009

The LEED Submittal Template has been provided stating that the project has provided direct line of sight views from a minimum of 90% of all space occupied for critical visual tasks. Calculations and floor plans have been provided, however the direct line of sight has not been highlighted and it is unclear whether the credit requirements would be met if the Chemical Analysis Laboratory and Biological Research Laboratory are included.

**TECHNICAL ADVICE:**

To substantiate that 90% of regularly occupied spaces have access to views, please provide a revised floor plan with direct line of sight indicated for all regularly occupied spaces. Also, please provide revised calculations based on direct line of site and revise the square footage calculations for the Biological Laboratory and Chemical laboratory. If either of these spaces are exempt from the regularly occupied criteria for this credit, please clarify this.

**Construction Application**

4/12/2010

The project team provided the Submittal template, response narrative, calculations, and plan diagram highlighting line of sight and exterior corridors, demonstrating credit compliance.

Earned	Denied
5	0
1	0

Innovation & Design Process	Possible Points	5
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**Innovation in Design 1.1**

Credit 1-Version 2.1

**Design Application**

12/9/2009

The LEED Submittal Template has been provided stating that the project achieves exemplary performance for water use reduction for credit Wec3 as specified in the LEED Reference Guide. The project has achieved 71% water efficiency through the use of waterless fixtures and rainwater harvesting, significantly reducing the impact of municipal supplies.

8/6/2010

Construction Application Review

1 0

**Innovation in Design 1.2**

Credit 1-Version 2.1

**Design Application**

12/9/2009

The LEED Submittal Template has been provided stating that the project achieves exemplary performance for Innovate Wastewater Technologies credit WEc2 as specified in the LEED Reference Guide. The project demonstrates 100% reduction in water use for sewage conveyance by harvesting rainwater and treating grey water to tertiary standards.

1 0

**Innovation in Design 1.3**

Credit 1-Version 2.1

**Design Application**

12/9/2009

The LEED Submittal Template has been provided stating that an education program has been developed to present the project's sustainable design practices to occupants and visitors to the facility. The program indicates an educational exhibit and a guided tour with a take home brochure. However, published documents and quantifiable evidence of the installed exhibit and have not been provided. The project team has only provided conceptual floor plans and elevations of the exhibit.

**TECHNICAL ADVICE:**

Please provide a photo documentation of the exhibit and associated signage along with a copy of the published brochure highlighting elements of the green educational program. In addition, provide a list of groups that have already participated in the Green tour.

**Construction Application**

4/12/2010

The project team provided the Submittal Template, response narrative and photographs of published documents distributed during public tours, in addition to permanent signage displayed in the facilities exhibition space. Furthermore, lists of groups who have already participated in the Green Tour have also been submitted, demonstrating credit compliance.

1 0

**Innovation in Design 1.4**

Credit 1-Version 2.1

**Design Application**

12/9/2009

The LEED Submittal Template has been provided for Low Emitting Materials, Systems Furniture, based on LEED-CI v2.0 EQ Credit 4.5 for exemplary performance. Floor plans showing the location of the systems furniture and a narrative have been provided stating Haworth as the furniture manufacturer. Greenguard Certificates have also been submitted and demonstrate credit compliance.

1 0

**LEED Accredited Professional**

Credit 2-Version 2.1

**Design Application**

12/9/2009

The LEED Submittal Template has been provided stating that a LEED AP has been a participant on the project development team. A copy of the LEED AP award certification for James Nicolow has been included as required.

## Appendix 14: Federal Consistency Determination



**STATE OF MISSISSIPPI**

Tate Reeves  
Governor

**MISSISSIPPI DEPARTMENT OF MARINE RESOURCES**

Joe Spraggins, Executive Director

March 22, 2022

NOAA Office For Coastal Management  
Attn: Matthew Chasse  
1305 East-West Highway  
Silver Spring, MD 20910

Re: FCC22-000009; NOAA; Grand Bay 2022-2026 Management Plan Update


The Mississippi Department of Marine Resources in cooperation with other state agencies is responsible under the Mississippi Coastal Program (MCP) for managing the coastal resources of Mississippi. Proposed activities in the coastal area are reviewed to ensure that the activities are in compliance with the MCP.

The Department has completed review of the above-referenced project under the Coastal Zone Management Act of 1972 and the Coastal Zone Reauthorization Amendments of 1990 and as the lead Coastal Program Agency for the State of Mississippi pursuant to 16 U.S.C. Section 1456(c) and Mississippi Code § 57-15-5, concurs with the submitted consistency determination for this project.

