Deepwater Horizon Oil Spill; Draft Programmatic and Phase III Early Restoration Plan and Draft Early Restoration Programmatic Environmental Impact Statement

Abstract: In accordance with the Oil Pollution Act of 1990 (OPA) and the National Environmental Policy Act (NEPA), the Federal and State natural resource trustee agencies (Trustees) have prepared a Draft Programmatic and Phase III Early Restoration Plan and Draft Early Restoration Programmatic Environmental Impact Statement (Draft Phase III ERP/PEIS). The Draft Phase III ERP/PEIS considers programmatic alternatives to restore natural resources, ecological services, and recreational use services injured or lost as a result of the *Deepwater Horizon* oil spill. The restoration alternatives are comprised of early restoration project types; the Trustees additionally propose forty-four specific early restoration projects that are consistent with the proposed early restoration program alternatives. The Trustees have developed restoration alternatives and projects to utilize funds for early restoration being provided under the Framework for Early Restoration Addressing Injuries Resulting from the *Deepwater Horizon* Oil Spill (Framework Agreement). Criteria and evaluation standards under the OPA natural resource damage assessment regulations and the Framework Agreement guided the Trustees' consideration of programmatic restoration alternatives. The Draft Phase III ERP/PEIS evaluates these restoration alternatives and projects under criteria set forth in the OPA natural resource damage assessment regulations and the Framework Agreement. The Draft Phase III ERP/PEIS also evaluates the environmental consequences of the restoration alternatives and projects under NEPA.

Lead Agency: U.S Department of the Interior

Cooperating Agencies:
Mississippi Department of Environmental Quality
Florida Department of Environmental Protection
Florida Fish and Wildlife Conservation Commission
Louisiana Coastal Protection and Restoration Authority
Louisiana Oil Spill Coordinator's Office
Louisiana Department of Environmental Quality
Louisiana Department of Wildlife and Fisheries
Louisiana Department of Natural Resources
Texas Parks and Wildlife Department
Texas General Land Office
Texas Commission on Environmental Quality
National Oceanic and Atmospheric Administration
U.S. Environmental Protection Agency
U.S. Department of Agriculture
U.S. Army Corps of Engineers

For Further Information Contact: Nanciann Regalado at *nanciann_regalado@fws.gov*.

Comments Due: We will consider public comments received on or before February 4, 2014.

Public Comments may be submitted:
Via U.S. Mail: U.S. Fish and Wildlife Service, P.O. Box 49567, Atlanta, GA 30345
Via the Web: http://www.gulfspillrestoration.noaa.gov.

Deepwater Horizon Oil Spill Natural Resource Damage Assessment

Draft Programmatic and Phase III Early Restoration Plan and Draft Early Restoration Programmatic Environmental Impact Statement

December 2013

EXECUTIVE SUMMARY

Introduction

On or about April 20, 2010, the mobile offshore drilling unit *Deepwater Horizon,* which was being used to drill a well for BP Exploration and Production, Inc. (BP) in the Macondo prospect (Mississippi Canyon 252 – MC252), suffered a blowout, caught fire, and subsequently sank in the Gulf of Mexico (the Gulf). Tragically, 11 workers were killed and 19 injured. This incident resulted in discharges of oil and other substances into the Gulf from the rig and the submerged wellhead. The *Deepwater Horizon* Oil Spill is the largest oil spill in U.S. history, discharging millions of barrels of oil over a period of 87 days (hereafter referred to as "the Spill," which includes activities conducted in response to the spilled oil). In addition, well over one million gallons of dispersants were applied to the waters of the spill area in an attempt to disperse the spilled oil.[1] An undetermined amount of natural gas was also released to the environment as a result of the Spill.

The U.S. Coast Guard responded and directed federal efforts to contain and clean up the Spill. The scope, nature and magnitude of the Spill was unprecedented, causing impacts to coastal and oceanic ecosystems ranging from the deep ocean floor, through the oceanic water column, to the highly productive coastal habitats of the northern Gulf, including estuaries, shorelines and coastal marsh. Affected resources include ecologically, recreationally, and commercially important species and their habitats in the Gulf and along the coastal areas of Texas, Louisiana, Mississippi, Alabama and Florida. These fish and wildlife species and their supporting habitats provide a number of important ecological and human use services.

Pursuant to the Oil Pollution Act (OPA), 33 United States Code (U.S.C.) § 2701 *et seq*., and the laws of individual affected states, federal and state agencies, Indian tribes and foreign governments shall act as trustees on behalf of the public to assess injuries to natural resources and their services that result from an oil spill incident, and to plan for restoration to compensate for those injuries. OPA further instructs the designated trustees to develop and implement a plan for the restoration, rehabilitation, replacement, or acquisition of the equivalent of the injured natural resources under their trusteeship (hereafter collectively referred to as "restoration"). This process of injury assessment and restoration planning is referred to as natural resource damage assessment (NRDA). OPA defines "natural resources" to include land, fish, wildlife, biota, air, water, ground water, drinking water supplies and other such resources belonging to, managed by, held in trust by, appertaining to, or otherwise controlled by the United States (including the resources of the Exclusive Economic Zone), any State or local government or Indian tribe, or any foreign government (33 U.S.C. § 2701(20)).

[1] Dispersants do not remove oil from the ocean. Rather, they are used to help break large globs of oil into smaller droplets that can be more readily dissolved into the water column.

The Federal Trustees are designated pursuant to section 2706(b) (2) of OPA (33 U.S.C. 2706(b) (2)) and Executive Orders 12777 and 13626. The following federal agencies are the designated natural resource Trustees under OPA for this Spill:[2]

- The United States Department of the Interior (DOI), as represented by the National Park Service (NPS), United States Fish and Wildlife Service (FWS), and Bureau of Land Management;
- The National Oceanic and Atmospheric Administration (NOAA), on behalf of the United States Department of Commerce;
- The United States Department of Agriculture (USDA); and
- The United States Environmental Protection Agency (EPA).

State Trustees are designated by the Governors of each state pursuant to section 1006(b) (3) of OPA (U.S.C. § 2706(b) (3)). The following state agencies are designated natural resources Trustees under OPA and are currently acting as Trustees for the Spill:

- Texas Parks and Wildlife Department (TPWD), Texas General Land Office (TGLO) and Texas Commission on Environmental Quality (TCEQ);
- The State of Louisiana's Coastal Protection and Restoration Authority (CPRA), Oil Spill Coordinator's Office (LOSCO), Department of Environmental Quality (LDEQ), Department of Wildlife and Fisheries (LDWF) and Department of Natural Resources (LDNR);
- The State of Mississippi's Department of Environmental Quality (MDEQ);
- The State of Alabama's Department of Conservation and Natural Resources (ADCNR) and Geological Survey of Alabama (GSA); and
- The State of Florida's Department of Environmental Protection (FDEP) and Fish and Wildlife Conservation Commission (FWC).

This document (Draft Phase III ERP/PEIS), prepared jointly by State and Federal Trustees, serves as a Draft Programmatic Early Restoration Plan and Programmatic Environmental Impact Statement and a Draft Phase III Early Restoration Plan and associated environmental analyses.

- This Draft Programmatic ERP and PEIS are intended to guide the development and evaluation of Early Restoration projects for the potential use of the remaining funds available for Early Restoration. This draft Programmatic ERP frames and helps to inform Early Restoration actions. The draft Programmatic ERP and PEIS identify a range of Early Restoration alternatives and project types that could be applied at this time and in future phases of Early Restoration planning. The PEIS may serve as the base document from which to tier subsequent environmental compliance evaluation for future Early Restoration plans.
- The Draft Phase III Early Restoration Plan proposes specific projects consistent with the Draft Programmatic Early Restoration Plan, supported by evaluation of the potential environmental impacts of the proposed projects.

[2] The U. S. Department of Defense is a trustee under OPA of natural resources at its Gulf Coast facilities potentially affected by the Spill but is not a member of the Trustee Council and did not participate in the preparation of this document.

The Trustees are actively seeking public comments regarding both the programmatic approach taken in this Draft document and the proposed Phase III Early Restoration projects. A Notice of Availability of this document and the request for input is available at: www.gulfspillrestoration.noaa.gov. The Draft's release opens a 60-day public comment period that runs through Feb. 4, 2014. The comment period will include 10 public meetings held across the Gulf states. All meetings will begin with an interactive open house during which Trustee staff will be available to discuss programmatic and project details.

Please visit www.gulfspillrestoration.noaa.gov to download an electronic copy of the draft and to view a list of public libraries and community locations across the Gulf in which electronic copies of the draft have been placed for public review.

In addition to verbal comments at public meetings, the public may submit written comments:

- Online: www.gulfspillrestoration.noaa.gov
- By U.S. Mail: U.S. Fish and Wildlife Service, P.O. Box 49567, Atlanta, GA 30345.

Framework Agreement

On April 20, 2011, BP agreed to provide up to $1 billion toward Early Restoration projects in the Gulf of Mexico to address injuries to natural resources caused by the Spill. This Early Restoration agreement, entitled "Framework for Early Restoration Addressing Injuries Resulting from the *Deepwater Horizon* Oil Spill" (Framework Agreement), represents a preliminary step toward the restoration of injured natural resources. The Framework Agreement provides a mechanism through which the Trustees and BP can work together "to commence implementation of Early Restoration projects that will provide meaningful benefits to accelerate restoration in the Gulf as quickly as practicable" prior to the resolution of the Trustees' natural resource damages claim.

The Early Restoration planning process is part of the NRDA but is also shaped in part by the Framework Agreement. Under the Framework Agreement, a proposed Early Restoration project may be funded only if all of the Trustees, the U.S. Department of Justice, and BP agree on, among other things, the amount of funding to be provided by BP and the "NRD Offsets" (explained later in this document) that will be credited for that project against BP's liability for NRD resulting from the Spill. The need for project-specific agreements with BP inevitably affects which projects are practical to pursue in the early restoration process.

Early Restoration is not intended to fully compensate the public for all natural resource injuries and losses including recreational use losses from the Spill. The Trustees have engaged the public in a separate process to address longer-term restoration. This process is described in Section 1.3.2 (Gulf Spill NRDA Restoration Planning) of the accompanying Draft Phase III ERP/PEIS. Since final determinations of injury will not be completed for some time, it is premature to say now what proportion of any particular resource injury or loss would be addressed by any Early Restoration project, including those proposed in this Draft Phase III ERP/PEIS. Ultimately, the responsible parties are obligated to compensate the public for the full scope of natural resource injuries caused by the spill, including the cost of assessment and restoration planning.

Natural Resource Damage Assessment Restoration Planning

Restoration activities are intended to restore or replace habitats, species, and services to their baseline condition, (primary restoration), and to compensate the public for interim losses from the time natural resources are injured until they recover to baseline conditions (compensatory restoration). To meet these goals, the restoration activities need to produce benefits that are related, or have a nexus, to natural resources injured and service losses resulting from the Spill.

Natural resource services include the ecological and recreational services that natural resources provide. Examples of ecological services include nutrient cycling, food production for other species, habitat provision, and other services that natural resources provide for each other. Recreational use services include (but are not limited to) recreational activities that make 'direct' use of natural resources (e.g., boating, nature photography, education, fishing, swimming, hiking, etc.).[3] For the purposes of this document, the term "natural resource services" includes ecological and recreational use services.

NRDA restoration planning is designed to evaluate potential injuries to natural resources and natural resource services; to use that information to determine whether and to what extent restoration is needed; to identify potential restoration actions to address that need; and to provide the public with an opportunity to review and comment on the proposed restoration alternatives. Restoration planning has two basic components: (1) injury assessment and (2) restoration selection. The goal of injury assessment is to determine the nature and extent of injuries to natural resources and services. The goal of restoration selection is to evaluate the need for and type of restoration required based on the injury assessment. Under the NRDA regulations, Trustees must identify a reasonable range of restoration alternatives, evaluate and select the preferred alternative(s), and develop a Draft (for public comment) and Final Restoration Plan. Each restoration alternative considered must address specific injuries

RESTORATION TERMS DEFINED

Restoration: Any action that restores, rehabilitates, replaces, or acquires the equivalent of the injured natural resources.

Baseline: The condition of the natural resources and services that would have existed had the incident not occurred

Primary Restoration: Any action, including natural recovery, that returns injured natural resources and services to baseline.

Compensatory Restoration: Any action taken to compensate the public for interim losses of natural resources and services from the date of injury until recovery.

Natural Resource Services: The functions performed by a natural resource for the benefit of another natural resource (ecological services) and/or the public (including recreational services).

[3] Natural resources can provide a variety of "direct" and "indirect" services to the public ("indirect" services to the public can be seen, for example, in the value the public holds for natural resources independent of their own use of such resources (e.g., by contributing to the protection of natural resources that they may not directly 'use' but want to preserve for future generations)). For the purposes of this document, the Trustees focus on the recreational service 'subset' of human use services. The Trustees reserve the right to seek compensation for all human use impacts arising from the Spill, consistent with OPA and OPA NRDA regulations.

associated with the incident. Ultimately, Trustees seek to implement restoration projects expected to fully compensate the public for losses of natural resources and services resulting from the Spill.

Early Restoration Programmatic Approach

For the purpose of accelerating meaningful restoration of injured natural resources and their services resulting from the Spill, The Trustees propose to continue implementation of Early Restoration in accordance with the OPA and using funds made available in the Framework Agreement. Given the potential magnitude and breadth of further Early Restoration, the Trustees elected to prepare a Programmatic Early Restoration Plan (Programmatic ERP) under OPA to analyze alternative approaches to continuing Early Restoration and to consistently guide remaining Early Restoration decisions. A programmatic approach assists the Trustees and the public in evaluation of proposed projects and in development and evaluation of future Early Restoration projects.

The regulations that guide natural resource damage assessments under OPA require that restoration planning actions undertaken by Federal Trustees comply with the National Environmental Policy Act (NEPA), 42 U.S.C. § 4321 et seq., and the regulations guiding its implementation at 40 C.F.R. Part 1500. NEPA and its implementing regulations outline the responsibilities of federal agencies, including the preparation of environmental analysis, such as an environmental impact statement (EIS).

A Federal agency may prepare a programmatic EIS (PEIS) to evaluate broad actions. 40 C.F.R. § 1502.4(b); *see* Forty Most Asked Questions Concerning CEQ's National Environmental Policy Act Regulations, 46 Fed. Reg. 18026 (1981). When a federal agency prepares a PEIS, the agency may "tier" subsequent narrower environmental analyses on site specific plans or projects from the PEIS (40 C.F.R. § 1502.4(b); 40 C.F.R. §1508.28). Federal agencies are encouraged to tier subsequent narrower analyses from a PEIS to eliminate repetitive discussions of the same issues and to focus on the actual issues ripe for decision at each level of environmental review (40 C.F.R. § 1502.20).

A PEIS may consider multiple related federal actions that may encompass a large geographic scale or that constitute a suite of similar programs, both of which apply to the joint state and federal Early Restoration effort for natural resources and services that were impacted by the Spill. The Trustees elected to prepare a programmatic EIS to support analysis of the environmental consequences of the Programmatic ERP and to consider the multiple related actions that may occur as a result of Early Restoration, and to allow for a better analysis of cumulative impacts of potential actions. The affected environment analyzed in this draft document includes the northern Gulf of Mexico region and its physical and biological environments, and the human uses and socioeconomics of that area (See Chapter 3 – The Affected Environment).

For the Programmatic ERP, the Trustees developed a set of project types for inclusion in programmatic alternatives, consistent with the desire to seek a diverse set of projects providing benefits to a broad array of potentially injured resources.[4] Ultimately, this process resulted in the inclusion of twelve project types in the programmatic alternatives evaluated for Early Restoration in this document, including:

[4] Project type names, descriptions, and the resources benefitted are not necessarily indicative of NRD Offsets agreed upon with BP for any particular project pursuant to the Framework Agreement. Offset types and the relationship to projects proposed in

1. Create and Improve Wetlands
2. Protect Shorelines and Reduce Erosion
3. Restore Barrier Islands and Beaches
4. Restore and Protect Submerged Aquatic Vegetation
5. Conserve Habitat
6. Restore Oysters
7. Restore and Protect Finfish and Shellfish
8. Restore and Protect Birds
9. Restore and Protect Sea Turtles
10. Enhance Public Access to Natural Resources for Recreational Use
11. Enhance Recreational Experiences
12. Promote Environmental and Cultural Stewardship, Education and Outreach

Additional project types were considered by the Trustees, but not evaluated in detail at this time, the Trustees do not consider them appropriate for Early Restoration. For example, while the Trustees are concerned about and continue to evaluate potential Spill injuries to marine mammals and to components of the deep benthic environment (e.g., deep sea corals, mesophotic reefs and deep soft bottom sediment habitat), additional time and effort is needed to enhance Trustee understanding of such injuries and identify appropriate, reliable restoration methods.

While the twelve project types can be combined in numerous ways to develop programmatic alternatives, the Trustees considered and evaluated the following four programmatic alternatives in this document:

1. No Action;
2. Contribute to Restoring Habitats and Living Coastal and Marine Resources (project types 1-9 above);
3. Contribute to Providing and Enhancing Recreational Opportunities (project types 10-12 above); and
4. Contribute to Restoring Habitats, Living Coastal and Marine Resources, and Recreational Opportunities (project types 1-12 above).

The Trustees believe that these alternatives and project types are consistent with relevant evaluation criteria and provide a reasonable range for consideration and evaluation. Each project type is described under the relevant alternative and the Draft Phase III ERP/PEIS presents the Trustees preferred alternative (Alternative 4). The environmental analysis of the Programmatic ERP and PEIS alternatives can be found in Chapter 6.

Early Restoration Project Selection Process

The Trustees developed the Early Restoration selection process to be responsive to the purpose and need for conducting Early Restoration. Figure ES-1 depicts the general Early Restoration project solicitation and selection process. In summary, Early Restoration project selection is a step-wise process

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this DERP are described in Chapters 8-12 of this document. Future proposed projects, even if similar to those proposed herein or within the same project type, may bear different proposed NRD Offsets.

comprised of: (1) project solicitation; (2) project screening; (3) negotiation with BP; and (4) public review and comment.

Restoration Project Solicitation

Public input is an integral part of NEPA, OPA and the Spill restoration planning effort, and is an important means for ensuring that the Trustees consider relevant information and concerns of the public. Following the Spill, the Trustees established websites to provide the public information about injury and restoration processes.[5] Public solicitation of restoration projects has been ongoing since the Notice of Intent to Conduct Restoration Planning for the Spill was published in 2010.

Following adoption of the Framework Agreement in April 2011, the Trustees invited the public to provide restoration project ideas through a variety of mechanisms, including public meetings and internet-accessible databases. The Trustees received hundreds of proposals, all of which can be viewed at several web pages.[6] The Trustees conducted a public scoping process soliciting comments regarding the above stated programmatic Early Restoration approach June 4 – August 2, 2013, after publication of a Notice of Intent. A record of the public meetings and input opportunities is available at http://www.gulfspillrestoration.noaa.gov. A summary of comments received in response to the Notice of Intent to Conduct Scoping will be available in the Administrative Record.

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[5] The Trustees established the following websites:

- NOAA, Gulf Spill Restoration, available at http://www.gulfspillrestoration.noaa.gov/;
- DOI, Deepwater Horizon Oil Spill Response, available at http://www.fws.gov/home/dhoilspill/;
- Texas Parks and Wildlife Department, Deepwater Horizon Oil Spill, available at http://www.tpwd.state.tx.us/landwater/water/environconcerns/damage_assessment/deep_water_horizon.phtml/;
- Louisiana, Deepwater Horizon Oil Spill Natural Resource Damage Assessment, available at http://losco-dwh.com/;
- Mississippi Department of Environmental Quality, Natural Resource Damage Assessment, available at http://www.restore.ms/;
- Alabama Department of Conservation and Natural Resources, NRDA Projects, available at http://www.outdooralabama.com/nrdaprojects/; and Florida Department of Environmental Protection, Deepwater Horizon Oil Spill Response and Restoration, available at http://www.dep.state.fl.us/deepwaterhorizon/default.htm

[6] See www.gulfspillrestoration.noaa.gov, http://losco-dwh.com, http://www.restore.ms,
http://www.tpwd.state.tx.us/landwater/water/environconcerns/damage_assessment/deep_water_horizon.phtml
http://www.outdooralabama.com/nrdaprojects/
http://www.deepwaterhorizonflorida.com
http://www.gulfspillrestoration.noaa.gov/restoration/give-us-your-ideas/.

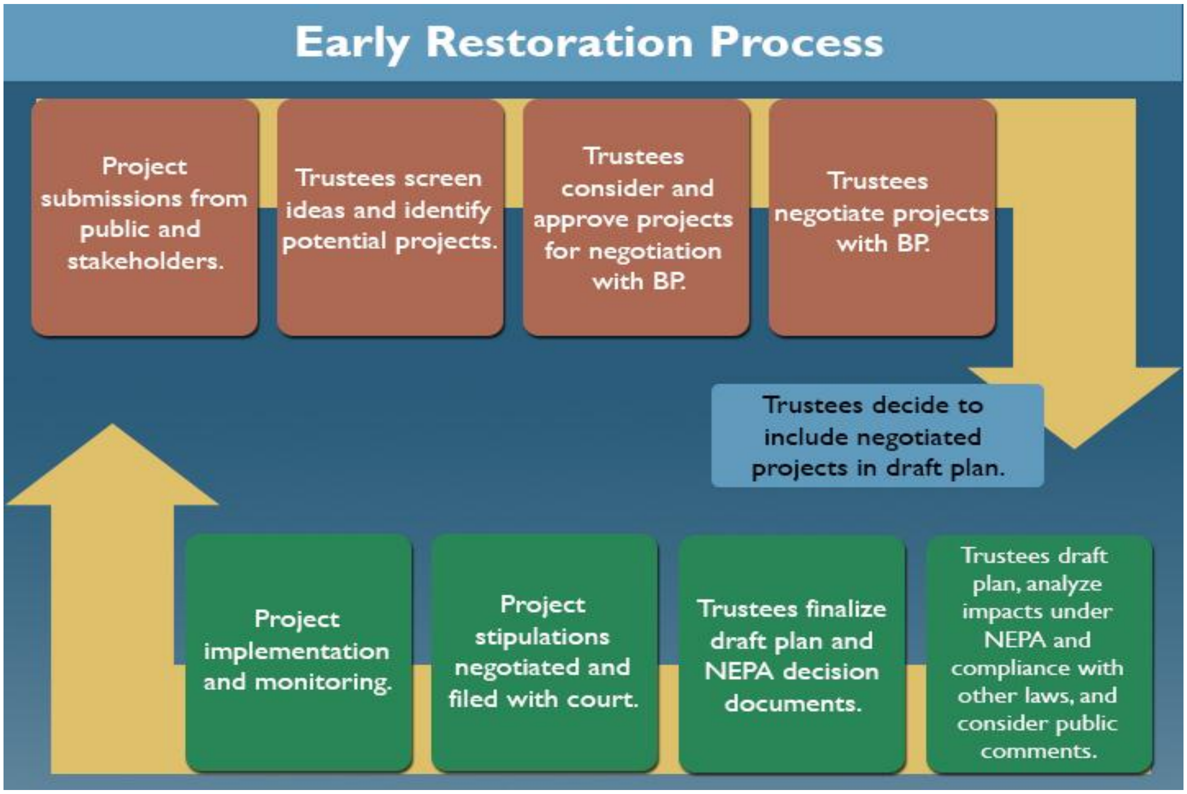

Figure ES-1. General Early Restoration project selection process.

The Trustees have addressed and continue to address NRDA, the restoration planning process and potential restoration projects at public meetings, venues and meetings with many non-governmental organizations and other stakeholders. The Trustees continue to solicit restoration ideas via the web and continue to consider existing and new project proposals as part of the restoration planning process.

Early Restoration Evaluation Criteria

In evaluating Early Restoration programmatic alternatives and specific restoration projects, the Trustees used criteria included in the NRDA regulations and the Framework Agreement, as well as factors that are otherwise key in planning or affecting Early Restoration, including those associated with other laws, regulations and programs. Chapter 2 contains a detailed discussion of various evaluation criteria. Chapter 5 provides a detailed evaluation of the consistency of the proposed alternatives with programmatic criteria, and Chapters 8-12 of this document provide project-specific information addressing each project's consistency with project evaluation criteria identified in Chapter 2. Additional Trustee-specific information on Trustee screening is included in each of Chapters 8-12.

Severability of Proposed Phase III Early Restoration Projects

In the Draft Phase III ERP/PEIS, the Trustees propose 44 specific Early Restoration projects expected to cost approximately $627 million for consideration along with a broader, programmatic plan and PEIS that encompass not only the proposed Phase III projects but also the remainder of the Early Restoration process. In general, the proposed Phase III projects presented in this Draft Phase III ERP/PEIS are independent of each other and can be selected independently for the Final Phase III ERP/PEIS. A decision not to include one or more of the proposed projects in the Final Phase III ERP/PEIS should not affect either the programmatic elements of the plan or the Trustees' selection of the remaining Phase III Early Restoration projects.

Proposed Phase III Early Restoration Projects

The Trustees are proposing a set of Phase III Early Restoration projects totaling approximately $627 million in estimated projects costs (including contingencies). Ecological projects comprise $396.9 million (63%) of this total, and recreational projects comprise the remaining $230 million (37%). Within the ecological project category, barrier island restoration accounts for $318.4 million of estimated project costs, followed by living shoreline ($66.6 million), oyster ($8.6 million), SAV ($2.7 million) and dune projects ($0.6 million). Project information and environmental analyses for proposed Phase III Early Restoration projects are included in Chapters 8-12 of the Draft Phase III ERP/PEIS.

Table ES-1. Summary of Phase III Early Restoration projects.

PROJECT CATEGORY	ESTIMATED COST FOR ALL PROPOSED PROJECTS IN THAT CATEGORY
Barrier Islands	$318,363,000
Recreational	$230,118,372
Living Shoreline	$66,603,668
Oyster	$8,610,081
Seagrasses	$2,691,867
Dune	$611,234
Total	**$626,998,302**

Table ES-2 lists the 44 proposed Phase III projects, identifies the state in which each is located or proximate, and relates each project back to the project type(s) and programmatic alternatives noted above. Proposed projects are organized by state, from west to east within the Gulf. Unless otherwise noted, state Trustees will be the project management lead for proposed projects located in their states.

Table ES-2. Proposed Phase III Early Restoration Projects: Relationship to Programmatic Alternatives.

				ALTERNATIVE 4											
				ALTERNATIVE 2									ALTERNATIVE 3		
	PROPOSED PROJECT	LOCATION	COST	CREATE AND IMPROVE WETLANDS	PROTECT SHORELINES AND REDUCE EROSION	RESTORE BARRIER ISLANDS AND BEACHES	RESTORE AND PROTECT SUBMERGED AQUATIC VEGETATION	CONSERVE HABITAT	RESTORE OYSTERS	RESTORE AND PROTECT FINFISH	RESTORE AND PROTECT BIRDS	RESTORE AND PROTECT SEA TURTLES	ENHANCE PUBLIC ACCESS TO NATURAL RESOURCES FOR RECREATIONAL USE	ENHANCE RECREATIONAL EXPERIENCES	PROMOTE ENVIRONMENTAL AND CULTURAL STEWARDSHIP, EDUCATION, AND OUTREACH
1	Freeport Artificial Reef Project	TX	$2,155,365											X	
2	Matagorda Texas Artificial Reef Project	TX	$3,486,398											X	
3	Mid/upper Texas Coast Artificial Reef Ship Reef Project[1]	TX	$1,785,765											X	
4	Sea Rim State Park Improvements	TX	$210,100										X	X	
5	Galveston Island State Park Beach Development	TX	$10,745,060										X	X	

				ALTERNATIVE 4											
				ALTERNATIVE 2									ALTERNATIVE 3		
	PROPOSED PROJECT	LOCATION	COST	CREATE AND IMPROVE WETLANDS	PROTECT SHORELINES AND REDUCE EROSION	RESTORE BARRIER ISLANDS AND BEACHES	RESTORE AND PROTECT SUBMERGED AQUATIC VEGETATION	CONSERVE HABITAT	RESTORE OYSTERS	RESTORE AND PROTECT FINFISH	RESTORE AND PROTECT BIRDS	RESTORE AND PROTECT SEA TURTLES	ENHANCE PUBLIC ACCESS TO NATURAL RESOURCES FOR RECREATIONAL USE	ENHANCE RECREATIONAL EXPERIENCES	PROMOTE ENVIRONMENTAL AND CULTURAL STEWARDSHIP, EDUCATION, AND OUTREACH
6	Louisiana Outer Coast Restoration	LA[2]	$318,363,000			X									
7	Louisiana Marine Fisheries Enhancement, Research, and Science Center	LA	$22,000,000											X	X
8	Mississippi Hancock County Marsh Living Shoreline Project	MS	$50,000,000	X	X										
9	Restoration Initiatives at the INFINITY Science Center	MS	$10,400,000										X	X	X
10	Popp's Ferry Causeway Park	MS	$4,757,000										X	X	X
11	Pascagoula Beach Front Promenade	MS	$3,800,000										X	X	
12	Alabama Swift Tract Living Shoreline	AL	$5,000,080		X										
13	Gulf State Park Enhancement Project	AL	$85,505,305										X	X	X
14	Alabama Oyster Cultch Restoration	AL	$3,239,485						X						
15	Beach Enhancement Project at Gulf Island National Seashore	FL[3]	$10,836,055											X	
16	Gulf Islands National Seashore Ferry Project	FL[3]	$4,020,000										X		
17	Florida Cat Point Living Shoreline Project	FL	$775,605	X	X										
18	Florida Pensacola Bay Living Shoreline Project	FL	$10,828,063	X	X										
19	Florida Seagrass Recovery Project	FL	$2,691,867				X								
20	Perdido Key State Park Beach Boardwalk Improvements	FL	$588,500										X	X	
21	Big Lagoon State Park Boat Ramp Improvement	FL	$1,483,020										X	X	
22	Bob Sikes Pier Parking and Trail Restoration	FL	$1,023,990										X	X	
23	Florida Artificial Reefs	FL	$11,463,587										X	X	
24	Florida Fish Hatchery	FL	$18,793,500										X	X	
25	Scallop Enhancement for Increased Recreational Fishing Opportunity in the Florida Panhandle	FL	$2,890,250										X	X	
26	Shell Point Beach Nourishment	FL	$882,750											X	
27	Perdido Key Dune Restoration Project	FL	$611,234			X									
28	Florida Oyster Cultch Placement Project	FL	$5,370,596						X						
29	Strategically Provided Boat Access Along Florida's Gulf Coast	FL	$3,248,340										X	X	

				ALTERNATIVE 4											
				ALTERNATIVE 2									ALTERNATIVE 3		
	PROPOSED PROJECT	LOCATION	COST	CREATE AND IMPROVE WETLANDS	PROTECT SHORELINES AND REDUCE EROSION	RESTORE BARRIER ISLANDS AND BEACHES	RESTORE AND PROTECT SUBMERGED AQUATIC VEGETATION	CONSERVE HABITAT	RESTORE OYSTERS	RESTORE AND PROTECT FINFISH	RESTORE AND PROTECT BIRDS	RESTORE AND PROTECT SEA TURTLES	ENHANCE PUBLIC ACCESS TO NATURAL RESOURCES FOR RECREATIONAL USE	ENHANCE RECREATIONAL EXPERIENCES	PROMOTE ENVIRONMENTAL AND CULTURAL STEWARDSHIP, EDUCATION, AND OUTREACH
30	Walton County Boardwalks and Dune Crossovers	FL	$743,276										X	X	
31	Gulf County Recreation Projects	FL	$2,118,600										X	X	
32	Bald Point State Park Recreation Areas	FL	$470,800										X	X	
33	Enhancements of Franklin County Parks and Boat Ramps	FL	$1,771,385										X	X	X
34	Appalachicola River Wildlife and Environmental Area Fishing and Wildlife Viewing Access Improvements	FL	$262,989										X	X	
35	Navarre Beach Park Gulfside Walkover Complex	FL	$1,221,847										X	X	
36	Navarre Beach Park Coastal Access	FL	$614,630										X	X	
37	Gulf Breeze Wayside Park Boat Ramp	FL	$309,669										X	X	
38	Developing Enhanced Recreational Opportunities at the Escribano Point Portion of the Yellow River Wildlife Management Area	FL	$2,576,365										X	X	X
39	Norriego Point Restoration and Recreation Project	FL	$10,228,130										X	X	X
40	Deer Lake State Park Development	FL	$588,500										X	X	
41	City of Parker – Oak Shore Drive Pier	FL	$993,649										X	X	
42	Panama City Marina Fishing Pier, Boat Ramp and Staging Docks	FL	$2,000,000										X	X	
43	Wakulla Marshes Sands Park Improvements	FL	$1,500,000										X	X	
44	Northwest Florida Estuarine Habitat Restoration, Protection and Education – Fort Walton Beach	FL	$4,643,547										X	X	X
TOTAL			$626,998,302												

[1] As described in more detail in Chapter 8, the Trustees include an alternative (the Corpus Artificial Reef Project) to the Mid/upper Texas Coast Artificial Reef Ship Reef Project, to be implemented in the event the Ship Reef Project becomes technically infeasible (e.g., an appropriate ship cannot be acquired with available funding). The Corpus Artificial Reef Project 'Alternative' has its own project description, description of Affected Environment and analysis of environmental consequences in Chapter 8; is categorized within the same Programmatic Alternative as the Ship Reef Project; and would provide similar Offsets.

[2] One component of this proposed project would be implemented on federally-managed lands and managed by DOI.

[3] These proposed projects would be implemented on federally-managed lands and managed by DOI.

Document Organization and Decisions to be Made

Consistent with the purpose and need and proposed actions identified above, this Draft Phase III ERP/PEIS is divided into the following chapters:

- **Chapter 1 (Introduction, Purpose and Need, and Public Participation)**: Introductory information and context for this document;
- **Chapter 2 (Early Restoration Process and Status)**: Background, process and status information for Early Restoration efforts to date;
- **Chapter 3 (Affected Environment)**: Information describing the affected environment within which Early Restoration activities are expected to take place;
- **Chapter 4 (The *Deepwater Horizon* Oil Spill Natural Resource Injury Assessment)**: A summary of the status of *Deepwater Horizon* Oil Spill Natural Resource Injury Assessment efforts;
- **Chapter 5 (The Proposed Early Restoration Programmatic Plan: Development and Evaluation of Alternatives):** Descriptions of Early Restoration programmatic alternatives considered by the Trustees, including a "No Action" alternative and 3 action alternatives, and identification of a preferred alternative;
- **Chapter 6 (Environmental Consequences of Alternatives)**: An evaluation of those alternatives, including their expected environmental consequences;
- **Chapter 7 (Introduction to Proposed Phase III Early Restoration Projects)**: Identification of proposed projects and provide brief, summary information about them;
- **Chapters 8-12 (Evaluation of Proposed Phase III Restoration Projects: [State]:** OPA and NEPA analyses related to the 44 specific projects proposed by the Trustees for implementation in Phase III of Early Restoration, including a discussion of cumulative impacts. Chapters 8, 9, 10, 11 and 12 provide this information for proposed projects in Texas, Louisiana, Mississippi, Alabama, and Florida, respectively.

The full document is intended to provide the public with information and analysis needed to enable meaningful review and comment on the Trustees' proposal to proceed with (1) identifying a preferred Early Restoration program; and (2) selecting and implementing up to 44 individual proposed Phase III Early Restoration projects. Ultimately, this document and the corresponding public comment are intended to inform the Trustees' selection of an Early Restoration programmatic alternative as well as individual Early Restoration projects. Projects not identified for inclusion in the Final Phase III and programmatic ERP/PEIS may continue to be considered for inclusion in future restoration plans.

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CHAPTER 1: INTRODUCTION, PURPOSE AND NEED, AND PUBLIC PARTICIPATION

1.1 Introduction

On or about April 20, 2010, BP Exploration and Production Inc. (BP) was using Transocean's mobile offshore drilling unit Deepwater Horizon to drill a well in the Macondo prospect (Mississippi Canyon 252–MC252) when the well blew out, and the drilling unit exploded, caught fire and subsequently sank in the Gulf of Mexico (the Gulf). This incident resulted in an unprecedented volume of oil and other discharges from the rig and from the wellhead on the seabed. Tragically, 11 workers were killed and 19 injured. The Deepwater Horizon oil spill is the largest oil spill in U.S. history, discharging millions of barrels of oil over a period of 87 days (hereafter referred to as "the Spill," which includes activities conducted in response to the spilled oil). In addition, well over one million gallons of dispersants[1] were applied to the waters of the spill area in an attempt to disperse the spilled oil. An undetermined amount of natural gas was also released to the environment as a result of the Spill.

The U.S. Coast Guard responded and directed federal efforts to contain and clean up the *Deepwater Horizon* oil spill. At one point nearly 50,000 responders were involved in cleanup activities in open water, beach and marsh habitats. The scope, nature and magnitude of the Spill caused impacts to coastal and oceanic ecosystems ranging from the deep ocean floor, through the oceanic water column, to the highly productive coastal habitats of the northern Gulf, including estuaries, shorelines and coastal marsh. Affected resources include ecologically, recreationally, and commercially important species and their habitats in the Gulf and along the coastal areas of Texas, Louisiana, Mississippi, Alabama, and Florida. These fish and wildlife species and their supporting habitats provide a number of important ecological and recreational use services.

State and Federal natural resource Trustees ("the Trustees"; see Section 1.2.1) are in the process of assessing and quantifying injuries to natural resources and services provided by those resources caused by the Spill (see Section 1.3). When completed, this process – known as Natural Resource Damage Assessment or "NRDA" – will guide the Trustees to the identification of restoration projects to compensate the public for those injuries (see Section 1.3.2). While the NRDA for the Spill is ongoing, the Trustees and BP have begun a process of "Early Restoration" (see Section 1.3.3) – whereby the Trustees begin to restore injured resources and services back to a baseline condition (the condition those resources would have been in but for the Spill) prior to the completion of the NRDA. To date, two Phases of Early Restoration have been implemented, which covered ten restoration projects with a total cost of approximately $71 million. Restoration Plans and assessments of environmental impacts were prepared for both (see Section 2.2). This document pertains to a third Phase of Early Restoration.

[1] Dispersants do not remove oil from the ocean. Rather, they are used to help break large globs of oil into smaller droplets that can more readily be dissolved in the water column.

The present document (Draft Phase III ERP/PEIS) serves as a Draft Programmatic Early Restoration Plan and Environmental Impact Statement and a Draft Phase III Early Restoration Plan and associated environmental reviews. As such, this document provides information and analysis concerning: (1) the programmatic approach proposed by the Trustees for continuing Early Restoration; and (2) 44 specific Early Restoration projects presently being proposed by the Trustees. This is a draft document, prepared jointly by the State and Federal Trustees, subject to public review and comment and subsequent revision and finalization by the Trustees. The remainder of this chapter provides additional background and contextual information relevant to document objectives, content and organization.

1.2 Overview of the Oil Pollution Act and the National Environmental Policy Act

1.2.1 The Oil Pollution Act and Designation of Trustees

The Oil Pollution Act (OPA) Title 33 United States Code (U.S.C.) § 2701 *et seq*., establishes a liability regime for oil spills into navigable waters or adjacent shorelines that injure or are likely to injure natural resources and services that those resources provide to the ecosystem or to humans. Pursuant to OPA, designated federal and state agencies, Indian tribes and foreign governments act as trustees on behalf of the public to assess the injuries and plan for restoration to compensate for those injuries. OPA further instructs the designated Trustees to develop and implement a plan for the restoration, rehabilitation, replacement, or acquisition of the equivalent of the injured natural resources under their trusteeship (hereafter collectively referred to as "restoration"). OPA defines "natural resources" to include land, fish, wildlife, biota, air, water, ground water, drinking water supplies and other such resources belonging to, managed by, held in trust by, appertaining to, or otherwise controlled by the United States (including the resources of the Exclusive Economic Zone), any State or local government or Indian tribe, or any foreign government (33 U.S.C. § 2701(20)). Regulations providing guidance to the Trustees on how to implement, in general, the NRDA and restoration processes are contained in Chapter 15 of the Code of Federal Regulations (C.F.R.), Part 990. Services (or natural resource services) mean the functions performed by a natural resource for the benefit of another natural resource and/or the public.

The Federal Trustees are designated pursuant to section 2706(b)(2) of OPA (33 U.S.C. 2706(b)(2)) and Executive Orders 12777 and 13626. The following federal agencies are the designated natural resource Trustees under OPA for this Spill:[2]

- The United States Department of the Interior (DOI), as represented by the National Park Service (NPS), United States Fish and Wildlife Service (FWS), and Bureau of Land Management;
- The National Oceanic and Atmospheric Administration (NOAA), on behalf of the United States Department of Commerce;
- The United States Department of Agriculture (USDA); and
- The United States Environmental Protection Agency (EPA).

[2] The U. S. Department of Defense is a trustee under OPA of natural resources at its Gulf Coast facilities potentially affected by the Spill but is not a member of the Trustee Council and did not participate in the preparation of this document.

State Trustees are designated by the Governors of each state pursuant to section 2706(b)(3) of OPA. The following state agencies are designated natural resources Trustees under OPA and are currently acting as Trustees for the Spill:

- Texas Parks and Wildlife Department (TPWD), Texas General Land Office (TGLO) and Texas Commission on Environmental Quality (TCEQ);
- The State of Louisiana's Coastal Protection and Restoration Authority (CPRA), Oil Spill Coordinator's Office (LOSCO), Department of Environmental Quality (LDEQ), Department of Wildlife and Fisheries (LDWF) and Department of Natural Resources (LDNR);
- The State of Mississippi's Department of Environmental Quality (MDEQ);
- The State of Alabama's Department of Conservation and Natural Resources (ADCNR) and Geological Survey of Alabama (GSA); and
- The State of Florida's Department of Environmental Protection (FDEP) and Fish and Wildlife Conservation Commission (FWC).

In addition to acting as Trustees for this incident under OPA, the States of Louisiana, Mississippi, Alabama, Florida and Texas are also acting pursuant to their applicable state laws and authorities, including but not limited to:

- The Texas Oil Spill Prevention and Response Act, Tex. Nat. Res. Code, Chapter 40.01 et seq.;
- The Louisiana Oil Spill Prevention and Response Act of 1991, La. R.S. 30:2451 et seq., and accompanying regulations, La. Admin. Code 43:101 et seq.;
- The Mississippi Air and Water Pollution Control Law, Miss. Code Ann. §§ 49-17-1 through 49-17-43;
- Alabama Code §§ 9-2-1 et seq. and 9-4-1 et seq.;
- The Florida Pollutant Discharge Prevention and Removal Act, Fla. Statutes Section 376.011 et seq.

1.2.2 The National Environmental Policy Act

The regulations that guide natural resource damage assessments (NRDA) under OPA state that actions undertaken by Federal Trustees to restore natural resources or services under OPA are subject to the National Environmental Policy Act (NEPA) , 42 U.S.C. § 4321, *et seq*., and the regulations guiding its implementation at 40 C.F.R. Part 1500 (15 C.F.R. § 990.23). NEPA and its implementing regulations set forth a process of environmental impact analysis, documentation and public review for federal actions. NEPA provides a mandate and a framework for federal agencies to consider environmental effects of their proposed actions and to inform and involve the public in their environmental analysis and decision-making process. Preparation of an environmental impact statement (EIS) is required for a "major federal action significantly affecting the quality of the human environment" (42 U.S.C. § 4332(C)). This document includes both a programmatic NEPA analysis as well as project-specific analyses for the 44 projects proposed for Phase III Early Restoration.

A Federal agency may prepare a programmatic EIS (PEIS) to evaluate broad actions, including similar actions that share common timing and geography. (40 C.F.R. 1502.4(b); *see* Forty Most Asked Questions

Concerning CEQ's National Environmental Policy Act Regulations, 46 Fed. Reg. 18026 (1981)). When a federal agency prepares a PEIS, the agency may "tier" subsequent narrower environmental analyses on site specific plans or projects from the PEIS (40 C.F.R. 1502.4(b); 40 C.F.R. §1508.28). Federal agencies are encouraged to tier subsequent narrower analyses from a PEIS to eliminate repetitive discussions of the same issues and to focus on the actual issues ripe for decision at each level of environmental review. (40 C.F.R. § 1502.20). The draft PEIS (DPEIS) within this document evaluates a range of broad Early Restoration alternatives, and may permit tiering to subsequent narrower NEPA analyses for future Early Restoration plans. In addition, this DPEIS evaluates specific projects that the Trustees have proposed for implementation in Phase III of Early Restoration and that fall within the broad Early Restoration alternatives evaluated in this DPEIS.

The DOI is the lead federal agency for preparing the Draft Phase III ERP/PEIS, and has invited the co-Trustees (See Section 1.2.1 for list of designated co-Trustees) to act as cooperating agencies pursuant to NEPA (40 C.F.R. § 1508.5). These cooperating agencies intend to adopt this PEIS, once it is completed. In addition, the U.S. Army Corps of Engineers was invited to be a cooperating agency for the PEIS. This document is prepared in accordance with 40 C.F.R. § 1500-1508, "*CEQ's Regulations for Implementing NEPA*", DOI NEPA implementing regulations (43 C.F.R. § 46).

1.2.3 Compliance with Other Applicable Authorities[3]

In addition to the requirements of OPA and NEPA, requirements of other laws may apply to the Early Restoration planning or Early Restoration implementation. The Trustees will ensure compliance with authorities applicable to Early Restoration projects. Whether and to what extent an authority applies to a particular project depends on the specific characteristics of a particular project, among other things. For the proposed Phase III restoration projects, the subset of authorities listed below are the most commonly relevant:

- Endangered Species Act (16 U.S.C. §§ 1531 et seq.);
- National Historic Preservation Act (16 U.S.C. §§ 470 et seq.);
- Coastal Zone Management Act (16 U.S.C. §§ 1451-1464);
- Federal Water Pollution Control Act (Clean Water Act, 33 U.S.C. §§ 1251 et seq.);
- Clean Air Act (42 U.S.C. §§ 7401 et seq.);
- Migratory Bird Treaty Act (16 U.S.C. §§ 703-712);
- Bald and Golden Eagle Protection Act (16 U.S.C. 668-668c);
- Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. §§ 1801 et seq.); and
- Marine Mammal Protection Act (16 U.S.C. §§ 1361-1421h).

In addition, State Trustees will ensure compliance with applicable authorities in their individual states.

[3] Authorities may include federal statutes, regulations, executive orders, or regulatory guidance.

1.3 Natural Resource Damage Assessment Restoration Planning

Restoration activities are intended to restore or replace habitats, species, and services to their baseline condition (primary restoration) and to compensate the public for interim losses from the time natural resources are injured until they recover to baseline conditions (compensatory restoration). To meet these goals, the restoration activities need to produce benefits that are related, or have a nexus, to natural resources injured and service losses resulting from the Spill. To meet the NRDA regulations, Trustees must identify a reasonable range of restoration alternatives, evaluate and select the preferred alternative(s), and develop a Draft and Final Restoration Plan.

Natural resource services include the ecological and recreational services that natural resources provide. Examples of ecological services include nutrient cycling, food production for other species, habitat provision, and other services that natural resources provide for each other. Recreational use services include (but are not limited to) recreational activities that make 'direct' use of natural resources (e.g., boating, nature photography, education, fishing, swimming, hiking, etc.).[4] For the purposes of this document, the term "natural resource services" includes ecological and recreational use services.

NRDA restoration planning is designed to evaluate potential injuries to natural resources and natural resource services; to use that information to determine whether and to what extent restoration is needed; to identify potential restoration actions to address that need; and to provide the public with an opportunity to review and comment on the proposed restoration alternatives. Restoration planning has two basic components: (1) injury assessment and (2) restoration selection. The goal of injury assessment is to determine the nature and extent of injuries to natural resources and services. The goal of restoration selection is to evaluate the need for and type of

RESTORATION TERMS DEFINED

Restoration: Any action that restores, rehabilitates, replaces, or acquires the equivalent of the injured natural resources.

Baseline: The condition of the natural resources and services that would have existed had the incident not occurred

Primary Restoration: Any action, including natural recovery, that returns injured natural resources and services to baseline.

Compensatory Restoration: Any action taken to compensate the public for interim losses of natural resources and services from the date of injury until recovery.

Natural Resource Services: The functions performed by a natural resource for the benefit of another natural resource (ecological services) and/or the public (including recreational services).

[4] Natural resources can provide a variety of "direct" and "indirect" services to the public. "Indirect" services to the public can be seen, for example, in the value the public holds for natural resources independent of their own use of such resources (e.g., by contributing to the protection of natural resources that they may not directly 'use' but want to preserve for future generations). For the purposes of this document, the Trustees focus on the recreational service 'subset' of human use services. The Trustees reserve the right to seek compensation for all human use impacts arising from the Spill, consistent with OPA and OPA NRDA regulations.

restoration required based on the injury assessment. To meet the NRDA regulations, Trustees must identify a reasonable range of restoration alternatives, evaluate and select the preferred alternative(s), and develop a Draft (for public comment) and Final Restoration Plan; further, each restoration alternative considered must address specific injuries associated with the incident. Ultimately, Trustees seek to implement restoration projects expected to fully compensate the public for losses of natural resources and services resulting from the Spill.

Given its expansive geographic scale and complexity, the *Deepwater Horizon* NRDA process may continue for several more years. As a result, the Trustees initiated the restoration and planning efforts described below to accelerate restoration in the Gulf, even while injury assessment activities are ongoing. The Early Restoration projects proposed in this Draft Phase III ERP/PEIS are not intended to fully compensate the public for injuries caused by the Spill. Additional restoration actions will be required.

1.3.1 Emergency Restoration

Under OPA, Trustees may take emergency restoration actions before completing the NRDA process in order to minimize continuing, or prevent additional, injury as long as the actions are feasible and the costs of the actions are not unreasonable.

The Trustees collectively implemented three emergency restoration projects in response to the Spill, addressing submerged aquatic vegetation (SAV), waterfowl and shorebirds, and sea turtles. The SAV project was implemented to prevent additional injury by restoring SAV beds damaged by propeller scarring and other response vessel impacts. The waterfowl habitat project provided alternative wetland habitat in Mississippi for waterfowl and shorebirds that might otherwise winter in oil-affected habitats. The sea turtle project was completed to improve the nesting and hatching success of endangered sea turtles on the Texas coast, including Padre Island National Seashore. Some Trustees also independently implemented additional emergency restoration actions.

1.3.2 Gulf Spill NRDA Restoration Planning

In February 2011, in accordance with 15 C.F.R. § 990.14(d) and State authorities, the Trustees issued a Notice of Intent to begin restoration scoping and to prepare a "Gulf Spill Restoration Planning PEIS." That NOI requested public input to identify and evaluate a range of restoration types that could be used to fully compensate the public for the environmental and recreational use damages caused by the Spill, as well as to develop procedures for the selection and implementation of restoration projects that will compensate the public for the natural resource damages caused by the Oil Spill. The Trustees invited the public to participate in this restoration and PEIS scoping as part of the Damage Assessment and Restoration Plan (DARP) effort for the Spill before BP provided Early Restoration funding. As part of the scoping process, the Trustees hosted public meetings across all the Gulf States during Spring 2011.

The Notice of Intent initiating scoping for the DARP and supporting PEIS can be viewed at: http://www.gulfspillrestoration.noaa.gov/wp-content/uploads/2011/02/PEIS-NOI_signed.pdf. The restoration planning and PEIS referenced in that NOI are specific to the ultimate presentation of a natural resource damage claim for this Spill, and draft documents are continuing to be prepared separately from, but will account for, Early Restoration plans.

Public input from this 2011 scoping process, and similar exercises conducted by individual Trustees, were also considered in the scoping of this Draft Phase III ERP/PEIS.

1.3.3 Early Restoration

In April 2011, the Trustees entered into an agreement under which BP, a responsible party[5], agreed to provide up to $1 billion toward Early Restoration projects in the Gulf to address injuries to natural resources caused by the Spill. This Early Restoration agreement, entitled "Framework for Early Restoration Addressing Injuries Resulting from the *Deepwater Horizon* Oil Spill" (Framework Agreement), is intended to facilitate and expedite restoration in the Gulf in advance of the completion of the NRDA process. The Framework Agreement provides a mechanism through which the Trustees and BP can work together "to commence implementation of Early Restoration projects that will provide meaningful benefits to accelerate restoration in the Gulf as quickly as practicable" prior to completion of the NRDA process or full resolution of the Trustees' natural resource damage claims (http://www.restorethegulf.gov/sites/default/files/documents/pdf/framework-for-early-restoration-04212011.pdf).

The Trustees previously selected 10 Early Restoration projects for implementation, including eight projects documented in the April 2012 final "*Deepwater Horizon* Oil Spill Phase I Early Restoration Plan and Environmental Assessment" and two projects documented in the December 2012 final "*Deepwater Horizon* Oil Spill Phase II Early Restoration Plan and Environmental Review." This Draft Phase III ERP/PEIS proposes additional Early Restoration projects across the Gulf.

The Early Restoration planning process is both part of the NRDA and the product of a partial, interim settlement with BP. Through Early Restoration , the Trustees seek to begin restoring the natural resources and natural resource services that were injured or lost because of the Oil Spill sooner than would be possible if restoration had to await a full NRD settlement or a court decision on the Trustees' NRD claims. The $1 billion that BP agreed to make available under the Framework Agreement provides an opportunity for progress towards on-the-ground restoration while the steps needed to determine the full and final tally of NRD unfold.

Practical factors necessarily affect the planning and selection of Early Restoration projects and this Draft Phase III ERP/PEIS. First, under the Framework Agreement, no proposed Early Restoration project will be funded unless all of the Trustees, the U.S. Department of Justice, and BP agree on, among other things, the amount of funding to be provided by BP and the "NRD Offsets" – the benefits expected from the project stated in either units of ecological service or monetary terms – that will be applied to reduce BP's NRD liability. Although every project proposed in the Draft Phase III ERP was sponsored from the

[5] The *responsible party* of an incident is the person, business, or entity that has been identified as owning the vessel or facility that caused the spill.

start by one or more State or Federal Trustee and each must be approved by all of the Trustees before it can proceed to implementation, the need for agreement with BP over funding and Offsets influences which projects, among all the alternatives from which the Trustees may choose, can proceed at the Early Restoration stage.

Second, because the NRDA is still a work in progress, it is impossible to say with reasonable certainty how much more restoration, beyond the current proposals, will be needed overall or in each potential project category to fully compensate for the effects of the Oil Spill on natural resources and natural resource services. The Early Restoration process is not intended to accomplish full restoration, however, and the Trustees do not view inaction on restoration as the right response to the present uncertainty.[6] An accounting of whether the restoration actions proposed by the Trustees adequately address all categories of natural resource injury and service losses must await completion of the NRDA and must consider both the Early Restoration projects and the final, comprehensive damages assessment and restoration plan.

1.4 Early Restoration Purpose and Need

For the purpose of accelerating meaningful restoration of injured natural resources and their services resulting from the Spill, the Trustees propose to continue implementation of Early Restoration in accordance with the Oil Pollution Act (OPA) and using funds made available in the Framework Agreement. In order to accelerate meaningful restoration under OPA, the Trustees need to identify restoration that contributes to making the environment and the public whole for injury to or loss of natural resources and services resulting from the Spill. In addition to the Phase I and II early restoration projects totaling approximately $71 million, the Trustees may implement up to $929 million in appropriate restoration projects via remaining funds made available by the Framework Agreement, of which $627 million is proposed in the Phase III component of this plan. Early restoration is being initiated prior to completion of the full natural resources damage assessment, and is not intended to fully address all injuries caused by the Spill.

1.5 Proposed Actions

To meet this purpose and need, the Trustees propose to adopt an Early Restoration program, including appropriate Early Restoration project types. In addition, consistent with the preferred programmatic alternative, the Trustees are proposing 44 specific projects for implementation in Phase III of Early Restoration.

1.5.1 Intent of this Document

The Trustees have prepared this Draft ERP/PEIS to evaluate the effectiveness and environmental consequences of Early Restoration project types that would meet this purpose and need, including analysis of specific proposed Early Restoration projects. The Trustees' process for identifying potential Phase III projects is described and proposed to continue for any future phases of Early Restoration.

[6] The Phase III ERP will not exhaust potential Early Restoration funding. If all proposed Phase III projects go forward, there will still be approximately $303 million in Early Restoration funding not yet allocated to projects.

1.6 Early Restoration Programmatic Analyses

1.6.1 Background

The proposed action includes development and evaluation of a proposed programmatic Early Restoration plan to guide the development of Early Restoration projects. This programmatic approach assists the Trustees and the public in evaluation of proposed Phase III projects and assists with development and evaluation of future Early Restoration projects. This section provides background on the Trustees' programmatic approaches to Early Restoration planning and supporting NEPA analyses.

Phase I and Phase II restoration alternatives selected by the Trustees identified ten restoration projects with a total cost of approximately $71 million. In the programmatic components of this Draft ERP/PEIS, the Trustees are proposing to continue implementing Early Restoration, including 44 additional projects proposed in Phase III. Together, the three Phases of Early Restoration would represent 54 projects costing about $700 M. Given the potential magnitude and breadth of Early Restoration, the Trustees elected to prepare a Programmatic Early Restoration Plan to analyze alternative approaches to continuing Early Restoration and to consistently guide remaining Early Restoration decisions.

Similarly, to allow for a better analysis of cumulative impacts of potential actions, the Trustees elected to prepare a programmatic EIS to support analysis of the environmental consequences of a Programmatic ERP and to consider the multiple related actions that may occur as a result of Early Restoration. This Programmatic ERP and PEIS inform the development of proposed Early Restoration projects for the potential use of the remaining funds available for Early Restoration.

