UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
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F/SER31:SG
SERO-2023-00049

03/05/2024

Jeffrey F. Pinsky
Chief, Environmental Branch
Galveston District Corps of Engineers
Department of the Army
Post Office Box 1229
Galveston, Texas 77553-1229

Ref.: U.S Army Corps of Engineers, Sabine-Neches Waterway Channel Improvement Project, Jefferson and Orange Counties, Texas, and Cameron Parish, Louisiana

Dear Jeffrey Pinsky,

The enclosed Biological Opinion responds to your request for reinitiation of a 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 above referenced action. The Opinion has been given the NMFS tracking number SERO-2023-00049. Please use the NMFS tracking number in all future correspondence related to this action.

This Opinion is a reinitiation of a previous Opinion (SER-2007-00954; issued August 13, 2007), for the remaining operations by the U.S. Army Corps of Engineers (USACE) for the deepening and widening of the Sabine-Neches Waterway Channel in Texas and Louisiana ("2007 Opinion"). Since the issuance of the 2007 Opinion, the take limit for loggerhead sea turtle has been exceeded and the giant manta ray was listed as threatened. The enclosed Opinion considers the effects of the remaining operations of the USACE's original proposed action on the following listed species: green sea turtle (North Atlantic DPS), Kemp's ridley sea turtle, hawksbill sea turtle, loggerhead sea turtle (Northwest Atlantic DPS), and giant manta ray. The enclosed Opinion is based on information provided by the USACE and the published literature cited within. NMFS concludes that the proposed action is not likely to adversely affect green sea turtle (North Atlantic DPS), leatherback and hawksbill sea turtle. NMFS also concludes that the proposed action is likely to adversely affect, but is not likely to jeopardize the continued existence of, Kemp's ridley sea turtle, loggerhead sea turtle (Northwest Atlantic DPS), and giant manta ray. The proposed action will have no effect on the South Atlantic DPS of green sea turtles.

NMFS is providing an Incidental Take Statement with this Opinion. The Incidental Take Statement describes Reasonable and Prudent Measures that NMFS considers necessary or appropriate to minimize the impact of incidental take associated with this action. The Incidental Take Statement also specifies Terms and Conditions, including monitoring and reporting requirements with which the USACE must comply, to carry out the Reasonable and Prudent Measures.

There is a current 7(a)(2) and 7(d) Memorandum in place for the remainder of the proposed action from the original 2007 Opinion that will allow work to continue until such time that NMFS completes this Opinion with the new ITS for affected species.

This new opinion (SERO-2023-00049), including the Incidental Take Statement, Reasonable and Prudent Measures, and Terms and Conditions replaces and supersedes the 2007 Opinion.
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 Sarah Garvin, Consultation Biologist, by phone at (727) 342-0249, or by email at Sarah.Garvin@noaa.gov.

Sincerely,

AMENDOLA.KIMBERLY.BARBARA.1365830769
Digitally signed by AMENDOLA.KIMBERLY.BARBARA.1365830769
Date: 2024.03.05 18:44:22 -05'00'

For Andrew J. Strelcheck
Regional Administrator

Enclosure:
NMFS Biological Opinion SERO-2023-00049
cc: Raven.Blakeway@usace.army.mil
nmfs.ser.esa.consultations@noaa.gov
File: 1514-22.f.8

Endangered Species Act - Section 7 Consultation
Biological Opinion

Action Agency: U.S. Army Corps of Engineers – Galveston District

Activity: Sabine-Neches Waterway Channel Improvement Project

Location: Texas and Louisiana

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

NMFS Tracking Number: SERO-2023-00049

Approved by: FOR AMENDOLA.KIMBERLY.BARBARA.1365830769 Digitally signed by AMENDOLA.KIMBERLY.BARBARA.1365830769 Date: 2024.03.05 18:28:07 -05'00'

Andrew J. Strelcheck, Regional Administrator
NMFS, Southeast Regional Office
St. Petersburg, Florida

Date Issued: 03/05/2024

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ACRONYMS, ABBREVIATIONS, AND UNITS OF MEASURE

ac	acre(s)
BIRNM	Buck Island Reef National Monument
BMP(s)	Best Management Practice(s)
BOEM	Bureau of Ocean Energy Management
°C	degrees Celsius
CCL	curved carapace length
CFR	Code of Federal Regulations
CITES	Convention on International Trade in Endangered Species of Wild Flora and Fauna
cm	centimeter(s)
CONAMP	National Commission of Natural Protected Areas
CPUE	catch per unit effort
cy	cubic yard(s)
DDT	Dichlorodiphenyltrichloroethane
DPS	Distinct Population Segment
DTRU	Dry Tortugas Recovery Unit
DW	disc width
DWH	Deepwater Horizon
ECO	Environmental Consultation Organizer
EFH	Essential Fish Habitat
EFP	Exempted Fishing Permit
ESA	Endangered Species Act of 1973, as amended (16 U.S.C. § 1531 et seq.)
°F	degrees Fahrenheit
FERC	Federal Energy Regulatory Commission
FGBNMS	Flower Garden Banks National Marine Sanctuary
FMP	Fishery Management Plan
FP	Fibropapillomatosis
FR	Federal Register
ft	foot/feet
ft^2	square foot/feet
FWC	Florida Fish and Wildlife Conservation Commission
FWRI	Florida Fish and Wildlife Research Institute
GADNR	Georgia Department of Natural Resources
GCRU	Greater Caribbean Recovery Unit
GRBO	*Biological Opinion on Dredging of Gulf of Mexico Navigation Channels and Sand Mining ("Borrow") Areas Using Hopper Dredges by COE Galveston, New Orleans, Mobile, and Jacksonville Districts*; NMFS Tracking Number SER-2000-01287, issued November 19, 2003 and revised June 24, 2005, January 9, 2007, and March 3, 2016
in	inch(es)
IPCC	Intergovernmental Panel on Climate Change
kg	kilograms(s)
km	kilometer(s)
kt	knot(s)
lb	pound(s)

lin ft	linear foot/feet
LNG	liquid natural gas
m	meter(s)
MCY	million cubic yards
MEC	Munitions and Explosives of Concern
MHW	Mean High Water
mi	mile(s)
mi^2	square mile(s)
MLLW	Mean Lower Low Water
mm	millimeter(s)
MMPA	Marine Mammal Protection Act
MMF	Marine Megafauna Foundation
mph	miles per hour
MSA	Magnuson-Stevens Fishery Conservation and Management Act
N/A	not applicable
NAD 83	North American Datum of 1983
NCWRC	North Carolina Wildlife Resources Commission
NEFOP	Northeast Fisheries Observer Program
NEFSC	Northeast Fisheries Science Center
NGMRU	Northern Gulf of Mexico
nm	nautical mile(s)
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NRU	Northern Recovery Unit
O&M	Operations and Maintenance
ODMDS	Offshore Dredge Material Disposal Site
Opinion	Biological Opinion, Conference Biological Opinion, or Draft Biological Opinion
oz	ounce(s)
PCB	Polychlorinated biphenyls
PDCs	project design criteria
PFB	Perfluorobutane
PFRU	Peninsular Florida Recovery Unit
POPs	persistent organic pollutants
PRDNR	Puerto Rico Department of Natural and Environmental Resources
PSO	Protected Species Observer
SARBO	*South Atlantic Regional Biological Opinion for Dredging and Material Placement Activities in the Southeast United States (2020 SARBO);* NMFS Tracking Number SERO-2019-03111, issued March 27, 2020 and revised July 30, 2020
SAV	Submerged Aquatic Vegetation
SCDNR	South Carolina Department of Natural Resources
SCL	straight carapace length
SEFSC	Southeast Fisheries Science Center
SERO PRD	NMFS Southeast Regional Office, Protected Resources Division
SSRIT	Smalltooth Sawfish Recovery Implementation Team
STSSN	Sea Turtle Stranding and Salvage Network
TED	turtle excluder device

TEWG	Turtle Expert Working Group
U.S.	United States of America
USACE	United States Army Corps of Engineers
USCG	United States Coast Guard
USFWS	United States Fish and Wildlife Service
USN	United States Navy
UXO	Unexploded Ordnances

1 INTRODUCTION

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 impacts associated with USACE's channel improvement project on the Sabine-Neches Waterway. Previous consultation on the project under Section 7 concluded with NMFS's Biological Opinion SER-2007-00954, issued on August 13, 2007 (hereinafter referred to as the "2007 Opinion"). As provided in 50 C.F.R. Section 402.16, reinitiation of consultation is required where discretionary federal agency involvement or control over the action has been retained (or is authorized by law) and if (1) the amount or extent of taking specified in the Incidental Take Statement is exceeded, (2) new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered, (3) the identified action is subsequently modified in a manner that causes an effect to listed species or critical habitat that was not considered in the Opinion, or (4) a new species is listed or critical habitat designated that may be affected by the identified action.

In the case of this reinitiation, USACE requested to reinitiate consultation on the 2007 Opinion due to the exceedance of the authorized take limit for loggerhead sea turtles and the listing of the giant manta ray as threatened (83 FR 2916, January 22, 2018).

This document represents NMFS's Opinion based on our review of potential effects of the USACE's remaining activities for the widening and deepening of the Sabine-Neches Waterway

Channel in Texas and Louisiana on the following listed species: green sea turtle (North Atlantic DPS), Kemp's ridley sea turtle, hawksbill sea turtle, loggerhead sea turtle (Northwest Atlantic DPS), and giant manta ray. Our Opinion is based on information provided by the USACE, the STSSN, the MMF, 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 Opinion and Incidental Take Statement 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

The following is the consultation history for the NMFS ECO tracking number SERO-2023-00049 Sabine-Neches Waterway.

On August 13, 2007, NMFS issued the 2007 Opinion for USACE's proposal to widen and deepen the Sabine-Neches Waterway Channel in Texas and Louisiana. The 2007 Opinion determined that carrying out the proposed work is likely to adversely affect but is not likely to jeopardize the continued existence of green, Kemp's ridley, loggerhead, hawksbill, and leatherback sea turtles. The Opinion issued an Incidental Take Statement for green, Kemp's ridley, loggerhead, hawksbill, and leatherback sea turtles. NMFS anticipated incidental lethal take by relocation trawling would consist of 4 sea turtles (3 Kemp's ridley and 1 loggerhead or 1 green sea turtle) and 32 non-injurious takes of sea turtles (7 loggerhead, 21 Kemp's ridley, 1 hawksbill, 1 leatherback, and 2 green sea turtles).

Dredging for the project began on June 15, 2022, and stopped in November 2022, because three incidental lethal takes of sea turtles occurred during hopper dredging during that period – 1 Kemp's ridley and 2 loggerhead sea turtles – exceeding the Incidental Take Statement for loggerhead sea turtles in the 2007 Opinion.

On October 5, 2022, NMFS received a Section 7(a)2-7(d) memorandum from USACE for continuation of dredge/relocation trawling for the project given the exceedance of existing take limit as outlined in the 2007 Opinion Incidental Take Statement.

On January 5, 2023, we received a written request from USACE for reinitiation of formal consultation under Section 7 of the ESA on the remaining activities for the widening and deepening of the Sabine-Neches Waterway Channel in Texas and Louisiana due to the exceedance of the authorized take limit for loggerhead sea turtles and the listing of the giant manta ray as threatened.

On July 27, 2023, we requested additional information related to historical dredging and sea turtle take within the action area. On August 16, 2023, we notified USACE of additional BMPs for PSOs and relocation trawling. We received a final response on August 17, 2023, and initiated formal consultation that day.

This new opinion (SERO-2023-00049), including the Incidental Take Statement, Reasonable and Prudent Measures, and Terms and Conditions replaces and supersedes the 2007 Opinion.

2 PROPOSED ACTION

2.1 Project Details

2.1.1 Project Description

The 2007 Opinion analyzed a channel improvement project for the widening and deepening of the Sabine-Neches Waterway Channel in Texas and Louisiana. The proposed project will involve a combination of hydraulic pipeline and hopper dredges. The Water Resources Development Act authorized the project in 2014. Work began on the project on June 12, 2022, with hopper dredging on the Sabine-Neches Waterway Channel. Work on the project stopped in November 2022 when the incidental take limit for loggerhead sea turtle was exceeded. Dredging and relocation trawling resumed on September 3, 2023. Portions of the specific work listed below, and described in the 2007 Opinion, have been started and have not been completed in their entirety. Therefore, we consider the project as unchanged from the original project considered in the 2007 Opinion. Specific work for the project includes:

1. Widening the Sabine Pass Jetty Channel, the Sabine Pass Channel, and the Port Arthur Canal to the junction of Taylors Bayou from 500 to 700 ft.
2. Widening the entrance and connecting channels of Taylors Bayou Navigation Channel.
3. Deepening of the Sabine Pass Jetty Channel, the Sabine Pass Channel, the Port Arthur Canal, the Sabine-Neches Canal, and the Neches River Channel to the Port of Beaumont from 40 to 48 ft.
4. Deepening the Taylors Bayou Navigation Channel and turning basins to 48 ft.
5. Deepening the existing Sabine-Neches Waterway Entrance Channel in the Gulf of Mexico from 42 to 50 ft, plus advance maintenance and allowable overdepth, and constructing an extension of the offshore entrance channel (50 ft x 700 ft for 13.1 mi).
6. Establishing 4 new ODMDSs along the 13.1-mi extension of the offshore entrance channel.
7. Dredging 2 new anchorage basins, 2 new turning basins, and 3 turning and anchorage basins on the Neches River Channel, and reducing the existing Sabine Pass anchorage basin in size by approximately 50 percent.
8. Restoring 3 degraded marsh areas on the Neches River, 6 degraded marsh areas near Willow and Black Bayous, Louisiana, and nourish Gulf shorelines at Texas and Louisiana Points.

The remaining dredging for the Sabine Pass Jetty and Entrance Channels will be conducted by hopper dredge. A hopper dredge operates by the vessel traveling slowing while trailing one or two suction arms off the side(s) of the hull. The suction arms collect sand and silt from the substrate, which are collected in a hopper onboard the vessel. Hydraulic pipeline dredge will modify the remaining channels and basins. The proposed new work will generate approximately 110 MCY of dredged material. Of that total, hopper dredges will remove approximately 44.69 MCY; hydraulic pipeline dredges will remove the remainder. Historic dredging records indicate that the material from Sabine Pass would average 51 percent silt, 31 percent clay, and 18 percent sand. Bed-leveling dredges will not be used in connection with the proposed action. Relocation trawling may occur to minimize the potential for hopper dredge interactions with sea turtles (see Mitigation Measures, Section 2.1.2, below). Relocation trawling involves the use of modified shrimp trawling equipment to capture and relocate protected species away from the area in which the hopper dredge is actively operating.

Work will be conducted 24 hours per day, 7 days per week. The dredging of the channels and basins is expected to require 4.75 years to complete, with several contracts running simultaneously. USACE's Dredged Material Management Plan for the Sabine-Neches Waterway Channel has a 50-year project life. Subsequent placement of dredged material for shoreline restoration will occur every 3 years, and will alternate between Texas and Louisiana Points, so that placement of materials at each shoreline will occur every 6 years.

2.1.2 Mitigation Measures

The USACE, or their designated agents, will implement the following conditions during the proposed action:

- Comply with NMFS SERO *Protected Species Construction Conditions*, revised May 2021.
- Comply with the NMFS SERO *Vessel Strike Avoidance Measures*, revised May 2021.
- Comply with the NMFS Safe Handling and Release Guidelines (Appendix A).
- Implement all GRBO Reasonable and Prudent Measures and Terms and Conditions identified in Appendix D.
- Implement relocation trawling when hopper dredging in accordance with Appendix C of this Opinion.
- Implement the general PDCs in the updated SARBO (NMFS 2020) on the use of in-water lines (Appendix B)
- Report all known interactions with ESA-listed species during the proposed action to the NMFS SERO PRD via the NMFS SERO Endangered Species Take Report Form (https://forms.gle/85fP2da4Ds9jEL829).

- Also, report all known interactions with sea turtles during construction to the Texas Stranding Hotline: (866)TURTLE5/(866) 887-8535
- Also, report all sightings of giant manta ray to the NMFS at (727) 824-5312 or by E-mail at: manta.ray@noaa.gov.

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 65-mi long deep draft channel running through Jefferson and Orange Counties in Texas, and Cameron Parish in Louisiana, as well as waters of the Gulf of Mexico, and includes the associated ODMDSs, all of which are bounded by a 1-mi buffer area. The action area experiences frequent ship traffic, including Coastal Tankers, Aframax, LNG ships and similar vessels, as well as recreational and fishing industry vessels. USACE also conducts regular O&M dredging within the action area, with frequency varying from every 1 to 6 years, and dredge volumes varying between 432,000 cy and 473,000 cy.

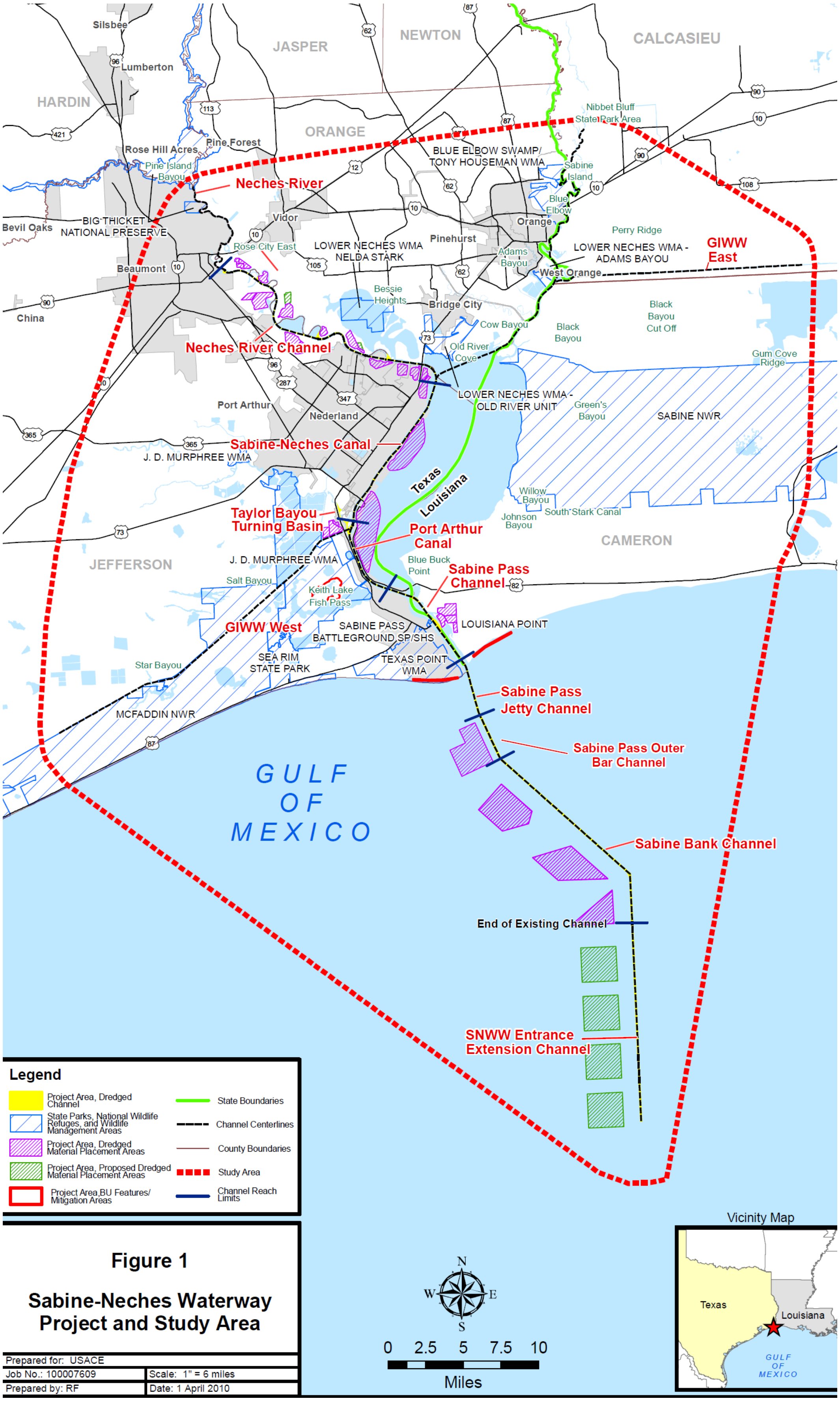

Figure 1

Sabine-Neches Waterway Project and Study Area

Figure 1. Location of the Sabine-Neches Waterway Channel action area (image provided by USACE).

3 EFFECTS DETERMINATIONS

Please note the following abbreviations are only used in **Table 1** 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 Determinations

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 1** below.

Table 1. 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
Sea Turtles					
Green sea turtle (North Atlantic DPS)	T	81 FR 20057/ April 6, 2016	October 1991	LAA	NLAA
Green sea turtle (South Atlantic DPS)	T	81 FR 20057/ April 6, 2016	October 1991	LAA	NE
Hawksbill sea turtle	E	35 FR 8491/ June 2, 1970	December 1993	NLAA	NLAA
Kemp's ridley sea turtle	E	35 FR 18319/ December 2, 1970	September 2011	LAA	LAA
Leatherback sea turtle	E	35 FR 8491/ June 2, 1970	April 1992	NE	NLAA
Loggerhead sea turtle (Northwest Atlantic DPS)	T	76 FR 58868/ September 22, 2011	December 2008	LAA	LAA
Fishes					
Giant manta ray	T	83 FR 2916/ January 22, 2018	2019 (Outline)	NLAA	LAA

We believe the proposed action will have No Effect on the South Atlantic DPS of green sea turtles. Limited information previously indicated that benthic juveniles from both the North Atlantic and South Atlantic DPSs may be found in waters off the mainland United States. However, additional research has determined that juveniles from the South Atlantic DPS are not likely to occur in these waters, including the action area for this project.

On August 13, 2007, NMFS issued the 2007 Opinion for USACE's proposal to widen and deepen the Sabine-Neches Waterway Channel in Texas and Louisiana. The Opinion issued an Incidental Take Statement for 4 sea turtle species. According to data provided by USACE, between 1995 and 2007, the USACE recorded 3 lethal takes of sea turtles during O&M dredging events within the Sabine-Neches Waterway Channel (i.e., 2 Kemp's ridley and 1 loggerhead sea turtles). As stated in the Consultation History (Section 1.2), between June and September 2022, USACE recorded 3 lethal takes of sea turtles during dredge activities authorized by the 2007 Opinion (i.e., 1 Kemp's ridley and 2 loggerhead sea turtles). In total, O&M dredging activities within the Sabine-Neches Waterway Channel since 1995 have resulted in a total of 6 documented lethal takes of sea turtle species. Of those 6 lethal takes, there was no documented lethal take of green, hawksbill, or leatherback sea turtles during hopper dredging activities. Based on this information, we do not anticipate any lethal take of green, hawksbill, or leatherback sea turtles from hopper dredging associated with the remaining operations of the project. Additionally, no green, hawksbill, or leatherback sea turtles were captured during any relocation trawling events for hopper dredging conducted with the Sabine-Neches Waterway Channel. Subsequently, we believe the proposed action is not likely to adversely affect green (North Atlantic DPS), hawksbill, or leatherback sea turtles.

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

Hydraulic dredging

Effects to green sea turtle (North Atlantic DPS), hawksbill sea turtle, and leatherback sea turtle include the risk of direct physical impact from hydraulic dredging and other in-water construction activities. We believe the risk of physical injury is extremely unlikely to occur due to the species' ability to move away from the project site and into adjacent suitable habitat, if disturbed. NMFS has previously determined in other dredging biological opinions that, while oceangoing hopper-type dredges may lethally entrain protected species, including sea turtles, non-hopper-type dredging methods, such as the hydraulic pipeline dredging proposed for use in this project, are slower and extremely unlikely to overtake or adversely affect them (NMFS 2007). Additionally, the applicant's implementation of NMFS SERO's *Protected Species Construction Conditions* (NMFS 2021) will require all construction workers to observe in-water related activities for the presence of these species. If a protected species is seen within 150 ft of operations, all appropriate precautions shall be implemented to ensure its protection. These precautions shall include cessation of operation of any moving equipment closer than 150 ft of a protected species. Operation of any mechanical construction equipment shall cease immediately if a protected species is observed within a 150-ft radius of the equipment. Activities may not resume until the species has departed the project area of its own volition.

Vessel Strike

Vessels can strike green sea turtle (North Atlantic DPS), hawksbill sea turtle and leatherback sea turtle, leading to injury or death. NMFS believes that it is highly unlikely that a dredge vessel, relocation trawler, or other support vessel will strike a protected species. Vessel collisions with green sea turtle (North Atlantic DPS) and hawksbill sea turtle from the proposed action are not expected due to the slow speed of the dredge (e.g., 3.5 kt or less while dredging), relocation trawlers, and support vessels; the avoidance behavior of these species to slow moving vessels; and the presence of NMFS-approved observers on board every dredge and relocation trawler to watch for ESA-listed species in the area. NMFS believes it is extremely unlikely that green sea turtles (North Atlantic DPS) and hawksbill sea turtles will be struck by vessels associated with the remaining operations of the proposed action.

Dredged Material Placement

Dredged material placement will occur at Louisiana Point and Texas Point. Over the 50-year period of analysis, beach nourishment activities using maintenance material from the adjacent Sabine Pass channel would result in the creation of new saline marsh along a 3-mi stretch of shore (mile 0.5 to 3.5) at Louisiana Point and the same at Texas Point. The placement of material from each 3-year Sabine Pass dredging cycle would alternate between Texas and Louisiana Points, so that placement of materials at each shoreline would occur every 6 years.

The potential for interaction from dredged material placement equipment while it is depositing the material is limited to the potential of green sea turtle (North Atlantic DPS) and hawksbill sea turtle being directly below the material as it is passing through the water column and landing on the sea floor at the pump-out areas. We believe that risk of these mobile species being caught in the discharge through the water column and buried on the sea floor is extremely unlikely. Green sea turtle (North Atlantic DPS) and hawksbill sea turtle would be able to detect the presence of the material and avoid being harmed by its placement. Placement in an open water environment would allow room for these species to move away from and around the placement. In addition, the implementation of NMFS SERO's *Protected Species Construction Conditions* will require all construction workers to observe in-water activities for the presence of these species. Operation of any mechanical construction equipment shall cease immediately if a protected species is seen within a 150-ft radius of the equipment. Activities may not resume until the protected species has departed the project area of its own volition or 20 minutes have passed since the animal was last seen in the area.

Entanglement

Green sea turtle (North Atlantic DPS) and hawksbill sea turtle may become entangled in flexible materials in the water, such as buoy lines used to mark pipelines; however, we believe entanglement from flexible materials in the water associated with dredging and placement activities is extremely unlikely to occur. As stated in Section 2.1.2, in order to reduce the risk of entanglement to ESA-listed species the USACE will follow the general PDCs in Appendix B on the use of in-water lines.

Water Quality

Green sea turtle (North Atlantic DPS) and hawksbill sea turtle may be affected by changes in water quality from turbidity caused by cutterhead pipeline or hopper dredging and material placement. We believe this effect is extremely unlikely to occur due to these species' mobility. ESA-listed sea turtles and giant manta ray are highly mobile and can avoid localized areas of increased turbidity.

Access
Green sea turtle (North Atlantic DPS) and hawksbill sea turtle may frequently feed in nearshore coastal waters and may be affected by their inability to access the project area due to their avoidance of dredging and placement activities. We believe the effect of the temporary loss of foraging/shelter opportunities for these species will be insignificant, given the availability of similar habitat nearby and the abundance of habitat outside of the project area.

3.1.3 ESA-Listed Species Likely to be Adversely Affected by the Proposed Action

We have determined that Kemp's ridley sea turtle, loggerhead sea turtle (Northwest Atlantic DPS), and giant manta ray are likely to be adversely affected by relocation trawling that will occur in connection with the proposed hopper dredging and handling that will occur in connection with relocation trawling. Subsequently, effects to these species require further analysis. We provide greater detail on the potential effects to these species from the proposed action in the Effects of the Action (Section 6), and whether those effects, when considered in the context of the Status of the Species (Section 4), the Environmental Baseline (Section 5), and the Cumulative Effects (Section 7), are likely to likely to jeopardize the continued existence of giant manta ray in the wild.

3.2 Effects Determinations for Critical Habitat

3.2.1 Agency Effects Determination

The project is not located in critical habitat, and there are no potential routes of effect to any critical habitat.

