

# 2019 Habitat Conservation and Restoration Plan for Coastal Alabama





Prepared by the Mobile Bay National Estuary Program and The Nature Conservancy

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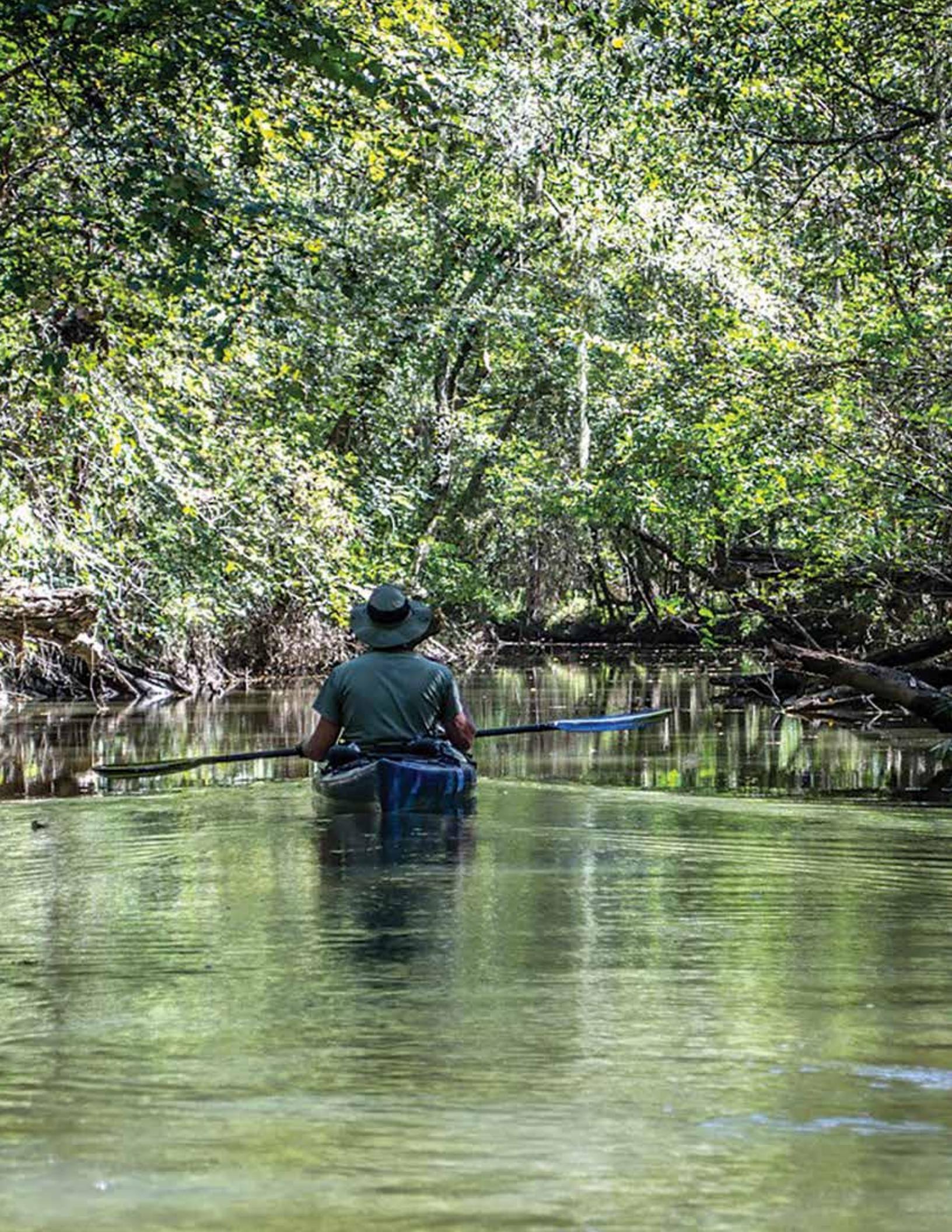
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## PHOTO CREDITS

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# Introduction

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## Importance of Ecosystem Conservation and Restoration

Impacts on the coastal environment will increase over the coming decades as Americans continue to move toward the shore and use the coastal environment more intensively. To ensure there are abundant fish and wildlife, clean water, and healthy coastal ecosystems, habitat conservation will be a vital component at watershed and regional scales. Habitat conservation practices seek to protect habitats that remain undegraded by the impacts of anthropogenic stress to prevent species extinction, habitat fragmentation, or reduction in wildlife ranges. Conservation of habitats serves the role of protecting the food, water, and habitat resources fish and wildlife need to survive. Sufficient amounts of these three resources must be available to maintain healthy populations of living resources.

Ecosystem restoration refers to returning a damaged ecological system to a stable, healthy, and sustainable state. Although it may be impossible to return an ecosystem feature to the exact same condition as prior to disturbance, restoration to improve ecosystem function and services will contribute to community health and well-being, protect against sea level rise and other climate change impacts, provide recreational opportunities, and ensure economic sustainability and community quality of life (MBNEP, 2012).

## The Purpose of This Plan

The 2006 publication of *Conserving Alabama's Coastal Habitats: Acquisition and Restoration Priorities for Mobile and Baldwin Counties* (the Habitat Atlas) set targets for the acquisition or restoration of priority parcels across coastal Alabama (MBNEP, 2006). Since the establishment of the Habitat Mapper in 2009 and publication of *Respect the Connect: Comprehensive Conservation and Management Plan for Alabama's Estuaries and Coast 2013-2018*, a substantial number of the acquisition targets identified in the Habitat Atlas have been secured and many restoration projects have been completed.

The purpose of the **2019 Habitat Conservation and Restoration Plan for Coastal Alabama (the Habitat Plan)** is to streamline restoration planning in coastal Alabama by consolidating available data sources. These include the latest available data on habitat species coverage, the products of ongoing and recently completed watershed management plans, and research from many organizations and agencies, given the unprecedented influx of funds from the *Deepwater Horizon* oil spill. The Habitat Plan will use these sources to direct appropriate focus on habitat acquisition, conservation, restoration, and management activities along the Alabama coast. Conservation and restoration efforts can be better streamlined and complemented by having a common plan and tool to help identify and prioritize projects at different scales (e.g. entire coast, county, municipality, individual watershed, individual habitat, etc.). Ongoing conservation and management efforts, existing and planned projects, and recommendations from completed watershed management plans are coordinated in the Habitat Plan and through the Coastal Alabama Restoration Tool (CART) to maximize conservation and restoration outcomes.

## Geographic Scope of the Plan

While Mobile Bay drains over 43,600 square miles, including most of Alabama and portions of Mississippi, Georgia, and Tennessee, the primary focus area of the Habitat Plan is limited to Alabama's two coastal counties, Mobile and Baldwin. The study area stretches from the Florida border in the Perdido Watershed to the east, westward to the Mississippi border in the Escatawpa Watershed. Major waterways include the Tombigbee, Tensaw, Apalachee, Blakeley, Escatawpa, Mobile, Alabama, Dog, Fowl, Fish, Magnolia, Bon Secour and Perdido rivers; Chickasaw, Norton, Three Mile, and Eight Mile creeks; the Intracoastal Waterway, Wolf and Perdido Bays, and Little Lagoon.

These two coastal counties comprise many sub-watersheds classified numerically by the U.S. Geological Survey (USGS) into Hydrologic Unit Codes, or HUCs. For planning purposes, the EPA prefers a scale of 12-digit HUCs, the smallest geographical area classified in the USGS schema. Alabama's two coastal counties include ninety-eight 12-digit HUCs, some combined into complexes for planning purposes (Figure 1), which drain into receiving waters like Fowl River (HUC031602050205), Magnolia River (HUC031602050308), and other familiar coastal rivers and bays.

## Background

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In April 2002, the MBNEP established an objective in its Comprehensive Conservation Management Plan to "provide optimum fish and wildlife habitat in the Mobile Bay system by effectively preserving, restoring, and managing resources to maintain adequate extent, diversity, distribution, connectivity, and natural functions of all habitat types." The CCMP highlighted many high-quality coastal habitats within the Mobile Bay estuary that were not under protective management. Threats to these habitats are associated with human population growth and include habitat destruction, degradation, and fragmentation; water quantity and quality impacts; invasion by non-native species; and suppression of natural ecological processes, like periodic fires. Habitat destruction and change have also resulted from the impacts of two of the most destructive hurricanes to strike the United States, Ivan in 2004 and Katrina in 2005. Direct effects of these storms on sensitive habitats and secondary impacts resulting from recovery and rebuilding efforts have also created challenges when seeking to maintain and preserve sensitive coastal ecological processes.

## The First Restoration Planning Effort

In 2006, the MBNEP joined with The Nature Conservancy to assess habitats for conservation based on quality of or contributions to ecosystems, stresses to those systems, sources of the stresses, strategies to abate those sources, and successful measurement of biodiversity health and threat abatement. This effort resulted in the creation of *Conserving Alabama's Coastal Habitats: Acquisition and Restoration Priorities for Mobile and Baldwin Counties (MBNEP, 2006)*, commonly called the "Habitat Atlas." The Habitat Atlas identified 17 priority acquisition sites (or other conservation options) and more than 30 other sites and habitat types where restoration or enhancement were considered viable and necessary. The Habitat Atlas was produced for use by governments and other community organizations to more effectively guide resource management activities in coastal Alabama.

One of the major drawbacks of the original Habitat Atlas was the lack of a mechanism for objectively evaluating habitats across both counties. It was largely based on participants' knowledge of parcels containing priority habitats which might be available for conservation or whose owners might be willing to consider restoration or conservation actions. A second challenge was an inability to compare restoration and conservation projects being implemented within the identified priority conservation and restoration areas.

## The Second Restoration Planning Effort

In 2009, the online geospatial *Mississippi Alabama Habitats Tool and The Prioritization Guide for Coastal Habitat Protection in Mobile and Baldwin Counties*, Alabama (the Habitat Mapper) was developed as part of a collaborative project between the MBNEP, TNC, and the Coastal Services Center and Office of Habitat Conservation of the National Oceanic and Atmospheric Administration (NOAA). The primary goal of this effort was to provide new information and mapping tools to support conservation planning and implementation of the habitat management goals of the CCMP. The development of a Habitat Mapper was achieved by bringing federal, state, and local entities together to update and improve the Habitat Atlas through a scientifically based methodology involving use of geospatial datasets to identify priority habitat "patches," irrespective of property boundaries. The Habitat Mapper used a revised analysis and prioritization process incorporating updated and additional habitat data that were not previously available, as well as consideration of potential habitat stressors.

The Habitat Mapper provided a more robust and dynamic tool for identifying priority habitats across the two coastal counties and established focus areas for concentrating conservation and restoration activities. In addition, it provided the viewer with a geospatial visualization of all projects in the Mississippi-Alabama Conservation and Restoration Projects Database, an inventory of all restoration and conservation projects planned, initiated, in progress, or completed between 2000 and 2010. However, because habitat patches typically cross several parcel boundaries, its value was based on validating potential projects based on their location within a priority habitat patch as opposed to the prior effort which targeted specific parcels for acquisition or restoration because they were located within a priority patch.

## Impacts of Deepwater Horizon

In 2010, the *Deepwater Horizon* incident, the largest marine oil spill in the history of the petroleum industry, spilled oil into the Gulf of Mexico over the course of 87 days. This event not only threatened the sensitive habitats, along the Alabama coast, most notably beaches and salt marshes, it shed a spotlight on the connection between the environment and Alabama's coastal economy.

The *Deepwater Horizon* settlement agreement, accepted by the Federal District Court in 2016, made more than \$20 billion available for Gulf Restoration over 15 years. In addition to the civil penalties, there were also criminal penalties (\$4.4 billion) and natural resource damage claims (\$8.1 billion) divided amongst the states based on formulas for damages.

From the \$32.5 billion in total penalties, Alabama specifically will receive a minimum of \$1.377 billion as follows:

- > \$296 million - Natural Resources Damage Assessment
- > \$356 million - National Fish and Wildlife Foundation Gulf Environmental Benefit Fund
- > \$373 million - Tourist Opportunities, and Revived Economies of the Gulf Coast States (RESTORE) Act Direct Component (Bucket 1)
- > \$TBD million - RESTORE Act Comprehensive Plan Component (Bucket 2) - competitive
- > \$326 million - Restore Act Spill Impact Component (Bucket 3)
- > \$TBD million - NOAA RESTORE Act Science Program (Bucket 4) - competitive
- > \$26 million - NOAA RESTORE Act Center of Excellence (Bucket 5)

This unprecedented influx of funds to support protection, restoration, and conservation of habitats and coastal communities constitutes the foundation of the Habitat Conservation and Restoration Plan for Coastal Alabama.

## The Comprehensive Conservation and Management Plan (CCMP)

In 2013, the MBNEP published Respect the Connect: **A Comprehensive Conservation and Management Plan for Alabama's Estuaries and Coast (CCMP)**, which was recently updated for years 2019-2023. This Plan set forth the following vision: *Alabama's estuaries, where the rivers meet the sea, are healthy and support ecological function and human uses.*

To ensure the CCMP was based on sound science, a Science Advisory Committee determined what areas of our coastal environment are most stressed and from what cause(s). The results of this assessment revealed freshwater wetlands; streams, rivers and riparian buffers; and intertidal marshes and flats were most stressed due to a combination including, but not limited to, land-use changes, sediment transport, fragmentation, sea level rise, and dredging and filling.

To ensure the strategies in the CCMP maintain a connection to what contributes to residents' quality of lives, extensive citizen input was collected and compiled to determine what mattered most to those living on the Alabama coast. The results of this data gathering revealed six common values:

- > **Access** (to the water and open spaces for recreation and vistas)
- > **Beaches and Shorelines** (protection, economy, beauty)
- > **Fish & Wildlife** (habitats, abundance, livelihood)
- > **Heritage/Culture** (protecting the legacy of the coast)
- > **Resilience** (protecting the capacity of human and natural physical systems to rebound from unforeseen events), and
- > **Water Quality** (whether drinkable, fishable or swimmable, the public places high value on quality rivers, creeks, and bays)

## The CCMP's Ecosystem Restoration and Protection Strategy

One of the purposes of this plan is to ensure **Conservation, Restoration, and Protection of Critical Habitats**. The Ecosystem Restoration and Protection strategy of the CCMP includes the following goals:

- > **ERP-1:** Improve trends in water quality in priority watersheds.
- > **ERP-2:** Focus watershed management activities on priority habitats.
- > **ERP-3:** Restore and expand human connections to nature as a mechanism for improving environmental protection by protecting and conserving priority habitats for public benefit and access by acquisition and easement.

## The CCMP Watershed Approach Guiding Restoration

The methodology followed for implementing the Ecosystem Restoration Strategy of the CCMP is through the development of watershed management plans (WMP) for the smallest drainage areas classified by the U.S. Geological Survey, also known as 12-Digit Hydrologic Unit Codes (or HUCs), usually named for the water body to which the land drains without regard for geopolitical boundaries. Watershed planning represents a collaborative shift from traditional city planning, where geopolitical borders limit actions to improve the condition of receiving waters. These plans depend upon public involvement and "stakeholders" who know the area, recognize its problems, and are invested in its health and resilience.

A key component of these plans is the identification of restoration and conservation projects, based on a scientific assessment of the watershed, an analysis of condition of priority habitats, the extent to which the project addresses at least one of the common values, and the degree to which the stressor causing the degrading habitat can be abated. These plans ensure restoration efforts are not only based in science but respond to community desires and fit into an overall management program, including improvements to the regulatory environment as well as enhanced community involvement.