1.6.2 Proposed Approach to Phased Early Restoration Planning and Tiered NEPA Analyses

Programmatic analyses can streamline Early Restoration by reducing or eliminating duplicative documentation at the project level, and focusing project analyses on appropriate, specific issues rather than broad, programmatic issues. Provided that: (1) proposed projects are consistent with the ultimately selected programmatic ERP, and (2) the nature of the environmental consequences are within the range considered in this PEIS, the Trustees propose to prepare more narrowed restoration plans to analyze individual/groups of projects under OPA supported by a NEPA analysis tiered to this PEIS. The programmatic analyses presented here allow the project-specific analyses in Phase III (see chapters 8-12) and any future proposed Early Restoration phases to focus on the critical site specific, area specific, or other specific issues. Thus, environmental analyses of future Early Restoration plans would be tiered (40 C.F.R. § 1508.28) from the PEIS presented in this document.

Public involvement is an important component of OPA and NEPA, and public involvement will continue to be an essential component of subsequent, more specific Early Restoration plan development and supporting NEPA analysis. OPA (U.S.C. § 2706(c) (5)) requires that restoration plans be developed and implemented only after adequate public notice and consideration of all public comments.

1.6.3 Summary of Proposed Program Alternatives

As described in Chapter 5, the Trustees develop and evaluate four programmatic alternatives in this document.

- Alternative 1: No Action (No Additional Early Restoration at this time);
- Alternative 2: Contribute to Restoring Habitats and Living Coastal and Marine Resources;
- Alternative 3: Contribute to Providing and Enhancing Recreational Opportunities; and
- Alternative 4 (Preferred Alternative): Contribute to Restoring Habitats, Living Coastal and Marine Resources, and Recreational Opportunities.

Each programmatic alternative includes a set of potential project types. Proposed Phase III Early Restoration projects are organized under appropriate project types within the programmatic alternatives and are evaluated in Chapters 8-12.

1.7 Severability of Proposed Phase III Projects

In the Draft Phase III ERP/PEIS, the Trustees propose 44 specific Early Restoration projects expected to cost approximately $627 million for consideration along with a broader, programmatic plan and PEIS that encompass not only the proposed Phase III projects but also the remainder of the Early Restoration process. In general, the proposed Phase III projects presented in this Draft Phase III ERP/PEIS are independent of each other and may be selected independently in the Final Phase III ERP/PEIS. A decision not to include one or more of the proposed projects in the Final Phase III ERP/PEIS should not affect either the programmatic elements of the plan or the Trustees' selection of the remaining Phase III Early Restoration projects.

1.8 Document Organization and Decisions to be Made

Consistent with the purpose and need and proposed actions identified above, this Draft Phase III ERP/PEIS is divided into the following chapters:

- **Chapter 1 (Introduction, Purpose and Need, and Public Participation)**: Introductory information and context for this document;
- **Chapter 2 (Early Restoration Process and Status)**: Background, process and status information for Early Restoration efforts to date;
- **Chapter 3 (Affected Environment)**: Information describing the affected environment within which Early Restoration activities are expected to take place;
- **Chapter 4 (The *Deepwater Horizon* Oil Spill Natural Resource Injury Assessment)**: A summary of the status of *Deepwater Horizon* Oil Spill Natural Resource Injury Assessment efforts;
- **Chapter 5 (The Proposed Early Restoration Programmatic Plan: Development and Evaluation of Alternatives):** Descriptions of Early Restoration programmatic alternatives considered by the Trustees, including a "No Action" alternative and the alternative proposed, and identification of a preferred alternative;
- **Chapter 6 (Environmental Consequences of Alternatives)**: An evaluation of the expected environmental consequences of the Early Restoration programmatic alternatives, including their cumulative impacts;
- **Chapter 7 (Introduction to Proposed Phase III Early Restoration Projects)**: Identifies proposed projects and provides brief, summary information about them;

- **Chapters 8-12 (Evaluation of Proposed Phase III Restoration Projects: [State]:** OPA and NEPA analyses related to the 44 specific projects proposed by the Trustees for implementation in Phase III of Early Restoration, including a discussion of cumulative impacts. Chapters 8, 9, 10, 11 and 12 provide this information for proposed projects in Texas, Louisiana, Mississippi, Alabama, and Florida, respectively.

This document is intended to provide the public with information and analysis needed to enable meaningful review and comment on the Trustees' proposal to proceed with (1) identifying a preferred Early Restoration program; and (2) selection and implementation of up to 44 individual proposed Phase III Early Restoration projects. The public review and comment process is described in the subsection below. Ultimately, this document and the corresponding public comment are intended to inform the Trustees' selection of an Early Restoration programmatic alternative as well as individual Early Restoration projects.

The public, government agencies, and other entities have identified and continue to identify a large number of potential restoration projects for consideration during the restoration planning process. In identifying which projects to propose for Phase III of Early Restoration, the Trustees considered the purpose and need, potential impacts to the environment, criteria presented and referenced in Chapter 2 and other portions of this document, as well as public input as they evaluated individual projects for inclusion in Phase III of Early Restoration. Projects not identified for inclusion in the Final Phase III and programmatic ERP/PEIS may continue to be considered for inclusion in future restoration plans.

1.9 Public Review and Comment

Public input is an integral part of NEPA, OPA and the Spill restoration planning effort. The purpose of public review is to facilitate public discussion regarding the proposed programmatic approach to Early Restoration, restoration alternatives, and proposed projects; allow the Trustees to solicit and consider public comment; and ensure that final plans address relevant issues.

On June 4, 2013 the Trustees published a Notice of Intent to Prepare a Programmatic Environmental Impact Statement for a Phase III Early Restoration Plan and Early Restoration Project Types, and to Conduct Scoping Meetings (FWS-R4-FHC-2013-N108; [FVHC98130406900-XXX-FF04G01000]). That Notice clarified the Trustees' intent to prepare a PEIS for Early Restoration under NEPA to evaluate the environmental consequences of Early Restoration project types, as well as to evaluate specific Early Restoration projects to be proposed for Phase III. In addition, the Federal Trustees clarified their intent to evaluate Early Restoration project types programmatically in the PEIS to allow for a better analysis of cumulative effects of Early Restoration and to support tiering of NEPA analyses for future Early Restoration plans to the PEIS, where appropriate. The public comment period ended on August 2, 2013. Public meetings were held as listed below:

- June 24, 2013: Galveston, Texas;
- June 27, 2013: Mobile, Alabama;
- July 16, 2013: Long Beach, Mississippi;
- July 18, 2013: Houma, Louisiana;

- July 23, 2013: Washington, DC; and
- July 25, 2013: Pensacola, Florida

The Trustees' summary of comments received in response to the notice will be available at the Administrative Record Index, http://www.doi.gov/deepwaterhorizon/adminrecord/index.cfm. The Trustees carefully reviewed these comments in identifying the alternatives to be considered in this PEIS and the project types to be included under each alternative (Chapter 5).

The public is encouraged to review and comment on this document. The deadline for submitting written comments on the document is specified in public notices placed in the Federal Register. Public comments will be considered by the Trustees prior to document finalization. Comments on the document can be submitted during the comment period by one of following methods:

- Via the Web: http://www.gulfspillrestoration.noaa.gov

- To submit hard copy comments, write: U.S. Fish and Wildlife Service, P.O. Box 49567, Atlanta, GA 30345.

Please note that if you include your address, phone number, email address, or other personal identifying information in your comment, your entire comment, including your personal identifying information, could be made publicly available.

The Trustees will hold a series of public meetings to facilitate the public review and comment process for the proposed Early Restoration programmatic approach and proposed Phase III projects. Locations, dates, and times will be identified in a cover letter accompanying this document and will be publicized, including in a Federal Register notice announcing release of this document. After the close of the public comment period, the Trustees will consider all input received during the public comment period, and proceed to finalize this Draft Phase III ERP/PEIS, as may be appropriate. A summary of comments received and the Trustees' responses will be included in the Final Phase III ERP/PEIS. Once the Draft Phase III ERP/PEIS is finalized, approved projects will proceed to implementation, pending compliance with all applicable state and federal laws.

1.10 Administrative Record

Pursuant to 15 C.F.R. § 990.45, the Trustees opened a publicly available Administrative Record for the NRDA for the Spill, including restoration planning activities, concurrently with the publication of the Notice of Intent to Conduct Restoration Planning. DOI is the lead Federal Trustee for maintaining the Administrative Record, which can be found at http://www.doi.gov/deepwaterhorizon/adminrecord.[7] Information about project implementation will be provided to the public through the Administrative Record and other outreach efforts, including http://www.gulfspillrestoration.noaa.gov.

[7] Additionally, Louisiana is also maintaining an Administrative Record (see http://losco-dwh.com/AdminRecord.aspx) in accordance with state regulations (La. Admin. Code 43:127).

1.11 Milestones

The following is a list of milestones that would occur prior to project implementation.

- Draft Phase III ERP/PEIS release for public review and comment
- Public comment period
- Public meetings (occurring during the public comment period) to solicit input
- Review public comments
- Consider and prepare responses to comments
- Revise the Draft Phase III ERP/PEIS (as appropriate), including responses to comments
- Issue Final Phase III and ERP/PEIS
- Issue Record of Decision
- Filing Stipulation Agreements with the Court

Should future substantial changes or significant new circumstances arise, the Trustees would consider the need to supplement the programmatic analyses.

CHAPTER 2: EARLY RESTORATION PROCESS AND STATUS

This chapter summarizes the Trustees' Early Restoration project selection process, including a discussion of Early Restoration projects previously selected and approved in the Phase I Early Restoration Plan/Environmental Assessment and the Phase II Final Early Restoration Plan/Environmental Review.

The Trustees' Early Restoration project selection process initially results in a set of potential projects that, consistent with the Framework Agreement, are submitted to BP for review and discussion. The Framework Agreement requires the Trustees and BP to agree on: (1) the funding amount for a proposed project; and (2) Offsets. If the Trustees and BP reach agreement in principle on project terms, those projects are incorporated into a Draft Early Restoration Plan and subject to NEPA review. Projects can be considered ready for implementation only after consideration of comments submitted during the public review process, finalization of the Early Restoration plan, and completion of NEPA review.

2.1 Early Restoration Project Selection Process

The Trustees developed the Early Restoration selection process to be responsive to the purpose and need for conducting Early Restoration. Figure 2-1 depicts the general Early Restoration project selection process. In summary, Early Restoration project selection is a step-wise process comprised of: (1) project solicitation; (2) project screening; (3) negotiation with BP; and (4) evaluation and environmental review of proposed projects under OPA and NEPA, including public review and comment. These steps are described in more detail below, along with the Early Restoration evaluation criteria used by the Trustees as part of this process.

2.1.1 Early Restoration Project Solicitation and Public Participation

Public input is an integral part of NEPA, OPA and the Spill restoration planning effort; it is an important means for ensuring that the Trustees consider relevant information and concerns of the public. Following the Spill, the Trustees established websites to provide the public information about injury and restoration processes.[1] A Notice of Intent to Conduct Restoration Planning for the *Deepwater Horizon* Oil Spill (NOI) was published in the Federal Register on October 1, 2010 and announced publicly by the Trustees (Discharge of Oil from Deepwater Horizon/Macondo Well, Gulf of Mexico; Intent to Conduct Restoration Planning, 75 Fed. Reg. 60,800 (October 1, 2010)). Pursuant to 15 C.F.R. § 990.44, the NOI

[1] The Trustees established the following websites:

- NOAA, Gulf Spill Restoration, available at http://www.gulfspillrestoration.noaa.gov/;
- DOI, Deepwater Horizon Oil Spill Response, available at http://www.fws.gov/home/dhoilspill/;
- Texas Parks and Wildlife Department, Deepwater Horizon Oil Spill, available at http://www.tpwd.state.tx.us/landwater/water/environconcerns/damage_assessment/deep_water_horizon.phtml/;
- Louisiana, Deepwater Horizon Oil Spill Natural Resource Damage Assessment, available at http://losco-dwh.com/;
- Mississippi Department of Environmental Quality, Natural Resource Damage Assessment, available at http://www.restore.ms/;
- Alabama Department of Conservation and Natural Resources, NRDA Projects, available at http://www.outdooralabama.com/nrdaprojects/; and
- Florida Department of Environmental Protection, Deepwater Horizon Oil Spill Response and Restoration, available at http://www.dep.state.fl.us/deepwaterhorizon/default.htm

announced that the Trustees determined to proceed with restoration planning to fully evaluate, assess, quantify, and develop plans for restoring, replacing, or acquiring the equivalent of natural resources injured and losses resulting from the Spill. Public solicitation of restoration projects has been ongoing since publication of the NOI.

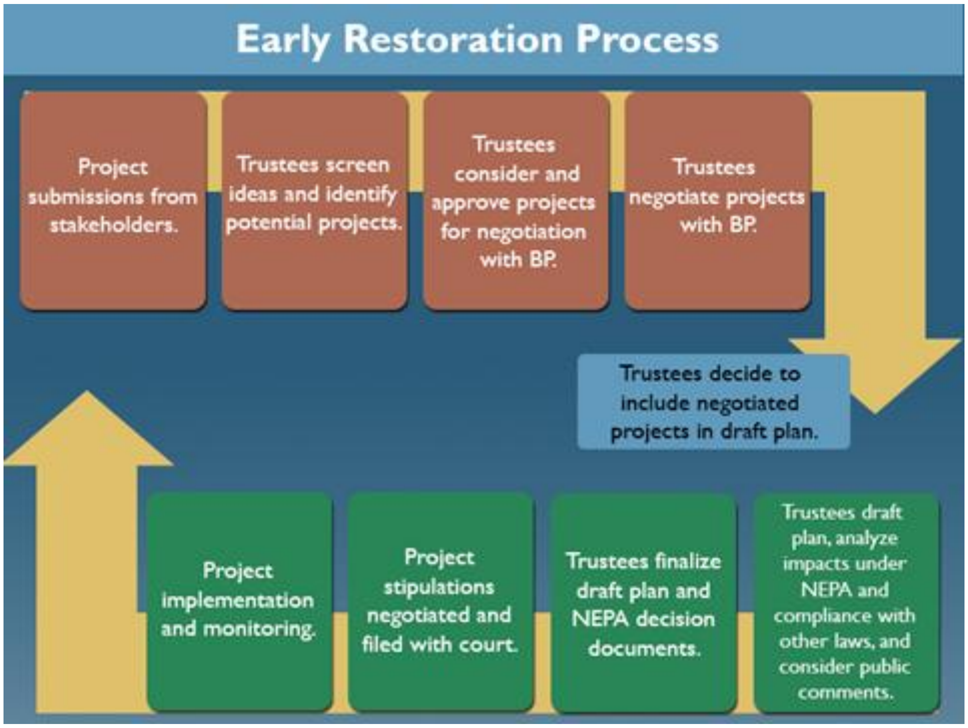

Figure 2-1. General Early Restoration project selection process.

Following adoption of the Framework Agreement in April 2011, the Trustees invited the public to provide restoration project ideas through a variety of mechanisms, including internet-accessible databases. The Trustees received hundreds of proposals, all of which can be viewed at several web pages.[2] In addition, ideas and comments were compiled from public meetings that focused on DARP restoration planning and supporting PEIS (spring 2011 scoping meetings) and Early Restoration (summer 2011). An additional series of public meetings was held following the release of the Phase I DERP/EA (early 2012), and one public meeting was held following the release of the Phase II DERP/ER (fall 2012). A complete record of the public meetings and opportunities to provide input and comments is available at http://www.gulfspillrestoration.noaa.gov.

The Trustees are mindful of other Gulf restoration reports, research, management plans and related efforts. These include those by the Gulf Coast Ecosystem Restoration Task Force (GCERTF 2011), Mabus

[2] See, www.gulfspillrestoration.noaa.gov; http://losco-dwh.com; http://www.restore.ms/; http://www.tpwd.state.tx.us/landwater/water/environconcerns/damage_assessment/deep_water_horizon.phtml http://www.outdooralabama.com/nrdaprojects/, www.deepwaterhorizonflorida.com, http://www.gulfspillrestoration.noaa.gov/restoration/give-us-your-ideas/.

(2010), (Brown et al. 2011), (NRCS 2011), (Peterson *et al*. 2011) Gulf Coast Ecosystem Restoration Council's Comprehensive Plan (GCERC 2013), and others as well as general coastal restoration planning efforts being undertaken by individual Trustees, such as Louisiana's Comprehensive Master Plan for a Sustainable Coast (CPRA 2012) and Annual Plan updates and the Mississippi Coastal Improvements Plan (USACE 2008).

The Trustees continue to address the ongoing NRDA for the Spill, the restoration planning process and potential restoration projects at public meetings, venues and meetings with many governmental and non-governmental organizations and other stakeholders. The Trustees continue to solicit restoration ideas via the web and continue to consider existing and new project proposals as part of the restoration planning process.

2.1.2 Early Restoration Evaluation

2.1.2.1 Evaluation Criteria

In evaluating potential Early Restoration actions, the Trustees considered the following suite of criteria per NRDA regulations at 15 C.F.R §990.53(a) (2):

- Whether each alternative is comprised of primary and/or compensatory restoration components that address one or more specific injury(ies) associated with the incident;
- Whether each alternative is designed so that, as a package of one or more actions, the alternative would make the environment and public whole;[3]
- Whether each alternative is technically feasible; and
- Whether each alternative is in accordance with applicable laws, regulations, or permits.

The NRDA regulations (15 C.F.R. § 990.54) provide criteria to be used by Trustees to evaluate projects designed to compensate the public for injuries caused by oil spills. To meet the NRDA regulations, the Trustees must evaluate proposed restoration alternatives based on, at a minimum:

- The cost to carry out the alternative;
- The extent to which each alternative is expected to meet the Trustees' goals and objectives in returning the injured natural resources and services to baseline and/or compensating for interim losses.[4]
- The likelihood of success of each alternative;
- The extent to which each alternative will prevent future injury as a result of the incident, and avoid collateral injury as a result of implementing the alternative;
- The extent to which each alternative benefits more than one natural resource and/or service; and

[3] The Trustees consider this criterion with the understanding that early restoration, by itself, will not make the environment and the public whole. For early restoration purposes, the Trustees consider whether each alternative will *contribute to* making the environment and public whole.

[4] In other words, the ability of the restoration project to provide comparable resources and services, that is, the nexus between the project and the injury, is an important consideration in the project selection process.

- The effect of each alternative on public health and safety.

Under NRDA regulations (15 C.F.R. § 990.54(b)), if the Trustees conclude that two or more alternatives are equally preferable, the most cost-effective alternative must be chosen.

The Framework Agreement states in paragraph 6 that the Trustees shall select projects for Early Restoration that meet the following criteria:

- Contribute to making the environment and the public whole by restoring, rehabilitating, replacing, or acquiring the equivalent of natural resources or services injured as a result of the Spill, or compensating for interim losses resulting from the incident;
- Address one or more specific injuries to natural resources or services associated with the incident;
- Seek to restore natural resources, habitats, or natural resource services of the same type, quality, and of comparable ecological and/or recreational use value to compensate for identified resource and service losses resulting from the incident;
- Are not inconsistent with the anticipated, long-term restoration needs and anticipated final DARP restoration plan; and
- Are feasible and cost-effective.

2.1.2.2 Early Restoration Project Screening

The project screening process was developed by the Trustees to be responsive to the purpose and need for conducting Early Restoration. The Trustees acted promptly to identify project proposals that met the above criteria as well as several practical considerations that, while not legally mandated, are nonetheless useful and permissible to help screen the large number of potential qualifying projects. None of these practical considerations are used as the sole basis for a decision; rather they are used as flexible, discretionary factors to supplement the suite of criteria described above. For example, Trustees:

- take into account how quickly a given project is likely to begin producing environmental benefits;
- seek a diverse set of projects providing benefits to a broad array of potentially injured resources;
- focus on types of projects with which they have significant experience, allowing them to predict costs and likely success with a relatively high degree of confidence and making it easier to reach agreement with BP on the Offsets attributed to each project, as required by the Framework Agreement; and
- give preference to projects that are closer to being ready to implement.

All of these discretionary factors are consistent with a key objective for pursuing Early Restoration: to secure tangible restoration of natural resources and natural resource services for the public's benefit while the longer-term process of fully assessing injury and damages is still underway.

In addition, NRDA regulations (15 C.F.R. § 990.56) contemplate the use of existing restoration projects and regional restoration plans to address natural resource injuries where such a plan or project is determined to be the preferred alternative among a range of feasible restoration alternatives for an incident. Projects already developed under such plans, with completed engineering designs, cost analyses, partner coordination, and permit and NEPA requirements satisfied, could be implemented quickly, and are good candidates for consideration in the Early Restoration process.

The Trustees evaluated proposals for Phase III of Early Restoration relative to the purpose and need for projects, potential impacts to the environment, evaluation criteria and the discretionary factors identified above. Included in these proposals, the Trustees identified a number of previously developed projects as appropriate for Early Restoration, and Chapters 8-12 identify the projects that are drawn from regional restoration plans or existing restoration projects. Additional information about the process that individual State Trustees used to screen potential projects is also described in Chapters 8-12.

In addition to the state screening processes, NOAA and DOI also consider the restoration evaluation criteria to identify potential projects, with particular focus as described below:

- DOI identified projects that would take place both on and off DOI-managed lands. DOI has significant experience implementing restoration projects on lands managed by DOI, which allows DOI to predict costs and project success with a relatively high degree of confidence. Additionally, the Spill injured natural resources and related services on several of the National Wildlife Refuges and National Parks. Consequently, DOI prioritized some restoration projects that would be implemented on these National Wildlife Refuges and National Parks. For projects that would not take place on DOI lands, DOI has sought to partner with other trustees to propose and implement Early Restoration projects that address injuries and comply with project evaluation criteria. As described in more detail in chapters 9 and 12, DOI will serve as a lead or co-lead implementing trustee for 3 of the projects proposed in the Draft Phase III ERP/PEIS (Louisiana Outer Coast Restoration (North Breton restoration location), Beach Enhancement Project at Gulf Islands National Seashore, and Gulf Islands National Seashore Ferry Project).
- NOAA's project screening process included the application of the restoration evaluation criteria, as well as identification of projects that would restore for injuries specifically to NOAA trust resources. Further, NOAA prioritized projects that would have benefits to both nearshore and offshore trust resources. NOAA sought to partner with other trustees to propose and implement Early Restoration projects that address injuries to NOAA trust resources, and comply with the project evaluation criteria. As described in more detail in chapters 9-12, NOAA will serve as a lead or co-lead implementing trustee for 4 of the projects proposed in the Draft Phase III ERP/PEIS (Louisiana Outer Coast Restoration (Chenier-Ronquille restoration location), Mississippi Hancock County Marsh Living Shoreline Project, Alabama Swift Tract Living Shoreline, and Florida Pensacola Bay Living Shoreline Project).

Individual Trustees identified preliminary lists of projects that were then brought to all of the Trustees for collective consideration and approval to proceed with project negotiations with BP.

2.1.2.3 Early Restoration Project Negotiation with BP

As per the NRDA regulations at 15 C.F.R. Part 990 Trustees are to invite responsible parties to participate in the NRDA process. However, the authority and responsibility to assess natural resource injuries and losses and to define appropriate restoration plans rest solely with the Trustees. BP confirmed its interest in cooperatively participating in the NRDA process in 2010. The Framework Agreement outlines BP's willingness to support Early Restoration planning and implementation.

2.1.2.4 Early Restoration Project Public Review and Comment

OPA (33 U.S.C. § 2706 et seq.), NEPA (42 U.S.C. § 4321 et seq.) and the Framework Agreement require the Trustees to consider public comments on the restoration planning process associated with the Spill. For each phase of Early Restoration, the Trustees have developed draft restoration plans for public review and comment and have held public meetings prior to finalizing projects. For example, the Phase I DERP/EA and the Phase II DERP/ER served as proposed restoration plans for Early Restoration, environmental review of the projects under NEPA, and the means used by the Trustees to seek public review and comment during Phases I and II. Public meetings were held to facilitate the public review and comment. A complete record of the public meetings and input opportunities is available at http://www.gulfspillrestoration.noaa.gov. The Trustees considered comments on the Phase I and Phase II DERP/EA-ER prior to finalizing projects. Following publication of the Final Phase I ERP/EA and Final Phase II ERP/ER the Trustees finalized agreements with BP regarding funding and Offsets for the selected projects and proceeded with implementation, subject to any remaining actions needed to comply with applicable state and federal laws.

2.2 Ongoing Early Restoration Projects

A total of ten projects were included in the Final Phase I EPR/EA and Phase II ERP/ER, and the Trustees finalized agreements with BP regarding funding and Offsets for them. Table 2-1 and Table 2-2 below provide summary information for those projects (as described in the Final Phase I EPR/EA and Phase II ERP/ER). Status on implementation of these restoration projects can be found at: http://www.gulfspillrestoration.noaa.gov/2012/09/new-atlas-tracks-progress-of-early-restoration-projects/.

2.2.1 Phase I Projects

Phase I Early Restoration Projects include marsh restoration, oyster restoration, dune restoration, creation of artificial reefs, and construction or enhancement of boat ramps (see Table 2-1). The total estimated cost for these projects (including contingencies) is approximately $62 million.

Table 2-1. Phase I Early Restoration project summaries.

PROJECT TITLE	LOCATION (PARISH/ COUNTY AND STATE)	SELECTED RESTORATION	ESTIMATED COST (INCLUDING POTENTIAL CONTINGENCIES)[5]	RESOURCES BENEFITTED
Lake Hermitage Marsh Creation	Plaquemines Parish, Louisiana	Approximately 104 acres of marsh creation	$14,400,000	Brackish Marsh in the Barataria Hydrologic Basin
Louisiana Oyster Cultch Project	St. Bernard, Plaquemines, Lafourche, Jefferson, and Terrebonne Parishes, Louisiana	A minimum of approximately 850 acres of cultch placement on public oyster seed grounds; construction of improvements to an existing oyster hatchery	$15,582,600	Oysters in Coastal Louisiana
Mississippi Oyster Cultch Restoration	Hancock and Harrison Counties, Mississippi	1,430 acres of cultch restoration	$11,000,000	Oysters in Mississippi Sound
Mississippi Artificial Reef Habitat	Hancock, Harrison, and Jackson Counties, Mississippi	100 acres of nearshore artificial reef creation	$2,600,000	Nearshore Habitat in Mississippi Sound
Marsh Island (Portersville Bay) Marsh Creation	Mobile County, Alabama	Protecting 24 existing acres of salt marsh; creating 50 acres of salt marsh; 5,000 linear feet of tidal creeks	$11,280,000	Coastal Salt Marsh in Alabama
Alabama Dune Restoration Cooperative Project	Baldwin County, Alabama	55 acres of primary dune habitat creation	$1,480,000	Coastal Dune and Beach Mouse Habitat in Alabama
Florida Boat Ramp Enhancement and Construction Project	Escambia County, Florida	Construction of four boat ramp facilities	$5,067,255	Recreational Use in Escambia County, FL
Florida (Pensacola Beach) Dune Restoration	Escambia County, Florida	20 acres of coastal dune habitat creation	$644,487	Coastal Dune Habitat in Escambia County, FL

2.2.2 Phase II Projects

Phase II Early Restoration Projects include enhancement of avian breeding habitat and protective improvements to turtle nesting habitat (see Table 2-2). The total estimated cost for these projects (including contingencies) is approximately $9 million.

[5] Actual costs may differ depending on future contingencies, but will not exceed the amount shown without further agreement between the Trustees and BP.

Table 2-2. Phase II Early Restoration project summaries.

PROJECT TITLE	LOCATION	SELECTED RESTORATION	ESTIMATED COST (INCLUDING POTENTIAL CONTINGENCIES)[6]	RESOURCES BENEFITTED
Enhanced Management of Avian Breeding Habitat Injured by Response in the Florida Panhandle, Alabama, and Mississippi	Florida: Escambia, Santa Rosa, Okaloosa, Walton, Bay, Gulf, and Franklin counties. Alabama: Bon Secour National Wildlife Refuge (NWR) in Baldwin and Mobile counties. Mississippi: Gulf Islands National Seashore (GUIS) – Mississippi District.	Symbolic fencing, predator control, and stewardship around important nesting areas to prevent disturbance	$4,658,118	Nesting and foraging habitat for beach nesting birds in Florida, and on DOI lands in Alabama and Mississippi.
Improving Habitat Injured by Spill Response: Restoring the Night Sky	State-owned beaches within the boundaries of the Gulf State Park in Baldwin County, AL, and properties in Escambia, Santa Rosa, Okaloosa, Walton, Bay, Gulf, and Franklin counties, FL.	Reduce artificial lighting impacts on nesting habitat for loggerhead sea turtles	$4,321,165	Nesting habitat for loggerhead sea turtles in Florida and state lands in Alabama.

2.3 Proposed Phase III Early Restoration Projects

As noted above, the Trustees are proposing a set of Phase III Early Restoration projects totaling approximately $627 million in estimated projects' costs (including contingencies). These projects are being evaluated in this document to permit the Trustees to expeditiously implement any selected projects and to avoid the delay in implementing any selected projects that would be incurred by evaluating these projects under individual NRDA restoration plans and their supporting individual NEPA analyses. Ecological projects comprise $396.9 million (63%) of this total, and recreational projects comprise the remaining $230 million (37%). Within the ecological project category, barrier island restoration accounts for $318.4 million of estimated project costs, followed by restoration of living shorelines ($66.6 million), oysters ($8.6 million), Seagrasses ($2.7 million) and dune projects ($0.6 million). Overview information concerning all of the proposed projects is presented in Chapter 7. More detailed project information and environmental analyses for proposed Phase III Early Restoration projects are included in Chapters 8-12 of this document.

2.4 Potential Future Phases of Early Restoration Projects

Approximately $71 million in Phase I and Phase II Early Restoration projects were selected for implementation. Approximately $627 million in Phase III Early Restoration projects are proposed in this plan, and are consistent with the Trustees' proposed preferred programmatic alternative identified in Chapter 5 (i.e., Alternative 4: Contribute to Restoring Habitats, Living Coastal and Marine Resources, and

[6] Actual costs may differ depending on future contingencies, but will not exceed the amount shown without further agreement between the Trustees and BP.

Protecting and Enhancing Recreational Opportunities). Table 2-3 provides a breakdown of proposed Phase III Early Restoration project costs by general project categories.

Table 2-3. Summary of Phase III Early Restoration projects.

PROJECT CATEGORY	ESTIMATED COST FOR ALL PROPOSED PROJECTS IN THAT CATEGORY
Barrier Islands	$318,363,000
Recreational	$230,118,372
Living Shoreline	$66,603,668
Oyster	$8,610,081
Seagrasses	$2,691,867
Dune	$611,234
Total	**$626,998,302**

If all proposed Phase III Early Restoration projects are selected, there would be $303 million still available for later phases of Early Restoration. The selection of potential projects for future phases of Early Restoration will be guided by the proposed preferred programmatic alternative.

2.5 References

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CHAPTER 3: AFFECTED ENVIRONMENT[1]

3.1 Introduction

The purpose of this chapter is to describe the environment of the area(s) to be affected or created by the alternatives under consideration (40 C.F.R. §1502.15). This chapter provides the context in which the impacts described in Chapter 6, Environmental Consequences, would occur. The description of the affected environment includes areas impacted by the *S*pill pertinent to Early Restoration, and also areas that may be affected by Early Restoration actions in the future. Although the OPA NRDA regulations do not constrain the geographic location of restoration projects, the affected environment for purposes of this Early Restoration Programmatic Environmental Impact Statement (PEIS) is the northern Gulf of Mexico region[2]. This area comprises of complex biological communities of interacting organisms, including humans, and their physical environment(s). The affected environment is discussed in more detail in each of the following subsections:

Section 3.2 Physical Environment: The Gulf of Mexico is a large basin. Its greatest east-west and north-south extents are approximately 1,100 and 800 miles, respectively, with a surface area of approximately 600,000 square miles, and containing approximately 584,000 cubic miles of water. The basin is bordered by Cuba, Mexico, and the United States (U.S.), and consists of an intertidal zone, continental shelf, continental slope, and abyssal plain. The U.S. portion of the Gulf extends from the southern tip of Texas eastward to the Florida Keys, following the coastline of five states: Texas, Louisiana, Mississippi, Alabama, and Florida. This northern portion of the Gulf of Mexico is dominated by inputs from the Mississippi River Basin (MRB), which drains 41% of the contiguous U.S. and contributes 90% of the freshwater entering the Gulf (U.S. EPA 2011). These inflows provide the nutrients and hydrological conditions that make the northern Gulf of Mexico one of the most unique natural areas in the world. The description of the physical environment of the northern Gulf includes information on the geology and substrates, hydrology and water quality, air quality, and noise characteristics of the area.

Section 3.3 Biological Environment: The northern Gulf of Mexico region contains a range of habitats that support diverse and productive ecosystems, with both nursery and feeding grounds for ecologically and economically important species (GCERTF 2011). The biological environment of the northern Gulf of Mexico can be divided into two sections: habitats and aquatic biological resources. The northern Gulf Coast contains a variety of habitats including wetlands (e.g., mudflats, salt pannes, tidal flats, forested wetlands, pine savannas, riparian forests, swamps, and mangroves), barrier islands, beaches and dunes, submerged aquatic vegetation (SAV) beds, and other habitats in the coastal environment. These habitats shelter 97% of all fish and shellfish harvested from the region during spawning, larval development, or other parts of their life cycle (NOAA 2010). In addition, these habitats support thousands of marine and terrestrial species, including more than 15,000 marine species (many of which are globally significant

[1] Portions of this section were drawn from multiple sources many of which were also used for description of the affected environment for the *Final Programmatic Environmental Assessment for the Initial Comprehensive Plan: Restoring the Gulf Coast's Ecosystem and Economy*.

[2] Note that more specific detail on the affected environment is provided for individual, proposed projects in Chapters 8-12.

resources), and dozens of threatened or endangered mammals, fish, birds, and reptiles (NOAA 2011a, NOAA 2012, and USFWS 2012b). This high level of diversity in both habitat types and species increases the productivity and stability of the Gulf Coast (Brown et al. 2011).

Section 3.4 Human Uses and Socioeconomics: Millions of people live, work, and recreate in the northern Gulf of Mexico region, and therefore, rely on the natural and physical resources the Gulf's environment provides. In addition to the ecological significance of its natural resources, as well as its range of habitats, the northern Gulf of Mexico ecosystem is also culturally and socioeconomically important to the people of the region and the nation. Coastal areas in the component states contain dozens of culturally important State and National Parks. In addition, the economy of the northern Gulf of Mexico is highly intertwined with its natural resources, which include: oil and gas deposits; commercial and recreational fisheries; waterfowl, migratory birds, and other wetland-dependent wildlife; and coastal beaches and waterways for ports, waterborne commerce, and tourism. In 2009, the total economy of the Gulf of Mexico region supported over 22 million jobs (17.2% of all jobs in the US), and produced over $2 trillion in GDP (16.7% of all GDP produced in the U.S.) (NOAA 2012z).

3.2 Physical Environment

This section provides a description of the geology and substrates, hydrology and water quality, air quality and noise characteristics of the northern Gulf of Mexico, in marine, upland, and transition environments. The nearshore, marine environment is comprised of the coastline and the inner continental shelf (Figure 3-1), extending to depths of 600 feet. The offshore, marine environment consists of portions of the Gulf of Mexico that are more than 600 feet deep including the outer shelf, continental slope, and abyssal plain. Coastal transition areas typically include tidally influenced areas (e.g., marshes, estuaries, and coastal wetlands). Finally, upland environments are those habitats that are adjacent to coastal transition, but are not subject to a tidal regime or regularly inundated by water.

3.2.1 Geology and Substrates

This section describes the geology and substrates of the northern Gulf of Mexico region, including upland surface soils, subsurface rock features, and submerged coastal and oceanic sediments. Sediment resources are particularly important along the northern Gulf Coast areas dominated by deltaic processes (e.g., Mississippi River Delta), and where land building and erosion are dynamic and dependent on the availability of sediment resources.

3.2.1.1 Upland Geology and Soil

The upland coastal area, from southern Texas to the Florida panhandle, has a relatively homogeneous substrate comprised of four distinct bands of sedimentary rock. Florida's peninsular Gulf Coast is less homogeneous, consisting of a wider variety of sedimentary rocks. Soils in the northern Gulf of Mexico region are grouped according to the parent rock, or combination of rocks, upon which they are formed and associated, and are thus called "soil associations". Appendix A.1 presents the various soil associations found throughout the coastal area of the Gulf.

3.2.1.2 Nearshore Coastal Geology and Sediment

Nearshore substrates in the northern Gulf coastal environment tend to be primarily composed of clay, silt, and sand-sized material; silt and clay are most prevalent, but sand is concentrated where present.

As such, unconsolidated sand, silt, and clay sediments comprise the primary substrates for habitats in the nearshore Gulf of Mexico.

Sediment sources in the northern Gulf coastal environment are predominately fluvial (associated with rivers and streams), especially west of the Alabama-Florida border. The sediment supply for the central and western Gulf Coast (including the nearshore environments of Louisiana, Mississippi, and Alabama) is dominated by the Mississippi River. Texas has a number of rivers such as Sabine, Neches, Trinity and Brazos that contribute sediments to the nearshore waters and bay systems; however, the majority of its offshore sediment deposits from the Mississippi/Atchafalaya river basins. Sediment discharge in the Mississippi River has been largely confined within the River's engineered channel banks, which effectively transport sediment material off the continental shelf, removing it from the nearshore coastal system. Mobile Bay, the second largest bay/delta system in the U.S. (ADCNR 2008b), also contributes sediment to the Central Gulf, primarily via the Mobile and Tensaw Rivers, and in Mississippi, both the Pearl and Pascagoula River systems contribute sediment to the Gulf. The sediment of the Florida peninsula nearshore environment differs from the rest of the Gulf Coast nearshore environments because it consists of predominately reworked carbonate that originates from the karst bedrock dominating the region (GOMA 2009). This is not true, however, for the Florida panhandle nearshore environment, which is composed of predominantly quartz sand.

Sediment deposition along the coastal environment is influenced by numerous physical processes including waves, winds (i.e., aeolian processes), river flows, and tidal currents. Nearshore sediment transport processes are particularly influenced by waves and tidal currents, which can cause frequent entrainment and transport of sediments in intertidal, benthic habitats. In addition, bottom currents transport sediments and deposit them differentially based on grain size, shaping the topographic features along the intertidal zone and continental shelf, and affecting the distribution of sediments, their chemical composition, and the availability of habitat to benthic organisms.

Unconsolidated sand, silt and clay sediments provide habitat for benthic organisms in the Gulf of Mexico. Physical processes (e.g., wave action and bottom currents) and chemical processes (e.g., breakdown of organic material and nitrogen cycling) regulate the abundance, type, and distribution of benthic organisms in the Gulf of Mexico (Gihring et al. 2009). The Gulf of Mexico Regional Ecosystem Restoration Strategy (GCERTF 2011) specifically highlighted the importance of sediments to the region, indicating that sediments delivered by Gulf river systems built much of the Gulf Coast and continue to be essential to the health of the Gulf ecosystem. Furthermore, the strategy encouraged the use of sediments in the Gulf to address coastal land loss through sustainable resource management, land rebuilding and restoration. Sediment resources in the Gulf of Mexico are used for many man-made construction and restoration projects. Access to large sand inventories is needed for emergency repair of beaches stemming from storms or for ongoing re-nourishment of beaches. Finer grain sediments can be used for marsh creation projects, and suitable clay resources are used for the construction and repair or enhancement of existing levees. Sand and sediment management along the Gulf Coast region is a major concern, especially in the context of increasing storm severity and land development. The Gulf of Mexico Alliance (GOMA) has developed a Gulf Regional Sediment Management Master Plan aimed at improving sediment management practices (GOMA 2009). In Mississippi a master plan for beneficial use of dredge material has been developed (GOMA 2011a) along with a Project Management Plan for selected beneficial use projects along the Mississippi coast (GOMA 2011b). In addition, Louisiana manages the Louisiana Sand Resources Database (LASARD) to aid in maximizing the use of sediment sources outside the system to implement projects included in Louisiana's Comprehensive Master Plan for a Sustainable Coast (CPRA 2012).

3.2.2 Hydrology and Water Quality

This section looks at the movement, distribution, supply, and quality of freshwater and coastal water resources within the nearshore and offshore environments of the northern Gulf Coast. Gulf Coast hydrology and water quality are mainly affected by freshwater inputs (from inland waters of the Gulf of Mexico Watershed) and the movement of salt water. Drainage into the Gulf of Mexico basin is extensive and includes 20 major river systems (>150 rivers) covering over 3.8 million square kilometers of the continental United States. Annual freshwater inflow to the Gulf is approximately 10.6×10^{11} cubic meters per year (280 trillion gallons). Eighty five percent of this flow comes from the United States, with 64% originating from the Mississippi River alone. The quantity and rate of freshwater inputs through contributing rivers can be altered by a number of natural and anthropogenic factors such as changes in rainfall and land cover; flood control practices; spillway operation; navigation structures such as locks, dams, weirs and other water control structures; consumption of freshwater by agriculture, municipal, and industrial interests; and the development of stormwater infrastructure. Freshwater inflows to the northern Gulf of Mexico contribute nutrients, sediments, and pollutants from upstream agriculture, stormwater runoff, industrial activities, and wastewater discharges. The influx of these constituents is further affected by currents and surface winds. In addition, the nearshore environment, including tidal marsh areas, has been physically modified (e.g., through channelization and canal construction), allowing saltwater intrusion, which impacts both surface and sub-surficial groundwater resources. These alterations can affect the influx of freshwater into the northern Gulf of Mexico resulting in alterations to salinity regimes in nearshore areas, and facilitating stratification, potentially increasing the frequency and magnitude of hypoxic events. On balance, the inflow of freshwater provides the freshwater and sediment inputs necessary for maintaining healthy nearshore salinity regimes and coastal landscapes, and offshore currents generally improve water quality through mixing and dilution. However, offshore currents can also serve as a conduit for pollution that can contribute to water quality degradation.

The rest of this section describes freshwater and coastal water environments, hydrology, and existing major water quality issues.

3.2.2.1 Freshwater Environments

The freshwater environment includes groundwater and surface waters (e.g., lakes, rivers, streams) connected to the northern Gulf of Mexico. As demand for freshwater resources from river basins and underground aquifers continues to increase throughout the Gulf Coast, maintaining freshwater flow of sufficient quality and quantity into bays and estuaries becomes increasingly important.

Groundwater

Groundwater supply is contained within permeable geologic formations, or parts of formations, called aquifers. Key geologic features help identify the location and availability of groundwater. For example, groundwater is typically found in unconsolidated geologic materials that lie above bedrock (solid rock beneath a layer of soil). Subsurface geology controls the transport of groundwater by transmitting water through porous and permeable layers. Subsurface geology can also stop water flow with impermeable barriers or divert it through fractures and other conduits. Aquifers in the northern Gulf Coast region can be classified into two primary types: semi-consolidated sand and gravel aquifers, which are found in coastal areas in Texas, Louisiana, Alabama, and Mississippi; and unconsolidated sand and gravel aquifers at or near the land surface, which are primarily found in Florida (USGS 2013). Groundwater can either be linked to or isolated from surface water resources, depending on the location, depth, and geologic structure of the aquifer.

Surface Water

The fresh, surface waters that supply the northern Gulf Coast serve as freshwater reservoirs, maintain nearshore salinity regimes, and serve as sources of nutrients and sediment resources. Freshwater inflow can affect the location, extent, and variety of estuary and nearshore habitat, especially during flood runoff seasons when large amounts of land-based material are transported to coastal environments. The surface waters of the Gulf Coast are provided by an extensive network of lakes, rivers, freshwater springs, and streams that ultimately discharge into the northern Gulf of Mexico (Figure 3-2). The inflow of freshwater from these rivers mixes with saline Gulf waters and creates an ecologically and economically important estuarine habitat.

Surface water quality is affected by nonpoint sources of pollutants such as agricultural and urban runoff and contaminants released from point discharges including excess nutrients, metals, oil and grease, suspended solids, and biocides. Thermal effluents can also affect the quality of both fresh and marine habitats.

Surface water flow is being affected in the Gulf of Mexico region by hydrologic modification from such activities as diversions, ditching, channelization, damming and undersized culverts. Below we provide descriptions of some of the key freshwater hydrologic features of the northern Gulf of Mexico.

Mississippi River Basin

The Mississippi River flows approximately 2,300 miles from Lake Itasca, Minnesota to the Gulf of Mexico, covering a drainage area of approximately 1.2 million square miles. The Mississippi River Basin (MRB) drains 41% of the contiguous U.S. and contributes 90% of the freshwater entering the Gulf of Mexico (U.S. EPA 2011). Traffic on the river has increased erosion, turbidity, and re-suspended sediments (U.S. EPA 2011). The Mississippi River is a heavily engineered river containing dams, locks, and levees to aid and control its flow.

Freshwater outflow from the MRB enters the northern Gulf of Mexico through two deltas: the Mississippi River Plaquemines-Balize Delta southeast of New Orleans receives about two-thirds of the flow, and the Atchafalaya River/Wax Lake Delta about 125 miles west receives the other one-third of the flow (Committee on Environment and Natural Resources 2010). The Atchafalaya River has also undergone significant hydrologic alterations in the last century. Historically, the discharge from this river accounted for less than 15% of the discharges from the MRB (Dale et al. 2010). Over time, more water was diverted from the Mississippi River into the Atchafalaya River so that by 1960, 30% of MRB discharges were diverted through the Atchafalaya River.

The Mississippi and Atchafalaya Rivers are the primary sources of freshwater, sediment, nutrients, and pollutants to the continental shelf (Murray 1997). Their freshwater discharge in the Gulf of Mexico is dependent on climatic conditions, but generally peaks in the spring. The freshwater and nutrients are carried predominantly westward along the Louisiana/Texas inner to mid-continental shelf, especially during peak spring discharge. This seasonal delivery of nutrient-laden freshwater to the Gulf of Mexico fuels the seasonal occurrence of hypoxia (low oxygen) along the northwestern portion of the Gulf of Mexico. (Murray 1997).

Channelization and human modifications to the Mississippi and Atchafalaya rivers have negatively impacted natural deltaic cycles in Louisiana by reducing the sedimentary load delivered to state marshes. As a result, the natural processes of coastal land formation have been modified. Historically, a balance was maintained between wetland formation and loss from overbank sediment deposition in actively forming delta lobes and subsidence and deterioration processes in abandoned delta lobes. The suspended sediment load has been greatly reduced by dams on major tributaries, land use changes in the watershed, and alterations to the landscape such as flood risk reduction projects and navigation channels. Overbank flooding of the Mississippi River and its tributaries has been greatly restricted or eliminated, removing the source of sediment and freshwater that built and maintained coastal marshes relative to subsidence and eustatic (global effects on) sea-level rise.

The Gulf Intracoastal Waterway

The Gulf Intracoastal Waterway (GIWW) is a 1,100 mile long man-made canal running along the Gulf of Mexico coastline from Brownsville, Texas to Carrabelle, Florida (Alperin 1983). The GIWW links all of the Gulf Coast ports with the inland waterway system of the U.S. (Texas DOT 2005). The GIWW is the nation's third busiest waterway with the Texas portion handling over 58% of the GIWW traffic. However, the use, operation, and maintenance of the GIWW have impacted the entire northern Gulf. For example, the GIWW has led to erosion and the decline of wetland quality. Shoreline development along the GIWW and recreational boating use of the system create conflicts with commercial navigation. Construction of the GIWW has led to altered salinities within some lagoons and coastal water bodies (reduction in some areas and increase in others), conveyance of salt water, intrusion of saltwater into local surficial aquifers, and increased water circulation and entrainment between inland water bodies and the Gulf of Mexico. Maintenance of the channels has also led to temporary increases in sedimentation and turbidity due to dredging and sediment placement activities.

3.2.2.2 Coastal Water Environment

The coastal water environment consists of both nearshore (e.g., estuaries, bays, bayous) and offshore (i.e., open ocean) environments of the northern Gulf of Mexico.

Nearshore Coastal Environment

Nearshore coastal environments encompass a broad range of habitats from inland, tidally influenced freshwater ecosystems to 600-foot-deep water off the Gulf Coast. This includes a variety of wetland and upland habitats including tidal marshes, salt pannes, tidal mud flats, swamps, pine savanna, maritime forests, dunes, and beaches. It also includes aquatic habitats such as estuaries, bayous, bays, SAV beds and the open overlying waters of the continental shelf. Estuaries are transitional mixing zones of freshwater and saltwater habitats. The northern Gulf of Mexico estuaries make up 42% of the total estuarine surface area in the continental U.S. (U.S. EPA 1999). The continental shelf is the gently sloping undersea plain, and is an extension of the continent's landmass under the ocean. The waters of the continental shelf are relatively shallow (rarely more than 500 to 650 feet deep) compared to the open ocean (thousands of feet deep) (Figure 3-1).

The nearshore coastal environment is characterized as a relatively shallow, open coastline with complex circulation patterns, weak tidal energies, generally warm water temperatures, seasonally varying stratification strength, and large inputs of freshwater (Committee on Environment and Natural Resources 2010). Nearshore coastal waters of the northern Gulf of Mexico are very productive and exhibit a wide range of chemical and physical characteristics, which are influenced by freshwater influxes. Seasonal cycles, storms, and hurricanes contribute to the variability in coastal Gulf systems (Livingston 2003). As noted above, nutrient concentrations in coastal waters are largely determined by the input of freshwater from riverine sources, but they are also affected by periodic upwelling events and onshore flow of deep, nutrient-rich water mediated by shelf circulation (Gilbes et al. 1996).

Hypoxia is a key water quality issue in the nearshore environment. Normal oxygen concentrations in the Gulf vary between 8 and 10 milligrams per liter (U.S. DOI 2010). However, a large area on the northern Gulf continental shelf exhibits seasonally depleted oxygen levels, leading to hypoxic conditions. Hypoxic conditions occur when oxygen concentrations fall below the level necessary to sustain most animal life, which is generally defined by dissolved oxygen concentrations below 2 milligrams per liter (Committee on Environment and Natural Resources 2010). Hypoxia in the Gulf of Mexico is caused by freshwater discharge and nutrient loading from the Mississippi River, nutrient-enhanced primary production (i.e., eutrophication), decomposition of biomass on the ocean floor, and depletion of oxygen due to water column stratification in the Gulf of Mexico. Hypoxia is known to occur in at least 105 distinct locations within Gulf of Mexico estuaries (NOAA GOM at a Glance Report 2011a) (Figure 3-3). Oil and gas exploration, natural seeps, and chlorinated agricultural pesticides also contribute to hypoxic conditions (Turner et al 2003).

Offshore Marine Environment

The offshore marine environment consists of portions of the Gulf of Mexico that are more than 600 feet deep including the outer shelf, continental slope, and abyssal plain. These environments are further removed from the coast and thus less influenced by freshwater inputs. The outer shelf is a transition area between deepwater currents over the continental slope (steep slope from the continental shelf to the ocean floor) and the abyssal plain (the ocean floor offshore) (BOEM 2011). Water at depths greater than 4,500 feet is relatively homogeneous with respect to temperature, salinity, and oxygen (Nowlin 1971, Pequegnat 1983, and Gallaway and Kennicutt 1988, as cited in MMS 2007). Waters in the open, pelagic Gulf, along the outer continental shelf and further offshore are generally clear with low nutrient concentrations and deep light penetration, generally to around 600 feet (Jochens et al. 2005).

3.2.3 Air Quality

The Clean Air Act (CAA) has established National Ambient Air Quality Standards (NAAQS) to protect public health and welfare, including ecosystems, from air pollution. The NAAQS establish threshold concentrations for six 'criteria pollutants': nitrogen dioxide, sulfur dioxide, particulate matter (PM_{10} & $PM_{2.5}$), carbon monoxide, surficial ozone (O_3), and lead. The Gulf of Mexico air quality can be described by comparing measured, ambient air concentrations of these criteria pollutants for each of the Gulf States to the NAAQS.

All of the Gulf Coast counties meet the NAAQS for nitrogen dioxide, sulfur dioxide, carbon monoxide, particulate matter, and lead. However, the Houston-Galveston-Brazoria area has been listed by EPA as nonattainment for existing ozone standards (U.S. EPA 2013) (IPCC 2013).

In addition to the CAA mandates, Council on Environmental Quality (CEQ) draft guidance advises Federal agencies to consider opportunities that reduce greenhouse gas (GHG) emissions caused by proposed Federal actions and adapt their actions to consider climate change impacts throughout the NEPA process (CEQ 2010).

3.2.3.1 Climate

A region's climate is defined by temperature, wind patterns, humidity, and rainfall. These weather patterns are what ultimately define a region's freshwater supply, freshwater flow, and seasonal plant and animal presence and productivity. It is important to consider the existing climate in the Gulf of Mexico to understand how climate and projections of climate change may inform restoration planning (for more detailed information see Chapter 6).

The climate of the Gulf coast is moderated by sea surface temperatures and air flows from the Gulf of Mexico, Caribbean Sea, and the Atlantic Ocean. The Gulf coast can generally be characterized as a maritime subtropical climate with hot and humid summers and mild winters. Temperatures in July and August range from an average low of 77° to an average high of 91 degrees Fahrenheit (°F) (BOEM 2011). Average high winter temperatures range from approximately 50°F in the northernmost areas of the Gulf coast to about 70°F in the southernmost locations in Texas and Florida (BOEM 2011).

Wind patterns resulting from the Gulf and Atlantic oceans provide a major source of moisture and precipitation for the region. Rainfall is primarily driven by storm fronts in the winter and spring and thunderstorms, tropical storms, and hurricanes in the summer and fall. The amount of rainfall and/or snowmelt dictates the amount of freshwater that drains into the Gulf of Mexico. This freshwater mediates salinities but also serves as a source of valuable nutrients and sediment. The Mississippi River Basin (MSR) and small, coastal watersheds drain to the Gulf of Mexico. The Mississippi River Basin (MSR) has an average annual rainfall of 34 inches which provides 90 % of the freshwater discharged into the Gulf of Mexico (Milly and Dunne 2001; Dale et al. 2010). Average annual rainfall along the Gulf coast watersheds varies from west to east ranging from 30 inches along parts of the Texas Gulf Coast to 60 inches in the Florida Panhandle.

Tropical cyclones, or hurricanes, are a storm system characterized by a low-pressure center surrounded by a spiral arrangement of thunderstorms that produce strong winds and heavy rain. These storms occur most frequently between June and October, with the worst storms usually in August and September.

Between 1950 and 2005 an average of three tropical cyclones per year affected the Gulf of Mexico. Between 1995 and 2005 the annual average increased to six tropical cyclones affecting the Gulf of Mexico (U.S. EIA 2006).

3.2.4 Noise

The primary sources of terrestrial noise in the coastal environment are transportation and construction-related activities. Transportation noise includes traffic noise from automobiles, trucks, and motorcycles; railway transportation services; and aircraft (including helicopters) take-offs, landings, and overflights from public and private airfields. Construction noise is created during a variety of activities, including but not limited to, construction and demolition projects, site preparation (e.g., land clearing, grading, excavation), and repair and maintenance activities. These actions can result in relatively high noise levels within several hundred feet of the activity. Noise levels generated can fluctuate depending on the type, number, and duration of use of heavy equipment for construction activities and can differ in effect by the type of activity, existing site conditions (vegetation to buffer sound) and existing ambient noise levels.

In the marine environment, underwater sound spreads out in space, and is reflected, refracted (changed in direction), and absorbed. Several important factors affecting sound propagation in water include spreading loss, absorption loss, scattering loss, and boundary effects of the ocean surface and the bottom (Malme 1995). Natural sources of noise in the Gulf of Mexico marine environment include wind and waves, seismic noise from volcanic and tectonic activity, precipitation, and marine biological activities (Greene 1995). A wider range of ambient noise levels occurs in water depths less than 600 feet (shallow water) than in deeper water.

In addition to ambient noise, some sounds are also introduced into ocean environments from anthropogenic sources. These may include transportation (e.g., aircraft, small and large vessels, and hovercraft), construction activities (e.g., dredging, tunnel boring, and pile-driving), hydrocarbon and mineral-related activities (e.g., oil and gas exploration, drilling and production), geophysical surveys (e.g., air guns, sleeve guns, or vibroseis), the use of sonar and pingers for navigation and target detection, explosions (e.g., military ordnance, ship and weapons testing, and offshore demolition), and the conduct of ocean science studies (e.g., seismology, acoustic propagation, and acoustic thermometry).

3.3 Biological Environment

The northern Gulf of Mexico contains a range of habitats that support diverse and productive ecosystems with both nursery and feeding grounds for ecologically and economically important species (GCERTF 2011). These habitats and species are connected through the movement of organisms (population and genetic connectivity) and the exchange of nutrients and organic matter (horizontally from nearshore to offshore, and vertically from the surface waters to the ocean floor). Habitats, resources, and their ecological connection are all part of the biological environment of the northern Gulf of Mexico. The following description of the biological environment is divided into two sections: habitats and living coastal and marine resources.

Note: The following discussion of natural resources, and natural resource services, in the northern Gulf of Mexico is not intended to be a precise, definitive, or complete survey of those resources or resource services, nor is citation to a particular source meant to suggest a preference for the information in that sources vis-à-vis other sources of similar information. Rather, the following discussion is intended to give a general sense of the type and scale of natural resources, and accompanying natural resource services, found in the northern Gulf of Mexico.

