CHARACTERIZATION OF VEGETATION AND WILDLIFE ON ISLE AUX HERBES

Prepared for

Mobile Bay National Estuary Program
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EXECUTIVE SUMMARY

This report describes the mapping of vegetation and physiographic features of Isle aux Herbes in Mobile County, Alabama, and provides detailed information on the composition and distributions of the vegetation and natural communities found on the island. This study was performed to identify and document important biological and ecological resources found on Isle aux Herbes in conjunction with possible salt marsh restoration opportunities.

Wildlife surveys of the island were made with specific efforts to target obligate salt marsh dependent terrestrial vertebrate species such as Seaside Sparrow (*Ammodramus maritimus*), Clapper Rail (*Rallus longirostris*), and Mississippi diamondback terrapin (*Malaclemys terrapin pileata*). Areas containing important breeding locations for colonial seabirds and waders (*i.e.* herons and egrets) were also identified and documented.

Five separate field visits were made during July and August 2006 (July 14, July 18, August 2, August 3, and August 11). A floristic inventory of the island identified 33 vascular plant species representing 14 taxonomic families. The grass family (Poaceae) contained the most species on Isle aux Herbes, with 9 species in 8 genera. An area of the submerged aquatic, widgeongrass (*Ruppia maritima* L.), estimated at 1.2 acres in size, was identified in the large sheltered cove located on the western side of the southern island. Only one non-native plant species was documented on Isle aux Herbes. Several individuals of the annual European grass, *Polypogon monspeliensis* (L.) Desf, were found on the southern tip of the northern island.

Thirty-six bird species were observed during the field surveys. Twenty locations of Seaside Sparrows were identified including the presence of fledglings. Several important bird areas (**IBAs**) were located including colonial seabird breeding sites and a large multi-species heronry.

A single individual of Mississippi diamondback terrapin was found foraging in an open water tidal pool near the southern tip of the lower island on August 2, 2006. This species is considered "critically imperiled" in the state of Alabama (Mirarchi, R. E., *et al.*, Volume 3, 2004). Although no terrapin nests were discovered during these surveys, areas with previous nesting records were identified and mapped to depict important breeding habitat for this species.

The boundaries of the island were mapped using Trimble Pro-XR® Global Positioning System (GPS) units accurate to within 1 meter, to provide baseline Geographic Information Systems (GIS) data on the island's shoreline which has experience loss of fringing marsh habitat through erosion due to recent hurricane activity. Isle aux Herbes consists of two separate islands that were formed when a man-made channel was apparently cut through the original island prior to 1958. The northern island is approximately 153 acres in size and the larger southern island contains 268 acres. The data will be useful to document and track additional loss of shoreline in the future.

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1.0 INTRODUCTION

The Mobile Bay National Estuary Program (MBNEP), funded the project entitled "Characterization of Vegetation and Wildlife on Isle aux Herbes" (Contract #DISL 429-5670-3600-2600). This report describes the GIS mapping effort of the 421-acre island's shoreline boundaries and also provides a detailed survey of the vegetation and natural communities found on the island. Lists of vascular plants and bird species observed on Isle aux Herbes during the study are provided. Important areas of wildlife utilization such colonial bird nesting sites, loafing areas, and a large heronry are also identified and discussed in regard to restoration plans to create new nesting habitats for avian species.

1.1 MBNEP BACKGROUND

Mobile Bay was designated a National Estuary in 1995 through the National Estuary Program, which was established by the Clean Water Act of 1987. The charge of the MBNEP is to develop and facilitate a blueprint for managing the resources of the Mobile Bay estuary. The MBNEP has developed a Comprehensive Conservation and Management Plan (CCMP) to accomplish this goal. The MBNEP CCMP identifies goals, objectives, and action plans aimed at rehabilitating and maintaining the various resources in the estuary.

1.2 STUDY PURPOSE AND OBJECTIVES

Habitat loss is a key environmental concern for the MBNEP. Isle aux Herbes has experienced shoreline erosion and loss of fringing salt marsh habitat in recent years due to a period of increased tropical storm and hurricane activity (**Figure 1**). This survey was performed in part to provide documentation of important biological and ecological resources found on Isle aux Herbes in conjunction with possible salt marsh restoration opportunities involving the beneficial use of dredge material. Areas of higher elevation could also be formed to create new breeding habitat for colonial birds.

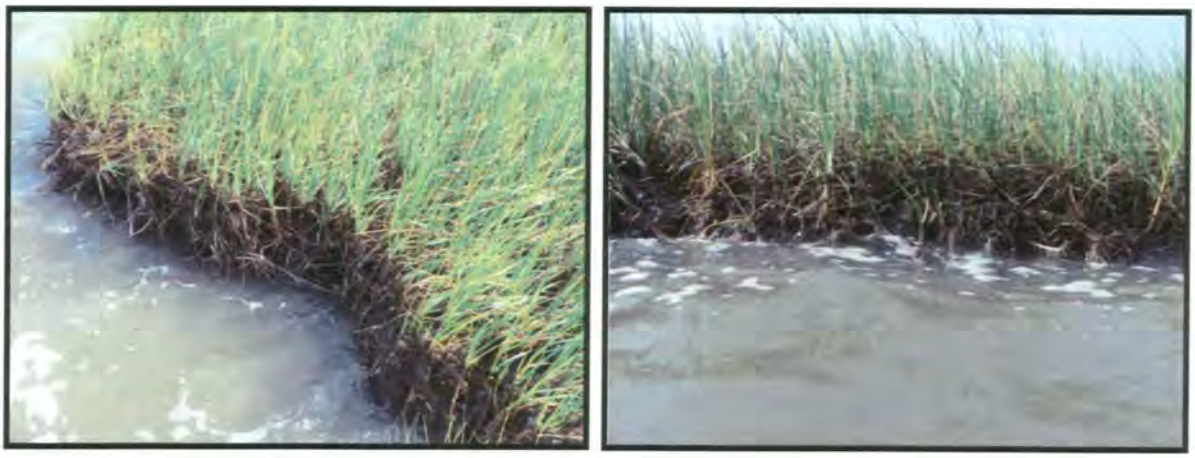


Figure 1: Close-up photographs showing shoreline erosion on Isle aux Herbes. Notice the exposed roots of *Spartina alterniflora*.

The environmental survey produced in this report contributes to the fulfillment of MBNEP's CCMP to "foster partnerships among agencies, and private property owners to…better manage existing publicly owned sites, and to restore former colonial and migratory bird nesting sites" (Mobile Bay Estuary Program; CCMP, 2002).

1.3 PROJECT LOCATION

Isle aux Herbes, also known locally as Coffee Island, is a 421-acre state owned island located approximately 1 mile offshore in Mississippi Sound directly south of the town of Bayou LaBatre in Mobile County, Alabama (**Figure 2**). Latitude/Longitude coordinates for the approximate center of Isle aux Herbes are N30° 20.57' and W88° 15.42'. Isle aux Herbes now consists of two separate islands that were formed when a man-made channel was apparently cut through the original island prior to 1958.

2.0 HISTORIC MAPS

Early maps depicting Isle aux Herbes are difficult to locate. Uncovering the origin of the island's name and its original depiction is complicated due to the fact that various names were applied to the island by early explorers and cartographers. A digital image search of historic maps on the Library of Congress's American Memory Map Collections website (http://rs6.loc.gov/ammem/gmdhtml/gmdhome.html) found what may be the earliest cartographic illustration of the island: an early 18th century map created by Jean Baptiste Bourguignon d'Anville (1697-1782) labeled Carte de la Louisiane par le Sr. d'Anville. Dressée en mai 1732. [Graveé par] Guille. de la Haye (Translated as "Chart of Louisiana by the Sr. of anville. Created in May 1732. [engraved by] Guille. Hague"; http://ets.freetranslation.com/). The actual date of the map is unclear as the associated bibliographic information shown on the website gives the published date as 1752 instead of the title date of 1732. A close-up examination of this map clearly shows Isle aux Herbes (**Figure 3**). The island apparently is not identified by name, although the French phrase "les Joncs" appears directly above the island. "Les Joncs" translates as "the bulrushes" or "Juncus" in French and this ambiguously placed label most likely refers to the expansive areas of black needlerush marsh (*Juncus roemerianus*) found along the coast north of Isle aux Herbes, and not to the island itself. Several islands are labeled on the map (*e.g.* I. aux Hérons [Island with Herons], Isle Dauphine, and Isle á Guillori) and these all begin with the initial word "Isle". It is assumed that if the cartographer had intended to name the island, it too would have been identified using the descriptor "Isle", typical of the other islands on the map, instead of "les Joncs", Interestingly, three additional unlabeled islands are also shown on this map, directly to the east of Isle aux Herbes. These correspond to Cat, Marsh, and Raccoon islands, which are still found there today.