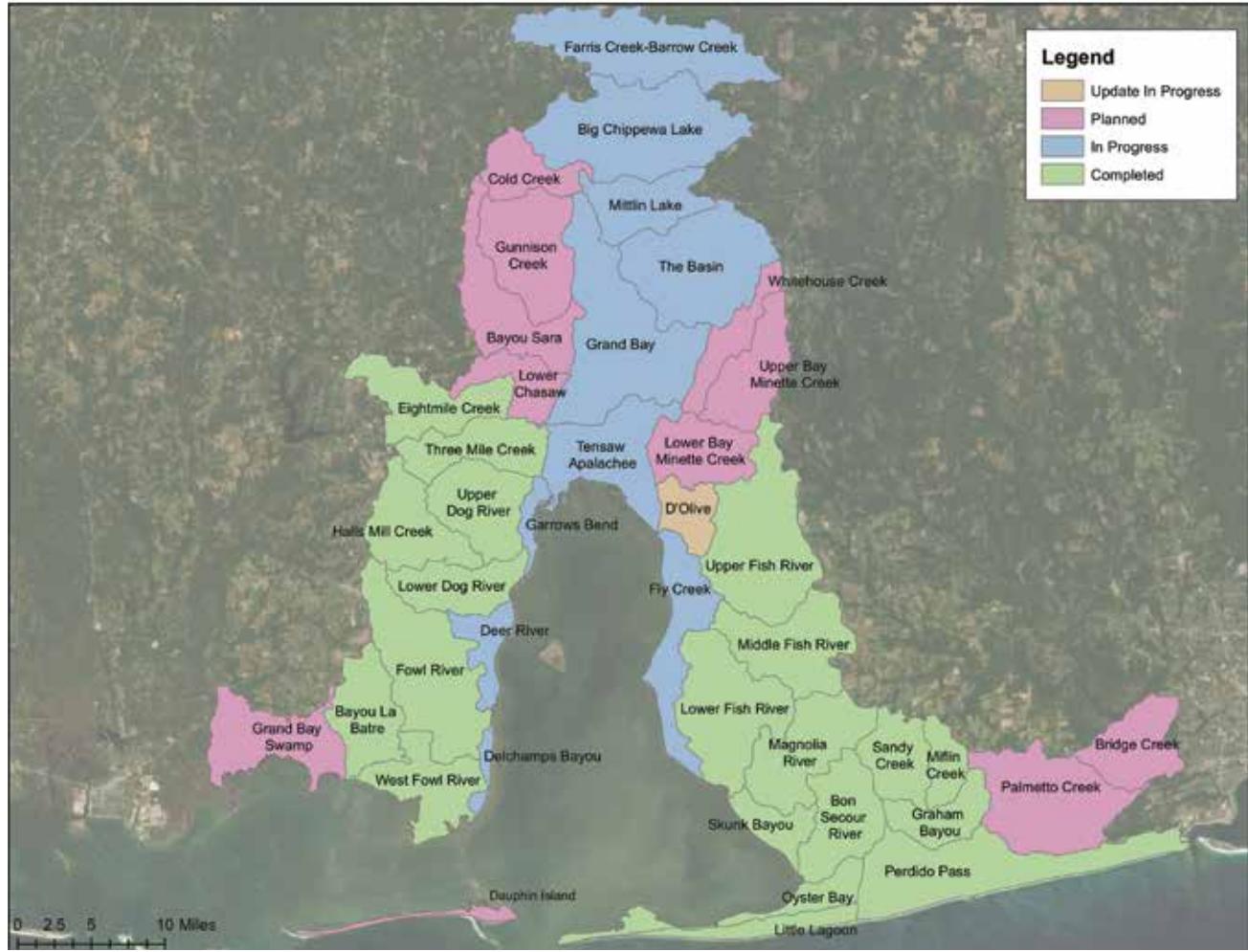
## Target Watersheds and Status of Planning

To achieve tangible and lasting environmental management success, municipalities need to work together to improve ecosystem service delivery in their watersheds. Planning at the watershed level is necessary to reach the scale of conservation and restoration needed to achieve real improvements to the habitats that will benefit both people and nature. It is the only way to reach those communities whose actions have an impact on a given freshwater system and to inform the citizens about the health of their watershed and the water upon which they rely to provide specific ecosystem services, like recreational opportunities. Like habitats, WMPs cross municipal boundaries and allow for all stakeholders within or dependent upon each watershed to have input into the management plan.

The Ecosystem Restoration and Protection strategy of the CCMP included a prioritization of watersheds for undertaking comprehensive watershed planning. With a combination of National Fish and Wildlife Foundation (NFWF) grants and RESTORE Bucket 2 funding through the State of Alabama, the MBNEP has secured funds to develop comprehensive watershed management plans for all tidally influenced watersheds from the Florida to the Mississippi borders. The status of this watershed plan development process, including component watersheds, funding sources, and completion status is provided in Table 1, along with a map showing watersheds identified for plan development either slated, in progress, or completed in Figure 1.

**Table 1.** Funding source and status of watershed management plan development.

FUNDING SOURCE AND STATUS OF WATERSHED MANAGEMENT PLAN DEVELOPMENT			
Watershed Plans	HUC 12 Watersheds	Funding Source	Completion Status
D'Olive	Sub Basin of Tensaw Apalachee	ADEM, EPA, MBNP, MASGC, APCO, Baldwin County, Daphne, Spanish Fort	2010
Eight Mile	Eight Mile Creek	MBNEP/MASGC/CWP	2011
Three Mile Creek	Three Mile Creek	ADCNR, MAWSS, ADEM, Mobile County, MBNEP, EPA	2014
Fowl River	Fowl River	NFWF-GEBF	2016
Dog River	Upper Dog River, Lower Dog River, Halls Mill Creek	NFWF-GEBF	2017
Bon Secour	Bon Secour River, Oyster Bay, Skunk Bayou	NFWF-GEBF	2017
Weeks Bay	Upper Fish River, Middle Fish River, Lower Fish River, Magnolia River	NFWF-GEBF	2017
Bayou La Batre	Bayou La Batre	NFWF-GEBF	2018
West Fowl River	West Fowl River	NFWF-GEBF	2019
Wolf Bay	Sandy Creek, Mifflin Creek, Graham Bayou	NFWF-GEBF/RESTORE	2019
Western Shore	Garrows Bend, Deer River, Delchamps Bayou	RESTORE	In progress
Little Lagoon/Gulf Frontal	Little Lagoon/Perdido Pass-Gulf Frontal	RESTORE	In progress
Mobile Tensaw Apalachee	Tensaw-Apalachee, Grand Bay, the Basin, Mittlin Lake, Big Chippewa Lake, Farris Creek/Barrow Creek	NFWF-GEBF/RESTORE	In progress
Fly Creek/Easter Shore	Fly Creek/Easter Shore	RESTORE	In progress
Eastern Delta	Whitehouse Creek, Upper Bay Minette Creek, Lower Bay Minette Creek	RESTORE	Planned
Western Delta	Cold Creek, Gunnison Creek, Bayou Sara, Lower Chasaw Creek	RESTORE	Planned
Dauphin Island	Dauphin Island	RESTORE	Planned
Grand Bay Swamp	Grand Bay Swamp	RESTORE	Planned
Bridge Creek/Palmetto Creek	Bridge Creek/Palmetto Creek	RESTORE	Planned



**Figure 1.** Map shows watersheds identified for plan development, including plan update in progress (brown), planned (pink), in progress (blue), or completed (green).



# Current Status of Coastal Habitats

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## The Different Types of Coastal Habitats

Alabama's extraordinary species diversity is a product of the mosaic of distinct coastal habitats characterizing our region, including the remnants of vast longleaf pine forests once dominating our landscape to the seagrass beds and oyster reefs fringing our coastlines. The mixture of habitats found in Alabama provides ecosystem services which support more species than found in any state east of the Mississippi River (MBNEP, 2012).

### Beaches and Dunes

The sandy coastlines fronting the Gulf of Mexico support herbaceous plants, such as sea oats and other salt-spray tolerant grasses and herbs, and provide habitat or nesting areas for the Alabama beach mouse, sea turtles, and a variety of resident and migratory shorebirds. Beaches and dunes provide the first line of defense against tropical storm surge and wave action (MBNEP, 2012).

### Freshwater Wetlands

In areas flooded by rivers and streams or groundwater seepage or containing topographic depressions holding water, these vegetated habitats serve to slow and store floodwater, recharge groundwater supplies, and trap excess sediments and nutrients to enhance water quality. Freshwater wetlands support highly diverse biological communities and are among the most highly stressed and historically altered habitats in coastal Alabama (MBNEP, 2012).

### Intertidal Marsh and Flats

These habitats are tidally inundated with salt or brackish water, may support a dense herbaceous plant layer with few shrubs, and represent one of the most biologically productive natural communities known. Tidal marshes and flats act as storm buffers, reduce shoreline erosion, absorb excess nutrients from runoff, and support numerous important fishery populations. Much of the early development of the City of Mobile was built on land created by filling marshes along the Mobile River (MBNEP, 2012).

### Longleaf Pine Habitat

Although longleaf pine was the most prevalent landscape in the southeastern U.S. when Europeans first arrived, most had disappeared by the early 20th century, due primarily to harvest and development. Today, restoration of longleaf pine forests is a conservation priority. Longleaf pine provides exceptional wildlife habitat and is relatively tolerant to both fire and strong winds and resistant to many insects and fungal diseases which attack other pine species (MBNEP, 2012).

### Maritime Forest

Once a more prevalent habitat along the northern Gulf coastline, these natural areas now occur in discontinuous, narrow bands, covering the more stable portions of barrier islands and coastal dune ridges. Maritime forests stabilize soils and provide storage capacity for groundwater and wildlife habitat favored by many migratory bird populations (MBNEP, 2012).

## Pine Savanna Forest

These non-riverine lowlands are poorly drained or seasonally wet and principally dominated by loblolly and slash pines with hardwoods occurring in wetter areas. Pine savanna systems are coastal buffers with widely scattered trees and a predominantly grass/herb understory of high species diversity. Decreases in their area and distribution are blamed largely on human development (MBNEP, 2012).

## Streams, Rivers, and Riparian Buffers

These are natural, flowing watercourses bounded by channel banks, progressing from their sources downstream to the estuary and tidal influence. They may be perennial or intermittent and often have beds comprising unconsolidated sandy or muddy sediments. Riparian buffers are vegetated lands directly adjacent to rivers and streams. Riparian buffers help stabilize stream channel structure and protect streams from upland sources of pollution by filtering and trapping sediments, nutrients, and chemicals (MBNEP, 2012).

# Marine Habitats

Marine habitats, including oyster reefs, submerged aquatic vegetation, and subtidal habitats are not addressed in this habitat restoration plan. While they are essential habitats of Mobile Bay, this plan focuses on the upland and freshwater habitats of Mobile Bay and its watersheds.

## Oyster Reefs

Oysters attach to one another to form dense reefs in brackish to salty waters in middle and lower Mobile Bay. In addition to being commercially valuable, oyster reefs provide important habitat for many species; filter impurities from the water, improving its quality; and stabilize shorelines and water bottoms by buffering wave action. In recent years, local oyster production has suffered from oyster drill predation stimulated by high salinities related to drought and incursion of saltwater into Mississippi Sound through the breach in western Dauphin Island caused by Hurricane Katrina in 2005.

## Submerged Aquatic Vegetation (SAV)

These habitats comprise expansive subtidal or intertidal areas occupied by rooted plants, with freshwater species in areas where riverine flow predominates and brackish to marine species occurring in the lower reaches of watersheds nearer the influence of Gulf waters. SAV beds filter polluted runoff, reduce erosion, and provide food for waterfowl and manatees and habitat for blue crabs, fish, and other aquatic animals. The extent of this habitat in Alabama has been greatly reduced since the mid-20th century, due in part to land-use conversion and associated degradation of water quality.

## Subtidal Habitats

These are the submerged areas below mean low tide, including open waters and the Gulf of Mexico. They are an important feature of commercial and recreational fishing activities along the Alabama coast. Subtidal areas can include different types of bottom habitat, including unconsolidated sediments, hard bottoms, and SAV beds.

For more detailed information on habitats, please refer to the Alabama Wildlife series (ADCNR, 2004) and Alabama's Wildlife Action Plan (ADCNR, 2015).

# The Ecosystem Services Provided by Coastal Habitats

Ecosystem services are the processes by which the environment produces resources we value. The most obvious examples are the services provided by plants. They use the energy of the sun to convert carbon dioxide to the food we eat and the oxygen we breathe. They stabilize soil, prevent erosion, and provide habitat for the fish, birds, and wildlife we value. Other examples are less obvious. Wetlands reduce excess nutrients, buffer shorelines from the erosive energy of storms, promote species diversity, and contribute to groundwater replenishment. While we often take these natural processes for granted, ecosystem services have monetary value which would become more apparent if it became necessary to replace them (MBNEP, 2012).

## Biodiversity

Alabama boasts the greatest biodiversity, or number of different species of plants and animals, of any state east of the Mississippi River. Nationwide, Alabama ranks fifth in biodiversity, enjoyed and valued by hunters; anglers; birders; anyone who enjoys a day on the water, in the woods, or in a field; and the State of Alabama, which depends upon tax revenue to provide human services upon which we depend (MBNEP, 2012).

## Carbon Sequestration

All the organic molecules upon which life depends have complex "skeletons" made of carbon. Carbon sequestration is the process by which the complex molecules created by plants are stored or sequestered to later provide energy and fuel to drive our automobiles, trains, planes, and economies (MBNEP, 2012).

## Fisheries Habitat

The healthy stocks of commercially and recreationally important fish and shellfish that we like to catch and eat are a huge component of the economic engine that powers the State's economy and supports our coastal quality of life. The health of these stocks depends upon habitats providing them the food, shelter, and breeding and nursery areas that they need (MBNEP, 2012).

## Flood Control

This is an essential service to people who live in a climate that receives over five and a half feet of rain annually, along with periodic tropical weather events. Wetlands, floodplains, and water bodies slow and store floodwaters, retaining and detaining them, preventing damage to development and infrastructure, and providing opportunities for infiltration and recharge of groundwater supplies (MBNEP, 2012).

## Groundwater Replenishment

With natural landscapes increasingly converted to impervious cover, areas promoting infiltration of surface water from rain and storms into the ground are necessary to sustain and replenish the aquifers from which we draw water for drinking, industry, and agriculture (MBNEP, 2012).

## Nesting Habitat for Birds and Turtles

Birds and turtles, especially valued by coastal residents and tourists, depend upon very specific habitats to lay eggs and raise young to ensure healthy populations can be enjoyed by current and future generations along the coast (MBNEP, 2012).

## Oyster Production

More than just particularly valued seafood supporting coastal heritage and culture, oysters build complex reefs providing optimal habitat for a gamut of aquatic organisms and reduce the wave energy that degrades shoreline habitats (MBNEP, 2012).

## Primary Production

Plants use the light energy of the sun to convert simple, inorganic carbon dioxide molecules into a complex organic compound called glucose, the primary energy source for living things and the building block for other more complex organic molecules, and the oxygen necessary for aerobic metabolism. Glucose forms the base of the food pyramid (MBNEP, 2012).

## Sediment and Nutrient Retention and Export

Sediments and nutrients cloud the water, blocking the light necessary for primary production and subsequently depleting our waters of the dissolved oxygen necessary for aquatic life. Plants found in wetlands, riparian areas, and SAV beds capture these sediments and nutrients and reduce their impacts elsewhere in the estuarine and marine ecosystems (MBNEP, 2012).

## Storm Buffer/Hazard Protection

The dune systems lining the Gulf of Mexico and wetlands fringing coastal water bodies are the first line of defense for human interests from the effects of tropical weather-related waves and storm surge. Both attenuate and dissipate waves and slow the onslaught of rising water levels, which accompany storms on the Gulf Coast (MBNEP, 2012).

## Water Quality Enhancement

Coastal habitats enhance water quality by sequestering contaminants in plant tissues and sediments, capturing and entraining the suspended sediments which block light transmission and incorporating nutrients that would otherwise promote growth of harmful algal blooms and deplete critical dissolved oxygen supplies (MBNEP, 2012).

## Wildlife Habitat

Wildlife habitat is critically important to supporting the exceptional species diversity in the State of Alabama. As natural landscapes are converted to developed lands, remaining wildlife habitat becomes increasingly important in providing this broad range of species places to live, eat, breed, and raise young (MBNEP, 2012).

# The Most Stressed Coastal Habitats

Over thirty scientists and resource managers from various disciplines evaluated ecosystem services provided by different coastal habitats to determine levels of impact from a suite of stressors. The expert panel evaluated 10 habitats for 14 of the ecosystem services they provide and the 13 anthropogenic stressors that negatively impact those habitats. For each of the 10 coastal habitat types (streams and rivers were combined with riparian buffers, effectively resulting in nine types), 13 stressors were rated numerically between zero, for those having no negative impact on the ecosystem service, and three for those having the most direct negative impact on each of the 14 recognized ecosystem services. Using this rating system, any ecosystem service that scored 2.2 or higher was identified as highly impacted from anthropogenic stressors (MBNEP, 2012). The cumulative scores of the stresses on the ecosystem services for each habitat were used to determine the most stressed habitats. The results of the analysis for all 10 habitats is provided in Table 2.

