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**The Regional, National, and International Importance of  
Louisiana's Coastal Avifauna: Implications for Avian Injury and  
Restoration Related to the *Deepwater Horizon* Oil Spill**  
Technical Report  
Draft

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## 1. Introduction

This report summarizes the importance of Louisiana's coastal zone in terms of regional, national, and global bird populations. The Louisiana coast is unique due to its extensive areas of marshes adjacent to a high density of coastal islands, all of which support abundant bird communities. As a consequence, Louisiana supports large populations of many species that depend on these habitats for most or all of their ecological requirements, particularly species that rely on islands for nesting and those that live in marsh habitats. Extensive areas of Louisiana's coastal habitat were affected by the *Deepwater Horizon* (DWH) oil spill (DWH Trustees, 2015, Sections 4.2 and 4.6). Louisiana hosts significant proportions of bird populations whose geographic ranges extend beyond the state's borders. Thus, effective management of these birds and their habitats in Louisiana can disproportionately influence management of these birds and similar habitats throughout their geographic ranges. This means that coordination among state and federal agencies is critical to ensuring the health of shared avian resources in Louisiana, the region, and beyond.

In this report, we describe why coastal Louisiana is important for birds (Section 2) as well as the ecological roles and economic value of avian resources in Louisiana (Section 3). Next, we describe Louisiana coastal habitats and the birds that use them regularly (Section 4) and during long-distance migrations (Section 5). We present conclusions of our report in Section 6.

## 2. Why Coastal Louisiana is Important for Birds

Coastal Louisiana is critically important for many types of birds in North America and beyond. Nearly all of coastal Louisiana is classified by the National Audubon Society as Important Bird Areas at state, continental, or global levels (Audubon, 2015; Figure 1). The Mississippi River Delta, exclusively within Louisiana, is one of the largest on the planet owing to the low relief of the terrain near the mouth and the shallow depth of the continental shelf in the area. Louisiana's coastal zone also supports the largest contiguous area of coastal marsh in North America (USFWS, 2015a). These extensive coastal habitats support a high biomass of various fish and invertebrate prey species that provide abundant food resources for many organisms, including birds (Gosselink, 1984). In addition, the Louisiana coast also has several islands that provide critical nesting sites for large numbers of colonial waterbirds. The presence of ideal nesting habitat adjacent to productive wetlands enhances the nesting and chick-rearing attractiveness of coastal Louisiana (Visser et al., 2005). Consequently, the richness and the abundance of birds that inhabit Louisiana's extensive coastal marshes are likely unmatched in the Gulf of Mexico (GoM; Table 1).



**Figure 1. Nearly all coastal basins in Louisiana are recognized as Important Bird Areas at state, continental, or global levels by the Audubon Society of America.**

Source: Audubon, 2015.

**Table 1. Total abundance recorded during aerial surveys in 2010 (number of nesting pairs) for four exemplar species from the Florida panhandle to eastern Texas (USFWS, 2015b). These species were among the most injured (in terms of numbers of individuals) by the DWH oil spill (DWH Trustees, 2015, Section 4.7).**

State	Brown Pelican	Laughing Gull	Royal Tern	White Ibis
Louisiana	17,308	28,711	19,081	6,594
Alabama	6,713	433	791	3,880
Florida	3,865	1,660	3,097	2,134
Texas	1,996	13,930	3,518	2,786
<b>Total</b>	<b>29,882</b>	<b>44,734</b>	<b>26,487</b>	<b>15,394</b>
<b>Louisiana % of total GoM</b>	<b>58%</b>	<b>64%</b>	<b>72%</b>	<b>43%</b>

Louisiana hosts significant proportions of bird populations whose geographic ranges extend beyond the state's borders. This means that effective management of these birds and their habitats in Louisiana, coordinated among state and federal agencies, can disproportionately influence management of these birds and similar habitats throughout their geographic ranges. This is particularly relevant when effects of anthropogenic threats are widespread across state boundaries, such as in the case of the DWH oil spill.