Isle aux Herbes has also been historically referred to as Terrapin Island (or sometimes Turtle Island) in reference to the large population of diamondback terrapins (*Malaclemys terrapin*) found on the island in the past. An 1835 map of Alabama (**Figure 4**) produced by Thomas Gamaliel Bradford is the earliest map located in our review that

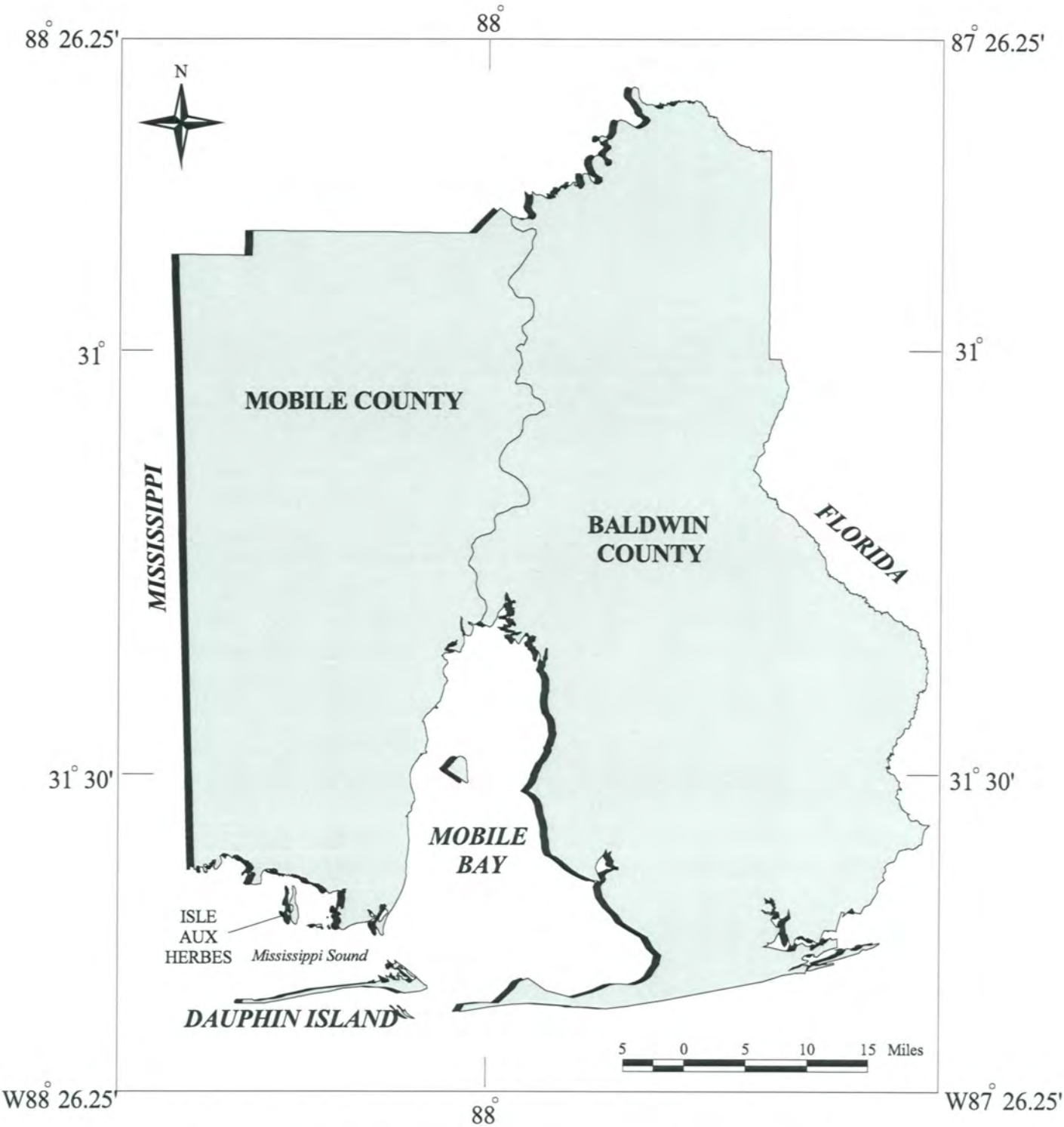


Figure 2: Location of Isle aux Herbes, Mobile County, Alabama

From the Library of Congress American Memory Map Collections website (http://rs6.loc.gov/ammem/gmdhtml/gmdhome.html)

Figure 3

Close up image of the map Carte de la Louisiane par le Sr. d'Anville. Dressée en mai 1732. [Gravée par] Guille. de la Haye. Translated as "Chart of Louisiana by the Sr. of anville. Erected in May 1732. [engraved by] Guille. Hague". Isle aux Herbes is clearly depicted on the map with the French phrase "les Joncs" appearing directly above the island. "Les Joncs" translates as "the bulrushes" or "Juncus" in French and this ambigously placed label most likely refers to the expansive areas of black needlerush marsh found along the coast north of Isle aux Herbes, and not to the island itself. Note the presence of the three small islands located to the east of Isle aux Herbes; what today are known as Marsh, Cat, and
Racoon Islands.

From the Alabama Maps Historical Archives Website (http://alabamamaps.ua.edu/historicalmaps/index.html).

Figure 4

A close up of an 1835 map of Alabama by Thomas Gamaliel Bradford showing Isle aux Herbes labeled as Terrapin Island in reference to the large population of diamondback terrapins found on the island.

uses the name Terrapin Island for Isle aux Herbes (Alabama Maps Historical Map Archives; http://alabamamaps.ua.edu/historicalmaps/index.html). This name continued to be used in state maps up until the 1880's.

The first use of the name Isle aux Herbes for the island is found in Frank Gray's 1878 Gray's New Map of Alabama (O.W. Gray & Son, 1878; **Figure 5**). Isle aux Herbes is taken from the French language and its English translation means "Island with Grasses" no doubt referring to the large stands of herbaceous salt marsh plants and the lack of woody tree and shrub species found there. The name Isle aux Herbes continues to be used today, although the island is locally known by many Alabama Gulf Coast residents as Coffee Island. No historic maps were located that use this name.

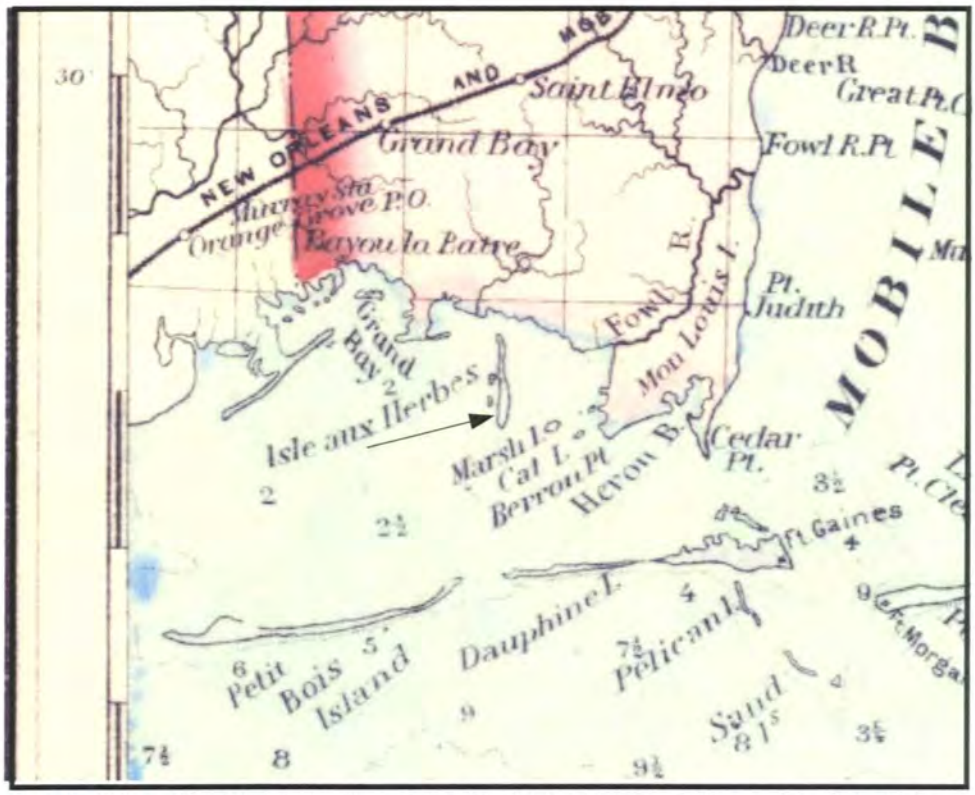
3.0 EXISTING LITERATURE AND HISTORIC VEGETATION SURVEYS

There is a paucity of available published literature on the vegetation and natural communities found on Isle aux Herbes. Mohr (1901) in his Plant Life of Alabama does not specifically mention visiting Isle aux Herbes although it is likely that he made trips to the island. The locations for many coastal salt marsh species are only broadly described in his book as occurring on offshore islands with occasional references made to nearby Cat Island (e.g. *Salicornia bigelovii*). His descriptions of these island salt marsh communities (classified by Mohr as "mesophile plant associations of salt marshes covering the outlaying islands") are extremely detailed and correspond well with the associations seen on Isle aux Herbes today.

Vittor and Stout (1975) provided an assessment of the ecological critical areas in the Alabama Coastal Zone. In their report, they describe Isle aux Herbes as consisting of nearly pure stands of smooth cordgrass (*Spartina alterniflora*). According to their study, the island comprises over 30% of the salt marsh habitat found in the state of Alabama. A large area of shoalgrass (*Halodule wrightii*) was identified on the western edge of the island. No detailed mapping of the natural communities or the submerged shoalgrass bed was provided in this report.

Stout and Lelong (1981) utilized intensive ground surveys complemented by assessment of black and white aerial photography to map wetland habitats and submerged aquatic vegetation along the Alabama Coast in a comprehensive investigation that included the current MBNEP area. They broadly characterized Isle aux Herbes as a saline and brackish marsh community in their classification of the wetland habitats of the Alabama Coastal Zone. Specific vascular plant species are not given for the island but a general list of dominant saline marsh plants occurring across the coastal areas of Alabama is provided.

M. G. LeLong (MGL) collected several vascular plant specimens from Isle aux Herbes during his botanical explorations of coastal Alabama. His voucher specimens from the island are currently deposited in the University of South Alabama's herbarium. Many specimens were made during a collecting trip on November 8, 1975 and examples include *Suaeda linearis* (Ell.) Moq. (MGL #8895), *Borrichia frutescens* (L.) DC.



From the Alabama Maps Historical Archives Website http://alabamamaps.ua.edu/historicalmaps/index.html).

Figure 5

Close up image of Gray's 1878 New Map of Alabama showing Isle aux Herbes. This may be the first recorded use of the name. Previous maps typically referred to the island as Terrapin Island.

(#8902), *Batis maritima* L. (MGL #8894) and *Aster tenuifolius* L. (= *Symphotrichium tenuifolius* (L.) G. L. Nesom; MGL #8900).