3.3.1 Habitats

The northern Gulf Coast contains a variety of habitats including wetlands (e.g., mudflats, salt pannes, tidal flats, forested wetlands, pine savannas, riparian forests, swamps, and mangroves), barrier islands, beaches and dunes, submerged aquatic vegetation beds, and other habitats in the coastal environment. These habitats are ecologically, economically, and culturally important. For example, approximately 97% of all fish and shellfish harvested from the northern Gulf of Mexico rely on coastal estuarine habitat during spawning or during other parts of their life cycle (NOAA 2010).

3.3.1.1 Wetlands

Wetlands are defined by Cowardin et al. (1979) as transitional lands between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is covered by shallow water. According to scientific classification, wetlands must have one or more of the following three attributes: (1) at least periodically, the land supports predominantly hydrophytes (water loving plants); (2) the substrate is predominantly undrained hydric soil; or (3) the substrate is nonsoil and is saturated with water or covered by shallow water at some time during the growing season of each year. Wetlands include marshes (saltwater, brackish, and freshwater), mudflats, salt pannes, tidal flats, forested wetlands, pine savanna, riparian forests, mangroves, and swamps. Coastal wetlands[3] comprise millions of acres of habitat for aquatic and terrestrial organisms that are ecologically and economically important to the Gulf Coast region. Coastal wetlands can be created by natural deltaic cycles and floodplain dynamics. For example, the majority of Louisiana's coastal wetlands were built by deltaic processes of the Mississippi River (U.S. Army Corps of Engineers [USACE] 1997).

Description and Ecological Importance

Both tidal and non-tidal wetland habitats provide a wide variety of ecosystem services. Specifically, wetlands provide habitat and foraging grounds for a variety of organisms; protect water quality by capturing suspended sediment and removing excess nutrients and pollutants from upland environments; prevent pollutants from reaching other habitats (Fisher and Acreman 2004; Bricker et al. 1999); have the ability to store and sequester carbon (Chmura et al. 2003; Choi and Wang 2004); and can buffer energy to protect coastal areas against storm surges. In addition, wetlands can decrease flooding through water storage after heavy rainfall. Wetlands provide habitat for countless bird, fish, and native plant species, and serve as a nursery for important recreational and commercial marine species.

[3] In MS "coastal wetlands" are specifically defined as publicly-owned lands subject to the ebb and flow of the tide, which are below the watermark of ordinary high tide; all publicly-owned accretions above the watermark of ordinary high tide; and all publicly-owned submerged water-bottoms below the watermark of ordinary high tide, including the flora and fauna in the wetlands (MS Code § 49-27-5(a)).

Many coastal wetlands in the Gulf Coast region have been designated as one or more types of Essential Fish Habitat (EFH). Figure 3-4 presents a composite of EFH for Brown, Pink, and White Shrimp. EFH for red drum; reef fish; and coastal, migratory, and pelagic species are included in Figure 3-5. Appendix A.2 describes this habitat in more detail. EFH includes all types of aquatic habitats that a managed species requires to spawn, breed, feed, or grow to maturity (NOAA Fisheries Service 2013). Wetland habitats, including tidal and non-tidal marshes, tidal flats, and mangrove swamps, are habitats utilized by many pelagic fish species for spawning, breeding, or growth to maturity (NOAA Fisheries Service 2010).

Wetlands in the northern Gulf of Mexico region also support turtles, mammals, and other taxa in addition to extraordinary bird species diversity. These habitats are especially important for birds since portions of three major bird flyway corridors occur within the Gulf – the Central, Mississippi, and Atlantic (USACE 2009), as shown in Figure 3-6.

Wetland loss in the northern Gulf of Mexico region has occurred at some of the highest rates documented within the United States. Between 1998 and 2004, there was a loss of over 370,000 acres (~2.1%) of wetlands in coastal watersheds adjacent to the Gulf of Mexico. Conversion of estuarine marshes to open water can be attributed to sea level rise, land surface subsidence and erosion. Freshwater wetlands in the northern Gulf of Mexico region continue to be lost to development and agriculture (Stedman and Dahl 2005).

Distribution

Coastal wetlands are found in all five Gulf States. The northern Gulf of Mexico shoreline has more wetlands than either the Atlantic or Pacific coastlines and is recognized for its vast coastal tidal wetlands (saltwater and estuarine marsh environments). The coastal watersheds with the highest densities of wetlands (greater than 32%) occur along southern Louisiana, Mississippi, and Alabama (Stedman and Dahl 2005).

Mudflats in the northern Gulf can be found throughout the Mississippi River Delta and in the intertidal zones of all five Gulf States. Though fairly continuous in south Texas (Corpus Christi Bay to Mexico) and in south Florida, particularly near the Everglades, mangroves are also found sporadically in the more northern latitudes of the Gulf Coast. The five states located along the northern Gulf Coast contain a variety of non-tidal wetlands commonly found in floodplains along rivers and streams, in isolated depressions surrounded by dry land, and in other low-lying areas (Gulf Restoration Network 2001).

3.3.1.2 Barrier Islands

Barrier islands are coastal landforms consisting primarily of unconsolidated deposits of sediments that tend to be oriented parallel to the coastline. Barrier islands can protect wetlands and other estuarine habitats from the direct impacts of the open ocean. They also slow the dispersal of freshwater into the Gulf of Mexico, thus contributing to the total area and diversity of estuarine habitat (BOEM 2012).

Description and Ecological Importance

Barrier islands consist of beaches (ocean front and, in some places, landward), dune complexes, barrier flats, and back barrier marshes. Often seagrasses are present in waters behind these islands where wave energy is lower. Beaches are generally located on the ocean side of a barrier island where the most influential processes of deposition and erosion occur, and are discussed in more detail in section 3.3.1.3.

Inshore of beach areas, one or more low dune ridges may be formed by the action of wind on sand. Sand dunes act as buffers against high winds and waves and as a reservoir for sand that can replenish beaches and back-barrier habitats during severe storms. Dune vegetation, such as sea oats and seacoast bluestem, has extensive root systems that can trap sand and promote dune building. Dune vegetation is adapted to the constant movement of sand, tidal flooding, and the high salt content of the substrate. Generally, succulent species (e.g., glassworts and saltworts) and vines are found on the beach fronts and wiregrass on highest dunes (LDWF 2012a). On larger barrier islands, secondary dunes form behind primary dunes. Secondary dune ridges are more heavily and diversely vegetated. Stable back dune areas can give rise to scrub communities built upon sandy or well-drained soils, with the predominant vegetation being herbaceous shrubs, evergreen oaks, or pines (BOEM 2012).

Barrier islands are often configured in chains that are separated from the mainland by a shallow sound, bay, or lagoon. The islands are typically separated by tidal inlets or passes (NOAA 2012a). The morphology of barrier islands is constantly changing in response to underlying geology; erosion; and deposition processes such as wind, currents, storm surge, overwash, sediment supply and transport. Movement of barrier islands may be landward, seaward, or laterally along the coast (BOEM 2012).

Barrier island systems provide habitat for many species of plants and wildlife, including important nesting areas for seabirds and sea turtles, and are vulnerable to human impacts. Barrier islands protect wetland systems that form along the islands such as lagoons, estuaries, and/or marshes by limiting erosion caused by daily ocean waves and tides as well as ocean storm events (Stone and McBride 1998). Coastal communities that have developed along the northern Gulf of Mexico are also afforded protection from coastal storms, surges, and tidal flooding by the presence of barrier land forms.

Stressors that impact the longevity and resilience of barrier islands in the northern Gulf Coast area include storm events, reduction in sediment supply, channelization, salt water intrusion, sea level rise, and invasive species. Reduction in barrier islands has resulted in increased loss of coastal wetlands and stress to marsh ecosystems due to greater wave and current action.

Distribution

Barrier islands along the northern Gulf of Mexico are found from Texas to Florida. Eight geographically distinct barrier island systems have been characterized for the Gulf of Mexico from west to east: (1) the lower Texas coast (Laguna Madre and Padre Island); (2) mid-Texas coast (Mustang Island to Matagorda Peninsula); (3) upper Texas coast (Cedar Lakes to Bolivar Peninsula); (4) the deltaic barrier islands of southeast Louisiana from Atchafalaya Bay to Chandeleur Sound; (5) Mississippi Sound and Mobile Bay barrier islands (Cat Island to Bon Secour Peninsula); (6) Northwest Florida barrier islands from Pensacola to Cape San Blas; (7) southwest Florida barrier islands (Anclote Key to Marco Island); and (8) Florida Bay (Ten Thousand Islands and the Florida Keys) (GOMA 2009; University of Texas 2012; TPWD 2012a; NOAA 2012b). Two areas of the northern Gulf of Mexico coastline within the U.S. have no barrier islands: the Chenier Plain of southeast Texas and southwest Louisiana (High Island, Texas to Vermilion Bay, Louisiana) and the Big Bend area of Florida from Apalachee Bay to Anclote Key. Certain of these systems are discussed below.

The Laguna Madre system is located along the southern coast of Texas, extending about 285 miles along the coast of the Gulf of Mexico (Oceana 2012). The northern part of the lagoon is located in Texas and is separated from the Gulf by a long, thin barrier island, Padre Island. Stretching 113 miles from Port Isabel to Corpus Christi, Padre Island is the longest barrier island in the U.S., and an 80-mile-long segment is designated as a National Seashore (Weise and White 1980). Mustang Island, San Jose Island, and Matagorda Island and Peninsula extend across the Coastal Bend region. Galveston Island is on the upper Texas coast and is developed. Bolivar Peninsula is also on the upper Texas coast, but is more remote and contains extensive wetlands (Gibeaut and Crawford 1996).

Major barrier islands in Louisiana include the Chandeleur Island chain, Grand Isle, Grand Terre, Shell, Pelican, Scofield Islands, and Timbalier Islands, and Isle Derniéres (LDWF 2012a). The Terrebonne Barrier Islands Refuge, which is owned and managed by LDWF, consists of three barrier islands in the Isles Derniéres Chain: Wine, Whiskey, and Raccoon Islands (LDWF 2012b). Over the past decade or so, State and Federal agencies have been working to restore barrier islands along the Isle Derniéres, Timbalier, and Barataria Bay Basin shorelines.

In Mississippi, there is an extensive barrier island system. Ship, Horn, and Petit Bois Islands are partly public lands managed under the Gulf Islands National Seashore. Cat Island is located between the Mississippi Sound and Chandeleur Sound, and a portion of the island is within the Gulf Islands National Seashore (GulfBase 2012). The remainder of the island is State and privately owned (Gulf Live, 2013).

In Alabama, Dauphin Island, which is mostly privately owned, protects the mainland marshes of lower Mobile County such as Grand Bay and Point aux Pins. Dauphin Island is found to the east of Mississippi's Petit Bois Island and extends to Pass Aux Herons on southwestern Mobile Bay near Cedar Point.

Florida barrier islands occur along the southwest coast north of the Everglades, except in the Big Bend area (from Apalachee Bay to Anclote Key) where, because of low energy and minimal erosive forces, no barrier beaches are found. The Florida barrier islands are considered stable compared to those found off the other Gulf States (BOEM 2012). Barrier islands in the Florida Panhandle including Perdido Key, Dog, St. George, St. Vincent, Shell, and Santa Rosa Islands, are 99% quartz sand and were originally deposited by rivers draining the Piedmont. Parts of Perdido Key and Santa Rosa Island are protected within the Gulf Islands National Seashore.

3.3.1.3 Beaches and Dunes

Beaches are defined as land covered by unconsolidated, sand-sized material with minimal vegetation, extending landward from the low water line to dunes or a place where there is a distinct change in material or physical features. Dunes are wind-blown deposits of sand that form just behind the beach face and separate the higher energy beach from lower energy habitats, such as barrier flats, wetlands and mudflats. Beaches, dunes, and swale wetlands are ecologically and recreationally important shoreline habitats.

Description and Ecological Importance

Beach sediments along the Gulf Coast vary between geographic regions, but are composed primarily of inorganic quartz from weathered continental rock (Brown et al. 1990, Finkl 2004, and U.S. EPA 2004 as cited in Thayer et al. 2003). Estuarine beaches along the bay systems in the northern Gulf contain a higher content of organic matter in the sand than coastal beaches as a result of riverine sediment deposition. Beach habitats are dynamic environments that undergo significant change throughout the year. Accretion occurs in the summer as a result of reduced wave energy with erosion processes increasing in the winter due to increased high-energy wave action. These physical processes often lead to seasonal changes in the diversity and abundance of organisms.

Primary dunes in a beach system incur most of the saline and thermal stress from coastal physical processes, and as a result, vegetation diversity is generally lower on primary dunes than secondary dunes. The latter lie landward of the primary dunes, are older, more stable, and support more diverse and larger types of vegetation such as shrubs and small trees. A swale wetland typically forms in between primary and secondary dunes and acts as a catch basin for water that breaches the primary dune. Vegetation growing in the swale tends to be more tolerant of saltwater inundation. Typical dune plants along the Gulf of Mexico include sea oats, beach morning glory, bitter panicgrass, and cordgrass species.

Beaches are important breeding, nesting, wintering, and foraging habitats for a variety of species. Several species of sea turtles nest on some beaches of the northern Gulf Coast of Mexico (see section 3.3.2.6). Many birds, including a number of federally listed and candidate species, including Wilson's plover, piping plover, red knot, and least tern, use beaches as important breeding, wintering, and migratory habitat. For example, coastal beaches are home to approximately 70% of the wintering population of the threatened piping plover (Elliott-Smith et al. 2009 as cited in Brown et al. 2011). Gulls and pelicans are also commonly found on Gulf beaches. Dune habitats support many different species, including federally listed species such as beach mice (see section 3.3.2.9). In addition, beaches provide habitat for a range of burrowing invertebrates and meiofauna (microscopically small benthic invertebrates).

Gulf coast beaches and dunes face a variety of threats including development pressure, sea level rise, sediment deficiencies, and habitat sustainability. Coastal population growth and the increasing economic development of ports, refineries, and industries have exacerbated these trends. The highest rates of erosion in the Gulf of Mexico region occur in Louisiana along barrier island and headland shores near the Mississippi delta. In Texas, erosion is rapid along the barrier islands and upper coast headlands. The Mississippi barrier islands are eroding and migrating laterally. The highest rates of erosion in Florida are generally found along the panhandle barrier island beaches and near tidal inlets. The most stable Gulf beaches are along Florida's west coast where low wave energy and beach nourishment minimize erosion (Morton et al. 2004). In addition to the long term shoreline change trends, anthropogenic modifications have created pockets of accretion and increased erosion in each of the Gulf States.

Currently, inland damming of rivers, creation of jetties, seawalls and other hard structures, and construction of structures in response to shoreline changes, has substantially altered the natural beach and dune processes. In addition to the direct impacts, these factors have reduced the Gulf Coast's capacity to adapt to large-scale changes in conditions caused sea level rise and coastal storms (McKenna 2009).

Distribution

Sandy beach and dune habitats are found along the coastline of all five Gulf States. The amount of sandy shoreline in each state is dependent upon the physical conditions at the area (e.g., wave action, sediment supply, etc.) and the level of coastal development.

3.3.1.4 Submerged Aquatic Vegetation

Submerged Aquatic Vegetation (SAV) describes plants that have adapted to living in or on aquatic environments. SAV includes seagrasses, oligohaline grasses, attached macroalgae, and drift algae. Due to the prominence of seagrass in Gulf Coast habitats, seagrass and SAV will be used interchangeably in the discussion below.

Description and Ecological Importance

Seagrasses are rooted vascular plants that grow in coastal waters and can, except for some flowering structures, live and grow below the water surface. Freshwater and brackish species are important components of estuary systems and inland waters. Seagrasses grow in the littoral (intertidal) and sublittoral (subtidal) zones in salinities ranging from freshwater to saltwater (>32 ppt). In the Gulf of Mexico, six species of seagrasses are common (Table 3-1). A detailed description of these species is included in appendix A.3.

Table 3-1. Seagrass species in the Gulf of Mexico.

COMMON NAME	HABITAT NOTES	GEOGRAPHIC DISTRIBUTION
Manatee grass	Subtidal environments (deeper waters) of high salinities.	Mainly in southern Texas and Florida, portions of Louisiana and Mississippi.
Shoal grass	Often exposed during low tide. Early colonizer of impacted areas.	Most common in Mississippi and Alabama. Also occurs in Texas and Louisiana, and Florida.
Turtle grass	Temperature limited, deeper waters.	Most abundant and widely spread in Gulf. Distributed in portions of Texas, Louisiana, Mississippi, and Florida.
Widgeon grass	Grows in both freshwater and saline environments.	Widespread along Texas, Louisiana, and Florida, portions of Mississippi, and Alabama. Dominant in some areas of Louisiana.
Paddle grass	Can grow in turbid waters.	Portions of Florida.
Star grass	Small plant growing in shallow waters.	Widespread in Florida, also occurs in portions of Texas and Mississippi.
Water celery/Eel grass	Grows in shallow coastal embayments and prefers fresh to brackish waters.	Present in all Gulf states.

SAV provide habitat, food, and/or shelter for birds, fish, shellfish, invertebrates, and other aquatic species, and are among the most productive habitats in coastal areas. SAV species filter contaminants and sediments; improve water quality; regenerate and recycle nutrients; and produce, export, and accumulate organic matter. Complex structures of seagrass leaves, roots, and rhizomes attenuate waves, reduce erosion, and promote water clarity while increasing bottom area habitat where communities of benthic organisms can live. SAV coverage has declined in most areas within the Gulf of

Mexico due to natural and human-induced stressors including reduced light and water clarity, increased nutrient loading, and physical disturbance caused by dredging, boat propellers, anchors and groundings.

Distribution

It is estimated that there are over three million acres of SAV, both marine and freshwater/brackish, in the Gulf of Mexico, making the northern Gulf of Mexico a globally important SAV area (NOAA 2011b). The northern Gulf of Mexico has four major types of marine habitat where seagrasses are present: (1) lagoons, which can be hypersaline, contain turtle grass, manatee grass, shoal grass, star grass, and widgeon grass; (2) shallow coastal areas that contain widgeon grass, turtle grass, manatee grass, shoal grass, star grass, and water celery; (3) back reefs (the portion of the coral reef ecosystem that extends from the coast to the reef crest) that contain turtle grass, manatee grass, and shoal grass; and (4) deep coastal areas that contain star grass, which is tolerant of less light. Although seagrasses can display vertical zonation, this is not the case for all locations. Turtle grass, manatee grass, and shoal grass are the dominant seagrass species in the Gulf of Mexico and can occur in single species stands, but often occur in intermixed beds (Short et al. 2007).

3.3.1.5 Other Habitats in the Coastal Environment of the northern Gulf of Mexico

Key habitats include riparian areas, cheniers, wet pine savannas and grassland savannas. These areas provide habitat for endangered and threatened terrestrial species as well as for migratory birds for use as stopover and nesting habitat. These coastal transition zones are important areas in the face of sea level rise for allowing habitat retreat.

Description and Ecological Importance

Riparian habitats are vegetated, forested areas adjacent to streams, rivers, lakes, reservoirs, and other inland aquatic systems that affect or are affected by the presence of water (USACE 2001). They are ecologically diverse and are home to a wide range of plants, insects, and amphibians. Riparian vegetation often consists of a lush mixture of trees, shrubs, and herbaceous vegetation, while adjacent terrestrial areas along the Gulf Coast are typically non-forested ecosystems such as grasslands (Fischer et al. 2001). Streamside forests and riparian areas help to create and maintain aquatic habitat by providing shade, food, and in-stream woody structure. These riparian habitats prevent soil erosion, can act as a nutrient sink by preventing excess nutrients from entering waterways, and can also help mitigate the effects of extreme weather events. Many existing riparian habitats, including associated wetlands and aquatic systems, are negatively affected by overgrazing, timber removal, flood-control, and nonpoint-source pollution (Fischer et al. 2001). Typical hardwood species are pecan, water oak, southern live oak, and elm, with some bald cypress located on larger streams (Griffith et al. 2008c and 2009). Large portions of floodplain forests have been removed and land cover is now a mix of forest, cropland, and pasture (Griffith et al. 2008c and 2009). Similar to other ecosystems discussed in this section, riparian habitats throughout the Gulf Coast and inland have been degraded by water management, land development, and invasion by nonnative species.

Cheniers are narrow stranded woodland ridges that parallel the shoreline and rise to about 5 feet in elevation (Griffith et al. 2008c and 2009; Barataria Terrebonne National Estuary Program [BTNEP] 2012). Coastal chenier ridges are considered to be the most important habitat for many neotropical, migratory birds during fall and spring seasons. Currently only about five percent of the historical, natural chenier habitat remains, due to impacts associated with coastal and agricultural development (American Bird Conservancy 2003). The Texas-Louisiana Chenier Plain, extending roughly from East Bay to Vermilion Bay along the Gulf Coast, is the most prominent area of chenier habitat in the United States. The loss of this natural chenier habitat has prompted the Louisiana Natural Heritage Program to list these areas as imperiled to critically imperiled.

Wet pine savannas are unique wetland habitats characterized by sparse canopy cover dominated by long-leaf pine, cypress species, or slash pine; very little shrubby understory; and dense groundcover of herbaceous species. Fire plays an important part in the ecology of this ecosystem because it keeps canopy and shrub species from crowding out the herbaceous layer. In addition, the long-leaf pine requires fire for regeneration. Wet pine savanna occupies much less of its historic range and is now considered a habitat type of special concern due to the lack of fire, invasive species infestation, and/or hydrologic alteration. Many of the larger, original areas have been permanently degraded by bedding (in attempts to establish pine plantations) and ditching or tilling to create drier areas for many types of uses including pastures and sod farms (USFS 2005). In many cases, this has altered hydrology to adjacent estuarine and marine systems.

Distribution

The most extensive riparian habitats in the southeastern U.S. are vast bottomland hardwood forests along broad river floodplains or alluvial valleys (Huffman and Forsythe 1981, Mitsch and Gosselink 1993 as cited in Fischer et al. 2001). Bottomland hardwood forests can be found in all five Gulf States (Griffith et al. 2008c).

Cheniers are found along the Gulf Coast between Vermilion Bay, Louisiana, and the Bolivar Peninsula and East Bay, Texas (about 200 miles), and inland from the coast from about 10 to 40 miles (American Bird Conservancy 2003).

Wet pine savannas are unique wetland habitats that occur along the lower Gulf coastal plain from north central Florida to eastern Texas. The Grand Bay National Wildlife Refuge located in coastal Mississippi and Alabama preserves one of the largest remaining blocks of wet pine savanna, a critically endangered ecosystem (National Wildlife Federation 2012).

3.3.2 Living Coastal and Marine Resources

The northern Gulf of Mexico supports more than 15,000 marine species, many of which are globally significant, in addition to many threatened and endangered terrestrial species (NOAA 2011a). Species diversity allows communities to more readily recover from perturbations, and increases productivity (in terms of biomass). Any changes in the health of these resources have the potential to disrupt the connectivity between resources in the Gulf (Brown et al. 2011).

3.3.2.1 Nearshore Benthic Communities

Nearshore benthic communities in the northern Gulf are largely composed of macroinvertebrate groups such as mollusks, sponges, polychaetes, and crustaceans. These diverse groups are found in habitats spanning from the intertidal zone to the soft sediments on the continental shelf. There are two main components to benthic communities– the infauna and epifauna. The benthic infauna includes worms, mollusks, and crustaceans that live in bottom sediments. These species maintain sediment and water quality and provide a food source for bottom-feeding fish, shrimp, and birds. The benthic epifauna includes commercially important shellfish and finfish that live on the surface of bottom sediments. This section presents a description of the key benthic resources of the Gulf, their ecological importance, and their distribution among Gulf habitats.

Description and Ecological Importance

Sponges, mollusks (e.g., clams and oysters), arthropods (including crustaceans such as blue crabs and shrimp), and polychaetes are all important taxa and contribute substantially to benthic biomass and productivity. Mollusks and crustaceans are important ecologically and commercially throughout the northern Gulf Coast region.

These taxa include many species that are filter feeders. Filter feeders remove and digest phytoplankton and particulate organic matter, and deposit processed materials on the substrate (Turgeon et al. as cited in Felder and Camp 2009). Some benthic fauna form habitats (such as oyster reefs) that harbor diverse microbial communities, and provide habitat and nursery areas for fish and crevices for mobile invertebrates to seek shelter (Taylor et al. 2007). In addition, benthic organisms, like mollusks, are important in marine food webs.

Mollusks are soft-bodied animals that may have a hard, external shell composed of calcium carbonate, a hard internal shell, or no shell at all. Mollusk taxa include larger, commercially important organisms such as clams, scallops and squid, along with snails, slugs, whelks, and other cephalopods (squid, cuttlefish, and octopi). Mollusks are an important food source to many larger benthic and pelagic species. Two main subgroups of mollusks are gastropods and bivalves. The eastern oyster is the predominant commercial bivalve species in the Gulf (Section 3.3.2.2).

Crustacea is a class of diverse organisms that vary in many ways including size, mobility, feeding strategy, and habitat preference. There are over a dozen subgroups of crustaceans within the Gulf of Mexico (Felder and Camp 2009). Smaller crustaceans such as isopods, amphipods, and tanaids are ecologically important and have large populations within the northern Gulf. Larger crustaceans include shrimps, crawfishes, lobsters, and crabs.

Distribution

Sponges are found throughout the northern Gulf on substrates that include reefs, mangrove roots, seaweed, and artificial structures (e.g., oil platforms). Mollusk species are found attached to rocks and shells, on seagrass blades, on plant stems and roots, burrowed into sediment and other substrates and moving freely on the ocean floor and water column. Polychaetes are present in nearly all marine environments and are common in the sandy and muddy substrates of the Gulf; many species use the soft sediment to create burrows. Shrimp are widely distributed among the Gulf habitats, ranging from estuaries to open water habitat on the continental shelf. Shrimp are also associated with EFH for many other important aquatic species such as red drum, reef fish, coastal migratory species, stone crab, blue crab, and spiny lobster. Crabs are bottom-dwellers in every type of habitat from the saltiest water of the Gulf to the almost fresh water of the back bays and estuaries, from the low tide line to waters 120 feet deep (Perry, H.M., and T.D. McIlwain 1986, TPWD 2013). Blue crabs, which are one of the primary species of commercial importance in the Gulf of Mexico, use a wide variety of benthic habitats throughout their life history. Offshore, high-salinity waters are used during early larval stages. Larvae then move into estuaries and use subtidal and intertidal mud flats, oyster bars, channel edges, tidal marshes, seagrass beds, and soft-sediment shorelines as they grow (NOAA 2012c).

3.3.2.2 Oysters

The eastern oyster is the primary oyster species found across the northern Gulf and is the major commercial species. Oysters are important as organisms and providers of habitat, with an integral role in the function and structure of estuarine ecosystems.

Description and Ecological Importance

The eastern oyster lives in shallow, well-mixed estuaries, lagoons, tidal sloughs of barrier islands, and oceanic bays. This species can be found from one foot above the mean low tide line to 40 feet below the mean low tide line and within the Gulf of Mexico is typically found at depths of 0 to 13 feet (Eastern Oyster Biological Review Team 2007).

Oysters are an ecological keystone species in most estuaries in the northern Gulf of Mexico, and oyster populations contribute to the integrity and functionality of estuarine ecosystems (Eastern Oyster Biological Review Team 2007). Self-sustaining oyster populations form reefs that are crucial components of estuaries: they improve water quality and recycle nutrients, provide structured habitat in predominantly soft-sediment environments (especially for secondary producers), and provide other important ecological services to the physical environment (e.g., acting as natural breakwaters, helping to prevent shoreline erosion) (Grabowski and Peterson 2007; Coen et al. 2007; Eastern Oyster Biological Review Team 2007; Gulf States Marine Fisheries Commission [GSMFC] 2012; Peterson et al. 2003).

Oyster reefs provide habitat for a large number of commercially and recreationally important fish species. The structural complexity of oyster reefs provides refuge, nursery areas, foraging grounds, and breeding grounds for fish (Grabowski et al. 2005; GSMFC 2012).

Distribution

In the Gulf of Mexico, oysters are distributed throughout the northern coastal environment and are found in higher abundance in nearshore, shallow, semi-enclosed water bodies close to freshwater sources (GSMFC 2012). Commercial landings of oysters provide some indication of their distribution in the region.

In 2011, the commercial landings of oysters were: Louisiana, 11,135,298 pounds; Texas, 3,943,434 pounds; Florida (west coast), 2,724,024 pounds; Alabama, 313,310 pounds; and Mississippi, 247,384 pounds. Oyster harvests represent a $64 million dollar industry in the Gulf of Mexico (NOAA 2012e) and account for more than 75% of the global catch of oysters. However, these oyster populations are considered in fair condition and are 50 to 89% of their historic levels (Beck et al. 2011).

3.3.2.3 Pelagic Microfaunal Communities

The upper water column in the nearshore coastal environment contains phytoplankton, zooplankton, micronekton, and neuston, collectively referred to as pelagic microfauna.

Description and Ecological Importance

Microfauna play an integral role in the Gulf food chain through both the production of food sources and the transfer of energy through trophic levels. Primary productivity (the production of new organic matter from photosynthesis) from near surface phytoplankton is transported to the sediments through the water column; however, much of this production is effectively consumed prior to reaching the bottom. Despite being generally oligotrophic (waters with low primary productivity), localized, offshore, deepwater areas of productivity do occur and contain a higher biomass of zooplankton and micronekton that contribute to secondary production (Biggs and Ressler 2001).

Distribution

Pelagic microfauna are distributed throughout the nearshore, shelf and offshore environment in the northern Gulf.

3.3.2.4 Sargassum

Sargassum is a genus of brown macroalga and a major component of the pleuston group in the offshore Gulf. The life history of sargassum is not well understood. Two pelagic species of *Sargassum* occur in the Gulf of Mexico, *Sargassum natans* and *Sargassum fluitans*, which support a diverse community of marine organisms.

Description and Ecological Importance

The pelagic *Sargassum* species are golden brown in color and typically 3.1 to 12.6 inches in diameter. *Sargassum* contains pneumatocysts, which are small vesicles that function as floaters to help *Sargassum* maintain positive buoyancy through the use of oxygen and nitrogen gas (SAFMC 2002). It normally occurs in small clumps, but under the right environmental conditions, can form large patches, mats, or windrows. In some instances these patches reach several acres in size and extend 10 feet deep. This alga supports a high diversity of marine invertebrates and vertebrates including several commercially and ecologically important pelagic fish, birds, and sea turtles. Over fifty-four species of fish are known to utilize *Sargassum* habitat for some portion of their life stages for shelter, feeding, spawning, and nurseries for juveniles. Commercially important species such as barracuda, mackerel, tuna and swordfish use *Sargassum* habitat for shelter and as foraging grounds, preying on small and juvenile fish (Coston-Clements et al. 1991). Juvenile sea turtles, including loggerhead turtles, green turtles, Kemp's ridley, and hawksbill turtles, use the *Sargassum* for protection and foraging grounds (Witherington et al. 2012). In addition, a wide variety of birds forage on invertebrates or small vertebrates found within *Sargassum* floating in the Gulf and washed up on beaches.

Distribution

Pelagic *Sargassum* shows a seasonal pattern of distribution and movement in the Gulf, with the northwestern Gulf being a major nursery area. Satellite imagery shows that *Sargassum* typically shows strong growth in the northwestern Gulf of Mexico in the spring of each year, and is transported to the Atlantic Ocean by about July (Gower and King 2008). It then travels east of Cape Hatteras and ends up north of the Bahamas by the following February. *Sargassum* is widely dispersed across the Gulf off Texas and Louisiana.

3.3.2.5 Finfish

The Gulf of Mexico supports diverse assemblages of fish that inhabit freshwater, estuarine, coastal, and marine habitats. This includes more than 15% of all known species of marine fish (McEachran and Fechhelm 1998). Fish assemblages vary based on salinity, temperature, depth, and substrate. The Gulf of Mexico has some of the most productive commercial and recreational finfish fisheries in the world.

Description and Ecological Importance

In the northern Gulf of Mexico, fish assemblages can be grouped by habitat use. Many pelagic and demersal fish inhabit coastal estuaries during their early life stages. Egg and larval stages of demersal fish often spend time in the upper water column where phytoplankton and zooplankton resources are concentrated, before ultimately moving to bottom waters. Some fish species have unique migratory patterns, spending most of their adult life in saltwater but spawning in freshwater (anadromous), or others that live primarily in freshwater and spawn in saltwater (catadromous), these two groups are collectively referred to as diadromous.

Fish populations in the northern Gulf of Mexico face a variety of stressors including fishing pressure, pollution, habitat degradation and loss, invasive species, and shifting environmental conditions. Fishing mortality, by either directed fisheries or as bycatch, is often the most dominant source of un-natural mortality. Changes in physical conditions in the marine environment can affect the growth, survival, and reproduction of many fish species. The spatial distribution of marine fish species is largely determined by climate. Factors such as air and water temperatures, ocean acidification, changes in runoff from the land, sea-level rise, and altered currents may also affect fisheries in the Gulf of Mexico (Karl et al. 2009).

Demersal Fish

Demersal fish in the northern Gulf of Mexico can be generally characterized as soft-bottom fish or hard-bottom fish, according to their association with particular substrate types. Soft-bottom habitat is relatively featureless and has lower species diversity than the more structurally complex hard bottom habitat. Demersal fish associated with soft-bottom generally prefer certain types of sediments over others; this tendency has led to the naming of three primary fish assemblages according to the dominant shrimp species found in similar sediment/depth regimes (Chittenden and McEachran 1976; reviewed in GMFMC 2004).

In the Gulf of Mexico, pink shrimp are found in waters up to about 148 feet over calcareous sediments. Common members of the pink shrimp assemblage include Atlantic bumper, sand perch, silver jenny, dusky flounder, and pigfish. Fishes associated with brown shrimp and white shrimp are found on more silty sediments. The brown shrimp assemblage extends to 299 feet. Examples of fish in the brown shrimp assemblage include porgies, searobins, batfish, lefteye flounders, cusk-eels, and scorpionfishes. The white shrimp assemblage exists in 11 to 72 feet of water, and dominant fish include drums, Atlantic croaker, snake mackerels, herrings, jacks, and flounders. Many fish species in the white and brown shrimp assemblages spawn in shelf waters and spend their early life stages in estuaries (GMFMC 2004).

The term “hard bottom” generally refers to exposed rock, but can refer to other substrata such as coral and clay, oyster reefs, or even artificial structures. Hard-bottom associated fish include most snapper and grouper. The GMFMC manages snappers, groupers, tilefishes, jacks, gray triggerfish, and hogfish under the reef fish fishery management plan. Other examples of reef fishes include sea basses, grunts, angelfishes, damselfishes, parrotfishes, and wrasses inhabit hard-bottom habitats in the Gulf of Mexico (Dennis and Bright 1988). Although reef fish are associated with hard-bottom habitat as adults, some species can be found over soft sediments as well, such as porgies. Like soft sediment species, many hard-bottom demersal fish are estuarine dependent and spend their juvenile states in coastal habitats.

Pelagic Fish

Pelagic fish include larger predatory species such as mackerels and cobia and smaller forage species such as menhaden. Pelagic species also include highly migratory species such as tunas, swordfish, sharks, and billfish. These species are found in federal waters throughout the Atlantic Ocean and the Gulf of Mexico. Billfish represent oceanic, epipelagic species that are occasionally coastal. Billfish typically do not school, but migrate extensively near the surface where they feed on pelagic fishes. Five species associated with the Gulf of Mexico are managed under FMPs. Because swordfish and tunas are highly migratory species, the fishery is managed by NOAA Fisheries Service in coordination with the International Commission for the Conservation of Atlantic Tunas (ICCAT).

Fish inhabiting oceanic waters can be divided into epipelagic, mesopelagic, and bathypelagic, on the basis of their depth preference. Epipelagic fishes inhabit the upper 700 feet of the water column in oceanic waters, typically beyond the continental shelf edge (Bond 1996). In the Gulf of Mexico, this group includes several shark species, swordfish, billfishes, flyingfish, halfbeaks, jacks, dolphinfish, and tunas. A number of the epipelagic species, such as dolphin fish, sailfish, white marlin, blue marlin, and tunas, are in decline and have important spawning habitat in the Gulf of Mexico. All of these epipelagic species are migratory, but specific patterns are not well understood. Many oceanic species are associated with *Sargassum* spp., jellyfishes, siphonophores, and driftwood, because they provide forage and/or nursery habitat. Most fish associated with floating seaweed are temporary residents, for example, juveniles of species that reside in shelf or coastal waters as adults. However, several larger species, such as dolphinfish, tuna, and wahoo, feed on the small fishes and fish attracted to Sargassum (GMFMC 2004).

Diadromous and Freshwater Fish

The coastal river systems of the Gulf generally have diverse assemblages of freshwater fish and invertebrates. Freshwater fish assemblages include sturgeons, gars, killifishes, and livebearers. Anadromous and catadromous fish, collectively referred to as diadromous, utilize both freshwater and saltwater to complete their life cycles. Some anadromous fish species in the Gulf of Mexico include Gulf sturgeon, striped bass, and Alabama shad; and some catadromous species include American eel and striped mullet.

Threatened and Endangered Fish Species

Fish species listed under the ESA within the northern Gulf of Mexico include: largetooth sawfish, smalltooth sawfish, and Gulf sturgeon (Table 3-2). Designated critical habitat for the Gulf sturgeon is presented in Figure 3-9.

Table 3-2. Federally listed fish species and species of concern found along and within the Gulf of Mexico.

SPECIES COMMON NAME	STATUS	USE OF GULF
Sawfish		
Smalltooth sawfish	Endangered	Sheltered bays, shallow banks, estuaries and river mouths along the Gulf of Mexico with muddy and sandy bottoms.
Largetooth sawfish	Endangered	Shallow estuarine and fresh coastal waters near rivermouths and large bays. Prefers semi enclosed water bodies.
Sturgeon		
Pallid sturgeon	Endangered	Large, turbid free-flowing riverine habitats with rocky or sandy substrates.
Source: NOAA 2012.		

The smalltooth sawfish is listed as endangered due to its capture as bycatch in various commercial and recreational fisheries and to habitat loss and degradation. It occurs in shallow, coastal waters within the Gulf and generally in nearshore habitats with muddy and sandy bottoms often in sheltered bays, estuaries (particularly mangroves), river mouths and mud banks (NOAA Fisheries Service 2009x).

Gulf sturgeon is listed as threatened due to declines in its population related to the presence of dams and water control structures that block access to historical spawning habitats, loss of habitat, poor water quality, and overfishing (USFWS 1995). It spawns in areas of rock and rubble in coastal rivers from Louisiana to Florida during the summer, and occurs in the Gulf and its estuaries and bays in the cooler months (USFWS 1995).

Pallid sturgeon, listed as endangered, is a native species found in the Missouri and Mississippi Rivers. Water control structures, dams, impoundments, and channelization have blocked movement, altered or destroyed spawning and foraging habitat and affected water quality leading to its decline. Louisiana and Mississippi are within the known range of pallid sturgeon (USFWS 1993). Additional detail on these three species is presented in Appendix A.4.

3.3.2.6 Sea Turtles

There are five species of sea turtles found within the Gulf of Mexico, all of which are listed under the ESA. These include the green sea turtle, the hawksbill sea turtle, the loggerhead sea turtle, Kemp's ridley sea turtle, and the leatherback sea turtle.

Description and Ecological Importance

For most sea turtles in the Gulf (with the exception of the leatherback turtle), hatchlings develop in open ocean areas (i.e., continental shelf) and juvenile and adult turtles move landward and inhabit coastal areas. Leatherback turtles spend both the developmental and adult life stages in the open oceanic areas of the Gulf (BOEM 2012). Sea turtles nest on sandy beaches in some estuarine areas. For healthy Gulf sea turtles, onshore activities are typically limited to the nesting process.

Immediately after hatchlings emerge from the nest, they move to the surf, are swept through the surf zone, and continue swimming away from land for up to several days (NOAA Fisheries Service 2011a). Once hatchling turtles reach the juvenile stage, they move to nearshore coastal areas to forage. As adults, they utilize many of the same nearshore habitats as during the juvenile developmental stage. Sea turtles utilize resources in coral reefs, shallow water habitat (including areas of seagrasses), and areas with rocky bottoms.

Turtles maintain a variety of Gulf habitats including SAV beds and coral reefs. Grazing on SAV by turtles helps to increase nutrient cycling in those habitats and prevents an over-accumulation of decaying SAV on the seafloor (Thayer et al. 1984). Sea turtles can also help to maintain their nesting beaches through the provision of necessary nutrients to dune vegetation (Bouchard and Bjorndal 2000). In addition to maintaining habitats, sea turtles also aid in balancing the food web in their marine environments. Leatherbacks, for example, prey primarily upon jellyfish and help to prevent the proliferation of this group that can easily out compete fish species in the same area (Lynam et al. 2006). Turtles can also be prey to larger organisms. Hatchling and juvenile sea turtles are particularly vulnerable to predators in the offshore environment (Wilson et al. 2010). Sea turtles also provide food to smaller organisms; fish feed off of the barnacles and algae that turtles carry around on their shells, and without this source of food, many fish species would lose a primary food source (Bjorndal and Jackson 2003). Each species of sea turtle in the Gulf is unique and affects the diversity and function of their environment differently; however, all species of sea turtles are critical in maintaining the health, function, and resiliency of the Gulf ecosystem as a whole.

Primary threats to sea turtle populations include loss of coastal habitat (e.g., shallow coral and SAV), loss of foraging areas, nest predation, and impacts to nesting habitat by human use (NOAA Fisheries Service 2011b). In addition, sediment dredges as well as fishing take, which includes incidental capture in fishing gear, primarily in longlines and gillnets, but also in dredges, shrimp trawls, traps, fishing lines and pots, pose a threat to sea turtles. (NOAA Fisheries Service 2011a, 2011c, and 2011d).

Distribution

All five species of sea turtles are migratory and thus have a wide geographic range (BOEM 2012). Sea turtle species can use all areas of the northern Gulf and can nest on any beach with suitable conditions. While most nesting observed in the northern Gulf of Mexico occurs in Florida and Alabama, all five sea turtle species have been known to nest along areas of the Texas coast, particularly Padre Island National Seashore (NPS 2011 as cited in BOEM 2012). There have also been recent reports of nesting in Mississippi (loggerhead turtles) (BOEM 2012), and historic nesting reports in Louisiana. The northern coastal Gulf of Mexico is also an important foraging hotspot for juvenile Kemp's ridley turtles (Shaver et al. 2013).

Threatened and Endangered Sea Turtle Species

All five species of sea turtles found in the Gulf of Mexico are listed under the ESA. Table 3-3 summarizes the status of listed sea turtles in the Gulf of Mexico. Appendix A.5 provides additional details regarding these species. The Gulf populations of green (breeding populations in Florida), hawksbill, Kemp's ridley, and leatherback sea turtles are listed as endangered. Loggerhead (northwest Atlantic distinct population segment) and green (except the Florida breeding population) sea turtles are listed as threatened.

Table 3-3. Threatened and endangered sea turtles of the Gulf of Mexico.

COMMON NAME	FEDERAL STATUS	USE OF GULF
Loggerhead sea turtle	9 Distinct Population Segments (DPSs) – 4 listed as threatened (Northwest Atlantic Ocean, South Atlantic Ocean, Southwest Indian Ocean, and Southeast Indo-Pacific Ocean DPSs) and 5 listed as endangered (Northeast Atlantic Ocean, Mediterranean Sea, North Pacific Ocean, South Pacific Ocean, and North Indian Ocean DPSs).	From Texas to Florida in shallow water habitats, continental shelf waters, open Gulf waters; nesting on Gulf Coast beaches in Florida, Alabama, Mississippi, and Texas. Records of historical nesting in Louisiana and Mississippi. Critical habitat has been proposed.
Green sea turtle	Breeding populations in Florida and on the Pacific Coast of Mexico are listed as Endangered; all others are listed as Threatened.	Inshore and nearshore waters from Texas to Florida; nests in Texas and Florida. Historically reported as nesting in Alabama (see figure 3-10 in chapter 3 for critical habitat).
Hawksbill sea turtle	Endangered	From Texas to Florida, particularly near coral reefs, in coastal and open Gulf waters; one record of nesting at Padre Island National Seashore, Texas; records of nesting in Florida (see figure 3-10 in chapter 3 for critical habitat).
Kemp's ridley sea turtle	Endangered	From Texas to Florida in coastal and pelagic waters; nesting on Gulf Coast beaches in Texas, and infrequently in Alabama and Florida.
Leatherback sea turtle	Endangered	Pelagic and coastal waters of the Gulf of Mexico; nests in Florida and incidentally in Texas (see figure 3-10 in chapter 3 for critical habitat).

3.3.2.7 Marine Mammals

Marine mammals found within the Gulf of Mexico include 21 species of cetaceans (whales and dolphins) and the West Indian manatee.

Description and Ecological Importance

Marine mammals are major consumers at multiple trophic levels. For example, herbivory by manatees influences composition of coastal seagrass communities (Bowen 1997). Cetaceans are divided into two groups: baleen whales and toothed whales, which also include dolphins and porpoises. Baleen whales feed on plankton and small fish by straining water through a net of plates (baleen) in their mouth. Toothed whales are active predators that capture prey items including fish and squid. The bodies of dead marine mammals support deep-sea communities, effectively linking the pelagic and deepwater ecosystems. All marine mammals are protected under the Marine Mammal Protection Act.

Distribution[4]

Cetacean distribution (Table 3-4) is affected by demographic, evolutionary, ecological, habitat-related, and anthropogenic factors (Bjørge, 2002; Bowen et al., 2002; Forcada, 2002; Stevick et al., 2002). Movement of individual marine mammals is generally associated with feeding or breeding activity (Stevick et al., 2002). For example, some baleen whale species make extensive annual migrations to low latitude mating and calving grounds in the winter and to high-latitude feeding grounds in the summer (Corkeron and Connor, 1999). Migrations probably occur during these seasons due to the presence of highly productive waters and associated prey species at high latitudes and of warm water temperatures for calving at low latitudes (Corkeron and Connor, 1999; Stern, 2002); however, not all baleen whales migrate. Some individuals, age classes, or subsets of a population may stay in one area year-round (Tershy et al., 1993; Notarbartolo-di-Sciara et al., 2003). Specific bathymetric and oceanographic features in the Gulf of Mexico attract and concentrate marine mammals. In the northern Gulf of Mexico, there are numerous cetacean sightings in waters over the continental shelf (particularly in nearshore waters), in the vicinity of the continental shelf break, over the continental slope, and out over the abyssal plain. Shallower waters over the continental shelf and inshore waters provide habitat for Atlantic spotted and bottlenose dolphins (Fulling et al., 2003; Mullin and Fulling, 2004).

Threatened and Endangered Marine Mammal Species

All marine mammals are protected under the Marine Mammal Protection Act of 1972 (MMPA) (16 United States Code [U.S.C.] 1361 *et seq.*). The Sperm whale and West Indian manatee are designated as endangered under the ESA and depleted under the MMPA. Sperm whales are endangered because they are targeted by commercial whaling efforts that occur outside the U.S. (NOAA 2012f). The West Indian manatee is endangered because various human related activities have resulted in a small population size (less than 2,500 mature individuals exist in the population, which may be declining). Research indicates that the species could face at least a 50% future reduction in population size from human-related activities (USFWS 2001; FWC 2007). To assist in their protection, Florida enacted the Manatee Sanctuary Act in 1978 and declared the entire State of Florida to be a manatee “refuge and sanctuary” (FWC 2007). The West Indian manatee is listed as endangered in the state of Louisiana, and they are occasionally seen within Louisiana estuaries, including Lake Pontchartrain.

[4] The information regarding distribution of marine mammals was extracted from the Gulf of Mexico Range Complex Final Environmental Impact Statement/Overseas Environmental Impact Statement (Department of the Navy 2010).

Table 3-4. Marine mammals of the Gulf of Mexico.

COMMON NAME	ENDANGERED SPECIES STATUS	USE OF GULF
Baleen Whales		
Bryde's whale		Bryde's whales likely have a cosmopolitan distribution and occur in tropical and warm temperate oceans around the world. They can be found globally in all oceans from 40° South (S) to 40° North (N). It is the only baleen whale that regularly inhabits the Gulf of Mexico and has been regularly sighted in the northeastern Gulf of Mexico.
Toothed Whales		
Sperm whale	E/D	Sperm whales are found throughout the world's oceans in deep waters between about 60°N and 60°S latitudes and occur as an apparently native population or populations in the northern Gulf of Mexico near coastal waters just south of the Mississippi delta.
Pygmy sperm whale		Pygmy sperm whales have a cosmopolitan distribution in temperate and tropical seas worldwide. Sightings in the northern Gulf of Mexico occur primarily in oceanic waters.
Dwarf sperm whale		Dwarf sperm whales have a cosmopolitan distribution in temperate and tropical seas worldwide. Sightings in the northern Gulf of Mexico occur primarily in oceanic waters.
Melon-headed whale		Melon-headed whales are found primarily in deep waters throughout tropical areas of the world. Sightings of melon-headed whales were documented in all seasons during surveys of the northern Gulf of Mexico between 1992 and 1998.
Killer whale		Killer whales have a global but patchy distribution and can be found in large concentrations over the continental shelf.
Pygmy killer whale		Pygmy killer whales are found primarily in deep waters throughout tropical and subtropical areas of the world. Sightings of these animals in the northern Gulf of Mexico occur in oceanic waters in all seasons based on data collected during surveys of the northern Gulf of Mexico between 1992 and 1998.
False killer whale		False killer whales can be found in all tropical and temperate oceans worldwide; they occur in the U.S. in Hawaii, along the entire West Coast, and from the Mid- Atlantic coastal states south including the northern Gulf of Mexico.
Short-finned pilot whale		Short-finned pilot whales are found primarily in deep waters throughout tropical and subtropical areas of the world. Sightings in the northern Gulf of Mexico occur primarily on the continental slope and were made in all seasons during surveys of the northern Gulf of Mexico between 1992 and 1998.
Blainville's beaked whale		Blainville's beaked whales appear to be widely but sparsely distributed in temperate and tropical waters of the world's oceans. Their distribution is cosmopolitan throughout the world's oceans.
Gervais' beaked whale		Gervais' beaked whales are distributed throughout deep, warm waters of the central and north Atlantic Ocean. This species is thought to occur mostly north of the equator.
Cuvier's beaked whale		Cuvier's beaked whales can be found in most oceans and seas worldwide
Dolphins		
Rough-toothed dolphin		Rough-toothed dolphins are found primarily in deep waters throughout tropical and warmer temperate areas of the world.
Risso's dolphin		Risso's dolphins have a cosmopolitan distribution in oceans and seas throughout the world from latitudes 60°N to 60°S. They occur in the nearshore waters of the Gulf of Mexico.
Bottlenose dolphin		Bottlenose dolphins are found in temperate and tropical waters around the world ranging from latitudes of 45°N to 45°S including the nearshore waters of the Gulf of Mexico.

COMMON NAME	ENDANGERED SPECIES STATUS	USE OF GULF
Atlantic spotted dolphin		Atlantic spotted dolphins occur throughout the warm temperate, subtropical, and tropical waters of the Atlantic Ocean. They occur in the nearshore waters of the Gulf of Mexico.
Pantropical Spotted dolphin		The species can be found in all oceans of tropical and subtropical climate worldwide.
Spinner dolphin		The species can be found in all tropical and subtropical oceans. In most places, spinner dolphins are found in the deep ocean.
Clymene dolphin		Clymene dolphins have a widespread distribution throughout the warm waters of the equatorial Atlantic Ocean. They only occur in deepwater (820-16,400 ft).
Striped dolphin		Striped dolphins have a cosmopolitan distribution. They are mainly found in tropical and warm temperate waters seaward of the continental shelf from 50°N to 40°S. This species occurs in the U.S. off the west coast, in the northwestern Atlantic, and in the Gulf of Mexico.
Fraser's dolphin		Fraser's dolphins have a cosmopolitan distribution from 30°S to 30°N, and live in deep, tropical waters.
Manatees		
West Indian Manatee	E/D	The manatee population in the U.S. is concentrated in Florida. Throughout most of Florida, manatees can be found in shallow, slow-moving waters of rivers, estuaries, bays, canals, and coastal areas where seagrass beds thrive.

E = Endangered as designated under the ESA.
D = Depleted as designated under the MMPA.
Note: Blank cell denotes that there is no Federal listing status for a species.
Source: NOAA 2011.

3.3.2.8 Birds

Many species of birds spend all or a portion of their life cycle along the Gulf of Mexico using a variety of habitats at different stages. Major groups of birds that inhabit the northern Gulf of Mexico include waterfowl and other water-dependent species, pelagic seabirds, raptors, colonial waterbirds, shorebirds, secretive marsh birds, and passerines. This section has been organized and subdivided to convey information on groups of birds that may be found at various times in these habitats. Several species have been presented in more detail within each of the major groups of birds discussed. Some species have been selected because they, or a large proportion of their population, are restricted to the habitats of the northern Gulf of Mexico region during all or part of the year. Other species described are considered of conservation concern by Federal or State agencies.

Many bird species migrate between breeding and wintering habitat in the northern Gulf of Mexico. Parts of the Central, Mississippi, and Atlantic Flyways (well-described routes between wintering grounds and summer nesting grounds) are used by hundreds of millions of birds that converge on the Gulf Coast where they either migrate along the northern Gulf Coast before reaching their destination on the Gulf of Mexico; follow the Mexico-Texas coastline (circum-Gulf migrants); or cross the Gulf of Mexico between Mexico's Yucatan Peninsula and the Texas Coast (trans-Gulf migrants) (TPWD 2011). Major migratory flyways are shown in Figure 3-6. The largest concentration of northbound migrating birds crosses the Gulf of Mexico reaching the northern Gulf of Mexico shoreline between the northern Texas coast and the Florida Panhandle (Morrison 2006).

Many of the bird species considered to be of conservation concern are also listed in wildlife action plans developed by the five states along the northern Gulf Coast. Species are listed as Species of Greatest Conservation Need (SGCN) due to limited distributions and are restricted by requirements for habitat, nesting, or diet. Additional discussion of bird ecology is found in Appendix A.6. There are a variety of stressors that impact birds in the Gulf of Mexico including human actions related to development, agriculture, or forestry and natural factors such as disease. Stressors may affect key ecological requirements such as habitat quality and availability, foraging quality and opportunities, and breeding success.

Description and Ecological Importance

This section presents an overview of the significance of the northern Gulf Coast to some groups of birds and the bird species found within the region, particularly those present within the habitats along the northern Gulf Coast and pertinent to Early Restoration.

Waterfowl and Other Water-dependent Species

Waterfowl include swans, geese, and ducks that migrate from summer nesting areas in the northern U.S. and Canada along flyways to wintering grounds along the northern Gulf Coast, as well as resident waterfowl species that breed and inhabit the Gulf region year round (e.g., mottled duck and whistling-ducks). In addition to waterfowl, other water-dependent birds of the northern Gulf Coast region include loons, grebes, seabirds, pelicans, cormorants, colonial waders, marsh birds, shorebirds, gulls and terns.

The coastal marshes of Louisiana, Mississippi, and Alabama provide winter habitat for more than half of the wintering duck population using the Mississippi Flyway while the coastal wetlands of Texas provide wintering habitat for more than half of the Central Flyway waterfowl population (Esslinger and Wilson 2002). As a result, the northern Gulf Coast provides wintering habitat for large continental populations of several waterfowl species including: 95% of gadwall, 80% of green-winged teal, 80% of redhead, 60% of lesser scaup, and 25% of northern pintail. In addition, the northern Gulf Coast provides year-round habitat for 90% of the mottled duck population in North America and is a key breeding area for whistling-ducks (Esslinger and Wilson 2002).

Pelagic Seabirds

Pelagic bird species (seabirds) live most of their lives in open marine waters, roosting and feeding at the water surface the entire year. In the breeding season, mature adults return briefly to nesting areas on islands or along coastlines. Nesting of pelagic species in the Gulf of Mexico region is very limited and includes only a few locations containing tern colonies. Seabirds regularly observed within the Gulf of Mexico include petrels, shearwaters, storm-petrels, tropicbirds, frigatebirds, boobies, gannets, phalaropes, gulls, terns, skuas, and jaegers (Ribic et al. 1997; McKinney 2009; Peake and Elwonger 1996). Some gull and tern species are also considered pelagic species; however, as colonial nesting species they are discussed separately below.

Raptors

Raptors that occur along the northern Gulf Coast include vultures, osprey, owls, kites, hawks, harriers, caracaras, eagles, and falcons. Raptors may be found as year-round residents, migrants, and wintering species. As a group, raptors prey on other birds, mammals, reptiles, amphibians, fish, carrion, and many invertebrates. Some species feed on a variety of prey items (red-tailed hawk) while other species such as Cooper's hawk have a narrow range of prey (Sibley 2001). Vultures and crested caracara are primarily scavengers. Many species of raptors construct nests of vegetation off the ground in trees; however, several species construct nests on bluffs, cliffs, or man-made structures, use nests of other species, or nest in cavities (Sibley 2001).

Colonial Waterbirds

Colonial waterbirds nest in social nesting groups (colonies) often containing a mix of species of a similar group (e.g., a wading bird colony may include multiple species of herons and egrets). This guild consists of two principal groups: wading birds (e.g., herons, egrets, ibises) and ground- or beach- nesting species (e.g. terns and gulls). Ground-nesting species can be further divided into species that feed in pelagic (open water) habitats such as cormorants, gulls, and terns and shorebirds that usually feed in open shoreline habitats. Shorebirds are described in more detail later in this section. All three groups feed mostly on aquatic organisms, and as a result, nesting colonies are usually concentrated within appropriate coastal habitats. The location and size of nesting colonies depend directly on the presence of predators, suitable nesting habitat and adequate food availability (Duke and Kruczynski 1992).