### **3. Ecological Roles and Economic Importance of Louisiana's Coastal Bird Resources**

The millions of birds that breed in, winter in, or migrate through coastal habitats in the northern GoM are an integral part of the ecosystem. For example, birds perform several ecosystem functions, including nutrient cycling and transport between habitat types, pollination, seed dispersal, and pest control (DWH Trustees, 2015, Section 4.7). Furthermore, their high abundance and high energetic demands mean that birds can strongly influence marine and coastal foodwebs through top-down effects (DWH Trustees, 2015, Section 4.7). Consequently, loss of birds as a result of the DWH oil spill will likely have important effects on northern GoM ecosystems. Because many species that occur in the spill-affected region migrate to other areas in North America, potential ecosystem effects would not be limited to the GoM.

In addition to their valuable ecological roles, healthy bird populations are a vital component of the Louisiana Gulf Coast experience for both tourists and residents. Charismatic species such as Brown Pelican, Magnificent Frigatebird, Laughing Gull, Black Skimmer, Royal Tern, and Sanderling attract nature enthusiasts, and they are important to the culture of the people who live there. Throughout the year, bird-watchers visit the Louisiana coast to enjoy its extensive and seasonally diverse bird-life at a variety of local, regional, and nationally known venues. For example, Grand Isle (southeastern Louisiana) holds an annual festival (Grand Isle Migratory Bird Festival: <http://grandisle.btneq.org/GrandIsleHome.aspx>) that attracts hundreds of bird-watchers and nature lovers to the island each April. The direct and induced economic impact of the festival was approximately \$60,000 in 2005 (Isaacs and Chi, 2005). The Louisiana Ornithological Society also convenes its fall and spring meetings on the coast at either Grand Isle or Cameron (western Louisiana).

The abundance of wintering waterfowl along the Louisiana coast attracts an estimated 100,000 waterfowl hunters each year; the number of waterfowl hunters in Louisiana is more than in any other Gulf state, and second nationally only to California (Carver, 2015). The economic value of waterfowl hunting is well-documented, with the average hunter in Louisiana spending an estimated \$890/year. Overall, waterfowl hunting in Louisiana contributes almost \$50 million in employment income, and nearly \$10 million in state and federal tax revenues (Carver, 2015). The popularity and economic value of waterfowl hunting are primary management goals of

several state Wildlife Management Areas and Refuges and National Wildlife Refuges along the coast (LDWF and The Conservation Fund, 2014).

Birds in Louisiana's coastal zone are highly valuable natural resources to all marine ecosystems and humans in the state and in the northern GoM. Loss of these resources would have significant ecological and economic ramifications at state, regional, and national levels.

## 4. Avian Species in Coastal Louisiana

In this section, we describe Louisiana coastal habitats and the birds that use them in the following order:

- ▶ ***Birds in nearshore habitats.*** We define habitats used by nearshore birds as those areas including marsh out to the limit of the continental shelf waters. Therefore, it includes marsh adjacent to the coastline, mudflats at the marsh's edge, pools and channels within the marsh, beaches, estuaries, and Gulf waters from the beach line to the continental shelf. In addition to nearshore birds generally, we highlight two groups of birds that use parts of nearshore habitats: island waterbird colonies and coastal marsh birds.
  - ***Bird colonies on island habitats.*** This category refers to those species that breed in colonies on islands along the Louisiana coast.
  - ***Birds in coastal marsh habitats.*** We define coastal marsh as the vegetated marsh adjacent to the coastline, regardless of marsh type; the marsh type itself varies depending on proximity to freshwater outflow, especially the Mississippi River.
- ▶ ***Birds in pelagic (offshore) habitats.*** This category refers to the offshore zone beyond the continental shelf and the birds that occur in these areas.

### 4.1 Birds in Louisiana Nearshore Habitats

For many species of birds, nearshore habitats in Louisiana support the ecological demands associated with numerous critical processes, including foraging, predator evasion, mating, nesting, and chick rearing (Figure 2). The productivity of this nearshore habitat is important to colonial island-breeders (Section 4.2) and obligate marsh birds (Section 4.3), as year-round nonbreeding habitat for resident birds and post-breeding habitat for molting, and as stopovers for migratory species (Section 4.4). Specifically, the unique value of islands as breeding habitats in Louisiana's nearshore habitats is related to being embedded within a matrix of healthy and productive nearshore habitats (Visser et al., 2005).