4.0 METHODS

4.1 AERIAL PHOTO ACQUISTION AND ANALYSIS

Georeferenced digital orthophotography flown in July 2002 was acquired in addition to post-Hurricane Katrina one-foot color aerial digital imagery from September 2005 (**Figures 6 and 7**). Both sets of these images were used to aid in the visual delineation of the natural communities found on Isle aux Herbes. The 2002 orthophotography was produced by Southeast Digital Mapping, L.L.C. of Mobile, Alabama. A Cessna T207 Skywagon aircraft was used for acquiring aerial photography on July 19, 20, and 22, 2002. The post-Hurricane Katrina color aerial digital imagery was taken in September 2005 by the U.S. Army Corps of Engineers, Mobile District, which coordinated the production of the 2005 imagery in support of FEMA's Hurricane Katrina activities.

Prior to field surveys the available aerial photography was examined to identify potential areas of field verification. Emphasis was placed on using the more current 2005 photography to identify natural community features. However, in the center of the lower island a large cloud formation obstructed the view. This obscured area was delineated using a combination of the 2002 orthophotography and ground truthing.

4.2 DELINEATION OF NATURAL COMMUNITIES

The boundaries of the northern and southern islands were physically mapped in the field during July and August with Trimble Pro-XR GPS®, accurate to within 1 meter. The shoreline was walked while collecting GPS line data to map the entire coastline (**Figure 8**). Line data were also collected to delineate the boundaries of distinct vegetation zones such as the often sharp demarcation between black needlerush (*Juncus roemerianus*) and smooth cordgrass (*Spartina alterniflora*). Point data were collected and labeled to identify areas with specific vegetation associations.

Two-foot contour Lidar elevation data of Mobile County (2002; available through the Mobile County Commission's Environmental Services Department) was utilized to aid in the identification and delineation of the numerous tidal creeks found on the islands.

Outlines of distinguishable vegetation signatures were digitized in a Geographic Information System (GIS) format using the 2002 orthophotographs and the 2005 color aerial photographs base maps. Natural community signatures detected through visual assessment of the aerial photography were ground truthed to document habitat characteristics in the field.

In addition to verifying the presence of natural communities on the photos, field data on species composition were collected to provide detailed descriptions of the

Figure 6
July 2002 aerial imagery used to aid in the delineation of the natural communities found on Isle aux Herbes

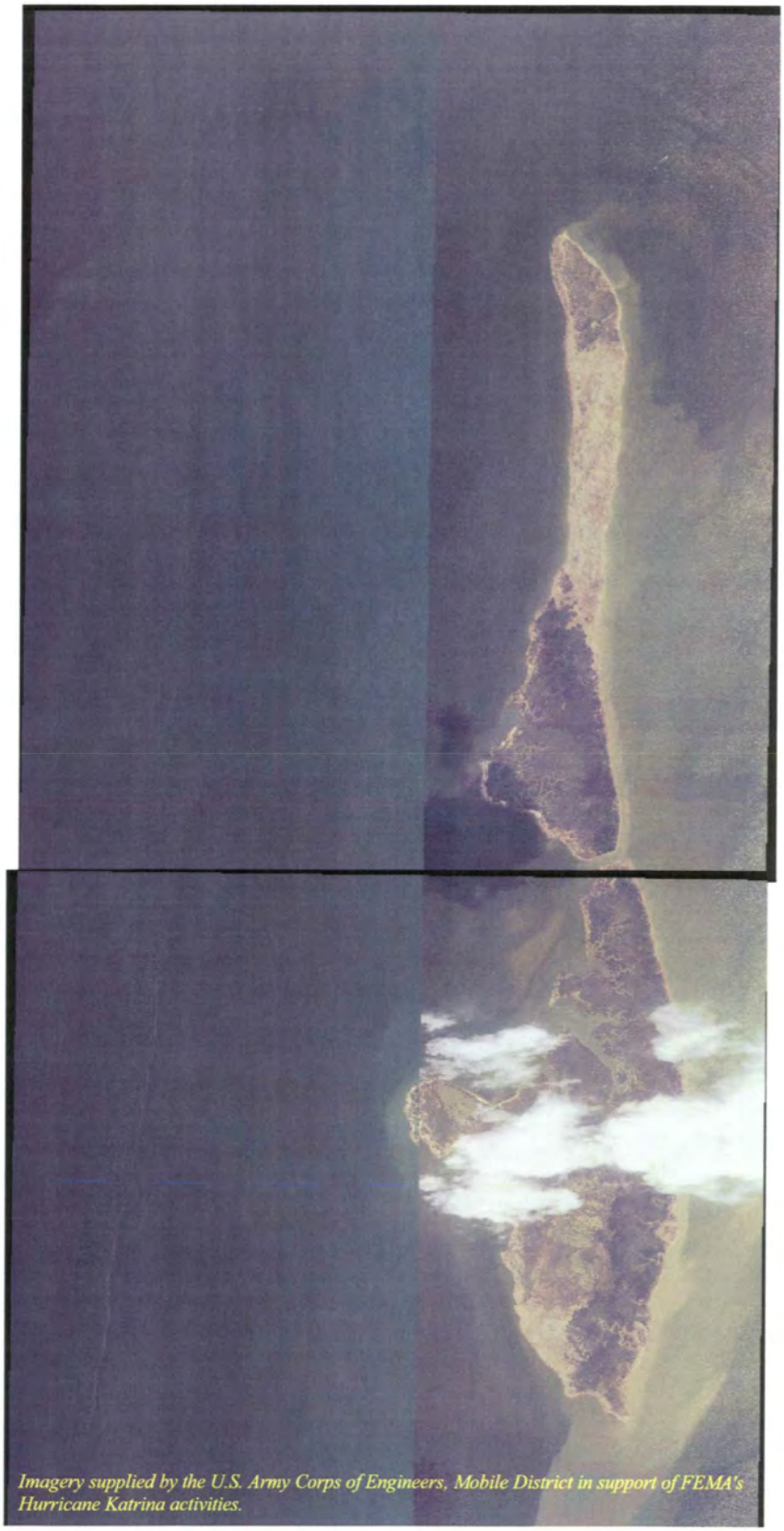


Figure 7

September 2005 Post Katrina aerial imagery used to aid in the delineation of the natural communities found on Isle aux Herbes

digitally mapped vegetation associations. Polygons of the different community types were generated as ArcView shapefiles (ArcView GIS Version 3.3), along with species composition point files.

Figure 8. Mapping the shoreline of Isle aux Herbes using GPS.

4.3 FLORISTIC SURVEYS METHODS

Field surveys were performed on five days in July and August 2006 (July 14 and 18; August 2, 3, and 11). Vegetation transects were not employed as part of this effort. Random encounter surveys were used to generate a list of plants found on Isle aux Herbes. Specific efforts were made to target all unique habitats. For species difficult to identify in the field, individuals were collected and brought back to the laboratory for identification. Species confirmations were made using keys found in various literature sources including Flora of North America (2003), Godfrey and Wooten (1979, 1981), Clewell (1985), and Wunderlin and Hansen (2003).

4.4 WILDLIFE SURVEY METHODS

Roger Clay, a nongame wildlife biologist with the Alabama Department of Conservation and Natural Resources (ADCNR), was interviewed on August 16, 2006 in regard to his knowledge of the wildlife on Isle aux Herbes. Mr. Clay has extensive field experience with the birds and other vertebrate species found on the Alabama coast through his many years of performing wildlife surveys with ADCNR. He regularly visits Isle aux Herbes to monitor breeding avian populations there as part of his duties with the state. Mr. Clay's local knowledge on the vertebrate wildlife found on Isle aux Herbes is considered an important resource for this report.

Dr. John Dindo, a Senior Marine Scientist and Assistant Director of the Dauphin Island Sea Lab was interviewed on August 24, 2006. Dr. Dindo has worked extensively with the breeding biology of herons and egrets on the Alabama Gulf Coast. His research focuses on the population ecology of waders and the interaction with weather events on their mortality and breeding success. As a part of these studies, he has been tracking a well known heronry on nearby Cat Island for many years. In 2005 Dr. Dindo documented a newly formed heronry on Isle aux Herbes. He has now been collecting data on the site for the past two years and his research is considered a valuable source of information on the breeding waders and colonial seabirds found on Isle aux Herbes.

Visual encounter surveys were performed in the field to document the terrestrial vertebrate species found on Isle aux Herbes. Optics used in the bird surveys include Swarovski EL 8.5 x 42 roof prism binoculars and a Kowa TSN-2 spotting scope with a 20X -60X zoom eyepiece. Surveys took place in July and August 2006 during five separate field days (July 14, July 18, August 2-3, and August 11).

A primary focus of this study was to document the locations of obligate salt marsh dependent terrestrial vertebrate species such as Seaside Sparrow (*Ammodramus maritimus*), Clapper Rail (*Rallus longirostris*), and the critically impaired Mississippi diamondback terrapin (*Malaclemys terrapin pileata*). Areas containing large concentrations of colonial birds (*e.g.* beaches utilized for loafing and nesting, obvious foraging areas, and a previously documented heronry) were also specifically targeted as part of the field surveys. Counts on total individuals were made on all species at these important and sensitive locations.

Incidental sightings of bird species were recorded in the field by marking the GPS location of birds encountered while mapping the shoreline of the islands. The total number of individuals observed at each location was also recorded.

5.0 RESULTS AND DISCUSSION

5.1 GIS ANALYSIS OF ISLAND SIZE

GPS and GIS analysis were employed to calculate the acreages of the two islands comprising Isle aux Herbes. The northern island was found to contain 153 acres. The southern island is estimated to be approximately 268 acres. These acreages do not include areas of open water tidal creeks.

5.2 NATURAL COMMUNITIES

Figures 9a and **9b** depicts the various natural communities found on Isle aux Herbes. A number of different of vegetated communities was identified and mapped.