**The above granted consistency certification was based upon the plan presented.**

If you have any questions regarding this letter, please contact Matt Murphy with the Bureau of Wetlands Permitting at 228-523-4159 or [matthew.murphy@dmr.ms.gov](mailto:matthew.murphy@dmr.ms.gov).

Sincerely,

 2022.03.22  
16:50:49  
-05'00'

Willa J. Brantley  
Director, Bureau of Wetlands Permitting  
MS Department of Marine Resources

JS/mm



**U.S. DEPARTMENT OF COMMERCE**  
**National Oceanic and Atmospheric Administration**  
**Office for Coastal Management**  
Silver Spring Metro Center, Building 4  
1305 East-West Highway  
Silver Spring, Maryland 20910

January 11, 2022

Willa Brantley  
Director of Wetlands Permitting  
Coastal Resources Management  
Mississippi Department of Marine Resources  
1141 Bayview Avenue  
Biloxi, Mississippi 39530

*Re: Coastal Zone Management Act Negative Determination  
Grand Bay National Estuarine Research Reserve 2022 – 2026 Management Plan*

Dear Ms. Brantley:

Pursuant to section 307(c)(1) of the Coastal Zone Management Act (CZMA), 16 U.S.C. § 1456(c)(1), and 15 C.F.R. § 930.35, NOAA's Office for Coastal Management, Stewardship Division, is submitting this negative determination for the federal approval of proposed revisions to the management plan for the Grand Bay National Estuarine Research Reserve available at: <https://www.grandbaynerr.org/reserve-management-plan/>. We have determined that the approval of revisions to the plan will have no effects to the coastal uses or resources of Mississippi.

The CZMA requires that federal actions affecting coastal uses or resources of the coastal zone of a state be consistent to the maximum extent practicable with the enforceable policies of state coastal management programs. When a federal agency determines that an activity of the agency has no coastal effects, the CZMA requirements do not apply except in those circumstances specified at 15 CFR 930.35 where a negative determination must be submitted to the state for review. The Federal Consistency regulations at 15 CFR § 930.35(a)(2) specify that a negative determination must be submitted for activities that are the same or similar to those for which effects were previously found and a consistency determination submitted to the state. In this instance, it has been determined that although a finding of coastal effects was made and a consistency determination submitted for previous management plans, the approval of the revised Grand Bay NERR Management Plan would have no coastal effects as there are no substantive changes between the actions and priorities included in this plan and the previous management plan. The Office for Coastal Management has reviewed the State coastal policies of the Mississippi Coastal Management Plan (CMP) found at < <https://dmr.ms.gov/wp-content/uploads/2019/07/Title-22-Part-23-121218.pdf>>. Conservation, research, education, and management activities associated with the Reserve are permissible uses under the Title 22, Part 23 rules for the Mississippi CMP. Reserve management and staff collaborate closely with the Mississippi Coastal Program so that activities and actions taken in support of the Grand Bay NERR management plan are consistent with the Mississippi CMP. The Reserve's activities and actions comply with the Mississippi CMP's enforceable policies and will be conducted in a manner consistent with the Mississippi CMP.

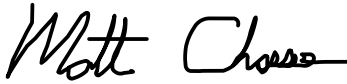
Pursuant to 15 C.F.R. § 930.35, the Mississippi Coastal Management Program has 60 days from the receipt of this negative determination to concur with or object to the finding of no coastal effects, with an option to extend the review an additional 15 days pursuant to 15 C.F.R. § 930.41 (b) with notice to this Office. NOAA will presume State concurrence if a decision by the state is not received by the 60<sup>th</sup> day from receipt of this determination (or 75 days if the review period is extended by the state).

Please send the State's response to:

Matt Chasse  
Coastal Management Specialist  
National Oceanic and Atmospheric Administration  
NOS, Office for Coastal Management  
1305 East West Highway, SSMC4/ 10<sup>th</sup> Floor  
Silver Spring, MD 20910  
and email copy to [matt.chasse@noaa.gov](mailto:matt.chasse@noaa.gov)

Please let me know if you have any questions or concerns. I can be reached at (240) 628-5417 or at [[matt.chasse@noaa.gov](mailto:matt.chasse@noaa.gov)].

Sincerely,

A handwritten signature in black ink that reads "Matt Chasse". The signature is written in a cursive style with a horizontal line extending from the end of the name.