4 RANGEWIDE STATUS OF ESA-LISTED SPECIES CONSIDERED FOR FURTHER ANALYSIS

4.1 Overview of Status Sea Turtles

There are 5 species (green, hawksbill, Kemp's ridley, leatherback, and loggerhead) of sea turtles that travel widely throughout the South Atlantic, Gulf of Mexico, and the Caribbean. These species are highly migratory and therefore could occur within the action area. Section 4.1.1 will address the general threats that confront all sea turtle species. The remainder of Section 4.1 (Sections 4.1.2-4.1.5) will address information on the distribution, life history, population structure, abundance, population trends, and unique threats to each species of sea turtle likely to be adversely affected within the action area.

4.1.1 General Threats Faced by All Sea Turtles

Sea turtles face numerous natural and man-made threats that shape their status and affect their ability to recover. Many of the threats are either the same or similar in nature for all listed sea turtle species. The threats identified in this section are discussed in a general sense for all sea turtles. Threat information specific to a particular species are then discussed in the corresponding Status of the Species (Section 4) where appropriate.

Fisheries
Incidental bycatch in commercial fisheries is identified as a major contributor to past declines, and threat to future recovery, for all of the sea turtle species (NMFS and USFWS 1991; NMFS and USFWS 1992; NMFS and USFWS 1993; NMFS and USFWS 2008; NMFS et al. 2011). Domestic fisheries often capture, injure, and kill sea turtles at various life stages. Sea turtles in the pelagic environment are exposed to U.S. Atlantic pelagic longline fisheries. Sea turtles in the benthic environment in waters off the coastal United States are exposed to a suite of other fisheries in federal and state waters. These fishing methods include trawls, gillnets, purse seines, hook-and-line gear (including bottom longlines and vertical lines [e.g., bandit gear, handlines, and rod-reel]), pound nets, and trap fisheries. Refer to the Environmental Baseline (Section 5) of this opinion for more specific information regarding federal and state managed fisheries affecting sea turtles within the action area). The Southeast United States shrimp fisheries have historically been the largest fishery threat to benthic sea turtles in the southeastern United States, and continue to interact with and kill large numbers of sea turtles each year.

In addition to domestic fisheries, sea turtles are subject to direct as well as incidental capture in numerous foreign fisheries, further impeding the ability of sea turtles to survive and recover on a global scale. For example, pelagic stage sea turtles, especially loggerhead and leatherback sea turtles, circumnavigating the Atlantic are susceptible to international longline fisheries including the Azorean, Spanish, and various other fleets (Aguilar et al. 1994; Bolten et al. 1994). Bottom longlines and gillnet fishing is known to occur in many foreign waters, including (but not limited to) the northwest Atlantic, western Mediterranean, South America, West Africa, Central America, and the Caribbean. Shrimp trawl fisheries are also occurring off the shores of numerous foreign countries and pose a significant threat to sea turtles similar to the impacts seen in U.S. waters. Many unreported takes or incomplete records by foreign fleets make it difficult to characterize the total impact that international fishing pressure is having on listed sea turtles. Nevertheless, international fisheries represent a continuing threat to sea turtle survival and recovery throughout their respective ranges.

Non-Fishery In-Water Activities
There are also many non-fishery impacts affecting the status of sea turtle species, both in the ocean and on land. In nearshore waters of the United States, the construction and maintenance of federal navigation channels has been identified as a source of sea turtle mortality. Hopper dredges, which are frequently used in ocean bar channels and sometimes in harbor channels and offshore borrow areas, move relatively rapidly and can entrain and kill sea turtles (NMFS 2020). Sea turtles entering coastal or inshore areas have also been affected by entrainment in the cooling-water systems of electrical generating plants. Other nearshore threats include harassment

and/or injury resulting from private and commercial vessel operations, military detonations and training exercises, in-water construction activities, and scientific research activities.

Coastal Development and Erosion Control

Coastal development can deter or interfere with nesting, affect nesting success, and degrade nesting habitats for sea turtles. Structural impacts to nesting habitat include the construction of buildings and pilings, beach armoring and renourishment, and sand extraction (Bouchard et al. 1998; Lutcavage et al. 1997). These factors may decrease the amount of nesting area available to females and change the natural behaviors of both adults and hatchlings, directly or indirectly, through loss of beach habitat or changing thermal profiles and increasing erosion, respectively (Ackerman 1997; Witherington et al. 2003; Witherington et al. 2007). In addition, coastal development is usually accompanied by artificial lighting which can alter the behavior of nesting adults (Witherington 1992) and is often fatal to emerging hatchlings that are drawn away from the water (Witherington and Bjorndal 1991). In-water erosion control structures such as breakwaters, groins, and jetties can impact nesting females and hatchlings as they approach and leave the surf zone or head out to sea by creating physical blockage, concentrating predators, creating longshore currents, and disrupting of wave patterns.

Environmental Contamination

Multiple municipal, industrial, and household sources, as well as atmospheric transport, introduce various pollutants such as pesticides, hydrocarbons, organochlorides (e.g., DDT, PCB, and PFC), and others that may cause adverse health effects to sea turtles (Garrett 2004; Grant and Ross 2002; Hartwell 2004; Iwata et al. 1993). Acute exposure to hydrocarbons from petroleum products released into the environment via oil spills and other discharges may directly injure individuals through skin contact with oils (Geraci 1990), inhalation at the water's surface and ingesting compounds while feeding (Matkin and Saulitis 1997). Hydrocarbons also have the potential to impact prey populations, and therefore may affect listed species indirectly by reducing food availability in the action area.

The April 20, 2010, explosion of the Deepwater Horizon oil rig affected sea turtles in the Gulf of Mexico. An assessment has been completed on the injury to Gulf of Mexico marine life, including sea turtles, resulting from the spill (DWH Trustees 2015). Following the spill, juvenile Kemp's ridley, green, and loggerhead sea turtles were found in *Sargassum* algae mats in the convergence zones, where currents meet and oil collected. Sea turtles found in these areas were often coated in oil and/or had ingested oil. The spill resulted in the direct mortality of many sea turtles and may have had sublethal effects or caused environmental damage that will impact other sea turtles into the future. Information on the spill impacts to individual sea turtle species is presented in the Status of the Species (Section 4) sections for each species.

Marine debris is a continuing problem for sea turtles. Sea turtles living in the pelagic environment commonly eat or become entangled in marine debris (e.g., tar balls, plastic bags/pellets, balloons, and lost, abandoned or discarded fishing gear) as they feed along oceanographic fronts where debris and their natural food items converge. Marine debris can cause significant habitat destruction from derelict vessels, further exacerbated by tropical storms moving debris and scouring and destroying corals and seagrass beds, for instance. Sea turtles that spend significant portions of their lives in the pelagic environment (i.e., juvenile loggerhead and juvenile green sea turtles) are especially susceptible to threats from entanglement in marine debris when they return to coastal waters to breed and nest.

Climate Change
There is a large and growing body of literature on past, present, and future impacts of global climate change, exacerbated and accelerated by human activities. Some of the likely effects commonly mentioned are sea level rise, increased frequency of severe weather events, and change in air and water temperatures. NOAA's climate information portal provides basic background information on these and other measured or anticipated effects (see http://www.climate.gov).

Climate change impacts on sea turtles currently cannot be predicted with any degree of certainty; however, significant impacts to the hatchling sex ratios of sea turtles may occur as a result (NMFS and USFWS 2007a). In sea turtles, sex is determined by the ambient sand temperature (during the middle third of incubation) with female offspring produced at higher temperatures and males at lower temperatures within a thermal tolerance range of 25°-35°C (Ackerman 1997). Increases in global temperature could potentially skew future sex ratios toward higher numbers of females (NMFS and USFWS 2007a).

The effects from increased temperatures may be intensified on developed nesting beaches where shoreline armoring and construction have denuded vegetation. Erosion control structures could potentially result in the permanent loss of nesting beach habitat or deter nesting females (NRC 1990). These impacts will be exacerbated by sea level rise. If females nest on the seaward side of the erosion control structures, nests may be exposed to repeated tidal overwash (NMFS and USFWS 2007b). Sea level rise from global climate change is also a potential problem for areas with low-lying beaches where sand depth is a limiting factor, as the sea may inundate nesting sites and decrease available nesting habitat (Baker et al. 2006; Daniels et al. 1993; Fish et al. 2005). The loss of habitat as a result of climate change could be accelerated due to a combination of other environmental and oceanographic changes such as an increase in the frequency of storms and/or changes in prevailing currents, both of which could lead to increased beach loss via erosion (Antonelis et al. 2006; Baker et al. 2006).

Other changes in the marine ecosystem caused by global climate change (e.g., ocean acidification, salinity, oceanic currents, dissolved oxygen levels, nutrient distribution, etc.) could influence the distribution and abundance of lower trophic levels (e.g., phytoplankton, zooplankton, submerged aquatic vegetation, crustaceans, mollusks, forage fish, etc.) which could ultimately affect the primary foraging areas of sea turtles.

Other Threats
Predation by various land predators is a threat to developing nests and emerging hatchlings. The major natural predators of sea turtle nests are mammals, including raccoons, dogs, pigs, skunks, and badgers. Emergent hatchlings are preyed upon by these mammals as well as ghost crabs, laughing gulls, and the exotic South American fire ant (*Solenopsis invicta*). In addition to natural predation, direct harvest of eggs and adults from beaches in foreign countries continues to be a problem for various sea turtle species throughout their ranges (NMFS and USFWS 2008).

Diseases, toxic blooms from algae and other microorganisms, and cold stunning events are additional sources of mortality that can range from local and limited to wide-scale and impacting hundreds or thousands of animals.

4.1.2 Kemp's Ridley Sea Turtle

The Kemp's ridley sea turtle was listed as endangered on December 2, 1970, under the Endangered Species Conservation Act of 1969, a precursor to the ESA. Internationally, the Kemp's ridley sea turtle is considered the most endangered sea turtle (Groombridge 1982; TEWG 2000; Zwinenberg 1977).

Species Description and Distribution

The Kemp's ridley sea turtle is the smallest of all sea turtles. Adults generally weigh less than 100 lb (45 kg) and have a carapace length of around 2.1 ft (65 cm). Adult Kemp's ridley sea turtle shells are almost as wide as they are long. Coloration changes significantly during development from the grey-black dorsum and plastron of hatchlings, a grey-black dorsum with a yellowish-white plastron as post-pelagic juveniles, and then to the lighter grey-olive carapace and cream-white or yellowish plastron of adults. There are 2 pairs of prefrontal scales on the head, 5 vertebral scutes, usually 5 pairs of costal scutes, and generally 12 pairs of marginal scutes on the carapace. In each bridge adjoining the plastron to the carapace, there are 4 scutes, each of which is perforated by a pore.

Kemp's ridley sea turtle habitat largely consists of sandy and muddy areas in shallow, nearshore waters less than 120 ft (37 m) deep, although they can also be found in deeper offshore waters. These areas support the primary prey species of the Kemp's ridley sea turtle, which consist of swimming crabs, but may also include fish, jellyfish, and an array of mollusks.

The primary range of Kemp's ridley sea turtles is within the Gulf of Mexico basin, though they also occur in coastal and offshore waters of the U.S. Atlantic Ocean. Juvenile Kemp's ridley sea turtles, possibly carried by oceanic currents, have been recorded as far north as Nova Scotia. Historic records indicate a nesting range from Mustang Island, Texas, in the north to Veracruz, Mexico, in the south. Kemp's ridley sea turtles have recently been nesting along the Atlantic Coast of the United States, with nests recorded from beaches in Florida, Georgia, and the Carolinas. In 2012, the first Kemp's ridley sea turtle nest was recorded in Virginia. The Kemp's ridley sea turtle nesting population had been exponentially increasing prior to the recent low nesting years, which may indicate that the population had been experiencing a similar increase. Additional nesting data in the coming years will be required to determine what the recent nesting decline means for the population trajectory.

Life History Information

Kemp's ridley sea turtles share a general life history pattern similar to other sea turtles. Females lay their eggs on coastal beaches where the eggs incubate in sandy nests. After 45-58 days of embryonic development, the hatchlings emerge and swim offshore into deeper, ocean water where they feed and grow until returning at a larger size. Hatchlings generally range from 1.65-1.89 in (42-48 mm) SCL, 1.26-1.73 in (32-44 mm) in width, and 0.3-0.4 lb (15-20 g) in weight. Their return to nearshore coastal habitats typically occurs around 2 years of age (Ogren 1989), although the time spent in the oceanic zone may vary from 1-4 years or perhaps more (TEWG 2000). Juvenile Kemp's ridley sea turtles use these nearshore coastal habitats from April through November, but they move towards more suitable overwintering habitat in deeper offshore waters (or more southern waters along the Atlantic coast) as water temperature drops.

The average rates of growth may vary by location, but generally fall within 2.2-2.9 ± 2.4 in per year (5.5-7.5 ± 6.2 cm/year) (Schmid and Barichivich 2006; Schmid and Woodhead 2000). Age to sexual maturity ranges greatly from 5-16 years, though NMFS et al. (2011) determined the best estimate of age to maturity for Kemp's ridley sea turtles was 12 years. It is unlikely that most adults grow very much after maturity. While some sea turtles nest annually, the weighted mean remigration rate for Kemp's ridley sea turtles is approximately 2 years. Nesting generally occurs from April to July. Females lay approximately 2.5 nests per season with each nest containing approximately 100 eggs (Márquez M. 1994).

Population Dynamics
Of the 7 species of sea turtles in the world, the Kemp's ridley sea turtle has declined to the lowest population level. Most of the population of adult females nest on the beaches of Rancho Nuevo, Mexico (Pritchard 1969). When nesting aggregations at Rancho Nuevo were discovered in 1947, adult female populations were estimated to be in excess of 40,000 individuals (Hildebrand 1963). By the mid-1980s, however, nesting numbers from Rancho Nuevo and adjacent Mexican beaches were below 1,000, with a low of 702 nests in 1985. Yet, nesting steadily increased through the 1990s, and then accelerated during the first decade of the twenty-first century (Figure 4), which indicated the species was recovering.

It is worth noting that when the Bi-National Kemp's Ridley Sea Turtle Population Restoration Project was initiated in 1978, only Rancho Nuevo nests were recorded. In 1988, nesting data from southern beaches at Playa Dos and Barra del Tordo were added. In 1989, data from the northern beaches of Barra Ostionales and Tepehuajes were added, and most recently in 1996, data from La Pesca and Altamira beaches were recorded. Currently, nesting at Rancho Nuevo accounts for just over 81% of all recorded Kemp's ridley sea turtle nests in Mexico. Following a significant, unexplained 1-year decline in 2010, Kemp's ridley sea turtle nests in Mexico increased to 21,797 in 2012 (Gladys Porter Zoo 2013). From 2013 through 2014, there was a second significant decline, as only 16,385 and 11,279 nests were recorded, respectively. More recent data, however, indicated an increase in nesting. In 2015 there were 14,006 recorded nests, and in 2016 overall numbers increased to 18,354 recorded nests (Gladys Porter Zoo 2016). There was a record high nesting season in 2017, with 24,570 nests recorded (J. Pena, pers. comm., August 31, 2017), but nesting for 2018 declined to 17,945, with another steep drop to 11,090 nests in 2019 (Gladys Porter Zoo data, 2019). Nesting numbers rebounded in 2020 (18,068 nests), 2021 (17,671 nests), and 2022 (17,418) (CONAMP data, 2022). At this time, it is unclear whether the increases and declines in nesting seen over the past decade-and-a-half represents a population oscillating around an equilibrium point, if the recent three years (2020-2022) of relatively steady nesting indicates that equilibrium point, or if nesting will decline or increase in the future. So at this point we can only conclude that the population has dramatically rebounded from the lows seen in the 80's and 90's, but we cannot ascertain a current population trend or trajectory.

A small nesting population is also emerging in the United States, primarily in Texas, rising from 6 nests in 1996 to 42 in 2004, to a record high of 353 nests in 2017 (National Park Service data). It is worth noting that nesting in Texas has somewhat paralleled the trends observed in Mexico, characterized by a significant decline in 2010, followed by a second decline in 2013-2014, but with a rebound in 2015, the record nesting in 2017, and then a drop back down to 190 nests in 2019, rebounding to 262 nests in 2020, back to 195 nests in 2021, and then rebounding to 284 nests in 2022 (National Park Service data).

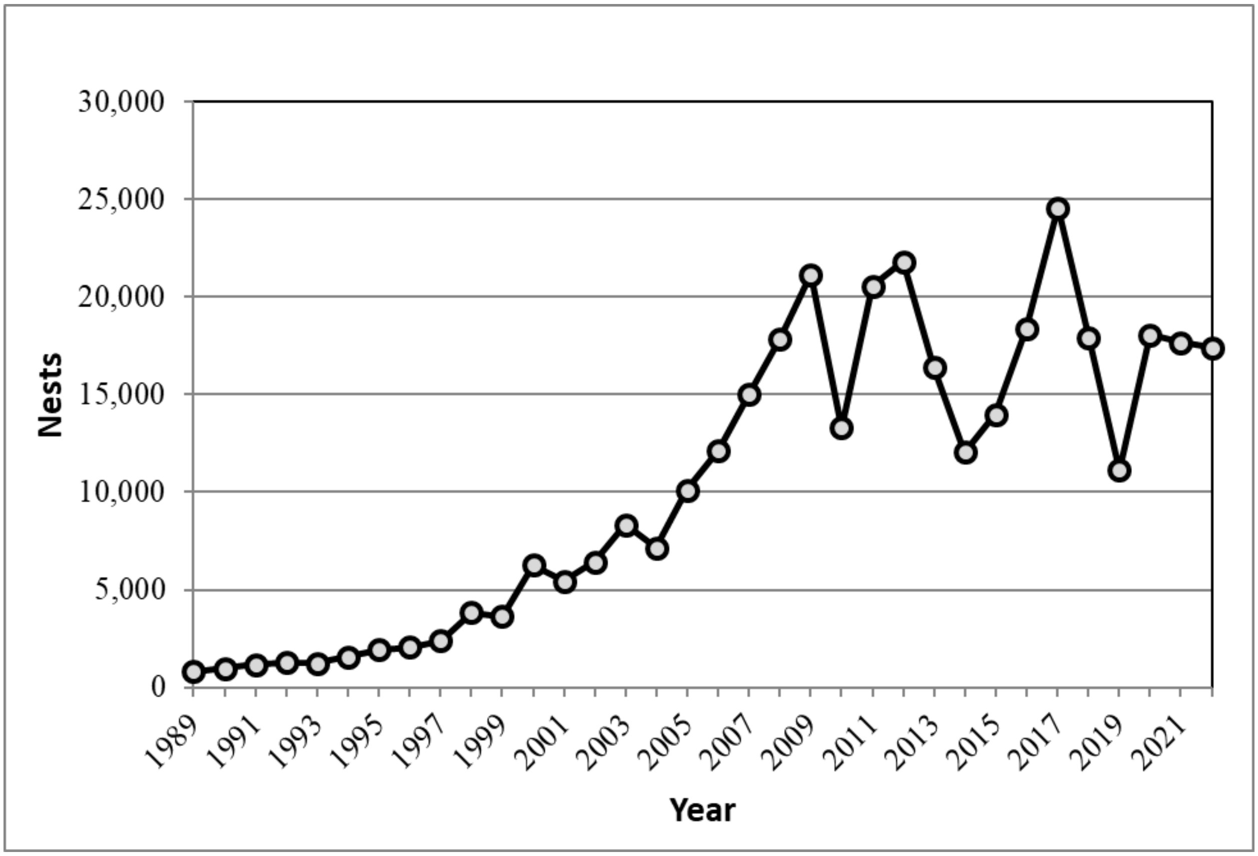

Figure 2. Kemp's ridley sea turtle nest totals from Mexican beaches (Gladys Porter Zoo nesting database 2019 and CONAMP data 2020-2022)

Through modelling, Heppell et al. (2005) predicted the population is expected to increase at least 12-16% per year and could reach at least 10,000 females nesting on Mexico beaches by 2015. NMFS et al. (2011) produced an updated model that predicted the population to increase 19% per year and to attain at least 10,000 females nesting on Mexico beaches by 2011. Approximately 25,000 nests would be needed for an estimate of 10,000 nesters on the beach, based on an average 2.5 nests/nesting female. While counts did not reach 25,000 nests by 2015, it is clear that the population has increased over the long term. The increases in Kemp's ridley sea turtle nesting are likely due to a combination of management measures including elimination of direct harvest, nest protection, the use of TEDs, reduced trawling effort in Mexico and the United States, and possibly other changes in vital rates (TEWG 1998; TEWG 2000). While these results are encouraging, the species' limited range as well as low global abundance makes it particularly vulnerable to new sources of mortality as well as demographic and environmental randomness, all factors which are often difficult to predict with any certainty. Additionally, the significant nesting declines observed in 2010 and 2013-2014 potentially indicate a serious population-level impact, and the ongoing recovery trajectory is unclear.

Threats

Kemp's ridley sea turtles face many of the same threats as other sea turtle species, including destruction of nesting habitat from storm events, oceanic events such as cold-stunning, pollution (plastics, petroleum products, petrochemicals, etc.), ecosystem alterations (nesting beach development, beach nourishment and shoreline stabilization, vegetation changes, etc.), poaching, global climate change, fisheries interactions, natural predation, and disease. A discussion on general sea turtle threats can be found in Section 4.1.1; the remainder of this section will expand on a few of the aforementioned threats and how they may specifically affect Kemp's ridley sea turtles.

As Kemp's ridley sea turtles continue to recover and nesting arribadas (massive, synchronized nesting events) are increasingly established, bacterial and fungal pathogens in nests are also likely to increase. Bacterial and fungal pathogen impacts have been well documented in the large arribadas of the olive ridley at Nancite in Costa Rica (Mo 1988). In some years, and on some sections of the beach, the hatching success can be as low as 5% (Mo 1988). As the Kemp's ridley sea turtle nest density at Rancho Nuevo and adjacent beaches continues to increase, appropriate monitoring of emergence success will be necessary to determine if there are any density-dependent effects.

Since 2010, we have documented (via the STSSN data, https://www.fisheries.noaa.gov/national/marine-life-distress/sea-turtle-stranding-and-salvage-network) elevated sea turtle strandings in the Northern Gulf of Mexico, particularly throughout the Mississippi Sound area. For example, in the first 3 weeks of June 2010, over 120 sea turtle strandings were reported from Mississippi and Alabama waters, none of which exhibited any signs of external oiling to indicate effects associated with the DWH oil spill event. A total of 644 sea turtle strandings were reported in 2010 from Louisiana, Mississippi, and Alabama waters, 561 (87%) of which were Kemp's ridley sea turtles. During March through May of 2011, 267 sea turtle strandings were reported from Mississippi and Alabama waters alone. A total of 525 sea turtle strandings were reported in 2011 from Louisiana, Mississippi, and Alabama waters, with the majority (455) having occurred from March through July, 390 (86%) of which were Kemp's ridley sea turtles. During 2012, a total of 384 sea turtles were reported from Louisiana, Mississippi, and Alabama waters. Of these reported strandings, 343 (89%) were Kemp's ridley sea turtles. During 2014, a total of 285 sea turtles were reported from Louisiana, Mississippi, and Alabama waters, though the data is incomplete. Of these reported strandings, 229 (80%) were Kemp's ridley sea turtles. These stranding numbers are significantly greater than reported in past years; Louisiana, Mississippi, and Alabama waters reported 42 and 73 sea turtle strandings for 2008 and 2009, respectively. In subsequent years stranding levels during the March-May time period have been elevated but have not reached the high levels seen in the early 2010s. It should be noted that stranding coverage has increased considerably due to the DWH oil spill event.

Nonetheless, considering that strandings typically represent only a small fraction of actual mortality, these stranding events potentially represent a serious impact to the recovery and survival of the local sea turtle populations. While a definitive cause for these strandings has not been identified, necropsy results indicate a significant number of stranded turtles from these events likely perished due to forced submergence, which is commonly associated with fishery interactions (B. Stacy, NMFS, pers. comm. to M. Barnette, NMFS PRD, March 2012). Yet, available information indicates fishery effort was extremely limited during the stranding events. The fact that 80% or more of all Louisiana, Mississippi, and Alabama stranded sea turtles in the past 5 years were Kemp's ridley sea turtles is notable; however, this could simply be a function of the species' preference for shallow, inshore waters coupled with increased population abundance, as reflected in recent Kemp's ridley sea turtle nesting increases.

In response to these strandings, and due to speculation that fishery interactions may be the cause, fishery observer effort was shifted to evaluate the inshore skimmer trawl fisheries beginning in 2012. During May-July of that year, observers reported 24 sea turtle interactions in the skimmer trawl fisheries. All but a single sea turtle were identified as a Kemp's ridley sea turtle (1 sea turtle was an unidentified hardshell turtle). The sea turtles encountered were all very small juvenile specimens, ranging from 7.6-19.0 in (19.4-48.3 cm) CCL. Subsequent years of observation noted additional captures in the skimmer trawl fisheries, including some mortalities. The small average size of Kemp's ridley sea turtles encountered introduces a potential conservation issue, as over 50% of these reported sea turtles could potentially pass through the maximum 4-in bar spacing of TEDs currently required in the shrimp fisheries. Due to this issue, a proposed 2012 rule to require 4-in bar spacing TEDs in the skimmer trawl fisheries (77 FR 27411) was not implemented. Following additional gear testing, however, we proposed a new rule in 2016 (81 FR 91097) to require TEDs with 3-in bar spacing for all vessels using skimmer trawls, pusher-head trawls, or wing nets. Ultimately, we published a final rule on December 20, 2019 (84 FR 70048), that requires all skimmer trawl vessels 40 ft and greater in length to use TEDs designed to exclude small sea turtles in their nets effective April 1, 2021. Given the nesting trends and habitat utilization of Kemp's ridley sea turtles, it is likely that fishery interactions in the Northern Gulf of Mexico may continue to be an issue of concern for the species, and one that may potentially slow the rate of recovery for Kemp's ridley sea turtles.

While oil spill impacts are discussed generally for all species in Section 4.1.1, specific impacts of the DWH oil spill event on Kemp's ridley sea turtles are considered here. Kemp's ridley sea turtles experienced the greatest negative impact stemming from the DWH oil spill event of any sea turtle species. Impacts to Kemp's ridley sea turtles occurred to offshore small juveniles, as well as large juveniles and adults. Loss of hatchling production resulting from injury to adult turtles was also estimated for this species. Injuries to adult turtles of other species, such as loggerhead sea turtles, certainly would have resulted in unrealized nests and hatchlings to those species as well. Yet, the calculation of unrealized nests and hatchlings was limited to Kemp's ridley sea turtle for several reasons. All Kemp's ridley sea turtles in the Gulf belong to the same population (NMFS et al. 2011), so total population abundance could be calculated based on numbers of hatchlings because all individuals that enter the population could reasonably be expected to inhabit the northern Gulf of Mexico throughout their lives (DWH Trustees 2016).

A total of 217,000 small juvenile Kemp's ridley sea turtles (51.5% of the total small juvenile sea turtle exposures to oil from the spill) were estimated to have been exposed to oil. That means approximately half of all small juvenile Kemp's ridley sea turtles from the total population estimate of 430,000 oceanic small juveniles were exposed to oil. Furthermore, a large number of small juveniles were removed from the population, as up to 90,300 small juveniles Kemp's ridley sea turtles are estimated to have died as a direct result of the exposure. Therefore, as much as 20% of the small oceanic juveniles of this species were killed during that year. Impacts to large juveniles (>3 years old) and adults were also high. An estimated 21,990 such individuals were exposed to oil (about 22% of the total estimated population for those age classes); of those, 3,110 mortalities were estimated (or 3% of the population for those age classes). The loss of near-reproductive and reproductive-stage females would have contributed to some extent to the decline in total nesting abundance observed between 2011 and 2014. The estimated number of unrealized Kemp's ridley sea turtle nests is between 1,300 and 2,000, which translates to between approximately 65,000 and 95,000 unrealized hatchlings (DWH Trustees 2016). This is a minimum estimate, however, because the sublethal effects of the DWH oil spill event on turtles, their prey, and their habitats might have delayed or reduced reproduction in subsequent years, which may have contributed substantially to additional nesting deficits observed following the DWH oil spill event. These sublethal effects could have slowed growth and maturation rates, increased remigration intervals, and decreased clutch frequency (number of nests per female per nesting season). The nature of the DWH oil spill event effect on reduced Kemp's ridley sea turtle nesting abundance and associated hatchling production after 2010 requires further evaluation. It is clear that the DWH oil spill event resulted in large losses to the Kemp's ridley sea turtle population across various age classes, and likely had an important population-level effect on the species. Still, we do not have a clear understanding of those impacts on the population trajectory for the species into the future.