**Figure 2. Nearshore marsh habitats, and coastal marshes in particular, provide vital habitat for birds in the northern GoM. Top: Brown Pelicans plunge-diving in nearshore waters; middle: Snowy Egrets, Great Egrets, and Roseate Spoonbills at an island colony; bottom: a Yellow Rail foraging in coastal marsh habitat.**

Photo credit: Erik I. Johnson, Audubon Louisiana.

Louisiana's nearshore habitats support nationally important populations of several species. For example, Wilson's Plover breeds in a narrow linear zone of habitat along the coast where beaches meet areas with some vegetation cover; this habitat has experienced dramatic losses over the last several decades due to beach development, increased beach recreation, and erosion (Zdravkovic, 2013). Wilson's Plover is listed in the U.S. Shorebird Conservation Plan as a Species of High Concern (MAVGCP, 2000), and is a species of greatest conservation need in Louisiana (LDWF, 2015). The total Louisiana breeding population of Wilson's Plover (*ca.* 2,500 adults; Zdravkovic, 2013) accounts for approximately 40% of the GoM population and approximately 30% of the USA breeding population, which is declining (Andres et al., 2012). In addition, Louisiana has two of the four breeding sites ranked as Globally Important (Zdravkovic, 2013).

Several wading bird species breed commonly in colonies along the coast, often in wooded nearshore islands (thus some populations could be included in Section 4.2: Island Waterbird Colonies), but they also have substantial inland breeding populations. Examples of wading birds present throughout the Louisiana nearshore habitats include Great Egret, Great Blue Heron, Snowy Egret, Cattle Egret, White Ibis, Roseate Spoonbill, and Reddish Egret, which is a coastal obligate (Rodewald, 2015).

## 4.2 Bird Colonies on Louisiana Island Habitats

From large barrier islands, such as the Chandeleurs (more than 1,600 hectares; Mitchell et al., 2012), to small coastal islands such as Queen Bess in Barataria Bay (*ca.* 14 hectares; Louisiana Coastal Wetlands Conservation and Restoration Task Force, 2002), the Louisiana coast provides a high density and diversity of islands. These isolated islands located adjacent to highly productive wetlands and nearshore marine habitats attract millions of nesting colonial waterbirds each spring and summer (Gosselink, 1984; Figure 3). Many species of colonial waterbirds require isolated islands for nest sites for protection from predators, particularly mammalian species, and many waterbird species are wholly dependent on such islands for successful reproduction (Visser et al., 2005). Consequently, effects of the DWH oil spill on islands used by colonial birds in Louisiana were and continue to be of particular concern (Baker et al., 2015).

Birds that nest in island colonies (e.g., colonial waterbirds, colonial breeding birds) forage in Louisiana's nearshore waters (Section 4.1), and are prominent members of the shoreline ecosystem year-round. Island waterbirds nest in colonies in Louisiana during early spring into early summer, with peak abundance in mid- to late June (e.g., Shields, 2014; Burger, 2015). Coastal Louisiana supports nationally important breeding populations of numerous colonial waterbird species, including Brown Pelicans (the state bird of Louisiana), gulls, terns, wading birds, and many others. Louisiana's Brown Pelicans account for approximately 40% of all



**Figure 3. Tens of thousands of birds from several species, including Brown Pelican, gulls, and terns, nest on island colonies in the northern GoM.** Islands that provide critical habitat for colonial waterbirds, and several colonies, including some of Louisiana’s largest colonies, were exposed to DWH oil in 2010.

Photo credit: Erik I. Johnson, Audubon Louisiana.

nesting pairs in the GoM and more than a quarter of all pairs in the eastern United States (Table 2). This species is highly susceptible to mortality due to pesticides, oiling, and natural and anthropogenic disturbance of nesting colonies (Shields, 2014). Brown Pelican populations have rebounded from lows recorded in the 1960s that coincided with the height of DDT-related impacts (Shields, 2014), and the species was removed from the Endangered Species list in 2009. However, even after banning DDT in 1972 and implementing diligent reintroduction and conservation efforts, the total global population is still fewer than 400,000 individuals (Wetlands International, 2013). Louisiana nesting habitats are an important resource for the continued recovery of Brown Pelican populations.



