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F/SER31:MET  
 SERO-2022-02452

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Ref.: SAM-2022-00145-KMN, Mississippi Department of Marine Resources, Pelican Key  
 Beneficial Use Site, Mississippi Sound, Harrison County, Mississippi

Dear Kaaren M. Neumann,

The enclosed Biological Opinion (Opinion) responds to your request for consultation with us, the National Marine Fisheries Service (NMFS), pursuant to Section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. § 1531 et seq.) for the following action. This consultation was assigned a NMFS tracking number. Please use this NMFS tracking number in all future correspondence.

<b>Action Agency Tracking Number</b>	<b>Applicant</b>	<b>NMFS Tracking Number</b>	<b>Project Location in Mississippi</b>	<b>Project Type</b>
SAM-2022-00145-KMN	Mississippi Department of Marine Resources	SERO-2022-02452	Mississippi Sound, Harrison County	Beneficial Use Site for the Disposal of Dredged Material

The Opinion considers the effects of the USACE’s proposal to authorize construction of a beneficial use site for the placement of dredged material in the open waters of the Mississippi Sound in Harrison County, Mississippi, on the following listed species and critical habitat: green sea turtle (North Atlantic [NA] DPS and South Atlantic [SA] DPS), Kemp’s ridley sea turtle, loggerhead sea turtle (Northwest Atlantic [NWA] DPS), hawksbill sea turtle, Gulf sturgeon, giant manta ray, and Gulf sturgeon designated critical habitat (Unit 8- Lake Pontchartrain-Mississippi Sound). The Opinion is based on information provided by the USACE and the Mississippi Department of Marine Resources (MDMR), and the published literature cited within. NMFS concludes that the proposed action will have no effect on hawksbill sea turtles. NMFS concludes that the proposed action is not likely to adversely affect green sea turtles (NA and SA DPSs), Kemp’s ridley sea turtles, loggerhead sea turtles (NWA DPS), Gulf sturgeon, and giant manta ray. NMFS concludes that the proposed action is likely to adversely affect, but is not likely to result in the destruction or adverse modification of critical habitat for Gulf sturgeon critical habitat (Unit 8- Lake Pontchartrain - Mississippi Sound).



We look forward to further cooperation with you on other projects to ensure the conservation of our threatened and endangered marine species and critical habitat. If you have any questions regarding this consultation, please contact Michael Tucker, Consultation Biologist, by phone at 727-209-5981, or by email at michael.tucker@noaa.gov.

Sincerely,

Andrew J. Strelcheck  
Regional Administrator

Enclosure (s):  
NMFS Biological Opinion SERO-2022-02452  
File: 1514-22.f.6

**Endangered Species Act - Section 7 Consultation  
Biological Opinion**

**Action Agency:** U.S Army Corps of Engineers, Mobile District  
Permit number: SAM-2022-00145-KMN

**Applicant:** Mississippi Department of Marine Resources

**Activity:** Beneficial Use Site for the Disposal of Dredged Material

**Location:** Pelican Key, Harrison County, Mississippi

**Consulting Agency:** National Oceanic and Atmospheric Administration, National  
Marine Fisheries Service, Southeast Regional Office,  
Protected Resources Division, St. Petersburg, Florida

NMFS Tracking Number: SERO-2022-02452

**Approved by:** \_\_\_\_\_  
Andrew J. Strelcheck, Regional Administrator  
NMFS, Southeast Regional Office  
St. Petersburg, Florida

**Date Issued:** \_\_\_\_\_

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## ACRONYMS, ABBREVIATIONS, AND UNITS OF MEASURE

ac	acre(s)
CFR	Code of Federal Regulations
cy	cubic yards
DO	Dissolved Oxygen
DPS	Distinct Population Segment
DWH	Deep Water Horizon
ECO	Environmental Consultation Organizer
ERDC	Environmental Research Development Center
ESA	Endangered Species Act of 1973, as amended (16 U.S.C. § 1531 et seq.)
ft	foot/feet
FR	Federal Register
GOM	Gulf of Mexico
GSCH	Gulf sturgeon critical habitat
in	inch(es)
km	kilometer(s)
km <sup>2</sup>	square kilometer(s)
m	meter(s)
MHW	Mean High Water
MDEQ	Mississippi Department of Environmental Quality
MDMR	Mississippi Department of Marine Resources
mg/L	Milligrams/Liter
mi	mile(s)
mi <sup>2</sup>	square mile(s)
MLLW	Mean Low Low Water
MMPA	Marine Mammal Protection Act
NAD 83	North American Datum of 1983
NMFS	National Marine Fisheries Service

nmi	nautical mile(s)
NOAA	National Oceanic and Atmospheric Administration
Opinion	Biological Opinion, Conference Biological Opinion, or Draft Biological Opinion
OSAT	Operational Science Advisory Team
PCE	Primary Constituent Elements
rkm	River kilometers
SERO PRD	NMFS Southeast Regional Office, Protected Resources Division
SAV	Submerged Aquatic Vegetation
SOM	Submerged Oil Mats
U.S.	United States of America
USACE	United States Army Corps of Engineers
USFWS	United States Fish and Wildlife Service
USM	University of Southern Mississippi

# 1 INTRODUCTION

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## 1.1 Overview

Section 7(a)(2) of the ESA, requires that each federal agency ensure that any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of critical habitat of such species. Section 7(a)(2) requires federal agencies to consult with the appropriate Secretary in carrying out these responsibilities. The NMFS and the USFWS share responsibilities for administering the ESA. Consultations on most ESA-listed marine species and their critical habitat are conducted between the federal action agency and NMFS (hereafter, may also be referred to as we, us or, our).

Consultation is required when a federal action agency determines that a proposed action “may affect” ESA-listed species or critical habitat and can be conducted informally or formally. Informal consultation is concluded after NMFS issues a Letter of Concurrence that concludes that the action is “not likely to adversely affect” ESA-listed species or critical habitat. Formal consultation is concluded after we issue a Biological Opinion (hereafter, referred to as an/the Opinion) that identifies whether a proposed action is “likely to jeopardize the continued existence of an ESA-listed species” or “destroy or adversely modify critical habitat,” in which case Reasonable and Prudent Alternatives to the action as proposed must be identified to avoid these outcomes. An Opinion often states the amount or extent of anticipated incidental take of ESA-listed species that may occur, develops Reasonable and Prudent Measures necessary to minimize the impacts, i.e., amount or extent, of the anticipated incidental take, and lists the Terms and Conditions to implement those measures. An Opinion may also develop Conservation Recommendations that help benefit ESA-listed species.

This document represents NMFS’s Opinion based on our review of potential effects of the USACE’s proposal to issue a 10-year Department of the Army Permit to MDMR (the applicant) for the construction of a beneficial use site for the placement of dredged material on a remnant island named Pelican Key, in the open waters of the Mississippi Sound, in Harrison County, Mississippi. NMFS has analyzed the potential effects of this proposed action on the following listed species and critical habitat: green sea turtle (North Atlantic [NA] DPS and South Atlantic [SA] DPS), Kemp’s ridley sea turtle, loggerhead sea turtle (Northwest Atlantic [NWA] DPS), hawksbill sea turtle, Gulf sturgeon, giant manta ray, and Gulf sturgeon designated critical habitat (Unit 8- Lake Pontchartrain-Mississippi Sound). This Opinion is based on information provided by the USACE, the MDMR, and the published literature cited within.

On July 5, 2022, the U.S. District Court for the Northern District of California issued an order vacating the 2019 regulations that were revised or added to 50 CFR part 402 in 2019 (“2019 Regulations,” see 84 FR 44976, August 27, 2019) without making a finding on the merits. On September 21, 2022, the U.S. Court of Appeals for the Ninth Circuit granted a temporary stay of the district court’s July 5 order. On November 14, 2022, the Northern District of California issued an order granting the government’s request for voluntary remand without vacating the 2019 regulations. The District Court issued a slightly amended order two days later on November 16, 2022. As a result, the 2019 regulations remain in effect, and we are applying the

2019 regulations here. For purposes of this consultation and in an abundance of caution, we considered whether the substantive analysis and conclusions articulated in the letter of concurrence would be any different under the pre-2019 regulations. We have determined that our analysis and conclusions would not be any different.

## **1.2 Consultation History**

On September 12, 2022, NMFS received a request for initiation of consultation under Section 7 of the ESA from the USACE for permit application SAM-2022-00145-KMN in a letter dated September 12, 2022. Upon review of the incoming consultation request, NMFS initiated consultation that same day (September 12, 2022).

## **2 PROPOSED ACTION**

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### **2.1 Project Details**

#### **2.1.1 Project Description**

The USACE proposes to issue a 10-year Department of the Army Permit to construct a beneficial use site for the placement of dredged material on a remnant (entirely submerged) island named Pelican Key, in the open waters of the Mississippi Sound (Figure 1). The site would be approximately 900 ac (80 ac of containment berm and 820 ac to be used for the placement of dredged material for the creation of marsh habitat). The northwestern portion of the proposed containment berm would be located approximately 1,870 feet southeast of the centerline of the Gulf Intracoastal Waterway (Figure 2). The USACE's purview is limited to the footprint of the proposed beneficial use containment area, consisting of the berms and interior portion proposed for dredge disposal activities. The proposed containment berm would be approximately 28,000 linear feet and constructed of approximately 917,000 cy of sediment, mechanically dredged from the surrounding area immediately adjacent to the site and approximately 528,000 cy of rip rap/armor stone material would be placed over the sediment berm once it has settled. The containment berm crest elevation would be approximately +5.0 MLLW, crest width: 5 ft; exterior (waterside) slope: 5 ft horizontal to 1 ft vertical (5H:1V); interior slope 3H:1V (Figure 3). The beneficial use dredged material placed inside of the containment area will be filled to a level between +1 and +3 ft MLLW, so that much of the interior area will flood during daily high tides, creating optimal salt-marsh habitat conditions (Figure 3). Gaps in the containment berm would be included in the final design based on recommendations of the reviewing agencies. The planned gaps on the containment berm would allow for tidal flushing of the site and movement of aquatic species in and out of the site. The interior containment area is expected to hold approximately 13.4 million cy of dredged material. Transport of the dredged material to the containment area may be by hydraulic pipeline or by barge. The method will depend on the dredging location, type of material dredged, and dredging methods in the dredging event(s). If a pipeline is used to transport the dredged material to the containment area, construction of the pipeline would entail the use of a pipeline barge to bring sections pipe to the dredging area where another barge with a crane would be used to connect the pipe sections and lower them down to the bottom. The pipeline would be constructed between the dredging area and the beneficial use containment area, and would be laid on the sea floor



unless it is required to be floated over existing pipelines or other obstructions along the route. Depending on the distance between the dredging area and the beneficial use containment area, booster pumps may be utilized as needed along the pipeline route.