4.1.3 Loggerhead Sea Turtle – Northwest Atlantic DPS

The loggerhead sea turtle was listed as a threatened species throughout its global range on July 28, 1978. NMFS and USFWS published a final rule which designated 9 DPSs for loggerhead sea turtles (76 FR 58868, September 22, 2011, and effective October 24, 2011). This rule listed the following DPSs: (1) Northwest Atlantic Ocean (threatened), (2) Northeast Atlantic Ocean (endangered), (3) South Atlantic Ocean (threatened), (4) Mediterranean Sea (endangered), (5) North Pacific Ocean (endangered), (6) South Pacific Ocean (endangered), (7) North Indian Ocean (endangered), (8) Southeast Indo-Pacific Ocean (endangered), and (9) Southwest Indian Ocean (threatened). The Northwest Atlantic DPS is the only one that occurs within the action area, and therefore it is the only one considered in this Opinion.

Species Description and Distribution
Loggerheads are large sea turtles. Adults in the southeast United States average about 3 ft (92 cm) long, measured as a SCL, and weigh approximately 255 lb (116 kg) (Ehrhart and Yoder 1978). Adult and subadult loggerhead sea turtles typically have a light yellow plastron and a reddish brown carapace covered by non-overlapping scutes that meet along seam lines. They typically have 11 or 12 pairs of marginal scutes, 5 pairs of costals, 5 vertebrals, and a nuchal (precentral) scute that is in contact with the first pair of costal scutes (Dodd Jr. 1988).

The loggerhead sea turtle inhabits continental shelf and estuarine environments throughout the temperate and tropical regions of the Atlantic, Pacific, and Indian Oceans (Dodd Jr. 1988). Habitat uses within these areas vary by life stage. Juveniles are omnivorous and forage on crabs, mollusks, jellyfish, and vegetation at or near the surface (Dodd Jr. 1988). Subadult and adult loggerheads are primarily found in coastal waters and eat benthic invertebrates such as mollusks and decapod crustaceans in hard bottom habitats.

The majority of loggerhead nesting occurs at the western rims of the Atlantic and Indian Oceans concentrated in the north and south temperate zones and subtropics (NRC 1990). For the Northwest Atlantic DPS, most nesting occurs along the coast of the United States, from southern Virginia to Alabama. Additional nesting beaches for this DPS are found along the northern and western Gulf of Mexico, eastern Yucatán Peninsula, at Cay Sal Bank in the eastern Bahamas (Addison 1997; Addison and Morford 1996), off the southwestern coast of Cuba (Gavilan 2001), and along the coasts of Central America, Colombia, Venezuela, and the eastern Caribbean Islands.

Non-nesting, adult female loggerheads are reported throughout the U.S. Atlantic, Gulf of Mexico, and Caribbean Sea. Little is known about the distribution of adult males who are seasonally abundant near nesting beaches. Aerial surveys suggest that loggerheads as a whole are distributed in U.S. waters as follows: 54% off the southeast U.S. coast, 29% off the northeast U.S. coast, 12% in the eastern Gulf of Mexico, and 5% in the western Gulf of Mexico (TEWG 1998).

Within the Northwest Atlantic DPS, most loggerhead sea turtles nest from North Carolina to Florida and along the Gulf Coast of Florida. Previous Section 7 analyses have recognized at least 5 western Atlantic subpopulations, divided geographically as follows: (1) a Northern nesting subpopulation, occurring from North Carolina to northeast Florida at about 29ºN; (2) a South Florida nesting subpopulation, occurring from 29°N on the east coast of the state to Sarasota on the west coast; (3) a Florida Panhandle nesting subpopulation, occurring at Eglin Air Force Base and the beaches near Panama City, Florida; (4) a Yucatán nesting subpopulation, occurring on the eastern Yucatán Peninsula, Mexico (Márquez M. 1990; TEWG 2000); and (5) a Dry Tortugas nesting subpopulation, occurring in the islands of the Dry Tortugas, near Key West, Florida (NMFS 2001).

The recovery plan for the Northwest Atlantic population of loggerhead sea turtles concluded that there is no genetic distinction between loggerheads nesting on adjacent beaches along the Florida Peninsula. It also concluded that specific boundaries for subpopulations could not be designated based on genetic differences alone. Thus, the recovery plan uses a combination of geographic distribution of nesting densities, geographic separation, and geopolitical boundaries, in addition to genetic differences, to identify recovery units. The recovery units are as follows: (1) the Northern Recovery Unit (Florida/Georgia border north through southern Virginia), (2) the Peninsular Florida Recovery Unit (Florida/Georgia border through Pinellas County, Florida), (3) the Dry Tortugas Recovery Unit (islands located west of Key West, Florida), (4) the Northern Gulf of Mexico Recovery Unit (Franklin County, Florida, through Texas), and (5) the Greater Caribbean Recovery Unit (Mexico through French Guiana, the Bahamas, Lesser Antilles, and Greater Antilles) (NMFS and USFWS 2008). The recovery plan concluded that all recovery units are essential to the recovery of the species. Although the recovery plan was written prior to the listing of the Northwest Atlantic DPS, the recovery units for what was then termed the Northwest Atlantic population apply to the Northwest Atlantic DPS.

Life History Information
The Northwest Atlantic Loggerhead Recovery Team defined the following 8 life stages for the loggerhead life cycle, which include the ecosystems those stages generally use: (1) egg (terrestrial zone), (2) hatchling stage (terrestrial zone), (3) hatchling swim frenzy and transitional stage (neritic zone- nearshore marine environment from the surface to the sea floor where water depths do not exceed 200 meters), (4) juvenile stage (oceanic zone), (5) juvenile stage (neritic zone), (6) adult stage (oceanic zone), (7) adult stage (neritic zone), and (8) nesting female (terrestrial zone) (NMFS and USFWS 2008). Loggerheads are long-lived animals. They reach sexual maturity between 20-38 years of age, although age of maturity varies widely among populations (Frazer and Ehrhart 1985; NMFS 2001). The annual mating season occurs from late March to early June, and female turtles lay eggs throughout the summer months. Females deposit an average of 4.1 nests within a nesting season (Murphy and Hopkins 1984), but an individual female only nests every 3.7 years on average (Tucker 2010). Each nest contains an average of 100-126 eggs (Dodd Jr. 1988) which incubate for 42-75 days before hatching (NMFS and USFWS 2008). Loggerhead hatchlings are 1.5-2 inches long and weigh about 0.7 oz (20 g).

As post-hatchlings, loggerheads hatched on U.S. beaches enter the "oceanic juvenile" life stage, migrating offshore and becoming associated with *Sargassum* habitats, driftlines, and other convergence zones (Carr 1986; Conant et al. 2009; Witherington 2002). Oceanic juveniles grow at rates of 1-2 inches (2.9-5.4 cm) per year (Bjorndal et al. 2003; Snover 2002) over a period as long as 7-12 years (Bolten et al. 1998) before moving to more coastal habitats. Studies have suggested that not all loggerhead sea turtles follow the model of circumnavigating the North Atlantic Gyre as pelagic juveniles, followed by permanent settlement into benthic environments (Bolten and Witherington 2003; Laurent et al. 1998). These studies suggest some turtles may either remain in the oceanic habitat in the North Atlantic longer than hypothesized, or they move back and forth between oceanic and coastal habitats interchangeably (Witzell 2002). Stranding records indicate that when immature loggerheads reach 15-24 in (40-60 cm) SCL, they begin to reside in coastal inshore waters of the continental shelf throughout the U.S. Atlantic and Gulf of Mexico (Witzell 2002).

After departing the oceanic zone, neritic juvenile loggerheads in the Northwest Atlantic inhabit continental shelf waters from Cape Cod Bay, Massachusetts, south through Florida, the Bahamas, Cuba, and the Gulf of Mexico. Estuarine waters of the United States, including areas such as Long Island Sound, Chesapeake Bay, Pamlico and Core Sounds, Mosquito and Indian River Lagoons, Biscayne Bay, Florida Bay, as well as numerous embayments fringing the Gulf of Mexico, comprise important inshore habitat. Along the Atlantic and Gulf of Mexico shoreline, essentially all shelf waters are inhabited by loggerheads (Conant et al. 2009).

Like juveniles, non-nesting adult loggerheads also use the neritic zone. However, these adult loggerheads do not use the relatively enclosed shallow-water estuarine habitats with limited ocean access as frequently as juveniles. Areas such as Pamlico Sound, North Carolina, and Indian River Lagoon, Florida, are regularly used by juveniles but not by adult loggerheads. Adult loggerheads do tend to use estuarine areas with more open ocean access, such as the Chesapeake Bay in the U.S. mid-Atlantic. Shallow-water habitats with large expanses of open ocean access, such as Florida Bay, provide year-round resident foraging areas for significant numbers of male and female adult loggerheads (Conant et al. 2009).

Offshore, adults primarily inhabit continental shelf waters, from New York south through Florida, The Bahamas, Cuba, and the Gulf of Mexico. Seasonal use of mid-Atlantic shelf waters, especially offshore New Jersey, Delaware, and Virginia during summer months, and offshore shelf waters, such as Onslow Bay (off the North Carolina coast), during winter months has also been documented (Hawkes et al. 2007) Georgia Department of Natural Resources [GADNR], unpublished data; South Carolina Department of Natural Resources [SCDNR], unpublished data). Satellite telemetry has identified the shelf waters along the west Florida coast, the Bahamas, Cuba, and the Yucatán Peninsula as important resident areas for adult female loggerheads that nest in Florida (Foley et al. 2008; Girard et al. 2009; Hart et al. 2012). The southern edge of the Grand Bahama Bank is important habitat for loggerheads nesting on the Cay Sal Bank in the Bahamas, but nesting females are also resident in the bights of Eleuthera, Long Island, and Ragged Islands. They also reside in Florida Bay in the United States, and along the north coast of Cuba (A. Bolten and K. Bjorndal, University of Florida, unpublished data). Moncada et al. (2010) report the recapture of 5 adult female loggerheads in Cuban waters originally flipper-tagged in Quintana Roo, Mexico, which indicates that Cuban shelf waters likely also provide foraging habitat for adult females that nest in Mexico.

Status and Population Dynamics
A number of stock assessments and similar reviews (Conant et al. 2009; Heppell et al. 2003; NMFS-SEFSC 2009; NMFS 2001; NMFS and USFWS 2008; TEWG 1998; TEWG 2000; TEWG 2009) have examined the stock status of loggerheads in the Atlantic Ocean, but none have been able to develop a reliable estimate of absolute population size.

Numbers of nests and nesting females can vary widely from year to year. Nesting beach surveys, though, can provide a reliable assessment of trends in the adult female population, due to the strong nest site fidelity of female loggerhead sea turtles, as long as such studies are sufficiently long and survey effort and methods are standardized (e.g., NMFS and USFWS 2008). NMFS and USFWS (2008) concluded that the lack of change in 2 important demographic parameters of loggerheads, remigration interval and clutch frequency, indicate that time series on numbers of nests can provide reliable information on trends in the female population.

Peninsular Florida Recovery Unit
The Peninsular Florida Recovery Unit (PFRU) is the largest loggerhead nesting assemblage in the Northwest Atlantic. A near-complete nest census (all beaches including index nesting beaches) undertaken from 1989 to 2007 showed an average of 64,513 loggerhead nests per year, representing approximately 15,735 nesting females per year (NMFS and USFWS 2008). The statewide estimated total for 2020 was 105,164 nests (FWRI nesting database).

In addition to the total nest count estimates, the FWRI uses an index nesting beach survey method. The index survey uses standardized data-collection criteria to measure seasonal nesting and allow accurate comparisons between beaches and between years. FWRI uses the standardized index survey data to analyze the nesting trends (Figure 3) (https://myfwc.com/research/wildlife/sea-turtles/nesting/beach-survey-totals/). Since the beginning of the index program in 1989, 3 distinct trends were identified. From 1989-1998, there was a 24% increase that was followed by a sharp decline over the subsequent 9 years. A large increase in loggerhead nesting has occurred since, as indicated by the 71% increase in nesting over the 10-year period from 2007 and 2016. Nesting in 2016 also represented a new record for loggerheads on the core index beaches. While nest numbers subsequently declined from the 2016 high FWRI noted that the 2007-2021 period represents a period of increase. FWRI examined the trend from the 1998 nesting high through 2016 and found that the decade-long post-1998 decline was replaced with a slight but non-significant increasing trend. Looking at the data from 1989 through 2016, FWRI concluded that there was an overall positive change in the nest counts although it was not statistically significant due to the wide variability between 2012-2016 resulting in widening confidence intervals. Nesting at the core index beaches declined in 2017 to 48,033, and rose again each year through 2020, reaching 53,443 nests, dipping back to 49,100 in 2021, and then in 2022 reaching the second-highest number since the survey began, with 62,396 nests. It is important to note that with the wide confidence intervals and uncertainty around the variability in nesting parameters (changes and variability in nests/female, nesting intervals, etc.) it is unclear whether the nesting trend equates to an increase in the population or nesting females over that time frame (Ceriani, et al. 2019).

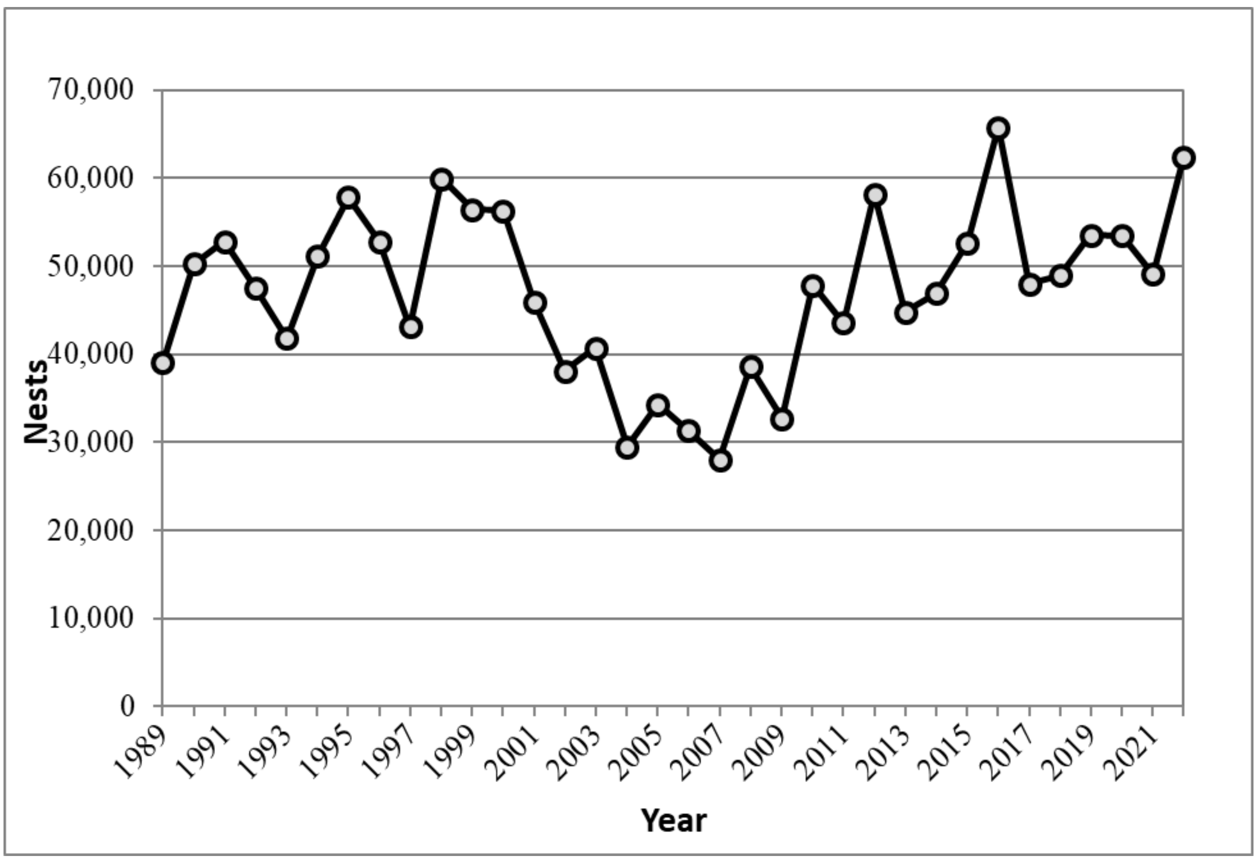

Figure 3. Loggerhead sea turtle nesting at Florida index beaches since 1989

<u>Northern Recovery Unit</u>

Annual nest totals from beaches within the Northern Recovery Unit (NRU) averaged 5,215 nests from 1989-2008, a period of near-complete surveys of NRU nesting beaches (GADNR unpublished data, NCWRC unpublished data, SCDNR unpublished data), and represent approximately 1,272 nesting females per year, assuming 4.1 nests per female (Murphy and Hopkins 1984). The loggerhead nesting trend from daily beach surveys showed a significant decline of 1.3% annually from 1989-2008. Nest totals from aerial surveys conducted by SCDNR showed a 1.9% annual decline in nesting in South Carolina from 1980-2008. Overall, there are strong statistical data to suggest the NRU had experienced a long-term decline over that period of time.

Data since that analysis (Table 2) are showing improved nesting numbers and a departure from the declining trend. Georgia nesting has rebounded to show the first statistically significant increasing trend since comprehensive nesting surveys began in 1989 (Mark Dodd, GADNR press release, https://georgiawildlife.com/loggerhead-nest-season-begins-where-monitoring-began). South Carolina and North Carolina nesting have also begun to shift away from the past declining trend. Loggerhead nesting in Georgia, South Carolina, and North Carolina all broke records in 2015 and then topped those records again in 2016. Nesting in 2017 and 2018 declined relative to 2016, back to levels seen in 2013 to 2015, but then bounced back in 2019, breaking records for each of the three states and the overall recovery unit. Nesting in 2020 and 2021 declined from the 2019 records, but still remained high, representing the third and fourth highest total numbers for the NRU since 2008. In 2022 Georgia loggerhead nesting broke the record at 4,071, while South Carolina and North Carolina nesting were both at the second-highest level recorded.

Table 2. Total Number of NRU Loggerhead Nests (GADNR, SCDNR, and NCWRC nesting datasets compiled at Seaturtle.org)

Year	Georgia	South Carolina	North Carolina	Totals
2008	1,649	4,500	841	**6,990**
2009	998	2,182	302	**3,472**
2010	1,760	3,141	856	**5,757**
2011	1,992	4,015	950	**6,957**
2012	2,241	4,615	1,074	**7,930**
2013	2,289	5,193	1,260	**8,742**
2014	1,196	2,083	542	**3,821**
2015	2,319	5,104	1,254	**8,677**
2016	3,265	6,443	1,612	**11,320**
2017	2,155	5,232	1,195	**8,582**
2018	1,735	2,762	765	**5,262**
2019	3,945	8,774	2,291	**15,010**
2020	2,786	5,551	1,335	**9,672**
2021	2,493	5,639	1,448	**9,580**
2022	4,071	7,970	1,906	**13,947**

In addition to the statewide nest counts, South Carolina also conducts an index beach nesting survey similar to the one described for Florida. Although the survey only includes a subset of nesting, the standardized effort and locations allow for a better representation of the nesting trend over time. Increases in nesting were seen for the period from 2009-2013, with a subsequent steep drop in 2014. Nesting then rebounded in 2015 and 2016, setting new highs each of those years. Nesting in 2017 dropped back down from the 2016 high, but was still the second highest on record. After another drop in 2018, a new record was set for the 2019 season, with a return to 2016 levels in 2020 and 2021 and then a rebound to the second highest level on record in 2022 (Figure 4).

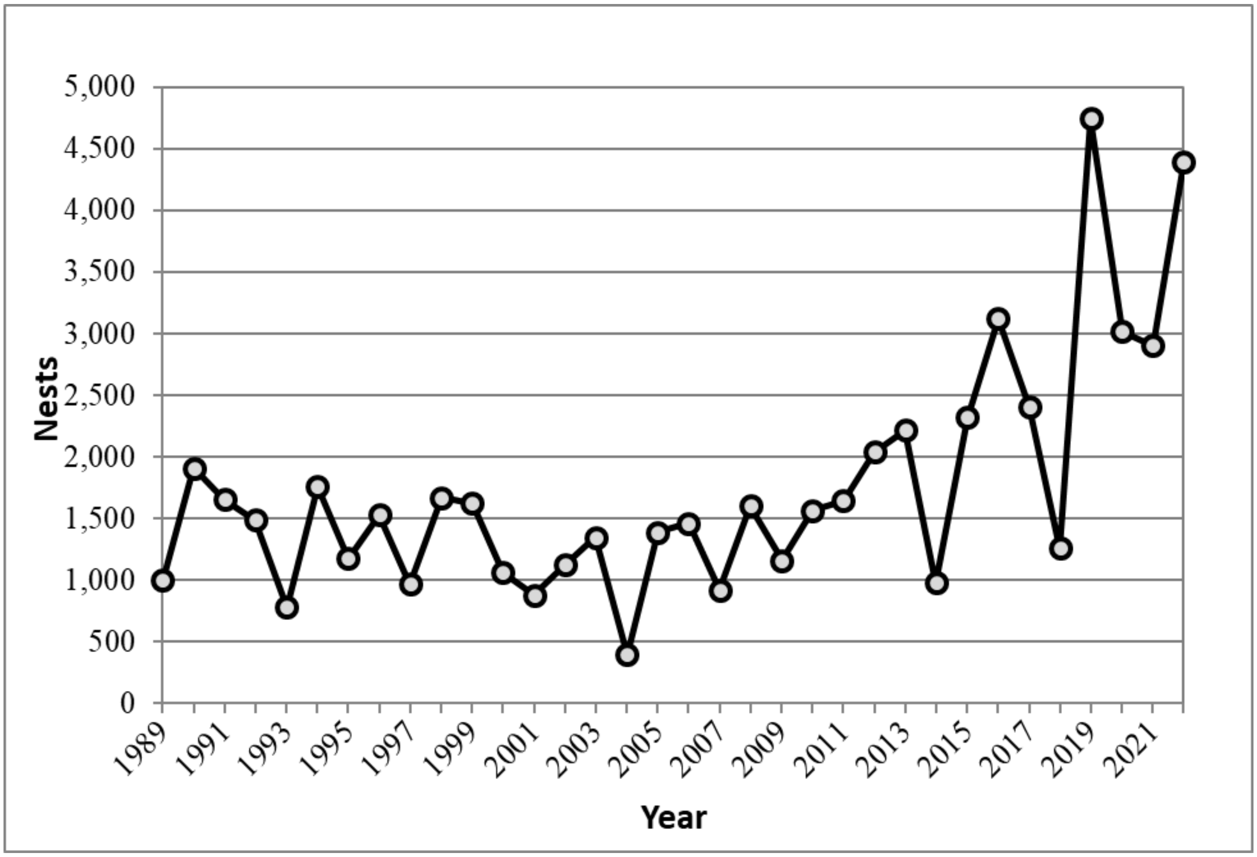

Figure 4. South Carolina index nesting beach counts for loggerhead sea turtles (data provided by SCDNR).

Other Northwest Atlantic DPS Recovery Units

The remaining 3 recovery units – Dry Tortugas (DTRU), Northern Gulf of Mexico (NGMRU), and Greater Caribbean (GCRU) – are much smaller nesting assemblages, but they are still considered essential to the continued existence of the species. Nesting surveys for the DTRU are conducted as part of Florida's statewide survey program. Survey effort was relatively stable during the 9-year period from 1995-2004, although the 2002 year was missed. Nest counts ranged from 168-270, with a mean of 246, but there was no detectable trend during this period (NMFS and USFWS 2008). Nest counts for the NGMRU are focused on index beaches rather than all beaches where nesting occurs. Analysis of the 12-year dataset (1997-2008) of index nesting beaches in the area shows a statistically significant declining trend of 4.7% annually. Nesting on the Florida Panhandle index beaches, which represents the majority of NGMRU nesting, had shown a large increase in 2008, but then declined again in 2009 and 2010 before rising back to a level similar to the 2003-2007 average in 2011. From 1989-2018 the average number of NGMRU nests annually on index beaches was 169 nests, with an average of 1100 counted in the statewide nesting counts (Ceriani et al. 2019). Nesting survey effort has been inconsistent among the GCRU nesting beaches, and no trend can be determined for this subpopulation (NMFS and USFWS 2008). Zurita et al. (2003) found a statistically significant increase in the number of nests on 7 of the beaches on Quintana Roo, Mexico, from 1987-2001, where survey effort was consistent during the period. Nonetheless, nesting has declined since 2001, and the previously reported increasing trend appears to not have been sustained (NMFS and USFWS 2008).

In-water Trends

Nesting data are the best current indicator of sea turtle population trends, but in-water data also provide some insight. In-water research suggests the abundance of neritic juvenile loggerheads is steady or increasing. Although Ehrhart et al. (2007) found no significant regression-line trend in a long-term dataset, researchers have observed notable increases in catch per unit effort (CPUE) (Arendt et al. 2009; Ehrhart et al. 2007; Epperly et al. 2007). Researchers believe that this increase in CPUE is likely linked to an increase in juvenile abundance, although it is unclear whether this increase in abundance represents a true population increase among juveniles or merely a shift in spatial occurrence. Bjorndal et al. (2005), cited in NMFS and USFWS (2008), caution about extrapolating localized in-water trends to the broader population and relating localized trends in neritic sites to population trends at nesting beaches. The apparent overall increase in the abundance of neritic loggerheads in the southeastern United States may be due to increased abundance of the largest oceanic/neritic juveniles (historically referred to as small benthic juveniles), which could indicate a relatively large number of individuals around the same age may mature in the near future (TEWG 2009). In-water studies throughout the eastern United States, however, indicate a substantial decrease in the abundance of the smallest oceanic/neritic juvenile loggerheads, a pattern corroborated by stranding data (TEWG 2009).

Population Estimate

The NMFS Southeast Fisheries Science Center developed a preliminary stage/age demographic model to help determine the estimated impacts of mortality reductions on loggerhead sea turtle population dynamics (NMFS-SEFSC 2009). The model uses the range of published information for the various parameters including mortality by stage, stage duration (years in a stage), and fecundity parameters such as eggs per nest, nests per nesting female, hatchling emergence success, sex ratio, and remigration interval. Resulting trajectories of model runs for each individual recovery unit, and the western North Atlantic population as a whole, were found to be very similar. The model run estimates from the adult female population size for the western North Atlantic (from the 2004-2008 time frame), suggest the adult female population size is approximately 20,000-40,000 individuals, with a low likelihood of females' numbering up to 70,000 (NMFS-SEFSC 2009). A less robust estimate for total benthic females in the western North Atlantic was also obtained, yielding approximately 30,000-300,000 individuals, up to less than 1 million (NMFS-SEFSC 2009). A preliminary regional abundance survey of loggerheads within the northwestern Atlantic continental shelf for positively identified loggerhead in all strata estimated about 588,000 loggerheads (interquartile range of 382,000-817,000). When correcting for unidentified turtles in proportion to the ratio of identified turtles, the estimate increased to about 801,000 loggerheads (interquartile range of 521,000-1,111,000) (NMFS-NEFSC 2011).

Threats (Specific to Loggerhead Sea Turtles)

The threats faced by loggerhead sea turtles are well summarized in the general discussion of threats in Section 4.1.1. Yet the impact of fishery interactions is a point of further emphasis for this species. The joint NMFS and USFWS Loggerhead Biological Review Team determined that the greatest threats to the Northwest Atlantic DPS of loggerheads result from cumulative fishery bycatch in neritic and oceanic habitats (Conant et al. 2009).

Regarding the impacts of pollution, loggerheads may be particularly affected by organochlorine contaminants; they have the highest organochlorine concentrations (Storelli et al. 2008) and metal loads (D'Ilio et al. 2011) in sampled tissues among the sea turtle species. It is thought that dietary preferences were likely to be the main differentiating factor among sea turtle species. Storelli et al. (2008) analyzed tissues from stranded loggerhead sea turtles and found that mercury accumulates in sea turtle livers while cadmium accumulates in their kidneys, as has been reported for other marine organisms like dolphins, seals, and porpoises (Law et al. 1991).

While oil spill impacts are discussed generally for all species in Section 4.1.1, specific impacts of the DWH oil spill event on loggerhead sea turtles are considered here. Impacts to loggerhead sea turtles occurred to offshore small juveniles as well as large juveniles and adults. A total of 30,800 small juvenile loggerheads (7.3% of the total small juvenile sea turtle exposures to oil from the spill) were estimated to have been exposed to oil. Of those exposed, 10,700 small juveniles are estimated to have died as a result of the exposure. In contrast to small juveniles, loggerheads represented a large proportion of the adults and large juveniles exposed to and killed by the oil. There were 30,000 exposures (almost 52% of all exposures for those age/size classes) and 3,600 estimated mortalities. A total of 265 nests (27,618 eggs) were also translocated during response efforts, with 14,216 hatchlings released, the fate of which is unknown (DWH Trustees 2016). Additional unquantified effects may have included inhalation of volatile compounds, disruption of foraging or migratory movements due to surface or subsurface oil, ingestion of prey species contaminated with oil and/or dispersants, and loss of foraging resources which could lead to compromised growth and/or reproductive potential. There is no information currently available to determine the extent of those impacts, if they occurred.