Several nonvegetated natural communities are found on Isle aux Herbes. These include areas of sand and shell hash beach, open shoreline mud flats subject to tidal inundation, and non-tidal interior mud flats. Tidal creeks, open tidal pools, and interior non-tidally connected pools are also a predominant feature of the island (**Figure 10**).

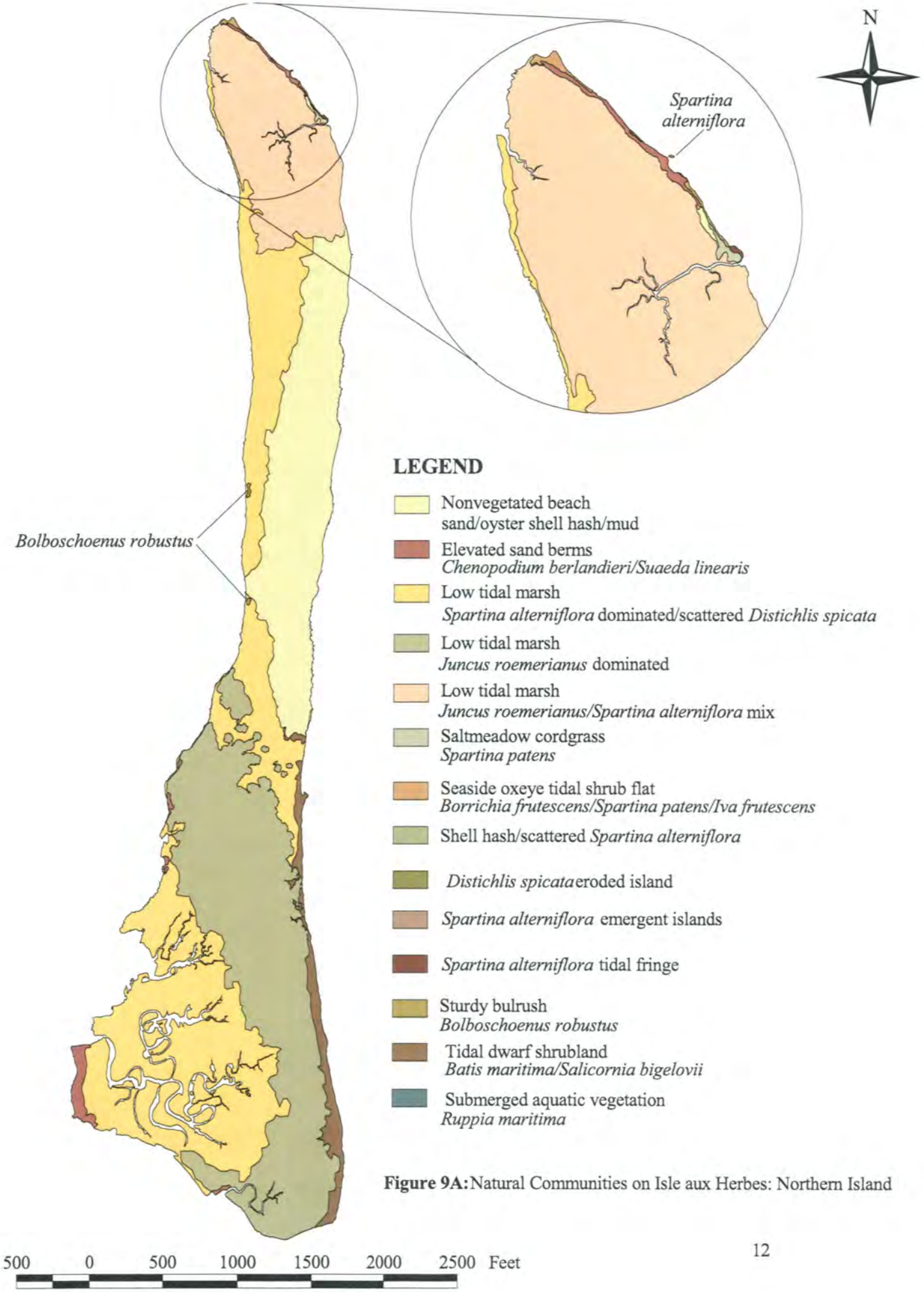


Figure 9A: Natural Communities on Isle aux Herbes: Northern Island

LEGEND

- Nonvegetated beach sand/oyster shell hash/mud
- Elevated sand berms *Chenopodium berlandieri/Suaeda linearis*
- Low tidal marsh *Spartina alterniflora* dominated/scattered *Distichlis spicata*
- Low tidal marsh *Juncus roemerianus* dominated
- Low tidal marsh *Juncus roemerianus/Spartina alterniflora* mix
- Saltmeadow cordgrass *Spartina patens*
- Seaside oxeye tidal shrub flat *Borrichia frutescens/Spartina patens/Iva frutescens*
- Shell hash/scattered *Spartina alterniflora*
- *Distichlis spicata* eroded island
- *Spartina alterniflora* emergent islands
- *Spartina alterniflora* tidal fringe
- Sturdy bulrush *Bolboschoenus robustus*
- Tidal dwarf shrubland *Batis maritima/Salicornia bigelovii*
- Submerged aquatic vegetation *Ruppia maritima*

Figure 9B: Natural Communities on Isle aux Herbes: Southern Island

500 0 500 1000 1500 2000 2500 Feet

Areas of laid down dead vegetation resulting from extreme storm surge events can be found in low zones of the island that naturally wash over. These could be classified as a distinct community type.

Figure 10: Tidal creeks are a common feature found on Isle aux Herbes.

Nonvegetated beach areas (**Figure 11**) are typically exposed but may be covered during high tide events. These areas usually occur at the seaward base of higher elevation sand berms. The substrate may be comprised entirely of sand or oyster shell hash, but is usually comprised of a mixture of the two. Some areas may possess soft mud at low tide. The separation between the nonvegetated sand beach and the higher vegetated sand/shell hash berms is often obscured. Several areas of beach were included as an elevated berm community during the mapping of the island.

Figure 11: A typical exposed shell hash beach found on Isle aux Herbes.

The higher elevation sand/shell hash beaches outside of daily tidal inundation constitute important nesting habitat for breeding colonial seabirds such as Black Skimmer (*Rynchops niger*) and Least Tern (*Sterna antillarum*). Caspian terns have been observed occasionally nesting on these beach areas in the past (Roger Clay, pers. comm.).

American Oystercatcher (*Haematopus palliatus*) has also been documented nesting on Isle aux Herbes along the sand beach and oyster shell hash areas.

Areas of exposed beach are mostly located on the northern tip of the upper island. 0.16 acre of sand/shell hash beach was identified and mapped.

Vegetated Communities

The vast majority of Isle aux Herbes is vegetated by large expansive interior flats of smooth cordgrass (*Spartina alterniflora*; **Figure 12**) Lower growing saltgrass (*Distichlis spicata* (L.) Greene) is often commonly found intermixed with the *Spartina*. Small scattered patches of black needlerush (*Juncus roemerianus*) may also occur in this community. This community type is best characterized as a Gulf Coast Cordgrass Salt Marsh following the International Vegetation Classification approach (Grossman, *et al.* 1998) and a detailed description is provided in Natureserve (2006). Approximately 278 acres of this community type were identified and mapped on Isle aux Herbes. An estimated 55 acres occurs on the northern island. 223 acres are estimated to occur on the southern island.

Figure 12: An example of a pure monotypic tidal flat of smooth cordgrass (*Spartina alterniflora*) found on Isle aux Herbes. *Distichlis spicata* also occurs scattered throughout.

Small fringing stands and emergent "islands" of *Spartina alterniflora* are irregularly found in standing water a short distance away from the immediate shoreline. These areas are typically less than 0.1 acre in size and are often narrowly linear in form. Unlike elevated islands formed when exposed shoreline features are separated from the main island through erosion processes, these emergent patches of *Spartina* lack an elevated foundation and the plant bases are almost always typically submerged. Five of

these emergent smooth cordgrass islands were identified and mapped representing a total of 0.16 acres. Fringing emergent stands of *Spartina alterniflora* with submerged bases are similar except they are connected to the main shoreline. Small areas (~0.4 total acres) of fringing *Spartina* were identified on the northern tip of the upper island.

A very small island consisting of an elevated mud base with sharply defined banks and dominated with saltgrass (*Distichlis spicata*) was located on the eastern side of the southern island (**Figure 13**). This island is unique in that it appears to have been recently formed due to erosion of a long narrow peninsula following Hurricane Katrina. The peninsula is clearly shown connected to the main shoreline in the 2005 post Katrina aerial photography (**Figure 13**). During the time of our survey the surrounding peninsula was no longer present having completely eroded away; the only remnants now being the small 0.005-acre island.

Areas dominated by needlerush (*Juncus roemerianus*) comprise approximately 40 percent (~160 acres) of the vegetative communities found on Isle aux Herbes. The northern island contains an estimated 44 acres of *Juncus* marsh. These areas tend to consist of pure monotypic stands of needlerush, although in some areas smooth cordgrass may be intermixed. A large area (~19.3 acres) of lower tidal marsh containing a mixture of black needlerush and smooth cordgrass is located on the northern tip of the upper island. This area is primarily dominated by needlerush on its eastern portions, but the separation of needlerush and smooth cordgrass on the western boundary is not clearly defined and consists of a broad transitional zone with patches of *Spartina* and *Juncus* intermixed. Patches of needlerush grade into a nearly pure cordgrass stand as it reaches the western shoreline. Here saltgrass can be found associating with *Spartina alterniflora*, typical of the cordgrass flats found on throughout the island. The southern boundary of this *Juncus/Spartina* community is well defined, formed by the abrupt end of the *Juncus*. Large areas of needlerush are found in the interior portions of the southern island. Approximately 96 acres of Juncus marsh was mapped on this island.

Two small patches of sturdy bulrush (*Bulboschoenus robustus* (Pursh) Soják) were mapped on the western side of the northern island. The two areas are 0.04 acre and 0.03 acre in size. No additional patches of this species were encountered during the field surveys; however, other small areas could possibly occur on the island.