Matt Chasse  
Coastal Management Specialist  
National Estuarine Research Reserve System

Attachment

Cc: Ayesha Gray, Manager, Grandy Bay National Estuarine Research Reserve



## Appendix 15: All Listed Species in the GNDNERR

Plants				
Family	Scientific Name	Common Name	State Ranking	Global Ranking
Acanthaceae	<i>Ruellia noctiflora</i>	Nightflowering Wild Petunia	S2	G2
Aquifoliaceae	<i>Ilex amelanchar</i>	Swamp Holly	S3	G4
Aquifoliaceae	<i>Ilex cassine</i>	Dahoon Holly	S2	G5
Aquifoliaceae	<i>Ilex myrtifolia</i>	Myrtle Holly	S3S4	G5?
Asteraceae	<i>Cirsium lecontei</i>	Le Conte's Thistle	S2	G2G3
Asteraceae	<i>Coreopsis nudata</i>	Georgia Tickseed	S1S2	G3?
Asteraceae	<i>Helianthus heterophyllus</i>	Wetland Sunflower	S3	G4
Cannaceae	<i>Canna flaccida</i>	Golden Canna	S1	G4?
Cupressaceae	<i>Chamaecyparis thyoides</i>	Atlantic Whitecedar	S2	G4
Cupressaceae	<i>Juniperus virginiana</i> var. <i>silicicola</i>	Southern Redcedar	S2	G5T4T5
Cyperaceae	<i>Carex verrucosa</i>	Warty Sedge	S1S2	G4
Cyperaceae	<i>Cladium mariscoides</i>	Smooth Sawgrass	S1	G5
Cyperaceae	<i>Cyperus polystachyos</i>	Manyspike flatsedge	S2S3	G5T5
Cyperaceae	<i>Eleocharis cellulosa</i>	Coastal Spikerush	S1	G4G5
Cyperaceae	<i>Eleocharis elongata</i>	Slim Spikerush	S1	G5
Cyperaceae	<i>Eleocharis equisetoides</i>	Jointed Spikesedge	S3S4	G4
Cyperaceae	<i>Eleocharis rostellata</i>	Beaked Spikerush	S1	G5
Cyperaceae	<i>Eleocharis tortilis</i>	Twisted Spikerush	S2S3	G5
Cyperaceae	<i>Fimbristylis caroliniana</i>	Carolina Fimbry	S3	G4
Cyperaceae	<i>Fimbristylis castanea</i>	Marsh Fimbry	S3	G5
Cyperaceae	<i>Fuirena breviseta</i>	Saltmarsh Umbrella-sedge	S3S4	G5
Cyperaceae	<i>Rhynchospora baldwinii</i>	Baldwin's Beaksedge	S2	G4
Cyperaceae	<i>Rhynchospora breviseta</i>	Shortbristle Beaksedge	S1	G3G4
Cyperaceae	<i>Rhynchospora cephalantha</i>	Bunched Beaksedge	S3	G5

Plants				
Cyperaceae	<i>Rhynchospora colorata</i>	Whitetop Beaksedge	S3S4	G5
Cyperaceae	<i>Rhynchospora corniculata</i>	Shortbristle Horned Beaksedge	S3S4	G4
Cyperaceae	<i>Rhynchospora filifolia</i>	Threadleaf Beaksedge	S3	G5
Cyperaceae	<i>Rhynchospora inundata</i>	Narrowfruited Beaksedge	S2S3	G4?
Cyperaceae	<i>Rhynchospora latifolia</i>	Sandswamp Whitetop Sedge	S2S3	G5
Cyperaceae	<i>Rhynchospora rariflora</i>	Fewflower Beaksedge	S3S4	G5
Cyperaceae	<i>Rhynchospora stenophylla</i>	Coastal Plain Beaksedge	S1S2	G4
Cyperaceae	<i>Rhynchospora tracyi</i>	Tracy's Beaksedge	S1	G4
Cyperaceae	<i>Schoenoplectus tabernaemontani</i>	Softstem Bulrush	S2S3	G5
Cyperaceae	<i>Scleria baldwinii</i>	Baldwin's Nutrush	S2S3	G4
Cyperaceae	<i>Scleria muhlenbergii</i>	Muehlenberg's Nutrush	S3	G5
Cyperaceae	<i>Scleria reticularis</i>	Reticulated Nutrush	S1	G4
Dryopteridaceae	<i>Dryopteris ludoviciana</i>	Louisiana Shield Fern	S1	G4
Fagaceae	<i>Quercus minima</i>	Dwarf Live Oak	S1	G5
Fagaceae	<i>Quercus myrtifolia</i>	Myrtle Oak	S2	G5
Gentianaceae	<i>Bartonia verna</i>	White Screwstem	S3S4	G5?
Gentianaceae	<i>Eustoma exaltatum</i>	Catchfly Prairie Gentian	S1	G5T4T5
Hypericaceae	<i>Hypericum myrtifolium</i>	Myrtleleaf St. Johnswort	S2	G4G5
Lentibulariaceae	<i>Pinguicula planifolia</i>	Chapman's Butterwort	S2S3	G3?
Lentibulariaceae	<i>Utricularia purpurea</i>	Eastern Purple Bladderwort	S2	G5
Menyanthaceae	<i>Nymphoides aquatica</i>	Banana Lily	S2	G5
Menyanthaceae	<i>Nymphoides cordata</i>	Floating Heart	S1S2	G5
Orchidaceae	<i>Calopogon barbatus</i>	Bearded Grass Pink	S2	G4?
Orchidaceae	<i>Calopogon multiflorus</i>	Many Flowered Grass Pink	S1	G2G3
Orchidaceae	<i>Platanthera integra</i>	Yellow Fringeless Orchid	S3	G3G4
Orchidaceae	<i>Platanthera nivea</i>	Snowy Orchid	S3	G5
Orchidaceae	<i>Spiranthes longilabris</i>	Giant Ladies' Tresses	S2	G3
Orobanchaceae	<i>Agalinis aphylla</i>	Coastal Plain False-Foxglove	S3	G3G4