**Table 2. Numbers of nests or nesting pairs of Brown Pelicans by state between 2007 and 2012.** Column on the right shows the percentage of abundance in Louisiana relative to each state, the total in the GoM, and the total in the eastern United States.

State	Number of nests or pairs
Louisiana	11,505
Texas	8,115
Alabama	6,100
North Carolina	5,150
South Carolina	4,462
Florida-Gulf	2,765
Virginia	1,924
Florida-Atlantic	1,790
Maryland	1,024
Georgia	790
<b>Total GoM</b>	<b>28,485</b>
<b>Total eastern United States (all states shown)</b>	<b>43,625</b>

Source: Shields, 2014.

For some species with global distributions concentrated in the eastern United States (e.g., many terns), Louisiana is one of the most important places in the world for breeding populations. For example, the Chandeleurs alone support the largest breeding colonies of Sandwich Terns in the world (Spendelov and Patton, 1988); as many as 46,613 nests were counted on a single island in the Chandeleur chain (Stake Island; Purrington, 1988) before these islands were devastated by hurricanes (Mitchell et al., 2012). Louisiana also hosts significant proportions (> 10%) of North American breeding populations of several species, including Laughing Gull (11%; Burger, 2015), Royal Tern (23%; Buckley and Buckley, 2002), and Sandwich Tern (45%; Shealer, 1999).

In addition, Louisiana islands also support breeding colonies of Gull-billed Tern, Caspian Tern, as well as some of the only breeding Common Tern in the GoM region (Rodewald, 2015). The Chandeleurs formerly supported the only breeding population of Sooty Tern in the United States, but this population effectively disappeared after Hurricane Georges ravaged Curlew Island in 1998 (Dittmann and Cardiff, 2005). However, three nesting pairs were recently discovered in the Isles Dernieres chain in Terrebonne Parish (Raynor et al., 2012), and one individual was observed at a nest scrape in the Chandeleurs in 2015 (Louisiana Natural Heritage Program, personal communication).

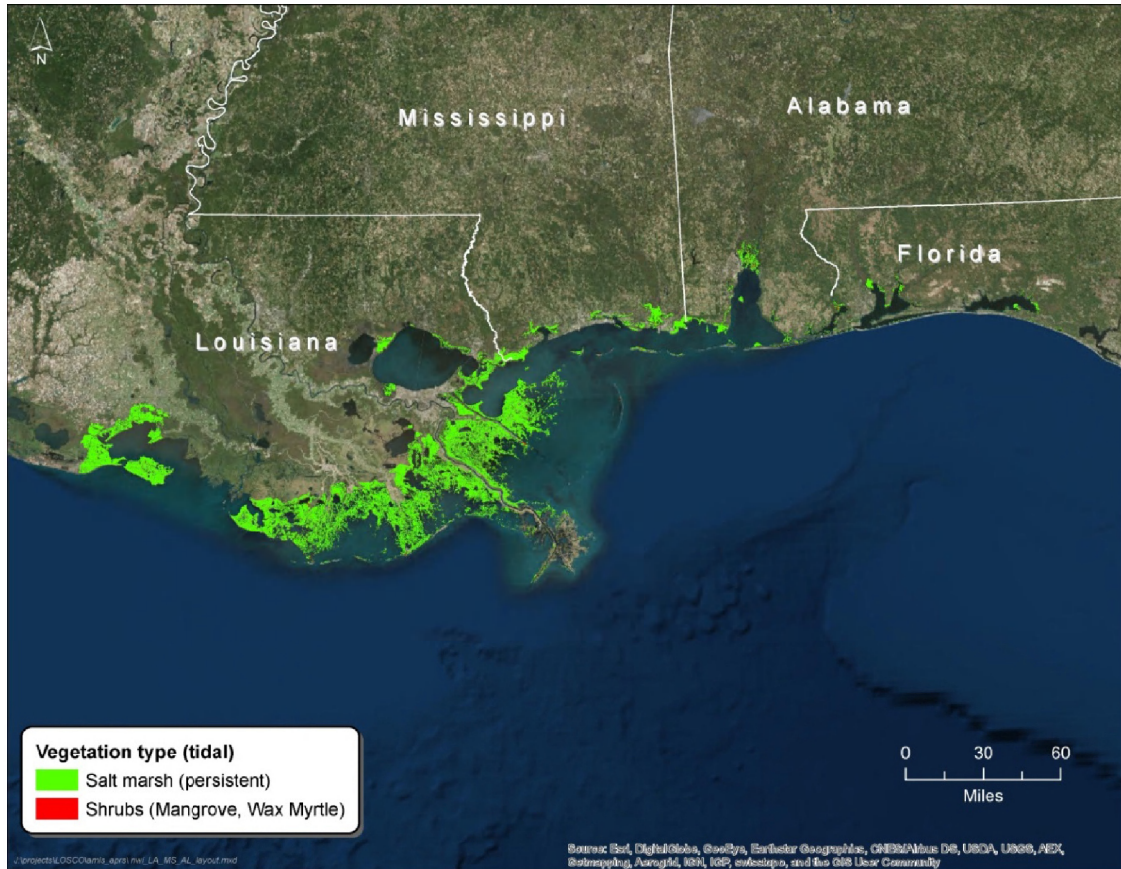
Not only does Louisiana support large abundances of colonial birds, but it also supports unique biological varieties. For example, the “Chandeleur Gull,” a hybrid swarm (i.e., a population of hybrids that has survived beyond the initial hybrid generation, with interbreeding between hybrid individuals and backcrossing with parent types) between Herring Gull and Kelp Gull, has been present for nearly 20 years on the Chandeleurs (Dittmann and Cardiff, 2005). It is the only such population in the world (*ca.* 30 individuals) and potentially represents a rare and interesting biological event, namely speciation through hybridization.