Unlike Kemp's ridley sea turtles, the majority of nesting for the loggerhead Northwest Atlantic DPS occurs on the Atlantic coast and, thus, loggerheads were impacted to a relatively lesser degree. However, it is likely that impacts to the NGMRU of the Northwest Atlantic DPS would be proportionally much greater than the impacts occurring to other recovery units. Impacts to nesting and oiling effects on a large proportion of the NGMRU recovery unit, especially mating and nesting adults likely had an impact on the NGMRU. Based on the response injury evaluations for Florida Panhandle and Alabama nesting beaches (which fall under the NFMRU), the DWH Trustees (2016) estimated that approximately 20,000 loggerhead hatchlings were lost due to DWH oil spill response activities on nesting beaches. Although the long-term effects remain unknown, the DWH oil spill event impacts to the Northern Gulf of Mexico Recovery Unit may result in some nesting declines in the future due to a large reduction of oceanic age classes during the DWH oil spill event. Although adverse impacts occurred to loggerheads, the proportion of the population that is expected to have been exposed to and directly impacted by the DWH oil spill event is relatively low. Thus we do not believe a population-level impact occurred due to the widespread distribution and nesting location outside of the Gulf of Mexico for this species.

Specific information regarding potential climate change impacts on loggerheads is also available. Modeling suggests an increase of 2°C in air temperature would result in a sex ratio of over 80% female offspring for loggerheads nesting near Southport, North Carolina. The same increase in air temperatures at nesting beaches in Cape Canaveral, Florida, would result in close to 100% female offspring. Such highly skewed sex ratios could undermine the reproductive capacity of the species. More ominously, an air temperature increase of 3°C is likely to exceed the thermal threshold of most nests, leading to egg mortality (Hawkes et al. 2007). Warmer sea surface temperatures have also been correlated with an earlier onset of loggerhead nesting in the spring (Hawkes et al. 2007; Weishampel et al. 2004), short inter-nesting intervals (Hays et al. 2002), and shorter nesting seasons (Pike et al. 2006).

4.2 Giant Manta Ray

The giant manta ray (*Manta birostris*) is listed as a threatened species under the ESA (83 FR 2916, January 22, 2018). Critical habitat for the giant manta ray is not designated (84 FR 66652; December 5, 2019).

Description and Distribution
The giant manta ray is the largest living ray species, attaining a maximum size of 700 cm DW with anecdotal reports up to 910 cm DW (Compagno 1999; Alava et al. 2002). Males mature at 350-400 cm DW and females mature at 380-500 cm DW (White et al. 2006; Last et al. 2016; Stevens et al. 2018). The species is recognized by its large diamond-shaped body with elongated wing-like pectoral fins, ventrally placed gill slits, laterally placed eyes, and wide terminal mouth. In front of the mouth, it has two structures called cephalic lobes that extend and help to introduce water into the mouth for feeding activities (making them the only vertebrate animals with three paired appendages). The giant manta ray has two distinct color types: chevron (mostly black back dorsal side and white ventral side) and black (almost completely black on both ventral and dorsal sides). Most of the chevron variants have a black dorsal surface and a white ventral surface with distinct patterns on the underside that can be used to identify individuals. There are bright white shoulder markings on the dorsal side that form two mirror image right-angle triangles, creating a T-shape on the upper shoulders.

The giant manta ray primarily feds on planktonic organisms such as euphausiids, copepods, mysids, decapod larvae and shrimp, but some studies have noted their consumption of small and moderately sized fishes.

The giant manta ray's reproduction is aplacental viviparous with a single large pup of 122-200 cm DW (White et al. 2006; Rambahiniarison et al. 2018). Reproductive periodicity is unknown, but assumed to be 4-5 years, similar to the closely related reef manta ray. Female age-at-maturity is estimated as 8.6 years of age, but first pregnancy may be delayed by up to 4 years (making first age of pregnancy 12 years) depending upon food availability (Rambahiniarison et al. 2018). The maximum age is estimated as 45 years, based on the longevity of the reef manta ray; generation length is therefore estimated as 29 years. Based on this life history, the maximum intrinsic rate of population increase could range between 0.019 and 0.046 per year (median 0.032 per year) (J. Carlson unpubl. data 2019, following methods in Dulvy et al. 2014). The species is among the longest-living ray species and has an extremely conservative life history; the average giant manta ray may produce only 4 to 7 pups during its estimated lifespan, which would contribute to the species' slow recovery from population reductions due to over-exploitation or other threats.

The giant manta ray is circumglobal in tropical and temperate waters from the surface to 1,000 m depth (Last et al. 2016). Within the Northern hemisphere, the species has been documented as far north as southern California and New Jersey on the U.S. west and east coasts, respectively, and Mutsu Bay, Aomori, Japan, the Sinai Peninsula and Arabian Sea, Egypt, and the Azores Islands. Within the Southern Hemisphere, the species occurs as far south as Peru, Uruguay, South Africa, New Zealand and French Polynesia (Lawson et al. 2017; Figure 1).

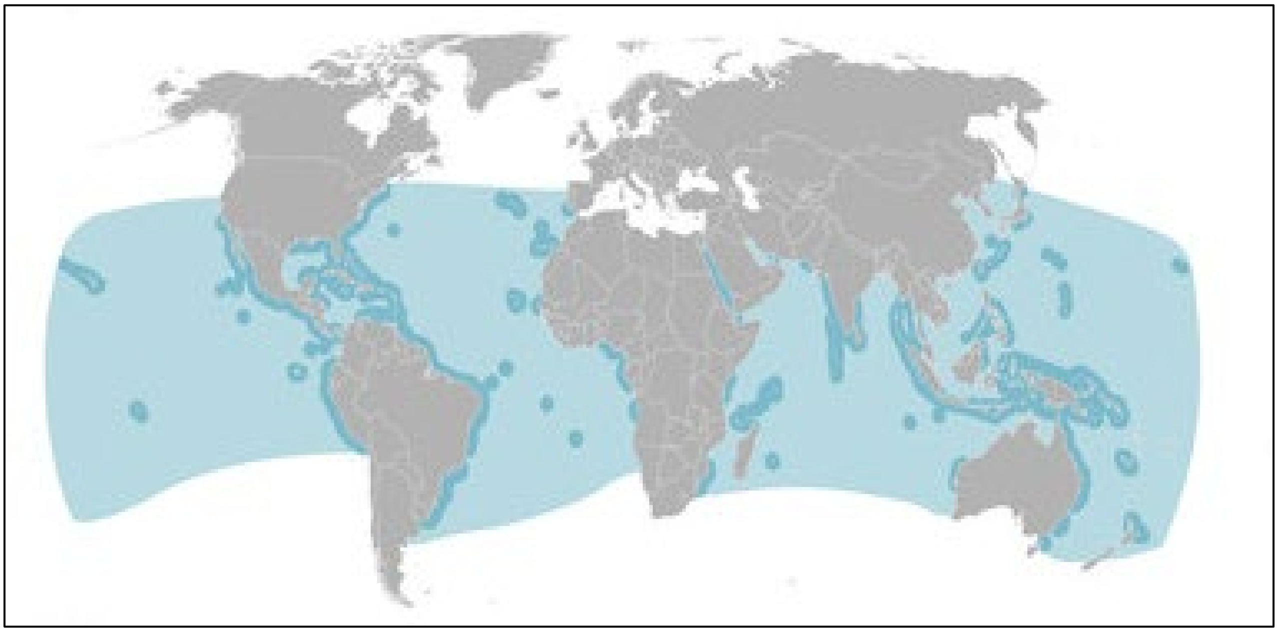

Figure 5. The Extent of Occurrence (dark blue) and Area of Occupancy (light blue) for giant manta ray, based on species distribution (Lawson et al. 2017).

The giant manta ray is a neritic and oceanic pelagic ray that occurs in places with regular upwelling along coastlines, oceanic islands, and offshore pinnacles and seamounts (Marshall et al. 2009). The giant manta ray can exhibit diel patterns in habitat use, moving inshore during the day to clean and socialize in shallow waters, and then moving offshore at night to feed to depths of 1,000 m (Hearn et al. 2014; Burgess 2017). The giant manta ray appears to exhibit a high degree of plasticity in terms of its use of depths within its habitat. Tagging studies have shown that the giant manta rays conduct night descents from 200-450 m depths (Rubin et al. 2008; Stewart et al. 2016) and are capable of diving to depths exceeding 1,000 m (Marshall et al. 2011). Stewart et al. (2016) found diving behavior may be influenced by season, and more specifically, shifts in prey location associated with the thermocline, with tagged giant manta rays (n=4) observed spending a greater proportion of time at the surface from April to June and in deeper waters from August to September.

Seasonal upwelling events concentrate zooplankton, creating patches of high productivity, which in turn may drive the seasonal occurrence and peaks in giant manta ray sightings. Small-scale movements also appear to be associated with exploiting local prey patches in addition to refuging and cleaning activities (O'Shea et al. 2010; Marshall et al. 2011; Graham et al. 2012; Rohner et al. 2013; Stewart et al. 2016a; Stewart et al. 2016b). Studies indicate that giant manta rays have a more complex depth profile of their foraging habitat than previously thought, and may actually be supplementing their diet with the observed opportunistic feeding in near-surface waters (Burgess et al. 2016; Couturier et al. 2013). However, not all giant manta ray subpopulations are defined by seasonal sightings. Studied subpopulations that have more regular sightings include: the Similan Islands (Thailand); Raja Ampat (Indonesia); northeast North Island (New Zealand); Kona, Hawaii (USA); Laje de Santos Marine Park (Brazil); Isla de la Plata (Ecuador); Ogasawara Islands (Japan); Isla Margarita and Puerto la Cruz (Venezuela); Isla Holbox, Revillagigedo Islands, and Bahia de Banderas, Mexico, southeast Florida; and in the Flower Garden Banks of the Gulf of Mexico (Notarbartolo di-Sciara and Hillyer 1989; Homma et al. 1999; Duffy and Abbott 2003; Luiz et al. 2009; Clark 2010; Kashiwagi et al. 2010; Marshall et al. 2011; Pate and Marshall 2021; Stewart et al. 2016ab.). Stewart et al. (2016a) suggest that habitats used by giant manta rays include both nearshore and offshore locations, and that the core spatial distribution of giant manta ray subpopulations encompass both types of habitats, leading to seasonal observations of giant manta rays in the nearshore habitats in many areas.

Within the northwestern Atlantic, the giant manta ray is distributed as far north as New Jersey, in the Gulf of Mexico, and in the U.S. Virgin Islands and Puerto Rico (Farmer et al., 2022; Figure 2). The giant manta ray are more commonly observed in productive nearshore environments, at shelf-edge upwelling zones, and at surface thermal frontal boundaries with temperatures ranging from approximately 20-30°C (Farmer et al. 2022). Species distribution models described in Farmer et al. (2022) indicate that giant manta rays occur more frequently in the nearshore waters of northeast Florida during the month of April, with their distribution extending northward along the shelf-edge as water temperatures warm, leading to higher occurrences north of Cape Hatteras, North Carolina, from June to October, and then south of Savannah, Georgia from November to March as water temperatures decrease. Within the Gulf of Mexico, the highest nearshore occurrence was predicted to occur around the Mississippi River delta from April to June and again from October to November.

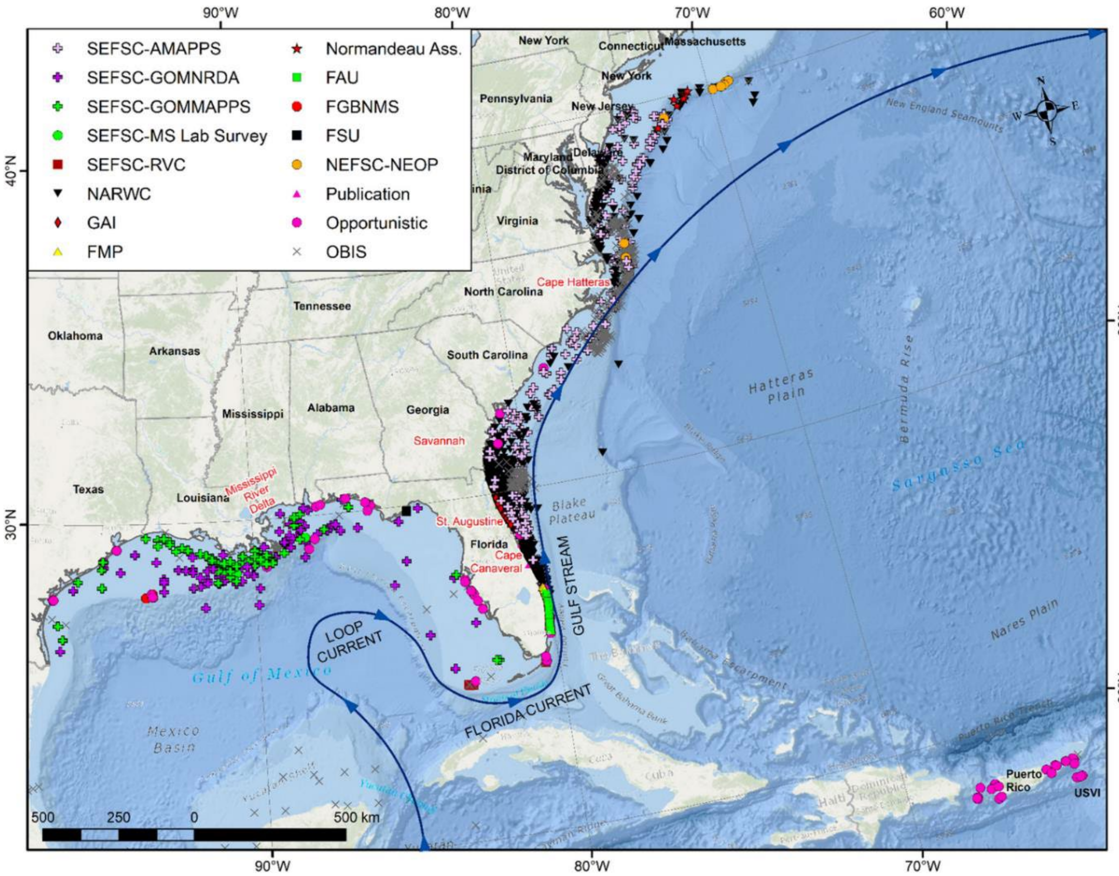

Figure 6. Reported sightings of manta rays (1925–2020) relative to regional landmarks and ocean currents, from Farmer et al. (2022).

Documenting nursery habitats is a priority in manta ray research and conservation (Stewart et al. 2018a), yet the juvenile life stages remain particularly understudied. To date, only three nursery areas for giant manta rays have been described worldwide, two of which occur within the Southeast (*M. birostris* and *M. cf. birostris:* Stewart et al. 2018a; Pate and Marshall 2020). Stewart et al. (2018a) described juvenile nursery habitat within the FGBNMS in the Gulf of Mexico. Pate and Marshall (2020) identified a nursery habitat along miles of highly developed coastline in southeast Florida (i.e., between Jupiter Inlet and Palm Beach Inlet), but note it is likely that the surveyed area only encompasses a portion of this nursery habitat. These nursery habitats were described based on the frequent observations of juveniles, high site fidelity, and extended use (Heupel et al. 2017).

Population Structure and Status

Although capable of long-distance movements of 100s to >1000 km (Andrzejaczek et al. 2021), most populations appear to be philopatric (Stewart et al. 2016a), with few examples of long-distance dispersal (Andrzejaczek et al. 2021; Knochel et al. 2022). Several authors have reported that giant manta ray likely occur in small regional subpopulations (Lewis et al. 2015; Stewart et al. 2016a; Marshall et al. 2022; Beale et al. 2019) and may have distinct home ranges (Stewart et al. 2016a). The degree to which subpopulations are connected by migration is unclear but is assumed to be low (Stewart et al. 2016a; Marshall et al. 2022) so regional or local populations are not likely to be connected through immigration and emigration (Marshall et al. 2022), making them effectively demographically independent.

The population structure of giant manta rays – the number of populations and subpopulations that comprise the species, whether they are linked by immigration and emigration, and the strength of those links – is largely unknown. At a minimum, the evidence suggests that giant manta rays in the Atlantic and giant manta rays in the Indo-Pacific represent separate populations because this species does not appear to migrate to the Pacific through Drake Passage (or vice versa) and they do not appear to migrate around the Cape of Good Hope to the Indian Ocean (Figure 1; Lawson et al. 2017; Marshall et al. 2022).

While NMFS concluded that the species is likely to become endangered within the foreseeable future throughout a significant portion of its range (the Indo Pacific and eastern Pacific), NMFS did not find the species met the criteria to list as a DPS (83 FR 2916, and 82 FR 3694). This decision is unique to the listing process, and does not mean that NMFS should not or would not consider the potential role that populations play in evaluating whether a proposed action is likely to result in appreciable reduction in numbers, distribution or reproduction, or whether such reductions may affect the viability of the putative populations that comprise the listed species.

The current evidence, combined with expert opinion, suggest the species likely has a complex population structure. While the species may occasionally be observed making long distance movements, it likely occurs in small spatially separated populations; however, to be viable the abundance of each subpopulation likely needs to be at least 1,000 individuals (Frankham et al. 2014). This structure is further supported by studies described by Beale et al. (2019) that have documented fisheries-induced declines in several isolated subpopulations (Lewis et al. 2015; Stewart et al. 2016; Moazzam 2018). Several studies have tracked individual giant manta rays and provide information on the spatial extent of giant manta ray populations. Stewart et al. (2016) studied four subpopulations of giant manta ray using genetics, stable isotopes, and satellite tags. They found that these subpopulations appeared to be discrete with little evidence of movement between them. The home ranges for three of these subpopulations, defined as the areas where tagged animals were expected to spend 95% of their time encompassed areas of 79,293 km^2 (Raja Ampat, Indonesia), 70,926 km^2 (Revillagigedo Islands, Mexico), and 66,680 km^2 (Bahia de Banderas, Mexico). These findings indicate that giant manta rays form discrete subpopulations that exhibit a high degree of residency. Stewart et al. (2016) states that this does not preclude occasional long-distance migrations, but that these migrations are likely rare and do not generate substantial gene flow or immigration of individuals into these subpopulations.

The Status Review (Miller and Klimovich 2016), notes only four instances of individual tagged giant manta rays making long-distance migrations. Of those, one animal was noted to travel a maximum distance of 1,151 km but that was a cumulative distance made up of shorter movements within a core area (Graham et al. 2012). No giant manta rays in that study moved further than 116 km from its tagging location and the results of Graham et al. (2012) support site fidelity leading to subpopulation structure. The remaining references to long distance migrations include Mozambique to South Africa (1,100 km), Ecuador to Peru (190 km), and the Yucatan into the Gulf of Mexico (448 km). The last two distances are well within core areas of subpopulation habitat use as specified in Stewart et al. (2016) and may only represent movements between coastal aggregation sites and offshore habitats as discussed in Stewart et al. (2016a). An additional instance of a long-distance migration is from Hearn et al. (2014) who tracked nine giant manta rays at Isla de la Plata, Ecuador. Eight of the nine tagged giant manta rays remained in an area of 162,500 km^2, while the ninth traveled a straight-line distance of 1,500 km to the Galapagos Islands; however, Stewart and Hearn later believed it may have been from a floating tag and not the result of a long distance migration (J. Stewart pers. comm. to J. Rudolph, NMFS, October 7, 2020).

In contrast with these few individuals making long-distance movements, most tracked individuals (Hearn et al. 2014 [8 out of 9 individuals]) or all tracked individuals (Graham et al. 2012 [6 individuals]; Stewart et al. 2016 [18 individuals]) from other studies remained within defined core areas, supporting subpopulation structure. Marshall et al. (2022) summarizes that current satellite tracking studies and international photo-identification matching projects suggest a low degree of interchange between subpopulations. To date there have been limited genetics studies on giant manta ray; however, Stewart et al. (2016) found genetic discreteness between giant manta ray populations in Mexico suggesting isolated subpopulations with distinct home ranges within 500 km of each other. In addition to genetics, differentiation was discovered through isotope analysis between those two Mexican populations (nearshore and offshore) and between two others (Indonesia and Sri Lanka). Using satellite tagging, stable isotopes and genetics, Stewart et al. (2016) concluded that, in combination, the data strongly suggest that giant manta rays in these regions are well-structured subpopulations that exhibit a high degree of residency. In the Gulf of Mexico, Hinojosa-Alvarez et al. (2016) propose a genetically distinct diverged group that may be a separate species and tentatively termed *M. cf. birostris.*

The global population size of the giant manta ray is difficult to assess, but abundance trajectories have been estimated based on longtime series of sightings at diving sites. Generally, divers encounter the giant manta ray less frequently than the reef manta ray and this is thought to be due to their oceanic habitat preference. Locally, abundance varies substantially and may be based on food availability and the degree that they were, or are currently, being fished. In most regions, giant manta ray population sizes appear to be small (less than 1,000 individuals). The current photo-identification databases for giant manta rays exist across multiple studied subpopulations, but rarely exceed 1,000 recorded individuals: 267 identified individuals in the Red Sea (Knochel et al. 2022); 588 in Raja Ampat, Indonesia (Beale et al. 2019); 101 in Mozambique (Marshall 2008); 1,141 in the Revillagigedo Archipelago, Mexico (K. Kumli pers. comm. Cited in Harty et al. 2022); 286 in coastal Mexico (J. D. Stewart unpubl. data, cited in Harty et al. 2022); 678 in the Maldives (Hilbourne and Stevens 2019); 59 in coastal Florida U.S. (Pate and Marshall 2020); 85 in the FGBNMS, U.S. (Stewart et al. 2018a); and 2,803 in Ecuador and Peru (Harty et al. 2022).

The global population size is not known, but three regional total abundance estimates are available. The total abundance estimates of giant manta rays populations are 600 in Mozambique (Marshall 2008), 1,875 from Raja Ampat (Beale et al. 2019), and 22,000 in coastal Ecuador and Peru (Harty et al. 2022). Preliminary (uncorrected for availability bias) relative abundance estimates for giant manta rays in the northwestern Atlantic and Gulf of Mexico, U.S., suggest an abundance ranging from approximately 5,000-14,000 individuals with a coefficient of variation between 14-20%, depending on the month (N. Farmer unpubl. data 2023). Preliminary satellite tagging returns from nine individuals suggest manta rays in the southeast spend a median of 14% of their time within depths visible to aerial observers; adjusted estimates for this availability bias suggest 47,802 ± 121,032 (mean ± SD; range 8,206-161,804) individuals in the western North Atlantic Ocean off the eastern United States. (N. Farmer unpubl. data 2023)

Giant manta ray aggregation sites are widely separated, and the lack of genetic sub structuring indicates occasional large-scale movements have occurred. Cross-referencing of regional photo-identification databases has not detected inter-region individual movements (e.g. across ocean basins) (Holmberg and Marshall 2018), indicating a low degree of interchange between ocean basins. Unlike the reef manta ray, no significant genetic sub-structuring has been detected within the giant manta ray (Stewart et al. 2016, Hosegood et al. 2019). Long-term studies, including those that have incorporated telemetry, have shown low re-sighting rates but a degree of philopatry.

The trend of the number of individuals varies widely across the range of the giant manta ray, but trends appear stable where they are protected and declining rapidly where fishing pressure is greater. For example, sighting trends appear stable where they receive some level of protections, such as Hawaii (Ward-Paige et al. 2013) and Ecuador (Holmberg and Marshall 2018), although individuals sighted in Ecuador seasonally migrate to Peru (A. Marshall unpubl. data 2019) where directed fishing occurs (Heinrichs et al. 2011). Elsewhere, the number of individuals is likely to be declining in places where the species is targeted or caught regularly as bycatch. For example, in southern Mozambique, a 94% decline in diver sighting records occurred over a 15-year period in a well-studied population (Rohner et al. 2017). Similarly, at Cocos Island, Costa Rica, there has been an 89% decline in diver sighting records of giant manta rays over a 21-year period (White et al. 2015). These steep declines have occurred in less than one-generation length (29 years) (Marshall et al. 2022).

Along with these sightings data, it is suspected (based on historical sightings, distribution data, and habitat suitability), that giant manta ray populations may have been depleted in areas where significant fisheries or threats for manta rays exist, such as the west coast of mainland Mexico (Booda 1984, Rubin 2002), Madagascar, Tanzania (Bianchi 1985), Kenya, Somalia, Pakistan (Nawaz and Khan 2015, Moazzam 2018), India, Sri Lanka, Bangladesh, Myanmar, China, Indonesia, and the Philippines. In these densely populated and heavily fished countries, fishing pressure may have more swiftly depleted resident populations of giant manta ray.

There are narratives consistent with rapid local depletion, and disappearance of manta rays, particularly in Indonesia. In Lamakera, eastern Indonesia, increasing international trade demand for manta ray products in the 1990s resulted in increased fishing effort, with up to 2,400 manta and devil rays landed per year. Consequently, manta ray catches declined sharply in this region, forcing fishers to travel further afield to find manta rays (Dewar 2002). Furthermore, landings of manta species, including giant manta ray (which was the main target), continued to decline in Lamakera despite increased effort, with a reduction in landings of 75% over a 13-year period from 2001 to 2014, leading to possible local extinction of manta species from Lamakera (Lewis et al. 2015). Landings of manta species also declined significantly during the same 13-year period in two other regions in Indonesia where effort also increased: Tanjung Luar (Lombok) (95% declines) and Cilicap (Central Java) (71% declines) (Lewis et al. 2015). Aggregations of manta rays have entirely disappeared from three other locations within Indonesia (i.e., the Lembeh Strait, South Sulawesi and Northwest Alor) with the cause strongly suspected as targeted and bycatch fishing (Lewis et al. 2015). In East Flores and Lembata, Indonesia, mobulid rays (including the giant manta ray) had historically been fished by indigenous villagers since 1959, with up to 360 individuals caught in a single year (Barnes 2005). From 1996 to 2001, fewer than 10 manta rays were being caught a year (Lewis et al. 2015).

In the Bohol Sea, Philippines, manta rays were targeted for over a century with landings estimated to have declined since the 1960s by 50-90% despite increasing fishing effort (Alava et al. 2002). Concern for the species led to a ban on targeting of giant manta ray in the Philippines in 1998, yet other Mobula species could still be targeted, and giant manta rays continued to be caught (Acebes and Tull 2016, Rambahiniarison et al. 2018). In 2017, all targeted Mobula fisheries in the Bohol Seas were banned, yet Mobula species may still be taken as bycatch in tuna fisheries in the Bohol Sea (Rambahiniarison et al. 2018). Declining trends in the abundance and body size of mobulid fisheries landings occurred in both India and Sri Lanka (Fernando and Stevens 2011, Pillai 1998, Nair et al. 2013, Raje et al. 2007). In Papua New Guinea, local declines have been noted and are attributed to fishing pressure (Rose 2008). Unspecified manta rays (some of which, based on distribution records, were likely giant manta rays) were caught as non-target species in purse seine sets from 1995 to 2006 (Marshall et al. 2022). There was a distinct and significant rise in the number of manta rays caught in these fisheries in 2001, which steadily rose until 2005/2006 when sharp declines were noted in the catch (Rose 2008).

Although sparse, the available data suggest that target fisheries in some regions have rapidly depleted localized populations of the giant manta ray and that local extinction is suspected to have occurred in many parts of their historical range. Globally, the suspected population reduction is 50-79% over three generation lengths, with a further population reduction suspected over the next three generation lengths, based on current and ongoing threats and exploitation levels, steep declines in monitored populations, and a reduction in area of occupancy (Marshall et al. 2022). In the few places where manta rays are protected, the number of individuals are thought to be stable (Marshall et al. 2022).

Threats

The most significant threat to giant manta rays is from targeted fisheries and bycatch. While the overwhelming cause of species decline is fishing mortality, sub lethal effects and lower levels of mortality occur from numerous other threats like vessel strike, entanglement, oil spills, oil and gas activities, pollution and marine debris, and global climate change (Marshall and Bennett 2010; Essumang 2010; Deakos et al. 2011, Couturier et al. 2012; Ooi et al. 2014; Stewart et al. 2018).