Construction of the containment berm would occur in 2 phases. The total estimated construction period for the Phase 1 berm is 2 to 3 months (60 to 90 days), and the estimated construction period for the Phase 2 berm is 4 to 6 months (120 to 180 days). Therefore, the maximum total construction period would be 270 days of in-water work. However, the construction would not occur in one continuous block of time. Instead, Phase 2 is expected to be constructed at a later time when more capacity is needed from future dredging events. The total number of future dredge material placement events is currently unknown. It is anticipated that the dredged material placement of each phase would occur in a single dredging event, (i.e. 2 total dredging events) and subsequent placement would only occur on an as needed basis for adaptive management to bring the marsh up to design elevation. Due to fluctuating marine conditions and tides, construction and material placement may occur during daylight and/or nighttime hours.

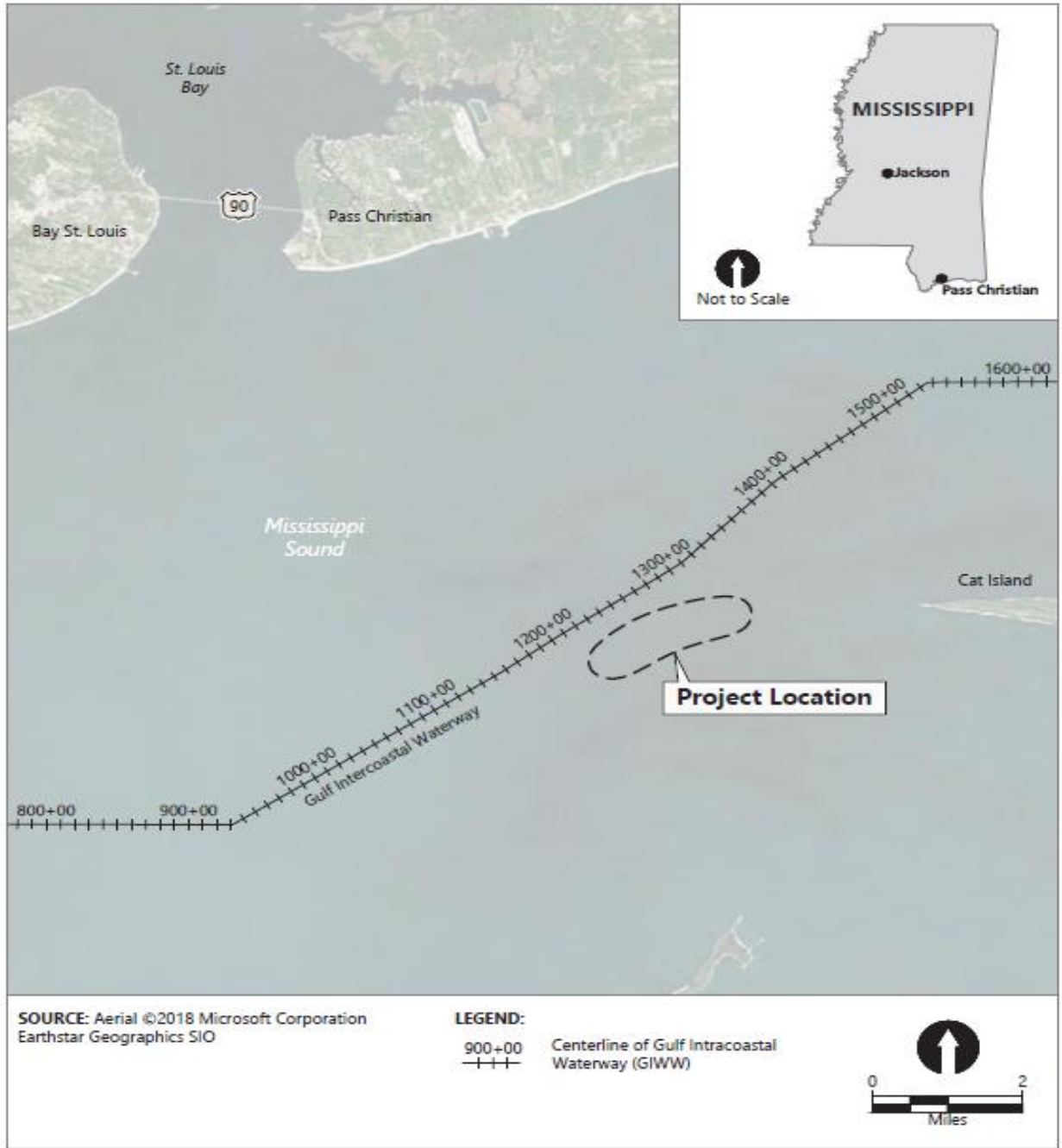


Figure 1. Overview of proposed project area showing proximity to the Gulf Intracoastal Waterway

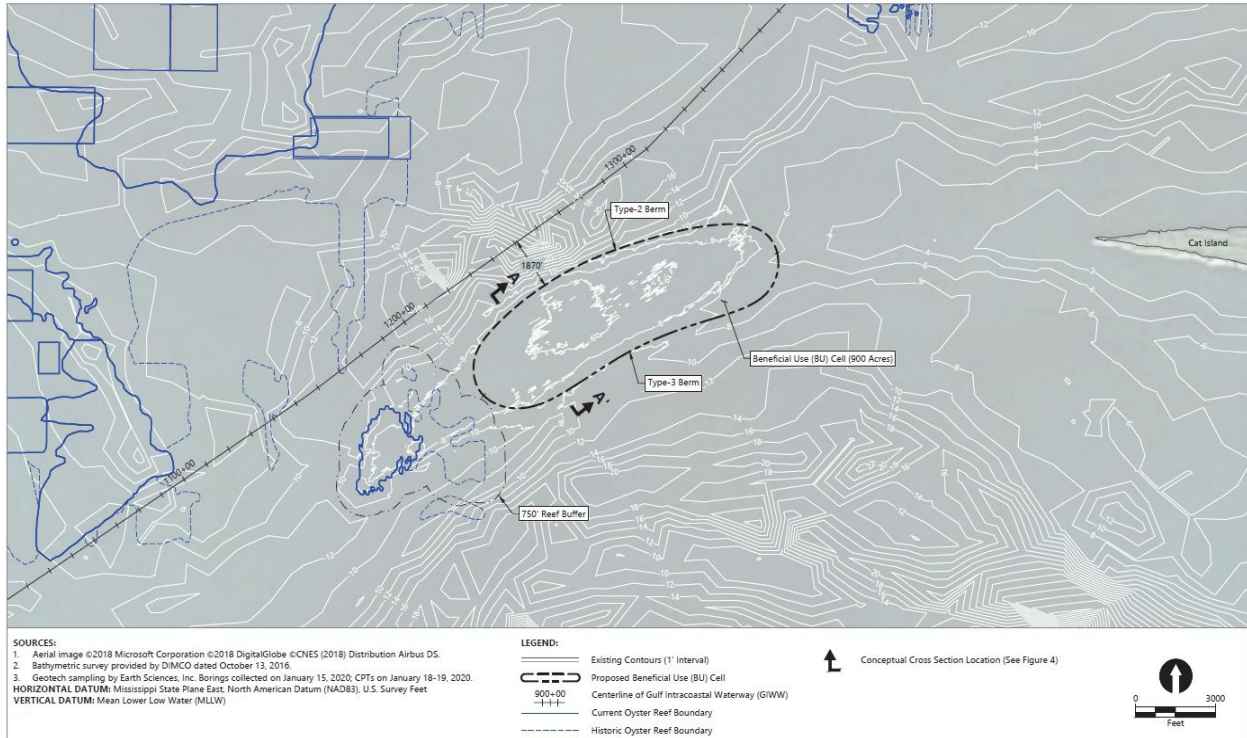


Figure 2. Overview of beneficial use site showing local bathymetry and historic oyster reefs