Colonies of wading birds may also be referred to as "rookeries" or "heronries." Wading birds are those birds with long legs, long necks, and long bills that allow them to forage in shallow water, probing or actively capturing fish, frogs, aquatic insects, crustaceans, and other prey (Terres 1991). Wading bird families found along the Gulf Coast include herons and egrets, storks, ibises and spoonbills, and cranes. Typical wading bird species include great blue heron, great egret, snowy egret, little blue heron, and tricolored heron. Reddish egret and roseate spoonbill are two species within the U.S. restricted in range to habitats in the Gulf Coast. Colonial-nesting species that feed in open water include cormorants, gulls, terns, and pelicans. These species actively pursue prey (generally fish) by plucking them from the surface or diving underwater to capture fish.

Shorebirds

Shorebirds are generally restricted to coastline and inland water margins (e.g. beaches, mudflats, shallow wetlands). The Gulf Coast contains some of the most important shorebird habitat in North America. Many of these species stop to rest and forage during migration flights or spend the winter in nearshore habitat along the Gulf Coast. For migrating and wintering shorebirds traveling to central and South America, the wetlands and barrier islands of this region provide critical food resources necessary to survive their migration to and from their wintering grounds in South America (Withers 2002). According to the *U.S. Shorebird Conservation Plan* (Gulf Coastal Prairie Working Group 2000) for the Lower Mississippi/Western Gulf Coast Shorebird Planning Region, the Gulf Coast provides breeding, wintering, and migratory habitat for 39 species of shorebirds, and the Gulf Coast is considered to be of extremely high importance to 14 species and of considerable importance to 21 species.

The northern Gulf Coast provides habitat for colonial ground- or beach-nesting shorebird species that breed on beaches, flats, dunes, bars, barrier islands, and similar nearshore habitats. Shorebirds that breed along the Gulf Coast include plovers, oystercatchers, willets, avocets, and stilts.

Marsh Birds

"Marsh bird" is a general term for birds that live in or around marshes and swamps. Along the Gulf Coast, bird species found in salt and freshwater marshes include grebes, bitterns, rails, gallinules, limpkin, and passerines exemplified by marsh wren, sedge wren, and several Ammodramus sparrow species. Some are year-round residents, but most marsh birds in this region are northern breeders that winter in Gulf Coast marshes. Some of these species (Black rail, Yellow Rail, Sedge Wren, Nelson's Sparrow) have a large percent of their population that is dependent on the marsh habitat in the Gulf region for overwintering.

Passerines

Passerines (e.g., flycatchers, vireos, crows, swallows, chickadees, nuthatches, wrens, thrushes, warblers, sparrows, tanagers, grosbeaks, blackbirds, and finches) and near passerines (e.g., pigeons, doves, cuckoos, owls, nightjars, swifts, hummingbirds, kingfishers, and woodpeckers) encompass the majority of land bird species. Many species are neotropical migrants that use a variety of nesting habitats in North America and winter in the Caribbean and Central and South America. As with shorebirds, the northern Gulf Coast is an important stopover for migrating passerines and near passerines providing resting and foraging habitat.

Distribution

The range of habitats along the Gulf Coast within each bordering state promotes bird diversity. Many species of birds spend all or a portion of their life cycle along the Gulf Coast using a variety of habitats at different stages. For example, gull and tern species nest onshore but feed offshore where food is abundant, returning with food for their young, and neotropical migrant passerines nest in wetlands, forests, and prairies of northern states and Canada, stopping to rest and forage along the Gulf Coast during spring and fall migrations. Waterfowl that spend the breeding season in wetlands and prairie potholes of the Great Plains, and shorebirds that breed inside the Arctic Circle, may spend the winter along the Gulf Coast. Additionally, many bird species remain year-round using Gulf Coast habitats to nest and raise young.

Threatened and Endangered Bird Species

Species of birds that inhabit or frequent the northern Gulf of Mexico that are listed as endangered or threatened under the ESA include: wood stork, Everglade snail kite, aplomado falcon, Mississippi sandhill crane, whooping crane, piping plover, least tern, and roseate tern (USFWS 2012b) (Table 3-5). The endangered aplomado falcon is being re-introduced to the coastal savannahs along the Gulf of Mexico on the Coastal Bend and Lower Coast of Texas as well as in west Texas. Yellow rail, Black Rail, Nelson's sparrow, and the seaside sparrow species complex are all secretive marsh bird species that are USFWS Bird Species of Conservation Concern and considered as Species of Greatest Conservation Need in Gulf States. The white-tailed kite, red-shouldered hawk, and crested caracara are also USFWS Birds of Conservation Concern.

Table 3-5. Threatened and endangered birds of the Gulf of Mexico.

COMMON NAME	FEDERAL STATUS	USE OF GULF
Aplomado Falcon	Endangered	This species breeds from Cameron to Calhoun County in the extreme southern portion of the Texas Gulf Coast; birds outside of this area are rare.
Everglade snail kite	Endangered	This species is a year-round resident in a small area of the extreme southern portion of the Florida Gulf Coast.
Least tern	Endangered	This species breeds throughout the entire Gulf of Mexico in coastal areas of all five states. A few populations also winter in the Gulf.
Mississippi sandhill crane	Endangered	A portion of this species is present year-round in Mississippi, but most birds use areas across the entire Gulf Coast primarily as a winter habitat.
Piping plover	Endangered	The winter range for this species covers portions of all five Gulf states.
Roseate tern	Threatened	This species has breeding grounds in the Florida Keys.
Whooping crane	Endangered	The only self-sustaining natural, wild population of this species winters at the Aransas National Wildlife Refuge along the Texas Gulf Coast.
Wood stork	Endangered	A portion of this species is present year-round along the Florida Gulf Coast. The entire population disperses to areas throughout the Gulf Coast post-breeding.

Federal and State agencies are defining and outlining bird conservation plans and initiatives using an integrative and regional approach primarily based on the lists of *Birds of Conservation Concern 2008* (USFWS 2008). These lists present species, subspecies, and populations of all migratory nongame birds that without conservation actions, could become candidates for listing under the ESA (USFWS 2008). The goals of these lists are to conserve avian diversity and to prevent or remove the need for additional ESA listings by implementing conservation and management actions (USFWS 2008).

3.3.2.9 Terrestrial Wildlife

A wide variety of terrestrial wildlife species are found in the northern Gulf Coast region, including invertebrates, insects, reptiles, and mammals ranging from voles to panthers. This section includes descriptions of a few species that are found in terrestrial habitats in the northern Gulf of Mexico. These examples include diamondback terrapin, beach mice, American alligator, otter, and mink that live in coastal, riparian and upland areas. Additional terrestrial wildlife species are described in Appendix A.6.

Description and Ecological Importance

Diamondback terrapins are believed to be the only turtle in the world that lives exclusively in brackish water habitats (e.g., tidal marshes, estuaries, and lagoons) (Griffin et al. n.d.). This species primarily forages on fish, invertebrates (e.g., snails, worms, clams, crabs), and marsh grass. Nesting for the species occurs within sandy beach and/or shell habitats. Diamondback terrapins have received “species of special concern” status in many states including Alabama, Mississippi, and Louisiana, where a number of conservation programs including re-introduction efforts are currently underway.

There are five species of beach mice in the northern Gulf of Mexico: Choctawhatchee, Alabama, Perdido Key, St. Andrew, and Santa Rosa. Beach mice in general exhibit typical nocturnal behavior (Wolf and Esher 1978 as cited in USFWS n.d.a). Beach mice appear to inhabit a single home range during their lifetime (Blair 1951 as cited in USFWS n.d.a) and the sizes of home ranges vary among species/subspecies. The primary and secondary dunes (frontal dunes) are considered optimal beach mouse habitat since it is where the mice were thought to reach their highest densities (Blair 1951, Meyers 1983, and Holler 1992 as cited in USFWS n.d.a). The scrub dunes appear to serve as refugia for beach mice during and after a tropical cyclone event (Holliman 1983 and Swilling et al. 1998 as cited in USFWS n.d.a).

Although they have a limited range, beach mice play an important role in the northern Gulf ecosystem. They consume plant material (e.g. seeds from sea oats, coastal panic grass, sea rocket, and other primary dune species) and invertebrates and serve as prey for predators, such as carnivorous mammals, snakes, and birds of prey (Borden 2005). In addition, beach mice help plant communities by dispersing seeds (Borden 2005).

Main stressors that negatively impact beach mice include severe storms that destroy habitat and drown mice in their burrows, coastal development and loss of dunes, and predators (e.g., domestic cats and red fox) (Borden 2005). The present-day distribution of the Alabama beach mouse is greatly reduced due to habitat loss and fragmentation associated with residential and commercial real estate development. This fragmenting isolates the remaining populations and substantially increases their vulnerability to the effects of tropical storms, weather cycles, predation, and other environmental factors (Holliman 1983 as cited in ADCNR 2011a).

American alligators are an important part of the environment; not only do they control populations of prey species, they also create peat and "alligator holes," and in this process create habitat that is invaluable to other species (Britton 1999 as cited in Schechter and Street 2000). These animals are carnivores with a diverse diet including fish, snails, birds, frogs, turtles, and mammals near the water's edge (Pajerski et al. 2000).

North American river otters feed on fish, frogs, crayfish, mollusks, and small mammals (Smithsonian National Zoological Park n.d.). River otters are ecologically significant due to their importance in the food-web where they help to control prey populations (Capital Regional District 2012).

American mink are also important due to their role in the freshwater food chain. They are found in water habitats mostly associated with coniferous and mixed forest. Grasslands are also suitable habitat if open water or marshland is present nearby (Sullivan 1996). The American mink is a carnivore, feeding on fish, crayfish, waterfowl, and small mammals.

Stressors affecting terrestrial wildlife in the northern Gulf of Mexico include habitat loss and degradation, pollution, invasive species, and climate change. Terrestrial invasive plant species can alter habitat for wildlife by out-competing native species and reducing suitable habitat. Terrestrial invasive animal species range from invertebrates (e.g., invasive red fire ants) to mammals (e.g., feral hogs) and can prey upon and compete with other wildlife species and alter habitat through their foraging techniques and other behaviors (e.g., rooting of feral hogs).

Distribution

Terrestrial wildlife species are distributed throughout the northern Gulf Coast region. Briefly, this section reviews the distribution of the highlighted species described above. Diamondback terrapins are found along the Atlantic Coast of the eastern U.S. from Cape Cod to the Florida Keys, and west along the northern Gulf Coast to Texas (Griffin et al. n.d.). Beach mice are found in Florida and Alabama. Choctawhatchee beach mice are found in Florida and the Alabama beach mouse is found along the coastal dunes of Baldwin County, Alabama, from the western tip of Fort Morgan Peninsula eastward to the Perdido Bay inlet, including Ono Island (ADCNR 2011a). The distribution of the Perdido Key beach mouse is restricted to Perdido Key, which is a narrow barrier island and contains only limited areas of scrub habitat. The Perdido Key beach mouse can be found in the frontal dunes of the Key to within several feet of the northern bay (ADCNR 2011b). The St. Andrew beach mouse habitat extends from the East Crooked Island in Bay County, Florida, southward along the mainland coastline adjacent to St. Joseph Bay, to St. Joseph Peninsula and east to Money Bayou along the Gulf of Mexico in Gulf County, Florida (Bowen 1968 and James 1992 as cited in USFWS n.d.a). American alligators are found within the great river swamps, lakes, bayous, marshes, and other bodies of water along the northern Gulf and Lower Atlantic Coastal Plains (Conant and Collins 1991). American mink range throughout the Gulf Coast region. They prefer small streambanks, lakeshores, and marshes and favor forested wetlands with abundant cover such as shrub thickets, fallen trees, and rocks (DeGraaf and Yamasaki 1986). The North American river otter can be found throughout the Gulf Coast region with the exception of the southwest Texas coast (Smithsonian National Museum of Natural History n.d.).

Threatened and Endangered Bird Species

Beach mice of Florida and Alabama are listed as endangered on the U.S. Endangered Species List. At the time of its listing as endangered by the USFWS in 1986, the only known population of the Perdido Key beach mouse was at Florida Point on Perdido Key. By 1986, the number of mice remaining was believed to be less than 30 animals, earning it the unfortunate designation as the “Most Endangered Small Mammal in North America” (ADCNR 2011b). Predation by domestic cats contributed significantly to the demise of this population. Starting in 2000, a new population was reestablished on Perdido Key State Recreation Area (ADCNR 2011b). In 2010, a population of Perdido Key beach mice was reestablished at Florida Point by translocation. Currently the Perdido Key beach mouse resides in its historical range on Perdido Key including public and private lands throughout the island (USFWS 2012c). Information on the threatened and endangered status of terrestrial species not discussed above can be found in Appendix A.6.

3.4 Human Uses and Socioeconomics

The human environment, as defined by the Council on Environmental Quality (CEQ) describes the relationship between people and the environment (40 C.F.R. § 1508.14). Socioeconomics is an umbrella term used to describe the interactions between social systems and the economy. The economic structure of a location affects the livelihoods of the people who live there, impacting their communities and their sense of place. Only basic information about the social and economic make-up of the Gulf Coast region is described in this document because socio-economic interactions can be difficult to describe and predict at the programmatic level; further socio-economic information is provided at the project-specific level (Chapters 8-12).

Millions of people live, work, and recreate in the northern Gulf of Mexico region, and therefore, rely on the natural and physical resources the Gulf's environment provides. In 2009, the total economy of the Gulf of Mexico region supported over 22 million jobs (17.2% of all jobs in the U.S.), and produced over $2 trillion in GDP (16.7% of all GDP produced in the U.S.). In the same year, six ocean-dependent sectors of the regional economy (living marine resources, marine construction, marine transportation, offshore mineral extraction, ship and boat building, and marine-related tourism and recreation) accounted for 480,000 jobs (2.2% of all jobs in the region) and produced about $100 billion in GDP (4.3% of total regional GDP) (NOAA 2012d).

Land use in the region comprises a heterogeneous mix of industrial activities: manufacturing, marine, shipping, agricultural, and petrochemical industry activities; recreation; and tourism. Along the northern Gulf Coast there are numerous state-managed, protected areas and recreational sites (such as State Parks and beaches) as well as units of both the National Park Service (NPS) and the USFWS.

This section briefly provides an overview of the socioeconomic conditions in the region, including cultural and aesthetic resources, infrastructure, and the land and marine management activities that are pertinent to Early Restoration. In addition, it describes aesthetic and visual resources of the northern Gulf Coast region, and generally characterizes public health and safety issues, including flood protection.

Note: As with the above discussion of natural resources, and natural resource services, in the northern Gulf of Mexico, the following discussion of human uses and socioeconomics of those resources and services is not intended to be a precise, definitive, or complete survey of those human uses or socioeconomics, nor is citation to a particular source meant to suggest a preference for the information in that sources vis-à-vis other sources of similar information. Rather, the following discussion is intended to give a general sense of the type and scale of those human uses and socioeconomics. The comprehensive NRDA currently under development by the Trustees may provide a more definitive accounting of some or all of those human uses and socioeconomics.

3.4.1 Socioeconomics and Environmental Justice

The demographic description of the region is focused on the counties/parishes that predominate the coastal environment.

The population of the Gulf coastal counties and parishes was nearly 17 million in 2010 according to the U.S. Census. Table 3-6 summarizes 2010 Census data on population size and change in population in the region. Four Gulf of Mexico counties have more than 500,000 residents: Lee, Pinellas and Hillsborough counties, Florida; and Harris County, Texas.

For additional demographic information on race, ethnicity, employment, income, poverty, education, language, and place of birth, see Appendix A.7.

Table 3-6. Population data for coastal counties in Texas, Louisiana, Mississippi, Alabama, and Florida.

GEOGRAPHIC AREA	TOTAL POPULATION	CHANGE IN POPULATION 2000-2010
Texas Coastal Environment Counties	6,197,133	17.3%
State of Texas	25,145,561	20.6%
Louisiana Coastal Environment Parishes	2,215,459	-1.4%
State of Louisiana	4,533,372	1.4%
Mississippi Coastal Environment Counties	370,702	1.8%
State of Mississippi	2,967,297	4.3%
Alabama Coastal Environment Counties	595,257	10.2%
State of Alabama	4,779,736	7.5%
Florida Coastal Environment Counties	7,434,861	19.0%
State of Florida	18,801,310	17.6%
Coastal Environment Counties and Parishes Total	16,813,412	14.5%
Data Source: U.S. Census Bureau 2010.		

Executive Order 12898 (Feb. 11, 1994) states that, to the greatest extent practicable, federal agencies must "identify and address, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations." To this effect, the Council on Environmental Quality (CEQ) has issued guidance directing federal agencies to analyze the environmental effects, including human health, economic, and social effects, of their proposed actions on minority and low-income communities when required by NEPA (CEQ 1997). CEQ has defined members of minority populations to include: American Indian or Alaskan Native; Asian or Pacific Islander; Black, not of Hispanic origin; or Hispanic. Low income populations for this analysis were determined based on the U.S. Census Bureau 1999 poverty thresholds (U.S. Census Bureau 1999). The analyses in this ERP/EA comply with Executive Order 128898 and CEQ's guidance.

3.4.2 Cultural Resources

People have lived in the coastal region of the Gulf of Mexico for more than 10,000 years. Today many unique and diverse cultures call the Gulf coast home. These cultures, past and present, are often closely linked to the environmental and natural resources that comprise the Gulf Coast ecosystem, and which these projects seek to help restore. Cultural resources encompass a range of traditional, archeological, and built assets. Historic properties in the affected coastal communities date from both the prehistoric and historic periods.

The National Historic Preservation Act of 1966 (NHPA), as amended in 2000 (NHPA; 16 U.S.C. § 470(w)), defines a historic property as "any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion on the National Register [of Historic Places]." Historic properties encompass built resources (bridges, buildings, piers, etc.), landscapes, archeological sites, and traditional cultural properties (TCPs). TCPs are historic properties significant for their association with practices or beliefs of a living community that are both fundamental to that community's history and part of the community's cultural identity. These properties may be above ground, below grade, or submerged in waterways and include resources listed in, or eligible for listing in, the National Register of Historic Places (NRHP). Terrestrial cultural resources may include buildings, structures, sites, and objects. Cultural resources offshore may include shipwrecks, archeological sites, structures, or districts.

Archaeological, architectural, and Native American resources are protected by a variety of laws and their implementing regulations.[5]

Although TCPs are typically associated with Native American culture, such historic properties also may be associated with other ethnic groups or communities. TCPs may vary between rural and urban areas and even within the same ethnic group. Research and contact with appropriate groups is part of the identification of TCPs.

The NRHP is the official Federal list of historic properties and is maintained by the NPS. As of November 2011, more than 10% of the properties listed in the NRHP were located in the affected Gulf States (9,083 of the 86,255 properties). The NRHP is dynamic; the list is not comprehensive and does not include all properties that meet the criteria for significance and integrity. Listings are limited only to those historic properties that have been formally documented, nominated, and accepted for inclusion by the Keeper of the NRHP.[6]

3.4.3 Infrastructure

Components of physical infrastructure and public services include Federal, State, Tribal, parish, municipal, and/or private facilities that support development and protect public health and safety. The amount and placement of infrastructure and public service development depend heavily on population and migration patterns, and employment trends. The massive, regional transportation infrastructure comprises road and highway networks, mass transit systems, railways, canals, seaports, airports, and ferries, as well as bike and pedestrian paths. In the coastal environment, there are about 1,800 miles of interstate highways, more than 7,000 miles of major U.S. and state highways, and almost 6,000 miles of rail lines. In addition, the Energy Independence and Security Act of 2007 authorized “American's Marine Highway Program,” making the nation's waterways part of the surface transportation system. Flood control, water management, and navigational infrastructure are discussed under Section 3.4.11.

3.4.4 Land and Marine Management

Land and marine areas may be set aside for a variety of active and passive recreational purposes. Land may be managed for wildlife and habitat protection and conservation, and/or scenic, cultural, and historical values. Land management may be at the Federal, State, or local levels by private organizations. Figure 3-12 provides a map of public lands in the Gulf of Mexico Coastal States. The following sections describe land and marine management programs in more detail.

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[5] Federally, these include the NHPA as amended in 2000; the Archeological and Historic Preservation Act of 1974; the Archaeological Resources Protection Act of 1979; the American Indian Religious Freedom Act of 1978; the Native American Graves Protection and Repatriation Act of 1990; the Submerged Lands Act of 1953; the Abandoned Shipwreck Act of 1987; and the Sunken Military Craft Act. The Advisory Council on Historic Preservation (ACHP) further guides treatment of archaeological and architectural resources through the regulations, Protection of Historic Properties (36 C.F.R. § 800). Additional regulations and guidelines for shipwrecks include 10 USC 113, Title XIV for the Sunken Military Craft Act; the Abandoned Shipwreck Guidelines prepared by the NPS (NPS 2007); and the Guidelines for Archaeological Research Permit Applications on Ship and Aircraft Wrecks under the Jurisdiction of the Department of the Navy.

[6] The NRHP includes historic properties that possess significance and integrity applying the National Register Criteria for Evaluation (36 C.F.R. § 60(a-d)).

For marine management, the 1982 United Nations Convention on the Law of the Sea (UNCLOS) established the sovereign rights of coastal states beyond their land territory and internal waters, described as a territorial sea. The U.S. is not a party to the UNCLOS, but recognizes the treaty as customary international law. For regulatory purposes, State waters extend from the baseline to three nautical miles in Louisiana, Mississippi, and Alabama. In Texas and on the Gulf Coast of Florida, State waters extend to 9 nautical miles. Federal waters continue from the state seaward boundary to 200 nautical miles from the baseline (the limits of the Exclusive Economic Zone or EEZ) (Figure 3-12).[7] Marine areas are managed by different Federal, State, or private agencies for a range of different purposes including managing for marine mineral resources, protecting natural resources, and managing for recreational purposes. Marine Protected Areas (MPAs) are established and managed by all levels of government and include marine sanctuaries, estuarine research reserves, ocean parks, and marine wildlife refuges. MPAs may be established to protect ecosystems, preserve cultural resources such as shipwrecks and archaeological sites, or sustain fisheries production.

3.4.4.1 National and State Parks

This section includes a summary of State and National Parks, natural areas, recreational areas, and historical/cultural landmarks located along the northern Gulf of Mexico. Parks can be set aside as recreational, natural, or historical and cultural areas. Recreational areas provide leisure activities for visitors, including picnic areas, hiking, camping, biking, and water sports. Natural areas are minimally human influenced areas that are set aside to maintain the natural scenic, geologic, or ecological value of the area. Historical and cultural areas are set aside to preserve those values.

National Parks

The NPS preserves the unimpaired natural and cultural resources and values within the national park system for the enjoyment, education, and inspiration of this and future generations. In the northern Gulf Coast, these areas include Palo Alto Battlefield National Historical Park (Texas), Padre Island National Seashore (Texas), Jean Lafitte National Historic Park and Preserve (Louisiana), New Orleans Jazz National Historical Park (Louisiana), Gulf Islands National Seashore (Mississippi and Florida), DeSoto National Memorial (Florida), Big Cypress National Preserve (Florida), Everglades National Park (Florida), and Dry Tortugas National Park (Florida). Five of these parks are also recognized as MPAs: Padre Island National Seashore, Jean Lafitte National Historical Park and Preserve, Gulf Island National Seashore, Dry Tortugas National Park, and Everglades National Park.

[7] Application of the Oil Pollution Act can extend beyond 200 nautical miles if impacts exist seaward of that boundary.

State Parks

State parks include recreational areas, historic and cultural sites, and natural areas along the coasts of the five Gulf States.

The Texas Parks and Wildlife Department manages 106 sites throughout Texas, of which 78 are state parks, 19 are state historic sites, and 7 are natural areas. Total land cover of the parks spans over 600,000 acres. Of the historic sites, four are located along the Gulf Coast: Battleship *Texas*, Lipantitlan, Port Isabel Lighthouse, and San Jacinto Battleground. The Texas state parks along the Gulf Coast include, but are not limited to, Brazos Bend, Galveston Island, Goose Island, Lake Corpus Christi, Lake Texana, Mustang Island, Sea Rim, Sheldon Lake, Resca de la Palma, Estero Llano Grande, Bentsen-Rio Grande Valley, Port Isabel, and San Jacinto Monument. Galveston Island and Mustang Island are two of the most popular state parks along the Gulf Coast (TPWD n.d.a). The state parks provide outdoor recreation opportunities like hunting, fishing, swimming, camping, hiking, biking, and bird watching.

Louisiana's State Parks, Historic Sites, and Preservation Areas have been chosen for their scenery and historical, cultural, architectural, and/or archeological significance. The state manages 22 State Parks, 18 Historic Sites (State Commemorative Areas), and 1 Preservation Area. State parks along the Gulf Coast of Louisiana include Sam Houston Jones, Palmetto Island, Cypremort Point, Lake Fausse Pointe, Grand Isle, Bayou Segnette, St. Bernard, Tickfaw, Fairview-Riverside, and Fontainebleau. Fort Pike is one of the state's historic sites. Louisiana State Parks offer recreational opportunities for boating, camping, fishing, hiking, history and nature programs, and swimming. The State Parks are managed by the Louisiana Department of Culture, Recreation, and Tourism (LDCRT) (LDCRT 2011).

Mississippi's Department of Wildlife, Fish, and Parks, Parks Division, manages 25 state parks. There are two state parks located along the Gulf Coast of Mississippi, Shepard State Park and Buccaneer State Park. Buccaneer State Park provides recreational access to hiking trails, ocean fishing, beachcombing, bird watching, swimming, windsurfing, bike riding, and golfing. Buccaneer State Park was directly hit by Hurricane Katrina in 2005; however, the park was rebuilt with more than 275 campsites. Shepard State Park is a 395-acre park in Gautier, Mississippi. This park provides visitors with abundant trees, wildflowers, bike and nature trails, a disc golf course, and 28 campsites (Mississippi State Parks n.d.). Mississippi Department of Marine Resources manages approximately 30,000 acres of coastal preserve that are open for recreation. These areas are crucial coastal wetland habitat and are preserved in 20 different sites across the state.

The Alabama Department of Conservation and Natural Resources, State Parks Division, manages Alabama's State Parks. Alabama contains 22 state parks spanning over 38,000 acres. Alabama State Parks offer fishing, boating, swimming, camping, hiking, golfing, nature crafts, and horseback riding. There are two parks located along the Gulf Coast of Alabama, Gulf State Park and Meaher State Park. Gulf State Park is 6,150 acres along the coast of Alabama with 2 miles of beaches. The park provides a variety of amenities including campgrounds, a pool, a nature center, a fishing pier, a pavilion, cabins, cottages, and a golf course. Gulf State Park also originally contained a lodge and conference center, which were destroyed in 2004 by Hurricane Ivan. Meaher State Park is a 1,327 acre park located in the wetlands along Mobile Bay (ADCNR 2011c). Other public lands in the coastal area of Alabama include

Alabama Forever Wild Land Trust areas (including the Grand Bay), Mobile-Tensaw River Delta, Perdido River and Weeks Bay tracts, as well as a number of small state-owned islands.

The Florida Park Service manages 161 parks spanning 700,000 acres and 100 miles of sandy beaches. The Park Service also manages over 40,000 historic artifacts, 300 historic structures, and more than 1,800 archeological sites. There are 60 Florida State Parks along the Gulf Coast of Florida offering year-round outdoor activities from swimming and diving to birding and fishing or hiking. The goal of Florida State Parks is to provide visitors with a selection of diverse natural and cultural sites (FDEP 2011). Nearly all State parks listed as MPAs in the Gulf of Mexico are located in Florida waters. The largest State park listed as an MPA in the Gulf of Mexico is Anclote Key State Park, located 3 miles off Tarpon Springs, Florida. This park was established in 1960 focusing on conservation of natural heritage and sustainable production in the 18.5-square-mile area (NMPAC 2011b). The State park is made up of four islands, Anclote Key, North Anclote Bar, South Anclote Bar, and Three Rooker Island (Florida State Parks n.d.). Florida State Parks are administered by the Florida Department of Environmental Protection (FDEP). Additionally, FDEP's Florida Coastal Office oversees the State's 41 aquatic preserves, a unique system encompassing almost 2.2 million acres of recreationally and aesthetically important submerged lands, as well as some associated uplands.

3.4.4.2 Refuges and Wildlife Management Areas

National Wildlife Refuges (NWRs) and State Wildlife Management Areas (WMAs) located in the northern Gulf of Mexico provide habitat for marine and terrestrial wildlife. NWRs, managed by the USFWS, are lands and waters preserved for conservation, management, and restoration of fish, wildlife, and plant resources. State WMAs are wildlife lands managed by State agencies and set apart for recreational activities such as hiking, fishing, hunting, wildlife viewing, and other outdoor activities. In some states, WMAs may also be established to perform research on wildlife populations and habitats, and conduct education on sound resource management in addition to providing recreation opportunities.

National Wildlife Refuges

There are more than 40 NWRs located along the coastline or within the coastal environment of the northern Gulf of Mexico from Texas through Florida (Figure 3-13). Most refuges along the Gulf Coastline were established to provide wintering areas for ducks, geese, shorebirds, and other migratory birds and to provide habitat for other wildlife in general. Three associated NWRs in Mississippi and Alabama make up the Gulf Coast National Wildlife Refuge Complex. Twenty-three NWRs are also designated as MPAs. NWR MPAs protect endangered species, contain resting areas for migrating birds, provide suitable nesting habitats, and contain spawning sites for fish and shellfish species.

State Wildlife Management Areas

There are more than 130 state WMAs managed by Texas, Louisiana, Mississippi, Alabama, and Florida. State WMAs are rural landscapes set aside for wildlife and provide recreational opportunities that include hunting, hiking, and bird watching.

3.4.1.1 Land Trusts

A land trust is a local, regional, or national nonprofit organization that, as all or part of its mission, actively works to conserve land by undertaking or assisting in land or conservation easement acquisition, or by its stewardship of such land or easements. Land trusts have varying conservation objectives; some work in specific geographic areas or concentrate on protecting different natural, scenic, or cultural features. Most land trusts in the northern Gulf Coast region are focused on conservation of critical, natural habitat; some land trusts also promote educational and recreational opportunities. Land trusts can acquire land through purchase, donation, or by other means, and in some cases they subsequently transfer that land to a public agency. They can also protect land through other methods such as negotiating and preparing for acquisition by other organizations or agencies. A land trust can also protect land by accepting conservation easements and ensuring that the easement is effectively monitored.

3.4.4.3 Marine Protected Areas

According to Executive Order 13158, an MPA is defined as "any area of the marine environment that has been reserved by Federal, State, territorial, tribal, or local laws or regulations to provide lasting protection for part or all of the natural and cultural resources therein."

Most MPAs have a primary focus on conservation of natural heritage, while a few have a primary focus on sustainable production or cultural heritage (NMPAC 2010). Natural heritage MPAs are managed to conserve, restore, and understand the area's natural biodiversity, populations, communities, habitats, and ecosystem. A sustainable MPA supports the continued extraction of renewable, living resources but protects the area's habitat for feeding, spawning, mating, or nursery grounds. Cultural heritage MPAs are managed to protect, understand, and maintain the legacy of physical evidence and attributes of a group or society for future generations (NMPAC 2011a).

At present, there are approximately 295 MPAs, managed under different jurisdictions and regulations, located within the northern Gulf of Mexico region. These MPAs cover nearly 40% of the Gulf of Mexico U.S. marine waters (Figure 3-13). Roughly 77% of the Gulf of Mexico MPAs is managed by State governments, but the majority of the area within MPAs in the Gulf of Mexico is managed by Federal agencies. Table 3-7 lists the number of MPAs under Federal or Gulf State jurisdiction and the percent of MPA area by jurisdiction (NOAA 2011c). These MPAs are mostly controlled for fishery management by NMFS and the GMFMC (NMPAC 2011b). The MPAs in the Gulf of Mexico include areas located within the Gulf States, the National Estuarine Research Reserve (NERR) System, the NWR System, and two National Marine Sanctuaries. De facto Marine Protected Areas (DFMPAs) are marine areas that are established for reasons other than conservation, such as economic use, human health or safety, and protection of government or private property. The U.S. Coast Guard (USCG), U.S. Army, and U.S. Navy manage DFMPAs. Examples of DFMPAs include safety, security, and danger zones, restricted areas, prohibited lighting areas, some anchorage grounds, and traffic separation schemes (NOAA 2011d).

Table 3-7. Marine Protected Areas of the Gulf of Mexico.

	TEXAS	LOUISIANA	MISSISSIPPI	ALABAMA	FLORIDA	FEDERAL
Number of MPAs	19	17	21	7	217	33
Percent of Area (%)	<1	1	1	<1	4	95
Source: NOAA 2011c.						

National Estuarine Research Reserve System

The NERR System is a network of 28 areas representing different biogeographic regions of the U.S. that are protected for long-term research, water quality monitoring, education, and coastal stewardship. Established by the Coastal Zone Management Act of 1972, as amended, the reserve system is a partnership program between NOAA and the coastal states. NOAA provides funding, national guidance, and technical assistance. Each reserve is managed on a daily basis by a lead State agency or university, with input from local partners. Reserve staff work with local communities and regional groups to address natural resource management issues, such as nonpoint-source pollution, habitat restoration, and invasive species. Through integrated research and education, the reserves help communities develop strategies to deal successfully with coastal resource issues. Reserves provide long-term water quality monitoring as well as opportunities for both scientists and students to conduct research in a "living laboratory." Several NERRs are located in the northern Gulf of Mexico, including Mission-Aransas, Texas; Grand Bay, Mississippi; Weeks Bay, Alabama; Apalachicola, Florida; and Rookery Bay, Florida (NOAA 2011c).

National Marine Sanctuaries

The National Marine Sanctuaries were developed under the National Marine Sanctuaries Act (NMSA) as areas designated to protect areas of the marine environment with special national significance due to their conservation, recreational, ecological, historical, scientific, cultural, archeological, educational, or aesthetic qualities. National Marine Sanctuaries are areas or systems of marine protected areas developed to conserve, protect, and enhance their biodiversity, ecological integrity, and cultural legacy. The Flower Gardens Banks is the sole National Marine Sanctuary in the northern Gulf of Mexico. Day-to-day management of national marine sanctuaries has been delegated by the Secretary of Commerce to NOAA's Ocean Service Office of National Marine Sanctuaries (NOAA 2013b). A map of marine sanctuaries is presented in Figure 3-13.

3.4.5 Tourism and Recreational Use

Many tourism and recreational opportunities are centered on or around the northern Gulf of Mexico, and are therefore dependent on a clean, healthy Gulf ecosystem. Outdoor recreation, broadly defined, is any leisure time activity conducted outdoors for pleasure or sport, including activities from wilderness camping to watching outdoor performances. This section describes examples of recreational pursuits in the region, including onshore and offshore wildlife observation, hunting, beach and other waterfront use, boating, and recreational fishing.

3.4.5.1 Wildlife Observation

The northern Gulf of Mexico region includes a diverse array of species and ecosystems, providing many opportunities for wildlife observation. The region is an important migratory bird flyway, and an important wintering ground for many avian species. Beaches in the region are nesting grounds for several species of sea turtles, and the waters of the Gulf itself are home to many species of marine mammals. Residents and visitors recreate by observing these species in their natural habitat.

3.4.5.2 Hunting

The USFWS estimates that in 2011, almost 3 million hunting visits were conducted in Gulf Coast states (See Table 3-8). While some hunting typically occurs inland, waterfowl and alligator hunting often occur in coastal areas in the northern Gulf Coast region. Across Gulf States, hunters averaged at least 13 days of hunting in 2006. Hunters utilize all different types of habitats (e.g., wetlands, coastal forests, etc.) around the Gulf. Hunters also rely on healthy populations of the game they are hunting to have successful hunting trips.

Table 3-8. Number of hunting visits in Gulf Coast States in 2011.

STATE	TOTAL NUMBER OF HUNTING VISITS
TEXAS	1,147,000
ALABAMA	535,000
FLORIDA	242,000
MISSISSIPPI	483,000
LOUISIANA	277,000
TOTAL	2,684,000
Source: USFWS, 2011.	

3.4.5.3 Beach and Waterfront Recreation (swimming, sightseeing, etc.)

Visitors to northern Gulf Coast beaches can participate in a range of activities from simply visiting a beach to swimming, snorkeling, wakeboarding, or surfing. Enjoyment of these activities requires clean and healthy shorelines and water resources. Visiting beaches was identified as the most popular recreation activity in the National Survey on Recreation and the Environment, conducted in 2000 (Lee worthy 2001), while participation in swimming, snorkeling, or diving was almost as popular. In addition, water sites other than beaches (e.g., coastal wetlands) also attracted hundreds of thousands of participants in the northern Gulf Coast region.

3.4.5.4 Boating

The northern Gulf coastal environment, with its nearly 2,000 miles of shoreline and 600,000 square miles of open water presents abundant opportunities to sail, motorboat, jet-ski, canoe, and kayak. In 2009, there were a total of 300 marinas in the region.

The online Coastal Travel Guide provides a list of public boat ramps and fishing piers for each coastal county along the Gulf Coast (Coastal Travel Guide 2012) (Table 3-9). Public boat ramps and piers are found throughout the coastal environment.

Table 3-9. Public boat ramps and fishing piers.

GEOGRAPHIC AREA	# PUBLIC RAMPS	# PIERS
Texas Coastal Environment	80	26
Louisiana Coastal Environment	89	3
Mississippi Coastal Environment	47	31
Alabama Coastal Environment	29	6
Florida Coastal Environment	341	96
Total for Coastal Environment	586	162
Source: Coastal Travel Guide 2012. Data are current as of October 2012.		

3.4.5.5 Recreational Fishing

Recreational fishing in the northern Gulf of Mexico region occurs onshore from one of the public fishing piers or stone jetties that flank the inlets and passes, or offshore from boats in waters that might be over 1,000 feet deep. Common nearshore locations include bridges and highway structures, open passes or inlets, along river or stream banks, mangrove and cypress swamps, hard-bottom structures including natural or artificial reefs and oyster beds, and around aids to navigation. Offshore recreational fishing includes the use of charter boats, headboats, and private boats. Offshore anglers pursue reef and other bottom fish and catch and release species.

Catch data indicate that U.S. marine recreational fishing activity (number of fishing trips per year) increased by over 20% in the years from 1996 to 2000, with nearly one third of this growth occurring in the Gulf of Mexico.

More than 30 million fish were harvested by recreational anglers in the Gulf of Mexico in 2009 as reported in the 2011 NOAA Fisheries summary. Key recreational species targeted in the Gulf of Mexico include Atlantic croaker, Gulf kingfish, southern kingfish, sand seatrout, silver seatrout, spotted seatrout, sheepshead porgy, red drum, red snapper, southern flounder, Spanish mackerel, and striped mullet (NOAA Fisheries Service 2011e). Targeted species vary from state to state (Table 3-12). In Texas, Louisiana, and Florida, spotted seatrout was the most commonly harvested species, while in Mississippi and Alabama, sand and silver seatrout were the most commonly harvested fish. Recreational fishers also target oysters, scallops, shrimp and blue crabs in the northern Gulf of Mexico.

3.4.5.6 Tourism

The natural and cultural resources of the Gulf provide a wide range of recreational destinations and tourist attractions that fuel local economies. Outdoor recreationists make millions of trips per year to the Gulf Coast. NMFS has estimated that, in 2006, the tourist industry contributed 620,000 jobs and more than $9 billion in wages to the Gulf of Mexico region (Gulf-At-A-Glance, GOMA 2008). Economic activity from the tourism and recreation sector is important to the northern Gulf Coast region.

3.4.5.7 Museums, Cultural Resources, and Education Centers

The Gulf Coast region offers access to museums, cultural resources, and education centers, and a great number of these facilities are focused specifically on the Gulf ecosystem itself. These organizations can benefit Gulf Coast residents through their work to protect the environment and the diversity of ecosystems found in and around the Gulf through research and education. They also provide eco-tourism opportunities for visitors to the region.

There are a number of museums and institutes that are tourist destinations unique to the northern Gulf Coast states. These facilities generally combine ecological and nature based education with research and conservation activities. They provide not only unique tourist opportunities but important outreach services as well. These facilities include, but are not limited to, the National Butterfly Center located in Mission, Texas; the World Birding Center in McAllen, Texas as well as its affiliate sites scattered throughout the coastal-Rio Grande Valley area; the Audubon Nature Institute facilities in New Orleans, Louisiana; the Institute for Marine Mammal Studies, INFINITY Science Center at Stennis, Mississippi; Center for Marine Education and Research in Gulfport, Mississippi; Gulf Coast Research Laboratory of the University of Southern Mississippi, Ocean Springs, Mississippi; and the Dauphin Island Sea Lab and Five Rivers Delta Resource Center, Alabama. Area organizations and local governments also offer opportunities for science-based educational outreach experiences for visitors via local nature centers, preserves, and sanctuaries. Organizations offering these opportunities include the Gulf of Mexico Sea Grant Programs, National Audubon Society, The Nature Conservancy, Louisiana Universities Marine Consortium (LUMCON), Conservancy of Southwest Florida, and the Gulf of Mexico Alliance – Environmental Education Network.

The northern Gulf Coast region also hosts a wide range of interesting publicly and privately-owned historical areas that illustrate the area's rich and complex history. These include, but are not limited to, plantation homes, civil war battlegrounds, and structures representing pre- and post-antebellum architecture.

3.4.6 Fisheries

Commercial fisheries represent a multi-billion dollar industry to the northern Gulf Coast region and have traditionally included finfish, shrimp, oysters, and crabs. The following sections include information on the volume and value of fish landed, the number of establishments, employees and payroll, and the economic impacts of the seafood industry and commercial fishing.

3.4.6.1 Commercial Fishing

State, federal, and international agencies regulate fishery resources within their jurisdiction. For species that are not managed by federal regulations, states have the authority to extend state rules into federal waters for residents of that state or vessels landing a catch in that state.

The shrimp, reef fish, and highly migratory species (HMS) fisheries are discussed in more detail below. While these do not encompass all the fisheries or fisheries gear operating in the northern Gulf of Mexico, they are most important to the discussion of potential Early Restoration actions.

The GMFMC is tasked with developing fishery management plans (FMPs) in order to manage fish resources in the Gulf of Mexico from the state territorial waters to the Exclusive Economic Zone (EEZ). (GMFMC n.d.). Several plans are managed jointly with the South Atlantic Fisheries Management Council (SAFMC). There are seven FMPs under the jurisdiction of the GMFMC:

- Migratory Pelagic Management Plan (jointly managed with SAFMC)

- Spiny Lobster Management Plan (jointly managed with SAFMC)
- Reef Fish Management Plan
- Shrimp Fishery Management Plan
- Red Drum Management Plan
- Coral Fishery Management Plan
- Aquaculture Management Plan (implementing regulations are in development)

The FMPs provide detailed information on the biology, distribution, habitat associations, life history characteristics, migratory patterns, spawning characteristics, and nursery areas, and include detailed EFH maps for species they cover.

The shrimp fishery is the dominant fishery in the northern Gulf of Mexico. The estuarine-dependent white, pink, and brown shrimp species, seabobs, and rock shrimp make up the Gulf of Mexico shrimp catch. The fishery in federal waters is managed by NOAA and the GMFMC, who attempt to coordinate management actions with state management programs. The Gulf of Mexico shrimp fishery has been declared overcapitalized and is presently subjected to a moratorium on new permits, which the GMFMC says will assist the economic recovery of the fishery (GMFMC undated, GMFMC undated2, GMFMC 2005).

The GMFMC manages snappers, groupers, tilefishes, jacks, gray triggerfish, and hogfish under the reef fish fishery management plan. Components of the reef fish fishery are managed singly or as separate groups. HMS including tuna, billfish, sharks, and swordfish are managed domestically by the National Marine Fisheries Service under the Magnuson-Stevens Fishery Conservation and Management Act and the Atlantic Tunas Convention Act. Current swordfish regulations for U.S. fishermen include quotas, time area closures, retention limits, size limits, and gear specifications. The *Consolidated Atlantic Highly Migratory Species Fishery Management Plan* covers HMS in the Gulf of Mexico. International management of tuna and tuna-like species is conducted by the International Commission for the Conservation of Atlantic Tunas.

Many Gulf States also manage open access fisheries (e.g. Gulf menhaden) via a regional Fishery Management Plan under the auspices of the Gulf States Marine Fisheries Commission (GSMFC). The GSMFC was established by an act of Congress (P.L. 81-66) in 1949 as a compact of the five Gulf States to make recommendations to the governors and legislatures of the five Gulf States regarding the management of the fisheries.

The highest landings by pound of finfish were 1.2 billion in 2009 with an ex vessel value of nearly $151 million. The greatest shellfish landings were also in 2009 with more than 364 million pounds valued at nearly $493 million. The majority of the shellfish and finfish harvest and the highest landings value occurred in Louisiana from 2008-2010.

3.4.6.2 Shellfish Fishery

The Gulf of Mexico is the top shellfish-producing region in the nation. In each state, some areas of State-owned water bottoms are managed as public commercial oyster reefs and/or leased to commercial harvesters with harvest rules and regulations varying by state. Shellfish quality is monitored by states adhering to strict controls from the U.S. Food and Drug Administration on shellfish growing, harvesting, processing, packaging, and transport. In all states, harvest is subject to periodic closure of areas due to water quality concerns, as determined by the appropriate state public health agency.

In Texas, there are 43 oyster leases on 2,322 acres of bottom, all within the Galveston Bay system. The oyster lease system in Texas exists for the purpose of relaying oysters from restricted waters to leases to reduce the incentive for poaching in restricted water (TPWD 2012b).

As of March 2012, in Louisiana, LDWF administrated 7,888 oyster leases totaling 391,143 acres (LDWF 2012c). Lessees have exclusive use of the water bottom at their leases, and are allowed to harvest year round, without restrictions on the harvest methods (e.g., dredge size) used. There is no minimum size for oysters harvested on a private lease, but all sacks of oysters must be tagged with the lease number prior to sale. Areas that have been set aside as public oyster beds or for coastal protection, conservation, or restoration are not leased.

The Mississippi Commission on Marine Resources protects and conserves shellfish by regulating shellfish activities. There is limited use of oyster leases in Mississippi (MDMR 2012), and the Department of Marine Resources (DMR) manages 12,000 acres of public, commercial oyster reefs; NRDA Early Restoration funding in fall 2012 and spring 2013 restored 1,430 acres of reef. Approximately 97% of the commercially harvested oysters in Mississippi come from reefs in the western part of the Mississippi Sound, primarily from Pass Marianne, Telegraph, and Pass Christian reefs (MDMR 2011).

Alabama Department of Conservation and Natural Resources (ADCNR), Marine Resources Division is responsible for the management of Alabama's oyster reefs. Harvest is also regulated by the Alabama Department of Public Health. The total public reefs including historically harvested reef footprints cover approximately 5300 acres which includes reefs in Mississippi Sound and Portersville Bay.

In Alabama, private oyster beds adjacent to riparian and leased areas are harvested commercially. The area of the riparian and leased water bottoms in which these private, commercially harvested, oyster beds are found currently totals approximately 870 acres. Alabama's public oyster reefs are open seasonally to commercial and recreational harvest. Commercial harvest requires the harvester to have an annual oyster catcher's license. Oysters may be harvested recreationally without obtaining a permit or fishing license. Recreational harvesters are limited to 100 3" oysters per person per day and may harvest only in areas opened to commercial harvest. Harvest methods and practices are closely regulated by the state (ADCNR 2013).

Florida's Division of Aquaculture is responsible for leasing the submerged state lands and water column for producing aquaculture products (Florida Department of Agriculture and Consumer Service 2011), and wild harvest of shellfish is regulated by the Florida Fish and Wildlife Conservation Commission. As of March 2012, the State is administering 15 oyster leases on 661 acres, and 560 hardshell clam leases covering about 1,320 acres, along the state's Gulf Coast (Florida Division of Aquaculture 2012). Along Florida's Gulf Coast, the majority of oysters harvested are caught on public reefs (Florida Division of Aquaculture 2012). On private oyster leases, there is no size limit or closed season, and unlike harvest on public reefs, where only tonging is allowed, oysters on private leases can be dredged. Florida is the only Gulf State where clams are harvested on private leases (Florida Division of Aquaculture 2012).

3.4.6.3 Seafood Processing and Sales

After fish and shellfish are landed, they move into the seafood processing and sales industry. In 2009, thirty counties and parishes along the Gulf Coast had economic activity in this sector. There were a total of 86 establishments in the fish processing sector. In terms of employment and income, the restaurant sector contributed the most to employment and income of the seafood industry sectors in Texas, Louisiana, Mississippi, and Alabama. In Florida, the seafood importing and brokering sector generated more jobs and greater income than the restaurant sector. Restaurants also generated greater business sales than the other seafood industry sectors in Louisiana, Mississippi, and Alabama, but in Texas and Florida, business sales generated by seafood importing and brokering were greater than those for restaurants. In Texas, the seafood importing and brokering and restaurant sectors generated similar value added. In Mississippi and Alabama, the restaurant sector generated more value added than other seafood industry sectors, but the primary dealer/processor sector also generated significant value added. In Florida, the importing and brokering sector generated by far the greatest value added of any seafood industry sectors in that state.

3.4.7 Aquaculture

NMFS (2011f) defines aquaculture as "…the propagation and rearing of aquatic organisms in controlled or selected aquatic environments for any commercial, recreational, or public purpose." The Census of Aquaculture targets, "all commercial or noncommercial places from which $1,000 or more of aquaculture products were produced and either sold or distributed during the census year" (USDA National Agricultural Statistics Service 2006). Noncommercial operations include Federal, State, and tribal hatcheries (USDA National Agricultural Statistics Service 2006). This section primarily addresses commercial aquaculture.

Table 3-10 summarizes the various categories of aquaculture in terms of number of farms with aquaculture sold and the value of the products sold. As a total, there are more crustacean farms in coastal areas than any other type of aquaculture farm; however, more counties have freshwater catfish farms. Mollusks, valued at more than $50 million, were the most valuable aquaculture product sold.

Table 3-10. Summary of categories of aquaculture.

AQUACULTURE CATEGORY	FARMS IN STUDY AREA	COUNTIES/PARISHES WITH FARMS	VALUE ($1,000)*
Catfish	96	35	> $6,255
Trout	8	6	> $0
Other food fish	36	19	> $13,591
Baitfish	11	5	> $11
Crustaceans	229	30	> $10,939
Mollusks	192	18	> $50,252
Ornamental fish	134	26	> $23,123
Sport or game fish	29	16	> $5
Other aquaculture products	60	20	> $15,911

*For many farms, value was not disclosed, so the figures presented here are minimums.
Source: USDA 2009, 2007 Census of Agriculture.

Table 3-11 shows the change in number of saltwater aquaculture farms and acreage by state from 1998 to 2005. Louisiana had the most dramatic increase, from an undisclosed number of acres on 2 farms in 1998 to almost 216,000 acres on 135 farms in 2005. The saltwater acreage in Louisiana represents 66% of all saltwater aquaculture acreage in the United States (USDA 2005).

Table 3-11. Number and Acreage of Saltwater Aquaculture Farms by State, 1998 and 2005.

STATE	1998		2005	
	FARMS	ACRES	FARMS	ACRES
Texas	10	1,726	19	2,432
Louisiana	2	D	135	215,770
Mississippi	0	0	1	D
Alabama	0	0	2	D
Florida	226	1,353	163	718
D – Data were withheld to avoid disclosing data for individual farms. Source: USDA 2005, 2005 Census of Aquaculture. Updated data not available.				

The GMFMC has approved an Aquaculture FMP. The purpose of the FMP is to establish a regional permitting process to manage the development of an offshore aquaculture industry in the Federal waters of the Gulf of Mexico. The goal of the aquaculture plan is to supplement wild caught fisheries with reared species in order to increase the maximum sustainable yield. NOAA is currently developing the implementing regulations for this FMP.

3.4.7.1 Stock Enhancement

Stock enhancement is a form of aquaculture (discussed in section 3.4.7) in which larval or juvenile organisms are reared in a hatchery setting and then released into the natural environment in an attempt to bolster natural populations. Several northern Gulf States have active finfish stock enhancement programs that focus on increasing recreational catch. Texas releases 25 to 30 million red drum, several million spotted seatrout, and several thousand southern flounder fingerlings into the natural environment every year. Mississippi releases spotted sea trout and red snapper, and Florida releases red drum.

Table 3-12. Recreational harvest of key species/species groups in 2009 (thousands of fish).

SPECIES	TEXAS[a]	LOUISIANA	MISSISSIPPI	ALABAMA	WEST FLORIDA
Sharks[b]	-	-	12	-	-
Common snook	-	-	-	-	15
Gray snapper	-	-	-	-	1,124
Red snapper	31	104	18	196	-
Mullets (including striped mullets)	-	-	194	-	564
Bluefish	-	-	-	21	-
Black drum (croaker)	98	503	-	-	-
Drum (Atlantic croaker)	117	624	323	343	-
Drum (Gulf and southern kingfish)	-	133	159	735	-

SPECIES	TEXAS[a]	LOUISIANA	MISSISSIPPI	ALABAMA	WEST FLORIDA
Drum (sand and silver seatrouts)	111	1,003	1,009	1,448	828
Drum (spotted seatrout)	810	9,913	805	411	1,438
Red drum	285	2,240	66	58	256
King mackerel	16	-	-	-	368
Spanish mackerel	-	-	-	95	1,286
Yellowfin tuna	-	6	-	-	-
Gag (grouper)	-	-	-	-	222
Porgies (sheepshead)	34	775	44	174	764
Southern flounder	47	308	178	90	-

[a] Texas data collected by TPWD.
[b] Sharks include species within the requiem shark family, blacktip sharks, Atlantic sharpnose sharks, and unidentified sharks.
Source: NOAA Fisheries Service 2011i.

3.4.8 Marine Transportation

Marine transportation is an important component of the northern Gulf of Mexico regional economy, and the Gulf Coast is a major shipping center. The U.S. economy relies heavily on the ports in the northern Gulf of Mexico region for the import and export of both foreign and domestic goods. About fifty percent of all U.S. international trade tonnage passed through the Gulf of Mexico in 2009. This industry is dependent upon navigation services for safe and efficient operations. These services include maintaining shipping channels and aids to navigation. The USACE is largely responsible for the maintenance and improvement of the navigation system consisting primarily of the annual dredging of hundreds of millions of cubic yards of sediment from ports, harbors, and waterways throughout the Gulf of Mexico region to maintain navigable depths and widths (EPA/USACE 2007 as cited in GOMA 2009). Figure 3-14 shows major shipping lanes. The region's navigable waterways include natural and maintained rivers, lakes, bays, sounds, canals, navigation channels, etc., and include major civil works such as the GIWW and deep water access channels for major ports.

3.4.9 Aesthetics and Visual Resources

Aesthetics and visual resources define the visual character of an area. These resources can be natural features, vistas, or viewsheds and can include urban or community features such as architecture, skylines, or other man made characteristics. The current Gulf of Mexico coastal region is characterized by thousands of miles of shoreline, which is bordered by a variety of landscapes, including natural and maintained beaches, mangroves and other wetlands, developed areas such as towns and urban centers, as well as heavily industrialized areas including ports and infrastructure related to energy production. Given the diversity of visual resources in this region, driving for pleasure in a natural setting is an extremely popular recreational activity in the coastal region of the northern Gulf of Mexico. Through "America's Byways," the U.S. Department of Transportation (DOT) Federal Highway Administration recognizes certain roads in the United States for their archeological, cultural, historic, natural, recreational, and/or scenic qualities and importance (America's Byways 2011). The program has identified many scenic byways (i.e., routes) in the Gulf Coast region: Creole Nature Trail, Great River Road, Alabama's Coastal Connection, Big Bend Scenic Byway, Florida Keys Scenic Highway, MS Beach Boulevard, MS Byways to Space, MS Highway 67, and MS Highway 605. These routes pass through coastal and upland portions of Louisiana, Alabama, Mississippi and Florida. There are many other ways to experience the visual and aesthetic resources of the Gulf Coast as well (e.g. boating and hiking).

3.4.10 Public Health and Safety

Public health and safety issues relate to the short-term construction of projects and long-term operations and maintenance. Additional discussion of the potential for direct or indirect impacts to public health and safety within the Gulf Coast Region is found in the individual proposed project descriptions and discussion of possible environmental consequences for individual proposed projects.

Provision of public health and safety can be complicated by large storm events such as tropical storms and hurricanes (and associated storm surges, winds, and battering waves) that have historically caused extensive damage to the shoreline as well as infrastructure such as roadways, bridges and buildings. The Gulf's coastal communities are at increased risk for severe shoreline damage and storm surges. More than half of the nation's population lives in coastal counties in densities five times greater than inland counties (NOAA, 2009). Coastal development has accelerated wetlands loss, as well as the loss of other coastline protections including reefs, barrier islands, tidal marshes and sand dunes along the Gulf Coast. These losses contribute to the damage and public health and safety threat large storm events pose to the communities and individuals in the Gulf Coast region.

During these large storm events, public safety personnel and facilities may be cut off from individuals caught in the path of the storm, thereby limiting the ability of police, fire and rescue personnel to reach affected populations. In addition, these affected populations may not be able to evacuate or access hospitals or emergency shelters if roadways or other infrastructure become impassable.