**Table 2.** Most stressed habitat types and their impact scores from anthropogenic stressors.

HABITAT TYPES AND THEIR IMPACT SCORE FROM ANTHROPOGENIC STRESSORS			
Habitat Type	Impact Score	Major Stressors	Ecosystem Services
Streams, Rivers, and Riparian Buffers	211.0	Freshwater Discharge Land-use Change Sediment	Fish Biodiversity Water Quality Sediment
Freshwater Wetlands	248.9	Land-use Change Fragmentation Dredging and Filling	Nesting for Birds and Turtles Biodiversity Wildlife Fisheries
Intertidal marshes and flats	230.4	Sediment Sea Level Rise Fragmentation	Biodiversity Fisheries Wildlife Water Quality
Longleaf Pine	180.7	Land-use Change Fragmentation	Wildlife Nesting for Birds and Turtles Biodiversity
Pine Savanna	169.2	Fragmentation Resource Extraction Fire Suppression	Wildlife Biodiversity Nesting for Birds and Turtles
Maritime Forest	162.3	Land-use Change	Nesting for Birds and Turtles Wildlife
Beaches and Dunes	139.3	Land-use Change Fragmentation	Wildlife Biodiversity Nesting for Birds and Turtles Hazard Protection
Submerged Aquatic Vegetation	149.0	Sedimentation Dredging and Filling Nutrient Enrichment	Biodiversity Fish Water Quality
Oyster Reefs	171.3	Dredging and Filling Freshwater Discharge	Oyster Production Water Quality Biodiversity Fish

From this effort, three habitat types – streams, rivers, and riparian buffers; freshwater wetlands; and intertidal marshes and flats - were identified as most stressed from dredging and filling, fragmentation, and sedimentation, all related to land-use change.

# Past Efforts to Restore Coastal Habitats

From 2006 to 2014, monies including, but not limited to, EPA Section 320 funding, competitive grant programs, opportunistic funding, and Alabama's Forever Wild Land Trust were used to fund watershed planning, acquisition, and restoration activities occurring on the coast. After 2014, funds from the *Deepwater Horizon* settlement agreements began contributing toward these efforts. MBNEP surveys the Management Conference each year on acquisition and restoration projects conducted by the partners and compiles this information into an annual Government Performance and Results Act (GPRA) report for EPA. The information on conservation and restoration efforts reflects all projects completed since 2006, as well as the projects completed as part of the Habitat Atlas (See Appendix A).

Although long-term success will be judged on the degree to which identified sites are conserved or restored, short-term results are promising. Approximately 56% of the lands (almost 32,200 acres) targeted for acquisition in the Habitat Atlas (2006) was acquired between 2006 and 2018, as shown in Table 3.

**Table 3.** Area (acres) identified and acquired by watershed/watershed complex since 2006.

MBNEP 2006 HABITAT ATLAS ACQUISITION SUCCESS			
Watershed/Watershed Complex	Area (acres) Identified	Acres (acres) Acquired	% Success
Grand Bay Swamp	<b>2,836</b>	<b>2,640</b>	<b>93%</b>
Mississippi Sound Complex	<b>7,093</b>	<b>917</b>	<b>13%</b>
Western Delta Complex	<b>3,233</b>	<b>2,580</b>	<b>80%</b>
Mobile-Tensaw-Apalachee Delta Complex	<b>2,558</b>	<b>1,269</b>	<b>50%</b>
Weeks Bay Complex	<b>5,223</b>	<b>1,131</b>	<b>22%</b>
Bon Secour Complex	<b>50</b>	<b>251</b>	<b>502%</b>
Gulf Frontal Complex	<b>115</b>	<b>132</b>	<b>115%</b>
Perdido River Complex	<b>30,000</b>	<b>18,000</b>	<b>60%</b>
Perdido Bay Complex	<b>5,259</b>	<b>4,711</b>	<b>90%</b>
<b>Total</b>	<b>56,367</b>	<b>31,631</b>	<b>56%</b>

Relative to the restoration projects identified in the Habitat Atlas and indicated in Table 4, all but one project had some level of restoration initiated. Approximately 17 of the 34 restoration / management actions (50%) identified in the Habitat Atlas were addressed in whole or part.

**Table 4.** MBNEP 2006 Habitat Atlas Restoration Success

MBNEP 2006 HABITAT ATLAS RESTORATION SUCCESS				
Watershed	2006 Projects	Progress	Status	CCMP Value
Grand Bay Swamp	<ul style="list-style-type: none"> <li>· prescribed fire management</li> <li>· invasive species control</li> <li>· longleaf pine restoration</li> <li>· hydrologic restoration</li> <li>· shoreline restoration</li> </ul>	<ul style="list-style-type: none"> <li>· prescribed fire lane construction underway</li> <li>· boundary posting underway</li> <li>· shoreline restoration planning underway</li> </ul>		Access Fish/ Wildlife Resiliency
Mississippi Sound Complex	<ul style="list-style-type: none"> <li>· habitat restoration, esp. for birds and terrapins</li> <li>· seagrass restoration</li> <li>· prescribed fire management</li> <li>· invasive species control</li> <li>· Alonso Landing breakwater/marsh</li> <li>· Sand Island stabilization</li> </ul>	<ul style="list-style-type: none"> <li>· Marsh Island project complete, including birds</li> <li>· Lightning Point project underway, including birds and terrapins</li> <li>· Dauphin Island feasibility plan underway</li> <li>· Alonso Landing complete</li> </ul>		Beaches/Shorelines Fish/ Wildlife Resiliency
Western Shore Complex	<ul style="list-style-type: none"> <li>· shoreline restoration with breakwaters and marsh</li> </ul>	<ul style="list-style-type: none"> <li>· small projects completed</li> <li>· larger projects currently being planned</li> </ul>		Fish/ Wildlife Resiliency
Mobile-Tensaw-Apalachee Delta Complex	<ul style="list-style-type: none"> <li>· marsh restoration north and south of Causeway</li> <li>· invasive species control</li> <li>· hydrologic restoration, including ditch filling</li> </ul>	<ul style="list-style-type: none"> <li>· marsh restoration planning initiated</li> <li>· some invasive species control underway</li> </ul>		Fish/ Wildlife Heritage/ Culture Resiliency Water Quality
D'Olive Bay	<ul style="list-style-type: none"> <li>· stream and streambank restoration</li> </ul>	<ul style="list-style-type: none"> <li>· 4 stretches on stream and streambank restoration complete</li> </ul>		Resiliency Water Quality
Weeks Bay Complex	<ul style="list-style-type: none"> <li>· prescribed fire management</li> <li>· Williams Reef restoration</li> </ul>	<ul style="list-style-type: none"> <li>· prescribed fire management implementation</li> </ul>		Fish/ Wildlife
Gulf Frontal Complex	<ul style="list-style-type: none"> <li>· sea turtle nest protection</li> <li>· Perdido Islands restoration and planting</li> </ul>	<ul style="list-style-type: none"> <li>· Share the Beach - Perdido Islands projects through City of Orange Beach, TNC, IOPF, and NOAA</li> </ul>		Access Beaches/ Shorelines Water Quality
Perdido River Complex	<ul style="list-style-type: none"> <li>· longleaf pine restoration</li> <li>· prescribed fire management</li> <li>· invasive species control</li> <li>· hydrologic restoration, including dirt roads</li> </ul>	<ul style="list-style-type: none"> <li>· IP Timber associated longleaf pine restoration complete</li> <li>· prescribed fire management underway</li> <li>· invasive species control underway</li> </ul>		Access Resiliency Water Quality
Perdido Bay Complex	<ul style="list-style-type: none"> <li>· prescribed fire management</li> <li>· invasive species control</li> <li>· hydrologic restoration</li> <li>· SAV restoration</li> </ul>	<ul style="list-style-type: none"> <li>-prescribed fire management</li> <li>-invasive species control</li> <li>-SAV restoration</li> </ul>		Access Fish/ Wildlife Water Quality
Wolf Bay Complex	<ul style="list-style-type: none"> <li>· living shoreline restoration</li> <li>· wetlands restoration</li> </ul>			Fish/ Wildlife Resiliency Water Quality

Green = Complete Blue = Underway



# Habitat Restoration Planning Methodology

## Process and Stakeholder Engagement

Stakeholder engagement in the development of the 2019 Habitat Conservation and Restoration Plan for Coastal Alabama began with input from each of the MBNEP Management Conference committeees: Project Implementation Committee, Science Advisory Committee, Community Action Committee, Community Resource Committee, Business Resource Committee, and Gouernment Networks Committee to refine habitat planning goals for this next 10-year period. Each committee was asked to vet and validate the coastal habitat restoration planning vision developed by the project team and to rank the priority of a series of habitat restoration and conservation goals on a scale of High, Medium, or Low. The results, presented in Table 5, show three high priority goals and three medium priority goals.

**Table 5.** Goals developed by the Technical Advisory Committee for the 2019 Habitat Conservation and Restoration Plan for Coastal Alabama.

HABITAT RESTORATION PLAN GOAL SETTING		Priority
Goal	Priority	
Restore chemical, biological, and physical integrity of coastal habitats to support an abundance of <b>fish, shellfish, wildlife, and recreation</b>	High	
Restore, conserve, or <b>enhance habitats in the headwaters of tidally influenced watersheds</b> or drainage basins	High	
<b>Protect uplands adjacent to coastal habitats</b> to accommodate landward migration of marshes	High	
Ensure adequate open space through <b>habitat protection and restoration for storm protection/flood</b> preunetion	Medium	
Ensure adequate open space through <b>habitat protection and restoration</b> for greater access and recreation	Medium	
Restore and <b>protect habitats which play a key role in coastal Alabama's heritage</b> and culture	Medium	

In addition to the input received by each of the Management Conference committees, a Technical Advisory Committee (TAC) participated in a series of meetings to guide plan development. This committee was made up of local, state, and federal resource managers, environmental professionals, and scientists involved in restoration research. These members were invited based on their expertise related to marine, freshwater, or upland habitats.

Participants in the TAC (shown in Table 6) covered a wide spectrum of public and private interests including: U.S. Army Corps of Engineers; U.S. Fish and Wildlife Service; U.S. Department of Agriculture's Natural Resources and Conservation Service; National Oceanic and Atmospheric Administration; Poarch Band of Creek Indians; Northern Gulf Institute; Mississippi-Alabama Sea Grant Consortium; Alabama Department of Conservation and Natural Resources, State Lands Division, Wildlife and Freshwater Fisheries Division, and Marine Resources Division; Alabama Department of Environmental Management; Geological Survey of Alabama; Alabama Forestry Commission; Alabama Forest Resources Council; Alabama Forestry Association; Weeks Bay National Estuarine Research Reserve; Grand Bay National Estuarine Research Reserve; Mobile County; Baldwin County; City of Orange Beach; City of Gulf Shores; City of Daphne; City of Mobile; Dauphin Island Sea Lab; Auburn University; University of South Alabama; The Nature Conservancy; Alabama Wildlife Federation; Longleaf Alliance; Coastal Land Trust; aquaculture interests (Point aux Pins Oysters); and, engineering firms (Thompson Engineering, Moffatt & Nichol, Jade Consulting, Vittor and Associates).

**Table 6.** Technical Advisory Committee participants grouped by area specialty.

	<b>SALTY</b> (Intertidal, Oyster, SAV, Salt Marsh, Beach)	<b>ORG</b>	<b>FRESH</b> (Wetland, Streams, Rivers, Riparian Buffers)	<b>ORG</b>	<b>UPLAND</b> (Longleaf Pine, Pine Savanna, Maritime)	<b>ORG</b>
<b>SUBTEAM CATEGORIES</b>						
Judy Haner	TNC		Jason Throneberry	TNC	Keith Tassin	TNC
<b>GIS SUPPORT</b>						
Sarah Johnston	WBNERR		Cynthia Feirman	MC	Lynn Ford	ADEM
<b>SCIENTISTS</b>						
Kevin Anson	ADCNR-MRD		Amy Hunter	ADCNR	John Gunter	AFC
Stephanie Smallegan	USA		Alex Beebe	USA	Scott Phipps	ADCNR-WBNERR
Bill Walton/Glenn/Scott	Auburn		Judy Stout	USA-ret	Mark Woodrey	GBNERR
LaDon Swann	MASGC		Dennis DeVries	Auburn		DISL
Dottie Byron	DISL		Steve Ashby	NGI		
<b>RESOURCE MANAGERS</b>						
Scott Bannon	ADCNR-MRD		Dave Armstrong	ADCNR-FWFD	Jo Lewis	ADCNR-SLD
Carl Ferraro	ADCNR-SLD		Keith Gauldin	ADCNR-FWFD	Roger Clay	ADCNR-SLD
Eric Brunden	ADCNR-WBNERR		Hank Burch	ADCNR-SLD	Doug Deaton	ADCNR-FW
Steve Jones	GSA		Jeff Powell	USFWS	John Hughes	USDA-NRCS
Dan Van Nostrand	NOAA		Lisa Huff	ADEM	Ken Leslie	AFC
Eric Sparks	MASGC		Mike Shelton	ADCNR-WBNERR	Dan Dumont	AFRC
Patric Harper	USFWS		Shannon Weaver	USDA-NRCS	Eric Spadenske	USFWS
Sherry Zettles	USACE		Todd Boatman	UASCE	Art Dyas	CLT
<b>LOCAL</b>						
Phillip West	OB		Ashley Campbell	Daphne	Tina Sanchez	MC
Dan Bond	GS		Janic Terry	Mobile	Joey Nunley	BC
<b>PROFESSIONAL</b>						
Scott Johnson	Thompson		Tim Thibaut	Vittor	Tyler Sibley	AFA
Kari Seruold	GMC		Drew Arnold	AWF		

The TAC met three times over the course of plan development. The first meeting focused on reviewing the results of the MBNEP Management Conference committees' goal-ranking exercise, refining the habitat restoration planning goals, and determining whether the preparation of a habitat change analysis between 2001/2002 and 2015/2016 was necessary prior to undertaking the habitat planning exercise.

While the project team continued to evaluate the best way to proceed relative to developing a habitat trend analysis, the second TAC meeting divided the group into three sections based on the ten habitat types delineated in the CCMP: Salty habitats (Intertidal, Oyster, SAV, Salt Marsh, Beach and Dunes); Freshwater habitats (Wetlands, Streams, Rivers, Riparian Buffers); and Upland habitats (Longleaf Pine, Pine Savanna, and Maritime Forests). Each group was provided with several different geospatial maps and asked to review previous planning efforts' prioritization criteria and make any changes deemed important.

In addition, the TAC was asked to develop a list of anthropogenic prioritization criteria to guide conservation and restoration-relative factors beyond habitat coverages and proximities.

The third TAC meeting focused on the development of target areas. During this meeting, an alternate process for classifying habitats was proposed which did not require ground-level habitat data, but instead used the broader Cowardin (Cowardin et al. 1979) and Anderson (Anderson et al. 1976) classifications based on the location of the habitat relative to topographic features, rather than the specific type of habitat present. This alternative classified habitats into four target types: Non-Restorable, Preservation/Conservation, Restoration, Reservation.

During discussion about target areas, the TAC decided to focus this phase of planning on the habitats within or draining to intertidal areas. This decision was made because these habitats are impacted differently and will require different stakeholder input and different conservation, restoration, and management strategies.

## Data Gathering

During initial stages of the project, staff from The Nature Conservancy and the MBNEP worked to compile geospatial data from local, state and federal sources. A list of all data compiled and reviewed in the creation of this plan can be found in Appendix B. As a result of this effort, several data gaps were identified. Some desired data sets simply do not exist, while other data sets are outdated or need improvement.

Main data gaps included information related to:

- > Threatened and endangered species, including State species of concern.
- > High-resolution salinity regimes.
- > Landscape changes in habitat types over time.

Data updates or improvements are needed for:

- > Protected lands and acquisition boundaries.
- > Construction control lines that do not extend to the edge of the two county boundaries.
- > Inshore and offshore sediment transport.
- > Bay oysters (only data on commercial or public reefs are available).
- > Two county habitat classification reconciliation.

Preliminary analysis was predicated on having a solid understanding of habitat losses from 2001-2015 across each habitat type. Unfortunately, due to different application of Cowardin (1979) and Anderson (1976) habitat classification codes by the different contractors classifying habitats in 2001/2002 and 2015/2016, a comparison of the datasets could not be completed without further reconciliation of habitat classification. For example, the classification PF04C - Palustrine Forested Needle-Leaved Evergreen Seasonally Flooded - was grouped into pine Savanna in 2001 and into freshwater wetlands in 2016. Both are correct, but they are not comparable, as this makes it seem that large expanses of pine Savanna were lost when, in fact, they were just classified differently.

# Guiding Principles, Vision, Purpose, Goals, Objectives

Protecting and restoring Alabama's natural resources is necessary both for the benefit of the wildlife that depends on these healthy habitats and for the people who derive goods and services from these ecosystems. Successful conservation and restoration ensure that ecosystem functions and services will be available for future generations. This habitat restoration plan is guided by the following six key concepts obtained from the International Standards for the Practice of Ecological Restoration (<https://www.ser.org/page/SERStandards/International-Standards-for-the-Practice-of-Ecological-Restoration.htm>):

- > Ecological restoration practice is based on an appropriate local native reference ecosystem, taking environmental change into account.
- > Identifying the target ecosystem's key attributes is required prior to developing longer-term goals and shorter-term objectives.
- > The most reliable way to achieve recovery is to assist natural recovery processes, supplementing them to the extent natural recovery potential is impaired.
- > Restoration seeks "highest and best effort" progression towards full recovery.
- > Successful restoration draws on all relevant knowledge.
- > Early, genuine, and active engagement with all stakeholders underpins long-term restoration success.