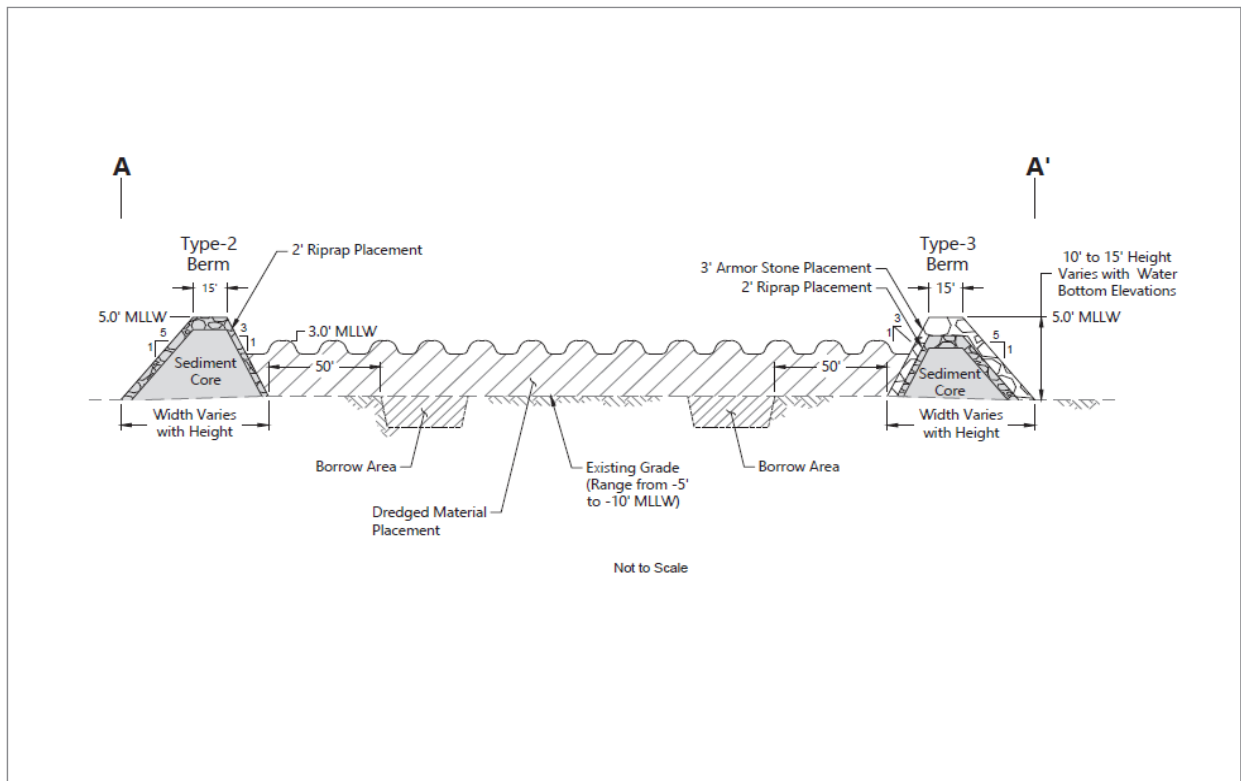


Figure 3. Diagram showing construction parameters for proposed beneficial use site

### 2.1.2 Mitigation Measures

- Protected Species Construction conditions as outlined by the National Marine Fisheries Service (May 2021), as well as standard manatee conditions for in-water activities as detailed by the U.S. Fish and Wildlife Service will be followed during construction of the project.
- The project footprint was designed to avoid impacts to nearby historical oyster reefs. A 750-foot buffer zone separating the construction area from the historical reefs was established with input from MDMR Fisheries (Figure 2).
- Prior to being placed in the site, any fill material will be required to be tested and approved by MDMR and the Mississippi Department of Environmental Quality (MDEQ)

## 2.2 Action Area

The action area is defined by regulation as all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action (50 CFR 402.02). For the purposes of this federal action, the action area includes the entire proposed 900-ac beneficial use site, as well as any transportation rout (pipeline or barge route) used to move the dredged material from the dredging site to the beneficial use site. The beneficial use site is located approximately 5.5 miles west of the western tip of Cat Island and approximately 7 miles south of Pass Christian, Harrison County, Mississippi (Figure 1). Depths currently at the proposed site range from -5 ft to -12 ft MLLW with a substrate consisting of fine to medium sand.

The 4 boundary points of the containment berm are shown in Table 1 below.

Table 1. Boundary Points on Containment Berm:

Point	Latitude	Longitude
North	N30°13'33.31"	W89°12'56.94"
East	N30°13'42.05"	W89°11'23.24"
South	N30°13'07.56"	W89°12'24.78"
West	N30°12'51.19"	W89°13'28.32"

## 3 EFFECTS DETERMINATIONS

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Please note the following abbreviations are only used in **Table 2** and **Table 3** and are not, therefore, included in the list of acronyms: E = endangered; T = threatened; LAA = likely to adversely affect; NLAA = may affect, not likely to adversely affect.

### 3.1 Effects Determinations for ESA-Listed Species

#### 3.1.1 Agency Effects Determination(s)

We have assessed the ESA-listed species that may be present in the action area and our determination of the project’s potential effects is shown in **Table 22** below.

Table 2. ESA-listed Species in the Action Area and Effect Determinations

Species (DPS)	ESA Listing Status	Listing Rule/Date	Most Recent Recovery Plan (or Outline) Date	USACE Effect Determination	NMFS Effect Determination
<b>Sea Turtles</b>					
Green sea turtle (North Atlantic DPS)	T	81 FR 20057/ April 6, 2016	October 1991	<u>NLAA</u>	<u>NLAA</u>
Green sea turtle (South Atlantic DPS)	T	81 FR 20057/ April 6, 2016	October 1991	<u>NLAA</u>	<u>NLAA</u>
Hawksbill sea turtle	E	35 FR 8491/ June 2, 1970	December 1993	<u>NLAA</u>	<u>NE</u>
Kemp’s ridley sea turtle	E	35 FR 18319/ December 2, 1970	September 2011	<u>NLAA</u>	<u>NLAA</u>
Loggerhead sea turtle (Northwest Atlantic DPS)	T	76 FR 58868/ September 22, 2011	December 2008	<u>NLAA</u>	<u>NLAA</u>
<b>Fishes</b>					
Giant manta ray	T	83 FR 2916/ January 22, 2018	2019 (Outline)	<u>NLAA</u>	<u>NLAA</u>
Gulf sturgeon (Atlantic sturgeon, Gulf subspecies)	T	56 FR 49653/ September 30, 1991	September 1995	<u>NLAA</u>	<u>NLAA</u>

We believe the project will have no effect on hawksbill sea turtles due to the species very specific life history strategies, which are not supported in the action area. Hawksbill sea turtles typically inhabit inshore reef and hard bottom areas where they forage primarily on encrusting sponges. This habitat type is not found in the action area.

### 3.1.2 Effects Analysis for ESA-Listed Species Not Likely to be Adversely Affected by the Proposed Action

#### 3.1.2.1 Effects from Artificial Lighting

Effects to ESA-listed sea turtles may include the risk of disorienting hatchlings and nesting females from the use of artificial lighting during night-time construction activities. Artificial lighting impacts could prevent successful hatchlings’ egress from the water’s edge to open water, and nesting females transiting back and forth between the open water and the nesting beach during nesting season. However, we expect this risk is extremely unlikely to occur due to the fact that the project will be located over 7 miles from the nearest potential nesting beaches, and there

is very little documented sea turtle nesting in this area. The major nesting concentrations in the U.S. extend from North Carolina through southwest Florida. Approximately 80% of loggerhead nesting occurs in six Florida counties (Brevard, Indian River, St. Lucie, Martin, Palm Beach, and Broward Counties) (NMFS 2008). Green sea turtles nest primarily along the central and southeast coast of Florida and some nesting occurs in southwest Florida (NMFS and USFWS 1991). Kemp's ridley sea turtles primarily nest off the beaches of Mexico, and in the U.S., smaller nesting assemblages occur in Texas, North Carolina, South Carolina, and Florida (NMFS, USFWS, and SEMERNAT 2011). There is intermittent low-density nesting in the continental U.S. for hawksbill sea turtles (NMFS and USFWS 1993).

The only recent discovery of a single sea turtle nest in Mississippi occurred in August 2022, and this was the first nest found since 2018. Nesting of any sea turtle species in Mississippi is a very rare occurrence and the potential for adverse effects from temporary construction related lighting in the offshore action area are extremely unlikely to occur

### **3.1.2.2 Effects of Habitat Exclusion/Conversion**

ESA-listed sea turtles, Gulf sturgeon, and giant manta rays may be affected by their inability to access the project area during berm construction activities, for foraging, refuge, and/or nursery habitat, due to their avoidance of construction activities and related noise and turbidity. We believe that any such construction-related effects would be insignificant. The site does not currently contain any structure that could be used by sea turtles for shelter. It also does not support SAV. ESA-listed sea turtles and giant manta rays may forage in the area but the habitat conditions are not optimal for these species, and the size of the area from which animals will be excluded is relatively small in comparison to the available similar habitat nearby. In addition, any construction-related disturbances to listed species would be temporary, and intermittent (long-term effects from the permanent conversion of habitat is discussed further below). In-water construction activities are expected to last for a total of 270 days, after which the site conditions surrounding the newly-constructed berm are expected to return to background levels and listed species will be able to return. Therefore, any potential avoidance of the action area due to construction related activities is not likely to adversely affect these ESA-listed species.

As stated above, the action area does not provide quality foraging habitat for sea turtles or giant mantas. Gulf sturgeon are the species most likely to be affected by the permanent placement of materials resulting in their long-term exclusion from areas currently used as foraging habitat. The proposed activities may cover and bury substrates containing prey species, such as benthic worms, crustaceans and mollusks. We believe the effect to Gulf sturgeon from the loss of foraging habitat will be insignificant. While the project area is considered to be appropriate foraging habitat for Gulf sturgeon (2-4 m deep with low-relief sand substrate; Fox et al. 2002), sturgeon are opportunistic feeders that forage over large areas, and the area of impact is relatively small (900 ac) compared to the surrounding area available in the Mississippi Sound (approximately 464,300 ac). In addition, creating emergent marsh habitat may provide an indirect benefit to Gulf sturgeon by enhancing the diversity and density of prey species surrounding the project area. The emergent marsh habitat is anticipated to provide habitat for a number of marine and benthic communities, with species including amphipods, polychaetes, gastropods, and bivalves (Carle et al 2020). The interior elevation and berm openings will allow

for tidal exchange, resulting in free movement of prey species in and out of the marsh habitat. As these prey species increase in abundance in the shallow project area, there will likely be a spillover effect to neighboring areas that are deeper than 6 ft, where increased prey abundance could benefit Gulf sturgeon. For these reasons, we believe that any potential effects from the placement of materials into areas currently used for foraging habitat is not likely to adversely affect gulf sturgeon or any other ESA-listed species that may be found in the action area.