A large area of upper marsh dominated by seaside oxeye (*Borrichia frutescens* (L.) DC.) and saltmeadow cordgrass (*Spartina patens* (Ait.) Muhl.) occurs on the northern half of the upper island (**Figure 14**). This community corresponds to the Seaside Oxeye Tidal Shrub Flat association following the International Vegetation Classification approach (Grossman, 1998) and is described in Natureserve's online encyclopedia of life (Natureserve Explorer, 2006). This broadly linear feature is 27.7 acres in size and averages approximately 400 feet in width. It runs along the eastern boundary of the upper island for approximately half its distance. Elevationally, this system is slightly higher than the adjoining needlerush and smooth cordgrass marsh areas. A narrow ecotonal zone of turtleweed (*Batis maritima* L.) is found at the transition zone between the *Borrichia* tidal flat and the lower *Juncus* and *Spartina alterniflora* marsh. Scattered individuals of marsh elder (*Iva frutescens* L.) can be found intermixed with *Borrichia* near the eastern

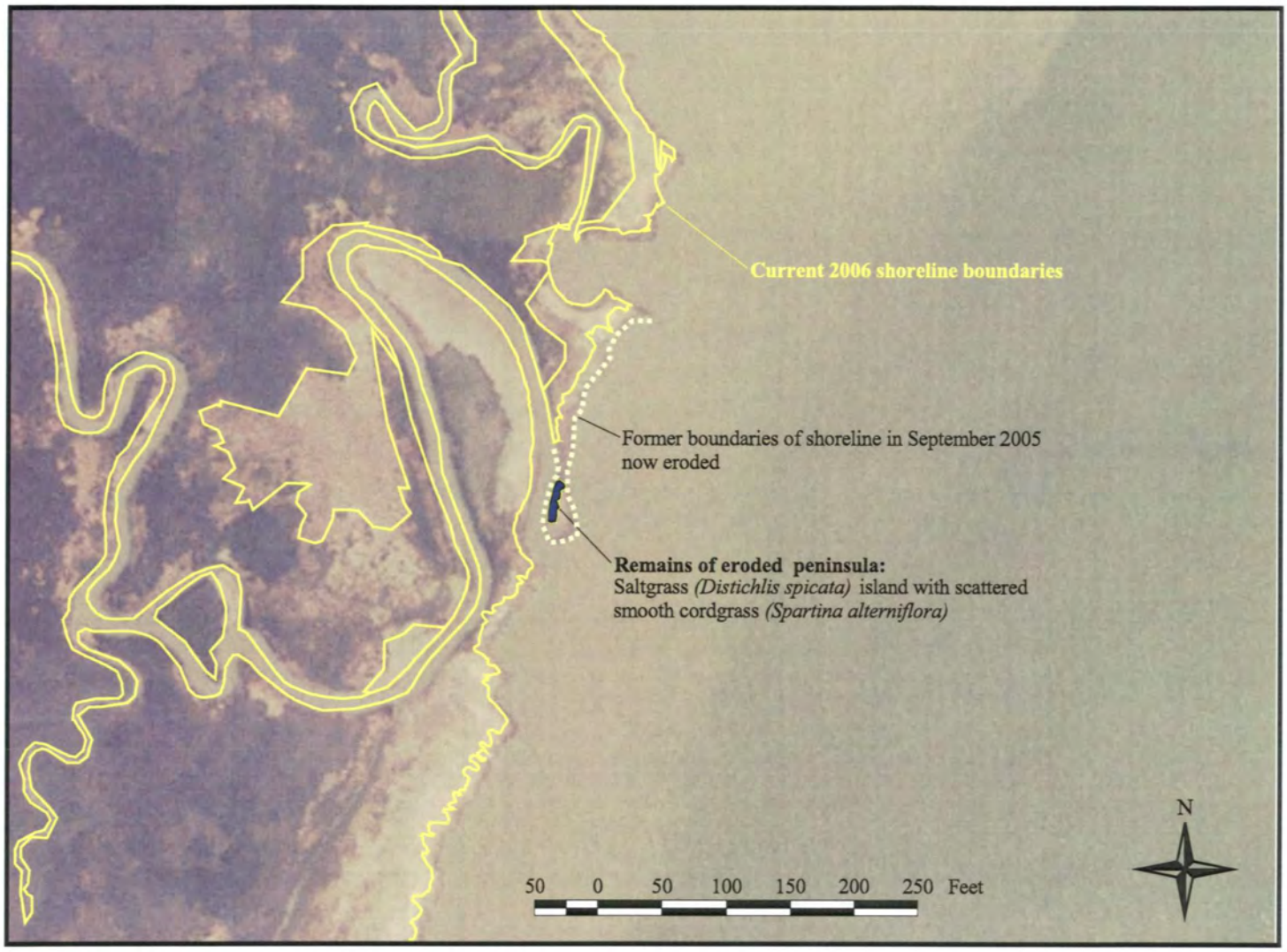


Figure 13: Example of shoreline erosion on Isle aux Herbes

shoreline where the elevation gradient is even higher. A large portion of the marsh elder was killed after Hurricane Katrina's storm surge inundated the island.

Figure 14: Seaside oxeye (*Borrichia frutescens*) and saltmeadow cordgrass (*Spartina patens*) tidal scrub community

A low elevation dwarf shrubland tidal community comprised of turtleweed (*Batis maritima* L.) and dwarf saltwort (*Salicornia bigelovii* Torr.) is found as a long and narrow fringing band along the eastern shoreline of both islands. The community appears to be restricted to the eastern side of Isle aux Herbes, and no examples were identified on the western shoreline. A search for ecological associations containing *Salicornia bigelovii* and *Batis maritima* on Natureserve Explorer's online database of natural communities did not find an identical listing, although one association, woody glasswort – (saltwort, saltgrass) dwarf-shrubland, does contain *Batis maritima* as a typical associated species. This particular community tends to be dominated by the woody glasswort (*Sarcocornia perennis*) instead of *Salicornia bigelovii*. *Sarcocornia perennis* is not present in this community on Isle aux Herbes and no individuals were located during our floristic survey of the island, although it is possible the species could occur. Approximately 5.0 acres of this community were mapped on Isle aux Herbes including 3.9 acres on the northern island and 1.1 acres on the southern island.

The higher elevation sand/shell hash berms are usually sparsely vegetated. Pitted goosefoot (*Chenopodium berlandieri* Moq. var. *boscianum* (Moq.) H. A. Wahl), tends to be the most dominant species in these locations. Annual seepweed (*Suaeda linearis* (Ell.) Moq.) is also a common associate. Other species present include crested saltbush (*Atriplex cristata* Humb. & Bonpl. Ex Willd.) and seaside heliotrope (*Heliotropium curassavicum* L.). In some areas these berms may contain large stands of marsh elder (*Iva frutescens*). This species appears to have been significantly reduced by Hurricane Katrina.

5.3 FLORISTIC SURVEY AND VASCULAR PLANT SPECIES

Typical of most salt marsh systems, species diversity on Isle aux Herbes is fairly low. A total of 33 vascular plant species representing 14 taxonomic families was recorded during the field surveys (**Table 1**). The grass family (Poaceae) contained the most species found on Isle aux Herbes (9 species in 8 genera). The amaranth family (Amaranthaceae, including Chenopodiaceae; following Stevens, 2001) was also well represented with five species.

An area of widgeongrass (*Ruppia maritima* L), estimated at 1.2 acres in size, was identified in the large sheltered cove located on the western side of the southern island. This feature is visible in 2005 post-Hurricane Katrina aerial photography but is not seen in the July 2002 imagery. Interestingly, Stout and LeLong (1981) show an area of *Ruppia* in the same location in their mapping of wetland habitats of the Alabama coastal zone. Vittor and Stout (1975) mention finding beds of shoalgrass (*Halodule wrightii*) along the western edge of Isle aux Herbes, although this species was not found during our study.

Only one non-native exotic vascular plant species was found during our field surveys of Isle aux Herbes. A few scattered individuals of annual rabbitsfoot grass (*Polypogon monspeliensis* (L.) Desf.) were observed in wet sandy soils along the southernmost tip of the northern island near the man-made channel. This species is native to Europe and is widely naturalized in disturbed wetland areas including brackish marshes (Godfrey and Wooten, 1979). No other exotic species were noted during the field surveys.

This floristic survey consisted of five field days performed over a month-long period during the summer growing season (July and August). Future botanical surveys performed during other months of the year, particularly in late winter and early spring when winter annuals are present, will certainly uncover additional species.

5.4 AVIFAUNA

A total of 37 bird species was documented during the five field surveys in July and August 2006 (**Table 2**). The location of incidental bird sightings made while mapping the island's shoreline are presented in **Figure 15.**

Table 1: Vascular Flora of Isle Aux Herbes, Mobile County, Alabama

DIVISION MAGNOLIOPHYTA
CLASS LILIOPSIDA

CYPERACEAE (SEDGE FAMILY)

Bolboschoenus robustus (Pursh) Soják –STURDY BULRUSH

Cyperus cf. polystachyos Rottb. –MANYSPIKE FLATSEDGE(?)