3.4.11 Flood and Shoreline Protection

Flood control refers to all methods used to reduce or prevent the detrimental effects of flood waters, including the construction of floodways (man-made channels to divert floodwater), levees, lakes, dams, reservoirs, or gates to hold extra water during times of flooding. Shoreline protection consists of engineered structures, living shorelines or other solutions meant to slow erosion by rising sea levels and wave action.

The USACE civil works programs and services include water resources development such as flood control, navigation, recreation, infrastructure, and environmental stewardship. These projects include structural projects and beach nourishment (USACE 2003). In addition, the USACE owns lands associated with these programs and services.

There are more than 30 USACE projects in the Galveston District including ecosystem restoration, floodgates, locks, waterways, ports, ship channels, harbors, rivers, lakes, dams, reservoirs, flood control projects, and recreation areas. The largest project is the Galveston seawall, which is 10 miles long and approximately 17 feet high, originally constructed in 1904 and extended to its current length by 1963 (USACE 1981).

The Mississippi River and Tributaries Project the largest flood control project in the world, includes several flood control elements including the Old River Control structure, the Morganza floodway and Bonnet Carré spillway. These projects are managed by the New Orleans District of the USACE. The

Morganza floodway, along with the Atchafalaya River, pass floodwaters into the Lower Atchafalaya Basin Floodway. Farther downstream, these floodwaters enter the Gulf of Mexico through the Atchafalaya River below Morgan City and the Wax Lake Outlet (USACE n.d.). The Bonnet Carré spillway is the southernmost floodway in the Mississippi River and Tributaries project, and is a popular recreational area. Located in St. Charles Parish, Louisiana, the spillway reduces risk for New Orleans and other downstream communities during major floods on the Mississippi River. This risk reduction is accomplished by diverting a portion of the floodwaters into Lake Pontchartrain and then into the Gulf of Mexico, bypassing New Orleans (USACE 2012).

USACE projects in Mississippi include projects authorized under the Mississippi Coastal Improvement Plan (MsCIP), which provides funding for major barrier island restoration, risk reduction strategies for areas of Mississippi, and ecological restoration of numerous coastal MS habitats (USACE 2009). It also includes the High Hazard Area Risk Reduction Plan which provides for the purchase of at-risk properties along Coastal Mississippi.

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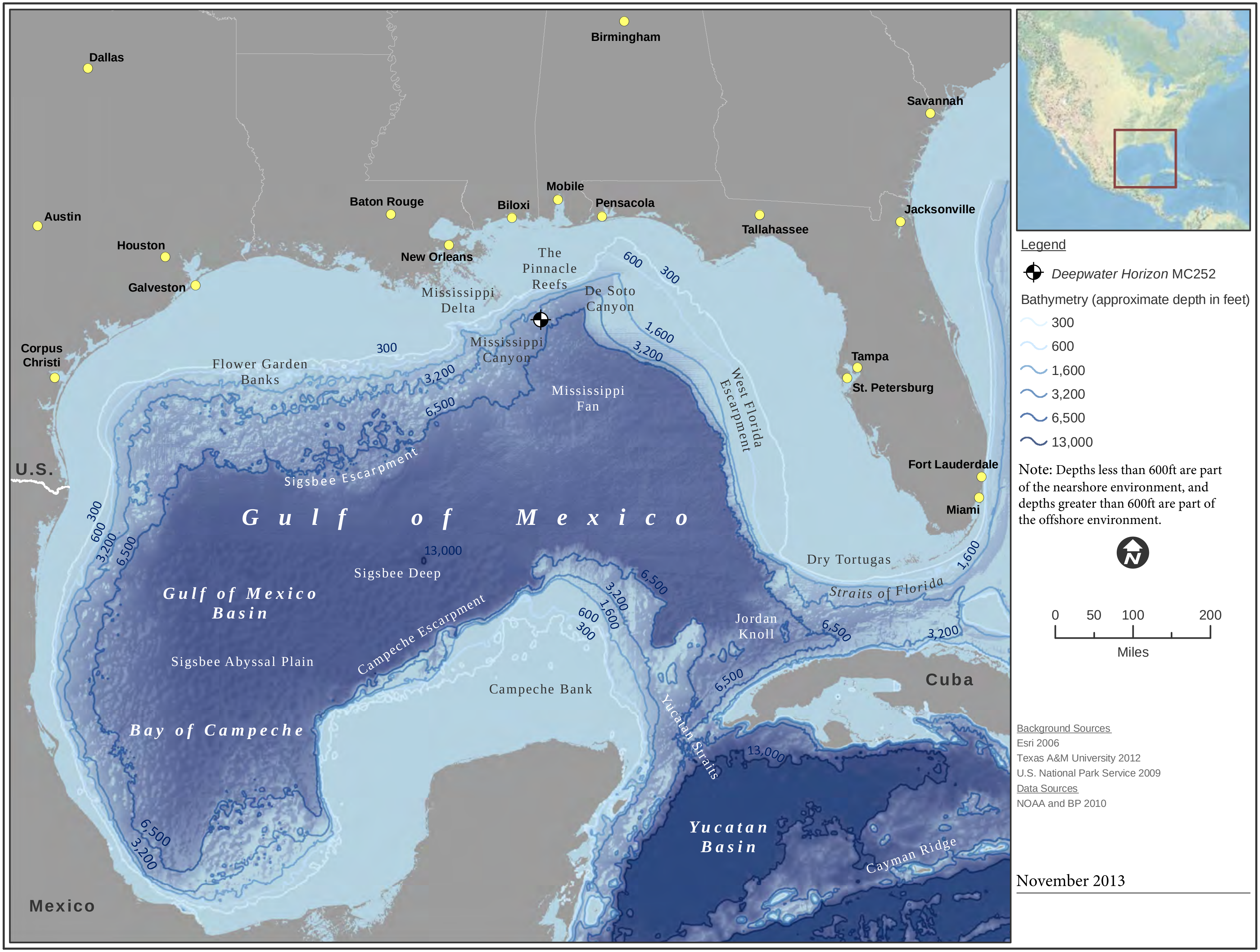

Figure 3-1. Bathymetry and Offshore Features of the Gulf of Mexico

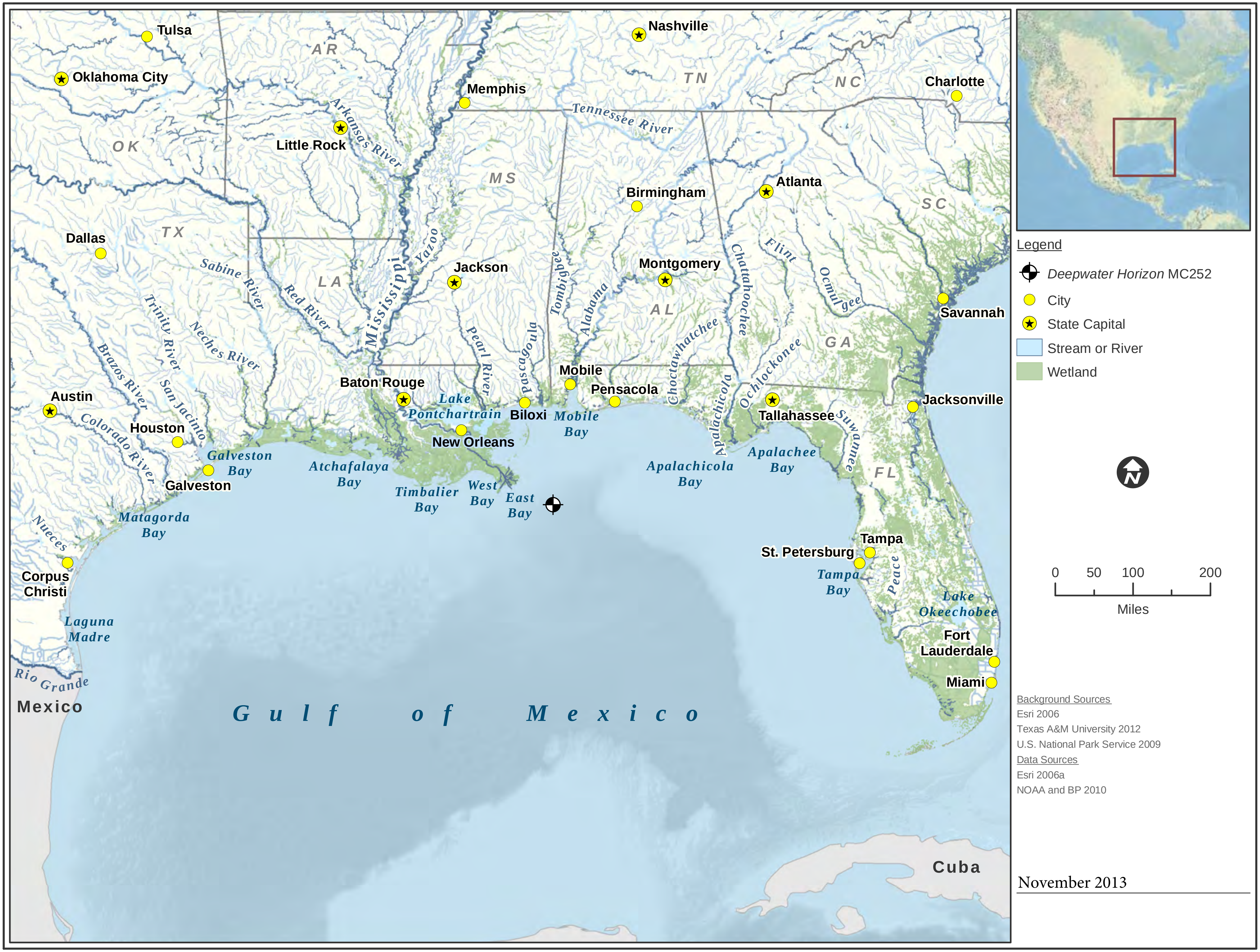

Figure 3-2. Freshwater and Estuarine Systems in the Gulf of Mexico

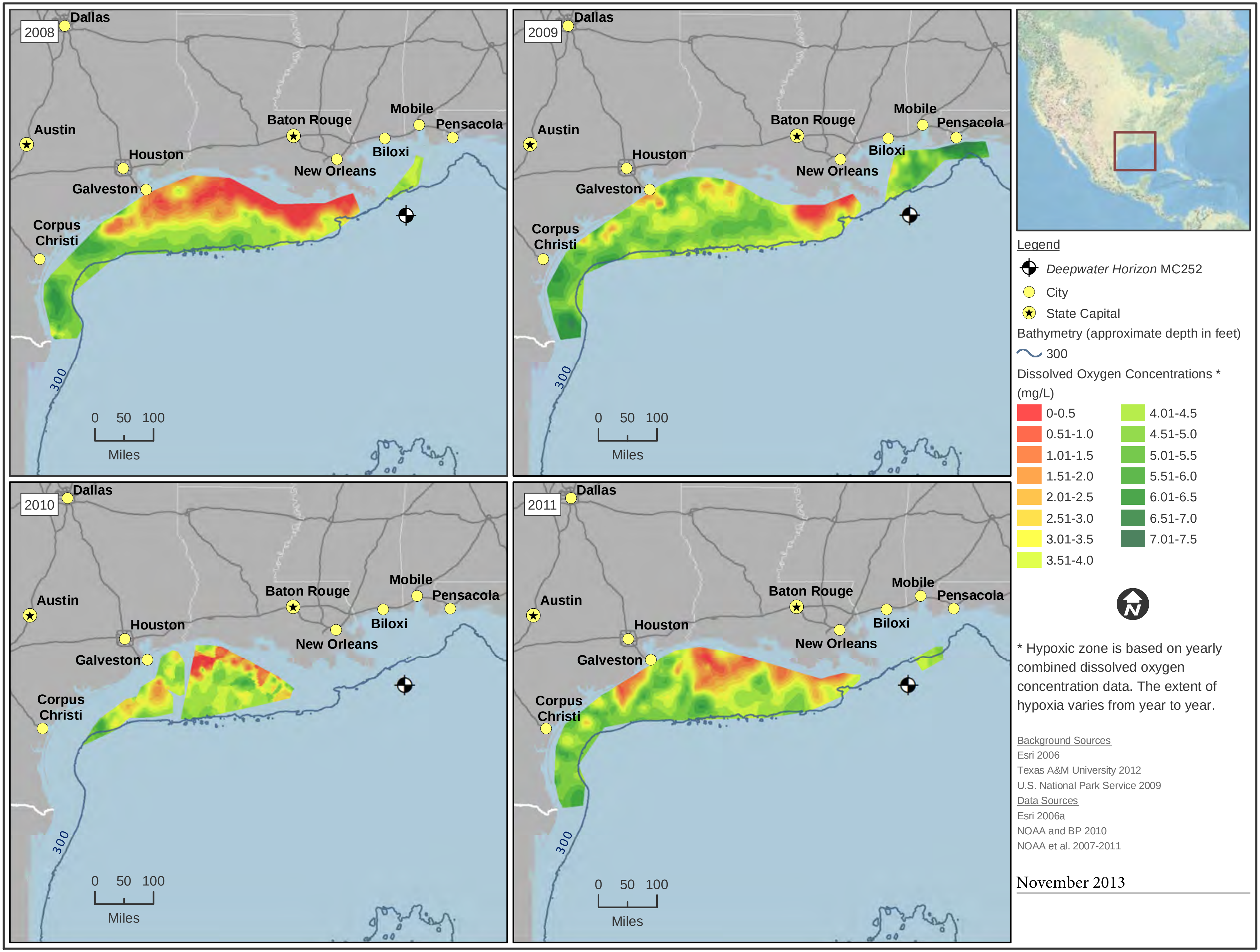

Figure 3-3. Dissolved Oxygen Concentrations in the Gulf of Mexico, 2008-2011

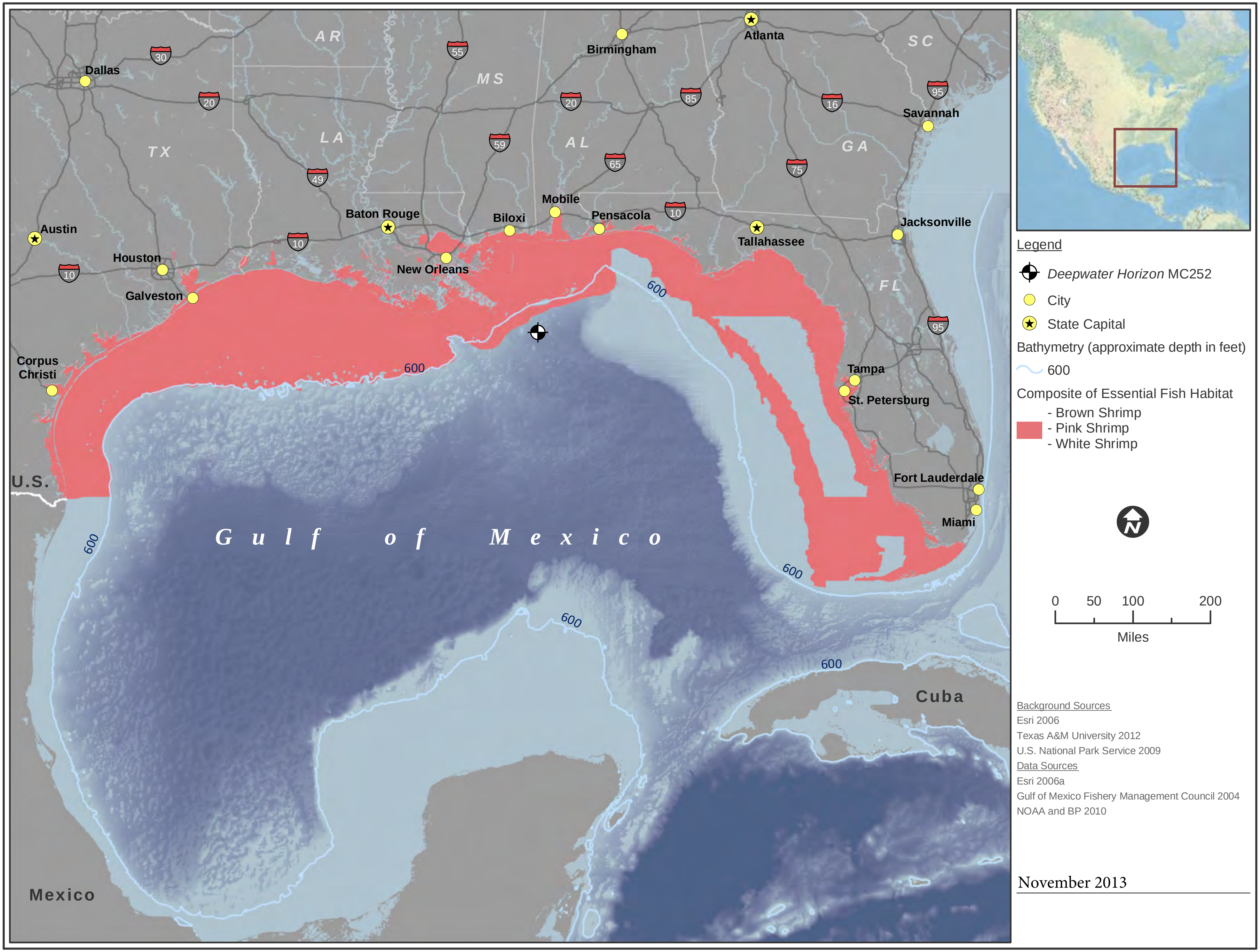

Figure 3-4. Composite of Essential Fish Habitat for Brown, Pink, and White Shrimp

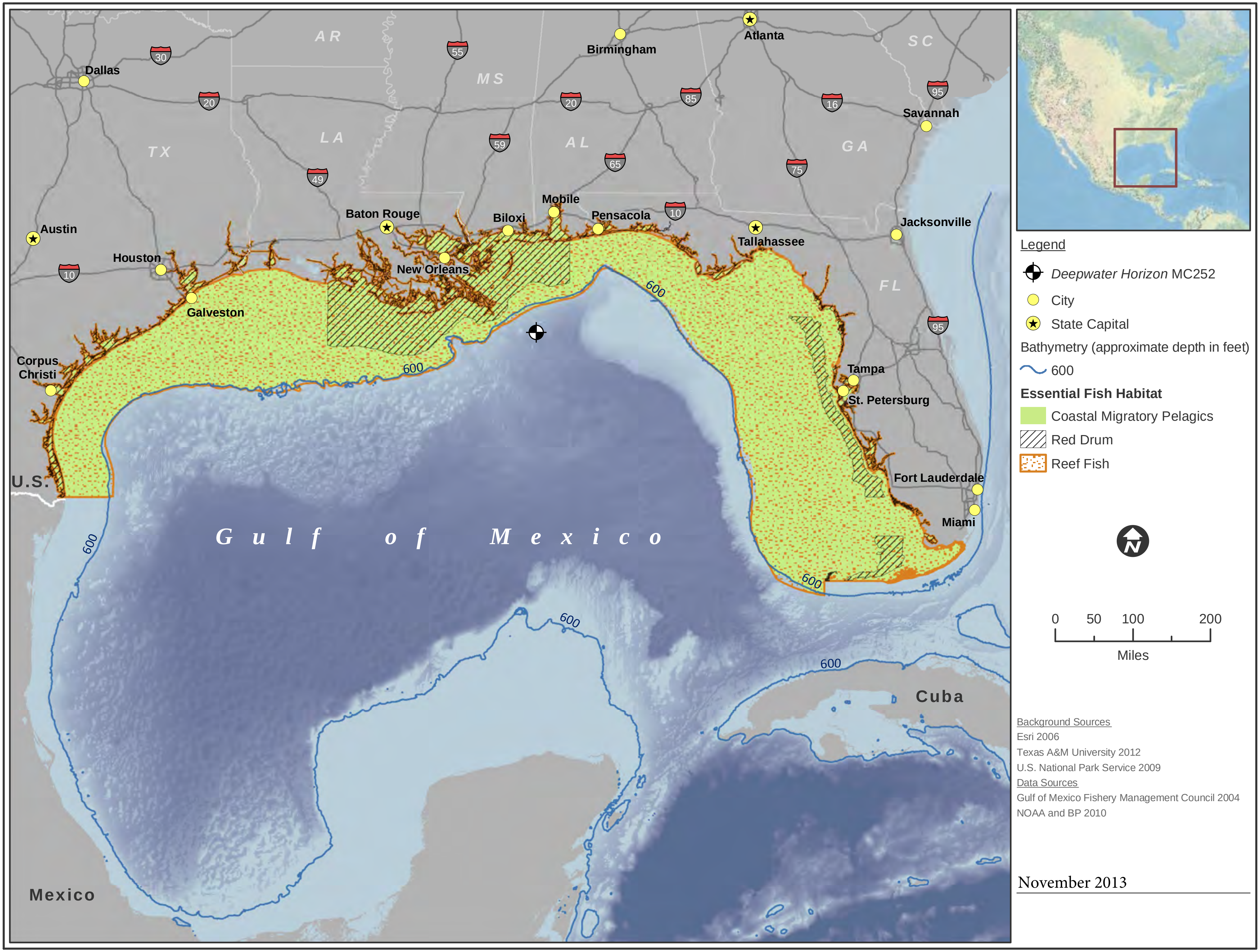

Figure 3-5. Essential Fish Habitat for Red Drum, Reef Fish, and Coastal Migratory Pelagics in the Gulf of Mexico

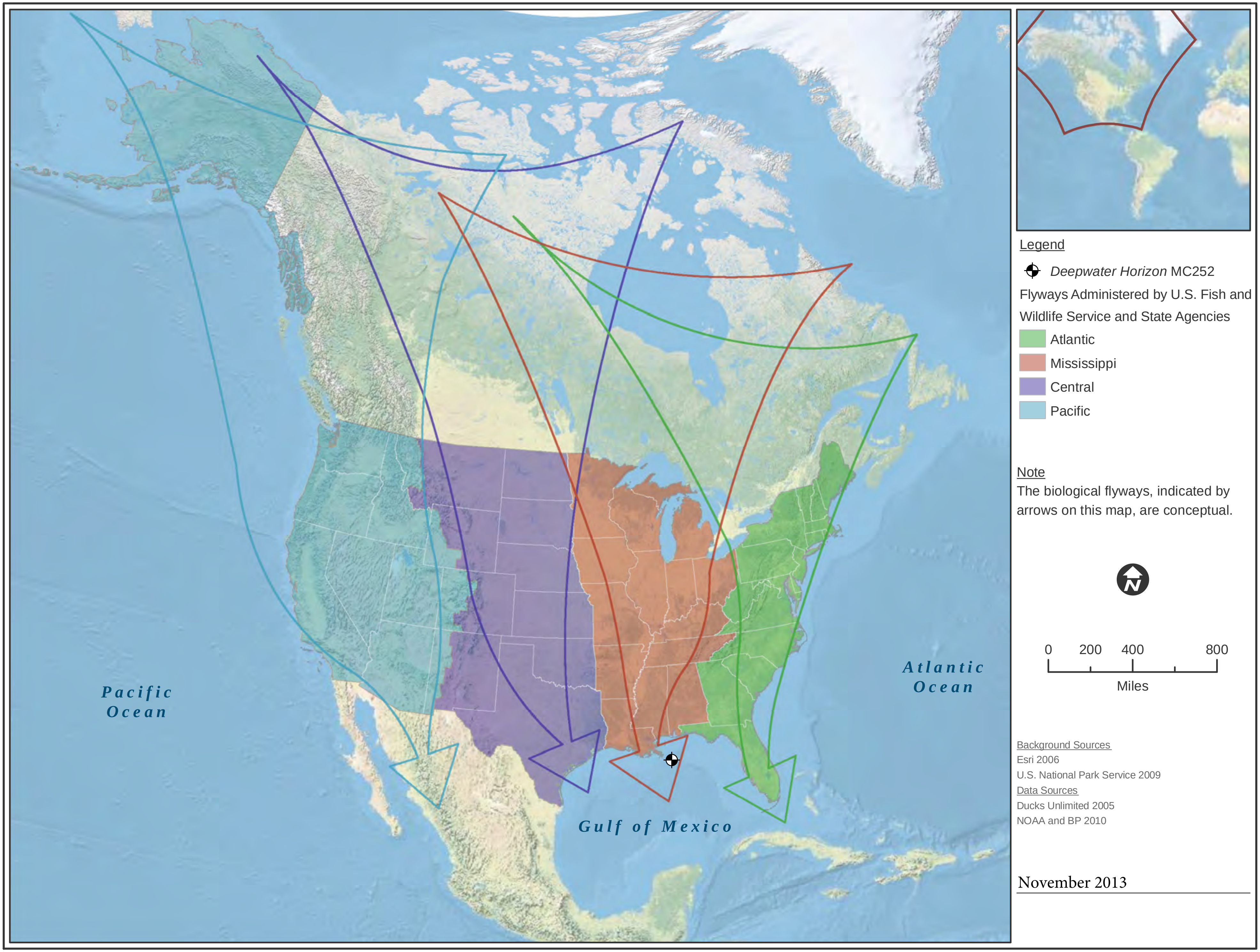

Figure 3-6. Administrative and Biological Migratory Bird Flyways

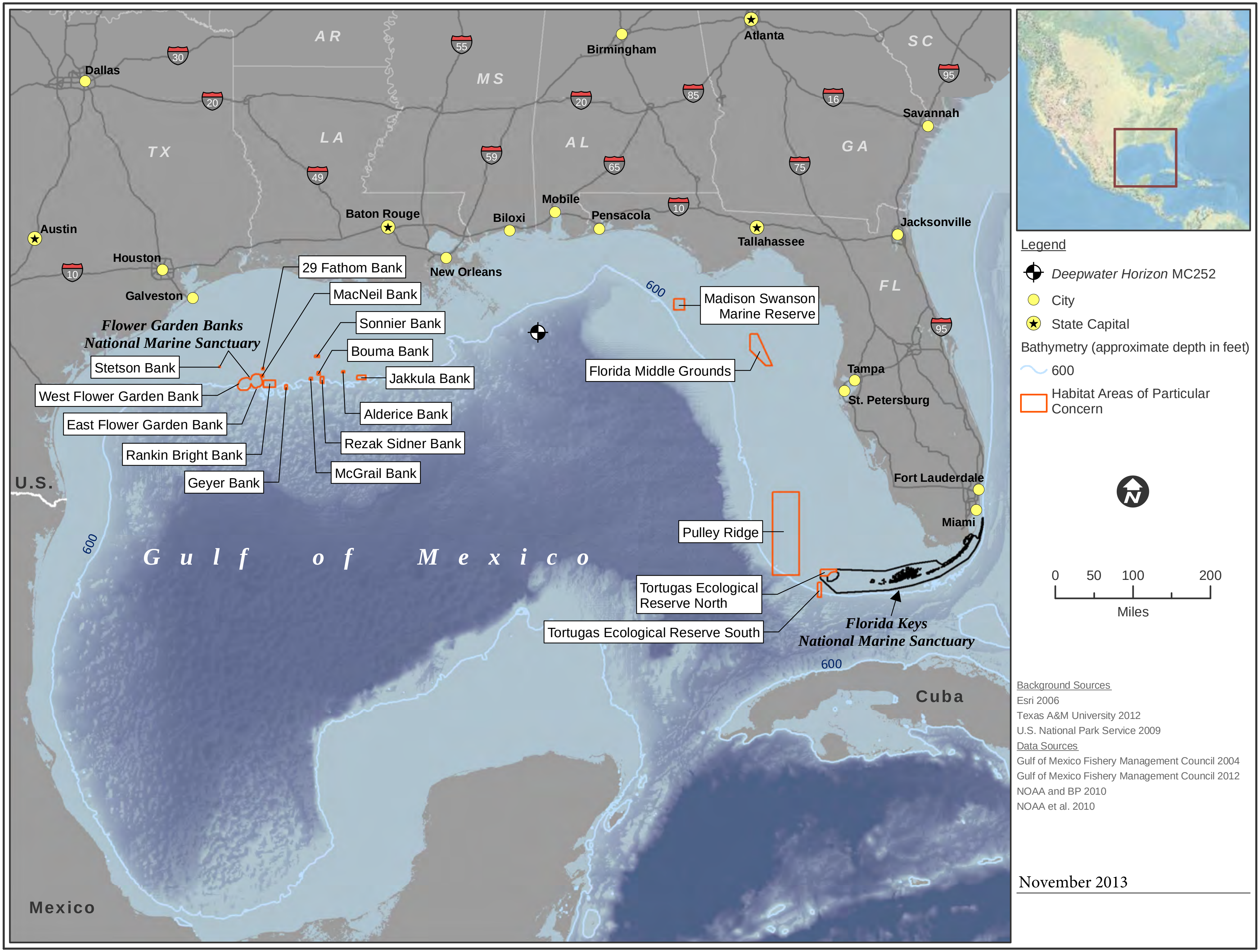

Figure 3-7. Habitat Areas of Particular Concern in the Gulf of Mexico

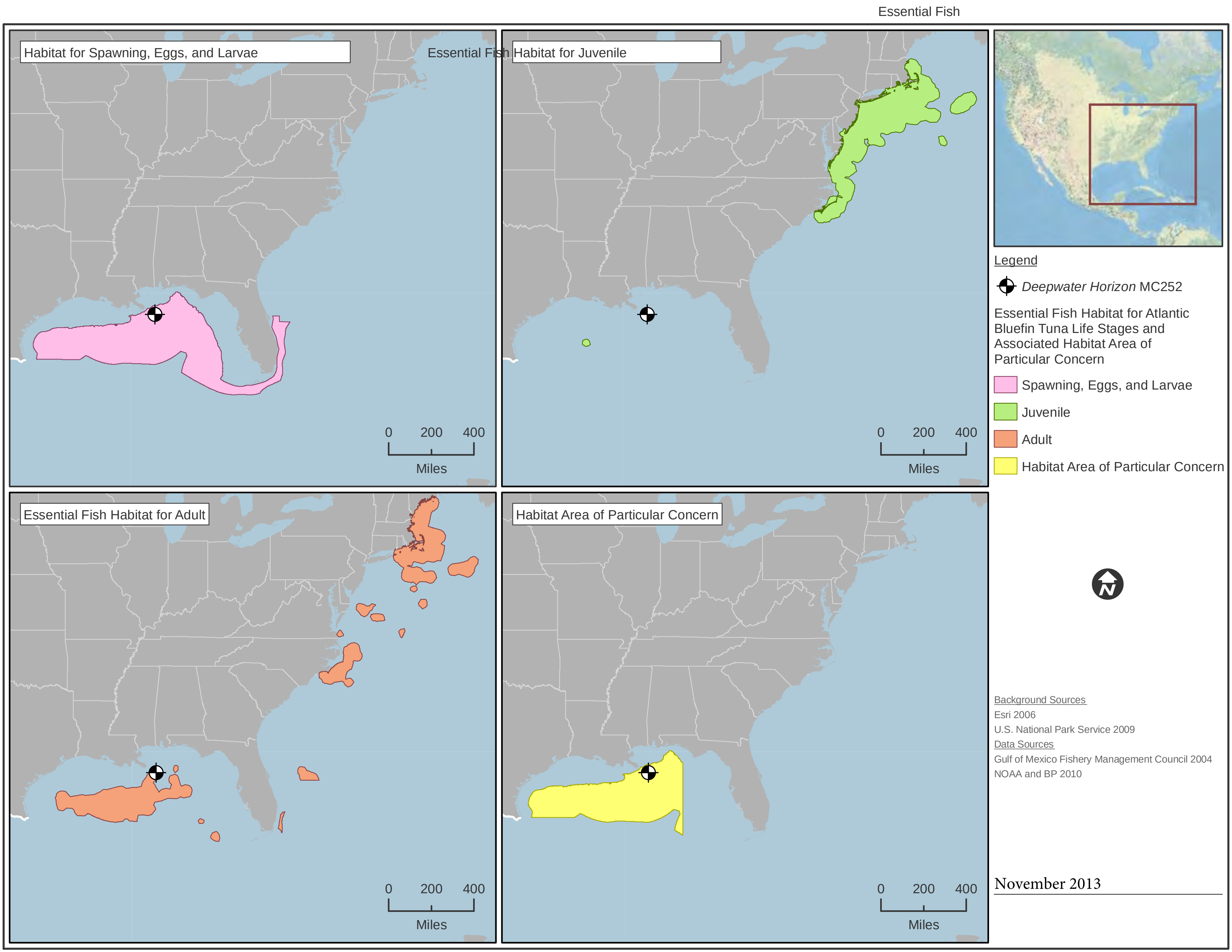

Figure 3-8. Essential Fish Habitat for Atlantic Bluefin Tuna Life Stages and Associated Habitat Area of Particular Concern

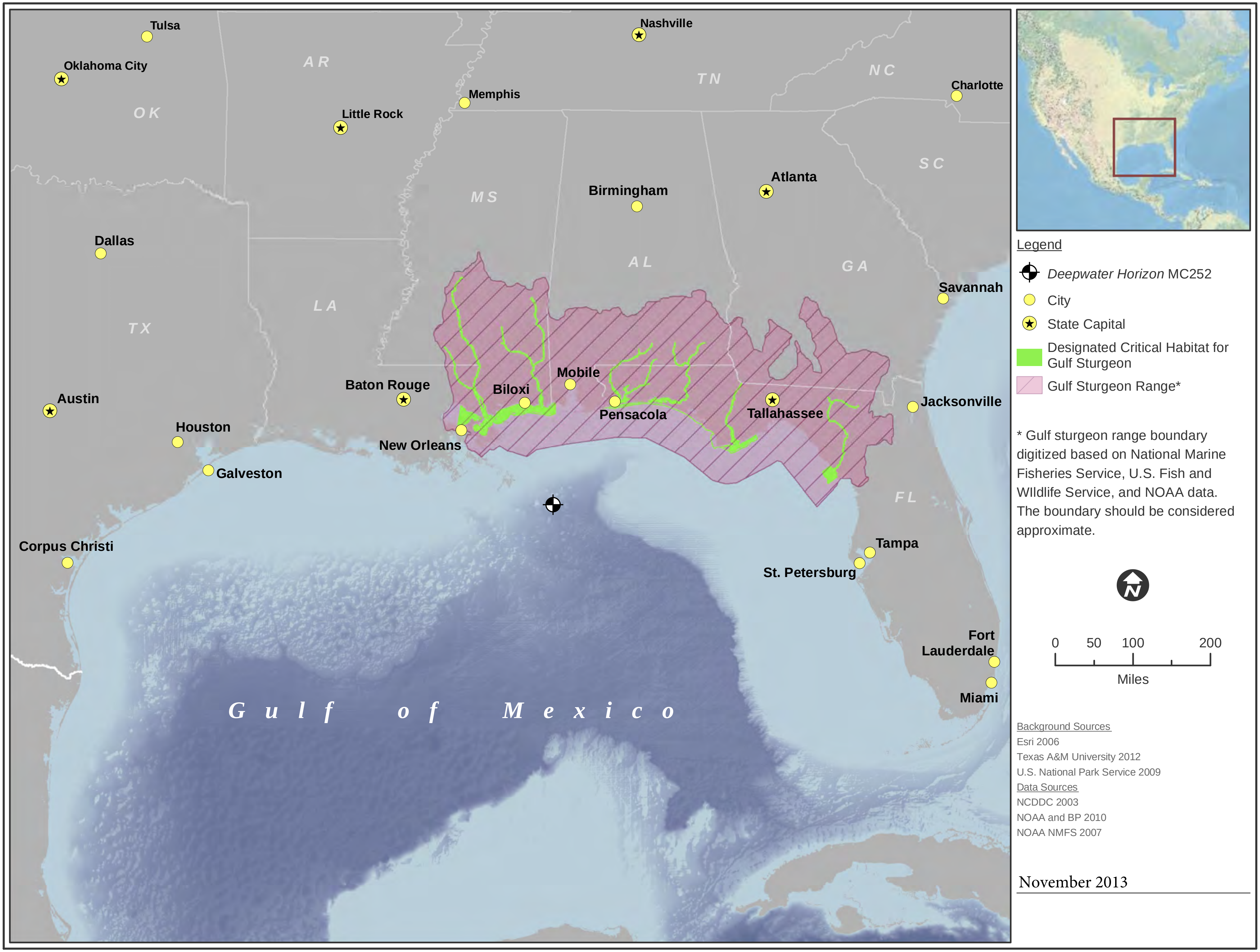

Figure 3-9. Designated Critical Habitat and Range of Gulf Sturgeon

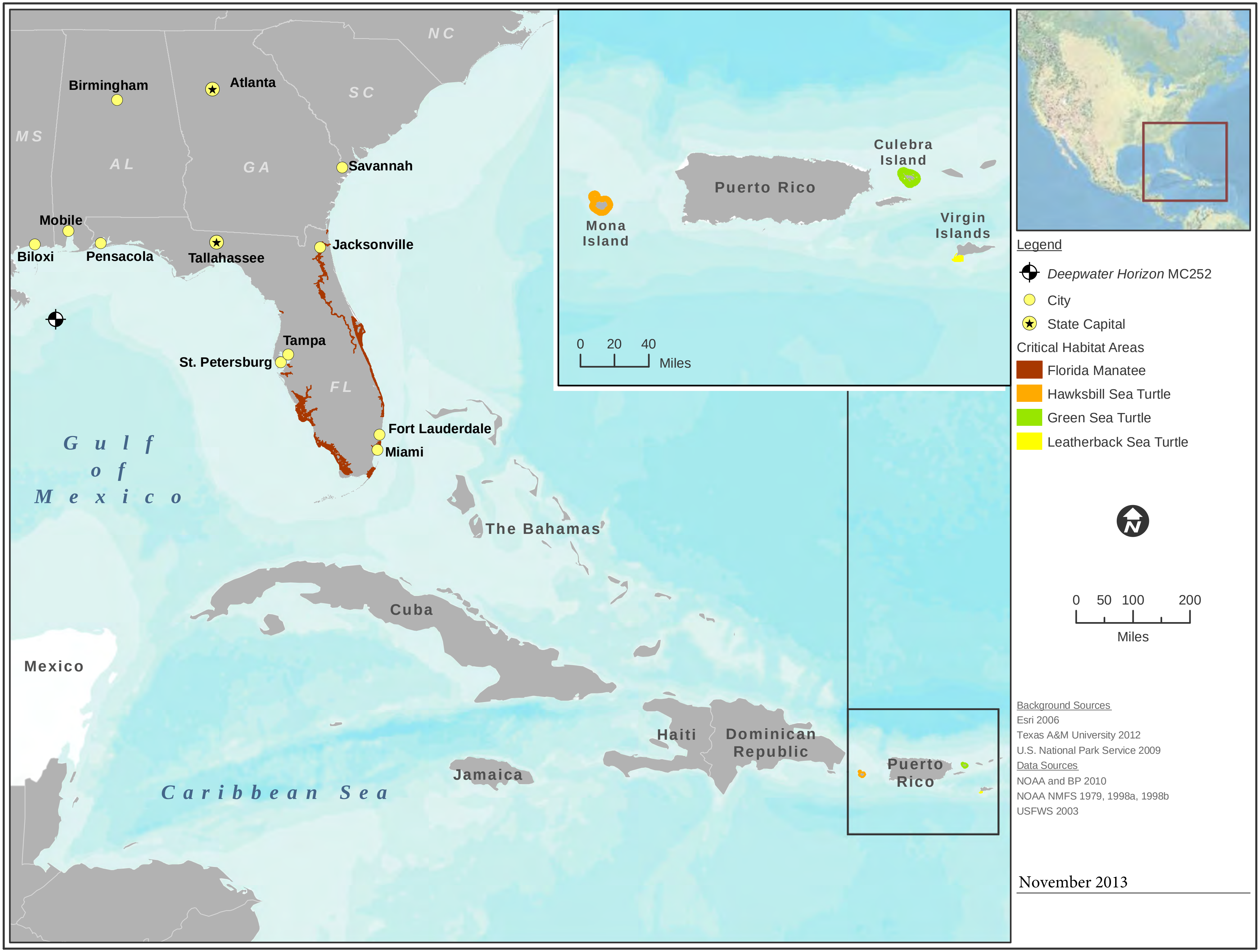

Figure 3-10. Designated Critical Habitat for the Florida Manatee, Green Sea Turtle, Hawksbill Sea Turtle, and Leatherback Sea Turtle

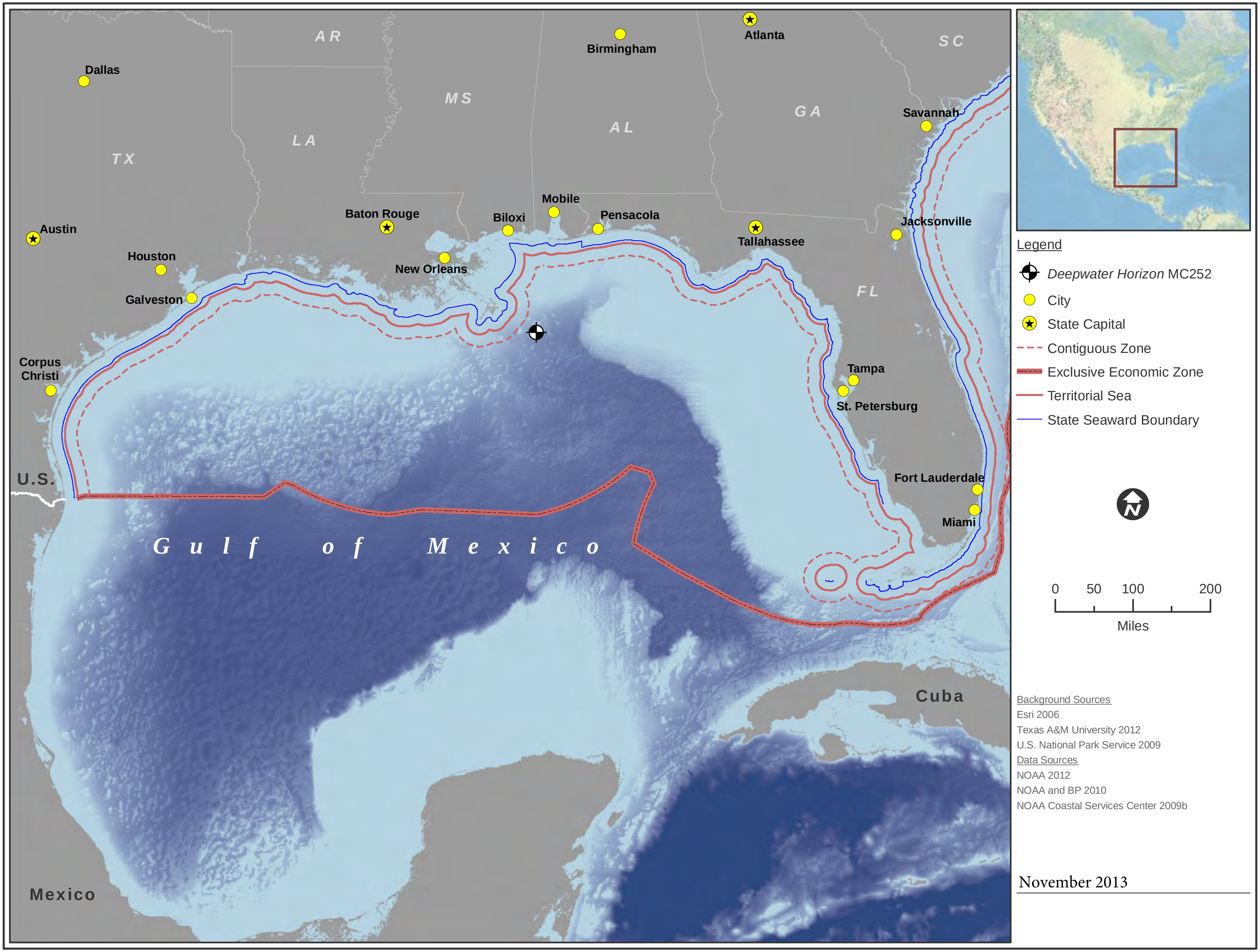

Figure 3-12. Exclusive Economic Zone, Contiguous Zone, and Territorial Sea Designations in the Gulf

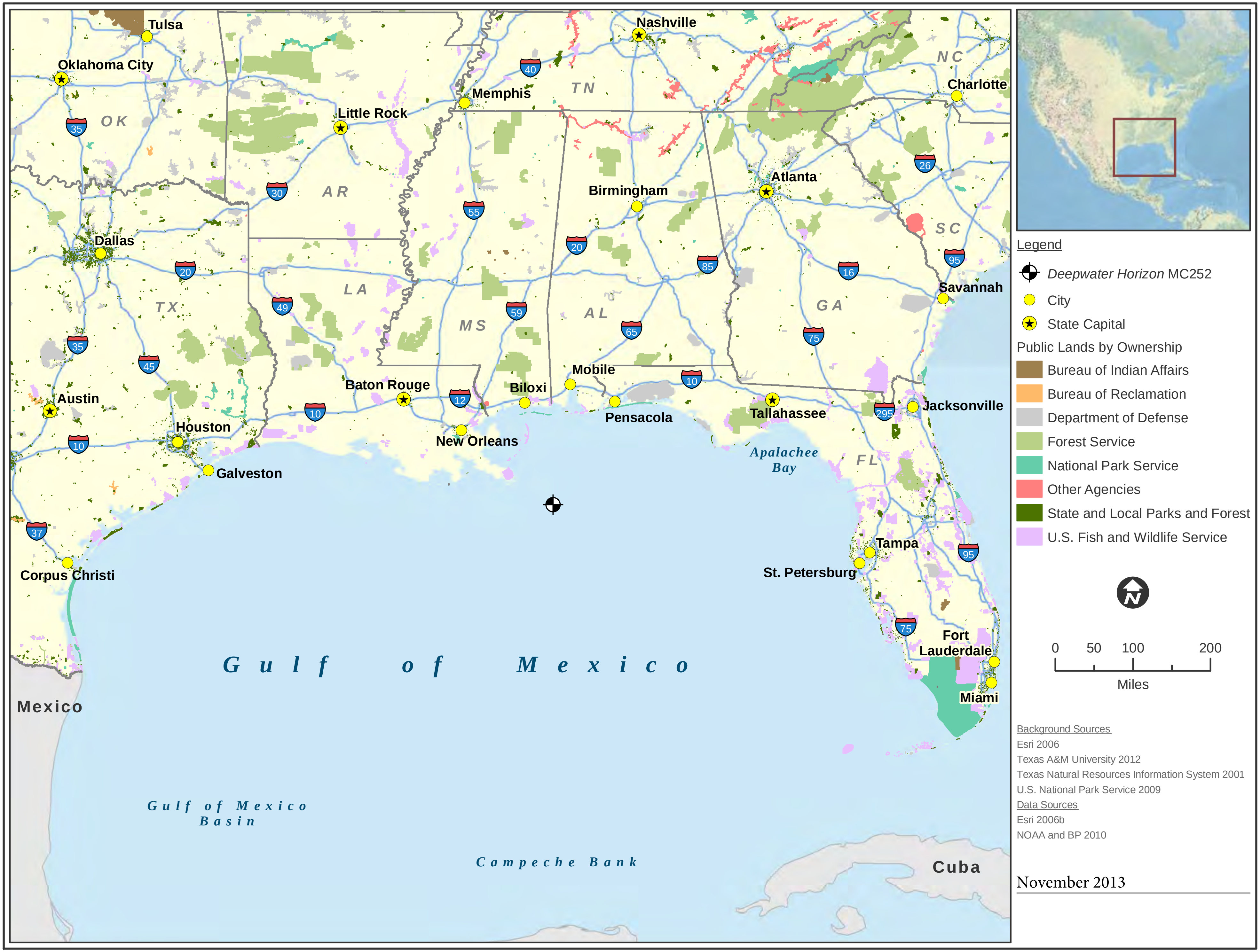

Figure 3-13. Public Lands in and around the Gulf of Mexico Coastal States

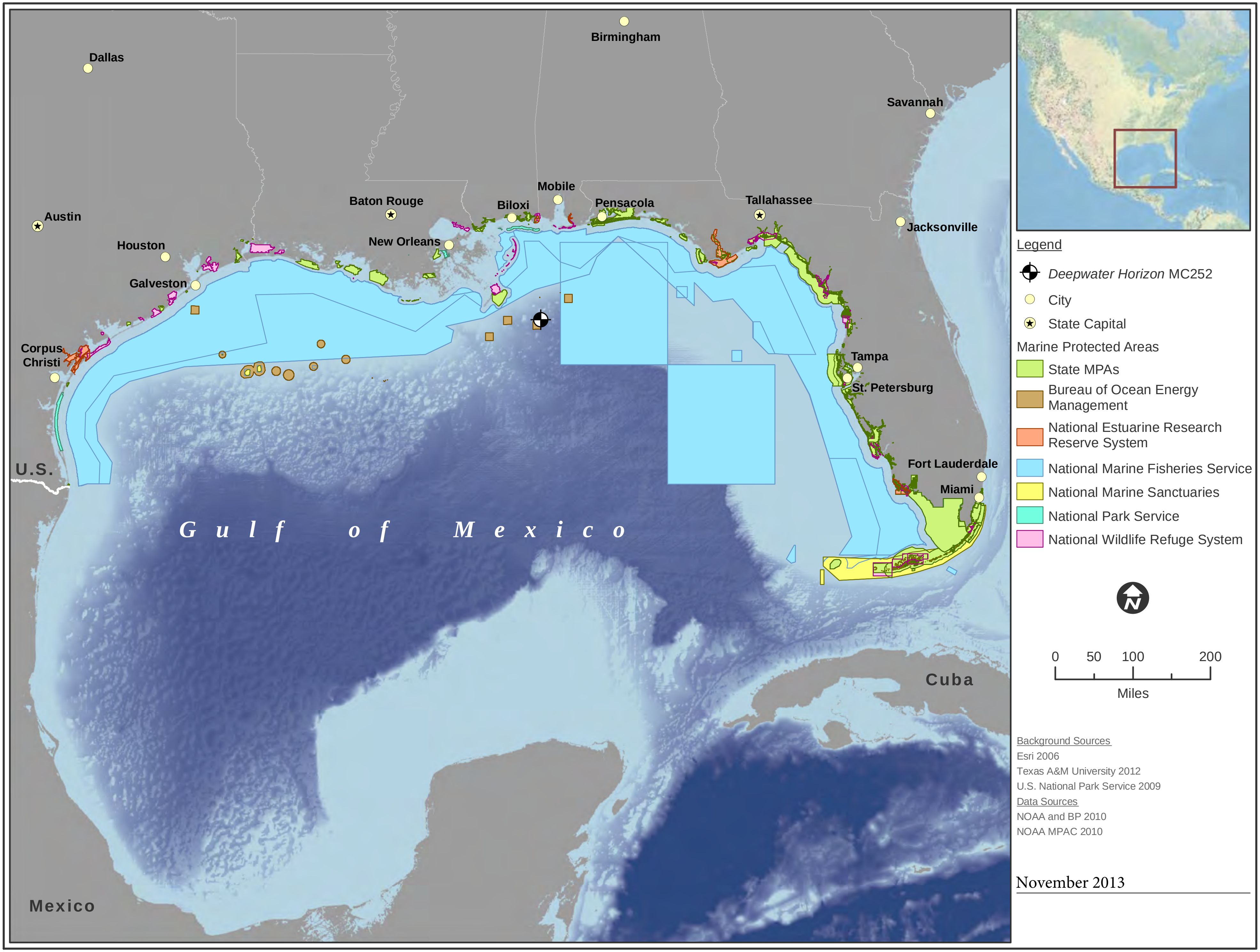

Figure 3-14. Marine Protected Areas in the Gulf of Mexico

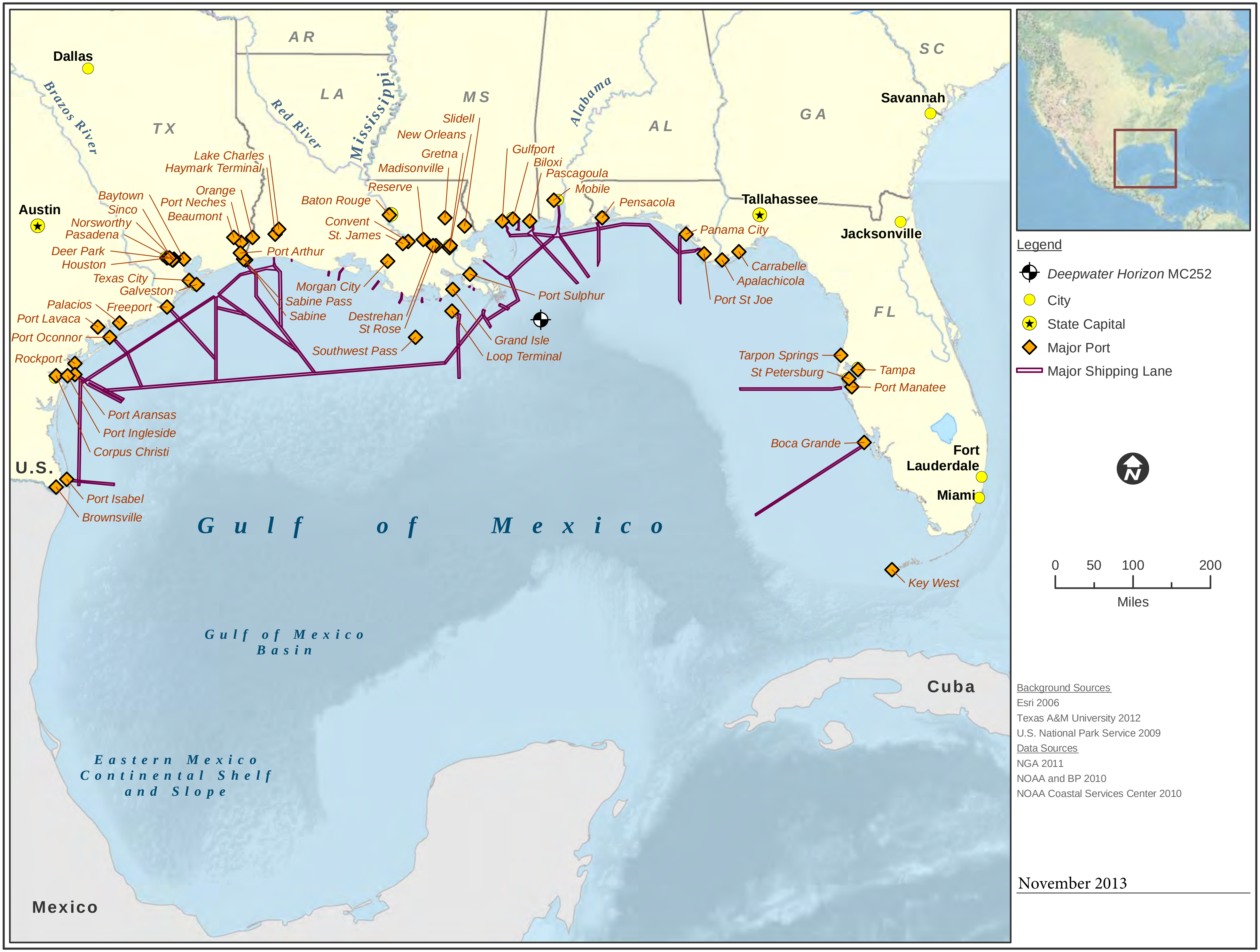

Figure 3-15. Major Shipping Lanes and Major Ports in the Gulf of Mexico

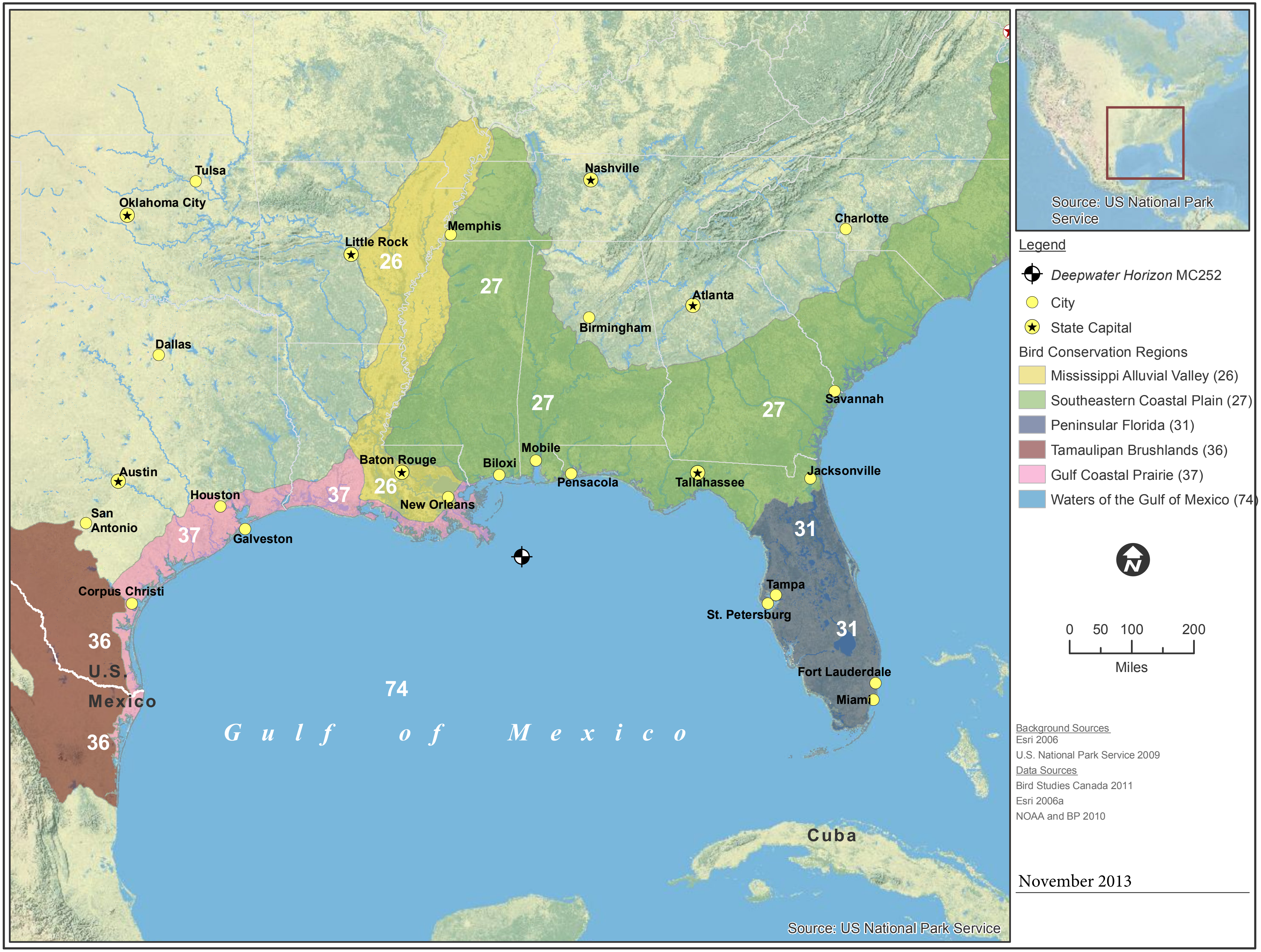

Figure 3-16. North American Bird Conservation Initiative Bird Conservation Regions Along the Gulf of Mexico

CHAPTER 3 APPENDIX A: SPECIES AND ENVIRONMENT SUPPLEMENTAL INFORMATION

A.1 Geology and Substrates

The soil associations identified within the shore-adjacent counties/parishes are described and summarized in Table A-1. Characteristics of each soil association and the county/parish where the soil association occurs are included.