### 3.1.2.3 Effects of Construction and Dredge Material Placement

ESA-listed sea turtles, Gulf sturgeon, and giant manta rays could be physically injured if struck by construction materials (dredge pipe, rock riprap, etc.), construction barges, vessels, or mechanical equipment during pipeline and containment berm construction and dredge material placement. We believe this route of effect is extremely unlikely to occur for the following reasons. All of these animals are highly mobile, and able to avoid slow-moving equipment. In addition, the applicant's implementation of NMFS's *Protected Resources Construction Conditions* (revised May 2021) will further reduce the risk by requiring all construction workers to watch for all ESA-listed species. Operation of any mechanical construction equipment will cease immediately if an ESA-listed species is seen within a 150-ft radius of the equipment. Activities will not resume until the protected species has departed the project area of its own volition.

## 3.2 Effects Determinations for Critical Habitat

### 3.2.1 Agency Effects Determination(s)

We have assessed the critical habitat that overlaps with the action area and our determination of the project's potential effects is shown in Table 3 below.

Table 3. Critical Habitat in the Action Area and Effect Determinations

Species (DPS)	Critical Habitat Unit in the Action Area	Critical Habitat Rule/Date	USACE Effect Determination	NMFS Effect Determination (Critical Habitat)
<b>Fishes</b>				
Gulf sturgeon	<u>Unit 8</u>	68 FR 13370/ March 19, 2003	<u>LAA</u>	<u>LAA</u>

### 3.2.2 Critical Habitat Likely to be Adversely Affected by the Proposed Action

We have determined that Gulf sturgeon critical habitat (unit 8 – Lake Pontchartrain) is likely to be adversely affected by the proposed action and thus require further analysis. We provide greater detail on the potential effects to critical habitat from the proposed action in the Effects of the Action (Section 6), where we analyze whether those effects, when considered in the context of the Status of the Critical Habitat (Section 4.2), the Environmental Baseline (Section 5), and the Cumulative Effects (Section 7), are likely to cause destruction or adverse modification of that critical habitat.

## 4 STATUS OF CRITICAL HABITAT CONSIDERED FOR FURTHER ANALYSIS

### 4.1 Status of the Critical Habitat Considered for Further Analysis

NMFS and USFWS jointly designated GSCH on April 18, 2003 (*see*, 50 CFR 226.214). The agencies designated 7 riverine areas (Units 1-7) and 7 estuarine/marine areas (Units 8-14) as critical habitat based on the physical and biological features that support the species. Critical habitat units encompass a total of 2,783 rkm and 6,042 km<sup>2</sup> of estuarine and marine habitats (Figure 4; Table 4). NMFS's jurisdiction encompasses the 7 units in marine and estuarine waters (Units 8-14), though NMFS's consultation responsibilities for projects in estuarine waters are limited to specific action agencies (Table 5).

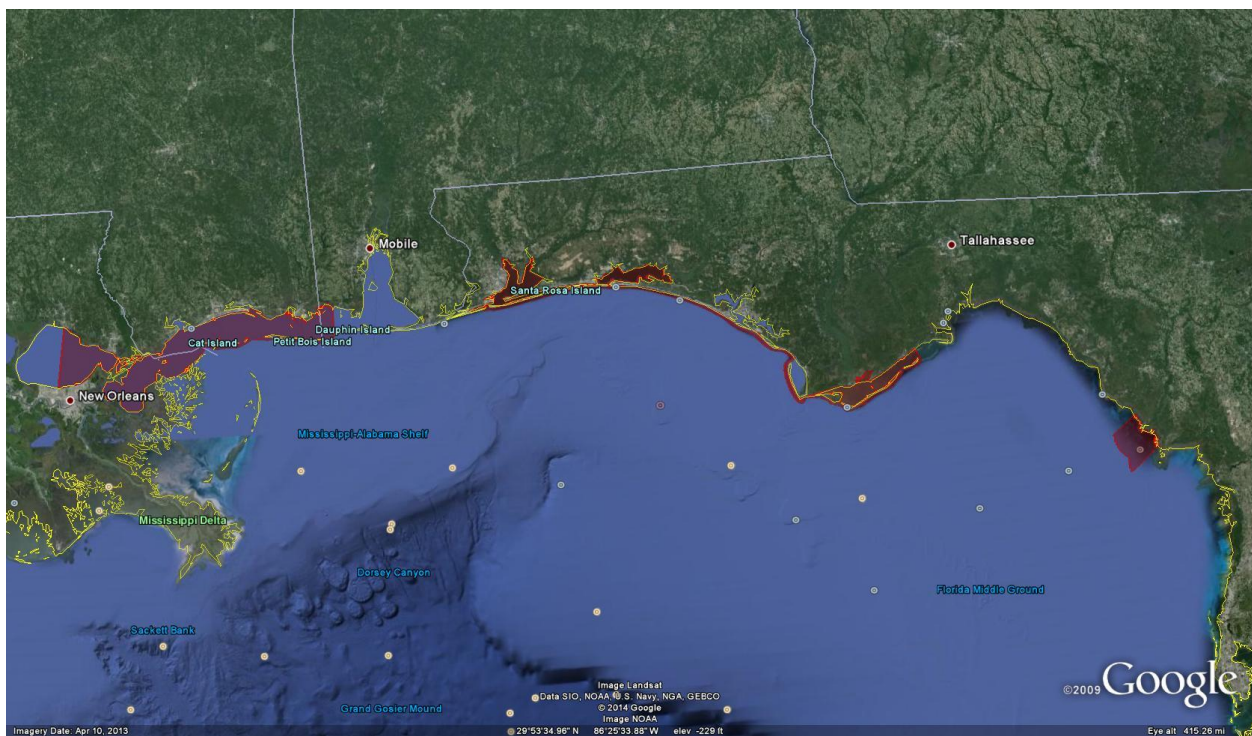


Figure 4. Gulf sturgeon critical habitat in estuarine and marine waters (Units 8-14) (©2014 Google)

Table 4. Approximate Area of the Estuarine and Marine Critical Habitat Units for Gulf Sturgeon

Critical Habitat Unit	State	Km <sup>2</sup>	Ac
8. Lake Borgne	Louisiana/Mississippi/Alabama	718	177,417.80
Little Lake		8	1,976.80
Lake Pontchartrain		763	188,537.30
Lake St. Catherine		26	6,424.60
The Rigolets		13	3,212.30
Mississippi Sound		1,879	464,300.90
MS nearshore Gulf		160	39,536.00



Critical Habitat Unit	State	Km <sup>2</sup>	Ac
<b>Total Unit 8</b>		<b>3,567</b>	<b>881,405.70</b>
9. Pensacola Bay	Florida	381	94,145.10
10. Santa Rosa Sound	Florida	102	25,204.20
11. Near Shore Gulf of Mexico	Florida	442	109,218.20
12. Choctawhatchee Bay	Florida	321	79,319.10
13. Apalachicola Bay	Florida	683	168,769.30
14. Suwannee Sound	Florida	546	134,916.60
<b>Total</b>		<b>6,042</b>	<b>1,492,978.20</b>

Table 5. Consultation Responsibility for Projects in Estuarine Waters

Lead Action Agency	NMFS	USFWS
Department of Transportation		X
U.S. Environmental Protection Agency		X
U.S. Coast Guard		X
Federal Emergency Management Agency		X
Department of Defense	X	
U.S. Army Corps of Engineers	X	
Minerals Management Service (now Bureau of Ocean Energy Management)	X	
Other	X	

Gulf sturgeon use rivers for spawning, larval and juvenile feeding, adult resting and staging, and to move between the areas that support these components. Gulf sturgeon use the lower riverine, estuarine, and marine environment during winter months primarily for feeding and for inter-river migrations. Within Florida estuaries, Gulf sturgeon are typically found in waters 2-4 m deep and use depths outside this range less than expected based on availability (Fox et al. 2002). Further, the 2-4-m deep habitats where Gulf sturgeon are typically found have sediments with a high percentage (> 80%) of sand (Fox et al. 2002). Gulf sturgeon in Mississippi estuaries appear to occupy habitats with lower percentages of sand (typically < 75% sand) but similar depth ranges (Michael Anders, USM, unpublished data). Adult sturgeon appear to spend extended periods of time in specific areas of the estuary and then travel relatively quickly to other areas where they again spend extended amounts of time (Edwards et al. 2007; Edwards et al. 2003). Sulak et al. (2012) believe Gulf sturgeon feed continuously during these periods which may last for 1-3 months. Additionally, it appears that there may be certain areas where Gulf sturgeon concentrate. USFWS discovered nearshore areas of concentrated feeding activity for adults from multiple riverine systems in the waters near Tyndall Air Force Base/Panama City Beach, Florida, and waters from Perdido, Florida, to Gulf Shores, Alabama (USFWS 2004; USFWS 2005; USFWS 2006; USFWS 2007). Estuaries and bays adjacent to riverine areas provide unobstructed passage of sturgeon from feeding areas to spawning grounds.