### 4.3 Birds in Louisiana Coastal Marsh Habitats

Louisiana has one the largest contiguous expanses of salt and brackish marshes of anywhere in the world, and by far the largest of any state in the eastern United States. Louisiana has saltmarsh (*ca.* 295,000 ha), intermediate marsh (*ca.* 380,000 ha), brackish marsh (*ca.* 404,000 ha), and fresh marsh (*ca.* 387,000 ha) (from Sesser et al., 2013). These habitat areas account for more than 40% of the saltmarsh of the eastern United States and as much as 70% of GoM saltmarsh (Dahl and Steadman, 2013; Sesser et al., 2013; DWH Trustees, 2015, Section 3) (Figure 4).

These Louisiana saltmarsh habitats support many avian populations, including obligate tidal marsh species such as Seaside Sparrow and Clapper Rail (Figure 5). These two species are restricted to narrow and patchily distributed linear strips of habitat along the coast or shorelines within marsh areas (Post et al., 2009; Rush et al., 2012), and are among Louisiana’s species of greatest conservation need (LDWF, 2015). Their habitat specialization made them particularly vulnerable to extensive oiling in marsh habitats during the DWH spill (Wallace and Ritter, 2015). Although estimates are not available, Louisiana’s populations of these species are likely substantial relative to other states because Louisiana has the largest and most continuous area of appropriate habitat in the United States (Figure 4). Clapper Rail is also a game bird in Louisiana, and so has direct economic importance from hunter-generated revenue (Rush et al., 2012).

Many other species use coastal marshes for foraging, roosting, evading predators, and nesting. For example, the entire world’s population of Nelson’s Sparrow, another species of greatest conservation need (LDWF, 2015), winters along the southern Atlantic Coast and Gulf Coast, including Louisiana (Shriver et al., 2011); during the nonbreeding season, it is a specialist of coastal marshes. Additionally, one of the least common North American waterfowl species, Mottled Duck, is largely restricted to the coastal zone of the Gulf of Mexico and the southern Atlantic Coast (Bielefeld et al., 2010). Additional species that are not obligate coastal marsh specialists but that have substantial breeding populations in coastal marsh are Least Bittern, Common Yellowthroat, Boat-tailed Grackle, Red-winged Blackbird (mostly *Phragmites*), Orchard Oriole (*Phragmites* only), Common Gallinule, and Pied-billed Grebe (Rodewald, 2015). Also, Green Heron and Tricolored Heron may not nest in coastal marsh but use this habitat extensively for feeding during the breeding season.