Fimbristylis castanea (Michx.) Vahl. –MARSH FIMBRY

JUNCACEAE (RUSH FAMILY)

Juncus roemerianus Scheele –BLACK NEEDLERUSH

POACEAE (GRASS FAMILY)

Distichlis spicata (L.) Greene –SALTGRASS

Elymus virginicus L. –VIRGINIA WILDRYE

Panicum amarum Ell. –BITTER PANICGRASS

Paspalum vaginatum Sw. –SEASHORE PASPALUM

Phragmites australis (Cav.) Trin. Ex Steud. –COMMON REED

Polypogon monspeliensis (L.) Desf. –ANNUAL RABBITSFOOT GRASS*

Spartina alterniflora Loisel. –SMOOTH CORDGRASS

Spartina patens (Ait.) Muhl. –SALTMEADOW CORDGRASS

Triplasis purpurea (Walt.) Chapman –PURPLE SANDGRASS

RUPPIACEAE (WIDGEONGRASS FAMILY)

Ruppia maritima L. –WIDGEONGRASS

CLASS MAGNOLIOPSIDA

AIZOACEAE (MESEMBRYANTHEMUM FAMILY)

Sesuvium portulacastrum (L.) L. –SHORELINE SEAPURSLANE

AMARANTHACEAE (AMARANTH FAMILY)

Atriplex cristata Humb. & Bonpl. ex Willd. –CRESTED SALTBUSH

Chenopodium berlandieri Moq. var. ***boscianum*** (Moq.) H.A. Wahl –PITTED GOOSEFOOT

Salicornia bigelovii Torr. –DWARF SALTWORT

Table 1: Continued

Suaeda linearis (Ell.) Moq. –ANNUAL SEEPWEED

APOCYNACEAE (DOGBANE FAMILY)
(Including Asclepiadaceae)

Cynanchum angustifolium Pers. –GULF COAST SWALLOWWORT

ASTERACEAE (SUNFLOWER FAMILY)

Ambrosia artemisiifolia L. –ANNUAL RAGWEED

Borrichia frutescens (L.) DC. –BUSHY SEASIDE OXEYE

Iva frutescens L. –MARSH ELDER, BIGLEAF SUMPWEED, JESUIT'S BARK

Solidago sempervirens L. –SEASIDE GOLDENROD

Symphyotrichum tenuifolium (L.) G.L. Nesom –ANNUAL SALTMARSH ASTER

BATACEAE (SALTWORT FAMILY)

Batis maritma L. –TURTLEWEED, SALTWORT

BORANGINACEAE (BORAGE FAMILY)

Heliotropium curassavicum L. –SEASIDE HELIOTROPE

BRASSICACEAE (MUSTARD FAMILY)

Cakile lanceolata (Willd.) O.E. Schulz –COASTAL SEAROCKET

Lepidium virginicum L. –VIRGINIA PEPPERWEED

CONVOLVULACEAE (MORNING-GLORY FAMILY)

Ipomoea imperati (Vahl) Griseb. –BEACH MORNING-GLORY

Ipomoea sagittata Poir. –SALTMARSH MORNING-GLORY

FABACEAE (PEA FAMILY)

Strophostyles helvola (L.) Elliot –TRAILING FUZZYBEAN

POLYGONACEAE (BUCKWHEAT FAMILY)

Rumex verticillatus L. –SWAMP DOCK

Surveys performed July-August, 2006.

Common Names adapted from the USDA Plants Database USDA, NRCS. 2006. The PLANTS Database (http://plants.usda.gov, 10 August 2006). National Plant Data Center, Baton Rouge, LA 70874-4490 USA.

Familial level taxonomy follows that of the Angiosperm Phylogeny Group

Table 2: Avifauna Observed on Isle Aux Herbes, Alabama

ANSERIFORMES

ANATIDAE
Anas fulvigula Mottled Duck

PELECANIFORMES

SULIDAE
Morus bassanus Northern Gannet (one 2nd year individual found dead)

PELECANIDAE
Pelecanus occidentalis Brown Pelican

FREGATIDAE
Fregata magnificens Magnificent Frigatebird

CICONIIFORMES

ARDEIDAE
Ardea herodias Great Blue Heron
Ardea alba Great Egret
Egretta thula Snowy Egret
Egretta caerulea Little Blue Heron
Egretta tricolor Tricolored Heron
Egretta rufescens Reddish Egret
Bubulcus ibis Cattle Egret
Nyctanassa violacea Yellow-crowned Night-Heron

THRESKIORNITHIDAE
Eudocimus albus White Ibis

GRUIFORMES

RALLIDAE
Rallus longirostris Clapper Rail

CHARADRIIFORMES

CHARADRIIDAE
Pluvialis squatarola Black-bellied Plover
Charadrius semipalmatus Semipalmated Plover

HAEMATOPODIDAE
Haematopus palliatus American Oystercatcher

SCOLOPACIDAE
Actitis macularius Spotted Sandpiper

Table 2: Continued

Tringa melanoleuca Greater Yellowlegs
Tringa semipalmata *semipalmata* Eastern Willet
Arenaria interpres Ruddy Turnstone
Calidris pusilla Semipalmated Sandpiper
Calidris mauri Western Sandpiper
Calidris minutilla Least Sandpiper
Limnodromus griseus Short-billed Dowitcher

LARIDAE
Larus atricilla Laughing Gull
Sternula antillarum Least Tern
Hydroprogne caspia Caspian Tern
Sterna hirundo Common Tern
Sterna forsteri Forster's Tern
Thalasseus maximus Royal Tern
Thalasseus sandvicensis Sandwich Tern
Rynchops niger Black Skimmer

CAPRIMULGIFORMES

CAPRIMULGIDAE
Chordeiles minor Common Nighthawk

PASSERIFORMES

HIRUNDINIDAE
Progne subis Purple Martin

EMBERIZIDAE
Ammodramus maritimus Seaside Sparrow

ICTERIDAE
Agelaius phoeniceus Red-winged Blackbird

Field surveys performed on July- August 2006

Taxonomy follows that of the American Ornithological Union's Checklist of North American Birds, Seventh Edition.

Figure 15: Incidental bird sightings

July 14, 2006

1. Willet (probable breeding pair)
   Red-winged Blackbird (4 female types)
2. Purple Martin (6 individuals flying by)

July 18, 2006

3. Clapper Rail (several heard calling)
4. Mottled Duck (1 flushed from ground)
5. American Oystercatcher (probable breeding pair)
6. Common Nighthawk (1 flushed from ground)
7. Willet (1 aggressive individual/probable breeding)
8. Magnificent Frigatebird (1 female carrying fish)

August 3, 2006

9. Red-winged Blackbird
10. Tricolored Heron (2 fledglings just out of nest)
11. Snowy Egret (1 foraging along shoreline)
12. Snowy Egret (1 fledgling unable to fully fly)

August 11, 2006

13. Clapper Rail (1 adult flushed)
14. Least Sandpiper (1 individual along shoreline)
15. Clapper Rail (several heard)
16. American Oystercatcher (1 flyby calling)
17. Red-winged Blackbird (1 male)
18. Clapper Rail (1 fledgling)

Several important bird areas (**IBAs**) are found on Isle aux Herbes (**Figure 16**). These include two large colonial seabird breeding locations and a multi-species heronry. Open sand and shell hash beaches also serve as important loafing areas for seabirds.

IBA1 is an exposed shell hash/sand beach located on the northern tip of Isle aux Herbes. It serves as an important loafing area for Brown Pelican (*Pelecanus occidentalis*) and other seabirds. No avian species were confirmed to utilized this specific beach for breeding during the survey, although the presence of a probable reproductive pair of American Oystercatchers (*Haematopus palliatus*) and observed territorial aggressive displays by Eastern Willet (*Tringa s. semipalmata*) here suggest probable breeding nearby for these species. Seaside Sparrows (*Ammodramus maritimus*) utilize the adjacent needlerush/smooth cordgrass marsh for breeding. Five individuals including fledglings were observed at this location on July 14, 2006.

IBA2 is a large sand/shell hash beach located near the southwest side of the northern island. This location hosts a breeding colony of Least Terns (*Sterna antillarum*) and is also an important loafing area for terns and gulls. Several migrant shorebirds species were also observed foraging in the lower elevation zones with wet sand.

IBA3 is an expansive open mud flat, located in a sheltered cove on the western side of the southern island. It is typically exposed at low tide. There are scattered patches of smooth cordgrass distributed throughout the mud flat. This mud flat represents an important foraging area for migrant shorebirds and waders (*i.e.* herons and egrets). Seabirds such as gulls and terns were also frequently observed loafing at this location.

IBA4 is a large elevated sand/shell hash beach located near the southwest side of the southern. This location hosts a large breeding colony of Least Tern and Black Skimmers.

IBA5 is a multi-species heronry. Tricolored Heron (*Egretta tricolor*) and White Ibis (*Eudocimus albus*) are the predominate species in this heronry with lesser numbers of Snowy Egret (*Egretta thula*). Nests are typically placed in marsh elder (*Iva frutescens*) found growing on the higher elevation sand/shell hash berms.

Individual species accounts of avian taxa utilizing these IBAs are discussed below.

Avifauna diversity is well represented by charadriform species (*e.g.* gulls, terns, and shorebirds), and members of the Ciconiiformes (herons, egrets, and ibises). As with most salt marsh communities, passerine diversity is very low.