<u>Fisheries</u>

The giant manta ray is reportedly targeted in at least 13 artisanal fisheries in 12 countries. Some of the largest documented fisheries have been in Indonesia, the Philippines, India, Sri Lanka, Mexico, Taiwan, Mozambique, Palestine (Gaza strip), and Peru (Couturier et al. 2012, Ward-Paige et al. 2013, Croll et al. 2016), where sometimes thousands of manta rays are landed per annum (Alava et al. 2002, Dewar 2002, White et al. 2006, Lewis et al. 2015). They are captured in a wide range of gear types including harpoons, drift nets, purse seine nets, gill nets, traps, trawls, and longlines. While many artisanal fisheries have grown to meet international trade demand for gill plates, some still target these rays mainly for food and local products (White et al. 2006, Essumang 2010, Rohner et al. 2017). The giant manta ray's coastal and offshore distribution and tendency to aggregate, makes them particularly susceptible to bycatch in purse seine and longline fisheries and targeted capture in artisanal fisheries (Croll et al. 2016, Duffy and Griffiths 2017). In particular, giant manta rays are easy to target because of their large size, slow swimming speed, tendency to aggregate, predictable habitat use, and lack of human avoidance (Couturier et al. 2012).

Bycatch

The giant manta ray is frequently caught as bycatch in a number of commercial and artisanal fisheries worldwide, particularly, purse-seine and gillnet fisheries and to a lesser extent commercial longline and trawl fisheries off Europe, western Africa, the Atlantic coast of the United States, Australia, and the Pacific and Indian Oceans (Marshall et al. 2022). Despite being unintentionally caught, they are typically retained because of their high trade value. Even when discarded alive, manta rays are often injured and have high post-release mortality (Tremblay-Boyer and Brouwer 2016, Francis and Jones 2017). Within the U.S. jurisdiction, the giant manta ray is caught as bycatch in fisheries that deploy the following gear types including: gillnet, longline, purse seine, trawl, vertical line, rod and reel, buoy, and pot gears. While most of the giant manta rays caught as bycatch in the Southeast U.S. are released alive, mortalities have been documented in the pelagic longline fishery and shrimp trawl fishery in the western Atlantic and Gulf of Mexico. Additionally, there may be substantial post release mortality for animals released alive, depending on the gear type deployed and handling practices.

Recreational anglers targeting sharks and cobia (*Rachycentron canadum*) using hook and line gear can foul-hook giant manta rays (C. Horn. unpubl. data 2022). Anglers targeting cobia will search for giant manta rays to capture the cobia that are frequently associated with manta rays (e.g., cobia are commonly observed traveling underneath manta rays). Cobia anglers commonly cast at giant manta rays in the hopes of catching the cobia (Roberts, 2022). This fishing practice is popular among cobia anglers in Florida and Georgia and regularly results in the foul hooking the giant manta ray, as is evident in the numerous social media posts and videos online documenting the interactions (C. Horn, unpubl. data 2022). NMFS has also documented several manta ray captures by anglers targeting sharks form the shore and during tournaments (C. Horn unpubl. data 2022). Giant manta rays can also be foul-hooked by recreational anglers fishing from piers and jetties (C. Horn, unpubl. data 2022; Pate et al. 2020). A study conducted in southeast Florida documented that 27% of the giant manta rays (n=16) observed were foul-hooked or entangled in fishing line, of which 6 individuals interacted with fishing gear more than once (Pate et al. 2020). While there is little information available on the physical effect of recreational foul-hooking and entanglement on giant manta rays, however amputations and disfigurements, specifically those of the cephalic fin, that likely reduce feeding efficiency and the absence of this fin may negatively affect size, growth rate and reproductive success (Marshall and Bennett 2010, Deakos et al. 2011, Couturier et al. 2012, Stewart et al. 2018). As with other marine species, even if a hook is removed, a captured giant manta ray is still at risk of post-release mortality due to the physical injury and physiological stress associated with the capture. However, due to their large size, giant manta rays are seldom boarded, so instead of removing the hook, fishermen tend to cut the branch line. Leaving the hook embedded and trailing line attached to the animal can result in serious injury (e.g., amputated or disfigured cephalic lobes and pectoral fins) and increase entanglement risk.

Entanglement

The giant manta ray is an obligate ram ventilator and mooring line entanglement can significantly restrict their ability to swim, rapidly leading to asphyxiation and death (Manta Trust 2019). Entanglement in mooring, anchor line, and buoy lines can also cause disfigurements and amputations (i.e., missing cephalic lobes) (Braun et al. 2015; Convention on Migratory Species 2014; Couturier et al. 2012; Deakos et al. 2011; Germanov and Marshall 2014; Heinrichs et al. 2011). Giant manta rays cannot swim backwards and often cannot see a thin mooring line directly in front of them as they swim forward. It is thought that giant manta rays become entangled when the line makes contact with the front of the head between the cephalic lobes, the animal's reflex response is to close the cephalic lobes, thereby trapping the rope between the cephalic lobes, and entangling the animal as it begins to roll in an attempt to free itself (A. Marshall pers comm to C. Horn, NMFS, 2019). In 2017 a giant manta ray was documented as dead entangled in a vessel exclusion line (steel cable) near Pompano Beach, Florida. The female measured 2.48 m DW and had no other signs of injury or fishing line entanglement. It is likely that the manta ray became entangled in the line and drowned (Pate et al 2020). In Hawaii, numerous manta rays have been reported to have dead or have evidence (i.e., amputations or disfigurements) as a result of entanglement in mooring lines (Deakos 2011). The Manta Trust (Manta Trust 2019) has recorded dozens of manta ray mortalities due to mooring line entanglements and it is thought that the number is higher as many incidents are unreported. The known mortalities associated with mooring line entangles have been reported throughout the giant manta rays range, but mostly in the Maldives where researchers and scientist are actively studying manta ray species.

Vessel Strike

Giant manta rays spend considerable time basking, traveling, and feeding in surface waters, where they are susceptible to vessel strikes (McGregor et al. 2019). In addition, giant manta rays are at greater risk of vessel strike if they occur near areas of high human use (e.g., inlets, coastal areas, beaches). In French Polynesia, manta rays near highly populated islands are more likely to be observed with sub-lethal injuries caused by vessel strikes than manta rays near unpopulated islands (Carpentier et al. 2019). Pate et al. (2020) documented at least 10 manta rays with injuries consistent with vessel strikes (denoted by multiple parallel linear injuries from propellers) within a high human use area (i.e., Boynton Beach to Jupiter) in southeastern Florida. However, the rapid wound healing of manta rays likely masks the frequency of vessel strike injuries leading to an underestimation of vessel strikes (McGregor et al. 2019). There are few instances of confirmed mortalities attributed to vessel strike injury (i.e., via stranding). However, mortality may be cryptic as manta rays are negatively buoyant and will sink when they die (Pate et al. 2020) thereby significantly decreasing the likelihood of detection.

Climate Change

Warming in northern latitudes off the U.S. East Coast appears to have resulted in a significant northerly shift of manta ray distribution (Farmer et al. 2022). Similarly, climate change is expected to cause shifts in productivity of the Humboldt Current System (Bertrand et al. 2018), and increased ocean temperatures, deepening stratification, and changes in wind patterns may lead to variable effects on primary production and upwelling strength (Mogollón and Calil 2018, Oyarzún and Brierley 2018). Even though some protection measures are in place, changes to food web dynamics may impact foraging opportunities for manta rays, potentially causing shifts in their distribution and movement patterns that may influence their susceptibility to incidental capture, especially in regional fisheries (Harty et al. 2022; Stewart et al. 2018).

<u>Pollution and Marine Debris</u>

In locations with high densities of floating microplastics, giant manta rays may directly ingest microplastics (Stewart et al. 2018). Additionally, zooplankton can be contaminated with pollutants and toxins (Fossi et al., 2014) and ingest microplastics and nanoplastics (Cole et al., 2013; Setälä et al., 2014). This suggests that mobulids, like giant manta ray, may be secondary consumers of microplastics and associated pollutants even if they are foraging in locations (or at depths) that do not have high densities of floating microplastics. Previous studies found elevated levels of some heavy metals in mobulid tissues (Essumang, 2009, 2010; Ooi et al., 2015), but low levels of POPs (Germanov et al. 2019). Phthalates and/or POPs have been recorded in tissue samples of baleen whales, basking sharks and whale sharks in areas with high levels of microplastic pollution (Fossi et al., 2014, 2016, 2017), indicating that filter feeding organisms are likely bioaccumulating these pollutants as a result of plastic ingestion. In addition, a number of studies have demonstrated that microplastics, POPs and heavy metals impact regular cellular and system functioning, including endocrine disruption, leading to knock-on negative impacts on reproductive output with the potential to alter populations and ecological assemblages of marine species (Jakimska et al., 2011; Rochman, 2013; Rochman et al., 2014; Galloway and Lewis, 2016; Sussarellu et al., 2016; Germanov et al., 2018). Yet, the implications of exposure to pollution and contaminants on the giant manta ray, remain speculative, especially at the level of individual fitness and population viability (Stewart et al. 2018).

<u>Oil and Gas Activities</u>

Hydrocarbons from petroleum products released into the environment via oil spills and other discharges may directly injure marine animals through skin contact with oils (Geraci 1990). In addition, hydrocarbons also have the potential to impact prey populations, and therefore may affect listed species indirectly by reducing food availability in the impacted area. While impacts to the giant manta ray from the DWH oil spill event are unquantified, they may have included direct exposure to oil, disruption of foraging or migratory movements due to subsurface or surface oil, ingestion of prey species contaminated with oil and/or dispersants, and loss of foraging resources. Aerial photographs and reports from boaters placed at least some manta rays in the thick surface of the DWH oil spill (Handwerk 2010). However, there is little information available to determine the extent of those impacts, if they occurred. Manta rays would have been near peak abundance in the spill area during April and May 2010 (Farmer et al. 2022; N. Farmer unpubl. data 2023).

There have been several reported incidences of giant manta ray entanglements associated with Oil and Gas Program activities. Line entanglements are associated with diver downlines, acoustic buoy release lines, acoustic pinger lanyards, nodal tether cables, and nodal lanyards. Similar to mooring line entanglements discussed above, the giant manta ray cannot see a vertical line directly in front of them and they become entangled once the line makes contact with their head, between the cephalic lobes, causing the animal to roll in an effort to free itself, thereby further entangling itself. There have been several confirmed reports of giant manta rays becoming entangled in vertical lines that deployed by commercial oil and gas divers in the Gulf of Mexico in recent years (C. Horn and N. Famer unpubl. data 2022). For example, in 2013, 2021, and 2022, giant manta rays were reported and documented as entangled in a vertical downlines deployed by oil and gas divers. In addition, commercial oil and gas divers have reported numerous incidences of large rays, possibly giant manta rays in close proximity to underwater operations. It is thought that zooplankton is attracted to the underwater lights deployed by commercial divers. The amassing of zooplankton is likely attracting giant manta rays to underwater operation sites where vertical lines are deployed thereby increasing their entanglement risk (C. Horn personal observation).

Other Threats

While the overwhelming cause of species decline is fishing mortality, other sub lethal effects occur from numerous lesser threats, such as anthropogenic noise, toxic blooms from algae and other microorganisms, military detonations and training exercises, in-water construction activities, aquaculture, aquarium trade, and tourisms. While these threats are known, the extent to which these impacts may affect individual health and overall population fitness is unclear (Couturier et al. 2012; Croll et al. 2016; Stewart et al. 2018).

5 ENVIRONMENTAL BASELINE

5.1 Overview

This section describes the effects of past and ongoing human and natural factors contributing to the current status of the species, their habitats, 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 species' 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 endangered and threatened individuals 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 individuals 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 Baseline Status of ESA-Listed Species Considered for Further Analysis

Sea turtles and giant manta ray found in the immediate project area may travel widely throughout the Atlantic, Gulf of Mexico, and Caribbean Sea, and individuals found in the action area can potentially be affected by activities anywhere within this wide range. The status of these species in the action area, as well as the threats to these species, are supported by the species accounts in Section 4 (Status of the Species).

As stated in Section 2.2 (Action Area), the proposed action occurs in 65-mi long deep draft channel running through Jefferson and Orange Counties, Texas, Cameron Parish, Louisiana, as well as waters of the Gulf of Mexico, and includes the associated ODMDSs, all of which are bounded by a 1-mi buffer area.

5.3 Additional Factors Affecting the Baseline Status of ESA-Listed Species Considered for Further Analysis

5.3.1 Federal Actions

In recent years, NMFS has undertaken numerous ESA section 7 consultations to address the effects of federally-permitted fisheries and other federal actions on threatened and endangered sea turtle species or giant manta ray. Each of those consultations sought to develop ways of reducing the probability of adverse effects of an action on sea turtles or giant manta ray. Similarly, recovery actions NMFS has undertaken under the ESA are addressing the problem of take of sea turtles or giant manta ray in the fishing and shipping industries and other activities such as USACE dredging operations. The summary below of anticipated sources of incidental take of sea turtle species or giant manta ray from federal actions includes only those actions which have already concluded or are currently undergoing formal section 7 consultation.

Fisheries

Adverse effects on threatened and endangered sea turtles species or giant manta ray from several types of fishing gear occur in the action area. These gears, including gillnet, hook-and-line (i.e., vertical line), and trawl gear; have all been documented as interacting with sea turtles. For all fisheries for which there is a FMP or for which any federal action is taken to manage that fishery, the impacts have been evaluated via section 7 consultation. Formal section 7 consultations have been conducted on the southeast shrimp trawl fishery, which is the only federally-managed fishery operating in the action area.

The southeast shrimp trawl fishery affects more sea turtles than all other activities combined (NRC 1990). On April 26, 2021, NMFS completed reinitiation of the opinion for shrimp trawling in the southeastern United States analyzing the effects of this fishery on species listed since the listing of several new species under the ESA and after finalizing the rule requiring TEDs for a portion of the skimmer trawl fisheries. This opinion determined that the shrimp trawl fishery would not jeopardize the continued existence of any sea turtle species or of giant manta ray. An

Incidental Take Statement has been issued for the take of sea turtles in this fishery. More detailed information can be found in the opinion (NMFS 2021).

Formal section 7 consultations have also been conducted for the issuance of several EFPs. These opinions have concluded the proposed activities may adversely affect but were not likely to jeopardize the continued existence of any sea turtles. Incidental Take Statements for each EFP issued were provided.

Federal Vessel Activity
Watercraft are the greatest contributors to overall noise in the sea and have the potential to interact with sea turtles through direct impacts or propellers. Sound levels and tones produced are generally related to vessel size and speed. Larger vessels generally emit more sound than smaller vessels, and vessels underway with a full load, or those pushing or towing a load, are noisier than unladen vessels. Vessels operating at high speeds have the potential to strike sea turtles. Potential sources of adverse effects from federal vessel operations in the action area include operations authorized or conducted by BOEM, FERC, USCG, NOAA, and USACE. For example, vessels associated with projects funded, authorized, or permitted by federal agencies can have effects in the action area. Commercial fishing vessels operating in federally managed fisheries likely traverse through the area on their way to federal waters.

NMFS has also conducted ESA Section 7 consultations related to energy projects in the Gulf of Mexico (BOEM and FERC) to implement conservation measures for vessel operations. Through the ESA Section 7 process, where applicable, NMFS has and will continue to establish conservation measures for all these vessel operations to avoid or minimize adverse effects to listed species. At the present time, they present the potential for some level of adverse effects.

Other potential sources of adverse effects from federal vessel activity and operations in the action area include operations of the USN and USCG. Through the ESA Section 7 process, where applicable, NMFS has and will continue to establish conservation measures for all these agency vessel operations to avoid or minimize adverse effects to listed species. Refer to the Biological Opinions for the USCG (NMFS 1995; NMFS 1996) and the USN (NMFS 1996; NMFS 1997a; NMFS 2013) for details on the scope of vessel operations for these agencies and conservation measures implemented as standard operating procedures.

Dredging
The construction and maintenance of federal navigation channels and sand mining (“borrow”) areas has also been identified as a source of sea turtle mortality. Hopper dredges move relatively rapidly (compared to sea turtle swimming speeds) and can entrain and kill sea turtles as the drag arm of the moving dredge overtakes the slower moving sea turtle. We originally completed a regional Opinion on the impacts of USACE’s maintenance dredging and sand mining operations in the Gulf of Mexico in 2003 (i.e., GRBO). We revised the GRBO in 2007 (NMFS 2007c), and concluded that: 1) Gulf of Mexico hopper dredging would adversely affect Gulf sturgeon and 4 sea turtle species (i.e., green, hawksbill, Kemp’s ridley, and loggerheads), but would not jeopardize their continued existence; and, 2) dredging in the Gulf of Mexico would not adversely affect leatherback sea turtles, smalltooth sawfish, or ESA-listed large whales. An Incidental Take Statement for adversely affected species was issued in this revised Opinion.

Oil and Gas Exploration and Extraction

Federal and state oil and gas exploration, production, and development are expected to result in some sublethal effects to protected species, including impacts associated with the explosive removal of offshore structures, seismic exploration, marine debris, oil spills, and vessel operation. Many Section 7 consultations have been completed on BOEM oil and gas lease activities. Until 2002, these Opinions concluded only one sea turtle take may occur annually due to vessel strikes. Opinions issued on July 11, 2002 (NMFS 2002d), November 29, 2002 (NMFS 2002a), August 30, 2003 (Lease Sales 189 and 197 (NMFS 2003b), and June 29, 2007 (2007-2012 Five-Year Lease Plan (NMFS 2007a) have concluded that sea turtle takes may also result from vessel strikes, marine debris, and oil spills. Oil drilling may affect the action area and species in the action area, for example, if tar balls wash ashore or if there was a spill offshore. The effects of the DWH oil spill on sea turtles is discussed above and in the following subsection.

Impact of DWH Oil Spill on Status of Sea Turtles

The April 20, 2010, explosion of the DWH oil rig affected sea turtles in the Gulf of Mexico. An assessment has been completed on the injury to Gulf of Mexico marine life, including sea turtles, resulting from the spill (DWH Trustees 2015a). Following the spill, juvenile Kemp's ridley, green, and loggerhead sea turtles were found in *Sargassum* algae mats in the convergence zones, where currents meet and oil collected. Sea turtles found in these areas were often coated in oil or had ingested oil. The spill resulted in the direct mortality of many sea turtles and may have had sublethal effects or caused environmental damage that will impact other sea turtles into the future. Information on the spill impacts to individual sea turtle species is presented in the Status of the Species (Section 4) sections for each species.

ESA Permits and Cooperative Agreements

The ESA allows the issuance of permits to take ESA-listed species for the purposes of scientific research (section 10(a)(1)(a)). In addition, the ESA allows for the NMFS to enter into cooperative agreements with states developed under section 6 of the ESA, to assist in recovery actions of listed species. Prior to issuance of these authorizations, the proposal must be reviewed for compliance with section 7 of the ESA.

Per a search of the NOAA Fisheries Authorizations and Permits for Protected Species (https://apps.nmfs.noaa.gov/) database by the consulting biologist on August 15, 2023, there were 7 active Section 10(a)(1)(A) scientific research permits applicable to ESA-listed sea turtle species within the action area. These permits allow the capture, handling, sampling, and release of these turtle species (all life stages except hatchlings).

Conservation and Recovery Actions Shaping the Baseline
Manta rays were included on Appendix II of CITES at the 16 Conference of the CITES Parties in March 2013, with the listing going into effect on September 14, 2014. Export of manta rays and manta ray products, such as gill plates, require CITES permits that ensure the products were legally acquired and that the Scientific Authority of the State of export has advised that such export will not be detrimental to the survival of that species (after taking into account factors such as its population status and trends, distribution, harvest, and other biological and ecological elements). Although this CITES protection was not considered to be an action that decreased the current listing status of the threatened giant manta ray (due to its uncertain effects at reducing the threats of foreign domestic overutilization and inadequate regulations, and unknown post-release mortality rates from bycatch in industrial fisheries), it may help address the threat of foreign overutilization for the gill plate trade by ensuring that international trade of this threatened species is sustainable. Regardless, because the United States does not have a significant (or potentially any) presence in the international gill plate trade, we have concluded that any restrictions on U.S. trade of the giant manta ray that are in addition to the CITES requirements are not necessary and advisable for the conservation of the species.

5.3.2 State and Private Actions

A number of activities in state waters that may directly or indirectly affect listed species include recreational and commercial fishing, construction, discharges from wastewater systems, dredging, ocean pumping and disposal, and aquaculture facilities. The impacts from some of these activities are difficult to measure. However, where possible, conservation actions through the ESA Section 7 process, ESA Section 10 permitting, and state permitting programs are being implemented to monitor or study impacts from these sources. Increasing coastal development and ongoing beach erosion will result in increased demands by coastal communities, especially beach resort towns, for periodic privately funded or federally sponsored beach nourishment projects. Some of these activities may affect listed species (e.g., sea turtles) and their critical habitat by burying nearshore habitats that serve as foraging areas. Additional discussion on some of these activities follows.

State Fisheries
Various fishing methods used in state commercial and recreational fisheries, including trawling, pot fisheries, gillnets, and vertical line are all known to incidentally take sea turtles, but information on these fisheries is sparse (NMFS 2001a). Most state data are based on extremely low observer coverage or sea turtles were not part of data collection; thus, these data provide insight into gear interactions that could occur but are not indicative of the magnitude of the overall problem.

To address data gaps, several state agencies have initiated observer programs to collect information on interactions between listed species and certain gear types. Other states have closed nearshore waters to gear-types known to have high encounter rates with listed species. Depending on the fishery in question, many state permit holders also hold federal permits; therefore, existing section 7 consultations on federal fisheries may address some of the state fishery impacts.

Additional information on impact of take (i.e., associated mortality) is also needed for analysis of impacts to sea turtles from these fisheries. Certain gear types may have high levels of sea turtle takes, but very low rates of serious injury or mortality. For example, hook-and-line takes rarely are dead upon retrieval of gear, but trawls and gillnets frequently result in immediate mortality. Hardshell turtles, particularly loggerhead sea turtles, seem to appear in data from almost all state fisheries. Texas and Louisiana have placed restrictions on gillnet fisheries within state waters such that very little commercial gillnetting takes place.

Observations of state recreational fisheries have shown that loggerhead, leatherback, and green sea turtles are known to bite baited hooks, and loggerhead sea turtles frequently ingest the hooks. Hooked turtles have been reported by the public fishing from boats, piers, and beach, banks, and jetties and from commercial fishermen fishing for reef fish and for sharks with both single rigs and bottom longlines (NMFS 2001b). A detailed summary of the known impacts of hook-and-line incidental captures to loggerhead sea turtles can be found in the TEWG reports (1998; 2000).

Vessel Traffic
Commercial traffic and recreational boating pursuits can have adverse effects on sea turtles and giant manta ray in particular via propeller and boat strike damage. The STSSN includes many records of vessel interactions (propeller injury) with sea turtles, and giant manta ray are also frequently observed with prop scars on their dorsal surface. Data show that vessel traffic is one cause of sea turtle mortality (Hazel and Gyuris 2006; Lutcavage et al. 1997). Stranding data show that vessel-related injuries are noted in stranded sea turtles. Data indicate that live- and dead-stranded sea turtles showing signs of vessel-related injuries continue in a high percentage of stranded sea turtles in coastal regions of the southeastern United States.

Coastal Development
Beachfront development, lighting, and beach erosion control all are ongoing activities throughout the action area. These activities potentially reduce or degrade sea turtle nesting habitats or interfere with hatchling movement to sea. Nocturnal human activities along nesting beaches may also discourage sea turtles from nesting sites. The extent to which these activities reduce sea turtle nesting and hatchling production is unknown. Still, more and more coastal counties are adopting stringent protective measures to protect hatchling sea turtles from the disorienting effects of beach lighting.

5.3.3 Marine Debris, Pollution, and Environmental Contamination

Marine debris is a continuing problem for sea turtles and giant manta ray. Sea turtles living in the pelagic environment and giant manta ray commonly eat or become entangled in marine debris (e.g., tar balls, plastic bags/pellets, balloons, and ghost fishing gear) as they feed along oceanographic fronts where debris and their natural food items converge. This is especially problematic for sea turtles that spend all or significant portions of their life cycle in the pelagic environment (i.e., leatherbacks, juvenile loggerheads, and juvenile green turtles). The number of oil drilling rigs operating in the Gulf of Mexico make the prevalence of tar balls on beaches in the action area an ongoing problem. Adult and juvenile sea turtles may consume tar balls while they are foraging in the water and hatchlings on the beach may become entangled and trapped in the tar balls as the tar balls soften and melt in the sun.

Sources of pollutants along the action area include atmospheric loading of pollutants such as PCB, stormwater runoff from coastal towns and cities into rivers and canals emptying into bays and the ocean, and groundwater and other discharges. Nutrient loading from land-based sources such as coastal community discharges is known to stimulate plankton blooms in closed or semi-closed estuarine systems. The effects on larger embayments are unknown. Although pathological effects of oil spills have been documented in laboratory studies of marine mammals and sea turtles (Vargo et al. 1986), the impacts of many other man-made toxins have not been investigated.

Coastal runoff, marina and dock construction, dredging, aquaculture, oil and gas exploration and extraction, increased under water noise and boat traffic can degrade marine habitats used by sea turtles (Colburn et al. 1996). The development of marinas and docks in inshore waters can negatively impact nearshore habitats. An increase in the number of docks built increases boat and vessel traffic. Fueling facilities at marinas can sometimes discharge oil, gas, and sewage into sensitive estuarine and coastal habitats. The species of turtles analyzed in this Opinion travel between near shore and offshore habitats and may be exposed to and accumulate these contaminants during their life cycles.

5.3.4 Acoustic Impacts

Acoustic effects are a known impact to ESA-listed sea turtles and giant manta ray and they are difficult to measure. Where possible, conservation actions are being implemented to monitor or study the effects to these species from these sources.

5.3.5 Stochastic Events

Stochastic events, such as hurricanes or cold snaps, occur in the action area and can affect ESA-listed sea turtles and giant manta ray in the action area. These events are unpredictable and their effect on the recovery of these ESA-listed sea turtles and giant manta ray is unknown; yet, they have the potential to impede recovery if animals die as a result or indirectly if important habitats are damaged.

5.3.6 Climate Change

As discussed earlier in this Opinion, 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.

Climate change impacts on sea turtles currently cannot be predicted with any degree of certainty; however, significant impacts to the hatchling sex ratios of sea turtles may result (NMFS and

USFWS 2007a). Increases in global temperature could potentially skew future sex ratios toward higher numbers of females (NMFS and USFWS 2007a). Sea level rise from global climate change is also a potential problem for areas with low-lying beaches where sand depth is a limiting factor, as the sea may inundate nesting sites and decrease available nesting habitat (Baker et al. 2006; Daniels et al. 1993; Fish et al. 2005). The loss of habitat as a result of climate change could be accelerated due to a combination of other environmental and oceanographic changes such as an increase in the frequency of storms and/or changes in prevailing currents, both of which could lead to increased beach loss via erosion (Antonelis et al. 2006; Baker et al. 2006). Other changes in the marine ecosystem caused by global climate change (e.g., ocean acidification, salinity, oceanic currents, dissolved oxygen levels, nutrient distribution, etc.) could influence the distribution and abundance of lower trophic levels (e.g., phytoplankton, zooplankton, submerged aquatic vegetation, crustaceans, mollusks, forage fish, etc.) which could ultimately affect the primary foraging areas of sea turtles.

Warming in northern latitudes off the U.S. East Coast appears to have resulted in a significant northerly shift of manta ray distribution (Farmer et al. 2022). Similarly, climate change is expected to cause shifts in productivity of the Humboldt Current System (Bertrand et al. 2018), and increased ocean temperatures, deepening stratification, and changes in wind patterns may lead to variable effects on primary production and upwelling strength (Mogollón and Calil 2018, Oyarzún and Brierley 2018). Even though some protection measures are in place, changes to food web dynamics may impact foraging opportunities for manta rays, potentially causing shifts in their distribution and movement patterns that may influence their susceptibility to incidental capture, especially in regional fisheries (Harty et al. 2022; Stewart et al. 2018).

6 EFFECTS OF THE ACTION

6.1 Overview

Effects of the action are all consequences to listed species or 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 listed species that are likely to be adversely affected. The analysis in this section forms the foundation for our jeopardy analysis in Section 8. The quantitative and qualitative analyses in this section are based upon the best available commercial and scientific data on species biology and 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.