Table A-1. Soil Associations Along the Gulf Coast

STATE	COUNTY / PARISH	SOIL ASSOCIATION	DESCRIPTION
Texas[a]	Orange, Jefferson, Liberty	Otanya-Kirbyville-Evadale	Formed on nearly level to steep, coastal plain uplands that are intricately dissected by streams. Parent materials are alluvial and marine sediments of Tertiary age. Soils occur on low-relief uplands and flat plains.
	Orange, Jefferson, Liberty, Chambers	Beaumont-League-Labelle	Formed in alluvial and marine sediments of primarily Quaternary age that were deposited under fluctuating sea level conditions. Soils occur in areas of low local relief and are dissected by rivers that flow to the Gulf of Mexico. Soils are well developed and clayey with high shrink-swell properties.
	Chambers, Liberty	Tinn-Trinity-Kaufman	Formed in alluvium on floodplains. Soils have clayey textures and high shrink-swell properties.
	Chambers, Liberty, Harris, Galveston, Brazoria, Matagorda	Lake Charles-Bernard-Edna	Formed in alluvial and marine sediment of primarily Quaternary age that were deposited under fluctuating sea level conditions. Soils occur in areas of low local relief and are dissected by rivers that flow to the Gulf of Mexico. Soils are well developed and clayey with high shrink-swell properties.
	Matagorda	Pledger-Brazoria-Norwood	Formed in alluvium on floodplains. Soils have clayey textures and high shrink-swell properties.
	Matagorda, Jackson, Victoria, Calhoun, Refugio, San Patricio	Laewest-Dacosta-Edna	Formed in alluvial and marine sediment of primarily Quaternary age that were deposited under fluctuating sea level conditions. Soils occur in areas of low local relief and are dissected by rivers that flow to the Gulf of Mexico. Soils are well developed and clayey with high shrink-swell properties.
	Refugio, San Patricio, Nueces, Kleberg	Victoria-Orelia-Edroy	Formed in alluvial and marine sediment of primarily Quaternary age that were deposited under fluctuating sea level conditions. Soils occur in areas of low local relief and are dissected by rivers that flow to the Gulf of Mexico. Soils are well developed and clayey with high shrink-swell properties.
	Kleberg, Kenedy, Willacy	Nueces-Sarita-Falfurrias	Formed on a broad coastal plain consisting of sediments of Tertiary and Quaternary age. Soils occur on nearly level land within the Rio Grande valley and are usually dissected by southeastward flowing streams. Soils are very deep, sandy soils on the sandsheet prairie that covers the southeast parts of the South Texas Coastal Plain.
Texas[a]	Cameron	McAllen-Hidalgo-Brennan	Formed on a broad coastal plain consisting of sediments of Tertiary and Quaternary age. Soils occur on nearly level to moderately sloping plains and broad ridges within the Rio Grande valley and are usually dissected by southeastward flowing streams. Soils are deep and very deep, well developed, loamy soils.
	Orange, Jefferson, Chambers, Harris, Galveston, Brazoria, & Matagorda	Harris-Surfside-Francitas	Formed in Quaternary sediments on nearly level coastal lowland plains, including marshes, tidal flats, and barrier islands. Soils can be described as saline and clayey.
	Calhoun, Aransas, Refugio, San Patricio, Nueces, Kleberg, Kenedey, Willacy & Cameron	Mustang-Daggerhill-Barrada	Soils can be described as sandy and usually occur on dunes on barrier island landscapes.
Louisiana[b]	St. Tammany	Guyton-Abita-Brimstone	Level to gently sloping, poorly drained and somewhat poorly drained soils that are loamy throughout.
		Myatt-Stough-Prentiss	Level and very gently sloping, poorly drained to moderately well drained soils that are loamy throughout.

Table A-1. Soil Associations Along the Gulf Coast

STATE	COUNTY / PARISH	SOIL ASSOCIATION	DESCRIPTION
		Cahaba-Prentiss-Latonia	Very gently sloping and level, well drained and moderately well drained soils that have a loamy surface layer and subsoil.
		Arkabula-Rosebloom	Nearly level, somewhat poorly drained and poorly drained soils that are loamy throughout.
		Ouchaita-Bibb	Nearly level, well drained and poorly drained soils that are loamy throughout.
		Larose-Allemands-Kenner	Level, very poorly drained soils that have a mucky surface layer and clayey and mucky underlying material, in freshwater marshes.
		Arat	Level, very poorly drained soils that are loamy throughout, in swamps.
		Clovelly-Lafitte	Level, very poorly drained soils that have a mucky surface layer and clayey and mucky underlying material, in brackish marshes.
		Barbary-Maurepas	Level, very poorly drained soils that are clayey or mucky throughout, in swamps.
	Orleans	Clovelly-Lafitte-Gentilly	Level, very poorly drained soils that have a moderately thick, thick, or thin mucky surface layer and clayey underlying material.
		Aquents	Level, poorly drained soils that are stratified and clayey to mucky throughout.
	St. Bernard	Clovelly-Lafitte	Level, very poorly drained soils that have a mucky surface layer and clayey and mucky underlying material, in brackish marshes.
Louisiana[b]		Timbalier-Bellpass	Level, very poorly drained soils that have a thick or moderately thick mucky surface layer and layer underlying material, in saline marshes.
		Scatlake	Level, very poorly drained soils that are clayey throughout, in saline marshes.
		Fausse	Level, very poorly drained soils that are clayey throughout, in saline marshes.
	Plaquemines	Balize-Larose	Level, very poorly drained soils that are loamy throughout or that have a thin mucky surface layer and clayey underlying material; in freshwater marshes.
		Clovelly-Lafitte-Gentilly	Level, very poorly drained soils that have a moderately thick, thick, or thin mucky surface layer and clayey underlying material.
		Timbalier-Bellpass	Level, very poorly drained soils that have a thick or moderately thick mucky surface layer and layer underlying material, in saline marshes.
		Scatlake	Level, very poorly drained soils that are clayey throughout, in saline marshes.
		Aquents	Level, poorly drained soils that are stratified and clayey to mucky throughout.
		Felicity	Gently undulating somewhat poorly drained soils that are sandy throughout.
	Jefferson	Clovelly-Lafitte	Level, very poorly drained soils that have a mucky surface layer and clayey and mucky underlying material, in brackish marshes.
		Timbalier-Scatlake	Level, very poorly drained soils that have a thick or thin mucky surface layer and clayey underlying material, in saline marshes.
		Scatlake	Level, very poorly drained soils that are clayey throughout, in saline marshes.
		Felicity	Gently undulating somewhat poorly drained soils that are sandy throughout.
	Tangipahoa	Maurepas	Level, very poorly drained, organic soils that are mucky throughout..
		Guyton-Abita	Level to gently sloping, poorly drained and somewhat poorly drained soils that are loamy throughout.
		Toula-Tangi	Very gently sloping and moderately sloping, moderately well drained soils that have a loamy surface layer and a loamy and clayey subsoil.

Table A-1. Soil Associations Along the Gulf Coast

STATE	COUNTY / PARISH	SOIL ASSOCIATION	DESCRIPTION
		Tangi-Ruston-Smithdale	Very gently sloping to moderately steep, moderately well drained and well drained soils hat have a loamy surface layer and a loamy and clayey subsoil.
	St. Charles	Kenner-Allemands	Level, very poorly drained soils that have a mucky or clayey surface layer and mucky and clayey underlying material. Commonly found in freshwater marshes.
		Barbary-Fausse	Level, very poorly drained soils that have a mucky or clayey surface layer and clayey underlying material, in swamps.
		Commerce-Sharkey	Level, somewhat poorly drained and poorly drained soils that are loamy throughout or have a loamy or clayey surface layer and a clayey subsoil.
Louisiana[b]	St. John the Baptist	Barbary	Level, very poorly drained soils that have a mucky surface layer and clayey underlying material
		Kenner-Allemands-Carlin	Level, very poorly drained soils that have a mucky organic surface layer and mucky or clayey underlying material.
		Cancienne-Carville	Level, somewhat poorly drained soils that have a loamy surface layer and a clayey subsoil or that is loamy throughout.
	Livingston	Calhoun-Toula-Bude	Level and gently sloping, poorly drained, moderately well drained, and somewhat poorly drained soils that are loamy throughout.
		Cloyell-Springfield-Encrow	Gently sloping and level, somewhat poorly drained and poorly drained soils that have a loamy surface layer and a loamy and clayey subsoil.
		Gilbert-Satsuma	Level and gently sloping, poorly drained and somewhat poorly drained soils that are loamy throughout.
		Myatt-Satsuma	Level and gently sloping, poorly drained and somewhat poorly drained soils that are loamy throughout.
		Myatt-Stough	Level, poorly drained and somewhat poorly drained soils that are loamy throughout.
	Lafourche	Timbalier-Bellpass	Level, very poorly drained soils that have a thick or moderately thick mucky surface layer and layer underlying material, in saline marshes.
		Scatlake	Level, very poorly drained soils that are clayey throughout, in saline marshes.
	St. James	Barbary-Sharkey	Frequently flooded, clayey soils.
		Sharkey	Clayey soils.
		Commerce-Sharkey	Level, somewhat poorly drained and poorly drained soils that are loamy throughout or have a loamy or clayey surface layer and a clayey subsoil.
	Terrebonne	Mhoon-Commerce	Level, somewhat poorly drained soils that are loamy throughout.
		Sharkey-Swamp	Dark colored, poorly drained soils made up of slack-water clays.
		Swamp	Level, poorly drained to very poorly drained, made up of mixed soils in drainageways, small swamps, and large swampy areas. Top layer commonly made up of sand to sandy loam.
		Marsh	Level, very poorly drained soils that have a mucky surface layer and a mucky or clayey underlying material.
	Assumption	Barbary	Level, very poorly drained, nearly continuously flooded, clayey soils.
		Commerce	Nearly level, somewhat poorly drained soils that are loamy throughout.
		Sharkey	Level, poorly drained, clayey soils.

Table A-1. Soil Associations Along the Gulf Coast

STATE	COUNTY / PARISH	SOIL ASSOCIATION	DESCRIPTION
		Fausse-Sharkey	Level, very poorly drained and poorly drained, frequently flooded, clayey soils.
Louisiana[b]	St. Mary	Barbary-Maurepas-Fausse	Level, very poorly drained soils that are clayey or mucky throughout, in swamps.
		Larose-Allemands-Kenner	Level, very poorly drained soils that have a mucky surface layer and clayey and mucky underlying material, in freshwater marshes.
	St. Martin	Fausse	Level, clayey soils that are inside the Atchafalaya Basin Floodway on the alluvial plain.
		Convent	Nearly level, loamy soils that are inside the Atchafalaya Basin Floodway on the alluvial plain.
		Sharkey-Baldwin-Iberia	Level to gently undulating, mainly clayey soils on the alluvial plain.
	Iberia	Placedo	Very poorly drained clayey soils of the firm marshes.
		Scatlake	Level, very poorly drained soils that are clayey throughout, in saline marshes.
		Lafitte	Very poorly drained organic soils of the soft marshes.
		Maurepas	Very poorly drained organic soils of the tidal swamps and soft marshes.
	Vermilion	Clovelly-Lafitte	Level, very poorly drained soils that have a mucky surface layer and clayey and mucky underlying material, in brackish marshes.
		Bancker-Creole	Level very poorly drained soils that have a mucky surface layer and a clayey underlying material; in brackish marshes.
		Scatlake	Level, very poorly drained soils that are clayey throughout, in saline marshes.
		Mermentau-Hackberry	Level and gently undulating, poorly drained and somewhat poorly drained soils that have a clayey or loamy surface layer, a clayey, sandy, or loamy subsoil, and a loamy or sandy substratum.
	Cameron	Creole	Level, very poorly drained soils that have a very fluid, mucky surface layer and slightly fluid and very fluid clayey, sandy, and loamy underlying material; in brackish marshes.
		Bancker	Level very poorly drained soils that have a very fluid, mucky surface layer and very fluid, clayey underlying material; in brackish marshes.
		Scatlake	Level, very poorly drained soils that are clayey throughout, in saline marshes.
		Clovelly	Level, very poorly drained soils that have a very fluid, mucky surface layer, and a very fluid, mucky and clayey underlying material; in brackish marshes.
		Mermentau-Hackberry	Level and gently undulating, poorly drained and somewhat poorly drained soils that have a clayey or loamy surface layer, a clayey, sandy, or loamy subsoil, and a loamy or sandy substratum.
Louisiana[b]		Udifluvents-Aquents	Level to moderately steep soils that are stratified and sandy to clayey throughout.
	Calcasieu	Mowata-Vidrine-Crowley	Level and very gently sloping, poorly drained and somewhat poorly drained soils that have a loamy surface layer and a loamy and clayey subsoil.
		Morey-Leton-Mowata	Level, poorly drained soils that have a loamy surface layer and a loamy or loamy and clayey subsoil.
		Kinder-Messen-Guyton	Level to moderately sloping, poorly drained and moderately well drained soils that are loamy throughout.

Table A-1. Soil Associations Along the Gulf Coast

STATE	COUNTY / PARISH	SOIL ASSOCIATION	DESCRIPTION
Mississippi[c]	Jackson	Eustis-Wadley-Benndale	Dominantly nearly level to strongly sloping, somewhat excessively drained soils that have a sandy surface layer and a sandy or loamy subsoil and well drained soils that have a loamy surface layer and a loamy subsoil; on uplands.
		Bayou-Daleville-Lenoir	Dominantly level and nearly level, poorly drained soils that have a loamy surface layer and a loamy subsoil and somewhat poorly drained soils that have a loamy surface layer and a clayey subsoil; on terraces.
		Handsboro-Axis-Maurepas	Dominantly level, very poorly drained soils that have a surface layer of mucky silt loam, mucky sandy clay loam, or muck and a substratum of muck or a loamy substratum; in tidal marshes, coastal floodplains, and swamps.
		Harleston-Escambia-Bayou	Dominantly nearly level to moderately sloping, moderately well drained, somewhat poorly drained, and poorly drained soils that have a loamy surface layer and a loamy subsoil; on uplands.
		Duckston-Newhan-Corolla	Dominantly nearly level to rolling, poorly drained, excessively drained, and somewhat poorly drained soils that are sandy throughout; on barrier islands.
	Harrison	Eustis-Latonia-Lakeland	Somewhat excessively drained and excessively drained soils that are sandy throughout and well drained soils that have a loamy subsoil.
		Smithton-Plummer	Poorly drained soils that have a loamy subsoil.
		Atmore-Harleston-Plummer	Poorly drained and moderately well drained soils that have a loamy subsoil.
Mississippi[c]	Harrison	Poarch-Plummer-Ocilla	Well-drained, somewhat poorly drained, and poorly drained soils that have a loamy subsoil.
		Harleston-Smithton-Nugent	Moderately well drained and poorly drained soils that have a loamy subsoil and excessively drained soils that are stratified with sandy and loamy material.
		Poarch-Atmore-Harleston	Well-drained soils on broad ridgetops, poorly drained soils on low wet flats, and moderately well drained soils on low ridges.
		Ruston-McLaurin-Saucier	Well drained and moderately well drained soils on broad ridges and short side slopes.
		Saucier-Poarch-Atmore	Well-drained to poorly drained soils on broad ridges and narrow side slopes.
		Handsboro	Very poorly drained organic soils.
		Handsboro-St. Lucie	Very poorly drained organic soils and excessively drained sandy soils.
	Hancock	Atmore-Beauregard-Escambia	Nearly level to gently sloping, moderately well drained to poorly drained silty and loamy soils on broad wet upland flats and low ridges.
		Atmore-Smithton-Escambia	Nearly level to gently sloping, poorly drained and somewhat poorly drained silty and loamy soils on broad wet upland flats and drainageways, and low upland ridges.
		Guyton-Atmore-Trebloc	Nearly level, very poorly drained silty soils on broad wet flats and drainageways.
		Handsboro-Bohicket	Nearly level, very poorly drained, mucky and clayey on tidal marshes that are flooded daily by tidal waters.
Alabama[d]	Baldwin	Marlboro-Faceville-Greenville	Deep, moderately well drained and well drained, level to gently sloping upland soils.
		Lakeland-Plummer	Deep, somewhat excessively drained to very poorly drained, level bottomland soils, level to moderately steep upland soils.

Table A-1. Soil Associations Along the Gulf Coast

STATE	COUNTY / PARISH	SOIL ASSOCIATION	DESCRIPTION
		Norfolk-Klej-Goldsboro	Deep, moderately well drained and well drained, level to gently sloping upland soils.
		Lakewood-St. Lucie-Leon	Moderately deep and deep, poorly drained to excessively drained soils that border saltwater and freshwater lakes.
	Mobile	Troup-Heidel-Blama	Nearly level to undulating, well drained soils that have loamy subsoils, formed in loamy, marine sediments.
	Mobile	Dorovan-Johnston-Levy	Nearly level to hilly, very poorly drained, mucky and loamy soils, formed in thick deposit of organic residues and alluvial sediments on bottomlands.
Alabama[d]		Notcher-Saucier-Malbis	Nearly level to gently undulating, moderately well drained soils that have loamy and clayey subsoils, formed in loamy and clayey marine and alluvial sediments on terraces.
		Bayou-Scambia-Harleston	Nearly level to gently undulating, poorly to moderately well drained soils with loamy subsoils, formed in marine and fluvial sediments on uplands and terraces.
		Axis-Lafitte	Nearly level, very poorly drained, loamy mineral and organic soils, formed in loamy marine sediments and thick herbaceous plant remains on coastal marshes.
		Urban land-Smithton-Benndale	Nearly level to gently rolling Urban land areas that are intermingled with poorly drained and well drained soils that have loamy subsoils, formed in loamy marine and fluvial sediments on uplands.
Florida[e]	Monroe	Tidal Marsh-Coastal Beach-Coastal Dune	Regularly flooded organic and mineral deposits and unstable sands along the seashore.
	Collier	St. Lucie-Lakewood-Pamello	Excessively drained soils, solid predominantly thick acid sand.
		Leon-Immakalee-Pompano	Somewhat poorly drained soils, soil predominantly thick acid sands with organic pans, interspersed with soil without pan formation.
		Adamsville-Pompano	Somewhat poorly drained soils, soil predominantly thick to thin sands overlying finer textured alkaline materials.
		Pompano-Charlotte-Delray	Poorly to very poorly drained soils, soils predominantly moderately thick to thin sands to sandy loams overlying finer textured alkaline materials.
		Tidal Marsh-Coastal Beach-Coastal Dune	Regularly flooded organic and mineral deposits and unstable sands along the seashore.
		Freshwater Swamp-Marsh[f]	Regularly flooded, very poorly drained soils with high organic and mineral deposits.
	Lee-Hillsborough	Leon-Immakalee-Pompano	Somewhat poorly drained soils, soil predominantly thick acid sands with organic pans, interspersed with soil without pan formation.
	Lee-Hillsborough	Leon-Pomello-Plummer	Somewhat poorly drained soils, soil predominantly thick acid sands with organic pans, interspersed with soil without pan formation.
		Leon-Blanton-Plummer	Somewhat poorly drained soils, soil predominantly thick acid sands with organic pans, interspersed with soil without pan formation.
		Adamsville-Pompano	Somewhat poorly drained soils, soil predominantly thick to thin sands overlying finer textured alkaline materials.
Florida[e]		Broward-Parkwood-Keri	Somewhat poorly drained soils, soil predominantly thick to thin sands overlying finer textured alkaline materials.

Table A-1. Soil Associations Along the Gulf Coast

STATE	COUNTY / PARISH	SOIL ASSOCIATION	DESCRIPTION
		Pompano-Charlotte-Delray	Poorly to very poorly drained soils, soils predominantly moderately thick to thin sands to sandy loams overlying finer textured alkaline materials.
		Tidal Marsh-Coastal Beach-Coastal Dune	Regularly flooded organic and mineral deposits and unstable sands along the seashore.
	Pasco-Citrus	Lakeland-Eustis-Blanton	Well drained to moderately well drained soils predominantly thick to moderately thick acid sands.
		Arredondo-Gainesville-Fort Meade	Well drained to moderately well drained soils predominantly thick to thin phosphatic sand and loamy sands overlying finer textured materials.
		Blanton-Klej	Well drained to moderately well drained soils predominantly thick to thin acid sands some of which overlie finer textured subsoils.
		Rex-Blanton	Well drained to moderately well drained soils predominantly thick to thin acid sands some of which overlie finer textured subsoils.
		Leon-Plummer-Rullege	Somewhat poorly drained soils, soil predominantly thick acid sands with organic pans, interspersed with soil without pan formation.
		Plummer-Rullege	Poorly to very poorly drained soils, soils predominantly thick to thin sandy loam surface soils overlying finer textured acid subsoils.
		Tidal Marsh-Coastal Beach-Coastal Dune	Regularly flooded organic and mineral deposits and unstable sands along the seashore.
		Freshwater Swamp-Marshf	Regularly flooded, very poorly drained soils with high organic and mineral deposits.
	Marion	Jonesville-Chiefland-Hernando	Well drained to moderately well drained soils predominantly thick to thin sands influenced by alkaline materials.
	Marion	Arredondo-Gainesville-Fort Meade	Well drained to moderately well drained soils predominantly thick to thin phosphatic sand and loamy sands overlying finer textured materials.
	Levy-Wakulla	Lakeland-Eustis-Blanton	Well drained to moderately well drained soils predominantly thick to moderately thick acid sands.
		Jonesville-Chiefland-Hernando	Well drained to moderately well drained soils predominantly thick to thin sands influenced by alkaline materials.
Florida[e]		Arredondo-Gainesville-Fort Meade	Well drained to moderately well drained soils predominantly thick to thin phosphatic sand and loamy sands overlying finer textured materials.
		Blanton-Klej	Well drained to moderately well drained soils predominantly thick to thin acid sands some of which overlie finer textured subsoils.
		Rex-Blanton	Well drained to moderately well drained soils predominantly thick to thin acid sands some of which overlie finer textured subsoils.
		Leon-Plummer-Rullege	Somewhat poorly drained soils, soil predominantly thick acid sands with organic pans, interspersed with soil without pan formation.
		Plummer-Rullege	Poorly to very poorly drained soils, soils predominantly thick to thin sandy loam surface soils overlying finer textured acid subsoils.
		Manatee-Felda	Poorly to very poorly drained soils, soils predominantly moderately thick to thin sands to sandy loams overlying finer textured alkaline materials.

Table A-1. Soil Associations Along the Gulf Coast

STATE	COUNTY / PARISH	SOIL ASSOCIATION	DESCRIPTION
		Norfolk-Ruston-Orangeburg	Well-drained, undulating, upland soils with loamy fine sand surface soils and sandy clay loam subsoils.
		Kanapaha-Blanton	Well drained to moderately well drained soils predominantly thick to thin acid sands some of which overlie finer textured subsoils.
	Franklin-Escambia	Lakeland-Eustis-Blanton	Well drained to moderately well drained soils predominantly thick to moderately thick acid sands.
		Lakeland-Eustis-Norfolk	Well drained to moderately well drained soils predominantly thick to moderately thick acid sands.
		Blanton-Klej	Well drained to moderately well drained soils predominantly thick to thin acid sands some of which overlie finer textured subsoils.
	Franklin-Escambia	Norfolk-Ruston-Orangeburg	Well-drained, undulating, upland soils with loamy fine sand surface soils and sandy clay loam subsoils.
		Magnolia-Faceville-Tifton	Well-drained undulating, upland soils, with loamy sand surface soils and fine sand to clay loam to fine sand clay subsoils.
		Shubuta-Cuthbert-Lakeland	Excessively drained to moderately well drained, sloping to very steep coarse sands, loamy sands, and sandy clay loams of the uplands that have a sandy clay to clay subsoil.
		Leon-Blanton-Plummer	Somewhat poorly drained soils, soil predominantly thick acid sands with organic pans, interspersed with soil without pan formation.
		Scranton-Ona	Somewhat poorly drained soils predominantly thick acid sands with dark surface soils.
Florida[e]		Goldsboro-Lynchburg	Well drained to moderately well drained soils predominantly thick to thin acid sands some of which overlie finer textured subsoils.
		Plummer-Rullege	Poorly to very poorly drained soils, soils predominantly thick to thin sandy loam surface soils overlying finer textured acid subsoils.
		Tidal Marsh-Coastal Beach-Coastal Dune	Regularly flooded organic and mineral deposits and unstable sands along the seashore.
		Freshwater Swamp-Marsh[f]	Regularly flooded, very poorly drained soils with high organic and mineral deposits.

[a] NRCS 2008.
[b] NRCS n.d.a.
[c] NRCS n.d.b.
[d] NRCS n.d.c.
[e] NRCS n.d.d.
[f] This description is based on characteristics of similar soil types and professional knowledge of soil characteristics common in freshwater swamps and marshes.

A.2 Essential Fish Habitat in Coastal Wetlands

Essential fish habitat for red drum, reef fish, and coastal migratory pelagic species are included in Figure 3-5.

Red Drum

Red drum is a demersal species that occur throughout the Gulf in a variety of habitats, ranging from depths of about 230 feet offshore to very shallow estuarine waters (GMFMC 2004). They commonly occur in virtually all of the Gulf's estuaries where they occur over a variety of substrates including seagrasses, sand, mud, and oyster reefs. Red drum tolerate salinities ranging from freshwater to highly saline water. Spawning occurs near the mouths of bays and inlets, and on the Gulf side of barrier islands. Eggs hatch mainly in the Gulf, and larvae are transported into estuaries where they mature before moving back to the Gulf. Estuarine wetlands, which include tidal wetlands, salt marshes, and tidal creeks, are especially important to larval, juvenile, and sub-adult red drum.

Harvest of red drum in the Exclusive Economic Zone is currently set to zero by the red drum FMP (GMFMC and NOAA 2011). Recreational harvest of red drum is allowed in State waters as regulated by each state.

Shrimp

Brown Shrimp

Brown shrimp are found along the Atlantic Coast from Massachusetts to Florida and within the Gulf of Mexico from Florida through the Yucatan Peninsula.

This species spawns at depths greater than 25 feet. Brown shrimp in the Gulf of Mexico spawn in spring and summer at water temperatures between 62.6 and 84.2 degrees Fahrenheit (°F). Adult brown shrimp are thought to die after spawning once (St. Amant et al. 1966 as cited in Larson et al. 1989). Postlarval brown shrimp move into shallow, low salinity areas with marsh grass in estuaries after water temperatures reach 51.8°F. Juvenile brown shrimp inhabit nursery areas and gradually move to deeper and higher salinity areas as they grow. Adult brown shrimp move seasonally with changes to water temperatures.

Brown shrimp are omnivorous and food sources include detritus, small invertebrates, and fish depending on the life stage of the shrimp. Carnivorous fishes and crustaceans feed on brown shrimp. Competition between brown shrimp and two other commercially important shrimp species, pink and white shrimp, is considered minor because the species have different preferred substrate and salinity preferences and temporal differences in habitat use. Each species also exhibits differences in diurnal activity (NOAA Fisheries Service 2011b).

Pink Shrimp

Pink shrimp are found from the lower Chesapeake Bay to Florida long the Atlantic Coast and in the Gulf of Mexico from Florida to approximately Isla Mujeres, Mexico. The species is most abundant in estuaries, bays, and broad, shallow continental shelf waters. The highest densities of pink shrimp are found within the Gulf of Mexico along the Florida and Yucatan, Mexico, coasts.

Pink shrimp move from shallow coastal nursery grounds to deeper waters as juveniles or early adults. Spawning then occurs in oceanic waters at depths of 13 to 157 feet, and sometimes deeper water. Pink shrimp can spawn all year: however, activity increases as water temperature rises. Peaks in spawning occur in late spring, summer, and early fall (TPWD 2002). Spawning moves from shallower waters to deeper waters as water temperature decreases. Postlarval life stages move into coastal nursery areas and concentrate in areas with shelter for shrimp. They spend between 2 and 6 months in these nursery areas, developing into juvenile and adult shrimp, before moving into offshore waters at depths between 30 and 144 feet (NOAA Fisheries Service 2011c).

Pink shrimp are found in areas with substrates consisting of shell-sand, sand, coral-mud, or mud. Sub-adult life stages prefer shell-sand and loose peat. Adult pink shrimp prefer calcareous sediments and also use hard sand substrate.

Pink shrimp are omnivores and feed on primarily benthic prey. Juveniles and young adults forage along the bottom in seagrass beds. This foraging activity generally occurs at night, but does occasionally occur during the day. Primary food sources change with life stage. Postlarvae feed on microplankton cultures and nauplii. Juvenile pink shrimp feed on dinoflagellates, foraminiferans, nematodes, polychaetes, ostracods, copepods, mysids, isopods, amphipods, caridean shrimp and eggs, and mollusks. Adult shrimp prey upon foraminiferans, gastropods, squid, annelids, crustaceans, small fish, and plants (NOAA Fisheries Service 2011c).

Pink shrimp are prey for birds and fish (including snook, spotted sea trout, and mangrove snapper or grey snapper, and reef fish species). They have also been found in the digestive tracts of dolphins. Pink shrimp habitat overlaps with brown and white shrimp. However, there are temporal differences and different environmental conditions preferred for the peak use of habitat areas for each species.

White Shrimp

White shrimp are distributed along the Atlantic Coast from New York to Florida. They are also found in the Gulf of Mexico from Apalachee Bay, Florida, to Ciudad Campeche, Mexico. This species is typically found in water less than 100 feet deep.

White shrimp spawn from March to November, though most commonly they spawn between April and October. Rising temperatures at the bottom of the water column trigger the beginning of the spawning season, and decreasing water temperatures in the fall occur at the same time as the end of spawning. Spawning occurs at salinities of 27 parts per thousand or greater and at depths of 26 to 102 feet (NOAA Fisheries Service 2011d).

White shrimp are larvae for approximately 10 days. During this life stage they are planktonic. Postlarvae move from oceanic areas into estuaries. Larval shrimp feed on zooplankton and phytoplankton. Juvenile shrimp are also found in estuaries, and tend to move further upstream within the estuaries than juvenile pink or brown shrimp. In Florida, juvenile white shrimp are found as far as 130 miles upstream from the estuary system; in Louisiana, they are found as far as 100 miles upstream. Juvenile white shrimp also prefer muddier substrates within loose peat and sandy mud (NOAA Fisheries Service 2011d).

Adult white shrimp prefer shallow muddy-bottom substrate. Both adult and juvenile white shrimp are benthic omnivores. Adults consume detritus, plant material, microorganisms, macroinvertebrates, and fish parts. This species serves as prey for many fish species and other marine and estuarine organisms.

A.3 Submerged Aquatic Vegetation

This section provides species descriptions for the six seagrass species found in the Gulf of Mexico.

Seagrasses

Manatee Grass

Manatee grass (*Syringodium filiforme*), a favorite food of the Florida manatee, is found in tropical coastal waters with salinities of 20 to 36 parts per thousand. Manatee grass commonly occurs growing with other species of seagrasses, or alone in small patches (Florida Museum of Natural History 2012). Manatee grass has grass blades that are long and thin, light green, and up to 3 feet in length. Like other seagrasses, this grass has inconspicuous flowers. Manatee grass propagates by rhizome extension and often mixes with turtle grass in seagrass meadows (U.S. Environmental Protection Agency [EPA] 2006). Manatee grass is found mostly in subtidal environments and may have a large understory of macroalgae. Manatee grass occurs mainly in south Texas and Florida (Gulf of Mexico Program [GMP] 2004). It also occurs in a few locations in eastern Louisiana and eastern Mississippi (USDA 2012a).

Shoal Grass

Shoal grass (*Halodule wrightii*) occupies the shallowest waters in the Gulf of Mexico and is often exposed during low tides (eFloras 2012). It is an early colonizer of vegetated areas and usually grows in water too shallow for other seagrass species except widgeon grass (Florida Department of Environmental Protection 2011). Shoal grass has elongate stalks that often branch into flat, wide leaves with a maximum width of 0.125 inch. These stalks may grow to 15 to 16 inches in length. They have a naturally ragged, somewhat three-pointed tip on the leaf. This plant inhabits very shallow areas and generally occurs in water less than 20 inches deep. While shoal grass beds can grow on both the landward and ocean sides of turtle grass beds, they are usually found on the landward side (U.S. EPA 2006). However, they can also grow in monospecific beds and not be associated with turtle grass. Sandy and muddy substrates are the most common habitat for shoal grass, but they can also be found adjacent to coral reefs and in mangrove swamps. Shoal grass is widely distributed throughout the Gulf of Mexico, with significant populations found in many coastal bays and estuaries (GMP 2004).

Turtle Grass

The common name for turtle grass refers to the green sea turtles that graze on large fields of this seagrass (Florida Museum of Natural History 2012). Turtle grass (*Thalassia testudiunum*) meadows are highly productive and play an important role in estuarine and near coastal ecosystems (U.S. EPA 2006). Turtle grass plants have broad, strap-like blades that range from 4 to 30 inches in length (GMP 2004). These plants reproduce asexually by creeping rhizomes or sexually by waterborne flower pollen and form dense meadows in estuaries or near coastlines (U.S. EPA 2006). Turtle grass is often found just below the low tide surface to depths of 100 feet in clearer waters. It prefers mud or sand substrate for colonization and has rhizomes that may be as deep as 10 inches below the substrate surface. Turtle grass is the most abundant and widely distributed seagrass in the Gulf of Mexico and can often be found in dense, extensive stands (GMP 2004).

Widgeon Grass

Widgeon grass (*Ruppia maritima*) (also known as ditch grass) grows in both freshwater and saline environments due to its abilities to withstand a wide range of salinities. Not generally considered a "true" seagrass, widgeon grass is primarily found in brackish bays and estuaries (Duke and Kruczynski 1992; U.S. EPA 2006). Widgeon grass leaves are needlelike, short, about 2 inches in length, and branch off of slender, elastic stems. This seagrass reproduces sexually through hydroanemophilous pollination, which leads to the production of tiny, inconspicuous flowers and seeds found on its stalks. It can also reproduce asexually by means of rhizomes which extend along the estuary bottom and send out shoots. Widgeon grass, because of its nutritive value, is an extremely important SAV species for many waterfowl species including the American widgeon, for which the plant is named (U.S. EPA 2006). Widgeon grass is the most common seagrass in parts of the Gulf of Mexico estuaries most influenced by freshwater (GMP 2004). It can form extensive SAV beds in subtidal areas, withstanding exposure to sun and some desiccation (Florida Museum of Natural History 2012).

Paddle Grass

Paddle grass (*Halophila decipiens*) is a small seagrass species that usually stands 1.2 to 2 inches tall. It has thin, oval blades in pairs that appear translucent to the eye. Rhizomes are often located near the surface and exposed to the water column. Paddle grass is easily uprooted due to its shallow rhizome structure and typically grows at depths between 33 and 100 feet. This seagrass species requires less light than other seagrasses and can be found in turbid areas and below docks. It is found mostly in the warmer waters of the Gulf of Mexico and extensive acreages of seasonal beds have been observed in southern Florida (GMP 2004).

Star Grass

Star grass (*Halophila engelmanni*) is found throughout the Gulf of Mexico (Green and Short 2003) and has similar physical characteristics to paddle grass (GMP 2004). It is a very small plant of shallow saline waters that rarely exceeds 4 inches in height. Salinity tolerance may vary but generally ranges from 20 to over 35 parts per thousand (Barataria Terrebonne National Estuary Program 2012). Star grass is found in sheltered sites from low-spring tide level up to 300 feet in clear waters. It is generally found in sandy and muddy substrates but can also be found in areas with gravel or rock bottom.

A.4 Federally Listed Fish Species

Smalltooth Sawfish – Endangered

Smalltooth sawfish is a cartilaginous, shark-like ray that is listed as endangered. Sawfishes have long, toothed snouts that look similar to a saw. They are long-lived, slow growing, slow to mature, and bear few young. These traits make all sawfish extremely vulnerable to overfishing and slow to recover from depletion (NOAA Fisheries Service 2009). It occurs in shallow coastal waters within the Gulf and generally in nearshore habitats with muddy and sandy bottoms. This species is often found in sheltered bays, on shallow banks, and in estuaries or river mouths (NOAA Fisheries Service 2011f). In 2009, the NOAA Fisheries Service designated two areas on the southwestern coast of Florida between Charlotte

Harbor and Florida Bay as critical habitat: Charlotte Harbor Estuary Unit, which comprises approximately 346 square miles of coastal habitat, and the Ten Thousand Islands/Everglades Unit, which comprises approximately 967 square miles of coastal habitat (Federal Register 2009a).

Gulf Sturgeon – Threatened

Gulf sturgeon spawns in freshwater and forages and overwinters in estuarine and salt water. They return to their natal freshwater source to spawn in areas of rock and rubble in coastal rivers from Louisiana to Florida during the summer, and occur in the Gulf and its estuaries and bays in the cooler months. Gulf sturgeon are bottom feeders, eating primarily macroinvertebrates, mollusks, worms, and crustaceans (USFWS 1995). Foraging occurs in brackish or marine waters of the Gulf and its estuaries. Pre-spawning activity is initiated in the spring and they migrate back to the Gulf in the fall. In 2003, the USFWS and NOAA Fisheries Service designated 14 geographic areas among the Gulf rivers and tributaries as critical habitat for the Gulf sturgeon (Figure 3-9). Specific geographic areas that are essential for the conservation of the species and that may require special management and protection have been designated as critical habitat for Gulf sturgeon. Fourteen geographic areas designated as critical habitat for Gulf sturgeon encompass approximately 1,730 miles and 3,333 square miles of estuarine and marine habitat (Federal Register 2003), respectively.

Pallid Sturgeon – Endangered

Pallid sturgeon was listed as endangered on September 6, 1990 (Federal Register 1990). Habitat is generally described as large, turbid, free-flowing rivers with a diverse assemblage of physical habitats that constantly changed pre-development (Dryer and Sandoval 1993). Pallid sturgeon are under the jurisdiction of the USFWS and based on their *Pallid Sturgeon Recovery Plan* (Dryer and Sandoval 1993), a few specimens were collected historically from the lower Mississippi River at New Orleans, but reports of pallid sturgeon from the Mississippi River dating from 1980 through publication of the recovery plan in 1993 have been limited to Chester, Illinois; Caruthersville, Missouri; and in both the Mississippi and Atchafalaya Rivers in Louisiana at the Old River Control where the Atchafalaya diverges from the Mississippi River. Two priority recovery areas extend to the Gulf of Mexico: the Mississippi River from its confluence with the Missouri River and the Atchafalaya River system (Dryer and Sandoval 1993).

A.5 Sea Turtles

Additional detailed information on the life cycles, habitat preferences, and migration patterns of each of the five sea turtle species in the Gulf of Mexico is presented below. All five sea turtle species discussed are Federally listed. Table A-2 presents the ESA status for each of the five species as well as information on the use of Gulf of Mexico habitats by each species.

Table A-2. Threatened and Endangered Sea Turtles of the Gulf of Mexico

COMMON NAME	SCIENTIFIC NAME	ENDANGERED SPECIES STATUS	USE OF GULF
Loggerhead sea turtle	*Caretta caretta*	9 DPSs – 4 listed as threatened (Northwest Atlantic Ocean, South Atlantic Ocean, Southwest Indian Ocean, and Southeast Indo-Pacific Ocean DPSs) and 5 listed as endangered (Northeast Atlantic Ocean, Mediterranean Sea, North Pacific Ocean, South Pacific Ocean, and North Indian Ocean DPSs).	From Texas to Florida in shallow water habitats, continental shelf waters, open Gulf waters; nesting on Gulf Coast beaches in Florida, Alabama, Mississippi, and Texas. Records of historical nesting in Louisiana and Mississippi.
Green sea turtle	*Chelonia mydas*	Breeding populations in Florida and on the Pacific Coast of Mexico are listed as Endangered; all others are listed as Threatened.	Inshore and nearshore waters from Texas to Florida; nests in Texas and Florida. Historically reported as nesting in Alabama.
Hawksbill sea turtle	*Eretmochelys imbricata*	Endangered	From Texas to Florida, particularly near coral reefs, in coastal and open Gulf waters; one record of nesting at Padre Island National Seashore, Texas; records of nesting in Florida.
Kemp's ridley sea turtle	*Lepidochelys kempii*	Endangered	From Texas to Florida in coastal and pelagic waters; nesting on Gulf Coast beaches in Texas, and infrequently in Alabama and Florida.
Leatherback sea turtle	*Dermochelys coriacea*	Endangered	Pelagic and coastal waters of the Gulf of Mexico; nests in Florida and incidentally in Texas.

Loggerhead Sea Turtle

Loggerhead sea turtles are broken into nine distinct population segments (DPSs) with listings of threatened or endangered under the ESA. The northwest Atlantic DPS, which includes the Gulf of Mexico, is listed as threatened. Loggerheads are circumglobal, occurring throughout the temperate and tropical regions of the Atlantic, Pacific, and Indian Oceans. Loggerheads are the most abundant species of sea turtle found in U.S. coastal waters (NOAA Fisheries Service 2011g).

Loggerhead nesting beaches have been observed n Florida, Alabama, Mississippi, and Texas. Nesting beaches were documented in Mississippi in 2012; historically, there have been infrequent instances of nesting loggerheads on barrier islands in Mississippi. Historical records indicate that nesting also occurred on beaches in Louisiana (FWC 2012a; Share the Beach 2012; Wynne and Schwartz 1999). During non-nesting years, adult females are distributed in waters off the eastern U.S. and throughout the Gulf of Mexico, Bahamas, Greater Antilles, and Yucatán.

After swimming from land, post-hatchling loggerheads take up residence in areas where surface waters converge to form local downwellings. These areas are often characterized by accumulations of floating material, such as sargassum, and, in the southeast U.S., are common between the Gulf Stream and the southeast U.S. coast, and between the Loop Current and the Gulf Coast of Florida. Post-hatchlings within this habitat are observed to be low-energy, float-and-wait foragers that feed on a wide variety of floating items, developing into juvenile sea turtles (Witherington 2002; NOAA Fisheries Service 2011g).

During this life stage, juvenile loggerheads are epipelagic and spend 75 percent of their time within the top 16.5 feet of the water column. Most of the dives of the turtles are between 6.5 and 16.5 feet with the remaining dives within the top 330 feet of the water column. Occasionally loggerheads dive to a depth greater than 656 feet. In areas that are shallow, such as around oceanic islands or ocean banks or ridges that come close to the surface, loggerheads spend some time on the bottom feeding. Little information is available on the dietary habits of ocean-stage juveniles (NOAA Fisheries Service 2011g).

Oceanic juveniles migrate to nearshore coastal areas after reaching 7 to 12 years of age and continue maturing until adulthood. In addition to providing critically important habitat for juveniles, the neritic zone also provides crucial foraging habitat, inter-nesting habitat, and migratory habitat for adult loggerheads in the western North Atlantic. To a large extent, these habitats overlap with the juvenile stage, the exception being most of the bays, sounds, and estuaries along the Atlantic and Gulf Coasts of the U.S. from Massachusetts to Texas, which are infrequently used by adults.

Adults primarily inhabit continental shelf waters, including areas in the Gulf of Mexico. Many male and female adult loggerheads utilize shallow water habitats with large expanses of open ocean access, such as Florida Bay, for year-round resident foraging areas (NOAA Fisheries Service and USFWS 2008). The predominant foraging areas for western North Atlantic adult loggerheads are found throughout the relatively shallow continental shelf waters of the U.S., Bahamas, Cuba, and the Yucatán Peninsula, Mexico (NOAA Fisheries Service 2011g). Adult loggerheads feed on a wide variety of organisms, including mollusks and benthic crabs (NOAA Fisheries Service and USFWS 2008).

Migration routes from foraging habitats to nesting beaches (and vice versa) for a portion of the population are restricted to the continental shelf, while other routes involve crossing oceanic waters to and from the Bahamas, Cuba, and the Yucatán Peninsula. Seasonal migrations of adult loggerheads along the mid- and southeast U.S. coasts have also been documented (NOAA Fisheries Service 2011g).

Loggerheads face threats on both nesting beaches and in the marine environment. Though prohibited in most jurisdictions, harvest of loggerheads still occurs in many places and is a serious and continuing threat to loggerhead recovery (NOAA Fisheries Service 2011g).

Green Sea Turtle

The breeding populations of green sea turtles in Florida and along the Pacific Coast of Mexico are listed as endangered under the ESA. Nesting populations of the green sea turtle in Florida are primarily found in east and southeast Florida. All other populations of green sea turtles are listed as threatened under the ESA (NOAA Fisheries Service 2011h). In a 2004 Green Turtle Assessment, the Marine Turtle Specialist Group (MTSG) of the International Union for Conservation of Nature classified green turtles as endangered globally. Analyses of historic and recent abundance information by the MTSG indicates that extensive population declines have occurred in all major ocean basins over approximately the past 100 to 150 years. The MTSG analyzed population trends at 32 index nesting sites around the world and found a 48 to 65 percent decline in the number of mature females nesting annually over the past 100 to 150 years (NOAA Fisheries Service 2011h). In 2010 and 2011, however, the number of nests has increased on Florida beaches (FWC 2012b).

The green turtle is globally distributed and generally found in tropical and subtropical waters along continental coasts and islands between 30°N and 30°S (NOAA Fisheries Service 2011h). In U.S. Atlantic and Gulf of Mexico waters, green turtles are found in inshore and nearshore waters from Texas to Massachusetts, the U.S. Virgin Islands, and Puerto Rico. Important feeding areas in Florida include the Indian River Lagoon, the Florida Keys, Florida Bay, Homosassa, Crystal River, Cedar Key, and St. Joseph Bay (NOAA Fisheries Service 2011h).

Like all sea turtles, green turtles primarily use three types of habitat (NOAA Fisheries Service 2011h): beaches for nesting, open ocean convergence zones, and coastal areas for feeding.

Green sea turtles nest on high-energy ocean beaches, generally on islands (NOAA Fisheries Service and USFWS 1991). Large nesting populations are found in Tortuguero, Costa Rica; Raine Island, Australia; and Tamaulipas, Mexico. Within the U.S., green sea turtles are known to nest in the Virgin Islands, Puerto Rico, the east coast of Florida, the Gulf Coast of Florida, and Padre Island, Texas (NOAA Fisheries Service and USFWS 1991; NPS 2011a; FWC 2012a). Between one and six nests are documented on Padre Island, Texas, each year (NPS 2011a). There have also been historical records of nesting in Alabama.

While nesting season varies from location to location, in the southeastern U.S., females generally nest in the summer between June and September; peak nesting occurs in June and July. During the nesting season, females nest at approximately 2-week intervals (NOAA Fisheries Service 2011h).

New hatchlings move to the convergence zones in pelagic areas; the turtles are primarily omnivores during this life stage. After reaching a carapace length of 8 to 10 inches, juvenile green turtles move into benthic foraging grounds in nearshore areas. Upon reaching a certain age, green sea turtles switch to herbivory and feed primarily on algae and seagrasses in shallow benthic environments (NOAA Fisheries Service and USFWS 1991). Coral reefs, rocky outcrops, and jetty rocks located near feeding areas are often used as resting locations for this species. Adult green turtles are unique among sea turtles in that they eat only plants. This diet is thought to give them greenish-colored fat, from which they take their name (NOAA Fisheries Service 2011h).

Hawksbill Sea Turtle

This species is listed as endangered under the ESA and critical habitat has been designated in Puerto Rico. Hawksbill turtles are circumtropical, usually occurring from 30°N to 30° S latitude in the Atlantic, Pacific, and Indian Oceans and associated bodies of water. Hawksbills are widely distributed throughout the Caribbean Sea and western Atlantic Ocean, the Greater and Lesser Antilles, and along the Central American mainland south to Brazil (NOAA Fisheries Service 2011i). The majority of nesting occurs in Mexico and Cuba in the Caribbean. Within the U.S., hawksbills are most common in Puerto Rico and the

U.S. Virgin Islands where the most significant nesting occurs on Mona Island and Buck Island, respectively (Diez and van Dam 2006 as cited in NOAA Fisheries Service 2011i). Along the Gulf Coast, hawksbills have been observed to nest in Florida and Texas. There is one record of nesting at Padre Island National Seashore (NPS 2009). In Florida, nesting is rare and restricted to the southeast coast of Florida and the Florida Keys (USFWS 2000; NOAA Fisheries Service 2011i). Research indicates that adult hawksbill turtles are capable of migrating long distances between nesting beaches and foraging areas, which are comparable to migrations of green and loggerhead turtles.

Hawksbill turtles use different habitats at different stages of their life cycle, but are most commonly associated with healthy coral reefs. Post-hatchlings (oceanic stage juveniles) are believed to occupy the pelagic environment, taking shelter in floating algal mats and drift lines of floating debris in the Atlantic. During the pelagic stage, hatchling hawksbill sea turtles have been observed in sargassum off several Gulf States (Coston-Clements et al. 1991; NOAA Fisheries Service 2011i). Hatchling turtles are thought to actively seek out sargassum mats in the open pelagic ocean. Sargassum mats provide hawksbill sea turtles with a variety of prey, including small crabs and snails (Louisiana Department of Wildlife and Fisheries 2010; NOAA Fisheries Service 2011i).

After a few years in the pelagic zone, small juveniles return to coastal foraging grounds. This shift in habitat also involves a shift in feeding strategies, from feeding primarily at the surface to feeding below the surface primarily on animals associated with coral reef environments. Coral reefs are the preferred foraging habitat of juvenile and adult hawksbill sea turtles. They feed primarily on sponges and are thought to be selective in their diet based on the limited species of sponges found in the guts of hawksbill sea turtles (NOAA Fisheries Service and USFWS 1993).

The ledges and caves of coral reefs provide shelter for resting hawksbills both during the day and at night. Hawksbills are known to inhabit the same resting spot at night. Hawksbills are also found around rocky outcrops and high energy shoals, which are also optimum sites for sponge growth. They are also known to inhabit mangrove-fringed bays and estuaries, particularly along the eastern shore of continents where coral reefs are absent (NOAA Fisheries Service 2011i).

Kemp's Ridley Sea Turtle

Kemp's ridley sea turtles are listed as endangered under the ESA. Kemp's ridleys are distributed throughout the Gulf of Mexico and U.S. Atlantic seaboard, from Florida to New England, but, due to drastic population declines in the mid nineteen hundreds, only 251 nests were recorded in Texas from 2002-2006. They display one of the most unique synchronized nesting habits in the natural world. Large groups of Kemp's ridleys gather off a particular nesting beach near Rancho Nuevo, Mexico, in Tamaulipas; then, wave upon wave of females come ashore and nest in what is known as an "arribada," which means "arrival" in Spanish. There are many theories on what triggers an arribada, including offshore winds, lunar cycles, and the release of pheromones by females (NOAA Fisheries Service 2011j). Scientists have yet to conclusively determine the cues for ridley arribadas. Arribada nesting is a behavior found only in the genus *Lepidochelys*. Female Kemp's ridleys nest from late March to July (NOAA Fisheries Service 2011j).

The Kemp's ridley has experienced a historical, dramatic decrease in arribada size. An amateur video from 1947 documented an extraordinary Kemp's ridley arribada near Rancho Nuevo. It has been estimated that approximately 42,000 Kemp's ridleys nested during that single day (Hildebrand 1963; NOAA Fisheries Service 2011j). Twenty years after the video was filmed, the largest arribada measured was just 5,000 individuals. Between the years of 1978 and 1991, only 200 Kemp's ridleys nested annually. Today the Kemp's ridley population appears to be in the early stages of recovery. Nesting has increased steadily over the past decade (NOAA Fisheries Service 2011j). In 2011, 20,570 Kemp's ridley nests were recorded in Tamaulipas, Mexico (Pena 2011). This is slightly less than the 21,144 nests registered during 2009, which was the greatest number of nests recorded since monitoring began in 1978. As of June 2012, nesting numbers are potentially on track to break the 2009 record, although the final number of nests is not currently available (Klemm 2012).

Arribadas occur in Tamaulipas, Mexico and to a lesser extent in Vera Cruz, Mexico and Texas. The three main nesting beaches in Tamaulipas, Mexico, are Rancho Nuevo, Tepehuajes, and Barra del Tordo, where about 85 percent of worldwide Kemp's ridley nesting occurs. In 2010, there was a petition made to designate critical habitat for Kemp's ridley sea turtles for nesting beaches along the Texas coast and marine habitats in the Gulf of Mexico and Atlantic Ocean. This petition is currently under review by USFWS and NOAA Fisheries Service (NOAA Fisheries Service 2011j).

On the Texas coast, 1,111 Kemp's ridley nests were recorded from 2002 to 2011. For the 2011 nesting season, 199 nests have been recorded in Texas, with 117 of those nests documented at Padre Island National Seashore. Those 199 nests are the most recorded for the Texas coast since consistent record keeping began in the early 1980s, passing the 2006 record of 102 nests (Shaver 2012; NOAA Fisheries Service 2011f; NPS 2012a). Texas nesting as of the end of June 2012 has already reached 200 with a month or two left in the nesting season.

Kemp's ridley post-hatchlings are likely transported into the northern Gulf of Mexico and then eastward; some continue southward in the Loop Current, then eastward on the Florida Current into the Gulf Stream, while others may remain within the Gulf of Mexico currents. Kemp's ridleys that remained in the Gulf of Mexico during their early oceanic stage apparently move into coastal waters, mainly along the northern and eastern shorelines of the Gulf. Both the initial transition and the subsequent movements of juvenile Kemp's ridleys to and from these shallow coastal habitats appear to be seasonal. The main characteristics that define the areas inhabited during the juvenile developmental stage are somewhat protected, temperate waters, shallower than 160 feet (NOAA Fisheries Service and USFWS 1992; NOAA Fisheries Service, USFWS, and SEMARNAT 2011). During the pelagic stage, Kemp's ridley turtles have been observed in sargassum off several Gulf States (Coston-Clements et al. 1991).

Adult Kemp's ridleys primarily occupy neritic habitats. Neritic zones typically contain muddy or sandy bottoms where prey can be found. Kemp's ridleys rarely venture into waters deeper than 160 feet (NOAA Fisheries Service 2011j; Byles and Plotkin 1994; Shaver and Rubio 2008). Their diet consists mainly of crabs, but may also include fish, jellyfish, and an array of mollusks (NOAA Fisheries Service 2011j).

Leatherback Sea Turtle

Leatherback sea turtles are listed as endangered under the ESA. Leatherback turtle nesting grounds are located around the world, with the largest remaining nesting assemblages found on the coasts of northern South America and West Africa. The U.S. Caribbean, primarily Puerto Rico and the U.S. Virgin Islands, and southeast Florida and the Gulf Coast of Florida support minor nesting colonies, but represent the most significant nesting activity within the U.S. (NOAA Fisheries Service 2011k; FWC 2012c). Adult leatherbacks are capable of tolerating a wide range of water temperatures, and have been sighted along the entire continental coast of the U.S. as far north as the Gulf of Maine and south to Puerto Rico, the U.S. Virgin Islands, and into the Gulf of Mexico.

Leatherback turtles are commonly known as pelagic animals, but they also forage in coastal waters. They are the most migratory and wide ranging of sea turtle species in the Gulf and feed mainly on soft-bodied animals such as jellyfish and salps (free-swimming, barrel-shaped marine invertebrates) (NOAA Fisheries Service 2011k).