<b>Plants</b>				
Orobanchaceae	<i>Agalinis filicaulis</i>	Thin Stemmed False-Foxglove	S2	G3G4
Orobanchaceae	<i>Agalinis linifolia</i>	False-Foxglove	S2	G4?
Orobanchaceae	<i>Agalinis maritima</i>	Saltmarsh False-Foxglove	S3S4	G5
Poaceae	<i>Aristida spiciformis</i>	Bottlebrush Threeawn	S1	G4
Poaceae	<i>Dichantherium erectifolium</i>	Erectleaf Panicgrass	S2	G4
Polygalaceae	<i>Polygala crenata</i>	Scalloped Milkwort	S2	G4?
Rhamnaceae	<i>Sageretia minutiflora</i>	Smallflower Mock Buckthorn	S2	G4
Sarraceniaceae	<i>Sarracenia leucophylla</i>	Whitetop Pitcher Plant	S2	G3
Sarraceniaceae	<i>Sarracenia rosea</i>	Rose Pitcher Plant	S1	G5T3
Solanaceae	<i>Lycium carolinianum</i>	Carolina Wolfberry	S1	G4
Solanaceae	<i>Physalis angustifolia</i>	Coastal Groundcherry	S3	G3G4
<b>Animals</b>				
<b>Family</b>	<b>Scientific Name</b>	<b>Common Name</b>	<b>State Ranking</b>	<b>Global Ranking</b>
Sirenia	<i>Trichechus manatus</i>	West Indian Manatee	S1N	G2
Gruidae	<i>Grus canadensis pulla</i>	Mississippi Sandhill Crane	S1	G5T1
Charadriidae	<i>Charadrius melodus</i>	Piping Plover	S2N	G3
Scolopacidae	<i>Calidris canutus</i>	Red Knot	S2N	G5
Picidae	<i>Leuconotopicus borealis</i>	Red-cockaded woodpecker	S1	G3
Ciconiidae	<i>Mycteria americana</i>	Wood Stork	S2N	G4
Emydidae	<i>Pseudemys alabamensis</i>	Alabama Red-Bellied Turtle	G1	S1
Testudinidae	<i>Gopherus polyphemus</i>	Gopher Tortoise	S2	G3
Cheloniidae	<i>Eretmochelys imbricata</i>	Hawksbill Sea Turtle	SNA	G3
Cheloniidae	<i>Lepidochelys kempii</i>	Kemp's Ridley Sea Turtle	S1B, S1N	G1
Cheloniidae	<i>Chelonia mydas</i>	Green Sea Turtle	SNA	G3
Dermochelyidae	<i>Dermochelys coriacea</i>	Leatherback Sea Turtle	SNA	G2
Cheloniidae	<i>Caretta caretta</i>	Loggerhead Sea Turtle	S1B, S1A	G3
Ranidae	<i>Lithobates sevosus</i>	Dusky Gopher Frog	S1	G1
Acipenseridae	<i>Acipenser oxyrhynchus oxyrhynchus</i>	Atlantic Sturgeon	S1	G3T2