6.2 Effects of the Proposed Action on ESA-Listed Species Considered for Further Analysis

6.2.1 Routes of Effect That Are Not Likely to Adversely Affect ESA-Listed Species

Hydraulic dredging

Effects to green sea turtle (North Atlantic DPS), hawksbill sea turtle, Kemp's ridley sea turtle, loggerhead sea turtle (Northwest Atlantic DPS), and giant manta ray include the risk of direct physical impact from hydraulic dredging and other in-water construction activities. We believe the risk of physical injury is extremely unlikely to occur due to the species' ability to move away from the project site and into adjacent suitable habitat, if disturbed. NMFS has previously determined in dredging Biological Opinions that, while oceangoing hopper-type dredges may lethally entrain protected species, including sea turtles, non-hopper-type dredging methods, such as the hydraulic dredge proposed for use in this project, are slower and extremely unlikely to overtake or adversely affect them (NMFS 2007). Additionally, the applicant's implementation of NMFS SERO's *Protected Species Construction Conditions* (NMFS 2021) will require all construction workers to observe in-water related activities for the presence of these species. If a protected species is seen within 150 ft of operations, all appropriate precautions shall be implemented to ensure its protection. These precautions shall include cessation of operation of any moving equipment closer than 150 ft of a protected species. Operation of any mechanical construction equipment shall cease immediately if a protected species is observed within a 150-ft radius of the equipment. Activities may not resume until the species has departed the project area of its own volition.

Vessel Strike

Vessels can strike ESA-listed sea turtles and giant manta ray, leading to injury or death. NMFS believes that it is highly unlikely that a dredge vessel, relocation trawler, or other support vessel will strike a protected species. Vessel collisions with ESA-listed sea turtles from the proposed action are not expected due to the slow speed of the dredge (e.g., 3.5 kt or less while dredging), relocation trawlers, and support vessels; the avoidance behavior of these species to slow moving vessels; and the presence of NMFS-approved observers on board every dredge and relocation trawler to watch for ESA-listed species in the area. NMFS believes it is extremely unlikely that ESA-listed sea turtles will be struck by vessels associated with the proposed project. While giant manta ray can be frequently observed traveling just below the surface and will often approach or show little fear toward vessels. Vessels covered under this Opinion will be traveling slowly while working, and giant manta ray are mobile species that appear to be able to be responsive to activity in the area and able to move out of the way of slow-moving equipment. In addition, we do not expect this species to be present in abundance in the project area, and there have been no reports of giant manta ray in the project area. Because we do not expect giant manta rays to be present in abundance in the project area and because we would not expect them to be struck by slow-moving equipment/vessels, we think it is extremely unlikely that a giant manta ray would be injured or killed due to vessel strike associated with the proposed action.

Entrainment and Impingement

We believe cutterhead and hopper dredging activities will result in no effect to giant manta ray from entrainment and impingement from dredging. This conclusion is supported by our decades of experience with reporting of take from hopper dredging (since the 1980s), and a review of the available scientific literature, which revealed no known reports of hopper dredging entrainment to this species. Furthermore, giant manta ray are not expected to be entrained due to their large size and ability to avoid the suction created by a hopper dredge. In addition, giant manta ray are a pelagic species and would not be expected to be found on the bottom and therefore are not likely to have an encounter with a cutterhead or hopper dredge while dredging.

Dredged Material Placement
Dredged material placement will occur at Louisiana Point and Texas Point. Over the 50-year period of analysis, beach nourishment activities using maintenance material from the adjacent Sabine Pass channel would result in the creation of new saline marsh along a 3-mi stretch of shore (mile 0.5 to 3.5) at Louisiana Point and the same at Texas Point. The placement of material from each 3-year Sabine Pass dredging cycle would alternate between Texas and Louisiana Points, so that placement of materials at each shoreline would occur every 6 years.

The potential for interaction from dredged material placement equipment while it is depositing the material is limited to the potential of ESA-listed sea turtles and giant manta ray being directly below the material as it is passing through the water column and landing on the sea floor at the pump-out areas. We believe that risk of these mobile species being caught in the discharge through the water column and buried on the sea floor is extremely unlikely. ESA-listed sea turtles and giant manta ray would be able to detect the presence of the material and avoid being harmed by its placement. Placement in an open water environment would allow room for these species to move away from and around the placement. In addition, the implementation of NMFS SERO's *Protected Species Construction Conditions* will require all construction workers to observe in-water activities for the presence of these species. Operation of any mechanical construction equipment shall cease immediately if a protected species is seen within a 150-ft radius of the equipment. Activities may not resume until the protected species has departed the project area of its own volition or 20 minutes have passed since the animal was last seen in the area.

Entanglement
ESA-listed sea turtles and giant manta ray may become entangled in flexible materials in the water, such as buoy lines used to mark pipelines; however, we believe entanglement from flexible materials in the water associated with dredging and placement activities is extremely unlikely to occur. As stated in Section 2.1.2, in order to reduce the risk of entanglement to ESA-listed species the USACE will follow the general PDCs in Appendix B on the use of in-water lines.

Water Quality
ESA-listed sea turtles and giant manta ray may be affected by changes in water quality from turbidity caused by cutterhead pipeline or hopper dredging and material placement. We believe this effect is extremely unlikely to occur due to these species' mobility. ESA-listed sea turtles and giant manta ray are highly mobile and can avoid localized areas of increased turbidity.

Access

ESA-listed sea turtles and giant manta ray may frequently feed in nearshore coastal waters and may be affected by their inability to access the project area due to their avoidance of dredging and placement activities. We believe the effect of the temporary loss of foraging/shelter opportunities for these species will be insignificant, given the availability of similar habitat nearby and the abundance of habitat outside of the project area.

6.2.2 Routes of Effect That Are Likely to Adversely Affect ESA-Listed Species

NMFS believes that the hopper dredging and relocation trawling components of the proposed action are likely to adversely affect Kemp's ridley sea turtle, the Northwest Atlantic DPS of loggerhead sea turtles, and giant manta ray. The Northwest Atlantic DPS of loggerhead sea turtle were not analyzed in the previous Opinion for the proposed work (SER-2007-00954; issued August 13, 2007) as they had not been listed yet, so they are included in this Opinion.

Giant manta rays are likely to be captured by relocation trawling that will occur in connection with hopper dredging, though we lack records of captures of this species to accurately estimate the number that may be captured. The lack of data is a result of the recent listing of this species under the ESA in 2018 (83 FR 2916, January 22, 2018), and that prior reports of captures of rays were not accurately identified to know if they were giant manta rays. The best documentation that we have at the time of completion of this Opinion is from the northeast Atlantic, which is outside of the action area. The reports from the northeast Atlantic are reports of mantas caught as bycatch in fisheries where NMFS' observers document each interaction with a Mobulid ray by species when possible. Observations historically included giant manta ray, Atlantic devil ray, unidentified ray, unidentified manta, and *Mobulidae* (any manta and devil ray species that could not be confirmed to species). Because of the unique form and cephalic lobes adjacent to the mouth of manta and devil rays, it is unlikely that these records would have been listed more generally as an unidentified stingray or an unidentified ray; however, we do consider misidentification in these reports possible. Historically, many *Mobulidae* species may have been identified as giant manta rays because observers were provided with the Peterson's guide *Atlantic Coast Fishes* as a main source for identification, and the giant manta ray was the only large *Mobulidae* species shown. In 2015, NMFS NEFSC re-evaluated photo records of *Mobulidae* species and found that numerous historic records that were originally identified as giant manta rays were actually other *Mobulidae* species. Thus, historic records that did not include photos, or where photos were not detailed enough to determine a species, were then classified as an unidentified manta ray.

6.2.3 Hopper Dredging – Effects on Sea Turtles

A typical hopper dredge vessel operates with 2 trailing, suction dragheads simultaneously, 1 on each side of the vessel. Sand will be dredged from the borrow area and transported to the nearshore waters adjacent to the beach. There it will be dispersed via pump and pipeline from the hopper dredge.

Effects of Hopper Dredging
It has been previously documented in NMFS Biological Opinions that hopper dredges have captured, injured, and killed sea turtles. Available data indicates that within the Gulf Region for

USACE (Texas, Louisiana, Mississippi, Alabama, and Florida), the following sea turtle take totals have been documented for civil and regulatory works projects occurring between 2004 to August 16, 2023 (ODESS database search August 16, 2023): 70 green sea turtles, 58 Kemp's ridley sea turtles, and 97 loggerhead sea turtles. Hopper dredges are equipped with large centrifugal pumps similar to those employed by other hydraulic dredges. Dredged material is raised by dredge pumps through suction pipes (dragarms) connected to the intake (drag) in contact with the channel bottom and discharged into hoppers built in the vessel. Dragarms are hinged on each side of the vessel with the drag extending downward toward the stern of the vessel. The dragarm is moved along the bottom as the vessel moves forward at speeds up to 3-5 mph. The dredged material is sucked up the pipe and deposited and stored in the hoppers of the vessel.

Most sea turtles are able to escape from the oncoming draghead. However, hopper dredges can entrain and kill sea turtles if the drag arm(s) of the moving dredge overtakes a slower moving or stationary sea turtle. Entrainment refers to the animal being sucked through the draghead into the hopper. Turtles can also be entrained if suction is created in the draghead by current flow while the device is being placed or removed, or if the dredge is operating on an uneven or rocky substrate and rises off the bottom. Reports based on dredge take during USACE navigation channel maintenance projects suggest that the risk of entrainment is highest when the bottom terrain is uneven or when the dredge is conducting "cleanup" operations at the end of a dredge cycle when the bottom is trenched and the dredge is working to level out the bottom. In these instances, it is difficult for the dredge operator to keep the draghead buried in the sand, thus sea turtles near the bottom may be more vulnerable to entrainment. In addition to entrainment, interactions with a hopper dredge result from crushing when the draghead is placed on the bottom or when an animal is unable to escape from the suction of the dredge and becomes stuck on the draghead (impingement). Mortality most often occurs when animals are sucked into the dredge draghead, pumped through the intake pipe and then killed as they cycle through the centrifugal pump and into the hopper.

Interactions with the draghead can also occur if the suction is turned on while the draghead is in the water column (i.e., not seated on the bottom). USACE implements procedures to minimize the operation of suction when the draghead is not properly seated on the bottom sediments, which reduce the risk of these types of interactions. In addition, during dredging operations, protected species observers will live aboard the dredge, monitoring every load, 24 hours a day, for evidence of dredge-related impacts to protected species, particularly sea turtles and giant manta ray. When the dredge is transiting, observers will maintain a bridge watch for protected species and keep a logbook noting the date, time, location, species, number of animals, distance and bearing from dredge, direction of travel, and other information, for all sightings.

Because entrainment is believed to occur primarily while the draghead is operating on the bottom, it is likely that only those species feeding or resting on or near the bottom would be vulnerable to entrainment. Within the action area, we expect effects to sea turtles from hopper dredge operations as these species are likely to be feeding on or near the bottom of the water column and thus are vulnerable to entrainment in the suction draghead of the hopper dredge.

Estimated Mortality from Hopper Dredging Impingement and Entrainment

To estimate take of Kemp's ridley, and loggerhead (Northwest Atlantic) sea turtles as a result of the proposed action, we analyzed the number of sea turtles killed by hopper dredging during previous hopper dredge projects within the Sabine-Neches Waterway Channel. The Sabine-Neches Waterway Channel is a subset of the entire Gulf Region (Texas, Louisiana, Mississippi, Alabama, and Florida) that we discussed in the previous section.

Table 3 below shows the total number of lethal takes of sea turtle species in the Sabine-Neches Waterway Channel between February 1995 and March 2007. A total of 2 Kemp's ridley and 1 loggerhead sea turtle takes occurred within the Sabine-Neches Waterway Channel during O&M hopper dredging that removed 35,464,724 cy of material. Between April 2007 to May 2022, a total of 1 Kemp's ridley sea turtle and 2 loggerhead sea turtle takes occurred during O&M hopper dredging events within the Sabine-Neches Waterway Channel that removed 35,311,915 cy of material (USACE 2023).

Table 3. Total reported incidental lethal takes for sea turtles during O&M dredging by the USACE Galveston District in Sabine-Neches Waterway Channel between 1995 and 2022.

Time Period	Kemp's ridley sea turtle	Loggerhead sea turtle	Green sea turtle	Hawksbill sea turtle	Unknown sea turtle species	Total Lethal Take	Total CY
1995-2007	2	1	0	0	0	3	35,464,724
2007-2022	1	2	0	0	0	3	35,311,915
TOTAL	**3**	**3**	**0**	**0**	**0**	**6**	**70,776,639**

According to data provided by USACE, between 1995 and 2022, the USACE recorded 6 lethal takes of sea turtles during O&M dredging events within the Sabine-Neches Waterway Channel (i.e., 3 Kemp's ridley and 3 loggerhead sea turtles). Of those O&M dredging projects, none documented any lethal take of green sea turtle or hawksbill sea turtle during hopper dredging activities. Based on this information, we do not anticipate any lethal take of green sea turtle or hawksbill sea turtle from hopper dredging associated with the proposed project.

To estimate the number of Kemp's ridley and loggerhead sea turtles (Northwest Atlantic DPS) that may be killed by the proposed action, we examined the ratio of documented Kemp's ridley and loggerhead sea turtles (Northwest Atlantic DPS) killed to the total volume of material removed by the previous hopper dredging projects within the Sabine-Neches Waterway Channel. The cumulative volume of material dredged using a hopper dredge within the Sabine-Neches Waterway Channel is approximately 70,776,639 cy. When we divide the total cubic yards of material dredged by the total number of number Kemp's ridley and loggerhead sea turtles (Northwest Atlantic DPS) observed as killed by a hopper dredge, we can calculate the expected mortality of each species per volume of dredged material for the proposed project.

Expected Observed Mortality of Sea Turtles by Species Per Volume of Dredged Material
= (total yards dredged by hopper dredge) ÷ (number of reported takes by hopper dredge for each species)

Kemp's ridley Sea Turtle
= 70,776,639 cy ÷ 3
= 1 expected Kemp's ridley sea turtle mortality per 23,592,213 cy

Loggerhead Sea Turtle
= 70,776,639 cy ÷ 3
= 1 expected loggerhead sea turtle mortality per 23,592,213 cy

The proposed project estimates that a total of approximately 44,690,000 cy of material will be dredged from the Sabine-Neches Waterway Channel using a hopper dredge.

Expected Observed Sea Turtle Mortalities by Species
= [(proposed volume of material to be dredged) ÷ (per volume total)] × (expected number of mortalities for each species)

Kemp's ridley Sea Turtles
= [(44,690,000 cy) ÷ (23,592,213 cy)] × (1 Kemp's ridley sea turtle)
= 1.89 observed Kemp's ridley sea turtle mortalities

Loggerhead Sea Turtles
= [(44,690,000 cy) ÷ (23,592,213 cy)] × (1 loggerhead sea turtle)
= 1.89 observed loggerhead sea turtle mortalities

Because the calculated number of observed mortalities is a fraction, we round this estimate to the nearest whole number for a total estimate listed in the table below.

Table 4. Estimated Number of Observed Sea Turtle Mortalities by Species.

Species	**Expected Number of Observed Mortalities Per Volume of Dredged Material**	**Expected Number of Observed Mortalities**
Kemp's ridley sea turtle	23,592,213 cy	2
Loggerhead sea turtle	23,592,213 cy	2

As discussed above, dredged material screening by observers on hopper dredges is only partially effective, and observed interactions are expected to document only 50% of sea turtles entrained and killed by a hopper dredge. Thus, the anticipated observed and unobserved lethal take of sea turtles by the proposed action is show in Table 5 below.

Table 5. Expected number of Observed and Unobserved Sea Turtle Mortalities by Species

Species	Expected Number of Observed + Unobserved Mortalities
Kemp's ridley sea turtle	2 + 2 = 4
Loggerhead sea turtle	2 + 2 = 4

In addition to the sea turtle interactions by hopper dredge, project-required relocation trawling is reported. This information is discussed below, in our analysis of the effect of relocation trawling. It also helps us anticipate which species are likely to be within the action area, in the absence of specific population data (e.g., nesting, migration), and their relative abundances.

6.2.4 Relocation Trawling

Relocation trawling is a proven method of reducing the density of ESA-listed species in front of an advancing hopper dredge and very likely results in reduced lethal take from hopper dredging (NMFS 2007). Relocation trawling is conducted only when it can be done safely. Nets are pulled along the sea bottom for 30 minutes or less before each retrieval and re-setting. During relocation trawling, PSOs live aboard the trawlers, monitor all tows for endangered and threatened species, and record water temperatures, bycatch information, and any sightings of protected species in the area. Any sea turtle or giant manta ray captured during relocation trawling are photographed, measured, biopsied for genetics, tagged, and relocated at least 3 nm away. Giant manta ray captured by relocation trawling will be handled by qualified, third-party PSOs aboard the vessel who will be responsible for collecting measurements, recording and reporting data, tagging, and taking genetic samples of the captured species. Species-specific handling guidelines are provided in the NMFS Safe Handling and Release Guidelines in Appendix A that detail how the PSO will perform these tasks such as how to take a genetic sample on a specific species, when species should be brought on board or released directly into the water, and how to handle animals in distress, among others. During all phases of relocation trawling, the applicant is required to abide by established harm avoidance and minimization measures.

Effects of Relocation Trawling
The effects of relocation trawling and subsequent handling are expected to be non-lethal to captured sea turtles and giant manta ray. All sea turtles captured via relocation trawling are released unharmed in a nearby area that contains the same habitat as the areas where the trawling occurs; therefore, any habitat displacement effects associated with the relocation trawling capture are considered to be insignificant. Capturing the species and relocating it, however, is an effect to the species, which is evaluated below.

All giant manta ray will be released directly from the trawling net according to the NMFS Safe Handling and Release Guidelines in Appendix A. Giant mantra rays are large animals that are difficult to carry and maneuver; thus, releasing them directly from the net will reduce the risk of harm to this species when captured. Due to the size and maneuverability of this species, we do not expect that they will be taken by hopper dredging and therefore releasing them back into the dredging area from relocation trawling is the safest option for this species.

Estimated Take of Sea Turtles from Relocation Trawling
We consulted project managers in the USACE Galveston District for information on the number of sea turtles captured during previous relocation trawling that occurred within the Sabine-Neches Waterway Channel. Using that information, we were able to calculate the number of sea turtles relocated per cubic yard of dredged material. Looking at the volume of dredge material instead of the number of dredge events allows us to better understand and estimate the potential for interactions for a project of this size. Between 1995 and 2022, the USACE recorded dredging a total of 70,776,639 cy of material during hopper dredging events within the Sabine-Neches Waterway Channel.

Estimated Number of Sea Turtles Relocated per Cubic Yard of Dredged Material
= (total number of sea turtles relocated) ÷ (total volume dredged)
= 23 ÷ 70,776,639 cy
= 0.000000325 sea turtles per cubic yard dredged

The proposed project estimates that a total of approximately 44,690,000 cy of material will be dredged from the Sabine-Neches Waterway Channel using a hopper dredge. We multiply this volume by the ratio calculated above to determine the estimated total of sea turtles to be relocated for the remainder of the proposed project.

Estimated Total Number of Sea Turtles Relocated (All Species)
= (proposed volume of material to be hopper dredged) × (estimated number of sea turtles relocated per cubic yard of dredged material)
= (44,690,000 cy) × (0.000000325 sea turtles relocated)
= 14.52 sea turtles relocated (all species)

Because the calculated estimate is a fraction, and it is not possible to incidentally take just a portion of an animal, we round this estimate up to the nearest whole number. This gives us a total estimate of 15 sea turtles to be relocated for the 44,690,000 cy of material to be dredged using a hopper dredge.

To estimate the number of Kemp's ridley and loggerhead (Northwest Atlantic DPS) sea turtles to be potentially relocated for the remainder of the proposed project, we looked at the breakdown of sea turtles captured and identified by species during previous relocation trawling that occurred within the action area. Table 6 shows the number of each sea turtle species captured during relocation trawling as well as the percentage of the total number of sea turtles captured represented by each species.

Table 6. Hopper Dredging Sea Turtle Relocation Trawling Data for the Sabine-Neches Waterway Channel, 2002-2022 (USACE data) [Note: Relocation trawling occurred only during the years listed for hopper dredging conducted within the Sabine-Neches Waterway Channel.]

Year	Green Sea Turtle Relocations	Kemp's ridley Sea Turtle Relocations	Loggerhead Sea Turtle Relocations	Hawksbill Sea Turtle Relocations	Unknown Species Relocations	Total Relocations (All species)
2002	0	3	5	0	0	8
2003	0	2	1	0	0	3
2006	0	2	3	0	0	5
2022	0	3	4	0	0	7
TOTAL	**0**	**10**	**13**	**0**	**0**	**23**
Percentage	**0**	**43.48%**	**56.52%**	**0**	**0**	**100%**

Using the calculated species percentages for relocated sea turtles in Table 6, we can estimate the potential species composition for future captures of sea turtles during relocation trawling within the action area for the remainder of the proposed project.

Table 7. Estimated Non-Lethal Take by Sea Turtle Species for Relocation Trawling

Species	Non-lethal Capture Estimate	Rounded Non-Lethal Total
Kemp's ridley sea turtle	14.52 × 0.4348 = 6.31	7
Loggerhead sea turtle (Northwest Atlantic DPS)	14.52 × 0.5652 = 8.21	9

The effects of capture and handling during relocation trawling can result in raised levels of stressor hormones and can cause some discomfort during tagging procedures. Based on past observations obtained during similar research trawling for sea turtles (i.e., small-scale trawling, not the type associated with large-scale maintenance dredging), these effects are expected to dissipate within a day (Stabenau and Vietti 2003). Since sea turtle recaptures are not common, and recaptures that do occur typically happen several days to weeks after initial capture, cumulative adverse effects of recapture are not expected. The reasoning behind this is sea turtles that are non-lethally taken by a closed-net trawl, which is observing trawl speed and tow-time limits, will be safely relocated to an area outside of the trawl area (typically 3-5 mi). If the sea turtle is captured again, the sea turtle will have had ample time to recover from the stress of the experience of the trawl net. This project differs from larger maintenance dredging projects, which would likely use larger relocation vessels with larger nets that can accommodate heavier catches and could potentially result in internal and external injuries to sea turtles, leading to the potential for post-release mortalities. Because of the smaller scale of this project, including the smaller relocation vessels and nets, and for the other reasons stated here, we do not anticipate any mortalities of healthy sea turtles associated with relocation trawling. Relocation trawling could injure or kill sea turtles with impaired health, but we do not anticipate this to occur.

Estimated Take of Giant Manta Ray from Relocation Trawling

Giant manta ray is likely to be captured by relocation trawling that will occur in connection with hopper dredging, though we currently lack records of captures of this species to accurately estimate the number that may be captured. The best available information we have at the time of completion of this Opinion is from the northeast Atlantic, which is outside of the action area. The reports from the northeast Atlantic are reports of mantas caught as bycatch in fisheries where NMFS' observers document each interaction with a Mobulid ray by species when possible. Based on the available unpublished NEFOP data from 2001-2015 of giant manta rays and unknown ray species captured in gear types used in the Northeast fisheries, we were able to estimate a CPUE based on the number of reported ray captures and the tow effort. The rays counted included those that were identified as giant manta rays through photo identification and others reported *Mobulidae* (any manta and devil ray species that could not be confirmed to species), assuming that they may have been giant manta ray. Table 8 shows the take that may occur under this Opinion using the calculated CPUE and multiplying it by the estimated number of tows under this Opinion. We used the maximum number of tows estimated to occur annually under this Opinion (i.e., 38,730 tows) to account for the likelihood of encountering more giant manta ray in the action area than the reported captures in a fishery in the northeast. Giant manta rays are year round residents in the action area for this Opinion, including some that migrate out of the action area.

Table 8. Estimated Relocation Trawling Captures of Giant Manta Ray (NEFOP data, 2001-2015)

	2001-2015
Total tows	57,829.12
Total Captures	11
CPUE	0.000190
Maximum annual estimated take (CPUE x 38,730 tows)	7.36

Because the calculated estimate is a fraction, we round this estimate up to the nearest whole number. This gives us a total estimate of 8 giant manta rays to be relocated annually for the material to be dredged using a hopper dredge.

7 CUMULATIVE EFFECTS

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 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 effect. 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.

8 JEOPARDY ANALYSIS

To "jeopardize the continued existence of" a species means "to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and the recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species" (50 CFR 402.02). Thus, in making this determination for each species, we must look at whether the proposed action directly or indirectly reduces the reproduction, numbers, or distribution of a listed species. If there is a reduction in 1 or more of these elements, we evaluate whether the action would be expected to cause an appreciable reduction in the likelihood of both the survival and the recovery of the species.

The NMFS and USFWS's ESA Section 7 Handbook (USFWS and NMFS 1998) defines survival and recovery, as these terms apply to the ESA's jeopardy standard. Survival means "the species' persistence…beyond the conditions leading to its endangerment, with sufficient resilience to allow recovery from endangerment." The Handbook further explains that survival is the condition in which a species continues to exist into the future while retaining the potential for recovery. This condition is characterized by a sufficiently large population, represented by all necessary age classes, genetic heterogeneity, and number of sexually mature individuals producing viable offspring, which exists in an environment providing all requirements for completion of the species' entire life cycle, including reproduction, sustenance, and shelter. Per the Handbook and the ESA regulations at 50 CFR 402.02, recovery means "improvement in the status of listed species to the point at which listing is no longer appropriate under the criteria set out in Section 4(a)(1) of the Act." Recovery is the process by which species' ecosystems are restored or threats to the species are removed or both so that self-sustaining and self-regulating populations of listed species can be supported as persistent members of native biotic communities.

The analyses conducted in the previous sections of this Opinion serve to provide a basis to determine whether the proposed action would be likely to jeopardize the continued existence of Kemp's ridley sea turtle, loggerhead sea turtle (Northwest Atlantic DPS), and giant manta ray. In Section 6.0, we outlined how the proposed action can adversely affect these species. Now we turn to an assessment of the species response to these impacts, in terms of overall population effects, and whether those effects of the proposed action, when considered in the context of the Status of the Species (Section 4), the Environmental Baseline (Section 5), and the Cumulative Effects (Section 7), will jeopardize the continued existence of the affected species. For any species listed globally, our jeopardy determination must evaluate whether the proposed action will appreciably reduce the likelihood of survival and recovery at the species' global range. For any species listed as DPSs, a jeopardy determination must evaluate whether the proposed action will appreciably reduce the likelihood of survival and recovery of that DPS.

8.1 Sea Turtles

8.1.1 Kemp's ridley sea turtle

Survival

The proposed action is expected to result in take of up to 11 Kemp's sea turtles (4 lethal, 7 non-lethal) during the proposed project. Any potential non-lethal take is not expected to have a measurable impact on the reproduction, numbers, or distribution of this species. The individuals suffering non-lethal injuries are expected to fully recover such that no reductions in reproduction or numbers of Kemp's ridley sea turtles are anticipated. All non-lethal take will occur in the action area, which encompass a small portion of the overall range or distribution of Kemp's ridley sea turtles. Any captured animals would be released within the general area where caught and no change in the distribution of Kemp's ridley sea turtles would be anticipated.

The potential lethal take of up to 4 Kemp's ridley sea turtles (2 observed, 2 not observed) during the project would reduce the number of Kemp's ridley sea turtles, compared to their numbers in the absence of the proposed action, assuming all other variables remained the same. Potential lethal capture would also result in a reduction in future reproduction, assuming the individual was female and would have survived otherwise to reproduce. For example, females lay approximately 2.5 nests per season with each nest containing approximately 100 eggs. The loss of 4 adult female loggerhead sea turtles could preclude the production of thousands of eggs and hatchlings of which a small percentage would be expected to survive to sexual maturity. Thus, the death of any females would eliminate their contribution to future generations, and result in a reduction in sea turtle reproduction. The potential lethal take, however, is expected to occur in a small, discrete area and Kemp's ridley sea turtle generally have large ranges; thus, no reduction in the distribution is expected from the take of these individuals.

Whether the reductions in numbers and reproduction of this species would appreciably reduce its likelihood of survival depends on the probable effect the changes in numbers and reproduction would have relative to current population sizes and trends. In the Status of Species (Section 4.1.4), we presented the status of Kemp's ridley sea turtle, outlined threats, and discussed information on estimates of the number of nesting females and nesting trends at primary nesting beaches. In the Environmental Baseline, we considered the past and present impacts of all state, federal, or private actions and other human activities in, or having effects in, the action area that have affected and continue to affect this sea turtle species. In the Cumulative Effects, we considered the effects of future state, tribal, local, or private actions that are reasonably certain to occur within the action area.

In the absence of any total population estimates, nesting trends are the best proxy for estimating population changes. It is important to remember that with significant inter-annual variation in nesting data, sea turtle population trends necessarily are measured over decades and the long-term trend line better reflects the population trend. In Section 4.1.4, we summarized available information on the number of Kemp's ridley sea turtle nesters and nesting trends. At this time, it is unclear whether the increases and declines in Kemp's ridley sea turtle nesting seen over the past decade-and-a-half represents a population oscillating around an equilibrium point, if the recent three years (2020-2022) of relatively steady nesting indicates that equilibrium point, or if nesting will decline or increase in the future. Nonetheless, the full data set from 1990 to present continues to support the conclusion that Kemp's ridley sea turtles are increasing in population size. We believe these nesting trends are indicative of a species with a high number of sexually mature individuals. Since the nesting trend information is increasing, we believe the potential lethal captures will not have any measurable effect on that trend.