A.6 Birds

This section presents additional life history information on selected bird species known to occur along the northern Gulf of Mexico including Federally listed species. Species described in more detail in this section represent species that spend all or a large portion of their annual life cycle along the northern Gulf of Mexico. Some species such as redhead, common loon and northern gannet winter along the Gulf coast; other species have restricted ranges and are not found anywhere else in the United States (e.g., buff-bellied hummingbird and green kingfisher). Descriptions of these and other species are presented in taxonomic order by major groups: waterfowl and other water-dependent species (section C.3.2.6.1), raptors (section C.3.2.6.2), colonial nesting species (section C.3.2.6.3), shorebirds (section C.3.2.6.4), secretive marsh birds (section C.3.2.6.5), near-passerines and passerines (section C.3.2.6.6) and Federally listed species (section C.3.2.6.7). Table A-3 presents the Federally listed bird species and species of conservation concern that may be found within along the northern Gulf of Mexico for each of the five Gulf states. Figure 3-16 depicts the bird conservation regions (BCRs) used as a basis for multi-disciplinary bird conservation programs and plans.

Waterfowl and Other Water-Dependent Species

Mottled Duck

Dabbling ducks feed primarily on SAV. Mottled duck (*Anas fulvigula*), a close relative of the mallard (*A. platyrhynchos*), is a mostly non-migratory dabbling species found in open marshy habitat and fresh or brackish ponds adjacent to the coast (Kaufman 1996). The species' range extends from Mexico north along the Gulf of Mexico to Alabama east to peninsular Florida, and most individuals will spend their entire annual cycle within that range. Population densities are highest in fresh and intermediate marshes of southeast Texas and coastal Louisiana (Bielefeld et al. 2010).

***Redhead* (*Aythya americana*) *and Lesser Scaup* (*Aythya affinis*)**

Redhead ducks are habitat specialists in winter and are dependent on shallow coastal habitats dominated by seagrass species: shoal grass, manatee grass (*Syringodium filiforme*), and turtle grass (*Thalassia testudinum*) (Woodin and Michot 2002). The large redhead population that winter along the

Gulf Coast is found within the Laguna Madre of Texas; winter numbers range from 299,000 to 1,407,000 individuals (GulfBase 2011; Woodin and Michot 2002). Other important Gulf Coast SAV areas include Chandeleur Sound of Louisiana, and Apalachee Bay of Florida (Woodin and Michot 2002). The species shows a strong fidelity to coastal areas within the Gulf of Mexico returning to the same areas each year (Woodin and Michot 2002). Lesser scaup are one of the most abundant and widespread of North American diving ducks and of the wintering population along the Gulf Coast; most winter along the Louisiana (>1.0 million) and Florida (>400,000) Gulf Coasts (Austin et al. 1998). Lesser scaup often are found in the same habitat as redhead, although they forage on mollusks, crustaceans, and other invertebrates rather than SAV (Woodin and Michot 2002; Austin et al. 1998).

***Common Loon* (*Gavia immer*)**

The common loon primarily breeds in Canada (94 percent of the population) and the northern U.S. Seventy percent of the North American common loons migrate to wintering areas along the Atlantic and Gulf Coasts (Evers 2004). They are obligate fish eaters, and commonly occur along inshore waters, but have ranged up to 62 miles offshore across the continental shelf (Evers 2004). Two other species of loons, red-throated and Pacific loon (*G. stellata* and *G. pacifica*), are also found in low numbers during winter months within the Gulf of Mexico.

***Least Grebe* (*Tachybaptus dominicus*)**

In South Texas, the least grebe is non-migratory and dependent on the availability of freshwater marshes, ponds, and lakes with emergent vegetation. In the Rio Grande Valley of southern Texas, the least grebe breeds in resaca (oxbow) lakes, when they are temporarily flooded; nesting (mostly) in areas of retama-huisache woodlands, but also in open water and along edges bordered by reeds (Storer 2011).

***Northern Gannet* (*Morus bassanus*)**

Northern gannet is described in more detail in this appendix because it is considered to be one of the bird species most impacted by the *Deepwater Horizon* oil spill (USFWS 2012a). Northern gannets nest in dense colonies on cliffs and ledges along both sides of the Atlantic. In North America, northern gannet breed in six well-established colonies: three in Quebec, Canada within the Gulf of St. Lawrence, and on islands offshore of Newfoundland, including Bonaventure Island. In winter, northern gannets from four major North American colonies winter in the Gulf of Mexico. Extrapolations from data acquired through bird-borne tracking devices estimated that about 118,600 gannets (66,100 adult and 52,500 immature gannets) are present in the Gulf of Mexico (Montevecchi et al. 2011). Arrival of northern gannet generally begins in November. Northern gannet begin leaving the Gulf of Mexico in February and most adult gannet are gone by mid-April; immature gannets remain longer than adults (Montevecchi et al. 2011). Northern gannets are relatively uncommon inshore along the northern Gulf Coast from Texas to Louisiana and the Gulf Coast of Florida (Clapp et al. 1982). In both habitats, northern gannets feed by plunge-diving for surface schooling fish, squid, and shrimp (Mowbray 2002).

***American White Pelican* (*Pelecanus erythrorhynchos*)**

The American white pelican occurs mainly in western and southern portions of North America, breeding inland within colonies (e.g., remote islands) in large, shallow freshwater bodies. The population east of the Rocky Mountains migrates south after breeding to winter along the Gulf Coast; however, a small non-migratory breeding colony does exist at the Padre Island National Seashore, Texas. The Texas Breeding Bird Atlas notes that since1983 nesting has occurred on an isolated spoil island within the Padre National Seashore boundaries (Texas A&M 2012).

Winter residents are common along the coast and on inland reservoirs in south Texas and the Chenier Plain and Barataria Bay of Louisiana (Texas A&M 2012; National Audubon Society 2011b). In the Grand Bay National Estuarine Research Reserve, Mississippi, concentrations of non-breeding American white pelicans occur during the breeding season (National Audubon Society 2011b). Louisiana (Chenier Plain, Barataria Bay) and Mississippi (Grand Bay) are designated as Important Bird Area (IBAs) (sites that provide essential habitat for one or more bird species) by the National Audubon Society, in part because of the concentration of wintering American white pelicans that occur (National Audubon Society 2011b).

Preferred winter habitat consists of shallow coastal bays, inlets, and estuaries with forage fish and exposed sites such as sand bars for loafing and roosting. Foraging American white pelicans obtain their food by swimming along the surface, dipping their bills into the water, and scooping up prey (e.g., small fish) in their pouches. In specific, the species utilizes cooperative foraging methods which concentrate / drive schools into the shallow water for easier capture (National Audubon Society 2011a).

Raptors

***Osprey* (*Pandion haliaetus*)**
Ospreys are almost exclusively reliant on fish for food and as such are dependent on large open water areas; however, they forage on a wide variety of freshwater and saltwater fish species and as a result are found over a wide range. The species' North American breeding range of the osprey encompasses northern portions of the U.S. and Canada. In the U.S., summer breeding populations are found from central Alaska south to portions of northern California, Idaho, Wyoming, and Colorado and eastward to New England through portions of Minnesota, Wisconsin, Michigan, and New York. Ospreys also breed southward along the Atlantic Coast to Virginia. From North Carolina south through Florida and along the Gulf Coast to Texas, ospreys are found year-round in the breeding territory. Individuals of the northern breeding population winter along the Gulf of Mexico from Florida through Texas; however, migrants tend to avoid wintering in areas where non-migrant populations breed (Poole et al. 2002). Common denominators for breeding habitat are: an adequate supply of accessible fish within commuting distance (6-12 miles) of the nest; shallow waters (1.5-7 feet deep), which generally provide most accessible fish; and open nest sites free from predators (especially mammalian). Such sites are generally elevated (e.g., trees, large rocks [especially over water], or bluffs), predator-free islands, and, increasingly, artificial structures such as towers supporting electrical lines or cell-phone relays and channel markers. Winter habitat includes coastal rivers, sandy beaches, mangrove creeks, and channels interspersed with mud/salt flats. The availability of fish influences osprey concentrations (Poole et al. 2002).

South Florida's non-migratory osprey population begins egg-laying in late November with a peak in December to mid-January; young fledge about 12-14 weeks later depending on nest location, weather, number of nestlings, etc. In general, the osprey population is thought to be increasing as a result of environmental recovery from pesticides, nesting platforms and other artificial nesting site availability, habituation to human activity, and a broad diet (Poole et al. 2002). Of note, osprey have been identified as a Species of Greatest Conservation Need (SGCN) in Mississippi and is tracked by the Louisiana Department of Wildlife and Fisheries Heritage Program in Louisiana.

***White-tailed Hawk* (*Buteo albicaudus*)**
White-tailed hawks are found in semi-arid to arid, open areas of the Gulf Coast region of southeastern Texas and a few birds have been observed in Louisiana (Farquhar 2009). The largest concentration of breeding adults is currently located in the coastal bend region of Texas and Mexico (Farquhar 2009). White-tailed hawks nest in small numbers across most of the coastal counties from Brazoria, Texas south. Nesting has occurred on north Padre Island and Matagorda Island, and breeding adults generally stay within or near nesting territories year round while young tend to disperse after fledging.

Colonial Nesting Species

Wading Birds

Reddish Egret
Reddish egrets are year-round residents with a limited distribution along the coasts of Texas, Louisiana, Alabama, Mississippi, and southern Florida. As such, they are considered as SGCN in those states, and are also listed by USFWS as a Bird of Conservation Concern and on the Gulf Coast Joint Venture Priority List of Landbird, Shorebird, and Waterbird Guilds (Table A-3). They are commonly found in hypersaline flats and lagoons and forage for small fish on shallow coastal flats, ponds, and lagoons throughout their range. Reddish egrets usually nest in mixed species heronries on coastal natural and artificial islands and mangrove keys (Lowther and Paul 2002). One of the only remaining naturally occurring islands in the Lower Laguna Madre, Green Island, Texas is characterized by a Tamaulipan thornscrub plant community, which provides nesting habitat for one of the largest reddish egret colonies (over 1,400 nesting pairs in 2007) in the world and is designated as a globally IBA (sites that provide essential habitat for one or more species of bird) not only for its concentration of reddish egret but also for its colony of roseate spoonbills (260 breeding pairs) (National Audubon Society 2011a).

***Roseate Spoonbill* (*Platalea ajaja*)**
Roseate spoonbills are limited in distribution to the Gulf Coast and because of their narrow distribution are listed by Louisiana as a Species of Special Concern and by the USFWS as a Bird Species of Conservation Concern. They are found in a variety of marine, brackish, and freshwater habitats including bays, inlets, estuaries, mangroves, marshes, and beaches where they nest primarily on islands (natural, spoil, mangrove keys, barrier islands) or over standing water in trees and shrubs. Texas and Louisiana have the largest breeding populations and have maintained large colonies, exceeding 450 pairs (Dumas 2000). In Florida, the nesting season occurs from November through June in several locations around Tampa Bay and northeastern and northwestern Florida Bay. Nesting in Louisiana and Texas occurs from April through August. In Texas, roseate spoonbills nest primarily on upper and central sections of coast: around Galveston Bay, Matagorda Bay, San Antonio Bay, and Corpus Christi Bay (Dumas 2000).

Open Water Feeding Colonial Nesting Species

***Brown Pelican* (*Pelecanus occidentalis*)**
During the middle of the twentieth century brown pelican populations suffered dramatic losses (e.g., impaired reproductive success) related to DDT toxicity. Following the utilization ban of this organochlorine pesticide within the U.S., brown pelican populations have increased or stabilized, which resulted in the species removal from the Endangered Species List in 2009 (USFWS 2011c). Nearly half of the southeastern brown pelican population lives along the northern Gulf Coast as year-round residents; however, the population is supplemented by wintering individuals from more northern portions of its range. Along the Gulf Coast, brown pelicans breed mainly on barrier, natural estuarine, or dredge-spoil islands, except in Florida, where mangrove islets are predominantly used (Shields 2002).

Brown pelicans seasonally forage during breeding (in shallow waters within 6 miles of nesting islands) and non-breeding (up to 47 miles from the nearest land) in shallow waters of estuaries and along the continental shelf for small, surface schooling fishes (e.g., menhaden, silversides, and mullet). Following foraging, brown pelicans are known to utilize a variety of habitat types (e.g., sandbars, pilings, jetties, breakwaters, mangrove islets, and offshore rocks for roosting and loafing (Shields 2002). Along the Gulf of Mexico, nests are typically built directly on bare sand or shell, but may also be constructed in dense vegetation composed of herbaceous plants or low shrubs, mangroves, or small trees (Shields 2002). Nesting along the Gulf Coast generally occurs from January to June with a peak between March and June. Due to the species' site-fidelic nature, brown pelicans are faithful to nest colony sites, and stable, undisturbed sites are occupied consistently, often for decades or longer (Shields 2002).

***Laughing Gull* (*Leucophaeus atricilla*)**
Laughing gulls are small, black-hooded gulls that nest in colonies of up to 25,000 pairs (Burger 1996). Burger (1996) noted estimates of breeding pairs in the five Gulf States were: Texas 64,595; Louisiana 28,975; Alabama >250; and Florida 24,000-48,000; however, the number of colonies varied and included 65 colonies in Texas, 19 in Louisiana, and more than 10 colonies in Alabama. There are also nesting colonies on the coast and barrier islands of Mississippi including Horn and Ship islands in the Gulf Islands National Seashore (Mississippi Bird Atlas Project 2012).

Along the Gulf, laughing gulls are year-round residents and are found from south Texas, east to Florida (it is the most common breeder in the Tampa Bay region); however, colonies may be very localized (Burger 1996). Laughing gulls nest in a wide range of habitats, including sandy beaches and islands; they nest in natural islands at the base of mangroves, and other low herbaceous vegetation and tall grasses (Burger 1996). Optimal habitat is often in sparse or dense vegetation that provides some protection from inclement weather and predators. Laughing gulls have a varied diet composed of aquatic and terrestrial invertebrates, including earthworms, flying insects and other insects, snails, crabs including eggs and larvae, fish, squid, detritus, garbage, and berries. Lower Tampa Bay has been designated as an IBA by the National Audubon Society, in part because of a population of breeding laughing gulls estimated at over 10,000 breeding pairs in 2001 (National Audubon Society 2011b).

***Brown Noddy* (*Anous stolidus*)**

Noddies are tropical, marine seabirds that show some behavioral and morphological traits similar to gulls (Chardine and Morris 1996). Brown noddies are localized in distribution and breed in the U.S. only on Bush Key in the Dry Tortugas off the southwestern tip of Florida, though they have nested on other keys in the Dry Tortugas in the past (Chardine and Morris 1996). The black noddy (*A. minutus*) is also found at the Dry Tortugas, although very rarely. In the non-breeding season, brown noddies are found at sea, and their presence may be influenced by the presence of schools of predatory fish such as tuna that drive schools of forage fish and squid to the surface (Chardine and Morris 1996). The breeding population on Bush Key, Dry Tortugas, Florida, has been monitored since early in the twentieth century and has fluctuated between about 100 and 2,500-3,000 pairs; in 1996 the population numbered 1,000-2,000 breeding pairs (Chardine and Morris 1996). Brown noddies are considered as SGCN in Florida (Table A-3).

***Gull-billed Tern* (*Gelochelidon nilotica*)**

Gull-billed terns have a large worldwide distribution; however, the estimated 3,019 nesting pairs within the U.S. nest in colonies on sandy beaches or on sandy barrier islands in coastal waters, especially near ocean inlets along the Atlantic and Gulf Coasts (Molina et al. 2009) They do occasionally nest inland and in elevated locations such as roofs. On the Gulf Coast they are year-round residents. Characteristic nest sites are most often in small to medium-sized colonies of 5 to 50 nests with other species of terns and, frequently, black skimmer. Substrates vary from bare sandy beaches and dunes above high tide line, either on natural barrier islands or on artificial dredged-material islands, to dense shell bars above the high-tide line (Molina et al. 2009). Nesting sites are used in consecutive years; however, gull-billed terns appear to be less tolerant of disturbance and less faithful to nest sites than other terns (Molina et al. 2009). Unlike most terns, this species has a broad diet and does not plunge-dive or depend on fish; instead, it feeds primarily on insects, crabs, and other prey. It is also known to eat small chicks of shorebirds and least terns, and to pirate fish from other small terns.

Gull-billed terns and are considered Birds of Conservation Concern by the USFWS and are on the Gulf Coast Join Venture Priority List of Landbird, Shorebird, and Waterbird Guilds as well as designated as SGCN in Texas, Louisiana, Mississippi, and Florida (Table A-3).

***Black Skimmer* (*Rynchops niger*)**

Black skimmers are related to terns; however, their bill is uniquely adapted to capturing small fish. A feeding skimmer flies low over the water with its bill open and its lower mandible under the surface of the water. When the mandible touches a fish, the upper bill (maxilla) snaps down to capture it. Black skimmers forage primarily in shallow tidal waters of bays, estuaries, lagoons, rivers, and pools within salt marshes, as well as creeks, and ditches where schools of small fish in calm surface waters are concentrated.

Black skimmers are highly social, nesting in colonies and forming large flocks outside the breeding season. Large, successful colonies usually occupy the same site from year to year, and are almost exclusively found in coastal areas where they nest on barrier beaches, shell banks, spoil islands, and salt marshes along the Atlantic and Gulf Coasts (Gochfeld and Burger 1994). Preferred colony habitat for black skimmer includes open, sandy substrate with some vegetative cover (less than 30 percent) where eggs and chicks are camouflaged, but also includes completely barren beaches. Black skimmers occasionally nest in salt marsh habitat on mats of dead seaweed or vegetation.

Skimmers typically form distinct sub-colonies in the most open areas of tern colonies; skimmers nest with least terns in Florida, with Forster's, least, and/or gull-billed terns, and laughing gulls along the Gulf Coast; however, in Louisiana, black skimmers have been documented in large single species colonies (Gochfeld and Burger 1994). Black skimmers are considered Birds of Conservation Concern by the USFWS and are on the Gulf Coast Joint Venture Priority List of Landbird, Shorebird, and Waterbird Guilds as well as designated as SGCN in Texas, Louisiana, and Mississippi (Table A-3). Gulf Islands, Florida; Sand Island, Mississippi; Sundown Island, Matagorda Bay, Texas; and Chandeleur Islands and Barataria-Terrebonne, Louisiana are IBAs that have been designated in part because of their populations of black skimmers (National Audubon Society 2011b).

Shorebirds

***Wilson's Plover* (*Charadrius wilsoni*)**

Wilson's plover is a medium-sized plover species associated strictly with coastal areas, and within the Gulf Coast ranges from southern Florida, including the Florida Keys (except the Dry Tortugas), west along the Gulf Coast to northern Mexico. In winter, they range mainly from central Florida and west to Louisiana and Texas (Corbat and Bergstrom 2000).

A coastal survey for Wilson's plovers over 2004-2005 found that a total of 3,336 individuals were nesting in Texas, Louisiana, and Mississippi comprising more than 50 percent of the U.S. breeding population (6,000 individuals) (Zdravkovic 2006). Wilson's plover is on the Gulf Coast Joint Venture Priority List of Landbird, Shorebird, and Waterbird Guilds, is on the Texas SGCN list, and is also listed in the *U.S. Shorebird Conservation Plan* as a species of "High Concern" (Table A-3).

Wilson's plovers are visual feeders capturing crustaceans, particularly fiddler crabs during low tide on intertidal mudflats (Corbat and Bergstrom 2000). Nesting areas for Wilson's plovers include areas of high salinity and sparse vegetation including salt flats, coastal lagoons, sand dunes, newly accreted beach, dry sand beach, overwash areas, and pre-dunes. Studies have documented site fidelity to the same nesting areas in subsequent years of 48-60 percent (Corbat and Bergstrom 2000). During the nonbreeding season, individuals congregate in groups of up to 30 or more, sometimes with other species of small plovers, for roosting and foraging (Corbat and Bergstrom 2000).

American Oystercatcher (Haematopus palliatus)

American oystercatchers are found in winter along the Gulf of Mexico from Texas to the Gulf Coast of Florida, including offshore islands of eastern Louisiana, Mississippi, and Alabama, and are considered the eastern race *Haematopus palliatus* (Schulte et al. 2010). However, their distribution in winter is very localized. The species is found along the Gulf Coast of Florida between Appalachia Bay on the Panhandle and the Ten Thousand Islands area of the Everglades; numbers drop off substantially west of Apalachicola Bay. Most flocks are concentrated near Cedar Key, Tampa Bay, and Cape Romano; Cedar Key supports one of the highest densities (Schulte et al. 2010). Estimates from aerial and ground surveys conducted from November 2002 to February 2003 were: Texas, 477; Louisiana, 147, Mississippi, 14;

Alabama, 49; and Florida, 2,137 (Brown et al. 2005). The species is strictly coastal and occupy areas of sand or shell beaches, dunes, tidal flats, and salt marsh because they feed almost exclusively on shellfish (e.g., bivalves and other mollusks) and other marine invertebrates that inhabit intertidal areas. In sand or mud flats, they often forage along the edge of the receding tide and feed in shellfish beds while mussels or oysters are still submerged (Nol and Humphrey 2012).

A small population of breeding American oystercatchers nests from Texas to the Gulf Coast of Florida. On the Gulf Coast of Florida, American oystercatchers nest from Lee County north to Bay County (Nol and Humphrey 2012). Nests are typically in open areas with little cover and consist of a shallow depression about 8 inches in diameter and 1-2 inches deep scraped out of sandy substrate. In recent years, they have been observed nesting in non-traditional habitats, including dredge spoil islands, and saltmarsh habitat (Schulte et al. 2010). American oystercatchers typically show strong annual breeding site fidelity (Schulte et al. 2010). American Oystercatcher is listed in the *U.S. Shorebird Conservation Plan* as a species of “High Concern” and is on the Texas SGCN list (Table A-3).

Secretive Marsh Birds

***Yellow Rail* (*Coturnicops noveboracensis*)**

Yellow rail breeds from the maritime provinces of Canada through the northern Great Plains and upper Midwest of the U.S. and winters along the northern Gulf Coast in salt marshes (above the high tide line) where it appears to prefer drier portions of cordgrass marshes. The yellow rail is considered a fairly common winter species in *Spartina* marshes, rice fields within Louisiana, and tall-grass pastures along the Texas coast (Cooksey and Weeks 2006). It feeds primarily on snails, other aquatic invertebrates, and seeds picked from the ground or vegetation (Bookhout 1995). The yellow rail is considered as SGCN in four of the five Gulf States (not Texas) (Table A-3).

***Nelson’s Sparrow* (*Ammodramus nelsoni*)**

Nelson’s sparrow has an unusual breeding distribution that not only includes coastal marshes from southern Hudson Bay and James Bay, Quebec, south to Maine, but also freshwater marsh on the northern Great Plains of Canada and the U.S. (Kaufman 1996). Nelson’s sparrows migrate to the Gulf of Mexico and southern Atlantic Coast to winter. Salt marsh habitat used by Nelson’s sparrows generally consists of sedges, rushes, cordgrass, salt grass, and other typical plants, although they will use freshwater marshes or fields adjacent to the coast. They feed primarily on insects and other small invertebrates (Kaufman 1996). Nelson’s sparrow is listed as SGCN in Louisiana, Mississippi, and Alabama (Table A-3).

***Seaside Sparrow* (*Ammodramus maritimus*)**

Seaside sparrow is a habitat specialist of salt and brackish marshes. Kaufman (1996) noted that “no other song bird in North America is as closely tied to salt marsh as the seaside sparrow.” Because of patchy and disjunct habitat, populations are discontinuous and locally distributed. Discontinuity of populations has resulted in the recognition of nine subspecies: two are extinct and of the remaining seven, five occur within the Gulf of Mexico region (Post and Greenlaw 2009). The Cape Sable seaside sparrow (*Ammodramus maritimus mirabilis)* is Federally listed as endangered and is a year-round resident in the Cape Sable area of the Everglades; it is the only subspecies that is found in freshwater marshes instead of salt marshes (Post and Greenlaw 2009). Cape Sable seaside sparrow (*Ammodramus mirabilis mirabilis*) is discussed further in the *Threatened and Endangered Species* section below. Scott's seaside sparrow (*A. m. peninsulae*) and Walkulla seaside sparrow (*A. m. junicolus*) are residents of the Gulf Coast of peninsular Florida, from the panhandle to Tampa Bay. Louisiana seaside sparrow (*A. m. fisheri*) is resident coastally along the Gulf of Mexico from Alabama west to northeast Texas, and *A. m. sennetti* (no common name) is resident coastally in southern Texas, from Aransas Bay to Boca Chica (Post and Greenlaw 2009). Resident populations along portions of the Gulf Coast remain in or near the breeding territory all year; studies have estimated the population of Scott's and Walkulla seaside sparrows on the northwestern Gulf of Mexico to contain 5,000-10,000 birds (Post and Greenlaw 2009). Seaside sparrow and/or a subspecies are listed as SGCN in the five Gulf States (Table A-3).

Optimum habitat for seaside sparrow contains contiguous nesting and feeding sites, although where the species' occur in non-optimal habitat, individuals travel between nest-centered territories and separate feeding areas. Seaside sparrows require nest sites in high and intertidal marsh zones with openings and edges for foraging. Nests are placed above spring tides, and the upper point of nest placement is determined by availability of stable vegetation for nest support and by amount of cover above nest (Post and Greenlaw 2009). Nesting begins in the early spring (February-March) and may regularly extend into August (Post and Greenlaw 2009). Seaside sparrows feed in open stands of grass, shallow pools, near tidal creeks, either on edges or in bordering cordgrass, gleaning seeds, adult insects, spiders, decapods, amphipods, and mollusks from surrounding vegetation and substrates or by probing in mud (Post and Greenlaw 2009).

Near Passerines and Passerines

***Buff-bellied Hummingbird* (*Amazilia yucatanensis*)**

Buff-bellied hummingbird is the only hummingbird that nests regularly in southern Texas; they nest from February to August. Buff-bellied hummingbirds are found in a variety of habitats, e.g., woodland edges, clearings, or brushy areas, where they nest in a small shrubs or deciduous trees such as common hackberry (*Celtis occidentalis*) or Texas ebony (*Ebenopsis ebano*). Favorite nectar plants include Turk's cap and red salvia (*Lilium superbum* and *Salvia coccinea*, respectively) (Kaufman 1996).

***Green Kingfisher* (*Chloroceryle americana*)**

Green kingfishers are found along rivers, streams, and pond edges along the Mexican border where dense vegetation provides low perches over the water. Green kingfishers require open water habitat where they plunge-dive for fish, and sandy banks for excavating nest burrows (Kaufman 1996).

***Altamira Oriole* (*Icterus gularis*) *and Hooded Oriole* (*I. cucullatus*)**

Altamira and hooded orioles are localized residents along the lower coast of Texas. Originally a native species of Mexico, the Altamira oriole has expanded its range north into Texas where it occupies open, native woodlands, riparian woodlands, and woodland edges in the Rio Grande Valley. Hooded oriole is found in open woods in lowlands, and groves of trees (cottonwood [*Hibiscus tiliaceus*], walnut [*Juglans* spp.], and sycamore [*Platanus* spp.]) along streams and canyons; palm trees are preferred. Both orioles feed on insects, fruit, and nectar (Kaufman 1996).

Threatened and Endangered Species

Attwater's Prairie-Chicken* (*Tympanuculus cupido attwateri*) *– Endangered

Attwater's prairie-chicken represents the southernmost subspecies of the greater prairie chicken (*Tympanuchus cupido*), and is endemic to coastal prairies along the northern Gulf of Mexico. Populations of Attwater's prairie-chicken currently occur in the wild at only two locations: the Attwater Prairie Chicken National Wildlife Refuge (Colorado County, Texas) and private ranches in Goliad and Refugio counties, Texas. Approximately 90 birds remained in these populations as of March 2009. A captive breeding program was initiated in 1992 (USFWS 2010b).

Primary factors in the decline of the Attwater's prairie-chicken include genetic isolation as a result of the loss and fragmentation of the coastal prairie habitat from agricultural, industrial and urban development, overgrazing, and the degradation and alteration of grassland habitat by the invasion of woody species (USFWS 2010b). Other current threats include diseases and parasites in both the wild and captive setting, inability of captive breeding facilities to produce large numbers of captive-reared birds that are capable of survival and reproduction in wild habitats, and poor brood survival in wild populations (USFWS 2010b).

Attwater's prairie chicken habitat consists of well-drained coastal prairie grasslands with a variety of short and tall grasses as well as some shrubs or weeds and a supply of surface water in summer (TPWD 2011b; USFWS 2010b). Attwater's prairie-chickens also feed on cultivated crops such as corn, peanuts, and rice (USFWS 2010b). Male Attwater's prairie-chickens gather in displaying areas of bare ground or short grass called booming grounds or leks to establish individual territories and attract females (TPWD 2011b). Booming grounds vary in size and may be naturally occurring short grass flats or artificially maintained areas such as roads, airport runways, oil well pads, plowed fields, and drainage ditches. In general courtship activity increases in late January and early February, appears to peak in March, and extends to mid-May. Most nests are located in grasslands within 1 mile of a booming ground and females display fidelity to general nesting areas between years (USFWS 2010b). Nest predation is high and about 70 percent of the nests annually may encounter some predation.

Wood Stork* (*Mycteria americana*) *– Endangered

Federally listed as endangered, the wood stork is a colonially nesting wading bird found year round in freshwater and estuarine wetlands in Florida, Alabama, and Mississippi (USFWS 2010c). Wood storks are also found along the Texas coast in late summer and early fall as a result of post-breeding dispersal possibly from colonies in Mexico and Central America (Texas A&M 2012). Along the Florida Gulf Coast, nesting colonies are concentrated in Central Florida, and many are located within 15-18 miles of the Gulf Coast (USFWS 2010c). Historically, wood stork may have nested in wetlands throughout the southeastern United States; however, loss of wetland habitat and increased water level management has altered foraging and nesting habitat. Human disturbance of nesting colonies and nest predation have also contributed to the listing of the U.S. breeding population of wood stork as endangered in Alabama and Florida (USFWS 1997).

Wood storks use a variety of freshwater and estuarine wetlands for nesting, foraging, and roosting. Nesting habitat requires medium to tall trees in standing water or islands surrounded by relatively large areas of water. The inundation of nesting areas prior to and during nesting deters predators and reduces nest abandonment and subsequent failure. Seasonal variation in rainfall and surface water volumes may cause wood storks to alter where and when habitats are used for nesting, foraging, or roosting. Changes in use may be local or result in a geographic shift for an entire regional population between years (USFWS 1997).

Wood storks feed almost exclusively on fish and are specialized feeders using a groping, tactile method to capture prey. This method requires foraging habitat that provides high prey densities that allow easy capture. Generally, foraging occurs in a variety of shallow-water wetlands (usually 6-12 inches deep) with open canopies and calm water without dense patches of aquatic vegetation (USFWS 1997).

Colonies are generally formed between January and April, and eggs are laid in late March to late May. Chicks generally fledge in late June or early July to mid-August (Coulter et al. 1999). The 2006 nesting totals indicate that the stork population has reached its highest level since it was listed as endangered in 1984 with over 11,000 nesting pairs documented in Florida, Georgia, South Carolina, and North Carolina (USFWS 2007a). No critical habitat has been designated for Wood Stork (USFWS 1997).

Everglade Snail Kite* (*Rostrhamus sociabilis plumbeus*) − *Endangered
Everglade snail kite is a non-migratory, year-round resident in peninsular Florida where it is common in flooded, freshwater marshes with emergent vegetation dominated by sawgrass (*Cladium jamaicense*) and open water areas where it can visually forage (Sykes et al. 1995). It has been Federally listed primarily as a result of the loss and degradation of wetland habitat in central Florida. Manipulation of water levels, drought, and loss of open areas due to vegetation growth as a result of nutrient enrichment and invasive plant species have played a role in the degradation of Everglade snail kite habitat (USFWS 2007b).

Distribution can be localized based on water levels and the abundance of apple snails (*Pomacea paludosa*), its primary food (Sykes et al. 1995). The Florida population and breeding success is strongly correlated to annual and winter season rainfall and water levels during the breeding season. Nesting almost always occurs over water to deter predation (Sykes et al. 1995).

Within Florida, its range comprises six large freshwater systems, some of which are interconnected, and several small, isolated wetlands: (1) Kissimmiee River valley system; (2) St. Johns River system; (3) Lake Okeechobee system; (4) Loxahatchee Slough system; (5) the Florida Everglades; and (6) Big Cypress Natural Preserve (Sykes et al. 1995). Critical habitat for the Everglade snail kite has been designated (USFWS 2007b).

Northern Aplomado Falcon* (*Falco femoralis septentrionalis*) – *Endangered/Experimental Population
Aplomado falcon inhabits desert and high elevation grasslands as well as savannahs in Central and South America as far south as Tierra del Fuego. A subspecies, the northern aplomado falcon, formerly inhabited desert grasslands and coastal prairies in Texas, New Mexico, and southeastern Arizona. The U.S. distribution of northern aplomado falcon has largely been determined by historic records, and its former abundance has been considered “fairly common” based on the collections; however, it appears to have been extirpated in the U.S. and was listed as endangered under the ESA because of extirpation

and threat from pesticide contamination in eastern Mexico (USFWS 1990a). Brush encroachment, agricultural practices, and collecting are mentioned as factors potentially leading to its extirpation. Since 1980, the Peregrine Fund, Inc. has produced aplomado falcons in captivity for release into the wild. More than 1,142 captive-bred falcons have been released in Texas and more than 244 young have been fledged since 1995 (USFWS 2007c). No critical habitat has been designated for northern aplomado falcon (USFWS 1990a).

Where aplomado falcons have been introduced, they use coastal prairies and desert grasslands with scattered yuccas (*Yucca torreyi*, *Y. elata*, *Y. treculeana*) and honey mesquites (*Prosopis glandulosa*). Foraging habitat typically contains scattered trees and shrubs that provide observation platforms for locating prey. In the U.S. and Mexico, recorded prey include horned lark (*Eremophila alpestris*), Brewer's sparrow (*Spizella breweri*), lark bunting (*Calamospiza melanocorys*), lark sparrow (*Chondestes grammacus*), as well as bats, small mammals, and a large variety of insects (Keddy-Hector 2000). In southern Texas it is also known to prey upon fiddler crabs.

Northern aplomado falcons do not construct their own nests, instead using former nests of other hawk species as well as crested caracara and common raven nests, and the availability of nests may be a limiting factor in ideal habitat (USFWS 1990a).

***Mississippi Sandhill Crane* (*Grus canadensis pulla*)**

Six different subspecies have been recognized for the sandhill crane, and three of the subspecies are non-migratory populations including the Mississippi sandhill crane (USFWS 2011d). Mississippi sandhill cranes are distinct from other sandhill cranes based on genetic, morphological, and behavioral characteristics and are listed as endangered under the ESA due to habitat loss from development and draining; habitat alteration from open pine savannah to pine plantations; fire suppression; and poaching. Today Mississippi sandhill cranes are found only on or adjacent to the Mississippi Sandhill Crane National Wildlife Refuge, Jackson County, Mississippi (USFWS 2011d). A captive-breeding program initiated in 1965 has supplemented the original population through 1989. In 2011, the Mississippi sandhill crane population was 110 cranes; during the winter, individuals of the northern migratory population (mostly greater sandhill cranes) join Mississippi sandhill cranes on the refuge (USFWS 1991).

Mississippi sandhill cranes rely on wet, coastal plain open savannah and swamp (wooded depressions) habitat for nesting and feeding. The habitat consists of wiregrass (*Aristida* spp.), scattered long leaf and slash pines (*Pinus palustris* and *P. elliotti*, respectively), and pond cypress (*Taxodium ascendens*). The savannah-swamp habitat provides invertebrates (insects, earthworms, crayfish), amphibians, and small reptiles for food along with plant matter (roots, tubers, nuts, berries and leaves) (USFWS 1991). Winter roost areas include sawgrass and needlerush marshes (USFWS 1991).

In general, sandhill cranes are long-lived and do not reach maturity until 3-4 years of age. Nesting peaks in April on the refuge and there is evidence that nesting success from hatching to independence is about 57 percent. Based on individual territory requirements, the 15,000-acre refuge is expected to be able to support 30-34 nesting pairs.

Whooping Crane* (*Grus americana*) – *Endangered/Experimental Population

Whooping cranes are found only in North America. Historically, migratory populations used several routes including important routes from wintering grounds in Louisiana, Texas, and the Rio Grande Delta of Mexico to nesting grounds in the central U.S. and Canada [Canadian Wildlife Service (CWS) and USFWS 2007]. Prior to 1950, Gulf Coast locations included southwestern Louisiana where there was a non-migratory flock as well as wintering whooping cranes; Bay St. Louis, Mississippi; and Mobile Bay, Alabama. Whooping cranes continue to use ancestral breeding areas, migration routes, and wintering grounds. Reasons for listing and factors limiting whooping cranes include: habitat destruction, shooting, and displacement by activities of man. Current threats include limited genetics of the population, loss and degradation of migration stopover habitat, construction of additional powerlines, degradation of coastal ecosystems, and threat of chemical spills in Texas (CWS and USFWS 2007).

Currently only one self-sustaining, natural, wild population of whooping cranes exists. The self-sustaining population nests in the Northwest Territories and adjacent areas of Alberta, Canada, primarily within boundaries of Wood Buffalo National Park. This population winters along the Gulf Coast at Aransas National Wildlife Refuge and adjacent areas (Lewis 1995). In addition to the breeding population at Wood Buffalo National Park, whooping cranes are found in the wild at 3 other locations and in captivity at 13 sites (Whooping Crane Conservation Association [WCCA] 2011). The second population of wild whooping cranes is non-migratory and occurs in central Florida, primarily on the Kissimmee Prairie where they were re-introduced in 1993 (Lewis 1995; CWS and USFWS 2007). A third population of wild whooping cranes is migratory and was reintroduced in 2001. This population migrates from the Necedah National Wildlife Refuge in central Wisconsin to Chassahowitzka National Wildlife Refuge on the Gulf Coast of Florida. As of May 2011, the total wild population was estimated at 414: 279 individuals in the Wood Buffalo National Park population; 20 individuals in the non-migratory Florida population; 10 in the Louisiana non-migratory population; and 105 in the Wisconsin migratory population (WCCA 2011). A fourth non-migratory population has become established in Louisiana as a result of releases at the White Lake Wetland Conservation Area in 2011 and has a total of 10 whooping cranes. A total of 157 whooping cranes are in captivity (WCCA 2011). Similar to wild cranes, threats to the captive flock include disease, accidents, and limited genetic material (CWS and USFWS 2007).

Whooping cranes are daytime migrants that fly south in the fall as singles, pairs, in family groups, or as small flocks and make regular stops to feed and rest. Spring migration by the Wood Buffalo National Park population from the Texas Gulf Coast begins March 25 to April 15, with last birds generally leaving by May 1. Autumn migration normally begins in mid-September from Wood Buffalo National Park, with most birds arriving on the wintering grounds in Texas between late October and mid-November (Lewis 1995).

In migration and on wintering and breeding grounds, the whooping crane uses a variety of habitats, including coastal marshes and estuaries, inland marshes, lakes, ponds, wet meadows and rivers, and agricultural fields. About 22,500 acres of salt flats and adjacent islands comprise the principal wintering grounds of the whooping crane at the 59,000-acre Aransas National Wildlife Refuge, Texas (TPWD 2012b; USFWS 2012a).

Whooping cranes are omnivorous, probing the soil subsurface with their bills and taking foods from the soil surface or vegetation. The winter diet consists predominately of Carolina wolfberry (*Lycium carlinianum*) and animal foods, especially blue crabs, clams (stout razor clam [*Tagelus plebius*], minor jackknife [*Ensis minor*]*,* Gulf wedge clam [*Rangia cuneata*]*,* angelwing clam [*Cyrtopleura costada*], thick lucine [*Phacoides pectinata*], constricted macorna [*Macoma constricta*]), and the plant wolfberry (*Lycium carolinianum*). Most foraging occurs in the brackish bays, marshes, and salt flats on the edge of the mainland and on barrier islands. Critical habitat in the U.S. was designated in 1978 and includes five sites in four states including wintering habitat of Aransas National Wildlife Refuge and vicinity (CWS and USFWS 2007).

Piping Plover* (*Charadrius melodus*) *– Endangered/Threatened

Piping plover are small, stocky, sandy-colored shorebirds whose name derives from its call notes, plaintive bell-like whistles which are often heard before the birds are observed (USACE 2009). The species breeds in three geographic regions of North America: the Atlantic Coast, Northern Great Plains, and the Great Lakes. The Atlantic Coast and Northern Great Plains populations are Federally listed as threatened and the Great Lakes population is listed as endangered (USFWS 2009). Individuals from all three breeding populations winter along the Gulf Coast primarily along the Mississippi, Louisiana, and Texas coasts. Wintering populations on the Gulf Coast include: 71 percent of the Great Lakes population, 88 percent from the prairies of Canada, and 2 percent of the Great Lakes population (USFWS 2009). As a result of the significance of Gulf Coast habitat to the Interior and Atlantic populations, piping plover are listed as threatened along the Gulf Coast of the U.S. Primary reasons for ESA listing of the piping plover include habitat loss and alterations (primarily from development), human disturbance, and inadequate regulatory mechanisms not only on the breeding range but also within the Gulf Coast winter range (USFWS 2009).

Winter census data collected for piping plover in 2006 enumerated a total of 3,355 individuals wintering within the United States. Census numbers along the Gulf Coast found a distribution of: Texas, 2,090; Louisiana, 226; Mississippi, 78; Alabama 29; and 321 individuals along the Gulf Coast of Florida (USFWS 2009).

Wintering piping plovers are found on beaches and bay shorelines; exposed intertidal substrate is the primary foraging habitat. Tidal wrack (organic material deposited on beaches by tidal action such as seaweed, shells, and driftwood) forms the species' primary roosting habitat. Studies have indicated that wintering piping plover concentrations occur on the Upper Coast of Texas at the mouths of rivers, and "washover" passes (low, sparsely vegetated barrier island habitats created and maintained by storm-driven water channels) into major bay systems as well as exposed seagrass beds and oyster reefs, but that plovers seldom used tidal flats adjacent to developed areas (USFWS 2009). Winter surveys observed that 63 percent of tagged piping plovers returned to their wintering site on Dauphin Island, Alabama demonstrating that there is some fidelity to wintering sites (Elliott-Smith and Haig 2004). Food items consumed on the wintering grounds include marine worms (e.g., polychaetes), insects, crustaceans, mollusks, and other small marine animals (Elliott-Smith and Haig 2004).

Critical habitat has been designated for wintering piping plover throughout the northern Gulf of Mexico Region from the Dry Tortugas, Florida, to the southern Texas Coast. Units of designated critical habitat by state include: Texas 37 units; Louisiana 7 units; Alabama 3 units; Mississippi 12 units; and 31 units along the Gulf Coast of Florida and the Florida Keys (USFWS 2001).

Least Tern* (*Sternula antillarum*) *– Endangered (Interior Subspecies)

The least tern breeding populations have been described as three distinct subspecies based on separate breeding ranges: (1) coastal least tern that breeds along the Atlantic and Gulf Coasts from New England south to Florida and west along the Gulf Coast to south Texas (TPWD n.d.a); (2) interior least tern that nests along rivers in the central United States; and (3) California least tern that occurs from San Francisco Bay to western Mexico (Thompson et al. 1997). The breeding populations of California and interior least tern are listed as endangered under the Federal ESA. The coastal least tern is not Federally listed; however, it is virtually indistinguishable from the interior least tern that winters along the Gulf of Mexico, and recent evidence indicates that coastal least terns from nesting colonies on the Texas Coast may breed inland with interior least terns (TPWD n.d.a). As a result, the least tern is considered as a Federally listed endangered species for the purposes of this Programmatic Environmental Impact Statement. Reasons for listing the interior least tern include habitat loss and alteration as a result of dams and channelization, changing hydrological regimes, and human disturbance of nesting and wintering colonies from recreational activities (TPWD n.d.a).

Interior least tern breeds locally along the Mississippi and Red rivers in Louisiana and Arkansas as well as along the Rio Grande River drainage in Texas at Falcon Reservoir, Lake Casa Blanca, and Amistad Reservoir, whereas the coastal least tern breeds locally along the Gulf Coast from southern Texas east to southern Florida. It is considered to be an increasing inland breeding species in Florida (Thompson et al. 1997). Interior and coastal least terns may winter along the Gulf Coast, but are primarily found in winter along the Central American coast and the northern coast of South America from Venezuela to northeastern Brazil (TPWD n.d.a; Thompson et al. 1997).

A colonial nesting species, coastal least terns use shell or sand beaches just above the high tide line and in front of dunes or riverine sand bars, and manmade sites (e.g., dredge spoils, roads, or roofs) as nesting habitat. Nests are often placed above water levels and in locations free from predators (USFWS 1990b). Nests are shallow scrapes placed in slightly elevated positions on sand that is commonly mixed with shell, gravel, or other fragments (USFWS 1990b). The nesting season begins in early April on the Gulf Coast (eggs are laid about April 20 on the Texas coast) and is usually completed by late August, though least terns can re-nest until late July if the nest or first brood is lost (TPWD n.d.a). Interior least terns use similar nesting habitat, preferring open sites with scattered, sparse, short vegetation (<20 percent cover), and also use sand and gravel pits, dredge islands, and artificial nesting sites, e.g., river dikes, roofs, and ash disposal areas (USFWS 1990b). After the nesting season and prior to migration, least terns gather at staging areas, often low, wet, gravel bars and floodplain wetlands where high concentrations of fish can be found (TPWD n.d.a).

During the winter, least terns use coastal habitats for foraging and roosting. They are found along barrier and mainland beaches; sand, mud, and algal flats; washover passes, salt marshes, and coastal lagoons (USFWS 1990). Threats to populations and habitat are similar on the breeding and wintering ranges. Habitat destruction and degradation, human disturbance, and predators reduce band wintering habitat quality and affect survival. Contaminants, as well as genetic and geographic consequences of small population size, pose additional threats to piping plover survival and reproduction (USFWS 1990b).

Least terns as a group feed in a variety of shallow water habitats, plunge-diving for small surface-swimming fish and shrimp. On the Gulf Coast, species such as bay anchovy, Gulf menhaden, mummichog (*Fundulus heteroclitus*), and silversides are common prey species (Thompson et al. 1997).

No critical habitat has been designated for least tern along the northern Gulf Coast (USFWS 1990b).

Roseate Tern* (*Sterna dougallii*) *– Threatened/Caribbean Population

The Caribbean population of the roseate tern subspecies (*Sterna dougallii dougallii*) is morphologically and geographically distinct from the North Atlantic population and is the only tropical population of roseate tern. In the U.S., it is found only in Puerto Rico, the Virgin Islands, and southern Florida including the Dry Tortugas (USFWS 2010c). Approximately 261 breeding pairs occur in Florida, where the primary threats are human disturbance and development (USFWS 2010c). Historically, the Dry Tortugas were the main breeding area for roseate tern in Florida; however, nest failures resulting from predation and storm surges likely caused a shift in the breeding colony to the Florida Keys, where 12 breeding areas were identified from the Key West area to Marathon Key. By 2000 and 2005 the entire Florida breeding population was restricted to two sites (e.g., Marathon Government Center, a roof colony, and Pelican Shoal); in 2005 the Pelican Shoal site became uninhabitable after hurricane damage (USFWS 2010c). In cooperation with the NPS, broadcast calls and decoys have been placed on Long Key, Dry Tortugas, to attract roseate terns, and as of 2007 and 2008, 39 and 47 roseate tern pairs, respectively, nested at Long Key. This method will be continued until it is determined that roseate terns have become permanently established (USFWS 2010c).

Similar to other colonial nesting tern species, roseate terns in Florida typically nest in relatively open areas, with rocky, grassy, coral rubble, or sand substrate often with no cover nearby; in Florida, roof top nests are also used. Adults arrive in the Dry Tortugas in late April and colonies are formed by mid-May; nesting begins in late May to early June (Gochfeld et al. 1998).

Roseate terns forage by plunge-diving over shallow waters or over schools of predatory fish where small fish are close to the surface and are often in association with other species of terns and noddies (Gochfeld et al. 1998).

No critical habitat has been designated for roseate tern (USFWS 2010c).

Ivory-billed Woodpecker* (*Campephilus principalis*) *– Endangered

Ivory-billed woodpeckers are believed to be extinct; however, potential evidence of the existence of at least one ivory-billed woodpecker in the Cache River National Wildlife Refuge, Arkansas, was found in 2005 (USFWS 2010d). Additional reports from a number of sources and localities resulted in a series of focused surveys, several of them in states along the northern Gulf of Mexico including Texas, Louisiana, and Florida; however, no positive evidence of the existence of ivory-billed woodpecker has been found (USFWS 2010d). In response to the potential for continued existence of the species, USFWS developed a recovery plan for the ivory-billed woodpecker. While searches to positively document the existence of ivory-billed woodpecker will continue, the goal for the *Recovery Plan for Ivory-billed Woodpecker* is to locate, protect, and increase existing populations and associated habitat and recover the species (USFWS 2010d).

Historically, in the U.S., the ivory-billed woodpecker occurred from the Ohio River in southern Illinois, Indiana, and Ohio, North Carolina west to southeastern Missouri, southeastern Oklahoma and eastern Texas and south to the Gulf of Mexico, Big Cypress Swamp and adjacent areas of Florida (Jackson 2002). Within this range, the ivory-billed woodpecker required extensive, continuous forested areas with very large trees that also provided a continuing supply of recently dead trees. Fast-growing softer tree species that resulted in large, easily excavated specimens were considered important. Known cavity trees included such soft-wood species as pines, red maple, sugar hackberry, and cabbage palmetto (*Sabal palmetto*), but also a few harder wood species such as bald cypress (Jackson 2002). Ivory-billed woodpeckers were resident in appropriate habitat but were considered nomadic in order to take advantage of areas where trees were damaged by insect infestations or other episodic events such as flooding or fire. In damaged forests, ivory-billed woodpeckers fed on beetle larvae excavated from underneath the bark of recently dead trees (Jackson 2002).

Ivory-billed woodpeckers excavated a nest hole in late January. Eggs were laid in February and young fledged in April. Similar to other woodpecker species, it is likely that ivory-billed woodpeckers used a cavity for a single breeding season but subsequent nests were excavated in the same area (Jackson 2002).

No critical habitat has been designated for ivory-billed woodpecker (USFWS 2010d).

Cape Sable Seaside Sparrow* (*Ammodramus mirabilis mirabilis*) *– Endangered

Cape Sable seaside sparrow is a small, secretive marsh bird that although widely distributed over large areas of south Florida, exists as six subpopulations [Comprehensive Everglades Restoration Plan (CERP) 2012]. The species is associated with open marshes and prairies that are primarily dry throughout most of the year. There are four grass communities that are the primary vegetation communities within Cape Sable seaside sparrow habitat: muhly grass prairie, short sawgrass prairie, tall clumped cordgrass prairies, and patchy low cordgrass prairies. The preferred habitat requires periodic fires to reduce encroachment by brush, shrubs, or trees (CERP 2012). The primary threats to the Cape Sable seaside sparrow include vegetation changes, development, hydrologic alteration, and catastrophic storms. Water levels with periods of inundation maintain the required vegetation; however, if inundation occurs during the nesting season, nests may be flooded reducing reproductive success. Because the population has a limited distribution and small population size, it is less resilient to unfavorable conditions and is at higher risk of localized extirpation (CERP 2012). The current populations appear to have declined as a result of wildfires. The most recent population estimate (2009) is 608 individuals; however, 71 percent of the population was estimated from one subpopulation, and no individuals were detectable in two of the subpopulations (USFWS 2010e).

Critical habitat has been designated for the Cape Sable seaside sparrow and a revision of the designation in 2007 resulted in the designation of 84,865 acres entirely located within Everglades National Park and the Southern Glades Wildlife and Environmental Area, which is managed jointly by the FWC and the South Florida Water Management District (USFWS 2010e).