## Restoration Vision

Alabama's estuaries and coastal waters are healthy and optimize ecological functions while supporting human uses.

## Restoration Purpose

Restore the chemical, biological, and physical integrity of coastal habitats to support an abundance of fish, shellfish, wildlife, and recreation in and on the water.

The following goals were vetted by the MBNEP Management Conference and refined by the TAC:

### GOAL

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- 1 Restore, conserve, or enhance habitats in the headwaters of tidally influenced watershed or drainage basins.
  - 2 Protect uplands adjacent to coastal habitats to accommodate landward migration of marshes.
  - 3 Ensure adequate open space through habitat protection and restoration for storm protection/flood prevention.
  - 4 Restore and protect habitats which play a key role in coastal Alabama's heritage and culture.
-

The measurable objectives are shown in Table 7 for each habitat type related to each goal:

**Table 7.** Objectives and habitat types listed for each goal

OBJECTIVES AND HABITAT TYPES LISTED FOR EACH GOAL		
Goal	Objective(s)	Habitat Type
<b>1. Restore, conserve, or enhance habitats in the headwaters of tidally influenced watersheds or drainage basins.</b>		
1.1	Conserve, restore, and enhance 18,922 acres of pine savanna habitat, in the headwaters of tidally influenced watershed or drainage basins.	Pine Savanna
1.2	Conserve, restore, and enhance 619,574 linear feet of streams, rivers, and 1,463 acres of riparian buffers of tidally influenced watersheds or drainage basins	Streams, Rivers, and Riparian Buffers
1.3	Conserve, restore, and enhance 42,031 acres of freshwater wetlands in the headwaters of tidally influenced watershed or drainage basins.	Freshwater Wetlands
1.4	Conserve, restore, and enhance 23,220 acres of longleaf pine habitat in headwater areas of tidally influenced watershed or drainage basins.	Longleaf Pine
<b>2. Protect uplands adjacent to coastal habitats to accommodate landward migration of marshes.</b>		
2.1	Protect 3,361 acres of pine savanna habitat adjacent to coastal habitats to accommodate landward migration due to sea level rise.	Pine Savanna
<b>3. Ensure adequate open space through habitat protection and restoration for storm protection/flood prevention.</b>		
3.1	Stabilize, conserve, and enhance 1,267 acres of beaches, dunes, and shorelines, where appropriate.	Beaches, Dunes, and Shorelines
3.2	Conserve, restore, and enhance 10,093 acres of nearshore and intertidal marshes and flats.	Intertidal Marshes and Flats
3.3	Conserve, restore, and enhance 1,995 acres of maritime forest.	Maritime Forest
<b>4. Restore and protect habitats which play a key role in coastal Alabama's heritage and culture.</b>		
4.1	Conserve, restore, and enhance 47,084 acres of longleaf pine habitat.	Longleaf Pine
4.2	Develop a Marine Habitat Restoration Plan.	Submerged Aquatic Vegetation, Subtidal Habitats, Oyster Reefs

## Methodology for Development of Habitat Plan Objectives

As part of the 2009 Habitat Tool development, selection criteria for each habitat type was developed to distinguish priority habitats from the overall universe of each habitat type. Participants were provided with a set of standardized metrics that could be analyzed for locating the most critical habitat patches for protection for each habitat type. Selection criteria included:

- > Size of habitat
- > Core area
- > Perimeter-to-area ratio
- > Proximity to other habitat patches
- > Nearest neighboring habitat patch
- > Distance to areas already protected
- > Coincidence with ecologically important areas
- > Threatened and endangered species
- > Potential migration area

Each habitat type (grouped into marine, freshwater, and upland) was evaluated using these criteria with a resulting landscape scale map of priority habitat patches to be used in prioritizing areas for restoration.

A key part of the methodology for creating the **2019 Habitat Conservation and Restoration Plan for Coastal Alabama** was conducting a review of these habitat prioritization criteria developed in 2009 and making any modifications necessary, based on new knowledge from completed watershed plans or work in the field. Table 8 provides a comparison between the 2009 criteria and any recommended modifications based on 2018 data.

In addition to evaluating and enhancing the prioritization criteria of 2009, the TAC developed a list of other criteria for consideration. This activity stemmed from agreement among TAC members that identifying priority habitats should consider the level of protections currently available to those habitats due to regulatory action at the local level.

Other datasets used in the habitat analysis included:

- > U.S. Army Corps of Engineers Sea Level Rise and Storm Surge Inundation Modeling scenarios.
- > South Alabama Stormwater and Coastal Area Resource Protection Regulatory coverages.
- > NRCS Soil Data, and
- > EPA Healthy Watersheds Assessment ([http://www.mobilebaynep.com/images/uploads/library/ALMB\\_HW\\_Report\\_Final\\_Assessment.pdf](http://www.mobilebaynep.com/images/uploads/library/ALMB_HW_Report_Final_Assessment.pdf)).

To delineate priority habitat patches for habitat restoration and conservation, geospatial analyses using the habitat prioritization criteria defined above were performed for the seven habitat types in the plan: pine Savanna; rivers, streams, and their riparian buffers; freshwater wetlands; beaches, dunes, and shorelines; intertidal marshes and flats; maritime forests; and longleaf pine. The analysis was conducted using 2016 habitat maps (Radiance Technologies, revised by Moffat & Nichol) as the basis for assessing priority habitat patches for each of the four goals developed for the plan and for each of the habitats related to each goal. Using the prioritization criteria developed by the TAC and other data sets, a geospatial analysis was conducted for the habitats related to the goal to determine measurable objectives for the plan. The following geospatial analyses represented in Figures 2 through 8 (from the habitat types presented in Table 8, at right) were performed to determine priority habitat patches related to each goal:

**Table 8.** Criteria comparison by habitat type

Habitat Type	2009	2018
Streams, rivers, riparian buffers (conservation) (See Figure 4)	Buffers (30m long) that contain 500 meter stretches of intact habitat and 50% or more overlap with prioritized watersheds	No change
Streams, rivers, riparian buffers (restoration) (See Figure 5)	Buffers (30m long) that contain 500 meter stretches of intact or impaired habitat and 50% or more overlap with prioritized watersheds	No change
Freshwater Wetlands (See Figures 6, 7)	All riverine freshwater wetlands from 2.5 to 25 acres in area and greater than 1,000 meters from medium-to-high intensity developed areas	Include any acreage that is not already protected/restored
Longleaf Pine (See Figures 8, 13)	Patches 1 mile or less from protected areas of 147 feet or less from a like habitat	Within or adjacent to protected areas (one-mile buffer); greater than or equal to 500-acre patch, outside of protected area; contain soils suitable for gopher tortoise habitat; adjacent to other priority habitats
Pine Savanna (See Figures 3,9)	Patches 500 acres or more in size and outside protected areas	No change
Maritime Forest (See Figure 12)	Patches adjacent to beach and dune, adjacent to marsh, or one-fourth mile or less from a protected area and 10 acres or larger	Areas greater or equal to two acres; forest that are less than or equal to 100 feet from beach/dune habitat
Intertidal Marsh and Flats (hazard protection) (See Figure 11)	Patches 30 meters or less from developed areas and 500 feet or less from the 100-year flood zone	For restoration, incorporate areas susceptible to sea level rise and potential beneficial use investment
Intertidal Marsh and Flats (natural resource protection) (See Figure 11)	Patches containing species of concern (Alabama beach mouse, sea turtles, submerged vegetation, and oysters) and that are 500 feet or less from a protected area	
Beaches and Dunes (See Figure 10)	Patches containing Alabama beach mouse habitat or sea turtle nesting sites that overlap 50% or less with construction control lines that are 1 mile or less from maritime forest	Areas with 10ft Coastal contour line; adjacent to natural vegetation/ability for beach to migrate
Submerged Aquatic Vegetation	Patches of brackish and fresh SAV 1 mile or less from boat ramps and marinas and 1 mile or more from dredged locations and 2 miles or less from protected areas	Recommend development of marine restoration plan
Oyster Reefs	Very little data on oyster habitat is available; therefore, all oyster habitats should be considered priority	Recommend development of marine restoration plan





Priority Habitat  
**PINE SAVANNA**

# Priority Habitat: PINE SAVANNA

## Goal 1:

Restore, conserve, or enhance habitats in the headwaters of tidally influenced watersheds or drainage basins

**1.1 Pine Savanna for conservation and restoration in Headwaters:** With a total coverage of 386,792 acres of pine savanna habitat in Alabama's two coastal counties, priority selection criteria included all pine savanna habitat that:

- > Intersects headwater (first or second order) streams;
- > Is 500 acres in area or larger;
- > Lies outside of protected areas; and
- > Lies within tidally influenced watersheds.

A total of 18,922 acres of pine savanna habitat met all four of the selection criteria and were, therefore, designated as priority pine savanna habitat (blue). Of all projects recommended in WMPs for intertidal watersheds to conserve, restore, or protect pine savanna habitat, 82 projects were recommended in which points, lines, or polygons used to represent project sites intersected priority habitat patches. Project types identified in priority pine savanna habitat include:

- > 80 habitat protection projects (Bayou La Batre, Fowl River, West Fowl River)
- > Two habitat restoration projects (Fowl River)

## Goal 2:

Protect uplands adjacent to coastal habitats to accommodate landward migration of marshes in response to sea level rise.

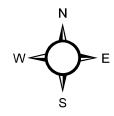
**2.1 Pine Savanna Protection for Landward Migration:** Goal 2 prioritizes pine savanna habitat to provide opportunities for landward migration of critical coastal edge habitats in response to rising sea level. With a total coverage of 386,792 acres of pine savanna habitat in Alabama's two coastal counties, shown in green, the priority selection criteria include all pine savanna habitat that:

- > Lies within undeveloped areas
- > Intersect upland marsh habitat;
- > Lies outside protected areas; and
- > Lies within 500 feet of sea level rise inundation areas.

Of total coastal pine savanna habitat, 3,361 acres (indicated in blue) met both criteria for selection as priority habitat for migration. WMP-recommended projects of various types fell within or intersected with priority patches of pine savanna habitat for migration. Recommended WMP projects of various types that fell within or intersected with patches of priority pine savanna habitat include:

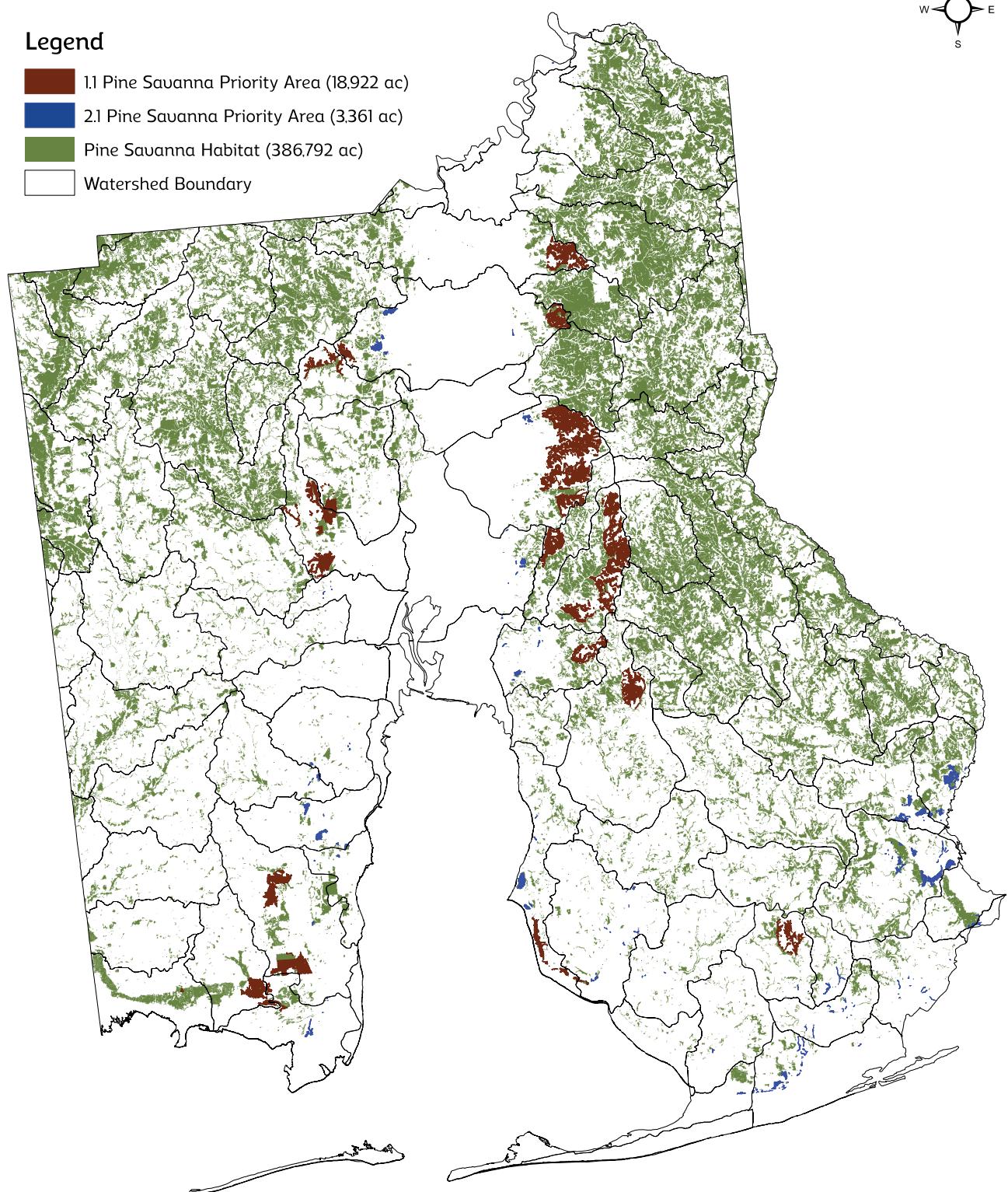
- > 20 habitat protection projects (Graham Bayou, West Fowl River, Upper Dog River, Halls Mill Creek, Lower Dog River)
- > Three habitat restoration projects (Lower Fish River, Upper Dog River, Halls Mill Creek)
- > Four other projects (West Fowl River, Magnolia River, Lower Fish River, Upper Dog River)

## Pine Savanna 1.1 and 2.1



### Legend

- 1.1 Pine Savanna Priority Area (18,922 ac)
- 2.1 Pine Savanna Priority Area (3,361 ac)
- Pine Savanna Habitat (386,792 ac)
- Watershed Boundary



**Figure 2.** Map shows all pine savanna habitat (green) and identified priority areas for goal 1 (brown) and goal 2 (blue).



A wide-angle photograph of a natural landscape. In the foreground, a body of water, likely a river or lake, stretches across the frame. The water is relatively calm, with some minor ripples and reflections of the surrounding environment. The middle ground is dominated by a dense forest of tall, mature trees, their dark green foliage creating a rich texture. The background shows a clear, pale blue sky. Superimposed on the upper portion of the image is the title text.

# Priority Habitat **STREAMS AND RIVERS**

# Priority Habitat: STREAMS AND RIVERS

## Goal 1:

Restore, conserve, or enhance habitats in the headwaters of tidally influenced watersheds or drainage basins

**1.2 Streams, Rivers, and Riparian Buffers Conservation in Headwaters:** There are almost 8 million total linear feet of headwater *rivers and streams* and 18,959 acres of *associated riparian buffers* (of 50-foot breadth on both sides of the stream) in Alabama's two coastal counties (indicated in blue). Priority selection criteria *for conservation* includes all headwater (first or second order) rivers, streams, and buffers that:

- > Lie outside of protected areas;
- > Lie within high-health catchment basins (derived from the 2014 Alabama and Mobile Bay Healthy Watersheds Assessment as catchments with watershed health rating of 70% or greater);
- > Are 500 linear feet in length or longer;
- > Lie within tidally influenced watersheds; and
- > Exclude impaired 303(d) list waters.

A total of 567,970 linear feet of headwater streams and 1,340 acres of associated riparian buffer met all five criteria for priority habitat designation for conservation (brown). Recommended WMP project types identified are:

- > 44 habitat protection projects (West Fowl River, Bayou La Batre, Halls Mill Creek)
- > Two water quality projects (Fowl River)

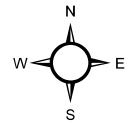
**1.2a. Streams, Rivers, and Riparian Buffers Restoration in Headwaters:** Also, under Goal 1 and Objective 1.2, priority selection criteria were developed *for restoration*, including all headwater rivers, streams, and buffers that:

- > Lie outside of protected areas
- > Lie within low-health catchment basins (derived from the 2014 Alabama and Mobile Bay Healthy Watersheds Assessment as catchments with watershed health rating of 30% or greater);
- > Are 500 linear feet in length or longer;
- > Lie within tidally influenced watersheds; and
- > Intersect impaired 303(d) list waters.