After analyzing the magnitude of the effects, in combination with the past, present, and future expected impacts to the species discussed in this Opinion, we believe the proposed project is not reasonably expected to cause an appreciable reduction in the likelihood of survival of the Kemp's ridley sea turtle in the wild.

Recovery
As to whether the consultation pier will appreciably reduce the species' likelihood of recovery, the recovery plan for the Kemp's ridley sea turtle (NMFS et al. 2011) lists the following relevant recovery objective:

- *A population of at least 10,000 nesting females in a season (as measured by clutch frequency per female per season) distributed at the primary nesting beaches (Rancho Nuevo, Tepehuajes, and Playa Dos) in Mexico is attained. Methodology and capacity to implement and ensure accurate nesting female counts have been developed.*

The recovery plan states the average number of nests per female is 2.5; it sets a recovery goal of 10,000 nesting females associated with 25,000 nests. Recent data indicates an increase in nesting. In 2015 there were 14,006 recorded nests, and in 2016 overall numbers increased to 18,354 recorded nests (Gladys Porter Zoo 2016). There was a record high nesting season in 2017, with 24,570 nests recorded (J. Pena, pers. comm., August 31, 2017), but nesting for 2018 declined to 17,945, with another steep drop to 11,090 nests in 2019 (Gladys Porter Zoo data, 2019). Nesting numbers rebounded in 2020 (18,068 nests), 2021 (17,671 nests), and 2022 (17,418) (CONAMP data, 2022). At this time, it is unclear whether the increases and declines in nesting seen over the past decade-and-a-half represents a population oscillating around an equilibrium point, if the recent three years (2020-2022) of relatively steady numbers of nests indicates that equilibrium point, or if nesting will decline or increase in the future. Currently, we can conclude only that the population has dramatically rebounded from the lows seen in the 1980's and 1990's, and we cannot ascertain a current population trend or trajectory.

The potential lethal captures during the proposed action will result in a reduction in numbers and reproduction; however, it is unlikely to have any detectable influence on the nesting trends. Given annual nesting numbers are in the thousands, the projected loss is not expected to have any discernable impact to the species. Any non-lethal capture would not affect the adult female nesting population. Thus, the proposed action will not impede achieving the recovery objectives above and will not result in an appreciable reduction in the likelihood of recovery of Kemp's ridley sea turtles in the wild.

Conclusion
The combined lethal and non-lethal captures of Kemp's ridley sea turtles associated with the proposed action is not expected to cause an appreciable reduction in the likelihood of either the survival or recovery of the Kemp's ridley sea turtle in the wild.

8.1.2 Loggerhead sea turtle (Northwest Atlantic DPS)

Survival
The proposed action is expected to result in take of up to 13 loggerhead sea turtles (4 lethal, 9 non-lethal) from the Northwest Atlantic DPS during the proposed project. Any potential non-lethal take is not expected to have a measurable impact on the reproduction, numbers, or distribution of this species. The individuals suffering non-lethal injuries are expected to fully recover such that no reductions in reproduction or numbers of loggerhead sea turtles are

anticipated. All non-lethal take will occur in the action area, which encompass a small portion of the overall range or distribution of loggerhead sea turtles within the Northwest Atlantic DPS. Any captured animals would be released within the general area where caught and no change in the distribution of Northwest Atlantic DPS of loggerhead sea turtles would be anticipated.

The potential lethal take of up to 4 loggerhead sea turtles (2 observed, 2 not observed) during the project would reduce the number of Northwest Atlantic DPS loggerhead sea turtles, compared to their numbers in the absence of the proposed action, assuming all other variables remained the same. Potential lethal capture would also result in a reduction in future reproduction, assuming the individual was female and would have survived otherwise to reproduce. For example, an adult female loggerhead sea turtle can lay approximately 4 clutches of eggs every 3-4 years, with 100-126 eggs per clutch. Thus, the loss of 4 adult female loggerhead sea turtles could preclude the production of thousands of eggs and hatchlings of which a small percentage would be expected to survive to sexual maturity. The potential lethal take, however, is expected to occur in a small, discrete area and loggerhead sea turtle generally have large ranges; thus, no reduction in the distribution is expected from the take of these individuals.

Whether the reductions in numbers and reproduction of this species would appreciably reduce its likelihood of survival depends on the probable effect the changes in numbers and reproduction would have relative to current population sizes and trends. In the Status of Species (Section 4.1.5), we presented the status of the DPS, outlined threats, and discussed information on estimates of the number of nesting females and nesting trends at primary nesting beaches. In the Environmental Baseline, we considered the past and present impacts of all state, federal, or private actions and other human activities in, or having effects in, the action area that have affected and continue to affect this DPS. In the Cumulative Effects, we considered the effects of future state, tribal, local, or private actions that are reasonably certain to occur within the action area.

In the absence of any total population estimates, nesting trends are the best proxy for estimating population changes. Abundance estimates in the western North Atlantic indicate the population is large (i.e., several hundred thousand individuals). In Section 4.1.5, we summarized available information on number of loggerhead sea turtle nesters and nesting trends. Nesting trends across all of the recovery units have been steady or increasing over several years against the background of the past and ongoing human and natural factors that have contributed to the current status of the species. Additionally, in-water research suggests the abundance of neritic juvenile loggerheads is steady or increasing.

While the potential lethal capture of up to 4 loggerhead sea turtles during the proposed project will affect the population, in the context of the overall population's size and current trend, we do not expect this loss to result in a detectable change to the population numbers or increasing trend. After analyzing the magnitude of the effects, in combination with the past, present, and future expected impacts to the DPS discussed in this Opinion, we believe the proposed project is not reasonably expected to cause an appreciable reduction in the likelihood of survival of the Northwest Atlantic DPS of loggerhead sea turtle in the wild.

Recovery
The recovery plan for the Northwest Atlantic population of loggerhead sea turtles (NMFS and USFWS 2009) was written prior to the loggerhead sea turtle DPS listings. However, this plan deals with the populations that comprise the current Northwest Atlantic DPS and is therefore, the best information on recovery criteria and goals for the DPS. It lists the following recovery objectives that are relevant to the effects of the proposed actions:

- *Objective: Ensure that the number of nests in each recovery unit is increasing and that this increase corresponds to an increase in the number of nesting females*
- *Objective: Ensure the in-water abundance of juveniles in both neritic and oceanic habitats is increasing and is increasing at a greater rate than strandings of similar age classes*

Recovery is the process of removing threats so self-sustaining populations persist in the wild. The proposed actions would not impede progress on carrying out any aspect of the recovery program or achieving the overall recovery strategy. The recovery plan estimates that the population will reach recovery in 50-150 years following implementation of recovery actions. The minimum end of the range assumes a rapid reversal of the current declining trends; the higher end assumes that additional time will be needed for recovery actions to bring about population growth.

In Section 4.1.3, we summarized available information on number of loggerhead sea turtle nesters and nesting trends. Nesting trends across all of the recovery units have been steady or increasing over several years against the background of the past and ongoing human and natural factors that have contributed to the current status of the species. Looking at the data from 1989 through 2016, FWRI concluded that there was an overall positive change in the nest counts although it was not statistically significant due to the wide variability between 2012-2016 resulting in widening confidence intervals. Nesting at the core index beaches declined in 2017 to 48,033, and rose again each year through 2020, reaching 53,443 nests, dipping back to 49,100 in 2021, and then in 2022 reaching the second-highest number since the survey began, with 62,396 nests. It is important to note that with the wide confidence intervals and uncertainty around the variability in nesting parameters (changes and variability in nests/female, nesting intervals, etc.) it is unclear whether the nesting trend equates to an increase in the population or nesting females over that time frame (Ceriani, et al. 2019). In-water research suggests the abundance of neritic juvenile loggerheads is also steady or increasing.

The potential non-lethal from the Northwest Atlantic DPS would not affect the adult female nesting population, number of nests per nesting season, or juvenile in-water populations. Thus, proposed project will not impede achieving the recovery objectives above and will not result in an appreciable reduction in the likelihood of Northwest Atlantic DPS of loggerhead sea turtles' recovery in the wild.

Conclusion
The combined lethal and non-lethal captures of loggerhead sea turtles associated with the proposed action is not expected to cause an appreciable reduction in the likelihood of either the survival or recovery of the Northwest Atlantic DPS of the loggerhead sea turtle in the wild.

8.2 Giant Manta Ray

The proposed action is expected to result in the capture of 8 giant manta rays during relocation trawling associated with the proposed project. We expect all captures to be non-lethal.

Survival
The non-lethal capture of giant manta ray is not expected to have any measurable impact on the reproduction, numbers, or distribution of this species. The individuals captured are expected to fully recover such that no reductions in reproduction or numbers of this species are anticipated. Since these captures may occur in the small, discrete action area and would be released within the general area where caught, no change in the distribution of giant manta ray is anticipated.

Recovery
A recovery plan for giant manta ray has not yet been developed; however, NMFS published a recovery outline for the giant manta ray (NMFS 2019). The recovery outline serves as an interim guidance to direct recovery efforts for giant manta ray. The recovery outline identifies two primary interim goals:

- *Stabilize population trends through reduction of threats, such that the species is no longer declining throughout a significant portion of its range; and*
- *Gather additional information through research and monitoring on the species' current distribution and abundance, movement and habitat use of adult and juveniles, mortality rates in commercial fisheries (including at-vessel and PRM), and other potential threats that may contribute to the species' decline.*

The major threats affecting the giant manta ray were summarized in the final listing rule (83 FR 2619, Publication Date January 22, 2018). The most significant threats to the giant manta ray are overutilization by foreign commercial and artisanal fisheries in the Indo-Pacific and Eastern Pacific and inadequate regulatory mechanisms in foreign nations to protect this species from the heavy fishing pressure and related mortality in these waters outside of U.S. jurisdiction. Other threats that potentially contribute to long-term risk of the species include: (micro) plastic ingestion rates, increased parasitic loads as a result of climate change effects, and potential disruption of important life history functions as a result of increased tourism. However, due to the significant data gaps, the likelihood and impact of these threats on the status of the species is highly uncertain. Relocation trawling not considered a major threat to this species and we do not believe the proposed action will appreciably reduce the recovery of giant manta ray, by significantly exacerbating effects of any of the major threats identified in the final listing rule.

The individuals suffering non-lethal capture are expected to fully recover such that no reductions in reproduction or numbers of giant manta rays are anticipated. The non-lethal capture will occur at in a discrete location and the action area encompasses only a portion of the overall range or distribution of giant manta rays. Any incidentally caught animal would be released within the general area where caught and no change in the distribution of giant manta rays would be anticipated. Therefore, the non-lethal capture of giant manta ray associated with the proposed action are not expected to cause an appreciable reduction in the likelihood of recovery of the giant manta ray in the wild.

Conclusion
The potential non-lethal capture associated with the proposed action is not expected to cause an appreciable reduction in the likelihood of either the survival or recovery of giant manta ray in the wild. Mortalities are not expected and the proposed project will not result in an appreciable reduction in the likelihood of giant manta ray recovery in the wild.

9 CONCLUSION

We reviewed the Status of the Species, the Status of the Critical Habitat, the Environmental Baseline, the Effects of the Action, and the Cumulative Effects using the best available data.

We do not anticipate that proposed action will result in take of the green sea turtle (North Atlantic DPS) or hawksbill sea turtles. The proposed action will result in take of the Kemp's ridley sea turtle, loggerhead sea turtle (Northwest Atlantic DPS), and giant manta ray. Given the nature of the proposed action and the information provided above, we conclude that the action, as proposed, is not likely to jeopardize the continued existence of the Kemp's ridley sea turtle, loggerhead sea turtle (Northwest Atlantic DPS), and giant manta ray.

10 INCIDENTAL TAKE STATEMENT

10.1 Overview

Section 9 of the ESA and protective regulations issued pursuant to Section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without a special exemption. *Take* is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct (ESA Section 2(19)). *Incidental take* refers to takings that result from, but are not the purpose of, carrying out an otherwise lawful activity conducted by the Federal agency or applicant. Under the terms of Section 7(b)(4) and Section 7(o)(2), taking that would otherwise be considered prohibited under Section 9 or Section 4(d) but which is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the ESA, provided that such taking is in compliance with the Reasonable and Prudent Measures and the Terms and Conditions of the Incidental Take Statement of the Opinion.

The take of giant manta ray by the proposed action is not prohibited under ESA Section 9, as no Section 4(d) Rules for the species have been promulgated. However, a circuit court case held that non-prohibited incidental take must be included in the Incidental Take Statement (*CBD v. Salazar*, 695 F.3d 893 [9th Circuit 2012]). Though the *Salazar* case is not a binding precedent for this action, which occurs outside of the 9th Circuit, NMFS finds the reasoning persuasive and is following the case out of an abundance of caution and because we anticipate that the ruling will be more broadly followed in future cases. Providing an exemption from Section 9 liability is not the only important purpose of specifying take in an Incidental Take Statement. Specifying incidental take ensures we have a metric against which we can measure whether or not reinitiation of consultation is required. Including these species in the Incidental Take Statement also ensures that we identify Reasonable and Prudent Measures that we believe are necessary or appropriate to minimize the impact of such incidental take.

Section 7(b)(4)(c) of the ESA specifies that to provide an Incidental Take Statement for an endangered or threatened species of marine mammal, the taking must be authorized under Section 101(a)(5) of the MMPA. Since no incidental take of listed marine mammals is anticipated as a result of the proposed action, no statement on incidental take of protected marine mammals is provided and no take is authorized. Nevertheless, the USACE must immediately notify (within 24 hours, if communication is possible) our Office of Protected Resources if a take of a listed marine mammal occurs.

As soon as the USACE becomes aware of any take of an ESA-listed species under NMFS's purview that occurs during 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). 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, Sabine Neches Waterway, the issuance date, and ECO tracking number, SERO-2023-00049, 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.

The USACE has a continuing duty to ensure compliance with the reasonable and prudent measures and terms and conditions included in this Incidental Take Statement. If the USACE (1) fails to assume and implement the terms and conditions or (2) fails to require the terms and conditions of the Incidental Take Statement through enforceable terms that are added to the permit or grant document or other similar document, the protective coverage of Section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the USACE must report the progress of the action and its impact on the species to NMFS as specified in the Incidental Take Statement (50 CFR 402.14(i)(3)).

10.2 Anticipated Incidental Take

Our take estimate for loggerhead sea turtles was underestimated in the 2007 Opinion which, in addition to the listing of the giant manta ray, prompted the need to reinitiate consultation on the remaining activities for this project. Based on the above information and analyses, NMFS believes that the proposed action is likely to adversely affect Kemp's ridley sea turtle, loggerhead sea turtle (Northwest Atlantic DPS), and giant manta ray. These effects will result from the remaining hopper dredging and associated relocation trawling and handling to be conducted for the Sabine-Neches Waterway Channel project.

NMFS anticipates the following lethal and non-lethal incidental take may occur as a result of the remaining hopper dredging and relocation trawling for the proposed project:

Table 9. Anticipated Lethal and Non-Lethal Take of Sea Turtles by Species

Species	Lethal (Hopper Dredging)	Non-Lethal (Relocation Trawling)
Kemp's ridley sea turtle	4	7
Loggerhead sea turtle	4	9

We do not anticipate, nor do we authorize, any lethal take of the green sea turtle (North Atlantic DPS) or hawksbill sea turtle from hopper dredging associated with the remainder of the proposed project.

Giant Manta Ray

We anticipate that the remaining hopper dredging and relocation trawling for the proposed project will incidentally take 8 giant manta rays. We expect all interactions with giant manta ray to be non-lethal.

10.3 Effect of Take

NMFS has determined that the anticipated incidental take specified in Section 10.2 is not likely to jeopardize the continued existence Kemp's ridley sea turtle, loggerhead sea turtle (Northwest Atlantic DPS), and giant manta ray if the proposed action is completed as proposed.

10.4 Reasonable and Prudent Measures

Section 7(b)(4) of the ESA requires NMFS to issue to any federal agency whose proposed action is found to comply with Section 7(a)(2) of the ESA, but may incidentally take individuals of listed species, a statement specifying the impact of that taking. The Incidental Take Statement must specify the Reasonable and Prudent Measures necessary to minimize the impacts of the incidental taking from the proposed action on the species, and Terms and Conditions to implement those measures. "Reasonable and prudent measures" are measures that are necessary or appropriate to minimize the impact of the amount or extent of incidental take" (50 CFR 402.02). Per Section 7(o)(2), any incidental taking that complies with the specified terms and conditions is not considered to be a prohibited taking of the species concerned.

The Reasonable and Prudent Measures and terms and conditions are required to document the incidental take by the proposed action and to minimize the impact of that take on ESA-listed species (50 CFR 402.14(i)(1)(ii) and (iv)). These measures and terms and conditions must be implemented by the USACE for the protection of Section 7(o)(2) to apply. The USACE has a continuing duty to ensure compliance with the reasonable and prudent measures and terms and conditions included in this Incidental Take Statement. If USACE fails to adhere to the terms and conditions of the Incidental Take Statement through enforceable terms, or fails to retain oversight to ensure compliance with these terms and conditions, the protective coverage of Section 7(o)(2) may lapse. To monitor the impact of the incidental take, the USACE must report the progress of the action and its impact on the species to SERO PRD as specified in the Incidental Take Statement [50 CFR 402.14(i)(3)].

NMFS has determined that the following Reasonable and Prudent Measures are necessary and appropriate to minimize impacts of the incidental take of ESA-listed species related to the proposed action. The following Reasonable and Prudent Measures and associated terms and conditions are established to implement these measures, and to document incidental takes. Only incidental takes that occur while these measures are in full implementation are not considered to be a prohibited taking of the species. These restrictions remain valid until reinitiation and conclusion of any subsequent Section 7 consultation.

1. USACE must provide take reports regarding all interactions with ESA-listed species that occur during the proposed project.

2. USACE must minimize the likelihood of injury or mortality to ESA-listed species resulting from relocation trawling and subsequent handling of animals.

10.5 Terms and Conditions

In order to be exempt from the prohibitions established by Section 9 of the ESA, USACE must comply (or must ensure that any applicant complies) with the following Terms and Conditions.

The following Terms and Conditions implement Reasonable and Prudent Measure #1:

- USACE must report all known captures of ESA-listed species and any other takes of ESA-listed species to the NMFS SERO PRD.
    - If and when the USACE becomes aware of any known reported capture, entanglement, stranding, or other take of ESA-listed species, the applicant must report it to NMFS SERO PRD via the NMFS SERO Endangered Species Take Report Form (https://forms.gle/85fP2da4Ds9jEL829).
        - Emails must reference this Opinion by the NMFS tracking number (SERO-2023-00049 Sabine Neches Waterway) and date of issuance.
        - This form shall be completed for each individual known reported capture, entanglement, stranding, or other take incident for ESA-listed species.
        - The form must include the species name, state the date and time of the incident, 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.
    - For the activities covered by this Opinion, the USACE must submit an annual summary report of capture, entanglement, stranding, or other take of ESA-listed species to NMFS SERO PRD by email: nmfs.ser.esa.consultations@noaa.gov.
        - All emails and summary reports must reference this Opinion by the NMFS tracking number (SERO-2023-00049 Sabine Neches Waterway) and date of issuance.
        - The summary report will contain the following information: the total number of ESA-listed species captures, entanglements, strandings, or other take that was reported during activities covered by this Opinion.
        - The summary report will contain all information for any sea turtles taken to a rehabilitation facility holding an appropriate USFWS Native Endangered and

Threatened Species Recovery permit. This information can be obtained from the appropriate State Coordinator for the STSSN (https://www.fisheries.noaa.gov/state-coordinators-sea-turtle-stranding-and-salvage-network)

- The annual summary report shall be submitted even when there have been no reported take of ESA-listed species.
- The first annual summary report will be submitted by January 31 in the calendar year following commencement of the activities covered by this Opinion. Thereafter, reports will be prepared every year during which the activities covered by the Opinion occur, and will be submitted to NMFS via email no later than January 31 of any year.

The following Terms and Conditions implement Reasonable and Prudent Measure #2:

- The USACE, and their designated agents, will:
  - Comply with NMFS SERO *Protected Species Construction Conditions*, revised May 2021.
  - Comply with the NMFS SERO *Vessel Strike Avoidance Measures*, revised May 2021.
  - Comply with the NMFS Safe Handling and Release Guidelines (Appendix A).
  - Implement all GRBO Reasonable and Prudent Measures and Terms and Conditions identified in Appendix D of this Opinion.
  - Implement relocation trawling when hopper dredging in accordance with Appendix C of this Opinion.
  - Implement the general PDCs in in Appendix B on the use of in-water lines (see Appendix B).
- After the final relocation trawling event, the USACE must submit a summary report of capture, entanglement, stranding, or other take of ESA-listed species to NMFS SERO PRD by email: nmfs.ser.esa.consultations@noaa.gov.
  - Emails and reports must reference this Opinion by the NMFS tracking number (SERO-2023-00049 Sabine Neches Waterway) and date of issuance.
  - The report will contain the following information: the total number of ESA-listed species captures, entanglements, strandings, or other take that was reported during the relocation trawling.

11 CONSERVATION RECOMMENDATIONS

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:

Dredge Equipment and Species Interactions

- NMFS recommends that the USACE explore alternative means for monitoring interactions with listed species when MEC/UXO screening is in place. This could include exploring the potential for video or other electronic monitoring and consider designing pilot studies to test the efficiency of innovative monitoring and screening techniques.
- NMFS recommends that the USACE conduct studies to evaluate differences in species take by different hopper dredge designs to determine whether some designs may result in higher likelihood of take. This should include an evaluation of the design of both the hopper dredging and the draghead deflector shield and options to minimize take in challenging locations such as areas with high debris and uneven bottom surfaces.
- NMFS recommends that the USACE evaluate the feasibility of installing video or other remote-sensing equipment (e.g., GoPro) on the dragarm or draghead to determine whether visibility is sufficient to monitor for interactions with species. If installing such equipment is feasible, and visibility is sufficient to observe and identify species encounters, the USACE should design a study to test species reactions to the dredge or the disturbance radius from the hopper dredge draghead.
- NMFS recommends that the USACE examine different inflow and overflow screening and box configurations to minimize the risk of clogging during dredging while maximizing the ability for PSOs to easily, and safely inspect all of the contents collected in the boxes for evidence of take. Possibilities include different placement within the hopper dredge that are more easily viewable, various box sizes and shapes that improve visibility without entering the box, and various screening designs and materials that reduce clogging. Improved technological solutions such as video monitoring capability may also prove useful in reducing the need for PSOs to enter the boxes to inspect the contents.
- NMFS recommends that the USACE continue to support the development of innovative new dredging methods/practices and dredge designs that will further minimize listed species interactions and mortalities. This could include a study to observe listed species reactions to dredging to understand how the species react to the oncoming draghead (e.g., disturbance radius, behavioral response) in different conditions (e.g., bottom topography, temperature).
- NMFS recommends that the USACE develop standard procedures to remove marine debris excavated during dredging operations. Marine debris creates an entanglement risk and pose risk to listed species when consumed. Standard procedures should be developed and implemented by action agencies to necessitate surface marine debris removal during dredging operations.
- NMFS recommends that the USACE conduct or support research that evaluates known, commonly used biomarkers for physiological stress (e.g., stress hormone levels) or other sublethal impacts of listed species taken during relocation activities. This information could help us better determine the condition of listed species post release and more accurately assess post-release mortality that will inform future consultations.
- NMFS recommends that the USACE explore the aggregate impacts of their activities through the development of Population Consequence of Disturbance models for listed species. Population Consequence of Disturbance models simulate the cumulative effects of sublethal stressors across individuals to characterize the population consequences of anthropogenic activities including sound exposure, pollutants, and reduced habitat access.

The Population Consequence of Disturbance modeling framework typically uses a bioenergetic model as a transfer function between stressors (e.g., behavioral disturbance) and their impacts on vital rates (i.e., growth, reproduction).

- NMFS recommends that the USACE design pilot studies and support literature searches to parameterize bioenergetic models for listed species. We recommend that the USACE design pilot studies to develop dose-response function for modeling the effects of sublethal stressors (e.g., what is the probability of a behavioral response at different levels of sound exposure). This will support the development of Population Consequence of Disturbance models for listed species.
- NMFS recommends that the USACE further examine hopper dredge designs currently in use to determine what features and practices could allow entrainment from a point not associated with the drag head. Past examples of occasional sea turtles found unharmed in the hopper indicates that some individuals may enter the hopper without having passed through the draghead.
- NMFS recommends that the USACE consider testing the feasibility of innovative techniques (e.g., side scan sonar) to improve observing or identify if giant manta ray, sea turtles, or other ESA-listed species are present in the path of dredging or trawling activities. If effective, results could identify times and locations when dredging or relocation trawling should or should not be used. This could reduce take if dredging in high density locations can be delayed to another time or reduce cost of relocation trawlers if the area has a low risk of species interaction.

Sea turtles

- NMFS recommends that the USACE conduct or support directed research to understand sea turtle use of and movement in, the water column in the summer. Warmer water temperatures, and breeding and nesting activities, likely result in different sea turtle behavior and movements within the water column compared to other times of year when hopper dredging occurs. Information on water column use during that time is important to understand the likelihood of sea turtle interactions with hopper dredges, and to inform hopper-dredging practices during the summer months.

Giant manta ray

- NMFS recommends the USACE conduct studies or support directed research to satellite (SPOT 6; Mini PAT) or acoustic tag giant manta rays in the action area. Data collected from tagging would be used evaluate residency and diel movement patterns, and purported nearshore nursery habitat along Florida east coast, which will inform future consultation and authorizations.
- NMFS recommends the USACE require all personnel to report giant manta ray sightings to the giant manta ray recovery coordinator at NMFS SERO PRD. Giant manta ray observations should be photographed and include the latitude/longitude, date, and environmental conditions at the time of the sighting.

12 REINITIATION OF CONSULTATION

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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APPENDIX A

1 Handling and Reporting Protocol for ESA-listed Species Observed or Encountered and Protected Species Observer (PSO) Roles and Responsibilities

All ESA-listed species that are observed or encountered during any activity covered under SERO-2023-00049 Sabine-Neches Waterway Channel, will be handled and reported as described in this Appendix, referred to as the PSO PDCs. These PDCs outline the requirements of vessel crew to report observations and for the PSO to observe for and handle ESA-listed species captured during dredging or relocation trawling. These requirements are in addition to any other applicable PDCs outlined in SERO-2023-00049 Sabine-Neches Waterway Channel and GRBO (SER-2000-01287). Vessel crew and PSOs working on projects covered under SERO-2023-00049 Sabine-Neches Waterway Channel should also be aware of the conditions in the PDCs that are applicable to the project upon which they are working on under SERO-2023-00049 Sabine-Neches Waterway Channel and GRBO (SER-2000-01287). Modifications to the handling procedures may be necessary to improve safe handling practices for both crew and animals. The current handling guidance (PSO PDCs) is available at (https://dqm.usace.army.mil/odess/#/technicalInfo).

2 Observations and Reporting Observations of ESA-listed Species

This outlines how staff operating on a project covered under SERO-2023-00049 Sabine-Neches Waterway Channel and GRBO (SER-2000-01287) will respond to ESA-listed species that are observed, but with no physical interaction occurring with the animal.

OBSERVE.1 For generally stationary construction with work contained to a specific project area, such as mechanical dredging equipment:

- All personnel working on the project will report ESA-listed species observed in the area to the on-site crew member in charge of operations.
- Operations of moving equipment will cease if an ESA-listed species is observed within 150 ft of operations by any personnel working on a project covered under this Opinion (e.g., sea turtles, elasmobranchs [giant manta ray, scalloped hammerhead shark, oceanic white tip shark] or ESA-listed marine mammal).
- Activities will not resume until the ESA-listed species has departed the project area of its own volition (e.g., species was observed departing or 20 minutes have passed since the animal was last seen in the area).

OBSERVE.2 For a vessel underway, such as a hopper dredge or support vessel, traveling within or between operations must follow speed and distance requirements, defined below, while ensuring vessel safety:

- All personnel working onboard will report ESA-listed species observed in the area to the vessel captain.
- If an ESA-listed species is spotted within the vessel's path, initiate evasive maneuvers to avoid collision.

- If a Rice's whale is spotted, slow to 10 knots and maintain a distance of at least 1,500 ft and report the observation to 1-877-WHALE-HELP.
- If a whale (other than a North Atlantic right whale) is spotted, maintain a distance of at least 300 ft.