Non-charadriform seabirds noted at Isle aux Herbes include Brown Pelican (*Pelecanus occidentalis*) and Magnificent Frigatebird (*Fregata magnificens*) both members of the Pelecaniformes. Numerous Brown Pelicans were observed during each field visit. A high count of 404 individuals was made on August 3, 2006 on the large open water cove located on the west side of the southern island (directly north of **IBA3** and **IBA4**). A large number of pelicans was also observed loafing on the island's sand

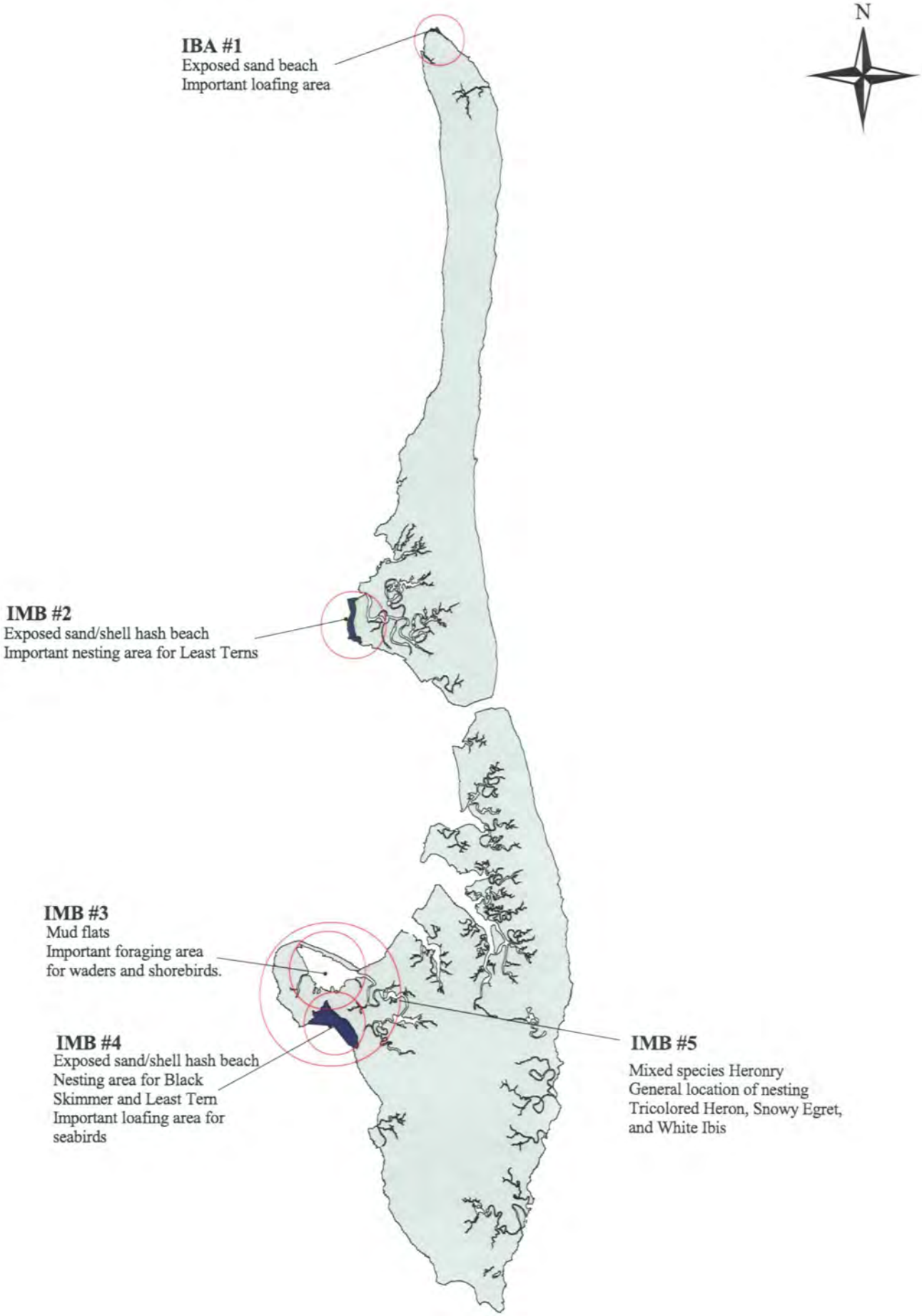


Figure 16: Location of Important Bird Areas (IBAs) on Isle aux Herbes

beaches. One extensive beach area located on the western side of the southern island (**IBA4**) serves as an important loafing area for Brown Pelican and many other seabird species. The largest concentrations of loafing Brown Pelicans were consistently found at this location. Thirty-four pelicans were observed here on July 14, 2006. A smaller sand beach located on the northernmost tip of Isle aux Herbes (**IBA1**) is also frequently utilized by Brown Pelicans and other seabirds for loafing, although fewer individuals are present because of its smaller size.

One female Magnificent Frigatebird was seen on July 18, 2006 near the man-made cut ("killer conch pass") that separates the two islands. This individual was observed in flight carrying an unidentified fish species.

Clapper Rail (*Rallus longirostris*) is a common inhabitant on Isle aux Herbes. Most encounters of this secretive bird involved calling individuals heard issuing the species distinctive advertising call. Several birds including at least one young fledgling were flushed from salt marsh areas while mapping the island.

Charadriform birds documented on Isle aux Herbes include various shorebird species and numerous species of gulls and terns. Ten species of shorebirds (Charadriformes) were identified on Isle aux Herbes (**Table 2**). Breeding species present include Eastern Willet (*Tringa s. semipalmata*) and American Oystercatcher (*Haematopus palliatus*). No nests were discovered for these species, but Roger Clay with the Alabama Department of Conservation and Natural Resources (ADCNR) has previously confirmed breeding of these species on the island. Pairs of Willets exhibiting territorial aggression were observed indicating probable breeding following the protocols described in the Alabama Breeding Bird Atlas (in prep.)

Numerous non-breeding migrant shorebird species were observed during the survey period. Most were found to utilize areas of exposed mud flats and shoreline beaches. Single individuals of Least Sandpiper (*Calidris minutilla*) were occasionally seen along the shoreline edge while mapping the island's boundaries using GPS. Large numbers of Short-billed Dowitchers (*Limnodromus griseus*) were observed foraging in the expansive mud flat found at **IBA3**. Thirty-one individuals were observed on July 14, 2006 along with two Black-bellied Plover (*Pluvialis squatrarola*) and one Least Sandpiper (*Calidris minutilla*). Twenty-six Short-billed Dowitchers were observed in the same location on August 3, 2006. Nine additional migrant shorebird species were also documented here on that date: Black-bellied Plover (*P. squatrarola*; two individuals), Semipalmated Plover (*Charadrius semipalmatus*; three individuals), American Oystercatcher (*H. palliatus*; two individuals), Greater Yellowlegs (*Tringa melanoleuca*; four individuals), Eastern Willet (*Tringa s. semipalmata*; one individual), Semipalmated Sandiper (*Calidris pusilla*; four individuals), Western Sandpiper (*C. mauri*; one individual), Least sandpiper (*C ninutilla*; three individuals). and Ruddy Turnstone (*Arenaria interpres*; two individuals).

Eight species of gulls and terns (family: Laridae) were sighted during the five field surveys (**Table 2**). Two species of seabirds were documented breeding on Isle aux Herbes. A colony of Black Skimmers (*Rynchops niger*) was identified on the western

side of the southern island at **IBA4 (Figure 16**). Three fledgling Black Skimmers were observed on July 14, 2006 at this location. Territorial aggression and distraction displays were also observed on August 3, 2006. An estimate of 12 individuals (6 breeding pairs) was made at **IBA4**.

Least Terns (*Sterna antillarum*) utilize higher elevation beaches dominated by finely broken shell hash for breeding on Isle aux Herbes. This study documented two nesting colonies on the island. One colony occurs on a shell hash beach located on the western side of the northern island (**IBA2; Figure 16).** A second colony occurs on the southern island (**IBA4**). Evidence of breeding consisted of the presence of used scrapes, territorial dive-bombing displays, and several young juvenile birds. One hundred ninety-one Least Terns were counted on July 14, 2006 at the large sand beach on the western side of the southern island (**IBA4**).

Non-breeding larid species observed include Laughing Gull (*Larus atricilla*), Common Tern (*Sterna hirundo*), Forster's Tern (*S. forsteri*), Sandwich Tern (*Thalasseus sandvicensis*), and Royal Tern (*T. maximus*). These species were most frequently observed loafing on the sand beach areas of the island and also in flight over Missisippi Sound. Caspian Terns (*Hydroprogne caspia*) were also commonly observed; 57 individuals were seen loafing on August 3, 2006 at the large mud flat cove on the western side of the southern island (**IBA4; Figure 16**). No evidence of breeding was documented for this species as part of the survey work, although Caspian Terns do breed occasionally on Isle aux Herbes (Roger Clay, personal communication).

Ciconiiform diversity is well represented on Isle aux Herbes. Eight species of long-legged waders were observed during the field surveys (**Table 2**). A large heronry is located on Isle aux Herbes near the large cove on the western side of the southern island. Three ciconiiform species breed on the island. Breeding was confirmed for Tricolored Heron (*Egretta tricolor*) and Snowy Egret (*Egretta thula*) during the field surveys. Two recently fledged downy Tricolored Herons (*Egretta tricolor*) were found under a stand of marsh elder (*Iva frutescens*) on August 3, 2006. These individuals appeared to be recently out of the nest and were still unable to fly. Two used heron nests were also found at this location and assumed to belong to Tricolored Heron (**Figure 17**). This observation of fledglings may possibly represent a late date for breeding. Thirty-five individuals of Tricolored Heron were observed on July 14, 2006 at the heronry location. Numbers of this species significantly declined over the course of the survey period with no individuals observed during the last field day on August 11, 2006.

A single individual young fledgling of Snowy Egret (*Egretta thula*) was observed on August 3, 2006. This individual was not able to fully fly and struggled along the shoreline to avoid our presence. Numerous adult Snowy Egrets were seen throughout the study.

In addition to these two species, Dr. John Dindo (personal communication) has also documented White Ibis (*Eudocimus albus*) nesting on Isle aux Herbes. Our surveys found White Ibis to be common although we did not confirm breeding for this species.

Cattle Egrets are currently not known to nest on the island. Three individuals were observed flying over Mississippi Sound on July 14, 2006. Dr. Dindo (personal communication) states that there were two unsuccessful nesting attempts by this species on Isle aux Herbes earlier this year.

An adult dark morph Reddish Egret (*Egretta rufescens*) was observed on August 3, 2006, foraging at the large mud flat cove located on the western side of the southern island (**IBA3**). Reddish Egret is imperiled in the state. Mirarchi *et al.* (Volume 3, 2004) assigned this species as a Priority 2 ranking (High Conservation Concern). Reddish egret is not known to nest on Isle aux Herbes.

Figure 17: Used nest of Tricolored Heron

Songbird (Passeriformes) diversity is characterized as species poor. Red-winged Blackbird (*Agelaius phoeniceus*) and Seaside Sparrow (*Ammodramus maritimus*) are the only two passerine species known to breed on Isle aux Herbes. Both are year-round residents on the island. No confirmations of breeding were made for Red-winged Blackbirds during the field surveys; however, previous work performed by the Alabama Breeding Bird Atlas Project (in prep.) has confirmed breeding of this species on Isle aux Herbes. Observations of Red-winged Blackbird included the sightings of several lone territorial males and also a small flock of four female type birds.