From the same distribution of coastal headwater streams, rivers, and buffers (indicated in green), a total of 51,601 linear feet of headwater streams and rivers and 123 acres of associated riparian buffer (indicated in blue) met all five criteria for designation as priority headwater streams, rivers, and riparian buffer habitat for restoration. The number of projects of each type and watersheds in which they fall are listed below:

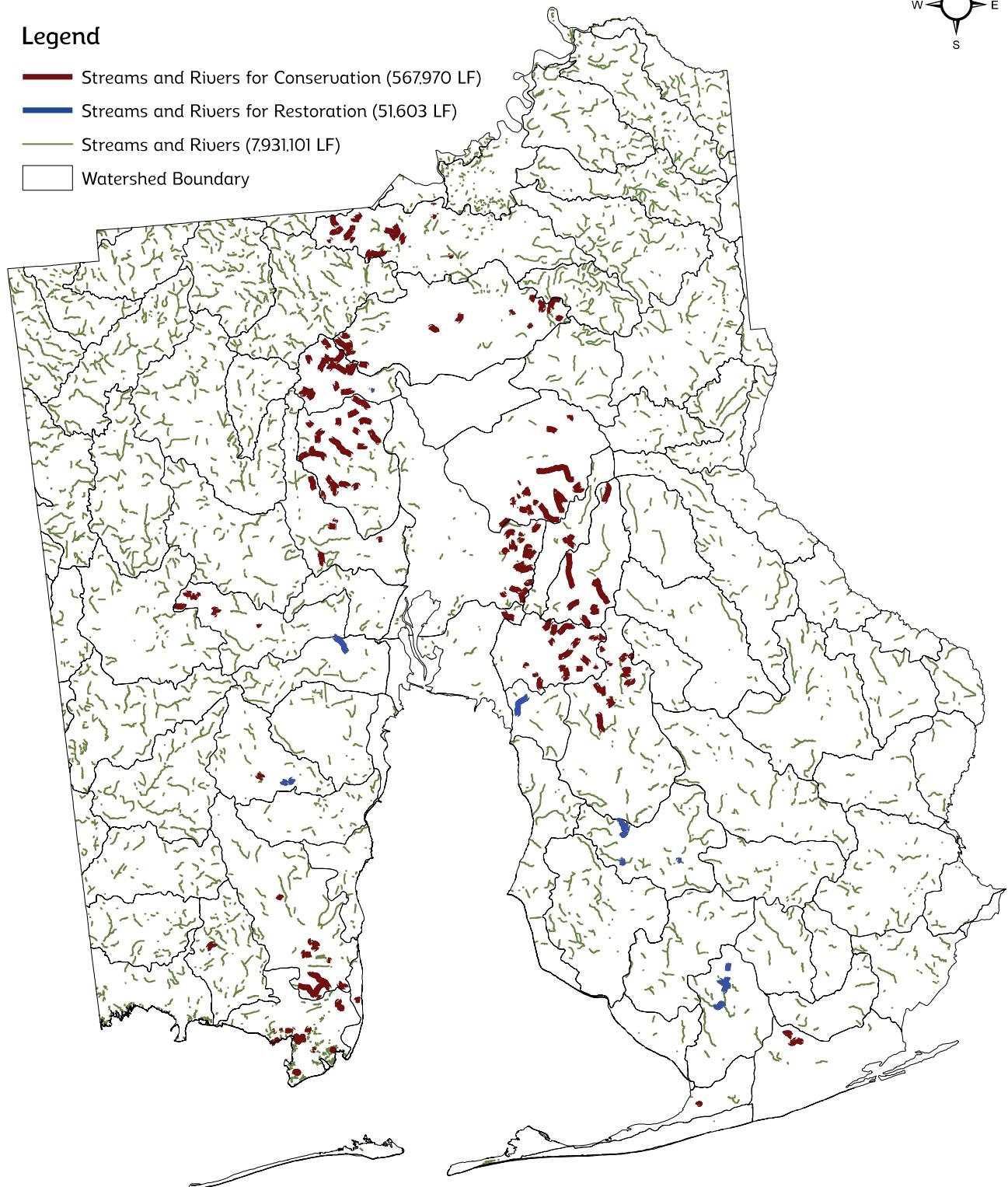
- > One habitat protection project (Halls Mill Creek)
- > Two habitat restoration projects (D'Olive, Bon Secour River)
- > Three water quality projects (Bon Secour, Three Mile Creek)
- > Three other projects (Middle Fish River, Halls Mill Creek)

## Streams and Rivers for Conservation and Restoration



### Legend

- Streams and Rivers for Conservation (567,970 LF)
- Streams and Rivers for Restoration (51,603 LF)
- Streams and Rivers (7,931,101 LF)
- Watershed Boundary



**Figure 3.** Map shows all headwater streams/rivers (green) and identified priority areas for conservation (brown) and for restoration (blue).





Priority Habitat  
**FRESHWATER WETLANDS**

# Priority Habitat: FRESHWATER WETLANDS

## Goal 1:

Restore, conserve, or enhance habitats in the headwaters of tidally influenced watersheds or drainage basins

**1.3 Freshwater Wetlands Conservation in Headwaters:** There are 317,834 total acres of freshwater wetlands across Alabama's two coastal counties (indicated in blue). Priority selection criteria **for conservation** include all freshwater wetlands that:

- > Intersect headwater streams;
- > Lie outside of protected areas;
- > Lie within high-health catchment basins (Healthy Watersheds Assessment watershed health ratings at least 70%); and
- > Lie within tidally influenced watersheds.

Of total coastal freshwater wetland coverage, 39,599 acres (indicated in brown) met all four criteria for priority designation for conservation. WMP recommended projects by type fell within or intersected with patches of priority freshwater wetlands designated for conservation.

- > 39 habitat protection projects (Lower Fish River, Bayou La Batre, Halls Mill Creek, and West Fowl River)

**1.3a. Freshwater Wetlands for Restoration in Headwaters: Priority selection criteria for restoration include all freshwater wetlands that:**

- > Intersect headwater streams;
- > Lie outside of protected areas;
- > Lie within low-health catchment basins. (Healthy Watersheds Assessment watershed health ratings of 30% or greater);
- > Fall within jurisdictional boundaries of municipalities that have current wetland/stream buffer regulations; and
- > Lie within tidally influence watersheds.

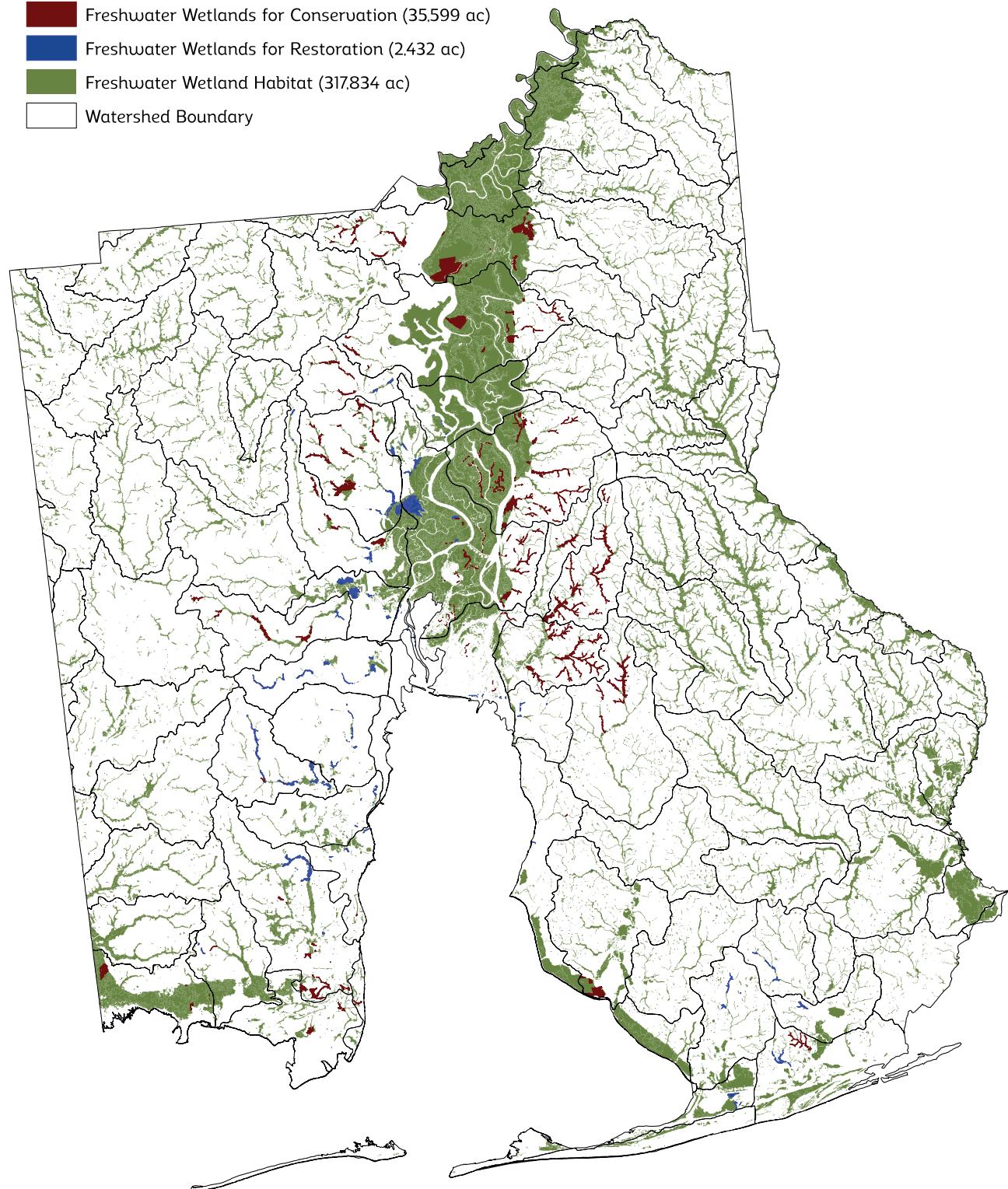
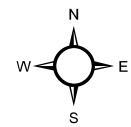
With green areas indicating total coastal coverage of freshwater wetlands, areas indicated in blue show patches meeting all five criteria for priority designation and encompassing a total of 2,432 acres. WMP-recommended projects of various types fell within or intersected with patches of priority freshwater wetlands designated for restoration. The number of projects of each type and watersheds in which they fall are listed below:

- > 48 habitat protection projects (Upper Dog River, Halls Mill Creek, Oyster Bay, Lower Dog River, West Fowl River, and Bayou La Batre)
- > Eight habitat restoration projects (Bon Secour River, Fowl River, Sandy Creek, Halls Mill Creek & Upper Dog River)
- > Two water quality projects (Bon Secour River)
- > 19 other projects (Halls Mill Creek, Three Mile Creek)

## Freshwater Wetlands for Conservation and Restoration

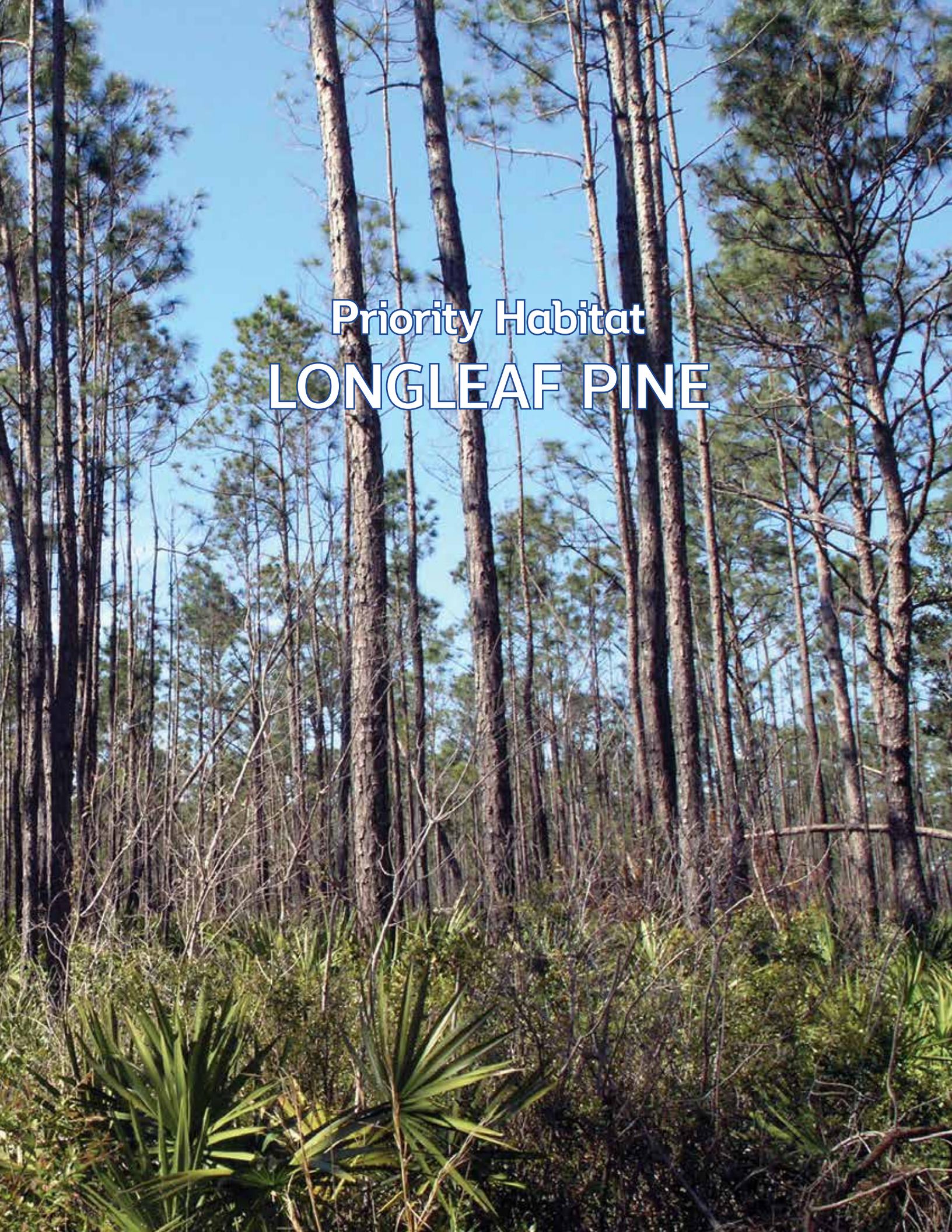
### Legend

- Freshwater Wetlands for Conservation (35,599 ac)
- Freshwater Wetlands for Restoration (2,432 ac)
- Freshwater Wetland Habitat (317,834 ac)
- Watershed Boundary



**Figure 4.** Map shows all freshwater wetland habitat (green) and identified areas for conservation (brown) and for restoration (blue).



A photograph of a longleaf pine forest. The trees are tall, thin, and have a light-colored, textured bark. They are densely packed, creating a vertical pattern against a clear blue sky. In the foreground, there are some green, leafy plants, possibly saw Palmetto, which are characteristic of this habitat.

# Priority Habitat **LONGLEAF PINE**

# Priority Habitat: LONGLEAF PINE

## Goal 1:

Restore, conserve, or enhance habitats in the headwaters of tidally influenced watersheds or drainage basins

**1.4 Longleaf Pine Conservation in Headwaters:** Total coverage of longleaf pine habitat in the two coastal counties, is indicated in green and accounts for 575,220 acres. Priority designation is attributed to headwater longleaf pine habitat that:

- > Intersect headwater streams;
- > Lie within undeveloped areas;
- > Contain soils that are moderately and highly suitable for gopher tortoise habitat;
- > Lie outside of protected areas; and
- > Lie within tidally influenced watersheds.

With green areas indicating total coastal coverage of longleaf pine habitat, areas indicated in brown show patches meeting all five criteria for priority designation and encompassing a total of 23,220 acres. Recommended WMP projects of various types that fell within or intersected with patches of priority longleaf habitat include

- > 17 habitat protection projects (Halls Mill Creek)
- > Three habitat restoration projects (Upper Fish River, Middle Fish River)
- > Eight other projects (Upper Fish River, Middle Fish River)

## Goal 4:

Restore and protect habitats which play a key role in coastal Alabama's heritage and culture.