## Appendix 16: Public Comments and Responses

Commenter	Organization	Comment	Page Number	Response	Specific Change	Page Number of Change
Janet Wright, PhD	Retired Professor/Botanist/Volunteer	I particularly want to commend this restoration project "to protect and restore wet pine savanna and flatwoods, including dependent native flora and fauna, which are imperiled habitats across their historic range." The vegetation and bird survey data from this monitoring and management project should be valuable not just for management at NERR but in similar habitats elsewhere. And as noted on p. 78, this is a great educational and outreach opportunity. The section on how the Restoration plots will be made accessible to the public for viewing and education is especially encouraging. I look forward to specifics about how this will be implemented.	84	NA	NA	NA
Janet Wright, PhD	Retired Professor/Botanist/Volunteer	Refers to the detention pond project to "re-establish native wetland vegetation at a stormwater wetland at the CRC." This is an exciting and dynamic project, wonderfully accessible, that could be a significant education and outreach tool. Please do give priority to interpretive signage for visitors, and activities for school-age groups. Periodic invasive species patrolling of the pond is also a good opportunity for citizen stewardship.	40	Interpretive signage will be added at the pond, and invasive species patrolling will be noted as a citizen science opportunity	NA	NA
Janet Wright, PhD	Retired Professor/Botanist/Volunteer	Of course, I have a special fondness for the project to develop the NERR herbarium as a resource tool for researchers and also to make it widely available virtually through iNaturalist and SERNEC online databases. This fits your p. 24 Goal 1 Objective "Action: Seek opportunities to weave reserve-generated data into other national monitoring networks." It has been rewarding to work with Cassy Porter, Andrew Heaton and Emmett Carstens on this project, and I think it will be an interesting model to other NERRS and similar organizations.	24	NA	NA	NA
Janet Wright, PhD	Retired Professor/Botanist/Volunteer	I realize that limited travel funding for most schools makes on-site visits for school groups difficult, so your On the Road program is important in that regard. I wonder if you have considered short residential opportunities, especially for high schoolers from underserved communities, such as a one-week summer internship. Recent programs such as Black in Marine Science and similar networks show that these opportunities can become career starters for many young people as they get an overview of a research or conservation field, acquire a few field skills, and begin to build a network with mentors and colleagues.	NA	The MDMR offers an internship each year with which we participate. We advertise this opportunity with our local network.	NA	NA
Janet Wright, PhD	Retired Professor/Botanist/Volunteer	The text here alludes to greater use of virtual learning opportunities in the future. I agree that given the remote location of the Reserve, this is a great way to extend the audience for lunch-and-learn discussions or short webinars. I would not like to see it used as a convenience to replace full-day workshops or several-day training sessions. I have attended many of these in past years (Restoration Ecology, NERR habitats, the bi-annual Symposium, Phenology Network training, Green Infrastructure, Grass Identification, Blue Carbon, etc.), where group interaction and access to the field sites was a big part of their value. These have been well-attended, so I don't think distance was a significant deterrent. Please look for ways to re-establish a vigorous program of on-site training.	51	We agree that virtual learning opportunities should not replace full day and multi-day workshops and trainings, and we aim to make virtual learning limited to special circumstances.	NA	NA
Janet Wright, PhD	Retired Professor/Botanist/Volunteer	p. 73---- Allowable and Unallowable Uses. With respect to uplands, this section includes the statements that "Current regulations allow hunting on the reserve in compliance with special regulations" and "There are no reserve restrictions or use restraints on outside researchers; however, permits are required by USFWS and MDMR. Recreational activities such as bird watching and hiking (on two designated trails ONLY) are encouraged." As a user, I would like to request that these uses be clarified for the public and better signage provided. For example, all-terrain vehicle use is prohibited, but am I allowed to park a vehicle in pullout spaces in order to hike? (p. 76 refers to two named parking lots for hunters, but I have never seen any such lots designated and their location is not given.) Why are bird watching and hiking "on two designated trails ONLY" while hunters' movements are apparently not restricted? eBird lists an astonishing 263 species of birds observed on the Grand Bay NWR/NERR, but I believe most of this reporting is from staff and researchers over the years, not the general public; birders I know feel that the NERR is relatively inaccessible or downright unfriendly to citizen birding. The prospect of a bird blind and viewing stand at Hawks' Marsh is an exciting one, and I hope this and other efforts to attract public wildlife viewing will get more priority. The Boardwalk and Savanna trails, and the Blueway, are excellent recent additions to access for visitors. Many people don't seem aware of the Boardwalk, so maybe signage near the road would help publicize that one. And I wonder if the end segment of the Savanna trail could be worked on. I have never been able to find a clear trail back to the parking lot, and a possible connection to the Boardwalk trail has been muddy and plowed up so as to be more of a barrier than a trail. (If this has been addressed in the past couple of months, thanks!)	73	We will work with USFWS to clarify the use of the pullout areas to birders and discuss the addition of signage. We will work on the Savanna Trail to ensure the beaten part of the trail is more accessible. We will prioritize the development of a platform and bird blind at the end of the Savanna Trail boardwalk, and do more to publicize the boardwalk trail.	NA	NA
Lindsey D. Bilyeu, MS	Choctaw Nation of Oklahoma	On page 17, Under the section for Archaeology and Cultural Resources, it mentions that the state historic preservation office is collaborated with. The shell middens located in the reserve are ancestral to the Choctaw people and we want to have them protected not only as cultural resources, but also, as sacred sites in the event that the middens contain burials. The Choctaw Nation Historic Preservation Department requests that we be included as a consulting partner on all ground disturbing projects, not just the state historic preservation office.	17	There are no ground disturbing projects at the shell middens in the reserve. All known cultural resources within the reserve boundaries are protected from ground disturbing activities. On USFWS refuge lands in the reserve, any archeological or cultural work requires an ARPA permit and special use permit issued by the Refuge.	NA	NA