Table A-3. Federally-Listed Bird Species and Species of Conservation Concern

COMMON NAME	SCIENTIFIC NAME	FEDERAL STATUS	USFWS[a]	GCJV[b]	USSCP[c]	STATE WILDLIFE ACTION PLAN SPECIES OF GREATEST CONSERVATION NEED				
						TX	LA	MS	AL	FL
Fulvous Whistling Duck	*Dendrocygna bicolor*					X	X			
Mottled Duck (inc. Florida)[d]	*Anas fulvigula (fulvigula)*					X	X	X		X
American Black Duck	*Anas rubripes*							X	X	
Northern Pintail	*Anas acuta*					X	X	X		X
Canvasback	*Aythya valisineria*					X	X			
Redhead[d]	*Aythya Americana*					X	X			
Lesser Scaup[d]	*Aythya affinis*					X	X	X		X
Northern Bobwhite	*Colinus virginianus*			X		X	X	X		X
Attwater's Greater Prairie-Chicken[e]	*Tympanuchus cupido attwateri*	E				X	X			
Red-throated Loon	*Gavia stellata*		X							
Common Loon[d]	*Gavia immer*									X
Horned Grebe	*Podiceps auritus*					X				X
Eared Grebe	*Podiceps nigricollis*					X				
Black-capped Petrel	*Pterodroma hasitata*		X							
Audubon's Shearwater	*Puffinis lherminieri*		X							
Band-rumped Storm-Petrel	*Oceanodroma castro*		X							
Wood Stork[e]	*Mycteria americana*	E*		X		X	X	X	X	X
Magnificent Frigatebird	*Fregata magnificens*		X							X
Masked Booby	*Sula dactylatra*									X
Brown Booby	*Sula leucogaster*		X							
Anhinga	*Anhinga anhinga*							X		
American White Pelican[f]	*Pelecanus erythrorhynchos*					X		X		
Brown Pelican[f]	*Pelecanus occidentalis*					X	X	X		X
American Bittern	*Botarus lentiginosus*		X			X	X	X		X
Least Bittern	*Ixobrychus exilis*		X			X		X	X	X
Great White Heron	*Ardea herodias occidentalis*									X
Snowy Egret	*Egretta thula*					X		X		X
Little Blue Heron	*Egretta cearulea*			X		X		X		X
Tricolored Heron	*Egretta tricolor*					X	X	X		X
Reddish Egret[f]	*Egretta rufescens*		X	X		X		X	X	X
Black-crowned Night-Heron	*Nycticorax nycticorax*							X		X

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						TX	LA	MS	AL	FL
Yellow-crowned Night-Heron	*Nycticorax violacea*					X	X	X		X
White Ibis	*Eudocimus albus*							X		X
Glossy Ibis	*Plegadis falcinellus*						X			X
White-faced Ibis	*Plegadis chihi*					X				
Roseate Spoonbill[f]	*Platalea ajaja*		X				X			X
Osprey[g]	*Pandion haliaetus*						X	X		
Swallow-tailed Kite	*Elanoides forficatus*		X			X	X	X	X	X
White-tailed Kite	*Elanus leucurus*					X				X
Snail Kite[e]	*Rostrhamus sociabilis plumbeus*	T								X
Mississippi Kite	*Ictinia mississippiensis*					X				X
Bald Eagle	*Haliaeetus leucocephalus*		X			X	X	X		X
Northern Harrier	*Circus cyaneus*					X	X		X	
Harris's Hawk	*Parabuteo unicinctus*		X			X				
Red-shouldered Hawk	*Buteo lineatus*					X				
Broad-winged Hawk	*Buteo platypterus platypterus*									X
Short-tailed Hawk	*Buteo brachyurus*		X							X
Swainson's Hawk	*Buteo swainsoni*		X			X				
White-tailed Hawk[g]	*Buteo albicaudatus*		X			X				
Ferruginous Hawk	*Buteo regalis*					X				
Crested Caracara (Audubon's)[k]	*Caracara cheriway auduboni*	T					X			X
American Kestrel (southeastern)	*Falco sparverius paulus*		X			X	X	X	X	X
Merlin	*Falco columbarius*					X				X
Aplomado Falcon[e]	*Falco femoralis*	E				X				
American Peregrine Falcon	*Falco peregrinus anatum*		X			X	X			
Arctic Peregrine Falcon	*Falco peregrinus tundrius*					X				
Prairie Falcon	*Falco mexicanus*					X				
Yellow Rail[h]	*Coturnicops novaeboracensis*		X				X	X	X	X
Black Rail	*Laterallus jamaicensis*		X	X		X	X	X	X	X
Clapper Rail	*Rallus longirostris*					X	X			X
Mangrove Clapper Rail	*Rallus longirostris insularum*									X

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						TX	LA	MS	AL	FL
Florida Clapper Rail	*Rallus longirostris scottii*									X
King Rail	*Rallus elegans*			X		X	X	X		X
Virginia Rail	*Rallus limicola*					X				
Purple Gallinule	*Porphyrio martinica*					X		X		
Limpkin	*Aramus guarana*		X							X
Mississippi Sandhill Crane[e]	*Grus canadensis pulla*	E**					X	X		
Florida Sandhill Crane	*Grus canadensis pratensis*									X
Whooping Crane[e]	*Grus americana*	E***				X	X			X
American Golden-Plover	*Pluvialis dominica*				X	X				
Snowy Plover	*Charadrius nivosus*		X	X	X	X	X	X	X	
Cuban Snowy Plover	*Charadrius nivosus tenuirostris*									X
Wilson's Plover[i]	*Charadrius wilsonia*		X	X	X	X	X	X	X	X
Piping Plover[e]	*Charadrius melodus*	T			X	X	X	X	X	X
Mountain Plover	*Charadrius montanus*		X		X	X				
American Oystercatcher[i]	*Haematopus palliatus*		X		X	X	X	X	X	X
Black-necked Stilt	*Himantopus mexicanus*					X				
American Avocet	*Recurvirostra americana*					X				X
Solitary Sandpiper	*Tringa solitaria*		X			X				
Greater Yellowlegs	*Tringa melanoleuca*					X				
Lesser Yellowlegs	*Tringa flavipes*		X			X				
Upland Sandpiper	*Bartramia longicauda*		X			X				
Whimbrel	*Numenius phaeopus*		X		X	X				X
Long-billed Curlew	*Numenius americanus*		X	X	X	X				
Hudsonian Godwit	*Limosa haemastica*		X	X	X	X				
Marbled Godwit	*Limosa fedoa*		X		X	X	X	X		X
Ruddy Turnstone	*Arenaria interpres*				X	X				
Red Knot (*rufa* ssp.); (*roselaari* ssp.)	*Calidris canutus*		X		X	X	X	X		X
Sanderling	*Calidris alba*				X	X				X
Semi-palmated Sandpiper (Eastern)	*Calidris pusilla*		X							X
Western Sandpiper	*Calidris mauri*			X		X		X		X
White-rumped Sandpiper	*Calidris fusicollis*									X
Pectoral Sandpiper	*Calidris melanotus*									X

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COMMON NAME	SCIENTIFIC NAME	FEDERAL STATUS	USFWS[a]	GCJV[b]	USSCP[c]	STATE WILDLIFE ACTION PLAN SPECIES OF GREATEST CONSERVATION NEED				
						TX	LA	MS	AL	FL
Dunlin	*Calidris alpine*						X	X		
Stilt Sandpiper	*Calidris himantopus*			X		X				
Buff-breasted Sandpiper	*Tryngites subruficollis*		X	X	X	X				
Short-billed Dowitcher	*Limnodramus griseus*		X	X		X	X			
Wilson's Snipe	*Gallinago delicata*					X				
American Woodcock	*Scolopax minor*				X	X	X	X	X	
Wilson's Phalarope	*Phalarope tricolor*				X	X				
Brown Noddy[f]	*Anous stolidus*									X
Sooty Tern	*Onychoprion fuscata*						X			X
Bridled Tern	*Onychoprion anaethetus*									X
Least Tern[e]	*Sternula antillarum*	E	X			X	X	X		X
Gull-billed Tern[f]	*Gelochelidon nilotica*		X	X		X	X	X		X
Caspian Tern	*Hydroprogne caspia*						X			X
Black Tern	*Childonias niger*		X							
Roseate Tern[e]	*Sterna dougallii*	T								X
Common Tern	*Sterna hirundo*						X			
Hairy Woodpecker	*Picoides villosus*									X
Red-cockaded Woodpecker[k]	*Picoides borealis*	E					X	X	X	X
Northern Flicker	*Colaptes auratus*									X
Pileated Woodpecker	*Dryocopus pileatus*					X				
Ivory-billed Woodpecker[e]	*Campephilus principalis*	E					X	X	X	X
Northern Beardless-Tyrannulet	*Camptostoma imberbe*		X			X				
Eastern Wood-Pewee	*Contopus virens*					X				
Acadian Flycatcher	*Empidonax virescens*					X				
Great Crested Flycatcher	*Myiarchus crinitis*					X				
Scissor-tailed Flycatcher	*Tyrannus forficatus*					X	X			
Eastern Kingbird	*Tyrannus tyrannus*					X				
Gray Kingbird	*Tyrannus dominicensis*									X
Rose-throated Becard	*Pachyrampus aglaiae*		X			X				
Loggerhead Shrike	*Lanius ludovicianus*		X	X		X	X	X		X
Bell's Vireo	*Vireo bellii*		X			X	X			
Yellow-throated Vireo	*Vireo flavifrons*					X	X			

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COMMON NAME	SCIENTIFIC NAME	FEDERAL STATUS	USFWS[a]	GCJV[b]	USSCP[c]	STATE WILDLIFE ACTION PLAN SPECIES OF GREATEST CONSERVATION NEED				
						TX	LA	MS	AL	FL
Warbling Vireo	*Vireo gilvus*					X	X			
Black-whiskered Vireo	*Vireo altiloquus*		X							X
Florida Scrub-Jay[k]	*Aphelocoma coerulescens*	T								X
Common Raven	*Corvus corax*								X	
Horned Lark	*Eremophila alpestris*					X				
Black-crested Titmouse	*Parus atricristatus*					X				
Verdin	*Auriparus flaviceps*		X			X				
White-breasted Nuthatch	*Sitta carolinensis*						X			X
Brown-headed Nuthatch	*Sitta pusilla*		X			X	X	X		X
Cactus Wren	*Campylorhynchus brunneicapillus*		X			X				
Bewick's Wren (*bewickii*)	*Thryomanes bewickii bewickii*		X			X		X	X	
Sedge Wren	*Cistothorus platensis*		X			X	X			
Worthington's Marsh Wren	*Cistothorus palustris griseus*									X
Marian's Marsh Wren	*Cistothrous palustris marianae*									X
Wood Thrush	*Hylocichla mustelina*		X			X	X	X	X	
Brown Thrasher	*Toxostoma rufum*					X				
Long-billed Thrasher	*Toxostoma longirostre*					X				
Curve-billed Thrasher	*Toxostoma curvirostre*		X			X				
Sprague's Pipit	*Anthus spragueii*		X			X	X			
Chestnut-collared Longspur	*Calcarius ornatus*		X			X				
Smith's Longspur	*Calcarius picusa*					X	X			
McCown's Longspur	*Calcarius mccownii*					X				
Worm-eating Warbler	*Helmitheros vermivorum*					X	X	X	X	X
Louisiana Waterthrush	*Parkesia motacilla*					X	X	X		X
Bachman's Warbler	*Vermivora bachmanii*						X	X		
Golden-winged Warbler	*Vermivora chrysoptera*			X		X				
Blue-winged Warbler	*Vermivora cyanoptera*		X			X				
Prothonotary Warbler	*Protonotaria citrea*		X			X	X	X		X
Swainson's Warbler	*Limnothlypis swainsonii*		X	X		X	X	X	X	X
Kentucky Warbler	*Geothlypis Formosa*		X			X	X	X	X	X
Hooded Warbler	*Setophaga citrina*					X	X			X

Table A-3. Federally-Listed Bird Species and Species of Conservation Concern

COMMON NAME	SCIENTIFIC NAME	FEDERAL STATUS	USFWS[a]	GCJV[b]	USSCP[c]	STATE WILDLIFE ACTION PLAN SPECIES OF GREATEST CONSERVATION NEED				
						TX	LA	MS	AL	FL
American Redstart	*Setophaga ruticilla*					X	X			
Cerulean Warbler	*Setophaga cerulea*		X	X		X	X	X	X	X
Northern Parula	*Setophaga americana*						X			
Tropical Parula	*Setophaga pitiayumi*		X			X				
Yellow Warbler (Cuban subspecies)	*Setophaga petechia gundlachi*		X							X
Yellow-throated Warbler	*Setophaga dominica*					X				
Stoddard's Yellow-throated Warbler	*Setophaga dominica stoddardi*									X
Prairie Warbler	*Setophaga discolor*		X			X	X	X		
Florida Prairie Warbler	*Setophaga discolor paludicola*									X
Black-throated Green Warbler	*Setophaga virens*		X							
White-collared Seedeater	*Sporophila torqueola*		X			X				
Botteri's Sparrow	*Peucaea botterii*		X			X				
Cassin's Sparrow	*Peucaea cassinii*		X			X				
Bachman's Sparrow	*Peucaea aestivalis*		X			X	X	X	X	X
Field Sparrow	*Spizella pusilla*					X	X			
Lark Sparrow	*Chondestes grammacus*					X	X			
Lark Bunting	*Calamospiza melanocorys*		X			X				
Grasshopper Sparrow	*Ammodramus savannarum*		X			X	X	X		X
Florida Grasshopper Sparrow[k]	*Ammodramus savannarum floridanus*	T								X
Henslow's Sparrow	*Ammodramus henslowii*		X			X	X	X	X	
LeConte's Sparrow	*Ammodramus leconteii*		X	X		X	X	X		
Nelson's Sparrow[h]	*Ammodramus nelsoni*		X				X	X	X	
Saltmarsh Sparrow	*Ammodramus caudacutus*		X							
Seaside Sparrow[h]	*Ammodramus maritimus*		X	X		X	X	X	X	
Wakulla Seaside Sparrow[h]	*Ammodramus maritimus junicolus*									X
MacGillivray's Seaside Sparrow[h]	*Ammodramus maritimus macgillivrai*									X
Cape Sable Seaside Sparrow[h]	*Ammodramus maritimus mirabilis*	E								X

Table A-3. Federally-Listed Bird Species and Species of Conservation Concern

COMMON NAME	SCIENTIFIC NAME	FEDERAL STATUS	USFWS[a]	GCJV[b]	USSCP[c]	STATE WILDLIFE ACTION PLAN SPECIES OF GREATEST CONSERVATION NEED				
						TX	LA	MS	AL	FL
Scott's Seaside Sparrow[h]	*Ammodramus maritimus peninsulae*									X
Harris's Sparrow	*Zonotrichia querula*					X				
Summer Tanager	*Piranga rubra*		X							
Scarlet Tanager	*Piranga olivacea*							X		
Pyrrhuloxia	*Cardinalis sinuatus*					X				
Varied Bunting	*Passerina versicolor*		X							
Painted Bunting	*Passerina ciris*		X			X	X	X		
Dickcissel	*Spiza americana*		X			X	X			
Eastern Meadowlark	*Sturnella magna*									
Western Meadowlark	*Sturnella neglecta*					X				
Rusty Blackbird	*Euphagus carolinus*		X				X	X		
Orchard Oriole	*Icterus spurius*					X	X			
Hooded Oriole	*Icterus cucullatus*		X			X				
Altamira Oriole[j]	*Icterus gularis*		X			X				
Audubon's Oriole	*Icterus graduacaudua*		X			X				

Table A-3. Federally-Listed Bird Species and Species of Conservation Concern

COMMON NAME	SCIENTIFIC NAME	FEDERAL STATUS	USFWS[a]	GCJV[b]	USSCP[c]	STATE WILDLIFE ACTION PLAN SPECIES OF GREATEST CONSERVATION NEED				
						TX	LA	MS	AL	FL

[a] USFWS Birds of Conservation Concern (USFWS 2008a).
[b] GCJV - Gulf Coast Joint Venture Priority List of Landbird, Shorebird, and Waterbird Guilds (2007).
[c] *U.S. Shorebird Conservation Plan* (USSCP), Gulf Coastal Prairie Working Group (2000).
Species described in sections:
[d] *Waterfowl*.
[e] *Threatened and Endangered Species*.
[f] *Colonial Waterbirds*.
[g] *Raptors*.
[h] *Secretive Marsh Birds*.
[i] *Shorebirds*.
[j] *Passerines*.
[k] *Terrestrial Species.*
E = Endangered
T = Threatened
*Federally Endangered in Alabama and Florida.
** Federally Endangered in Mississippi.
*** Federally Endangered in Texas.
Sources: USFWS = Birds of Conservation Concern 2008; GCJV = Gulf Coast Joint Venture Priority List of Landbird, Shorebird, and Waterbird Guilds (2007); USSCP (Gulf Coastal Prairie Working Group 2000); FWC 2011; Alabama Department of Conservation and Natural Resources 2005; Mississippi Wildlife, Fisheries and Parks 2005; Lester et al. 2005; and TPWD 2005.

A.7 Terrestrial Wildlife

Terrestrial wildlife species that can be found in habitats above the high tide line include mice, voles, rats, woodrats, rabbits, deer, panthers, bear, otter, and mink.

Key Largo Cotton Mouse* (*Peromyscus gossypinus allapaticol*) – *Threatened

Key Largo cotton mice were listed as a threatened species by the USFWS in 1983. This mouse was once found throughout the upper Florida Keys, but it is now restricted to only the very northernmost part of Key Largo, Florida (USFWS 1999d). The Key Largo cotton mouse is dependent on the tropical hardwood hammock forests found in this area for food and shelter. Key Largo cotton mice are omnivores. Habitat fragmentation due to residential and commercial construction as well as natural events (e.g., hurricanes) have degraded the quality of hardwood hammock forests in the Florida Keys, causing a decline in the Key Largo cotton mouse population (USFWS 1999d).

Florida Salt Marsh Vole* (*Microtus pennsylvanicus dukecampbelli*) – *Endangered

Florida salt marsh voles are currently listed as a Federally endangered species. *M. pennsylvanicus dukecampbelli* is a small (less than 8 inches) rodent that is closely related to the meadow vole (USFWS 2010g). It is known only from one site at Waccasassa Bay on the west coast of Florida, where it appears to exist in low numbers. The salt marsh vole is known to occur only in salt marsh habitat where the vegetation is dominated by salt grass, with smooth cordgrass and glasswort (USFWS 2010g). It is believed to survive high tides and storm flooding by swimming and climbing vegetation. Due to the very restricted range of this subspecies, any natural or human-caused adverse impact could result in its extinction. In addition, a single storm could drive the vole to extinction (USFWS 2010g).

Rice Rat* (*Oryzomys palustris natator*) – *Endangered

Rice rat, often called the silver rice rat, was listed as endangered by the USFWS in 1991. It is found only in wetlands habitats of the lower Florida Keys. The silver rice rat can be distinguished from the marsh rice rat by larger body size and smaller populations (USFWS 1999e). Populations vary across the lower Keys based on availability of suitable habitat. Rice rats utilize three different wetland areas: "(1) low intertidal areas, (2) salt marsh flooded by spring or storm tides, and (3) buttonwood transitional areas that are slightly more elevated and only flooded by storm tides" (Goodyear 1987 as cited in USFWS 1999e). Each of these areas is used for different purposes; intertidal areas are generally used during nocturnal activity for foraging, and low salt marsh areas and buttonwood areas are used for foraging and nesting with the latter providing more dense cover when needed (USFWS 1999e). Critical habitat was designated for the rice rat in 1993 and includes "areas containing contiguous mangrove swamps, salt marsh flats, and buttonwood transition vegetation. These vegetation types, as well as cattail marshes, contain the primary constituent elements necessary for this species survival" (50 Code of Federal Regulations [CFR] 17.95 as cited in USFWS 1999e).

Silver rice rats are omnivorous and eat both animal and plant material. They often forage along the edge of flooded areas for invertebrates, small crabs, and mangrove vegetation and other plant material. Freshwater sources are critical to the survival of this species because they cannot effectively concentrate urine to meet metabolic needs (Dunson and Lazell 1982, and Goodyear 1987 as cited in USFWS 1999e).

The major threat to this species is from degradation and loss of habitat as a result of urbanization (USFWS 1999e). Residential and commercial construction activities generally result in the loss of wetland habitat and reduction of freshwater resources. Residential expansion also introduces predators such as domestic cats that can threaten local populations.

Key Largo Woodrat* (*Neotoma floridana smalli*) *– Threatened

Key Largo woodrats were first listed as threatened under the Endangered Species Conservation Act of 1969; its status was later changed to endangered by the USFWS in 1983 through an emergency listing action. The Key Largo woodrat historically occurred throughout the forested uplands of Key Largo; however, its current range is limited to the northernmost area of Key Largo, Florida, within the tropical hardwood hammock forests (USFWS 1999f).

Key Largo woodrats rely on natural vegetation in hardwood forests to locate food resources and nest materials. This species is known to build large stick "houses" for resting and breeding. Key Largo woodrats are omnivores and feed primarily on a variety of leaves, seeds, and buds from a diversity of tropical hardwood fruits (USFWS 1999f).

The major threat to Key Largo woodrat habitat is modification caused by increasing commercial and residential construction. These activities generally remove all vegetation and grade the area, leaving no suitable habitat for the woodrat. This decreased range also makes this species more susceptible to genetic isolation and hurricanes (USFWS 1993 as cited in USFWS 1999f).

Lower Keys Marsh Rabbit* (*Sylvilagus palustris hefneri*) *– Endangered

Lower Keys marsh rabbits (*Sylvilagus palustris hefneri*) are a Federally listed endangered species. The Lower Keys marsh rabbit is only found in the Lower Florida Keys. Marsh rabbits are semi-aquatic and good swimmers, and they sometimes hide in water to avoid danger. Preferred habitats of the marsh rabbit are swamps, lake margins, and coastal waterways. The Lower Keys marsh rabbit feeds on bushy seaside tansy (*Borrichia frutescens*), which is common in mid-saltmarsh areas (USFWS n.d.a).

Florida Panther* (*Puma concolor coryi*) *– Endangered

Florida panther were listed as endangered by the USFWS (1967) and represents the only subspecies of puma that still occurs in the eastern U.S. Its historical range covered much of the southeastern U.S., including Florida, Louisiana, and Mississippi, but is now confined to one breeding population in south Florida; this area represents about 5 percent of its historic range (USFWS 2008c).

Due to their energetic needs, Florida panthers require large unfragmented habitat to thrive. Panthers preferentially select habitats that make it easy to stalk and capture prey; areas of dense understory vegetation allow panthers to stalk prey and are important for resting and denning cover. Prey for the Florida panther is typically either white-tailed deer or feral hogs (Maehr et al. 1990b, and Dalrymple and Bass 1996 as cited in USFWS 2008c). Other prey can include raccoons, rabbits, and alligators.

Florida panther populations continue to face threats due to habitat degradation and fragmentation. Residential and commercial construction, conversion of forest to agriculture, and road construction are the primary human activities that threaten this species. Panther mortality from vehicle collisions is also a common problem (USFWS 2008c). To enhance efforts to protect this species and allow for population recovery, the Florida National Panther Wildlife Refuge was established in 1989. The refuge consists of over 26,000 acres within the Big Cypress Basin in south Florida (USFWS 2012c).

Louisiana Black Bear* (*Ursus americanus luteolus*) – *Threatened
Louisiana black bear were listed as threatened by the USFWS in 1992. This species is typically distinguished from other black bears by its longer and narrower skull and larger molar teeth (USFWS n.d.b). It is found in east Texas, Louisiana, and Mississippi primarily in bottomland hardwood forests and floodplain forests. In addition, the species requires habitat with dense vegetation to provide cover and undisturbed travel corridors. Critical habitat was designated for Louisiana black bear in 2009; this critical habitat covers approximately 1.2 million acres of forest within the states of Texas, Louisiana, and Mississippi (Federal Register 2009b).

Louisiana black bear are generally active from April to November and hibernate during the winter months. Hibernation takes place in large hollow trees or in shallow ground depressions (TPWD n.d.b). After emerging from hibernation, they eat easy to digest plants and berries. Acorns and other nuts are consumed prior to hibernation in the winter.

Habitat loss remains the principal threat to this species. Bottomland hardwoods are frequently flooded due to reservoir construction and many forests are cleared for conversion to agricultural fields (USFWS n.d.b). Clearing of forests for residential and commercial construction activities has also reduced available black bear habitat.

Key Deer* (*Odocoileus virginianus clavium*) – *Endangered
Key deer were listed as endangered in 1967. It once had a range throughout the Florida Keys, but is now restritcted to Big Pine Key and small surrounding islands (USFWS 1999g). The Key deer is the smallest subspecies of the white-tailed deer; males generally weigh between 55 and 75 pounds (National Wildlife Federation n.d.). Key deer utilize various habitats within the key islands including pine flatwoods, pine rocklands, mangrove swamps, and freshwater wetlands. Pine rocklands are particularly important for this species because these areas provide a permanent source of freshwater (USFWS 1999g). Key deer feed primarily on red mangrove trees; however, they can feed on up to 160 other species of vegetation to meet their nutritional requirements. Some of these include palm berries, grasses, and mulberries.

Although a National Key Deer Refuge was established in 1957 for the protection and recovery of this species, Key deer maintain their endangered listing due to continued loss of habitat. Construction activities within the Florida Keys have degraded essential vegetation and freshwater sources. Other human-related activities have also interfered with deer populations. Fencing by residential owners disrupts migration routes and vehicular traffic is the cause of many Key deer mortalities (USFWS 1999g). Many residents of the islands also illegally feed Key deer, which has altered how they use the remaining habitat and has attracted large numbers of deer to residential areas (USFWS 1999g).

Diamond-backed Terrapin (Malaclemys terrapin)
The Diamond-backed terrapin is not listed as "threatened" or "endangered" by the USFWS (2013); however, along the Gulf Coast their State Conservation Status ranges from S4 (apparently secure) in Florida to S3 (vulnerable) in Texas, to S2 (imperiled) in Alabama, Mississippi, and Louisiana (NatureServe 2013). The diamondback terrapin lives almost exclusively in brackish water such as salt marshes,

lagoons, coastal swamps, and estuaries (Ernst and Lovich 2009) but also utilize beaches and upland habitat for nesting (Roosenburg 1994). Their diet consists of a variety of worms, crabs, snails, and fish (Ernst & Lovich 2009).

From the 1880s until the 1930s, harvesting of this species for its meat nearly brought the diamond-backed terrapin to extinction but the introduction of protective laws and a decrease in consumer demand has enabled some populations to recover (Burton and Burton 2002). Currently, threats to the diamondback terrapin include incidental drowning in crab traps, coastal development, pollution, drainage and impoundment of salt marshes, human disturbance of nesting sites, and changes in fresh water flow into estuarine systems (Seigeland Gibbons 1995; Dorcas et al. 2007).

Table A-4. Federally Listed Terrestrial Wildlife Species

SPECIES COMMON NAME	SCIENTIFIC NAME	FEDERAL STATUS	HABITAT NOTES	GULF COAST STATES ADJACENT COASTAL COUNTY/PARISH RANGE[A]
Crustaceans				
Mollusks				
Stock Island Tree Snail[b]	*Orthalicus rese*	Threatened	Smooth-barked trees within hardwood hammock forests	Monroe County, Florida
Insects				
Schaus Swallowtail Butterfly[b]	*Heraclides aristodemus ponceanus*	Endangered	Dense subtropical dry forests	Monroe County, Florida
Reptiles				
American Alligator	*Alligator mississippiensis*	Threatened	Freshwater and slow-moving swamps, marshes, and lakes	Texas, Louisiana, Mississippi, Alabama (counties not defined); Polk through Monroe Counties, Florida
American Crocodile[b]	*Crocodylus acutus*	Threatened	Fresh and salt waters mix coastal wetlands and canals	Charlotte through Monroe Counties, Florida
Ringed Map Turtle[b]	*Graptemys oculifera*	Threatened	Pearl River in areas with strong currents and abundance of structures (e.g., logs)	St. Tammany County, Alabama; Hancock County, Mississippi
Yellow Blotched Map Turtle[b]	*Graptemys flavimaculata*	Threatened	Endemic to the Pascagoula River in areas with moderate currents with logs and sandbars.	Jackson County, Mississippi
Alabama Red Belly Turtle[b]	*Pseudemys alabamensis*	Endangered	Freshwater to moderately brackish shallow streams, river, and bayous	Harrison and Jackson Counties, Mississippi; Mobile and Baldwin Counties, Alabama
Diamondback Terrapin	*Malaclemys terrapin*	N/L	Brackish water habitats	Gulf Coast from Texas to Florida Keys
Birds				
Audubon's Crested Caracara	*Polyborus plancus audubonii*	Threatened	Prairie region and south-central portion of Florida	Polk through Collier Counties, Florida
Florida Grasshopper Sparrow	*Ammodramus savvarum floridanus*	Endangered	Dry prairie habitat limited to the prairie region of south-central Florida	Polk, DeSoto and Glades Counties, Florida
Florida Scrub Jay	*Aphelocoma coerulescens*	Threatened	Only occurs in oak scrub habitats on dune ridges with find, white, drained sand.	Marion through Collier Counties (expect Sumter County), Florida

Table A-4. Federally Listed Terrestrial Wildlife Species

SPECIES COMMON NAME	SCIENTIFIC NAME	FEDERAL STATUS	HABITAT NOTES	GULF COAST STATES ADJACENT COASTAL COUNTY/PARISH RANGE[A]
Red-cockaded Woodpecker	*Picoides boralis*	Endangered	Nest and roost in cavities of living pine species. Longleaf pine (*Pinus palustris*) is the preferred tree species.	Liberty, Texas (historical record); Calcasieu, Livingston, Tangipahoa, and St. Tammany Parishes, Louisiana; Harrison and Jackson Counties, Mississippi; Escambia through Jefferson Counties, Polk County and Glades through Collier Counties, Florida
Mammals				
Small Mammals				
Choctawhatchee Beach Mouse[b]	*Peromyscus polionotus allophrys*	Endangered	Primary and secondary dunes	Okaloosa, Walton and Bay Counties, Florida
Alabama Beach Mouse[b]	*Peromyscus polionotus ammobates*	Endangered	Primary, secondary and scrub dunes of the coastal strand community	Baldwin County, Alabama
Perdido Key Beach Mouse[b]	*Peromyscus polionotus trissyllepsis*	Endangered	Scrub habitat on frontal dunes	Baldwin County, Alabama; Escambia County, Florida
St. Andrew Beach Mouse[b]	*Peromyscus polionotus peninsularis*	Endangered	Primary and secondary dunes	Bay and Gulf Counties, Florida
Key Largo Cotton Mouse[b]	*Peromyscus gossypinus allapaticol*	Threatened	Tropical hardwood hammocks	Monroe County, Florida
Florida Salt Marsh Vole[b]	*Microtus pennsylvanicus dukecampbelli*	Endangered	Salt marsh habitat dominated by salt grass (*Distichlis spicata*), smooth cordgrass (*Spartina alterniflora*), and glasswort (*Salicornia* spp.) vegetation	Levy County, Florida
Rice Rat[b]	*Oryzomys palustris natator*	Endangered	Mangrove swamps, salt marsh flats, and buttonwood vegetation	Monroe County, Florida
Medium Mammals				
Key Largo Woodrat[b]	*Neotoma floridana smalli*	Threatened	Tropical hardwood hammock forests	Monroe County, Florida

Table A-4. Federally Listed Terrestrial Wildlife Species

SPECIES COMMON NAME	SCIENTIFIC NAME	FEDERAL STATUS	HABITAT NOTES	GULF COAST STATES ADJACENT COASTAL COUNTY/PARISH RANGE[A]
Lower Keys Marsh Rabbit[b]	*Sylvilagus palustris hefneri*	Endangered	Swamps, lake margins, and coastal waterways are the preferred habitat	Monroe County, Florida
Large Mammals				
Florida Panther[b]	*Puma concolor coryi*	Threatened	Large unfragmented habitat	Polk through Monroe Counties, Florida
Louisiana Black Bear[b]	*Ursus americanus luteolus*	Threatened	Bottomland hardwood forests and floodplain forests	Calcasieu through St. Tammany Parishes, Louisiana
Key Deer[b]	*Odocoileus virginianus clavium*	Endangered	Pine flatwoods, pine rocklands, mangrove swamps, and freshwater wetlands	Monroe County, Florida
Semi-aquatic Mammals				
North American River Otter	*Lontra canadensis*	N/L	Freshwater and coastal marine habitats include river, lakes, marshes, swamps, and estuaries	Throughout the Gulf of Mexico
American Mink	*Neovision vison*	N/L	Coniferous forest, mixed forest and grasslands with open water or marshland nearby	Throughout the Gulf of Mexico

[a] Counties where species is known to or is believed to occur.
[b] Federally listed wildlife identified by the USFWS as threatened by the gulf oil spill (USFWS 2010a).
N/L = not listed.

A.8 Socioeconomics

This section presents additional information related to human uses and socioeconomics of the northern Gulf of Mexico including demographics. Tables are used to summarize the statistical data.

In the 2010 Census, the shore-adjacent counties and parishes as a whole were made up of 71 percent of people who identify themselves as white, while people who identify themselves as black make up about 16 percent of the population. More than 3 percent of individuals identified themselves as Asian, 6.4 percent identify themselves as some other race, and 2.4 percent identify as 2 or more races. Less than 1 percent of the population of the shore-adjacent counties and parishes identified themselves as American Indian.

Ethnicity is queried separately from race in the Census, and Hispanic ethnicity is defined as anyone who self-identifies as Hispanic or Latino. In the shore-adjacent counties and parishes, 23 percent of the population identified themselves as Hispanic and this population segment includes people of white and non-white races. Table A-5 summarizes race and ethnicity data by county in the shore-adjacent counties and parishes.

Data on other social variables that describe communities (i.e., income, employment, poverty, education, language spoken at home, birthplace, etc.) are collected in the American Community Survey (ACS), which has replaced the Census long form. The ACS is an ongoing survey that provides data every year, but unlike the U.S. Census, the data provided by the ACS are estimates. ACS data are published as 1-year, 3-year, and 5-year estimates. One-year estimates are the most current, but are only available for geographies with a population greater than 65,000; 3-year estimates are available for areas with a population greater than 20,000; and 5-year estimates are the least current, but are available for all geographies. Half of the counties in the shore-adjacent counties and parishes have fewer than 65,000 people, and 15 counties have a population of less than 20,000; therefore, 5-year ACS estimates (2005-2009) were queried for the summaries provided here (Table A-6).

The unemployment rate was calculated based on the civilian labor force. The civilian labor force is made up of individuals aged 16 to 64 that are in the labor force, but not in the armed services. The unemployment rate for the shore-adjacent counties and parishes as a whole was 7.4 percent, and the unemployment rate for individual Gulf states ranges from 6.9 to 9.4 percent. Median household income in the shore-adjacent counties and parishes ranges from $22,747 (Willacy County, Texas) to $62,570 (Brazoria County, Texas). Per capita income ranges from $10,242 (Willacy County, Texas) to $36,942 (Collier County, Florida).

Poverty status is determined through a combination of family income over the past 12 months, and family size. Poverty status is not determined for institutionalized people, people living in military group quarters, people in college dorms, and unrelated individuals under 15 years old. In general, across the shore-adjacent counties and parishes, poverty is highest in the Texas shore-adjacent counties and lowest in the Florida shore-adjacent counties.

Educational attainment data are collected for the population aged 25 years and older. Table A-7 presents shore-adjacent counties and parishes and statewide information on the proportion of the population over 25 years that has earned a high school diploma, a bachelor’s degree, and an advanced degree.

ACS also collects data on languages spoken at home by the population aged 5 and older. Table A-8 presents shore-adjacent counties and parishes and statewide information on languages spoken at home and birthplace.

Table A-5. Summary of Race and Ethnicity Data

GEOGRAPHIC AREA	RACE							ETHNICITY
	% WHITE	% BLACK	% AMERICAN INDIAN	% ASIAN	% PACIFIC ISLANDER	% OTHER RACE	% TWO OR MORE RACES	% HISPANIC (WHITE & NON-WHITE)
Aransas County, TX	87.4%	1.3%	0.7%	2.0%	0.0%	6.3%	2.3%	24.6%
Brazoria County, TX	70.1%	12.1%	0.6%	5.5%	0.0%	9.2%	2.6%	27.7%
Calhoun County, TX	81.5%	2.6%	0.5%	4.4%	0.0%	8.8%	2.1%	46.4%
Cameron County, TX	87.0%	0.5%	0.4%	0.7%	0.0%	9.8%	1.5%	88.1%
Chambers County, TX	78.6%	8.2%	0.6%	1.0%	0.1%	9.5%	2.1%	18.9%
Galveston County, TX	72.5%	13.8%	0.6%	3.0%	0.1%	7.4%	2.7%	22.4%
Harris County, TX	56.6%	18.9%	0.7%	6.2%	0.1%	14.3%	3.2%	40.8%
Jackson County, TX	81.3%	7.0%	0.4%	0.4%	0.0%	8.8%	2.1%	29.0%
Jefferson County, TX	52.2%	33.8%	0.5%	3.4%	0.0%	8.1%	2.0%	17.0%
Kenedy County, TX	87.5%	1.2%	1.4%	0.2%	0.0%	6.7%	2.9%	76.7%
Kleberg County, TX	79.9%	3.7%	0.6%	2.3%	0.1%	10.9%	2.4%	70.2%
Liberty County, TX	77.2%	10.8%	0.6%	0.5%	0.0%	9.0%	2.0%	18.0%
Matagorda County, TX	71.2%	11.4%	0.7%	2.0%	0.0%	12.3%	2.3%	38.3%
Nueces County, TX	81.5%	4.0%	0.6%	1.7%	0.1%	9.6%	2.4%	60.6%
Orange County, TX	86.1%	8.5%	0.5%	1.0%	0.1%	2.1%	1.7%	5.8%
Refugio County, TX	80.5%	6.5%	0.6%	0.4%	0.0%	10.0%	2.0%	47.2%
San Patricio County, TX	85.9%	1.7%	0.6%	0.8%	0.1%	8.5%	2.4%	54.4%
Victoria County, TX	79.5%	6.4%	0.6%	1.0%	0.0%	10.1%	2.4%	43.9%
Willacy County, TX	85.8%	2.1%	0.3%	0.6%	0.0%	9.3%	1.8%	87.2%
Texas Shore-adjacent Counties Total	63.2%	15.9%	0.6%	4.9%	0.1%	12.4%	2.9%	42.1%
State of Texas	70.4%	11.8%	0.7%	3.8%	0.1%	10.5%	2.7%	37.6%
Ascension Parish, LA	73.3%	22.2%	0.3%	0.9%	0.0%	1.9%	1.2%	4.7%
Assumption Parish, LA	66.8%	30.5%	0.6%	0.2%	0.0%	1.0%	0.9%	2.1%
Calcasieu Parish, LA	70.8%	24.8%	0.5%	1.1%	0.0%	0.9%	1.9%	2.6%
Cameron Parish, LA	95.7%	1.7%	0.5%	0.1%	0.0%	0.8%	1.1%	2.3%
Iberia Parish, LA	62.2%	32.0%	0.4%	2.4%	0.0%	1.5%	1.6%	3.1%
Jefferson Parish, LA	62.9%	26.3%	0.5%	3.9%	0.0%	4.3%	2.1%	12.4%
Lafourche Parish, LA	79.4%	13.2%	2.8%	0.7%	0.0%	2.0%	1.8%	3.8%
Livingston Parish, LA	91.9%	5.1%	0.4%	0.5%	0.0%	1.0%	1.1%	3.0%
Orleans Parish, LA	33.0%	60.2%	0.3%	2.9%	0.0%	1.9%	1.7%	5.2%
Plaquemines Parish, LA	70.5%	20.5%	1.6%	3.2%	0.1%	1.4%	2.7%	4.6%
St. Bernard Parish, LA	74.0%	17.7%	0.7%	1.9%	0.1%	2.7%	2.9%	9.2%

Table A-5. Summary of Race and Ethnicity Data

GEOGRAPHIC AREA	RACE							ETHNICITY
	% WHITE	% BLACK	% AMERICAN INDIAN	% ASIAN	% PACIFIC ISLANDER	% OTHER RACE	% TWO OR MORE RACES	% HISPANIC (WHITE & NON-WHITE)
St. Charles Parish, LA	69.2%	26.6%	0.3%	0.8%	0.0%	1.3%	1.6%	5.0%
St. James Parish, LA	48.0%	50.6%	0.2%	0.1%	0.0%	0.4%	0.7%	1.2%
St. John the Baptist Parish, LA	42.5%	53.5%	0.3%	0.7%	0.0%	1.5%	1.4%	4.7%
St. Martin Parish, LA	65.8%	30.7%	0.4%	0.8%	0.0%	0.9%	1.4%	2.1%
St. Mary Parish, LA	59.3%	32.5%	1.8%	1.7%	0.1%	2.6%	2.0%	5.3%
St. Tammany Parish, LA	83.6%	11.4%	0.5%	1.3%	0.0%	1.4%	1.8%	4.7%
Tangipahoa Parish, LA	66.2%	30.3%	0.3%	0.6%	0.0%	1.2%	1.4%	3.5%
Terrebonne Parish, LA	70.3%	18.9%	5.7%	1.0%	0.1%	2.0%	2.1%	4.0%
Vermilion Parish, LA	80.9%	14.3%	0.4%	2.0%	0.0%	1.0%	1.4%	2.4%
Louisiana Shore-adjacent Parishes Total	65.0%	28.4%	0.8%	1.9%	0.0%	2.1%	1.8%	5.7%
State of Louisiana	62.6%	32.0%	0.7%	1.5%	0.0%	1.5%	1.6%	4.2%
Hancock County, MS	88.4%	7.1%	0.5%	1.0%	0.0%	0.8%	2.1%	3.3%
Harrison County, MS	69.7%	22.1%	0.5%	2.8%	0.1%	2.1%	2.7%	5.3%
Jackson County, MS	72.1%	21.5%	0.4%	2.2%	0.1%	1.9%	1.9%	4.6%
Mississippi Shore-adjacent Counties Total	72.8%	20.1%	0.4%	2.4%	0.1%	1.9%	2.3%	4.8%
State of Mississippi	59.1%	37.0%	0.5%	0.9%	0.0%	1.3%	1.1%	2.7%
Baldwin County, AL	85.7%	9.4%	0.7%	0.7%	0.0%	2.0%	1.5%	4.4%
Mobile County, AL	60.2%	34.6%	0.9%	1.8%	0.0%	0.9%	1.5%	2.4%
Alabama Shore-adjacent Counties Total	68.0%	26.9%	0.8%	1.5%	0.0%	1.3%	1.5%	3.0%
State of Alabama	68.5%	26.2%	0.6%	1.1%	0.1%	2.0%	1.5%	3.9%
Bay County, FL	82.2%	10.8%	0.7%	2.0%	0.1%	1.2%	3.1%	4.8%
Calhoun County, FL	80.8%	13.8%	1.1%	0.5%	0.1%	1.4%	2.4%	5.2%
Charlotte County, FL	90.0%	5.7%	0.3%	1.2%	0.0%	1.1%	1.7%	5.8%
Citrus County, FL	93.0%	2.8%	0.3%	1.4%	0.0%	0.8%	1.6%	4.7%
Collier County, FL	83.9%	6.6%	0.3%	1.1%	0.0%	6.2%	1.9%	25.9%
DeSoto County, FL	66.2%	12.7%	0.4%	0.5%	0.0%	17.7%	2.4%	29.9%
Dixie County, FL	88.8%	8.4%	0.4%	0.3%	0.0%	0.5%	1.5%	3.1%
Escambia County, FL	68.9%	22.9%	0.9%	2.7%	0.1%	1.3%	3.2%	4.7%
Franklin County, FL	82.6%	13.8%	0.5%	0.2%	0.1%	1.2%	1.7%	4.6%
Gadsden County, FL	35.9%	56.0%	0.3%	0.5%	0.0%	5.9%	1.3%	9.5%
Gilchrist County, FL	90.9%	5.3%	0.5%	0.4%	0.1%	1.4%	1.5%	5.0%
Glades County, FL	71.0%	12.3%	4.6%	0.4%	0.0%	9.9%	1.7%	21.1%

Table A-5. Summary of Race and Ethnicity Data

GEOGRAPHIC AREA	RACE							ETHNICITY
	% WHITE	% BLACK	% AMERICAN INDIAN	% ASIAN	% PACIFIC ISLANDER	% OTHER RACE	% TWO OR MORE RACES	% HISPANIC (WHITE & NON-WHITE)
Gulf County, FL	78.1%	18.7%	0.4%	0.3%	0.0%	0.8%	1.8%	4.3%
Hardee County, FL	72.2%	7.0%	0.6%	1.1%	0.0%	17.1%	2.0%	42.9%
Hernando County, FL	89.5%	5.1%	0.4%	1.1%	0.0%	1.9%	2.0%	10.3%
Hillsborough County, FL	71.3%	16.7%	0.4%	3.4%	0.1%	5.0%	3.1%	24.9%
Holmes County, FL	90.5%	5.8%	0.8%	0.4%	0.1%	0.4%	2.0%	2.2%
Jackson County, FL	69.1%	26.6%	0.7%	0.5%	0.1%	1.2%	1.9%	4.3%
Jefferson County, FL	60.4%	36.2%	0.3%	0.4%	0.0%	1.5%	1.3%	3.7%
Lafayette County, FL	77.4%	15.9%	0.4%	0.1%	0.0%	4.7%	1.4%	12.1%
Lee County, FL	83.0%	8.3%	0.4%	1.4%	0.1%	4.9%	2.1%	18.3%
Leon County, FL	63.0%	30.3%	0.3%	2.9%	0.1%	1.2%	2.2%	5.6%
Levy County, FL	85.5%	9.4%	0.4%	0.6%	0.1%	2.2%	1.9%	7.5%
Liberty County, FL	77.3%	17.9%	1.1%	0.2%	0.0%	1.9%	1.7%	6.2%
Madison County, FL	57.6%	38.8%	0.5%	0.2%	0.0%	1.6%	1.3%	4.7%
Manatee County, FL	81.9%	8.7%	0.3%	1.6%	0.1%	5.3%	2.0%	14.9%
Marion County, FL	81.0%	12.3%	0.4%	1.3%	0.0%	2.9%	2.1%	10.9%
Monroe County, FL	89.5%	5.7%	0.4%	1.1%	0.1%	1.4%	1.8%	20.6%
Okaloosa County, FL	81.1%	9.3%	0.6%	2.9%	0.2%	2.0%	3.9%	6.8%
Pasco County, FL	88.2%	4.5%	0.4%	2.1%	0.1%	2.6%	2.2%	11.7%
Pinellas County, FL	82.1%	10.3%	0.3%	3.0%	0.1%	2.0%	2.2%	8.0%
Polk County, FL	75.2%	14.8%	0.4%	1.6%	0.1%	5.5%	2.4%	17.7%
Santa Rosa County, FL	87.8%	5.4%	0.9%	1.8%	0.1%	1.0%	3.0%	4.3%
Sarasota County, FL	90.2%	4.7%	0.2%	1.3%	0.0%	2.0%	1.6%	7.9%
Sumter County, FL	86.6%	9.7%	0.4%	0.7%	0.0%	1.5%	1.1%	6.0%
Suwannee County, FL	82.5%	11.4%	0.5%	0.5%	0.0%	3.1%	1.9%	8.7%
Taylor County, FL	75.2%	20.7%	0.8%	0.7%	0.0%	0.9%	1.7%	3.4%
Wakulla County, FL	82.0%	14.5%	0.6%	0.6%	0.1%	0.5%	1.8%	3.3%
Walton County, FL	87.8%	5.8%	0.9%	0.9%	0.1%	2.1%	2.4%	5.3%
Washington County, FL	80.4%	15.0%	1.3%	0.5%	0.1%	0.6%	2.1%	2.9%
Florida Shore-adjacent Counties Total	79.6%	12.1%	0.4%	2.1%	0.1%	3.4%	2.4%	13.6%
State of Florida	75.0%	16.0%	0.4%	2.4%	0.1%	3.6%	2.5%	22.5%
Shore-adjacent Counties and Parishes Total	71.1%	16.3%	0.6%	3.1%	0.1%	6.4%	2.4%	22.5%
Data Source: U.S. Census 2010. Data are current as of October 2012.								

Table A-6. Summary of 5-Year Estimates (2005-2009) of Labor Force, Employment, Income and Poverty Data

GEOGRAPHIC AREA	CIVILIAN LABOR FORCE[A]	% UNEMPLOYED	MEDIAN HOUSEHOLD INCOME	PER CAPITA INCOME	POPULATION FOR WHOM POVERTY WAS DETERMINED		
					% IN POVERTY	% UNDER 5 IN POVERTY	% UNDER 18 IN POVERTY
Aransas County, TX	9,561	8.5%	$41,172	$24,950	17.1%	32.4%	27.2%
Brazoria County, TX	138,524	5.5%	$62,570	$27,208	10.6%	17.1%	14.4%
Calhoun County, TX	9,014	7.0%	$43,305	$20,468	13.9%	17.1%	18.0%
Cameron County, TX	137,948	7.5%	$30,034	$13,474	35.7%	50.1%	47.0%
Chambers County, TX	14,371	4.9%	$60,451	$27,166	11.0%	19.5%	13.5%
Galveston County, TX	138,279	6.9%	$54,398	$27,768	13.0%	18.3%	17.4%
Harris County, TX	1,942,927	7.2%	$50,569	$26,498	16.7%	27.0%	24.4%
Jackson County, TX	6,579	6.6%	$48,509	$23,563	10.0%	8.2%	16.9%
Jefferson County, TX	105,633	8.1%	$41,420	$21,670	18.0%	30.1%	27.0%
Kenedy County, TX	134	22.4%	$25,417	$12,892	52.4%	0.0%	58.1%
Kleberg County, TX	13,371	9.2%	$34,652	$17,941	26.1%	38.2%	25.8%
Liberty County, TX	30,612	8.1%	$44,730	$18,571	15.8%	27.0%	23.1%
Matagorda County, TX	16,687	10.0%	$40,307	$21,396	21.9%	31.6%	31.9%
Nueces County, TX	147,026	7.6%	$42,356	$21,979	19.7%	34.6%	28.2%
Orange County, TX	36,138	7.8%	$45,608	$22,826	14.9%	22.2%	20.1%
Refugio County, TX	2,599	6.3%	$39,914	$17,894	14.5%	24.1%	20.3%
San Patricio County, TX	28,542	7.0%	$43,748	$20,196	14.8%	29.7%	20.5%
Victoria County, TX	41,628	6.9%	$45,859	$23,219	15.2%	27.6%	23.1%
Willacy County, Texas	5,374	6.4%	$22,747	$10,242	46.9%	58.7%	58.2%
Texas Shore - adjacent Counties Total	2,824,947	7.2%	$43,040	$24,864	17.8%	28.7%	25.7%
State of Texas	11,259,841	6.9%	$48,199	$24,318	16.8%	27.4%	23.7%
Ascenion Parish, LA	49,344	4.7%	$60,874	$26,385	10.6%	19.2%	15.2%
Assumption Parish, LA	9,933	7.6%	$43,003	$21,150	19.9%	37.3%	28.4%
Calcasieu Parish, LA	87,013	7.9%	$42,938	$23,514	16.5%	27.2%	23.4%
Cameron Parish, LA	3,913	0.8%	$57,786	$25,681	8.1%	2.3%	15.0%
Iberia Parish, LA	32,541	7.2%	$40,803	$19,559	20.6%	33.0%	29.2%
Jefferson Parish, LA	215,315	7.0%	$48,213	$25,196	13.8%	24.0%	21.5%
Lafourche Parish, LA	41,450	4.0%	$46,196	$22,578	15.4%	29.7%	22.8%
Livingston Parish, LA	55,074	4.2%	$52,779	$22,722	12.0%	17.6%	16.8%
Orleans Parish, LA	156,735	12.8%	$36,258	$23,559	23.4%	38.9%	38.1%

Table A-6. Summary of 5-Year Estimates (2005-2009) of Labor Force, Employment, Income and Poverty Data

GEOGRAPHIC AREA	CIVILIAN LABOR FORCE[A]	% UNEMPLOYED	MEDIAN HOUSEHOLD INCOME	PER CAPITA INCOME	POPULATION FOR WHOM POVERTY WAS DETERMINED		
					% IN POVERTY	% UNDER 5 IN POVERTY	% UNDER 18 IN POVERTY
Plaquemines Parish, LA	9,212	6.3%	$50,610	$21,960	10.6%	17.2%	12.7%
St. Bernard Parish, LA	16,554	9.2%	$38,478	$18,182	18.5%	33.0%	28.4%
St. Charles Parish, LA	25,152	6.9%	$59,884	$25,216	13.0%	22.0%	17.5%
St. James Parish, LA	9,797	6.8%	$49,883	$21,818	13.2%	21.3%	20.7%
St. John the Baptist Parish, LA	22,281	8.1%	$47,574	$20,921	14.3%	24.1%	20.9%
St. Martin Parish, LA	23,566	6.5%	$39,186	$20,788	16.1%	25.3%	21.3%
St. Mary Parish, LA	22,739	6.6%	$38,269	$19,725	21.5%	36.5%	32.3%
St. Tammany Parish, LA	105,070	5.2%	$59,804	$28,587	10.3%	13.5%	13.1%
Tangipahoa Parish, LA	51,174	8.7%	$38,067	$19,608	22.0%	36.6%	30.3%
Terrebonne Parish, LA	48,732	5.4%	$47,338	$22,513	16.9%	27.1%	24.8%
Vermilion Parish, LA	24,088	4.3%	$40,785	$20,108	18.5%	26.8%	26.0%
Louisiana Shore-adjacent Parishes Total	1,009,683	7.4%	$46,936	$23,645	16.2%	26.8%	23.7%
State of Louisiana	2,018,591	7.7%	$42,167	$22,535	18.4%	29.8%	26.3%
Hancock County, MS	17,718	7.5%	$44,025	$22,168	14.3%	17.7%	18.7%
Harrison County, MS	81,617	9.0%	$44,570	$22,444	14.8%	25.2%	19.9%
Jackson County, MS	60,328	9.3%	$47,767	$22,256	14.8%	22.5%	21.7%
Mississippi Shore-adjacent Counties Total	159,663	9.0%	$45,454	$22,342	14.8%	23.5%	20.5%
State of Mississippi	1,286,435	9.4%	$36,796	$19,534	21.4%	34.1%	30.2%
Baldwin County, AL	78,695	5.6%	$48,918	$26,197	11.9%	22.3%	19.4%
Mobile County, AL	183,772	8.5%	$40,476	$21,274	19.1%	35.0%	28.9%
Alabama Shore-adjacent Counties Total	262,467	7.7%	$44,697	$22,741	17.0%	31.6%	26.3%
State of Alabama	2,102,604	7.9%	$41,216	$22,732	16.8%	27.8%	23.7%
Bay County, FL	76,343	6.6%	$46,240	$24,858	12.5%	17.3%	18.9%
Calhoun County, FL	4,538	8.5%	$29,642	$14,506	20.5%	36.9%	27.6%
Charlotte County, FL	57,707	9.0%	$44,639	$27,561	9.5%	21.0%	15.9%
Citrus County, FL	48,694	10.1%	$37,807	$22,714	13.6%	28.6%	21.7%
Collier County, FL	131,487	6.6%	$58,133	$36,942	10.8%	22.7%	18.2%
DeSoto County, FL	14,130	8.8%	$37,226	$17,187	20.7%	41.3%	31.2%
Dixie County, FL	4,785	7.9%	$31,426	$15,504	19.6%	27.5%	27.9%

Table A-6. Summary of 5-Year Estimates (2005-2009) of Labor Force, Employment, Income and Poverty Data

GEOGRAPHIC AREA	CIVILIAN LABOR FORCE[A]	% UNEMPLOYED	MEDIAN HOUSEHOLD INCOME	PER CAPITA INCOME	POPULATION FOR WHOM POVERTY WAS DETERMINED		
					% IN POVERTY	% UNDER 5 IN POVERTY	% UNDER 18 IN POVERTY
Escambia County, FL	135,044	8.8%	$43,148	$23,154	15.5%	28.1%	24.1%
Franklin County, FL	4,786	9.8%	$38,436	$22,924	23.8%	46.3%	35.6%
Gadsden County, FL	18,373	8.7%	$35,423	$17,245	24.6%	37.8%	35.2%
Gilchrist County, FL	7,514	7.2%	$41,048	$18,364	14.7%	27.3%	20.6%
Glades County, FL	4,237	7.0%	$39,260	$19,810	17.5%	36.2%	28.4%
Gulf County, FL	5,952	9.5%	$38,574	$18,754	17.5%	40.3%	30.2%
Hardee County, FL	11,656	9.7%	$38,865	$15,209	22.9%	32.4%	27.7%
Hernando County, FL	63,562	10.3%	$42,457	$22,872	11.1%	16.7%	17.0%
Hillsborough County, FL	589,772	7.3%	$49,594	$27,252	13.5%	20.5%	19.0%
Holmes County, FL	7,196	7.7%	$33,868	$15,545	19.0%	33.5%	26.5%
Jackson County, FL	17,711	9.2%	$36,442	$16,604	21.1%	24.9%	18.5%
Jefferson County, FL	6,336	11.1%	$44,011	$20,323	20.4%	30.9%	26.6%
Lafayette County, FL	2,867	2.8%	$46,551	$16,575	18.0%	20.9%	20.1%
Lee County, FL	253,382	7.6%	$50,362	$30,363	10.5%	19.7%	16.2%
Leon County, FL	141,096	8.1%	$42,889	$25,467	21.5%	23.8%	18.5%
Levy County, FL	15,777	8.0%	$35,294	$18,381	19.1%	35.6%	29.2%
Liberty County, FL	3,384	6.6%	$39,583	$16,157	22.8%	26.8%	18.2%
Madison County, FL	7,729	8.3%	$36,682	$16,486	22.4%	53.4%	39.9%
Manatee County, FL	138,958	7.1%	$47,935	$28,418	11.7%	21.4%	19.0%
Marion County, FL	126,749	9.0%	$40,306	$22,407	13.9%	31.5%	22.5%
Monroe County, FL	38,269	4.2%	$54,946	$36,086	10.3%	14.0%	10.7%
Okaloosa County, FL	82,135	5.8%	$53,741	$28,361	10.4%	18.3%	16.4%
Pasco County, FL	197,638	8.4%	$43,690	$23,811	11.7%	17.3%	16.2%
Pinellas County, FL	430,241	6.4%	$44,838	$28,872	11.6%	20.2%	16.7%
Polk County, FL	248,938	7.2%	$44,043	$22,283	14.4%	26.5%	21.8%
Santa Rosa County, FL	68,183	7.9%	$54,250	$24,700	10.3%	17.8%	15.6%
Sarasota County, FL	152,438	7.6%	$49,013	$32,768	9.8%	19.2%	15.4%
Sumter County, FL	24,436	9.1%	$41,010	$22,314	14.9%	27.3%	22.7%
Suwannee County, FL	15,622	8.4%	$34,157	$17,798	17.9%	28.5%	27.1%
Taylor County, FL	8,578	11.5%	$35,900	$17,248	22.9%	36.1%	33.6%
Wakulla County, FL	14,379	7.1%	$52,353	$22,114	13.1%	16.4%	18.4%

Table A-6. Summary of 5-Year Estimates (2005-2009) of Labor Force, Employment, Income and Poverty Data

GEOGRAPHIC AREA	CIVILIAN LABOR FORCE[A]	% UNEMPLOYED	MEDIAN HOUSEHOLD INCOME	PER CAPITA INCOME	POPULATION FOR WHOM POVERTY WAS DETERMINED		
					% IN POVERTY	% UNDER 5 IN POVERTY	% UNDER 18 IN POVERTY
Walton County, FL	23,982	8.0%	$46,159	$27,125	13.1%	23.4%	20.3%
Washington County, FL	9,405	11.3%	$35,090	$17,850	21.0%	28.4%	27.9%
Florida Shore-adjacent Counties Total	3,214,009	7.6%	$42,376	$26,560	13.0%	22.5%	19.1%
State of Florida	8,490,304	7.6%	$47,450	$26,503	13.2%	21.1%	18.3%
Shore-adjacent Counties and Parishes Total	7,470,769	7.4%	$43,777	$25,322	15.4%	26.2%	22.8%

[a] Civilian Labor Force and % unemployed statistics apply to the population aged 16-64.
Note: for state Shore-adjacent Counties and Parishes totals, median household income represents an average of the median household incomes for all counties in the shore-adjacent counties and parishes within that state.
Data Source: U.S. Census Bureau 2011; ACS 2005-2009. Data are current as of October 2012.

Table A-7. Summary of 5-Year Estimates (2005-2009) of Educational Attainment

GEOGRAPHIC AREA	POPULATION 25 YEARS AND OLDER		
	% WITH HIGH SCHOOL DIPLOMA	% WITH BACHELOR'S DEGREE	% WITH ADVANCED DEGREE
Texas Shore-adjacent Counties Total	77.4%	24.8%	8.4%
State of Texas	79.3%	25.4%	8.3%
Louisiana Shore-adjacent Parishes Total	80.1%	20.9%	6.9%
State of Louisiana	80.5%	20.6%	6.8%
Mississippi Shore-adjacent Counties Total	83.8%	19.2%	6.8%
State of Mississippi	78.9%	19.1%	6.7%
Alabama Shore-adjacent Counties Total	83.8%	21.9%	7.5%
State of Alabama	80.8%	21.5%	7.8%
Florida Shore-adjacent Counties Total	85.5%	23.9%	8.4%
State of Florida	84.9%	25.6%	9.0%
Shore-adjacent Counties and Parishes Total	82.0%	23.6%	8.1%
Data Source: U.S. Census Bureau 2011; ACS 2005-2009. Data are current as of October 2012.			

Table A-8. Summary of 5-Year Estimates (2005-2009) of Language, and Birthplace Data

GEOGRAPHIC AREA	POPULATION 5 YEARS AND OLDER				% NATIVE BORN
	% SPEAKING ONLY ENGLISH AT HOME	% SPEAKING SPANISH AT HOME	% SPEAKING FRENCH AT HOME	% SPEAKING OTHER LANGUAGE AT HOME	
Texas Shore-adjacent Counties Total	61.7%	32.4%	0.4%	5.6%	80.0%
State of Texas	66.4%	28.9%	0.3%	4.5%	84.2%
Louisiana Shore-adjacent Parishes Total	89.9%	3.9%	3.6%	2.6%	95.9%
State of Louisiana	91.6%	2.9%	3.4%	2.1%	96.9%
Mississippi Shore-adjacent Counties Total	94.2%	2.8%	0.4%	2.7%	96.1%
State of Mississippi	96.4%	2.1%	0.2%	1.3%	98.1%
Alabama Shore-adjacent Counties Total	95.4%	2.2%	0.2%	2.2%	97.0%
State of Alabama	95.6%	2.6%	0.2%	1.6%	97.1%
Florida Shore-adjacent Counties Total	85.0%	10.0%	0.5%	4.5%	89.3%
State of Florida	74.2%	18.9%	0.7%	6.3%	81.3%
Shore-adjacent Counties and Parishes Total	77.8%	16.8%	0.9%	4.5%	87.2%
Data Source: U.S. Census Bureau 2011; ACS 2005-2009. Data are current as of October 2012.					

A.9 References

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