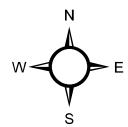
**4.1 Longleaf Pine:** Total coverage of longleaf pine habitat in the State's two coastal counties, is indicated in green and accounts for 575,220 acres. Priority designation is attributed to longleaf pine habitat that:

- > Lies within undeveloped areas;
- > Lies within areas containing soils that are highly or moderately suitable for gopher tortoise habitats; and
- > Lie outside of and at least 0.5 miles from protected areas.

Of the total acreage of longleaf pine forest in the two coastal counties, less than eight percent, or 47,084 acres (indicated in blue) met all three selection criteria for designation as priority habitat. Recommended WMP projects by type that fell within or intersected with priority patches of longleaf pine habitat are listed below.

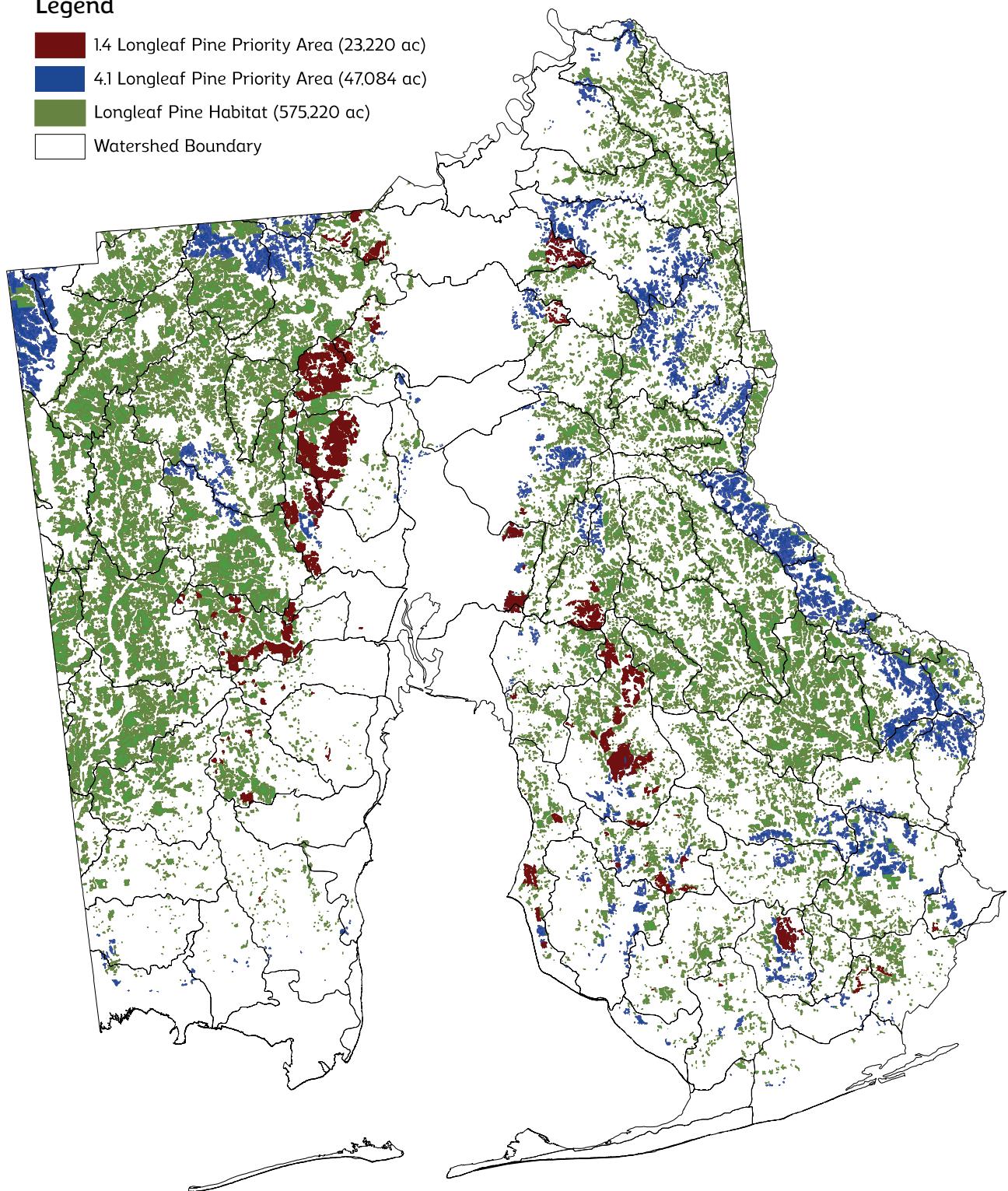
- > 34 habitat protection projects (Bayou La Batre, Lower Fish River)
- > Six habitat restoration projects (Upper Fish River, Sandy Creek, Lower Fish River, Middle Fish River, Magnolia River)
- > Ten other projects (Upper Fish River, Middle Fish River, Magnolia River, Lower Fish River)

## Longleaf Pine 1.4 and 4.1



### Legend

- 1.4 Longleaf Pine Priority Area (23,220 ac)
- 4.1 Longleaf Pine Priority Area (47,084 ac)
- Longleaf Pine Habitat (575,220 ac)
- Watershed Boundary



**Figure 5.** Map shows all longleaf pine habitat (green) and identified priority areas for goal 1 (brown) and goal 2 (blue).





Priority Habitat  
**BEACHES, DUNES AND  
SHORELINES**

# Priority Habitat: BEACHES, DUNES AND SHORELINES

## Goal 3:

Ensure adequate open space through habitat protection and restoration for storm protection and flood prevention.

**3.1 Beaches, dunes, and shorelines for storm protection and flood prevention:** Beaches, dunes and shoreline habitat account for 2,074 (indicated in green) acres in Alabama's two coastal counties. Priority designation is attributed to beaches, dunes, and shorelines that:

- > Lie within areas under current one-meter sea level rise inundation scenarios;
- > Lie outside of protected areas; and
- > Within the Alabama Department of Environmental Management's (ADEM) "Coastal Area".\*

Of total beach, dune and shoreline habitat, 1,267 acres (indicated in blue), met both criteria for selection as priority habitat for storm protection and flood prevention. WMP-recommended projects of various types fell within or intersected with priority patches of beach, dune and shoreline habitat. The number of projects of each type and watershed in which they fell are listed below:

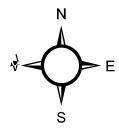
- > One habitat protection project (Graham Bayou)

\*ADEM Admin. Code r. 335-8-1-02(k)

(k) "Coastal Area" means the waters (including the lands therein and thereunder) and the adjacent shorelands (including the waters therein and thereunder) lying seaward of the continuous 10-foot contour (as defined below) extending seaward to the outer limit of the United States territorial sea. The inland boundaries of the coastal area are described as follows: begin at the southernmost point of the Mississippi-Alabama state line where the land surface elevation reaches 10 feet above mean sea level and continue in a general easterly direction along the 10-foot contour to the proximity of Mobile Bay; continue in a northerly direction on the 10-foot contour along the western shore of Mobile Bay and the Mobile River delta to the north line of Mobile County; thence southeastward along the north line of Mobile County to the intersection with the Baldwin County line in the Mobile River; thence along the west and north lines of Baldwin County in the Mobile and Alabama Rivers to the intersection of the westernmost point of Baldwin County where the land surface altitude reaches 10 feet above mean sea level; thence along the 10-foot contour in a southwesterly and southern direction along the Alabama River, the Mobile River delta and the east shore of Mobile Bay to the proximity of Bon Secour; thence continue along the 10-foot contour in an easterly and northeasterly direction to the Alabama-Florida state line.

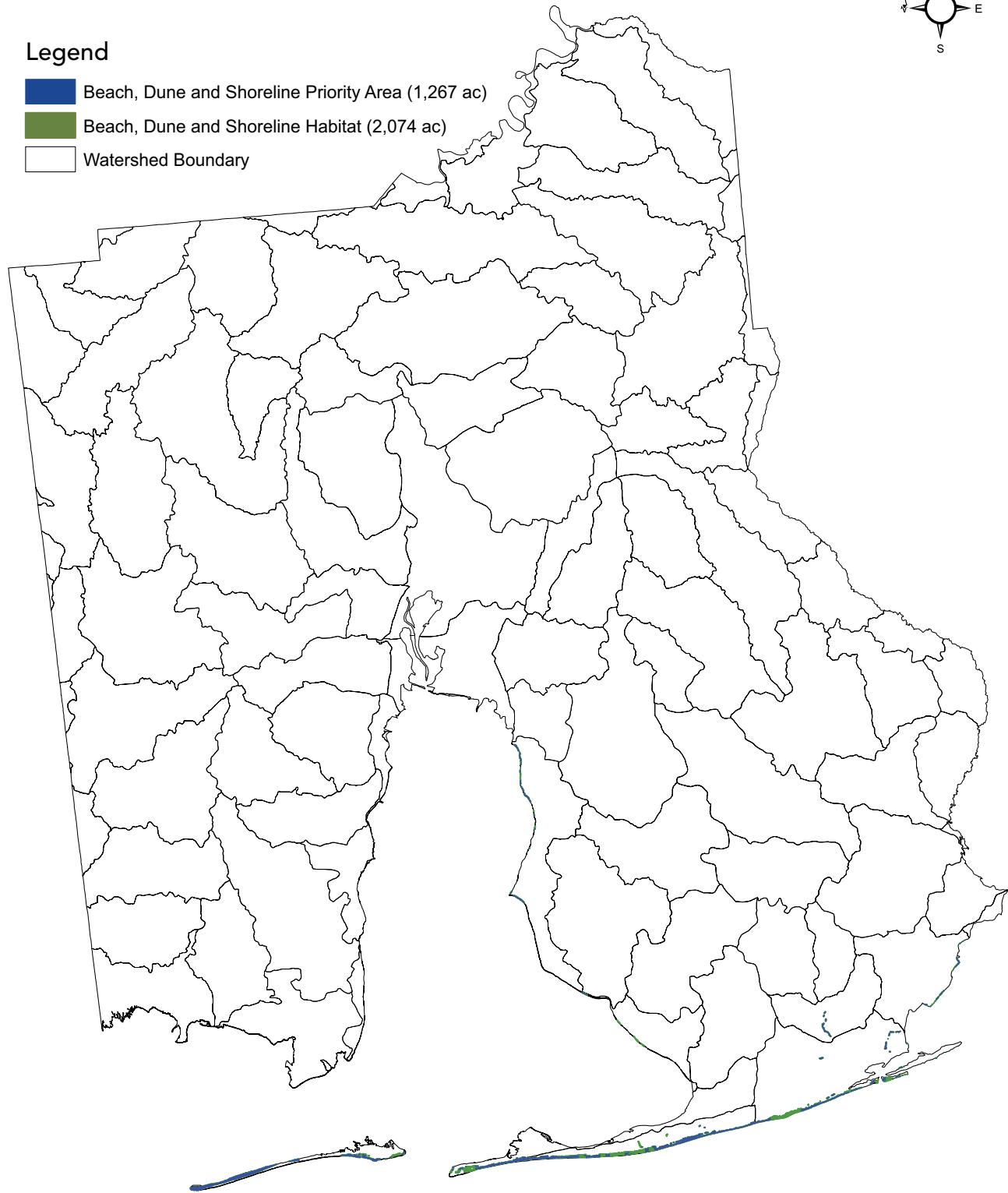
For our purposes, the "Coastal Area" was included to define upland and coastal habitat types. ADEM describes the "Coastal Areas" as areas between sea-level and the continuous 10-foot contour boundary described. This boundary represents a line that is defined as being at a continuous 10-foot elevation level. However, it is possible that higher elevation levels can exist within this boundary due to human-induced or natural reasons, such as lands having been filled or the natural accretion of dunes.

## Beaches, Dunes and Shorelines



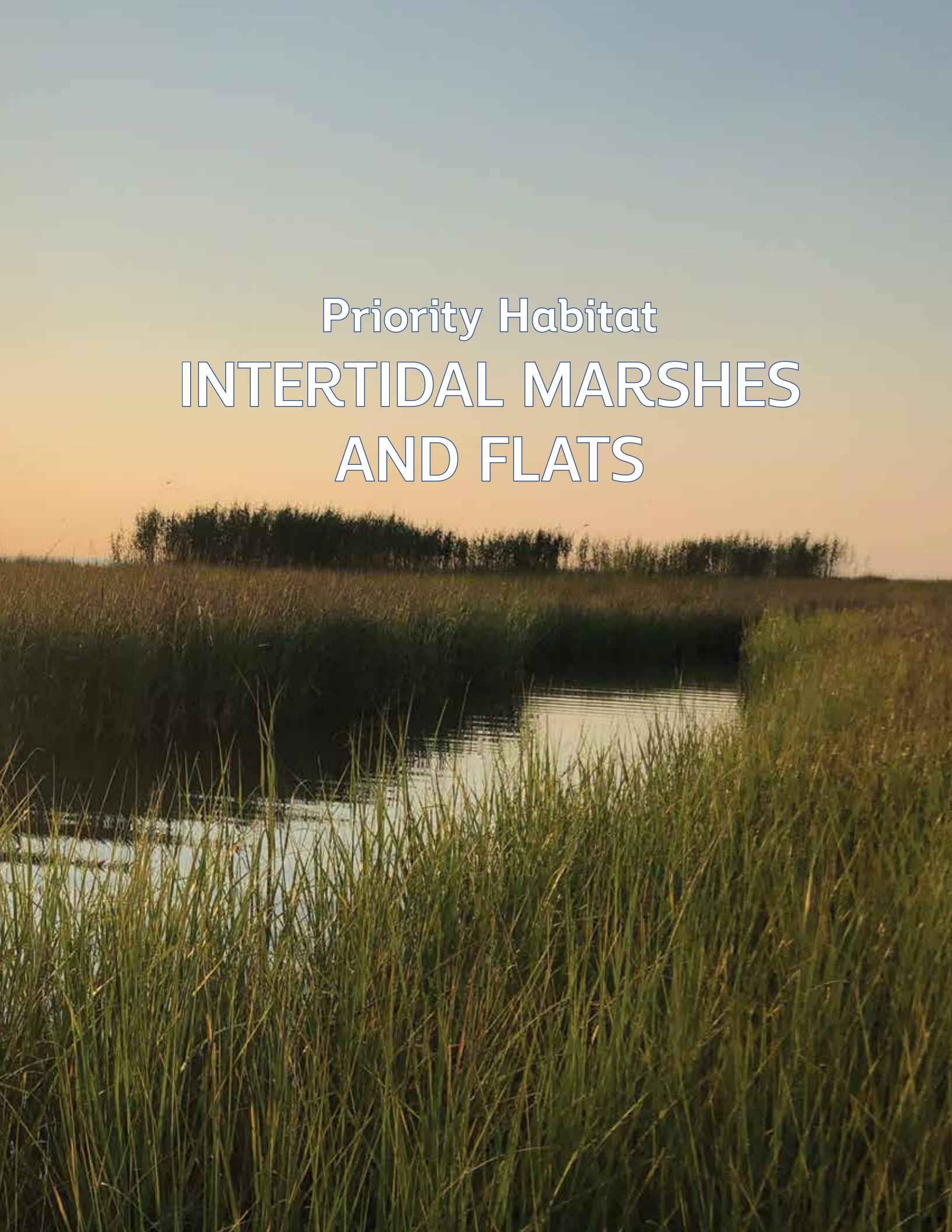
### Legend

- Beach, Dune and Shoreline Priority Area (1,267 ac)
- Beach, Dune and Shoreline Habitat (2,074 ac)
- Watershed Boundary



**Figure 6.** Map shows all beach, dune and shoreline habitat (green) and identified priority areas (blue) for storm protection/flood prevention.





Priority Habitat

# INTERTIDAL MARSHES AND FLATS

# Priority Habitat: INTERTIDAL MARSHES AND FLATS

## 3.2 Intertidal marshes and flats for storm protection and flood prevention:

Intertidal marshes and flats account for 21,511 acres within the two coastal counties. Priority designation is attributed to intertidal marshes and flats that:

- > Lie within areas under current one-meter sea level rise inundation scenarios;
- > Lie outside of protected areas; and
- > Within the Alabama Department of Environmental Management's (ADEM) "Coastal Area".