#### *Physical and Biological Features of Critical Habitat*

Critical habitat determinations focus on those physical and biological features (primary constituent elements = PCEs) that are essential to the conservation of the species (50 CFR 424.12). Federal agencies must ensure that their activities are not likely to result in the destruction or adverse modification of the PCEs within defined critical habitats. Therefore, proposed actions that may impact designated critical habitat require an analysis of potential impacts to each PCE. NMFS and USFWS identified 7 habitat features essential for the

conservation of Gulf sturgeon. Four of these features are found in the marine and estuarine units of critical habitat:

1. Abundant food items, such as detritus, aquatic insects, worms, and/ or mollusks, within riverine habitats for larval and juvenile life stages; and abundant prey items, such as amphipods, lancelets, polychaetes, gastropods, ghost shrimp, isopods, mollusks and/or crustaceans, within estuarine and marine habitats and substrates for subadult and adult life stages
2. Water quality, including temperature, salinity, pH, hardness, turbidity, oxygen content, and other chemical characteristics, necessary for normal behavior, growth, and viability of all life stages
3. Sediment quality, including texture and other chemical characteristics, necessary for normal behavior, growth, and viability of all life stages
4. Safe and unobstructed migratory pathways necessary for passage within and between riverine, estuarine, and marine habitats (e.g., an unobstructed river mouth or a dammed river that still allows for passage)

As stated in the final rule designating GSCH, the following activities, among others, when authorized, funded, or carried out by a federal agency, may destroy or adversely modify critical habitat:

- (1) Actions that would appreciably reduce the abundance of estuarine and marine prey for juvenile and adult Gulf sturgeon, within a designated critical habitat unit, such as dredging, dredged material disposal, channelization, in-stream mining; and land uses that cause excessive turbidity or sedimentation;
- (2) Actions that would alter water quality within a designated critical habitat unit, including temperature, salinity, pH, hardness, turbidity, oxygen content, and other chemical characteristics, such that it is appreciably impaired for normal Gulf sturgeon behavior, reproduction, growth, or viability, such as dredging, dredged material disposal, channelization, impoundment, in-stream mining, water diversion, dam operations, land uses that cause excessive turbidity, and release of chemicals, biological pollutants, or heated effluents into surface water or connected groundwater via point sources or dispersed non-point sources;
- (3) Actions that would alter sediment quality within a designated critical habitat unit such that it is appreciably impaired for normal Gulf sturgeon behavior, reproduction, growth, or viability, such as dredged material disposal, channelization, impoundment, in-stream mining, land uses that cause excessive sedimentation, and release of chemical or biological pollutants that accumulate in sediments; and
- (4) Actions that would obstruct migratory pathways within and between adjacent riverine, estuarine, and marine critical habitat units, such as dams, dredging, point-source-pollutant discharges, and other physical or chemical alterations of channels and passes that restrict Gulf sturgeon movement (68 Federal Register [FR] 13399).

The proposed action will occur in critical habitat Unit 8. The placement of dredged material and riprap will cover up, and fundamentally change the physical characteristics of the critical habitat

in the action area. Hence, NMFS believes designated critical habitat for Gulf sturgeon is likely to be adversely affected by the proposed action. Unit 8 encompasses Lake Pontchartrain east of the Lake Pontchartrain Causeway, all of Little Lake, The Rigolets, Lake St. Catherine, Lake Borgne, including Heron Bay, and the Mississippi Sound (Figure 5). The Mississippi Sound includes adjacent open bays including Pascagoula Bay, Point aux Chenes Bay, Grand Bay, Sandy Bay, and barrier island passes, including Ship Island Pass, Dog Keys Pass, Horn Island Pass, and Petit Bois Pass. The northern boundary of the Mississippi Sound is the shoreline of the mainland between Heron Bay Point, Mississippi and Point aux Pins, Alabama. Critical habitat excludes St. Louis Bay, north of the railroad bridge across its mouth; Biloxi Bay, north of the U.S. Highway 90 bridge; and Back Bay of Biloxi. The southern boundary follows along the broken shoreline of Lake Borgne created by low swamp islands from Malheureux Point to Isleau Pitre. From the northeast point of Isleau Pitre, the boundary continues in a straight north-northeast line to the point 1 nautical mile (nm) (1.9 km) seaward of the western most extremity of Cat Island (30°13'N, 89°10'W). The southern boundary continues 1 nm (1.9 km) offshore of the barrier islands and offshore of the International Regulations for Preventing Collisions at Sea 1972 (72 COLREGS) lines at barrier island passes (defined at 33 CFR80.815), (d) and (e) to the eastern boundary. Between Cat Island and Ship Island there is no 72 COLREGS line. We, therefore, defined that section of the unit southern boundary as 1 nm (1.9 km) offshore of a straight line drawn from the southern tip of Cat Island to the western tip of Ship Island. The eastern boundary is the line of longitude 88°18.8'W from its intersection with the shore (Point aux Pins) to its intersection with the southern boundary. The lateral extent of Unit 8 is the MHW line on each shoreline of the included water bodies or the entrance to rivers, bayous, and creeks.

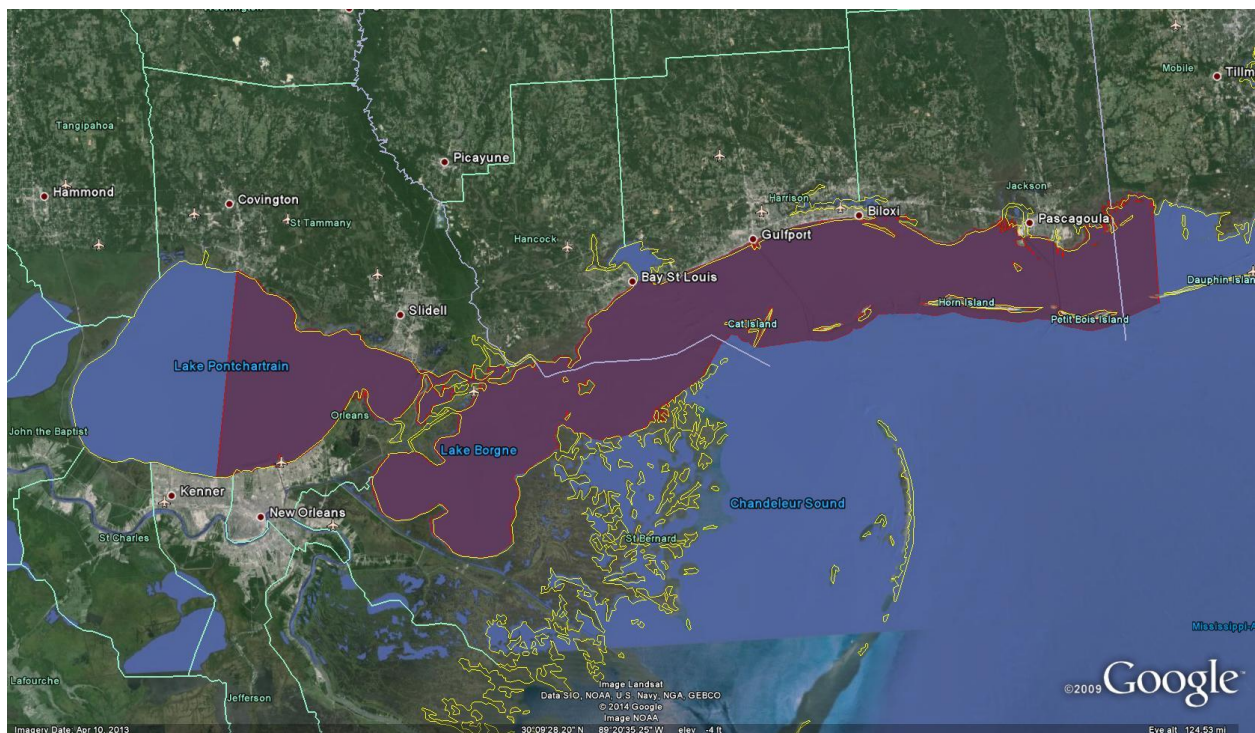


Figure 5. Gulf sturgeon critical habitat Unit 8

The Pearl River and its tributaries flow into The Rigolets, Little Lake, and Lake Borgne, the western extension of Mississippi Sound. The Rigolets connect Lake Pontchartrain and Lake St. Catherine with Little Lake and Lake Borgne. The Pascagoula River and its tributaries flow into Pascagoula Bay and Mississippi Sound. This unit provides juvenile, subadult, and adult feeding, resting, and passage habitat for Gulf sturgeon from the Pascagoula and the Pearl River subpopulations. One or both of these subpopulations have been documented by tagging data, historic sightings, and incidental captures as using Pascagoula Bay, The Rigolets, the eastern half of Lake Pontchartrain, Little Lake, Lake St. Catherine, Lake Borgne, Mississippi Sound, within 1 nmi (1.9 km) of the nearshore Gulf of Mexico adjacent to the barrier islands and within the passes (Davis et al. 1970; Morrow et al. 1998; Reynolds 1993; Rogillio 1993; Rogillio et al. 2001; Rogillio et al. 2007; Ross et al. 2001; Ross et al. 2009) (F. Parauka, USFWS, pers. comm. to S. Bolden, NMFS, December 2, 2002). Substrate in these areas ranges from sand to silt, all of which contains known Gulf sturgeon prey items. The Rigolets is an 11.3 km (7 mi)-long and about 0.6 km (0.4 mi)-wide passage connecting Lake Pontchartrain and Lake Borgne. This brackish water area is used by adult Gulf sturgeon as a staging area for osmoregulation and for passage to and from wintering areas (Rogillio et al. 2001). Lake St. Catherine is a relatively shallow lake with depths averaging approximately 1.2 m (4 ft), connected to The Rigolets by Sawmill Pass. Bottom sediments in Sawmill Pass are primarily silt; Lake St. Catherine's are composed of silt and sand (Barrett 1971). Incidental catches of Gulf sturgeon are documented from Lake St. Catherine and Sawmill Pass (Reynolds 1993) (H. Rogillio, Louisiana Department of Wildlife and Fisheries, pers. comm. to S. Bolden, NMFS, December 2, 2002). Based on the proximity of Little Lake, Lake St. Catherine, and Sawmill Pass to The Rigolets and Pearl River, we believe these areas are also used for staging and feeding and, therefore, were included with The Rigolets as critical habitat.