Seaside Sparrows were identified at 20 separate locations on Isle aux Herbes (**Figure 18**). Most of these (14 locations; 70%) consisted of sightings of single individuals. A maximum of five individuals was observed on July 14, 2006 at the northernmost tip of the north island. Confirmed breeding by this species was documented by the presence several fledglings observed while mapping the island's shoreline.

5.5 HERPTOFAUNA

A single individual of Mississippi diamondback terrapin (*Malaclemys terrapin pileata*) was found foraging in an open water pool near the southern tip of the lower island on August 2, 2006 (N30.327057° W88.25600°; **Figure 19**). The isolated water

Figure 18: Seaside Sparrow *(Ammodramus maritimus)* locations

July 14, 2006

1. 5 individuals observed (including fledglings)
2. 1 individual observed

July 18, 2006

3. 1 individual observed
4. 1 individual observed
5. 1 individual observed
6. 2 individuals (breeding pair)
7. 1 individual observed

August 2, 2006

8. 1 individual observed
9. 1 individual observed
10. 1 individual observed
11. 4 individuals observed

August 3, 2006

12. 1 individual observed
13. 1 individual observed
14. 1 individual observed
15. 1 individual observed

August 11, 2006

16. 1 individual observed
17. 1 individual observed
18. 1 individual observed
19. 2 individuals observed (breeding pair)
20. 3 individuals observed (including 1 fledgling)

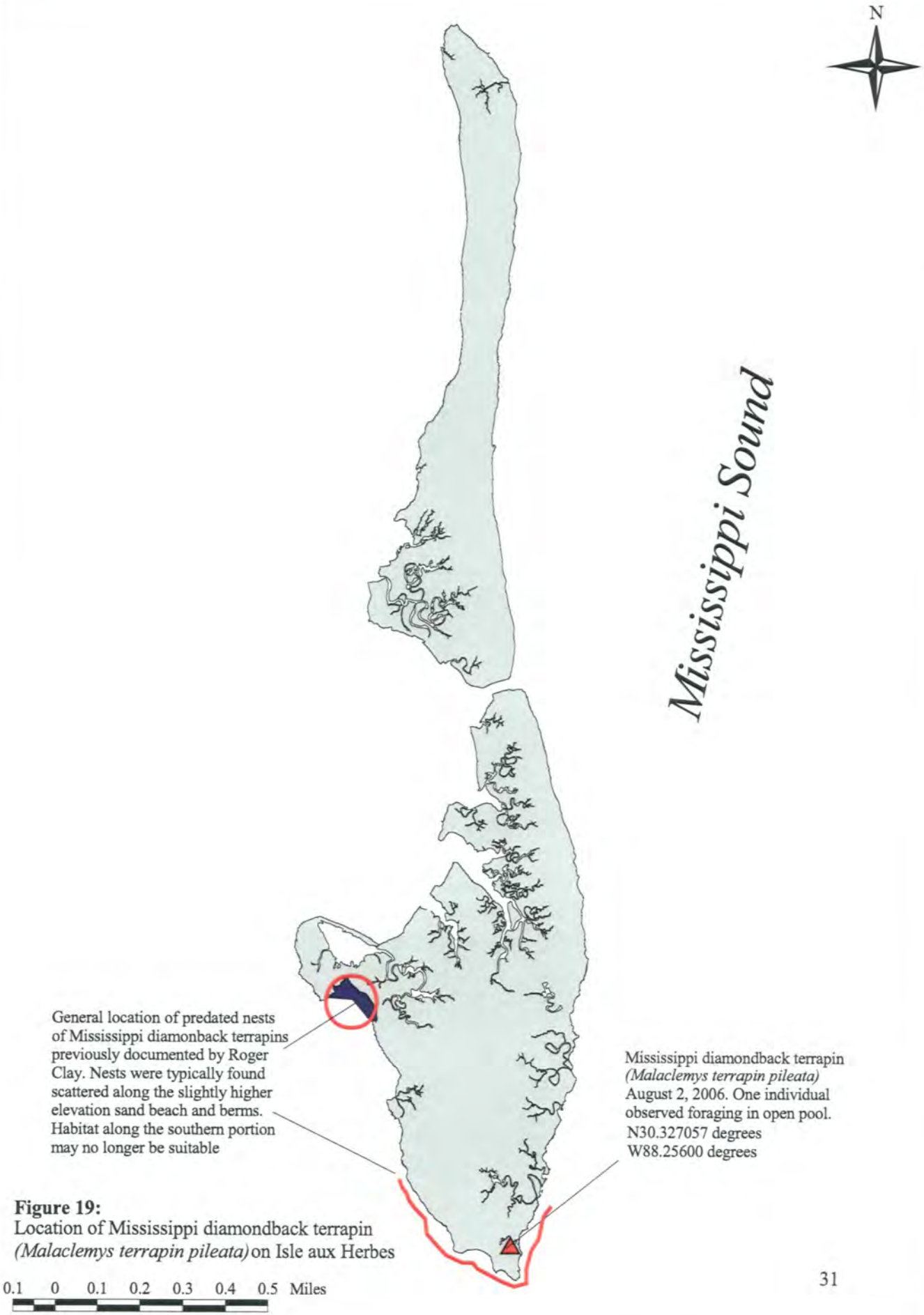


Figure 19:
Location of Mississippi diamondback terrapin *(Malaclemys terrapin pileata)* on Isle aux Herbes

body did not appear to have an obvious connection through tidal channels. The sex of the terrapin was not determined. This species is considered "critically imperiled" in the state of Alabama (Mirarchi, *et al.*, Volume Three, 2004) and its discovery is considered significant.

Roger Clay, a nongame wildlife biologist with the Alabama Department of Conservation and Natural Resources (ADCNR), mentioned he has previously found predated terrapin nests in past years on the slightly higher elevated sand beaches and berms located on the southern most island (personal communication; **Figure 19**). According to Mr. Clay, these sand areas suitable for nesting are transitory, especially following severe storm events such as tropical storms and hurricanes.

Mr. Clay also stated that although he has not personally observed Gulf saltmarsh water snake (*Nerodia clarkii*) on Isle aux Herbes, he believes that the species most likely occurs on the island. Our field survey did not find any individuals of Gulf saltmarsh water snake. Future nocturnal surveys may prove useful when the snakes are most actively foraging.

The partial skeletal remains of a dead sea turtle, consisting of only plastral scutes, was found washed up on a exposed sand beach located on the northern point of the uppermost island. Although not identified to species, it was assumed that this individual was most likely a loggerhead sea turtle (*Caretta caretta*). No other species of reptiles or amphibians were observed during our survey.

6.0 CONCLUSIONS AND RECOMMENDATIONS

Isle aux Herbes possesses many important biological resources that provide vital ecological, environmental, and social functions to human society on the Alabama Gulf Coast. One is the island's significant role in buffering the effects of tropical storms and hurricanes. The importance of offshore islands as protective barriers from storm surge has long been recognized. This fact has taken on new significant meaning following the immense destruction of Hurricane Katrina in 2005. The prevention of shoreline erosion and loss of salt marsh habitats across the Gulf Coast coupled with marsh restoration efforts should be a key priority for the future.

Isle aux Herbes offers many other ecological benefits. Its salt marshes and tidal creeks provide nursery habitat for numerous fish species and help to support an economically important fisheries industry. The surrounding oyster reefs provide social and economic benefits to local Gulf Coast residents in addition to helping maintain water quality of Mississippi Sound. A large submerged bed of widgeon grass is found in a sheltered cove on the western side of the southern island. Bottom disturbance in this area should be avoided to prevent loss of this important aquatic resource.

The island also contains critical breeding habitat for many terrestrial species that are rare or imperiled in the state. These include a multi-species heronry and several seabird breeding colonies. Seaside Sparrows, are restricted to the limited salt marsh

habitats of the Alabama Coast. Isle aux Herbes also provides habitat for the critically imperiled Mississippi diamondback terrapin.

A large multi-species heronry is located on the southern island of Isle aux Herbes. To help minimize disturbance to the nesting herons and egrets, it is recommended that "people on foot, in boats, or personal watercraft stay at least 200 meters (600 feet) away from nesting colonies" (Mirarchi, *et al.*, Volume Four, 2004). If possible, these and other activities should be restricted to months outside the peak of breeding in March – August when the birds are most susceptible to disturbance. Similarly, disturbance to the breeding colonies of Least Tern and Black Skimmer found on the island should be minimized by observing the 200-meter buffer zone and by also avoiding disrupting activities during the breeding season. State monitoring programs and academic research should continue to track these colonies. Nesting areas should be clearly posted and educational material provided to the public on the importance of the breeding locations. Future studies may also help to elucidate precise setback distances from the breeding locations (Mirarchi, *et al.*, Volume 4, 2004).

Seaside Sparrow is considered imperiled in the state by Mirarchi *et al.* (Volume 3, 2004). Isle aux Herbes serves as an important breeding area for the species in Alabama. Research is needed to establish population densities on the island. The species' salt marsh habitat should be protected from "dredging, filling, pollution, and development" (Mirarchi *et al.*, Volume 4, 2004).

Mississippi diamondback terrapin is critically imperiled in the state and was recently assigned a Priority 1 status by Mirarchi, *et al.* (Volume 3, 2004), the highest level of conservation concern for the state's wildlife. The species appears to have recently experience significant population declines across its restricted range in Alabama. Research is needed to identify important terrapin breeding areas on Isle aux Herbes. These areas should be avoided during nesting periods.

The diverse natural resources found on Isle aux Herbes are worthy of protection. Efforts should be made to conserve these valuable assets. When performed in an environmental and ecological framework, salt marsh restoration and the creation of topographically elevated habitats for breeding birds will provide an unique opportunity to better improve wildlife populations and overall ecosystem functions.

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