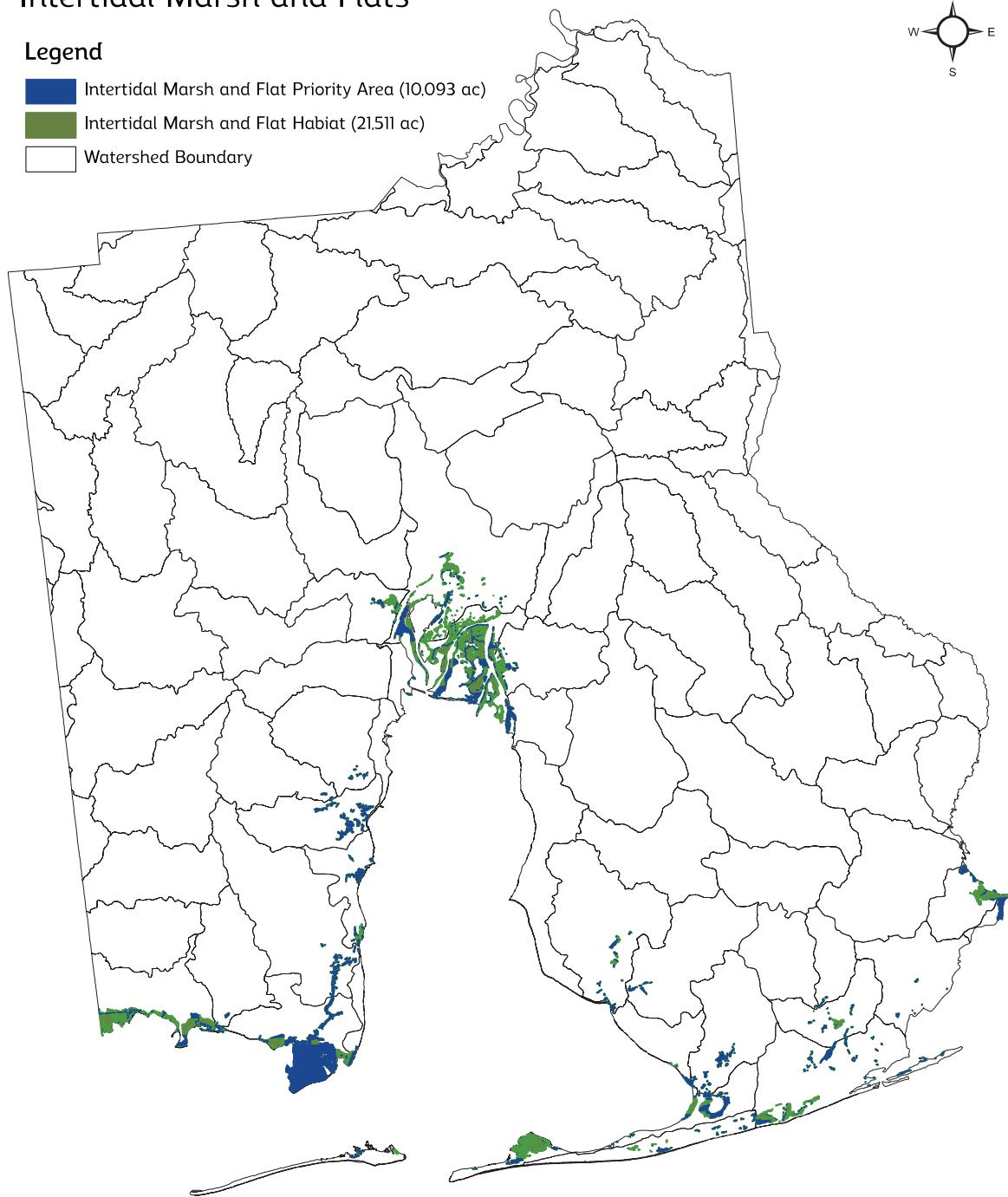
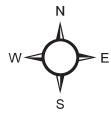
Approximately half of the total coverage of intertidal marshes and flats, 10,093 acres (indicated in blue) met both criteria for designation as priority habitat. WMP-recommended projects of various types fell within or intersected with priority patches of intertidal marshes and flats. The number of projects of each type and watersheds in which they fall are listed below:

- > 285 habitat protection projects (Magnolia River, Lower Fish River, Halls Mill Creek, Lower Dog River, Upper Dog River, Oyster Bay, Skunk Bayou, West Fowl River, Graham Bayou, Bon Secour River, and Bayou La Batre)
- > Seven habitat restoration Projects (Fowl River, Oyster Bay, Lower Fish River)
- > Six other projects (Lower Fish River, Magnolia River, West Fowl River, and Lower Dog River)

## Intertidal Marsh and Flats

### Legend

- Intertidal Marsh and Flat Priority Area (10,093 ac)
- Intertidal Marsh and Flat Habitat (21,511 ac)
- Watershed Boundary



**Figure 7.** Map shows all intertidal marshes and flats habitat (green) and identified priority areas (blue) for storm protection/flood prevention.



A photograph of a dense, lush maritime forest. The scene is filled with a variety of green foliage, including large, spreading trees with gnarled branches and clusters of palm fronds. The ground is covered with a mix of fallen leaves, low-growing plants, and patches of green grass. The overall atmosphere is one of a wild, undisturbed natural environment.

# Priority Habitat **MARITIME FOREST**

# Priority Habitat: MARITIME FOREST

**3.3 Maritime Forest for storm protection and flood prevention:** Maritime forests account for 47,277 acres within the two coastal counties. The selection criteria for priority habitat includes maritime forest that:

- > Lie outside of protected areas;
- > Within 100 feet of shoreline, beach or dune habitat; and
- > Within the Alabama Department of Environmental Management's (ADEM) "Coastal Area".

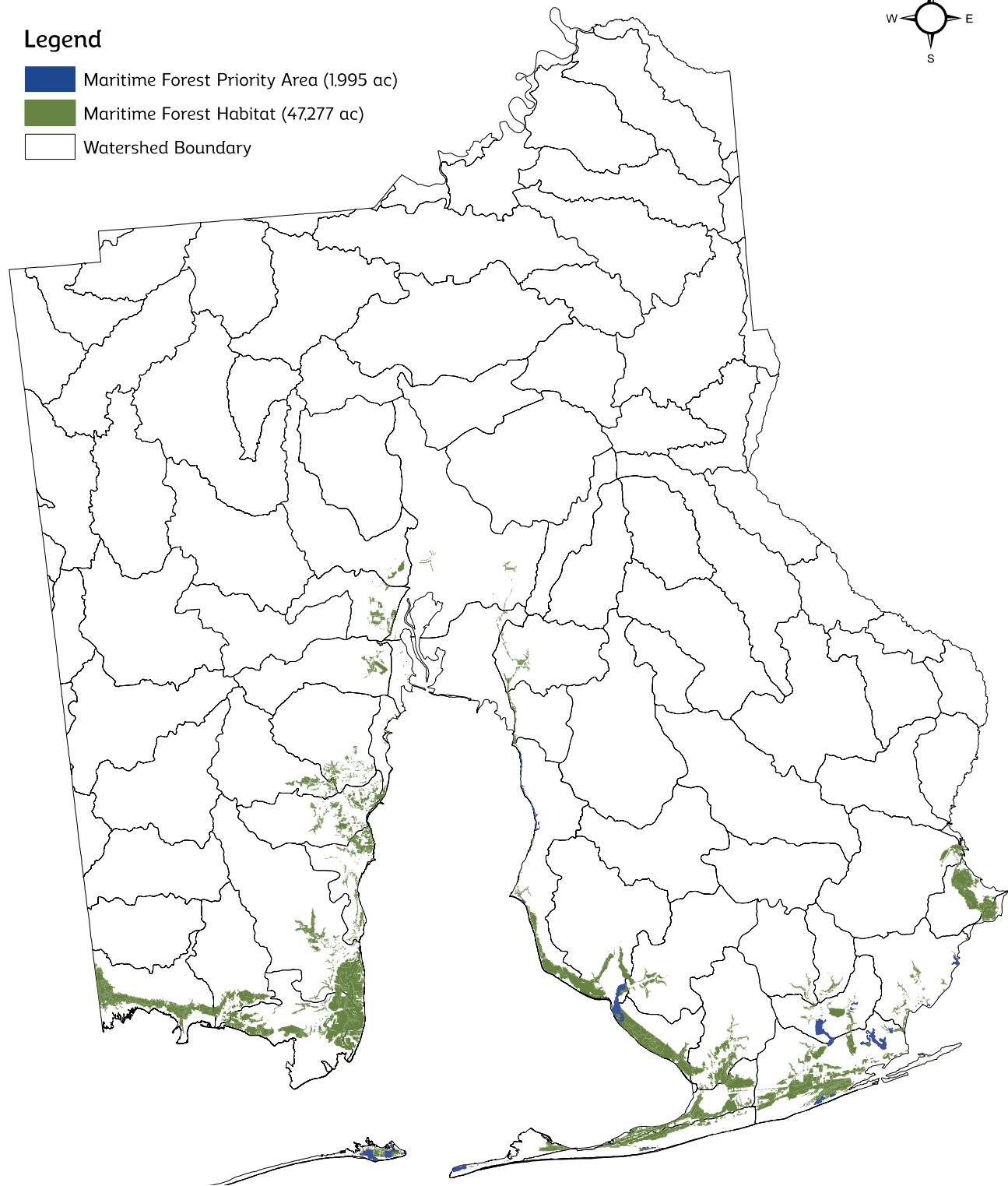
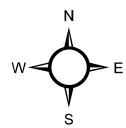
Most extant maritime forest habitat, 1,995 acres of total coverage, occurs outside of protected areas and within 100 feet of shoreline, beach, or dune habitat, and are, therefore, considered priority habitat. With coastal WMPs yet to be developed for the Dauphin Island and Perdido Pass/Gulf Frontal watersheds, only one WMP-recommended projects by type were identified.

- > One habitat protection project (Lower Fish River)

## Maritime Forest

### Legend

- Maritime Forest Priority Area (1,995 ac)
- Maritime Forest Habitat (47,277 ac)
- Watershed Boundary



**Figure 8.** Map shows all maritime forest habitat (green) and identified priority areas (blue) for storm protection/flood prevention.



# Implementing the Plan

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## Overview of Conservation Methods

Habitat conservation is driven by the acquisition or protection of land. There are many methods for conserving land and, in most cases, the property owner is incentivized to conserve the property for its habitat value. Often incentives are financial and include tax benefits. Land is frequently purchased for inclusion in a program that will protect and manage the property for long-term public benefit, such as Alabama's Forever Wild Land Trust program. In cases with landowners preferring to maintain control of their property, a conservation easement can be executed to maintain the landowner's rights, while restricting development detrimental to priority habitat ecosystem service provision.

## Guiding Principles for Conservation Activities

Overall guiding principles have been developed to help focus conservation efforts, including:

- > Prioritizing those parcels most vulnerable to environmental pressures.
- > Prioritizing those parcels that meet the greatest ecological need.
- > Leveraging public and private funds.
- > Coordinating activities among public and private entities to accomplish objectives.
- > Seizing opportunities as they arise.

Properties identified for habitat conservation and restoration will require long-term site protection measures to ensure their conservation into perpetuity. Efforts for long-term protection of restoration sites will require cooperation between landowners, governments, and non-profit organizations committed to the protection of these resources. Among the many ways to protect conservation and restoration areas are land acquisition, conservation easements, and other land-use controls. Several of these techniques are defined below:

**Land Donation** - Land that is donated outright to a land trust or agency for conservation purposes. In Alabama, State agencies, counties or municipalities, or non-governmental organizations, like The Nature Conservancy, Forever Wild Land Trust, or Alabama Land Trust, may serve as recipient entities. Tax benefits may be available to donors.

**Fee Simple Acquisition** - The landowner sells all his rights, title, and interest in the property to a land trust or agency at fair market value. The land trust then owns and manages the land. Incentives may include potential income and estate tax benefits.

**Discount Acquisition** - In a discount acquisition, the buyer pays the difference between the amount of unpaid principal of a mortgage and the price paid for the mortgage in the secondary market. This method provides the buyer a discount on the property and provides debt relief as an incentive to the seller.

**Bargain Sale** - A bargain sale is where the land is sold at less than its fair market value. It combines the income-producing benefit of a sale with the tax-reducing benefit of a donation. It can also avoid the expenses of a sale on the open market. The difference between the land's appraised fair market value and its sale price is considered a charitable donation to the land trust and can be claimed as an income tax deduction.

**Conservation Easements** - A conservation easement is a legal agreement between a landowner and a conservation organization or government agency permanently limiting a property's uses in order to protect the property's conservation values. Landowners grant conservation easements to protect their land from inappropriate development while retaining the rights of private ownership. The conservation easement does not necessarily exclude all development but restricts any development that would be harmful to the public benefits the easement seeks to protect.

With a conservation easement, the landowner continues to own the property and may sell it, live on it, use it, or leave it to heirs, but the agreed-upon restrictions remain with the land forever. Granting a conservation easement does not mean that landowners must grant public access to their property.

Other conservation options can be found in the land trust handbook, *Land Conservation in Coastal Alabama - Options for Landowners*, produced by the Partnership for Gulf Coast Land Conservation (PGCLC, 2018).

## Defining Restoration in Broad Terms: Restoration Project Principles

Habitat restoration is, by its very nature, a joint venture between scientists and practitioners. As shown in Table 9, Restore America's Estuaries and the Estuarine Research Federation developed a set of principles to guide restoration activities in coastal estuaries (RAE, 2000). A concentrated, year-long process involving scientists and restoration professionals across the nation produced a gold standard for estuarine habitat restoration and guiding principles (RAE, 2000). These principles are intended as a guide for all types of restoration activities, including large-scale and community-based restoration projects, and have been adapted to apply to all restoration, not just estuarine.

**Table 9.** Principles used to guide restoration activities in coastal estuaries.

CONTEXT	Preservation of existing habitat is critical to the success of estuarine restoration.
	Ecosystems can be restored only by using a long-term stewardship approach and by developing the constituencies, policies, and funding needed to support this.
	The size, scale, and amount of restoration activity must increase substantially to have a significant effect on overall estuarine function and health.
PLANNING	Restoration plans should be developed at the watershed level to set a broad vision, articulate clear goals, and integrate an ecosystem perspective.
	Restoration plans should be developed through open regional processes that incorporate all key stakeholders and the best scientific thinking available.
DESIGN	Project goals should be clearly stated, site specific, measurable, and long-term – in many cases, greater than 20 years.
	Success criteria for projects needs to include both functional and structural elements and be linked to suitable, local reference habitats.
	Site plans need to address off-site considerations, such as potential flooding and saltwater intrusion, to ensure projects do not have negative impacts on nearby people and property.
	Scientifically-based monitoring is essential to the improvement of restoration techniques and overall estuarine restoration.
IMPLEMENTATION	Ecological engineering practices should be applied in implementing restoration projects, using all available ecological knowledge and maximizing the use of natural processes to achieve goals.
	Adaptive management should be employed at as many restored sites as possible, so they continue to move toward desired endpoints and self-sustainability.
	Long-term site protection is essential to effective habitat restoration.
	Public access to restoration sites should be encouraged wherever appropriate but designed to minimize impacts on the ecological functioning of the site.

## Monitoring and Adaptive Management

The process of using monitoring information to adjust or correct management actions to achieve desired outcomes is commonly called adaptive management. Monitoring programs are designed to provide accountability to a wide range of stakeholders, including agencies, partners, communities, and land and water resource managers. Incorporating an adaptive management strategy into restoration actions is critical for ensuring long-term success.

The MBNEP Science Advisory Committee published a Monitoring Framework in 2015 with a vision of establishing comprehensive restoration monitoring that enables quantitative assessment of restoration success and assessment of overall ecosystem function. The goals of this framework are to answer three questions:

1. What, if any, changes are there in the water quality, sedimentation, flow, biology, and habitat quantity and quality as a result of restoration efforts and management plan implementation?
2. How are potential ecosystem health indicators related to stressors and ecosystem functions/services?
3. What is the long-term status of the biological condition in the Mobile Bay watershed?

To achieve these goals the framework recommends:

1. The adoption of this framework in every restoration request for proposals (RFP) and restoration contracts for Mobile and Baldwin counties;
2. Long-term monitoring based on this framework in every watershed management plan for all watersheds in Mobile and Baldwin counties;
3. Data synthesis to develop tools and products for assessment of restoration success, adaptive resource management, and baseline establishment; and
4. Active engagement with county and municipal planners, resource managers, agencies working within the watershed, and other stakeholders to encourage implementation of monitoring and broad application of tools developed from data synthesis.

## Watershed Plan Project Inventory

The suite of projects identified in WMPs spans six project types: habitat protection, habitat restoration, infrastructure, planning, recreational facilities, and water quality. Table 10 provides a summary of the number of projects falling within priority patch areas identified in each of the eight completed WMPs as they relate to each project type. Currently, the projects that have been identified in the eight completed watershed management plans have been compiled and added to CART to showcase needs in each specific watershed. The list of projects will expand and evolve as more WMPs are completed over the next few years. Lack of a WMP limits having a full suite of projects to comprehensively address watershed issues. However, some obvious “no regret” projects have been identified in areas without a formal WMP yet in place, such as the Deer River restoration being planned prior to development of the Western Shore Complex WMP. For a list of all WMP projects, see Appendix C.