The Mississippi Sound is separated from the Gulf of Mexico by a chain of barrier islands, including Cat, Ship, Horn, and Petit Bois Islands. Natural depths of 3.7-5.5 m (12-18 ft) are found throughout the Sound and a channel 3.7 m (12 ft) deep has been dredged where necessary from Mobile Bay to New Orleans. Incidental captures and studies confirm that both Pearl River and Pascagoula River adult Gulf sturgeon winter in the Mississippi Sound, particularly around barrier islands and barrier islands passes (Reynolds 1993; Rogillio et al. 2001; Ross et al. 2001). Pascagoula Bay is adjacent to the Mississippi Sound. Gulf sturgeon exiting the Pascagoula River move both east and west, with telemetry locations as far east as Dauphin Island and as far west as Cat Island and the entrance to Lake Pontchartrain (Ross et al. 2001). Tagged Gulf sturgeon from the Pearl River subpopulation have been located between Cat Island, Ship Island, Horn Island, and east of Petit Bois Islands to the Alabama State line (Rogillio et al. 2001). Gulf sturgeon have also been documented within 1 nmi (1.9 km) off the barrier islands of Mississippi Sound. Thus, the area 1 nmi (1.9 km) offshore of the barrier islands of Mississippi Sound is included in Unit 8.

Habitat used by Gulf sturgeon in the vicinity of the barrier islands is 1.9-5.9 m (6.2-19.4 ft) deep (average 4.2 m [13.8 ft]), with clean sand substrata (Heise et al. 1999; Rogillio et al. 2001; Ross et al. 2001). Preliminary data from substrate samples taken in the barrier island areas indicate that all samples contained lancelets (Ross et al. 2001). Inshore locations where Gulf sturgeon were located (Deer Island, Round Island) were 1.9-2.8 m (6.2-9.2 ft) deep and all had mud

(mostly silt and clay) substrata (Heise et al. 1999), typical of substrates supporting known Gulf sturgeon prey.

#### *Status of Critical Habitat Unit 8*

Activities associated with coastal development have been and continue to be the primary threat to marine and estuarine units of GSCH. These activities generally include dredging, shoreline armoring, installation of breakwaters, and construction of docks, piers, marinas, and storm water drainage systems. Although many coastal development activities are currently regulated, some permitted direct and/or indirect damage to habitat from increased urbanization still occurs and is expected to continue in the future.

## **5 ENVIRONMENTAL BASELINE**

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### **5.1 Overview**

This section describes the effects of past and ongoing human and natural factors contributing to the current status of the designated critical habitat and ecosystem within the action area without the additional effects of the proposed action. In the case of ongoing actions, this section includes the effects that may contribute to the projected future status of the species, their habitats, and ecosystem. The environmental baseline describes the critical habitat's health based on information available at the time of the consultation.

By regulation, the environmental baseline for an Opinion refers to the condition of the listed species or its designated critical habitat in the action area, without the consequences to the listed species or designated critical habitat caused by the proposed action. The environmental baseline includes the past and present impacts of all Federal, State, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of State or private actions which are contemporaneous with the consultation in process. The consequences to listed species or designated critical habitat from ongoing agency activities or existing agency facilities that are not within the agency's discretion to modify are part of the environmental baseline (50 CFR 402.02).

Focusing on the impacts of the activities in the action area specifically, allows us to assess the prior experience and state (or condition) of the areas of critical habitat that occur in an action area, that will be exposed to effects from the action under consultation. This focus is important because, in some states or life history stages, or areas of their ranges, listed critical habitat features will commonly exhibit, or be more susceptible to, adverse responses to stressors than they would be in other states, stages, or areas within their distributions. These localized stress responses or stressed baseline conditions may increase the severity of the adverse effects expected from the proposed action.

### **5.2 Factors Affecting Critical Habitat Considered for Further Analysis**

### **5.2.1 State and Private Actions**

According to an analysis conducted by NMFS on the long-term, persistent effects of the DWH oil spill (M. Press, NMFS, memo to D. Bernhart, NMFS, December 8, 2014), indirect impacts to water quality could occur if remnant submerged oil mats (SOMs) from the DWH spill are present in areas that are disturbed by in-water construction or dredging activities. Contributors to OSAT III report have stated that while there is a possibility that construction activities could re-suspend oil into the water column in certain areas, the likelihood of this happening is low. Additionally, an analysis of the matrix of material (oil plus sand) stranded in mats revealed that SOMs were composed mostly of sand: 83.2%-90.6% sand and 9.4%-16.8% oil (OSAT II). Construction-related disturbance of SOMs could result in suffocation of infaunal organisms and toxicity of substrate, which could impact potential foraging areas within GSCH through the displacement and/or reduction of prey items; however, given the small size and the location of the proposed action area, there is a low likelihood of undiscovered SOMs in the area, and impacts to sediment quality and prey abundance are not considered likely to occur. Even if remnant SOMs were present in the action area, the likelihood of any re-suspended DWH oil being toxic is low, and should also not have measurable effects on water quality (or on listed species directly) (W. Bryant, OSAT III Science Team Lead, pers. comm. to M. Press, NMFS, July 31, 2014).

### **5.2.2 Stochastic Events**

Stochastic events such as hurricanes, are relatively common in and around GSCH (Unit 8). These events are unpredictable and their effect on the ability of the PCEs to function properly is variable but can be significant. Gulf sturgeon mortalities in the Apalachicola River in Florida were directly attributed to Hurricane Michael and a severe hypoxic event from that storm (Dula et al. 2020) where the DO concentrations dropped so low (i.e., 0.2 mg/L) that water quality became uninhabitable, resulting in the death of thousands of fish including multiple sturgeon. Historically, Gulf sturgeon were disproportionately negatively affected by hurricanes (Category 3 or above) in the western GOM versus the eastern GOM (Rudd et al. 2014). Predicted increases in the frequency and severity of hurricanes may be attributed to climate change and pose additional threats to sturgeon movement/recruitment patterns. Tropical storm events also lead to post-hurricane hypoxic and anoxic in-river conditions leading to sturgeon mortality events of all life-stages. While not specific to the proposed action area, stochastic events such as the ones discussed here are certainly possible within the range of the GSCH Unit 8. More information is needed to continue to assess the impacts of stochastic events on GSCH.

### **5.2.3 Climate Change**

There is a large and growing body of literature on past, present, and future impacts of global climate change. Potential effects commonly mentioned include changes in sea temperatures and salinity (due to melting ice and increased rainfall), ocean currents, storm frequency and weather patterns, and ocean acidification. These changes have the potential to affect species behavior and ecology including migration, foraging, reproduction (e.g., success), and distribution. For example, large-scale factors impacting riverine water quality and quantity that likely exacerbate habitat threats to Gulf sturgeon include drought, and intra- and inter-state water allocation. For sturgeon, altered precipitation patterns cause increases/decreases in rainfall distribution that can dramatically impact river habitat (flow, bottom habitat, predator/prey interactions, habitat niche partitioning, nutrient

flow, pollutant dispersal, and important abiotic factors). The seasonal timing and precipitation pattern changes (e.g., summer flooding) for anadromous fish like Gulf sturgeon may undermine the functionality of critical habitat and the successful spawning or embryo survival for that spawning season. Female Gulf sturgeon may spawn every two to five years, so the potential loss of an entire reproductive effort can profoundly impact species recovery.

## **6 EFFECTS OF THE ACTION**

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### **6.1 Overview**

Effects of the action are all consequences to critical habitat that are caused by the proposed action, including the consequences of other activities that are caused by the proposed action. A consequence is caused by the proposed action if the effect would not occur but for the proposed action and the effect is reasonably certain to occur. Effects of the action may occur later in time and may include consequences occurring outside the immediate area involved in the action (50 CFR 402.02).

In this section of our Opinion, we assess the effects of the action on critical habitat. The analysis in this section forms the foundation for our destruction or adverse modification analysis in Section 7. The quantitative and qualitative analyses in this section are based upon the best available commercial and scientific data on the effects of the action. Data are limited, so we are often forced to make assumptions to overcome the limits in our knowledge. Sometimes, the best available information may include a range of values for a particular aspect under consideration, or different analytical approaches may be applied to the same data set. In those cases, the uncertainty is resolved in favor of the species. NMFS generally selects the value that would lead to conclusions of higher, rather than lower risk to endangered or threatened species. This approach provides the “benefit of the doubt” to threatened and endangered species.

#### **6.1.1 Effects of the Proposed Action on Critical Habitat Considered for Further Analysis**

The proposed action area is within the boundary of GSCH Unit 8 – Mississippi Sound for Gulf sturgeon. The following essential features are present in Unit 8: (1) prey abundance; (2) water quality; (3) sediment quality; (4) migratory pathways. We believe the proposed action will adversely affect the prey abundance (PCE 1) and sediment quality (PCE 3) of Gulf sturgeon critical habitat as outlined below. While the other essential features that are present in the action area may be affected by the proposed action, we believe they are not likely to be adversely affected. We describe all potential routes of effects and their consequences to the prey abundance (PCE 1), water quality (PCE 2), sediment quality (PCE 3), and migratory pathways (PCE 4) of Gulf sturgeon critical habitat in the following sections.