Commenter	Organization	Comment	Page Number	Response	Specific Change	Page Number of Change
Lindsey D. Bilyeu, MS	Choctaw Nation of Oklahoma	On page 23, we would like to see cultural resources protection listed under the "Reserve Priority Coastal Management Issues". We would further like to see the objectives of how cultural resources protection would be carried out.	23	Cultural resource protection will be added as a reserve priority coastal management issue.	"Culture resource protection" added as a listed priority and "Objective 2.6: Conserve cultural resources and provide information on anthropogenic uses of the Grand Bay estuary (all) Action: Coordinate with partners to conserve and protect cultural resources." added as an objective and action in the strategic plan.	23, 26
Lindsey D. Bilyeu, MS	Choctaw Nation of Oklahoma	On page 25, under Goal 2, we request that we be included as one of the partners in strategically implementing land management activities. We request to be consulted under the NHPA Section 106 process to properly evaluate the project areas that land management will take place.	25	Land management activities are not funded by NERR Operations award (or any federal source) and most of the activity does not occur within the NERR boundary. A NOI is provided to the MDAH State Archeologist when project activities commence and we will follow guidelines provided by the SHPO. "Protect cultural resources" was added under Goal 2 and an action was added to engage the GBCC in the planning and implementation process of any land management activities should they occur.	Page 26, "Action: Should land management activities occur with federal funds the GBCC will be strategic partners in the planning and implementation" Added under Objective 2.6	NA
Lindsey D. Bilyeu, MS	Choctaw Nation of Oklahoma	On page 26, under Goal 3, we would like to see cultural/tribal outreach take place. This will enable the community to interact with Tribes and learn about our cultural resources and the importance of protecting them. Also, when developing material, including interpretative displays and printed materials, please consult with Tribes, including the Choctaw Nation of Oklahoma. In addition, when working with volunteers, please make sure that classified information about cultural resources are not shared with them or the public, including location of archaeological sites.	26	The reserve would welcome collaboration on tribal and cultural information from the Choctaw Nation of Oklahoma to support reserve community outreach efforts. The reserve protects culturally sensitive resources from disturbance.	NA	NA
Lindsey D. Bilyeu, MS	Choctaw Nation of Oklahoma	On page 28, under Goal 5, we would like to have Tribal consultation included in the "Facilities are managed and maintained in optimal conditions". Please consult with us on all ground disturbing activities that take place within the reserve. This will allow us to protect cultural resources. Under 5.4 "Emergency planning and management activities", please include tribal consultation in disaster response and recover planning.	28	There are no ground disturbing projects at the shell middens in the reserve. All known cultural resources within the reserve boundaries are protected from ground disturbing activities. The disaster response plan is available online. If any impacts to cultural resources take place we will seek information from the state historic preservation office, USFWS, and Tribal entities. GBCC provides a forum for partners to share information regarding emergency response and management activities within the Reserve to ensure that natural and cultural resources are protected.	NA	NA
Lindsey D. Bilyeu, MS	Choctaw Nation of Oklahoma	On page 30, under Program Foundations- Science and Outreach, Research, Monitoring, and Stewardship, please include Tribal consultation regarding research on archaeological sites.	30	There is no research currently being conducted on archeological sites. Any research on archeological sites must be approved and coordinated through SHPO and USFWS, who would coordinate with Tribal entities. The most recent historical archaeological work at the Reserve was conducted in 2012 by H. Edwin Jackson at the University of Southern Mississippi for the Mississippi Department of Archives and History. This research is available to The Choctaw Tribe of Oklahoma upon request.	NA	NA
Lindsey D. Bilyeu, MS	Choctaw Nation of Oklahoma	On page 37, under Stewardship Program Context, prescribe burning is listed as a practice that would be undertaken on the reserve for habitat management. Please include Tribal consultation on these undertakings. Please also include areas that will receive traffic from automobiles or off road equipment, such as ATVs and heavy equipment, in consultation.	37	Prescribed burning conducted by the state is conducted on state lands outside the NERR boundary and is not supported with funding from NERR Operations award (or any federal source). The lands within the NERR boundary that are subjected to prescribed burning are federal and USFWS has a burn management plan that completes the Tribal consultation process and most of the prescribed burning activity is conducted by USFWS.	NA	NA
Lindsey D. Bilyeu, MS	Choctaw Nation of Oklahoma	On page 40, under Trail Management and Debris Removal, please include Tribal consultation on all ground disturbing work. Additionally, under Marsh Protection/Restoration, please include Tribal consultation in these areas as well.	40	Trail management (generally sweeping the boardwalk and some light mowing on established trail) and debris removal (removing garbage and other items left by dumping) are not ground disturbing activities. There are no ground disturbing projects at the shell middens in the reserve. All known cultural resources within the reserve boundaries are protected from ground disturbing activities.	NA	NA
Lindsey D. Bilyeu, MS	Choctaw Nation of Oklahoma	On page 41, under Outreach and Education, please include Tribal consultation in developing teaching materials that would be used in outreach. Tribal consultation and coordination can enrich your outreach program by providing information about the people who originally inhabited the land and why these lands are still important to Tribes.	41	The reserve would welcome collaboration on tribal and cultural information from the Choctaw Nation of Oklahoma to support reserve community outreach efforts. The reserve protects culturally sensitive resources from disturbance.	NA	NA