**Table 10.** Number of projects identified by project type within each completed watershed management plan.

Watershed	Project Type		
	Habitat Protection	Habitat Restoration	Other
Bayou La Batre	182	0	0
Bon Secour, Skunk Bayou, Oyster Bay	10	5	4
D'Olive	0	1	0
Fowl River	0	8	2
Dog River Complex	129	5	6
Weeks Bay	32	7	26
Three Mile Creek	0	1	20
West Fowl River	201	0	2
Wolf Bay	5	5	0
<b>Total</b>	<b>559</b>	<b>32</b>	<b>60</b>

## Other Projects Funded through the Alabama RESTORE

To date, the State of Alabama and Gulf Coast Recovery Council have committed funding to projects totaling almost \$771 million with a range of benefits from public access, habitats and wildlife, economies, transportation, etc. Each funding source has specific guidelines for the types of projects that can be implemented. Table 11 shows the number of projects funded to date by spill-related funding sources relative to the CCMP-identified or other values and how projects are spread across funding sources, given their respective constraints.

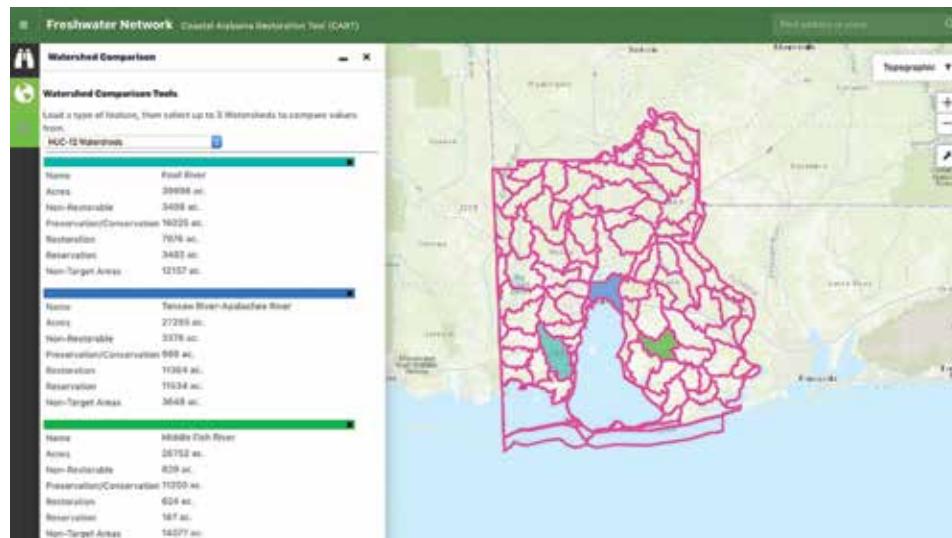
**Table 11.** Number of projects funded to date by spill related funded sources.

SUMMARY OF PROJECTS FUNDED THROUGH OIL SPILL RELATED SOURCES									
Source	CCMP Value Project Type Addresses						Other		
	Access	Beaches/Shorelines	Fish/Wildlife	Water Quality	Heritage/Culture	Economic	Transportation	Education	Other
NRDA	6	6	13	2				1	
RESTORE Bucket 1	3			2	3	4	2	1	1
RESTORE Bucket 2		5	8	1					
RESTORE Bucket 3	2	1	1	14			2	3	2

## The Coastal Alabama Restoration Tool (CART)

The Coastal Alabama Restoration Tool (CART) has been established as part of TNC's Freshwater Network (<https://maps.freshwaternetwork.org/alabama/>) to provide a platform for viewing the data layers used to develop priority habitat targets as well as projects identified in all published watershed plans. In addition, it includes data on all projects entered into the Alabama RESTORE project portal. CART provides the user with the ability to visualize proposed projects in the context of priority areas to ensure more strategic and targeted implementation of restoration activities. In addition, it allows the user to compare several attributes across and within a watershed, as shown in Figure 9. Several data layers on the CART site can be used to prioritize projects based upon the goals of a specific funding source. For example, impaired streams are a priority of the ADEM 319 program, and

these streams can be highlighted in CART to identify potential project areas. Further, if the highlighted impaired stream is part of a watershed that has a WMP in place, projects identified in that WMP can be overlaid to select specific projects for implementation.



**Figure 9.** Watershed comparison in CART

## Regional Restoration Priorities

Coastal Alabama is poised geographically, structurally, and socially to support regional restoration priorities. Geographically, Alabama's coastal counties are sandwiched between the Escatawpa Watershed to the west and the Perdido Watershed to the east, both of which are in relatively pristine condition. Socially, the MBNEP has worked to bring all levels of government together with local communities, businesses, non-profits, and others to showcase how partnerships can effect change of how our environmental resources are managed and protected long-term. Opportunities to collaborate across geopolitical boundaries on issues and challenges and to strengthen partnerships comes into play regionally with federal agencies (USFWS, NOAA, EPA) and two organizations: The Gulf of Mexico Alliance and the Gulf RESTORE Council.

### Gulf of Mexico Alliance (GOMA)

The Gulf of Mexico Alliance (GOMA) serves as a platform for partnerships and regional collaboration opportunities across the five Gulf of Mexico states: Alabama, Florida, Louisiana, Mississippi, and Texas. The goal of the GOMA is to significantly increase regional collaboration to enhance the ecological and economic health of the Gulf of Mexico. Priority issues for this group include water quality, habitat conservation and restoration, ecosystem integration and assessment, nutrients and nutrient impacts, coastal community resilience, and environmental education.

### Gulf RESTORE Council

Spurred by the *Deepwater Horizon* oil spill, the Resources and Ecosystems Sustainability, Tourist Opportunities, and Revived Economies of the Gulf Coast States (RESTORE) Act was signed into law by President Obama on July 6, 2012. The RESTORE Act calls for a regional approach to restoring the long-term health of the valuable natural ecosystem and economy of the Gulf Coast region. The RESTORE Act dedicates 80 percent of civil and administrative penalties paid under the Clean Water Act, after the date of enactment, by responsible parties in connection with the *Deepwater Horizon* oil spill to the Gulf Coast Restoration Trust Fund (Trust Fund) for ecosystem restoration, economic recovery, and tourism promotion in the Gulf Coast region. In addition to creating the Trust Fund, the RESTORE Act established the Gulf Coast Ecosystem Restoration Council (Federal Council). The Council includes the Governors of the states of Alabama, Florida, Louisiana, Mississippi and Texas, the Secretaries of the U.S. departments of Agriculture, the Army, Commerce, Homeland Security, and the Interior, and the Administrator of the EPA.



# Coordinating Restoration Partnerships, Funding and Decision-Making

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## The Restoration Community

Conservation and restoration in Alabama are regulated by the Alabama Department of Conservation of Natural Resources (ADCNR), Alabama Department of Environmental Management (ADEM), and the U.S. Army Corps of Engineers (USACE). ADCNR oversees impacts to State submerged lands, as well as consistency with the Alabama Coastal Area Management Program. In addition to their regulatory capacity, ADCNR is an active participant in on-the-ground restoration and land acquisition and manages the properties in Alabama's Forever Wild Land Trust Program. ADEM ensures projects will not have negative impacts on the environment and water quality. USACE is the federal agency that reviews restoration projects and issues permits to allow organizations to implement restoration projects, coordinating with other federal agencies, including USFWS and NOAA, as well as State cultural resource agencies like the State Historical Preservation Office.

The restoration community in Alabama includes federal, state, and local governments, engineers, consultants, non-profit organizations, businesses, and local citizens. These groups comprise the stakeholders that drive restoration projects in coastal Alabama. A project may not include every stakeholder listed, but a suite of stakeholders from the list are involved in nearly every project.

The MBNEP's Project Implementation Committee (PIC) brings together that restoration community of resource managers, scientists, engineers, and agency and organization representatives to undertake environmental projects related to CCMP goals and objectives. Made up of personnel who "put shovels in the ground," the PIC engages in the following:

1. Assessing restoration needs and resources and prioritizing watersheds and projects accordingly.
2. Using sediment analyses and watershed planning as a basis for informing restoration activities.
3. Identifying projects and planning for their implementation (i.e. water quality monitoring; habitat conservation, restoration, and protection; data management; public access, etc.).
4. Identifying tasks and citizen input mechanisms to be implemented.
5. Conducting periodic project status meetings to track progress.
6. Cooperatively identifying tasks/roles for MBNEP in addressing issues or galvanizing action.

Meeting at least quarterly, the PIC shares progress on watershed planning and provides opportunities for vetting new or upcoming projects and a platform to share valuable lessons learned on restoration for continued improvement.

## Sources of Restoration Funding

Often the most intricate challenges of a WMP are financing the implementation of recommendations to fulfill its goals and objectives. Because watershed management goals and objectives can vary widely, especially across different geographic and economic regions, sources of funding for watershed projects can also vary widely. The priorities for WMPs will not always align with priorities for funding sources, so it is vital to secure funding opportunistically from a diverse group of sources.

Successful implementation of conservation and restoration activities requires the long-term commitment of significant financial resources and community support. The design, construction, and maintenance of stormwater improvements; purchase of land for offline retention or detention; modification and/or protection of shorelines to reduce erosion; or the purchase and preservation of tracts of land to create greenspace buffers, wetlands, or floodplains to protect stream quality will require significant and reliable funding. Because the jurisdictional areas of political entities do not follow or encompass the watershed or ecological boundaries, a public-private partnership may be the most effective way to accomplish conservation and restoration goals.

Establishment of inter-governmental partnerships may provide additional funding options for conservation and restoration, while clearly illustrating to funders the community's active resolve to serve as vested and committed partners. These partnerships could significantly enhance the viability, competitiveness, and position of watershed and landscape scale-conservation and restoration, incorporating stakeholders across all sectors to ensure efforts are not duplicated. Developing a cooperative approach would allow for nonprofits, governments, businesses, and the public to come together to collaborate on the many serious and complex issues.

To acquire the funding necessary to undertake significant restoration, preservation, and/or management projects, political and private entities will have to consider and compare all available funding options. Many financial assistance opportunities, primarily in the form of federal grants and cooperative agreements, are available to help with conservation and restoration. Some sources could be helpful across entire watersheds and others within limited areas. Many would require public-private partnerships and cooperation among landowners, non-governmental organizations, and governments, rather than being imposed by governmental entities.

The following alternatives for funding and financing projects are listed here and discussed in more detail in Appendix E:

### Deepwater Horizon Oil Spill-Related

- > Natural Resources Damage Assessment (NRDA)
- > National Fish & Wildlife Foundation Gulf Environmental Benefit Fund (NFWF GEBF)
- > Resources and Ecosystem Sustainability, Tourist Opportunities, and Revived Economies of the Gulf Coast States Act (RESTORE Act)

### Federal

- > Gulf of Mexico Energy Security Act
- > "Green" Stimulus Funding
- > National Oceanic and Atmospheric Administration (NOAA)
- > U.S. Department of Agriculture, Natural Resources Conservation Service (NRCS)
- > U.S. Department of the Interior, Fish and Wildlife Service (USFWS)
- > U.S. Environmental Protection Agency (EPA)

## State

- > Alabama Coastal Area Management Program (ACAMP)
- > Clean Water State Revolving Fund
- > Forever Wild Land Trust (FWLT)

## Local

- > Capital Improvement Cooperative Districts
- > Environmental Tax Shifting
- > Impact Fees
- > Improvement Districts
- > Property, Sales, or Other Taxes (General Fund)
- > Special Assessments
- > Stormwater Programs
- > System Development Charges
- > Environmental tax shifting
- > Capital improvement cooperative districts

## Private

- > Business and Industry
- > Mitigation Banks
- > National Fish and Wildlife Foundation (non GEBF funding opportunities)
- > Non-Governmental Organizations and Other Private Funding
- > Gulf Coast Conservation Grants Program

## Conclusion

This plan was developed to assist the State of Alabama, the MBNEP Management Conference, and the National Fish and Wildlife Foundation Gulf Environmental Benefit Fund in targeting restoration efforts across Mobile and Baldwin counties, where investments will have the greatest impact on improving ecosystems and biodiversity along the Alabama coast. It provides guidelines for the decision-making process from project conceptualization to implementation to post-completion monitoring and follow up. It does not provide all the answers nor is it a step-by-step formula that is guaranteed to result in successful restoration. It is meant to guide planners, project sponsors, government agencies, and interested parties through a thoughtful, scientific process. The intended outcome includes well developed, ecosystem-based restoration projects focused on enhancing habitat resilience and biodiversity across Alabama's two coastal counties.

This plan provides a framework for prioritizing watershed scale projects recommended through comprehensive watershed planning as well as others identified through community planning. It focuses efforts in target areas where protection and restoration efforts can build off of one another. It is predicated on community desire to seek the highest and best recovery outcomes across restoration activities. This plan strives not only to reverse past impacts but to cumulatively effect an increase in the extent and healthy functionality of coastal Alabama's ecosystems for the benefit of all.

## REFERENCES

- Alabama Department of Conservation and Natural Resources, Division of Wildlife and Freshwater Fisheries. 2004. *Alabama Wildlife Volume Four: Conservation and Management Recommendations for Imperiled Wildlife*. The University of Alabama Press. Tuscaloosa, Alabama.
- Alabama Department of Conservation and Natural Resources, Division of Wildlife and Freshwater Fisheries. 2015. Alabama's Wildlife Action Plan. [https://www.outdooralabama.com/sites/default/files/Research/SWCS/AL\\_SWAP\\_FINAL%20June2017.pdf](https://www.outdooralabama.com/sites/default/files/Research/SWCS/AL_SWAP_FINAL%20June2017.pdf)
- Alabama Department of Environmental Management, Coastal Area Management Program. 2013 Administrative Code. <http://www.alabamaadministrativecode.state.al.us/docs/adem/335-8-1.pdf>
- Anderson, J. R., E.E. Hardy, J.T. Roach, and R.E. Witmer. 1976. *A Land Use and Land Cover Classification System for Use with Remote Sensor Data*. U.S. Geological Survey, Professional Paper 964. Reston, VA.
- Berahzer, S.I. 2010. *Emerging Sources of Stormwater Funding* [Presentation]. Southeast Stormwater Association Seminar: Creative Alternatives for Stormwater Funding.
- Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. *Classifications of Wetlands and Deepwater Habitats of the United States*. US Fish and Wildlife Service Report OBS-79/31.
- Environmental Law Institute. 2018. <http://eli-ocean.org/wp-content/blogs.dir/2/files/ELI-NRDA-in-AL-Jan.-2018.pdf>
- Forever Wild Land Trust. 2018. *Forever Wild Program Overview*. From: <https://www.alabamaforeverwild.com/>
- Leo, S. and J. Tillery. 2010. *Mitigation Banking* [Presentation]. Southeast Stormwater Association Seminar: Creative Alternatives for Stormwater Funding.
- Mobile Bay National Estuary Program. 2006. *Conserving Alabama's Coastal Habitats: Acquisition and Restoration Priorities of Mobile and Baldwin Counties*. Mobile, Alabama. 66 pp.
- Mobile Bay National Estuary Program. 2012. *Comprehensive Conservation & Management Plan for Alabama's Estuaries and Coast 2013-2018, Respect the Connect*. Mobile, Alabama.
- Mustian, M.T. 2010. *Impact Fees, Special Assessments and Stormwater Utilities* [Presentation]. Southeast Stormwater Association Seminar: Creative Alternatives for Stormwater Funding.
- National Oceanic and Atmospheric Administration. 2014. *What is a Natural Resource Damage Assessment?* From: <http://oceanservice.noaa.gov/facts/nrda.html>
- Partnership for Gulf Coast Land Conservation. 2018. *Land Conservation in Coastal Alabama - Options for Landowners*. Pamphlet. Biloxi, MS.
- Private Landowner Network. 2015. *Five Star Restoration Program*. From: <https://www.privatelandownernetwork.org/local-resources/FiveStar-Restoration-Program/38019/>

McDonald T, Gann GD, Jonson J, and Dixon KW. 2016. *International standards for the practice of ecological restoration – including principles and key concepts*. Society for Ecological Restoration, Washington, D.C.

Restore America's Estuaries and Estuarine Research Federation. 2000. *Principles of Estuarine Habitat Restoration*. Washington, D.C.

Spitzer, K. 2010. *Comparative Stormwater Utility Practices* [Presentation]. Southeast Stormwater Association Seminar: Creative Alternatives for Stormwater Funding.

U.S. Environmental Protection Agency. 2008. *Funding Stormwater Programs*. EPA Publication No. 833-F-07-012. Washington, DC.

U.S. Fish and Wildlife Service. 2016. *Natural Resources Damage Assessment*. U.S. Department of the Interior. From: <https://www.fws.gov/midwest/es/ec/nrda/index.html>