#### **6.1.2 Critical Habitat Essential Features that Are Not Likely to be Adversely Affected**

##### **6.1.2.1 Water Quality (PCE 2)**

The construction of containment berms and placement of dredged material for the project may generate turbidity that could cause localized and temporary reductions in water quality (PCE 2). We believe the effect to PCE 2 from the construction of containment berms and placement of dredged material will be insignificant because the action area is in a naturally high turbidity area and the disturbed sediments will primarily be sand that is expected to settle out of the water column relatively quickly. Once the containment berms are completed, the placement of beneficial use dredge material will have only minor effects on surrounding turbidity levels as most suspended solids will remain contained within the designated area. Effects to temperature, salinity, pH, hardness, oxygen content, and other chemical characteristics of PCE 2 are not expected to result from the construction of containment berms and placement of dredged material. Therefore, we believe there will be no effect to those aspects of PCE 2 from the proposed action.

#### **6.1.2.2 Migratory Pathways (PCE 4)**

The construction of containment berms could obstruct migratory pathways (PCE 4) if they were to prevent movement within estuarine and marine areas used for foraging. We believe effects to PCE 4 from the placement of containment berms will be insignificant. The proposed location of the containment structure is out in the open waters of the Mississippi Sound, over 5 miles from the nearest land feature (Cat Island) and nearly a half mile from the Gulf Intercostal Waterway. At this open-water location, the containment structure is not expected create any sort of impediment to the species passing through the area.

### **6.1.3 Critical Habitat Essential Features that Are Likely to be Adversely Affected**

#### **6.1.3.1 Prey Abundance (PCE 1)**

NMFS has previously considered and analyzed the following factors in other opinions to determine direct and indirect effects of projects impacting Gulf sturgeon prey abundance (PCE 1) essential to the conservation of the Gulf sturgeon (barrier island restoration [NMFS Opinions SER-2011-05667, SER-2012-09034, SERO-2018-00258; artificial reef placement SERO-2018-19361; dredging SERO-2020-01936]): Gulf sturgeon sub-populations using affected critical habitat, mean generation time, foraging behavior, benthic community structure, potential Gulf sturgeon prey in the action area, and benthos recovery after burial. Of the aforementioned factors previously considered, NMFS has determined that only the following are relevant to the proposed action and hence analyzed in this Opinion:

- (1) Gulf sturgeon sub-populations using affected critical habitat;
- (2) Foraging behavior;
- (3) Benthic community structure; and,
- (4) Potential Gulf sturgeon prey in action area.

Mean generation time and benthos recovery after burial are not relevant because we are assuming a total loss of the impacted area, even though there is potential for indirect beneficial effects from the establishment of intertidal marsh habitat.



#### **6.1.3.1.1 Gulf sturgeon sub-populations using affected critical habitat**

Both adult and subadult Gulf sturgeon likely use the action area for feeding; Gulf sturgeon from both the Pearl and Pascagoula rivers are known to forage in Mississippi Sound. Regionally, telemetry data document that Gulf sturgeon from the Pearl River and Pascagoula River subpopulations migrate from their natal bay systems to Mississippi Sound and move along the barrier islands, with relocation of tagged individuals greatest in the passes between the islands (Rogillo et al. 2001; Ross et al. 2001). Therefore, individuals from these sub-populations likely use the action area as foraging habitat and the loss of prey species in the area will adversely affect the prey abundance PCE for these sub populations. However, individuals foraging in this area will still have ample alternative foraging habitat post-construction and some of that habitat adjacent to the action area may benefit from increased prey availability due to the intertidal marsh habitat creation (e.g., spillover effect).

#### **6.1.3.1.2 Foraging Behavior**

As benthic feeding cruisers, sturgeon forage extensively in an area, presumably until preferred prey is depleted/reduced, relocate, and resume foraging. Tracking observations (Edwards et al. 2003b; Fox et al. 2002b; Sulak and Clugston 1999) support that individual Gulf sturgeon move over an area until they encounter suitable prey type and density, at which time they forage for extended periods of time. Individual Gulf sturgeon often remain in localized areas (less than 1 square km) for extended periods of time (greater than two weeks) and then move rapidly to another area where localized movements occurred again (Fox et al. 2002b). In a multi-year study, Ross et al. (2009b) found Gulf sturgeon from both the Pascagoula and Pearl Rivers broadly overlap and use the shallow water along the Gulf barrier islands as foraging grounds in the winter. These marine habitats utilized by the Gulf sturgeon were all less than 7 m deep, generally well oxygenated, and with relatively clear water; bottom substrates were mostly coarse sand and shell fragments or fine sand (Ross et al. 2009).

Unit 8 of GSCH encompasses a total of 3,567 km<sup>2</sup> (881,421 ac). The proposed action will impact 900 ac of benthos below the MHWL. The area of suitable foraging substrate that will be adversely impacted by the placement of material (900 ac) constitutes 0.1% ( $900 \text{ ac} / 881,421 = 0.0010 * 100 = 0.1\%$ ) of the total area within the unit. While the exact amount of benthic area required to sustain Gulf sturgeon health and growth is unknown (and likely dependent on fish size and reproductive status), Gulf sturgeon have been known to travel long distances (greater than 161 km) during their winter feeding period. Thus, Gulf sturgeon in the project area will likely find appropriate and abundant prey in the areas adjacent to the project location given the proximity to nearby sandy areas. Additionally, the resultant intertidal marsh creation may add a beneficial component to Gulf sturgeon prey densities and diversity in the areas adjacent to the project (see discussion below in Summary of Effects on Prey Abundance (PCE 1)).

#### **6.1.3.1.3 Benthic Community Structure**

According to the USACE Mobile District, the substrates that comprise about 78% of the open water zone of the Mississippi Sound system are inhabited primarily by polychaetes

(*Mediomastus ambiseta*, *Streblospio benedicti*) and amphipods (*Grandidierella bonnieroides*). Areas around river mouths typically have much higher numbers of infaunal macroinvertebrates than areas outside of the region of riverine inflow. Such differences have been attributed to deposition of nutrients and detritus by rivers during periods of flooding, and increased activity and abundance of benthic macroinvertebrates. Without a comprehensive benthic survey, current availability of Gulf sturgeon prey within the action area is undeterminable. While the absolute biomass of benthic meio- and macrofauna is not totally dependent upon sediment grain size, community structure and faunal size directly correlate to benthic substrate (Parsons et al. 1984). Because the proposed action will convert 900 ac of fine to medium sand substrate, into hardened berm and shallow intertidal marsh habitat, the existing benthic community structure will be disrupted. Potential benefits to the benthic community structure outside and adjacent to the action area (i.e., spillover zone) are discussed further in the next section on potential Gulf sturgeon prey.

#### **6.1.3.1.4 Potential Gulf Sturgeon Prey in Action Area**

Prey availability is essential for development of all life stages of Gulf sturgeon using critical habitat in the action area. Both adult and subadult Gulf sturgeon are known to lose up to 30 percent of their total body weight while over-summering in the rivers, and subsequently compensate the loss during winter feeding in estuarine and marine areas (Carr Jr. 1983; Clugston et al. 1995; Heise et al. 1999; Morrow Jr. et al. 1998; Ross et al. 2000; Sulak and Clugston 1999; Wooley and Crateau 1985). Gulf sturgeon have been described as opportunistic and indiscriminate benthivores; their guts generally contain benthic marine invertebrates including amphipods, lancelets, polychaetes, gastropods, shrimp, isopods, molluscs, and crustaceans (Carr et al. 1996; Fox et al. 2000; Fox et al. 2002a; Huff 1975; Mason Jr. and Clugston 1993). Generally, Gulf sturgeon prey are burrowing species (e.g., annelids, polychaetes, oligochaetes, amphipods, isopods, and lancelets) that feed on detritus and/or suspended particles, and inhabit sandy substrate. The proposed action will convert 900 ac of existing benthos from sandy substrate to hardened berm and shallow, intertidal marsh habitat that will render the area unsuitable for Gulf sturgeon foraging. Recent research shows that eastern population Gulf sturgeon were detected overwintering on shallow, sandy bottom in Mississippi Sound, near the barrier islands (Vick et al. 2018a; Vick et al. 2018b) indicating foraging habitat in this area is used by fish from both eastern and western population segments. Additionally, high prey abundance is commonly associated with shallow (1-3 m), sandy areas from Mississippi Sound eastward (Wilber et al. 2019). Therefore, it has been concluded that Gulf sturgeon are foraging in these sandy areas where they are repeatedly located, as this habitat supports their prey.

The construction of hardened berm and shallow, intertidal marsh habitat in the project area will permanently cover the existing sandy substrate in all areas of the 900-ac project footprint, reducing the availability of potential prey items in the immediate action area. NMFS assumes a total loss of benthic prey in the action area due to coverage of the benthos and lost access to sturgeon of benthic prey resources. An indeterminate benefit to prey species may occur due to a spillover effect from intertidal marsh habitat creation to benthic prey outside of the action area – however, NMFS cannot quantify this benefit.

*Summary of Effects on Prey Abundance (PCE 1)*

The proposed action may impact the prey abundance PCE in Unit 8 of Gulf Surgeon designated critical habitat. We believe the potential effects to prey abundance (PCE 1) from the conversion of 900 ac of substrate consisting of fine to medium sand at a depth of -5 ft to -12 ft MLLW, will adversely affect 900 ac of the prey abundance PCE 1. Gulf sturgeon from both the Pearl and Pascagoula rivers are known to forage in Unit 8, and telemetry data document that Gulf sturgeon from these subpopulations migrate from their natal river systems to Mississippi Sound and forage along the barrier islands in the area of the proposed project location (Rogillio et al. 2001; Ross et al. 2001). We believe the conversion from open water habitat that is well suited to Gulf sturgeon foraging, to hardened berms and shallow marsh habitat will have an adverse impact on prey abundance.