Commenter	Organization	Comment	Page Number	Response	Specific Change	Page Number of Change
Lindsey D. Bilyeu, MS	Choctaw Nation of Oklahoma	On page 48, under Ecological and Socioeconomic Setting and Context, please add the need for protecting cultural resources and conducting cultural resources investigations on the reserve. The protection of cultural resources should be of priority to the reserve. When cultural resources surveys are to be done, please consult with Tribes about the area that will be surveyed and find out if there are any sensitive areas that should be avoided or removed from project activities. Once complete, cultural resources survey reports should be provided to the Tribes for review.	48	Cultural resource protection will be added as a reserve priority coastal management issue. There are no cultural resources surveys currently being conducted on archeological sites. Any research on archeological sites must be approved and coordinated through SHPO and USFWS, who would coordinate with Tribal entities.	See Line 9 above	See Line 9 above
Lindsey D. Bilyeu, MS	Choctaw Nation of Oklahoma	Under the Administrative Plan and organization framework there doesn't appear to be a cultural resources specialist or an archaeologist. Would the reserve be open to having these positions? Currently, how are cultural resources being managed without these positions being included in the organizational framework?		The reserve coordinates with the SHPO and the USFWS, who interface with Tribal entities. At this time, the reserve does not have the resources to support a cultural resources specialist or an archaeologist. The reserve would welcome resources from the Choctaw Nation of Oklahoma to support cultural expertise.	NA	NA
Lindsey D. Bilyeu, MS	Choctaw Nation of Oklahoma	On page 60, under Strategic Partnerships, we would highly recommend that you develop partnerships with the Tribes that have an interest in this land, including the Choctaw Nation of Oklahoma. A partnership would help us to understand each other's needs and make plans to benefit the reserve and the cultural and natural resources that are important to Tribes.	60	We welcome participation from the Choctaw Nation of Oklahoma and other Tribal entities in our Grand Bay Community Collaborative.	NA	NA
Lindsey D. Bilyeu, MS	Choctaw Nation of Oklahoma	On page 63, under Communications Plan, social media is mentioned as a communication strategy. We request that cultural resources information be kept confidential and not posted on social media in order to prevent looting of sites and protection of our ancestors.	63	We do not post on social media about locations of cultural resources on federal or state land.	NA	NA
Lindsey D. Bilyeu, MS	Choctaw Nation of Oklahoma	On page 68, under Planned Facilities and Infrastructure, please include Tribal consultation on all ground disturbing activities. As we do not have any previous consultation on what was done on the reserve, all areas will need to be surveyed and consulted on prior to work commencing.	68	Future facilities development activities federally funded require the completion of ESA and NHPA consultations before the commencement of ground disturbing activities.	NA	NA
Lindsey D. Bilyeu, MS	Choctaw Nation of Oklahoma	On page 70, under the Resource Protection Plan, could you please include Tribal consultation when considering cultural resources?	70	All known cultural resources within the reserve boundaries are protected from ground disturbing activities identified within the management plan.	NA	NA
Lindsey D. Bilyeu, MS	Choctaw Nation of Oklahoma	It also appears that the reserve has a number of state and federal agencies serving as advisors or authorities. Tribes should also be included in this list since our resources are on the reserve and we have the cultural expertise to best protect these sites.	NA	We welcome participation from Tribal entities in our Grand Bay Community Collaborative.	NA	NA