**Figure 4. Louisiana contains the vast majority of total salt marsh and the majority of total shrub habitat within the northern GoM (U.S. Geological Survey National Wetland Inventory habitat classifications; USFWS, 2015a). These areas support large populations of obligate marsh bird species as well as other bird species that frequently use marsh habitats.**



**Figure 5. Coastal marshes support large populations of several unique marsh bird species, such as species that are completely dependent on coastal marsh habitats including the Seaside Sparrow (top photo) and Clapper Rail (bottom photo). These marsh areas – and the bird species that live in these areas – were exposed extensively to DWH oil (DWH Trustees, 2015, Section 4.6; Wallace and Ritter, 2015).**

Photo credits: Erik I. Johnson, Audubon Louisiana.

#### 4.4 Birds in Pelagic (Offshore) Habitats

Relatively little is known about bird populations of the pelagic zone off the Louisiana coast, or the GoM in general. Pelagic birds use the area especially at the interface of the outflow of the Mississippi River and continental shelf and deeper, offshore waters. Pelagic specialists that regularly use this region during the warm months include Bridled Tern, Sooty Tern, Wilson's Storm-Petrel, Band-Rumped Storm-Petrel, Leach's Storm-Petrel, Cory's Shearwater, Audubon's Shearwater, Masked Booby, Brown Booby, and Pomarine Jaeger (Rodewald, 2015). In winter and spring, the area also supports Northern Gannet, which breed along the Atlantic Coast of Canada (Mowbray, 2002).

### 5. Louisiana is a Hub for International Migratory Routes for Many Species

For bird species migrating to and from their tropical wintering grounds, the Louisiana coastline provides critical stopover habitat. Although census data are not available, these transient bird populations likely number in the hundreds of thousands and, in some years, millions.

The first wooded habitats inland from the immediate coast are perhaps the most important stopover habitat in the world for migratory landbirds. The abundance and richness of migrant landbird species that use and depend on these strips of coastal woods (*cheniers* and maritime forest) and coastal shrub-scrub is well-documented: approximately 100 Neotropical migratory landbird species use this habitat for refueling and resting during migration (Providence, 2009). These habitats depend on the adjacent coastal marsh and beach habitats to protect them from saltwater and erosion.

During migration periods and in the winter, Louisiana coastal habitats are home to exceptionally high numbers of shorebirds, waterfowl, and other waterbirds. For example, the Louisiana coast provides critical nonbreeding habitat for the Piping Plover, a federally Endangered (Threatened in Louisiana) species (USFWS, 2009; Figure 6). Common wintering waterfowl in the southeast of Louisiana include Gadwall, Ring-necked Duck, Green-winged Teal, Lesser Scaup, Canvasback, Northern Pintail, Blue-winged Teal, American Wigeon, Northern Shoveler, and Mallard (Rodewald, 2015). Other waterbirds that use these areas include Dunlin, Sanderling, Western Sandpiper, Short-billed Dowitcher, Semipalmated Plover, Black-bellied Plover, American Avocet, Least Sandpiper, Red Knot (federally Threatened), Marbled Godwit, and Common Loon (Rodewald, 2015). A substantial proportion of the U.S. population of American White Pelican also winters in nearshore habitat (Knopf and Evans, 2004).





**Figure 6. Piping Plover foraging in Cameron Parish, Louisiana.** Coastal Louisiana provides critical wintering habitat for this federally Endangered (Threatened in Louisiana) species.

Source: Erik I. Johnson, Audubon Louisiana.

## 6. Summary

This report illustrates the regional and global importance of Louisiana coastal habitats for numerous species of birds, thereby providing context for avian injuries caused by the DWH oil spill. Louisiana's coastal zone encompasses North America's largest river delta system, largest contiguous area of saline and brackish coastal marshes, and a high density of islands, all of which provide abundant resources to support millions of birds. These habitats also support regionally and globally significant populations of several species (e.g., Brown Pelicans, Sandwich Terns, Seaside Sparrows, Clapper Rails), including imperiled species (e.g., Wilson's Plover, Piping Plover). Consequently, coastal Louisiana has a disproportionately important role in ensuring healthy bird populations that range across the GoM, North America, and beyond. Widespread anthropogenic effects, such as the DWH oil spill, on these ecologically and economically valuable coastal habitats therefore warrant coordinated management of shared natural resources in the northern GoM, especially in Louisiana.

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