### **6.1.3.2 Sediment Quality (PCE 3)**

The construction of containment berms and placement of dredged material will cover or bury bottom substrates and affect sediment quality (PCE 3) by converting substrate, capable of supporting Gulf sturgeon prey, to emergent marsh habitat that is not suitable for sturgeon foraging. The existing benthos will be converted from fine to medium sand bottom habitat with a depth of -5 ft to -12 ft MLLW, to either rock-armored containment dike or subtidal marsh habitat. The sediment quality will be permanently altered by converting suitable foraging sediments in optimal foraging water depths into rock-armored containment dike and shallow-water subtidal marsh, which will be inaccessible to gulf sturgeon. An estimated 900 ac of quality foraging sediments will be permanently lost due to the proposed action.

## **7 CUMULATIVE EFFECTS**

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ESA Section 7 regulations require NMFS to consider cumulative effects in formulating its Opinions (50 CFR 402.14). Cumulative effects include the effects of future state or private actions, not involving federal activities, that are reasonably certain to occur within the action area considered in this Opinion (50 CFR 402.02). NMFS is not aware of any specific future projects that may contribute to cumulative effects within the action area. The ongoing activities and processes described in the environmental baseline are expected to continue and NMFS did not identify any additional sources of potential cumulative effects. Although the present human uses of the action area are expected to continue, some may occur at increased levels, frequency, or intensity in the near future as described in the environmental baseline.

The extent and time and location of potential future oil spills are not fully known at this time. Routes of exposure are generally believed to be, 1) suffocation of infaunal organisms, and 2) toxicity of substrate. Both of these effects would impact potential foraging areas within GSCH through the displacement and/or reduction of prey items.

Coastal runoff and river discharges carry large volumes of petrochemical and other contaminants from agricultural activities, cities, and industries into the Gulf of Mexico. The coastal waters of the Gulf of Mexico have more sites with high contaminant concentrations than other areas of the coastal United States due to the large number of waste discharge point sources. Chemicals and metals such as chlordane, dichlorodiphenyldichloroethylene (DDE),

dichlorodiphenyltrichloroethane (DDT), dieldrin, polychlorinated biphenyl (PCBs), cadmium, mercury, and selenium settle to the substrate and are later incorporated into the food web as they are consumed by macroinvertebrates, and subsequently by benthic feeders such as sturgeon. Some of these compounds may affect the surrounding environment by reducing DO, altering pH, and altering other water quality properties.

Although little is known about contaminant effects on GSCH, general studies on sturgeon habitats indicate that the effects of contaminants and pollution contribute to lost habitat (Barannikova 1995; Shagaeva et al. 1995; Verina and Peseridi 1979).

## **8 DESTRUCTION OR ADVERSE MODIFICATION ANALYSIS**

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### **8.1 Critical Habitat Destruction or Adverse Modification Analysis**

NMFS's regulations define *destruction or adverse modification* to mean "a direct or indirect alteration that appreciably diminishes the value of critical habitat as a whole for the conservation of a listed species" (50 CFR 402.02). Alterations that may destroy or adversely modify critical habitat may include impacts to the area itself, such as those that would impede access to or use of the essential features. NMFS will generally conclude that a federal action is likely to "destroy or adversely modify" critical habitat if the action results in an alteration of the quantity or quality of the essential physical or biological features of critical habitat and if the effect of the alteration is to appreciably diminish the value of critical habitat as a whole for the conservation of the species.

This analysis takes into account the geographic and temporal scope of the proposed action, recognizing that "functionality" of critical habitat necessarily means that the critical habitat must now and must continue in the future to support the conservation of the species and progress toward recovery. The analysis takes into account any changes in amount, distribution, or characteristics of the critical habitat that will be required over time to support the successful recovery of the species. Destruction or adverse modification does not depend strictly on the size or proportion of the area adversely affected, but rather on the role the action area and the affected critical habitat serves with regard to the function of the overall critical habitat designation, and how that role is affected by the action.

The following analysis demonstrates that while the proposed action will adversely affect the prey abundance and sediment quality PCEs of Gulf sturgeon designated critical habitat, it will not appreciably reduce the critical habitat's ability to support Gulf sturgeon conservation as a whole. Despite permanent adverse effects to approximately 900 ac of suitable foraging habitat, Unit 8 will continue to serve its intended conservation role for Gulf sturgeon.

The critical habitat designated within Mississippi Sound provides many thousands of acres of similar shallow, sandy-bottom habitat that will continue to provide optimal foraging habitat for Gulf sturgeon. Many other areas within Unit 8 also provide critical foraging habitat, especially the areas just outside of the river mouths where these fish feed immediately after leaving the rivers, following months of fasting in the freshwater habitat. These areas around river mouths

typically have much higher numbers of infaunal macroinvertebrates than areas such as the proposed action area, which lie outside of the region of riverine influence. These critical foraging habitats around the mouths of the primary spawning rivers will remain unaffected by the proposed action. The area expected to be affected constitutes only ~ 0.2% of the total area of critical habitat in Mississippi Sound (900 ac/464,301 ac \* 100 = 0.19%), and only ~ 0.1% of the total area of critical habitat in Unit 8 (900 ac/881,406 ac \* 100 = 0.10%).

Gulf sturgeon that may currently utilize the project area will continue to have unfettered access to the thousands of acres of highly suitable foraging habitat within Mississippi Sound, and throughout critical habitat Unit 8. Additionally, the intertidal marsh habitat created by the proposed action may add a beneficial component to Gulf sturgeon prey densities and diversity in the areas immediately adjacent to the action area. Therefore, NMFS concludes that the proposed action's impacts on prey abundance and sediment quality is not expected to reduce the critical habitat's ability to support Gulf sturgeon conservation. The conservation function of Unit 8 will remain intact.

Finally, the proposed action will not interfere with recovery objectives, actions, or tasks identified in the Gulf sturgeon recovery plan (USFWS and GSMFC 1995). The proposed action will not affect population size or distribution, disrupt research activities, and will not impede recovery of the species. NMFS concludes that the effects of the project will not discernibly impact the ecological function of Unit 8, and that the designated critical habitat will continue to serve its intended conservation role for Gulf sturgeon.

## **9 CONCLUSION**

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After reviewing the current status of GSCH in Unit 8, the Environmental Baseline, the Effects of the Proposed Action, and the Cumulative Effects, it is our Opinion that the proposed action will not reduce the critical habitat's ability to support Gulf sturgeon conservation, despite permanent adverse effects. Given the nature of the proposed action and the information provided above, we conclude that the action, as proposed, is likely to adversely affect, but is not likely to destroy or adversely modify, GSCH.

## **10 INCIDENTAL TAKE STATEMENT**

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### **10.1 Overview**

NMFS does not anticipate that the proposed action will incidentally take any ESA-listed species under our purview and no take is authorized in this Opinion. Nonetheless, should the USACE become aware of any take of an ESA-listed species under NMFS's purview that occurs as a result of the proposed action, the USACE shall report the take to NMFS SERO PRD via the [NMFS SERO Endangered Species Take Report Form](https://forms.gle/85fP2da4Ds9jEL829) (<https://forms.gle/85fP2da4Ds9jEL829>). This form shall be completed for each individual known reported capture, entanglement, stranding, or other take incident. Information provided via this form shall include the title, Pelican Key Beneficial Use Site, the issuance date, and ECO tracking number, SERO-2022-02452, for this Opinion; the species name; the date and time of the incident; the general location and activity resulting in capture; condition of the species (i.e., alive, dead, sent to rehabilitation);

size of the individual, behavior, identifying features (i.e., presence of tags, scars, or distinguishing marks), and any photos that may have been taken. At that time, consultation may need to be reinitiated.

## **11 CONSERVATION RECOMMENDATIONS**

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Section 7(a)(1) of the ESA directs federal agencies to utilize their authority to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation Recommendations identified in Opinions can assist action agencies in implementing their responsibilities under Section 7(a)(1). Conservation recommendations are discretionary activities designed to minimize or avoid adverse effects of a proposed action on ESA-listed species or critical habitat, to help implement recovery plans, or to develop information. The following conservation recommendations are discretionary measures that NMFS believes are consistent with this obligation and therefore should be carried out by the federal action agency:

- 1) Gather data describing community structure of the benthos in and nearby the project area that would help determine local Gulf sturgeon prey availability and thereby assist in future assessments of impacts to designated critical habitat.
- 2) The project description states “Gaps in the containment berm would be included in the final design based on recommendations of the reviewing agencies.” NMFS recommends that the containment berm be constructed with minimum 5 ft gaps (at the sea floor) at least every 75 ft around the entire length of the berm, to allow for tidal flushing and species movement. These gaps may be constructed after the fill material has been placed and settled, to prevent excessive turbidity and leakage of fill materials outside of the containment berm.

NMFS requests notification if the conservation measure is implemented. This will assist us to evaluate future project effects on Gulf sturgeon or designated Gulf sturgeon habitat.

## **12 REINITIATION OF CONSULTATION**

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This concludes formal consultation on the proposed action. As provided in 50 CFR 402.16, reinitiation of formal consultation is required and shall be requested by USACE or by the Service, where discretionary federal action agency involvement or control over the action has been retained, or is authorized by law, and if: (a) the amount or extent of incidental take specified in the Incidental Take Statement is exceeded, (b) new information reveals effects of the action on listed species or critical habitat in a manner or to an extent not considered in this Opinion, (c) the action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this Opinion, or (d) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, the USACE must immediately request reinitiation of formal consultation and project activities may only resume if the USACE establishes that such continuation will not violate Sections 7(a)(2) and 7(d) of the ESA.

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