Lindsey D. Bilyeu, MS	Choctaw Nation of Oklahoma	On page 73, Allowable and Unallowable Uses, we request that Tribes be consulted on the uses that take place in the reserve, as these uses could have an effect on cultural resources.	73	All known cultural resources within the reserve boundaries are protected from ground disturbing activities identified within the management plan.	NA	NA
Lindsey D. Bilyeu, MS	Choctaw Nation of Oklahoma	On page 74, under Off-bottom aquaculture, please include Tribal consultation and the Section 106 process when considering these activities. Also, on page 74, Surveillance and Enforcement Capacities, are mentioned. What capacities do you have for cultural resources protection? With vandalism and theft being prevalent, I would assume that looting could be going on at archaeological sites.	74	The process for permitting would be followed should any off-bottom aquaculture in the reserve be pursued (but this is not expected in the next five years). MDMR Marine Patrol and USFWS Law Enforcement provide law enforcement services to the reserve. There has been no evidence of looting or disturbance at any of the archeological sites.	NA	NA
Lindsey D. Bilyeu, MS	Choctaw Nation of Oklahoma	On page 76, when discussing Current Public Access, Bosarge Shell Midden is mentioned as a point of interest on the Grand Bay NERR Blueway. We would like more information the Bosarge Shell Midden, so that we can determine if it is a sensitive area to the Tribe. We certainly prefer that shell middens be protected as they have the potential to contain burials.	76	Access to Bosarge Shell Midden can be provided through a scientific collecting permit through MDMR and a special use permit through USFWS so further study can be accomplished. Additional information can be found in Jackson et al. 2015. Reference to the Bosarge Shell Midden has been removed.	Removed "Bosarge Shell Midden"	76
Lindsey D. Bilyeu, MS	Choctaw Nation of Oklahoma	On page 78, when discussing Public Access Opportunities and Visitor Experience, the usual of mechanical means for vegetation removal is mentioned. Tribes need to be consulted on these ground disturbing activities. Also, please include us in consultation for the re-establishment projects.	78	The vegetation removal on page 78 is referring to fuel reduction activities associated with the NRDA Project that occur outside of the reserve boundary and on state land. All known cultural resources within the reserve boundaries are protected from ground disturbing activities.	NA	NA
Lindsey D. Bilyeu, MS	Choctaw Nation of Oklahoma	On page 79, please include Tribal consultation on lands that are being acquired by the reserve and survey these lands for cultural resources.	79	Land acquisition activities at the reserve are being completed by MDEQ, not the reserve, and follow all legal due diligence with the state.	NA	NA
Lindsey D. Bilyeu, MS	Choctaw Nation of Oklahoma	On page 82, under Restoration Plan, please conduct Tribal consultation on all ground disturbing restoration work and include Tribal consultation in your management plan.	82	All known cultural resources within the reserve boundaries are protected from ground disturbing activities.	NA	NA
Lindsey D. Bilyeu, MS	Choctaw Nation of Oklahoma	In addition to all the items mentioned above, the reserve needs to be conducting NAGPRA consultation as well and have an unanticipated discovery/treatment of human remains plan in place to deal with the unanticipated discovery of Native American artifacts or human remains. Please work with Tribes to develop this plan.		The reserve is a state entity and NAGPRA applies to federal entities. All known cultural resources within the reserve boundaries are protected from ground disturbing activities. We do not expect to find remains as all our activities occur above ground, but should we encounter them we will contact the Jackson County Sheriff's Office and the SHPO.	NA	NA