OBSERVE.3 Report sightings (not encountered, collided with, or injured by a project SERO-2023-00049 Sabine-Neches Waterway Channel) of the following species:

- Giant manta ray: Report sightings by E-mail at: manta.ray@noaa.gov.
- Also, report all whale sightings to the NMFS Southeast Marine Mammal Stranding Hotline at (877) WHALE-HELP (877-942-5343).

OBSERVE.4 Any collision(s) with an ESA-listed species must be immediately reported to the USACE according to their internal protocol and to NMFS consistent with the reporting requirements in Section 2.1.2 of SERO-2023-00049 Sabine-Neches Waterway Channel. A vessel collision with an ESA-listed species is counted as take for the project.

In addition, reports of certain species shall also be reported as listed below. A link to the most current contact information will also be available at (https://dqm.usace.army.mil/odess/#/technicalInfo).

- Sea turtle take will also be reported to the appropriate state species representative (https://www.fisheries.noaa.gov/state-coordinators-sea-turtle-stranding-and-salvage-network).

OBSERVE.5 Any collision with a marine mammal will be reported immediately to the Southeast Regional Marine Mammal Stranding hotline at 1-877-WHALE-HELP (1-877-942-5343) for guidance. This includes both ESA and non-ESA listed marine mammals.

3 PSO Credentials

All handling, tagging, and/or genetic sampling of ESA-listed species captured on projects covered under SERO-2023-00049 Sabine-Neches Waterway Channel will be conducted by a PSO that meets the qualifications provided by NMFS.

PSO.1 Protected Species Training and Experience: PSOs selected to work on projects covered under SERO-2023-00049 Sabine-Neches Waterway Channel will meet the following requirements:

- PSOs will meet the training and experience requirements outlined by NMFS. At the time of the completion of SERO-2023-00049 Sabine-Neches Waterway Channel, PSO qualifications are confirmed by the NMFS Greater Atlantic Region Office, as defined on their website (https://www.fisheries.noaa.gov/new-england-mid-atlantic/careers-and-opportunities/protected-species-observers) for endangered species observers.
- PSOs will be trained and have experience to operate on the specific equipment they are aboard (e.g., hopper dredge, relocation trawler, G&G survey vessel).

PSO will have training and/or experience to identify and handle all species that may occur in the geographic area of the project.

- PSO will be trained to safely install the specific tags being used and or collect genetic samples required under GRBO (SER-2000-01287).
- ESA-listed species specific safe handling procedures, tagging procedures, and genetic sampling procedures must be followed, as outlined in these PSO PDCs. The PSO must carry a copy of the PSO PDCs and all other applicable PDCs while on the vessel for easy reference.
- The SERO-2023-00049 Sabine-Neches Waterway Channel and GRBO (SER-2000-01287) serves as the authority for the PSO to handle, tag, and genetic sample ESA-listed species for those projects.

PSO.2 To minimize the risk of vessel collisions, a PSO trained in species observation is also responsible for monitoring for the presence of ESA-listed species when the vessel is in motion and must therefore have the training and experience needed to identifying ESA-listed species and marine mammals in their natural environment.

4 PSO Responsibilities

The Section outlines the responsibilities of a PSO working on a relocation trawler or hopper dredge. The PSO is also responsible for all other duties outlined in the PDCs of this appendix.

Note: PSOs are also trained and may be responsible for monitoring for non-ESA-listed species including marine mammals protected under the Marine Mammal Protection Act. While the requirements outlined in SERO-2023-00049 Sabine-Neches Waterway Channel and GRBO (SER-2000-01287) PDCs are limited to ESA-listed species, the PSO PDCs include guidance to minimize the risk of encounter with non-ESA listed marine mammals. SERO-2023-00049 Sabine-Neches Waterway Channel and GRBO (SER-2000-01287) do not provide MMPA authorization.

4.1 PSO Guidance for handling ESA-listed species captured or observed injured or dead

The following PDCs describe how the PSO will handle ESA-listed species captured in hopper dredging and relocation trawling. If an ESA-listed species is observed injured or dead during other forms of dredging or material placement, this guidance also applies (e.g., observed during beach sand placement, in an upland disposal area, and while mechanical or cutterhead dredging).

PSO.3 PSOs observer coverage requirements are required to monitor for ESA-listed species as described below. PSOs on any project will not be assigned any other task (i.e., captain or other vessel crew position or task) while performing the role of PSO:

- Hopper dredging:
  - More than 1 PSO will be aboard the hopper dredge at all times.

    - The PSO on-duty is responsible for personally monitoring, handling, and reporting all captured ESA-listed species at all times when the hopper dredge is operating and follow the requirements of SERO-2023-00049 Sabine-Neches Waterway Channel and GRBO (SER-2000-01287).
    - The PSOs will stand watch to detect ESA-listed species in the area and to alert the captain of their presence to avoid vessel collision whenever the vessel is moving. The on-duty PSO will only be responsible for standing watch and not performing other tasks such as inspecting or handling captures when the vessel is in motion.
- Relocation trawling: The PSO(s) will be aboard the trawling vessel at all times.
    - The PSO is responsible for all handling and reporting of ESA-listed species.
    - Trawling crew may assist in the removal of species from the nets and data recording only and the PSO is responsible for all tagging, genetic sampling, and assuring information reported is accurate.
    - All crew aboard the vessel, including the PSO, are responsible for monitoring for the presence of ESA-listed species in the area and reporting it to the vessel captain and PSO.

PSO.4 Reporting Captures of ESA-listed Species:

- <u>Report to NMFS</u>: All non-lethal captures and dead ESA-listed species observed or collected during a project covered under SERO-2023-00049 Sabine-Neches Waterway Channel and GRBO (SER-2000-01287) will be recorded and reported to NMFS according to the procedures outlined in SERO-2023-00049 Sabine-Neches Waterway Channel Section 2.1.2 and GRBO (SER-2000-01287). The captures will be recorded as follows:
    - Non-lethal take:
        - ESA-listed species captured and released back into the wild alive and healthy, will be considered nonlethal take.
        - If a sea turtle is entrained in a hopper dredge and is retrieved alive, the specialist such as a state sea turtle coordinator or sea turtle rehabilitation center specialist must be contacted to determine how the turtle should be handled (e.g., euthanized or taken to a rehabilitation facility). The take for a live turtle entrained in a hopper dredge is considered lethal until deemed healthy after an evaluation or rehabilitation and released back into the wild, then the take can be revised to be nonlethal.
        - If a sea turtle is captured in relocation trawling and is deemed unhealthy or injured and requires being sent to a specialist for further evaluation, the take is considered nonlethal, unless the species cannot be released back into the wild or dies, in which case the take must be updated to a lethal take.

- Lethal take: All ESA-listed species that are captured that are determined to be fresh dead, will be considered lethal take associated with the project and counted under the total allowed take for SERO-2023-00049 Sabine-Neches Waterway Channel. This includes the capture of ESA-listed species in relocation trawling or found within the project area including material removal and material placement areas. An explanation of how to determine if a species is fresh dead or decomposed and how to handle and report the specimen is provided in PSO PDC Section 5 below.
- Recovered dead: All ESA-listed species captured or observed in the project area that are decomposing will be considered a recovered specimen and will not be counted against SERO-2023-00049 Sabine-Neches Waterway Channel Incidental Take Statement. An explanation of how to determine if a species is fresh dead or decomposed and how to handle and report the specimen is provided in PSO PDC Section 5 below.

- Report captures to other agencies:
  - Sea turtles: All captures will be reported to the appropriate state species representative including live, fresh dead, and recovered dead (https://www.fisheries.noaa.gov/state-coordinators-sea-turtle-stranding-and-salvage-network).
  - Smalltooth sawfish take will be reported to 1-844-4SAWFISH or email Sawfish@MyFWC.com.
  - Giant manta ray will be reported to manta.ray@noaa.gov.

PSO.5 Photo Documentation: Photograph all captured ESA-listed species for identification purposes and classify sex where applicable (e.g., sea turtles). In addition, take photographs of all injuries to ESA-listed species and provide a high resolution digital image with the take reporting forms as part of the reporting requirements outlined in SERO-2023-00049 Sabine-Neches Waterway Channel Section 2.1.2 and GRBO (SER-2000-01287), as follows:

- Captures in relocation trawling that are not brought aboard the vessel or are released from the net will be photographed for identification purposes. Photographing should be done as quickly as possible to minimize the time the animal is out of the water and will not require manipulating the animal to improve the photograph.
- All injured, deceased, or otherwise debilitated sea turtles encountered during the course of dredging operations, whether intact, damaged, or partial remains, are thoroughly photographed.
- All surfaces should be clearly represented in the photos with both wide vantage and close-up images that portray any injuries and postmortem condition (if deceased).

- Minimally, this includes multiple images of the dorsal (top) and ventral (bottom) aspects of each specimen taken from different angles and perspectives.
- An identification placard and scale should appear in the images but should not obscure the specimen, injury, or specific area of interest. The identification placard will include the location of capture, date, time, and species. In addition, the time settings on the camera should be current so that the time stamp within the photo metadata is accurate.
- For any live capture that is injured or otherwise debilitated and will be taken to a rehabilitation facility, photographs can be delayed in order to minimize stress and risk of further injury prior to veterinary examination.
- For deceased specimens, photos will be taken within 2 hours following discovery so that postmortem state in the images accurately portrays the condition at the time of discovery.

PSO.6 Written Documentation: Document all relevant details of the capture according to the reporting requirements in SERO-2023-00049 Sabine-Neches Waterway Channel Section 2.1.2 and GRBO (SER-2000-01287) (e.g., species, size, sex, condition upon release, location of capture, and time of capture) that can be observed or measured by the PSO without causing harm to the animal.

PSO.7 Tagging: Nonlethal captures of ESA-listed species captured by projects covered under SERO-2023-00049 Sabine-Neches Waterway Channel Section 2.1.2 and GRBO (SER-2000-01287) will be tagged according to the following requirements. Tagging requirements only apply to those ESA-listed species that are brought aboard a relocation trawler (PSO PDC Section 4) or those captured and ultimately released alive from a hopper dredge after being evaluated by a specialist and/or rehabilitated.

- <u>Scanning</u>: All ESA-listed species (live and dead) and/or species parts captured by a hopper dredge or brought aboard a relocation trawler will be scanned for passive integrated transponder (PIT) tags to determine if the animal has been previously tagged. The presence of any external tags (e.g., flipper tags, dart tags) will also be noted. All previous tag numbers must be recorded and reported on the appropriate forms outlined for each species in PSO PDC Sections 6-9 below.
- <u>Tagging</u>: All ESA-listed species captured alive and in good health by a hopper dredge or brought aboard a relocation trawler that are scanned and lack a previous pit tag, will be PIT tagged according to the specific species procedures identified in PDC PSO.7. Additional external tags (e.g., flipper tags) are optional. The cost associated with tagging is the responsibility of the federal action agency overseeing the project (i.e., USACE) or the company awarded the contract.

PSO.8 Genetic Sampling: All nonlethal and lethal captures ESA-listed species captured by projects covered under SERO-2023-00049 Sabine-Neches Waterway Channel and GRBO (SER-2000-01287) will be have genetic samples taken except:

- Live ESA-listed species that are not brought aboard a relocation trawler (PSO PDC Section 4.2).
- Any leatherback sea turtles, even if brought aboard the vessel to untangle and safely release.
- If the PSO believes that collecting a sample would imperil human or animal safety. The rationale for this decision will be recorded on the species observation form and available digitally as part of the reporting requirements outlined in the SERO-2023-00049 Sabine-Neches Waterway Channel Section 2.1.2 and GRBO (SER-2000-01287).

PSO.9 Genetic samples will be collected according to the handling procedures defined for each species in the PSO PDCs Section 6-9 below.

- A tissue sample will be collected from any dead ESA-listed species. If multiple dead animal parts are found, a sample will be collected from all parts that are not connected to one another regardless of whether the tissues are believed to be from the same turtle. For example, if part of a sea turtle flipper and a detached head are found at the same time, a sample from each part will be collected for genetic analysis.
- All genetic samples will be preserved in RNAlater™ preservative. Once the sample is in buffer solution, refrigeration/freezing is not required, but care should be taken not to expose the sample to excessive heat or sunlight. Label each sample with the animal's unique identification number (PIT tag number). Since giant mantas will not be pit tagged, label any samples collected with the date, project name, and species name. Do not use glass vials; a 2 millimeter screw top plastic vial is preferred (e.g., MidWest Scientific AVFS2002 and AVC100N). Gently shake the sample to ensure the solution covers the entire sample.
- Genetic samples will be mailed to the addresses listed below with information provided in the container stating the sample was collected under SERO-2023-00049 Sabine-Neches Waterway Channel and GRBO (SER-2000-01287). Package the genetic samples with an absorbent material within a double-sealed container (e.g., zip lock bag). If more than 1 sample is being sent to an address, package all of the samples together. The cost associated with taking the sample and delivering it to the appropriate entity listed below is the responsibility of the federal action agency overseeing the project (i.e., USACE) or the company awarded the contract.
  - Sea turtles: Sea Turtle Program NOAA Southeast Fisheries Science Center Attn: Lisa Belskis, 75 Virginia Beach Drive, Miami, Florida 33149. Contact number: 305-361-4212 Lisa.Belskis@noaa.gov

- Elasmobranchs: NOAA Southeast Fisheries Science Center, Attention Dr. John Carlson, National Marine Fisheries Service, Panama City Laboratory, 3500 Delwood Beach Rd, Panama City, Florida, 32408).

4.2 PSO Guidance on Relocation Trawling

The following PDCs describe how the PSO will handle ESA-listed species captured during relocation trawling including a flow chart summarizing how to handle different species and text describing the general handling guidance, the order to release species if multiple ESA-listed species are captured in trawling, and where they should be released. Trawling within the range of ESA-listed corals is not covered under this Opinion.

Table 10. PSO Handling Guidance

Species and handling protocol	Handling priority for multiple captures	Required to bring aboard (Y/N)	Directly measure all required data	Estimate all required data	Photograph (PDC PSO.5)	Tagging and Genetic Sampling (PDC PSO.7-10)	Relocate
Smalltooth sawfish PSO PDC Section 7	1	A, C	No	Yes	Yes	No	No
Sharks PSO PDC Section 9	2	A	No	Yes	Yes	No	No
Giant manta ray PSO PDC Section 8	3	A, C	No	Yes	Yes	No	No
Leatherback sea turtle PSO PDC Section 6	4	A	No	Yes	Yes	No	No
Green, hawksbill, Kemp's ridley, loggerhead sea turtles PSO PDC Section 6	6	B, E	Yes	No	Yes	Yes	F

A. Animals will not be brought aboard and will remain and be released from net while still in water. If necessary, cut the net to expedite release.

B. Animals will be brought aboard, except if the PSO directs removal from net to protect the safety of the animal or crew (e.g., turtle in net with large shark).

C. If juvenile manta rays or smalltooth sawfish need to be brought aboard to safely disentangle, only allowed if animal is small enough to be picked up by crew and released according to PSO handling guidance

D. Turtle will be kept cool, wet, and kept in a safe area such as a kiddie pool to contain for safe transportation to the relocation site. If sick, injured, or requiring resuscitation, see PSO PDC Section 6 for guidance.

E. Animals brought aboard will be measured and data collected as quick as possible to return them to the water safely.

F. Relocate according to guidance in PDC PSO.11-13.

PSO.11 Marine Relocation Trawling: Relocation trawling is authorized in the marine environment as a measure to minimize lethal take of ESA-listed species.

- Sea turtles (with the exception of leatherback sea turtles) will be relocated 3-5 mi from the dredge project, if relocation can be done safely, according to the guidance in PSO PDC Section 6.
- The PSO will determine the appropriate release site based on the species captured and surrounding habitat.

PSO.12 Estuarine Relocation Trawling: Relocation trawling is authorized in the estuarine environment as a measure to minimize lethal take of ESA-listed species.

- For the purposes of relocation trawling authorized in SERO-2023-00049 Sabine-Neches Waterway Channel and GRBO (SER-2000-01287), the estuarine environment consists of bays, harbors, estuaries, or other semi-confined areas inland of the COLREGS Demarcation Line, but outside of a river. The start of a river is not defined and varies by location and should be determined by best professional judgment. When in doubt, NMFS may be contacted for clarification.
- The PSO will determine the appropriate release site based on the species captured and surrounding habitat.

PSO.13 Riverine Relocation Trawling: Relocation trawling is not authorized within rivers, as noted in PDC PSO.12 above, the start of a river is not defined and should be determined by best professional judgment.

PSO.14 For relocation trawling:

- If any marine mammals, or aggregation of any other species not targeted for relocation trawling (e.g., fever of rays or school of fish) are sighted prior to deploying the nets and believed to be at-risk of interaction (e.g. moving in the direction of the vessel/gear and moms/calves close to the gear), gear deployment should be delayed until the animal(s) are no longer at-risk or have left the area of their own volition.
- During relocation trawling, the PSO and vessel staff will monitor for species presence at all times. Gear will be immediately retrieved if marine mammals or other species not targeted for relocation trawling are believed to be captured/entangled or at-risk of capture/entanglement. Operations may resume when interaction with these species is deemed unlikely, based on best professional judgment and through coordination with the PSO onboard.
- If a non ESA-listed marine mammal is injured or captured during relocation trawling, we recommend that trawling activities cease if other marine mammals may be in the area that are at risk of capture until provided guidance on how to proceed by NMFS or the marine mammal stranding staff. SERO-2023-00049 Sabine-Neches Waterway Channel and GRBO

(SER-2000-01287) does not consider effects to non-ESA-listed marine mammal species.

PSO.15 Relocation trawling handling and training:

- The PSO will train all crew members on the vessel how to safely handle and remove animals from the net and record tow capture data.
  - Training will occur with each new crew before heading out to begin work (e.g., if the crew will be at sea for 3 weeks before rotating staff, the training will be done at the beginning of the 3-week period, even for crews that have worked together before).
  - ESA and non-ESA listed animals captured may be removed from the net by crew other than the PSO, if trained by the PSO on proper handling and release techniques to minimize the risk of harm to these animals.
  - All ESA-listed species tagging, and genetic sampling will be performed by the PSO. Other crew members may assist with data collection, which be checked by the PSO for accuracy before reporting.
- All crew members will have easy access to equipment used to untangle animals from the net or to cut the nets to free the animal including knives, line-cutting poles, long-handled dehookers, and/or boat hooks.
- The nets will be checked during every tow for the presence of ESA-listed species. This may require pulling the tail end of the net to the boat to confirm nothing has been captured.
- For all species, ensure the vessel is in neutral and release animal over the side, head first.

5 Handling and Reporting Dead ESA-listed Species

All dead ESA-listed species collected within the construction area or by equipment used on a project covered under SERO-2023-00049 Sabine-Neches Waterway Channel and GRBO (SER-2000-01287), will be handled and recorded as described in the PSO PDCs and SERO-2023-00049 Sabine-Neches Waterway Channel Section 2.1.2 and GRBO (SER-2000-01287).

PSO.16 Dead ESA-listed species collected within the area of work will be rated as fresh dead or decomposed and documented as described in PSO PDC.4. The determination of a specimen's condition (fresh dead or decomposed) is as follows:

- Decomposed specimens are those that exhibit obvious bloating (expansion of the body or tissues by putrefactive gases); detachment of skin upon handling; or liquefaction of organs and tissues. Examples of decomposition in sea turtles are provided in Figure 7 below. Note: foul odor alone is not considered definitive evidence of decomposition.

- If it is not clear whether the specimen is fresh dead or decomposed, the specimen will be retained for further examination by an individual that has demonstrated expertise in sea turtle necropsy and forensic pathology. Such examinations typically include complete gross examination and selective histopathology, depending on postmortem condition. Individuals that will conduct examinations should be identified prior to the onset of dredging operations along with the necessary logistical planning for transportation and storage needs. The associated stranding coordinator for the state or region of the operation may be able to advise or assist in this regard as such needs are regularly required during stranding response. NMFS retains the right to review evidence or seek the opinion of an expert if a take determined to be decomposed should have been listed as fresh take and take associated with the project.

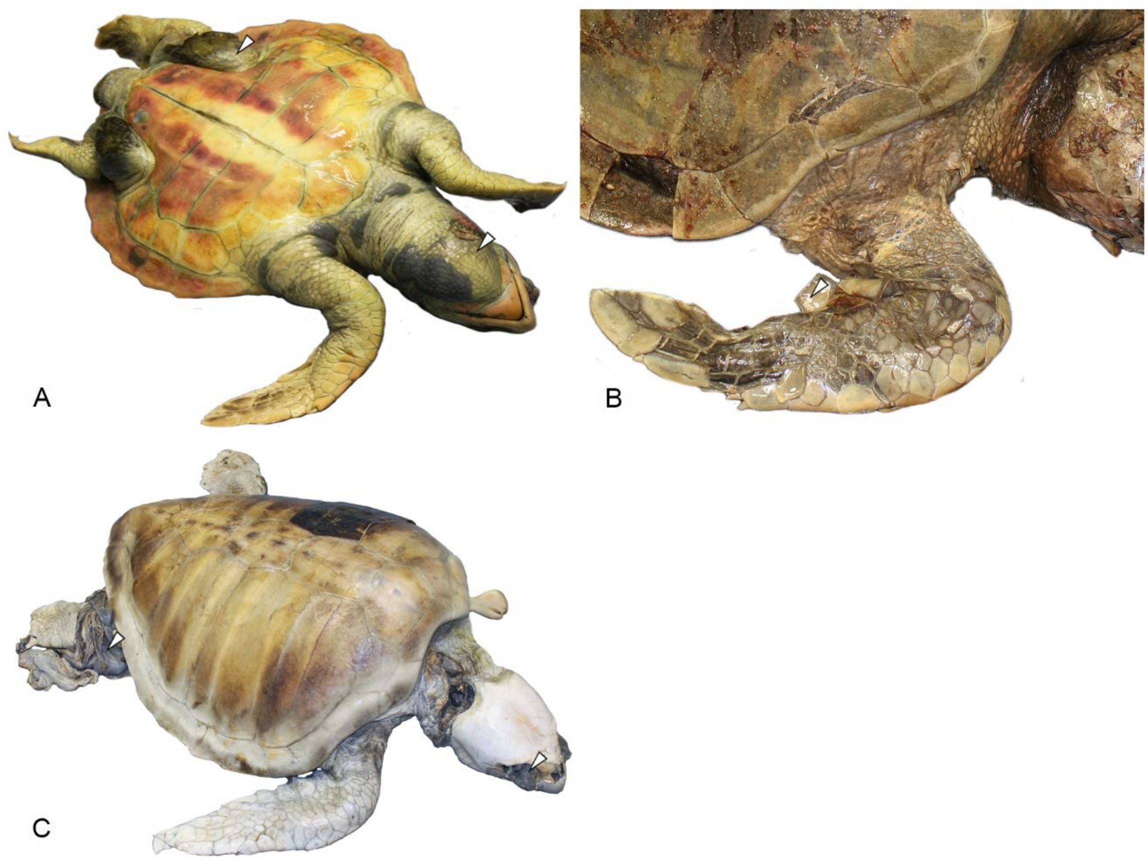


Figure 7. Examples of obvious signs of decomposition.
(A) Bloating expands the loose skin around the flippers and neck. (B) The skin starts to detach in sheets. (C) Soft tissues beginning to fall apart and easily tear when handled.

PSO.18 Dead ESA-listed species and species parts that need further examination by a specialist to determine the cause of death will be refrigerated, iced, or frozen as soon as possible, (must be iced or frozen no more than 2 hours from discovery). The timeline from discovery to transfer for examination, including ambient temperature, must be thoroughly documented. Whether the carcass/part is refrigerated or frozen will depend on predetermined logistical parameters for a given project. In general, a carcass/part may be kept refrigerated or iced, but not frozen if it will be examined within 48 hours. Remains may be frozen if examination will be delayed or maintaining refrigeration is not possible for any reason.

- Dead turtles: Follow the protocol outlined on the *Protocol for Collecting Tissue From Dead Turtles for Genetic Analysis* (https://dqm.usace.army.mil/odess/documents/geneticsampleprotocol.pdf). If a revised document is released, the PSO is required to follow the revised protocols. This document and any revisions will also be available on the NMFS dredging webpage (https://www.fisheries.noaa.gov/content/southeast-dredging).
- Dead elasmobranchs specimens will be stored as described in PDC PSO.16 until advised how to dispose of or provide to Dr. John Carlson, NOAA Fisheries, Panama City Laboratory at 1-850-234-6541 x 221. Dead smalltooth sawfish will also be reported to 1-844-4SAWFISH (1-844-472-93474).

6 Sea Turtle Handling, Tagging and Genetic Sampling Protocol for Relocation Trawling

6.1 Identification

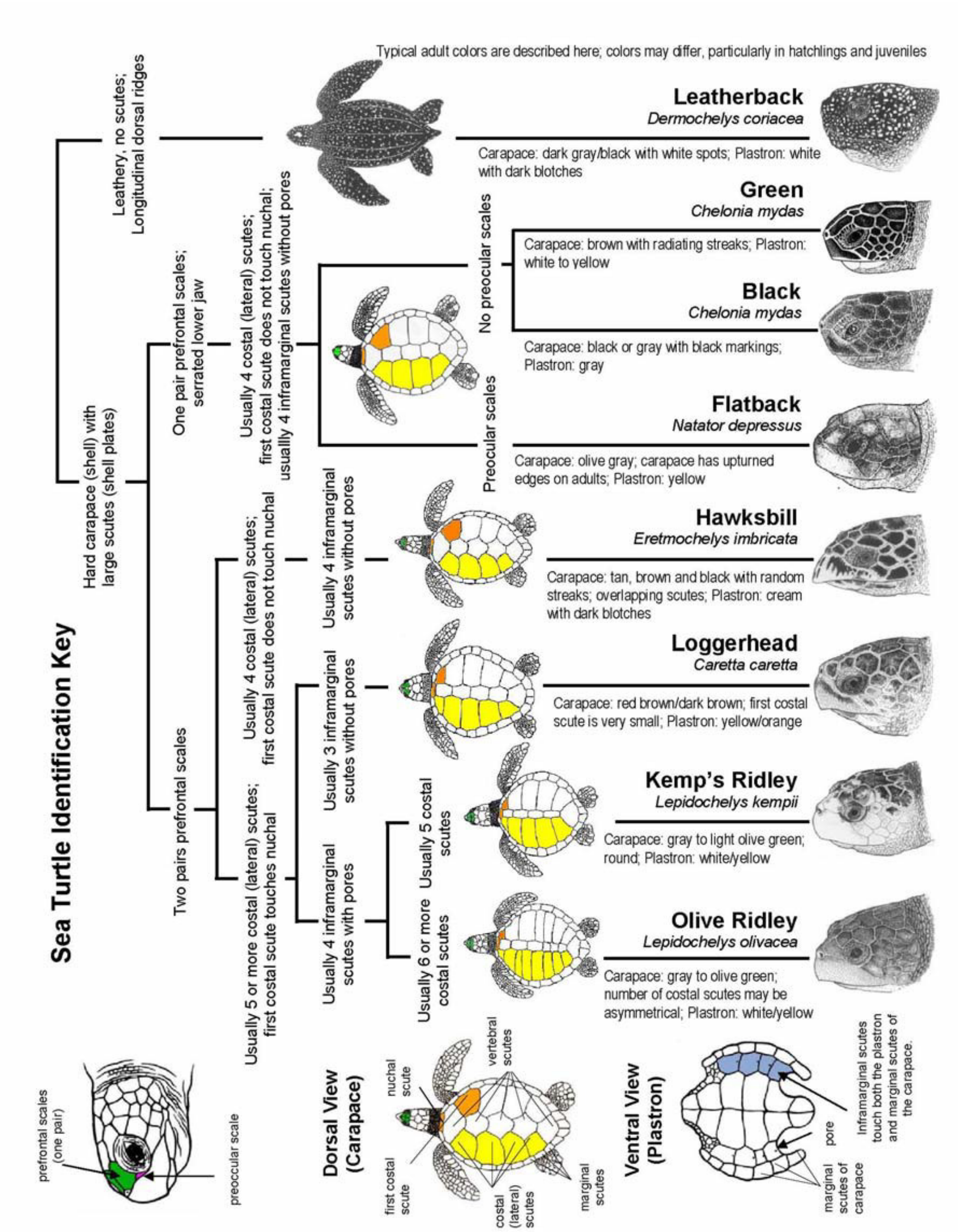


Figure 8. Sea Turtle Identification Key Image from the Southeast Fisheries Science Center Sea Turtle Research Techniques Manual, updated January 2013 (NOAA Technical Memorandum NMFS-SEFSC-579, https://repository.library.noaa.gov/view/noaa/3626)(NMFS 2008)

6.2 Handling

- Sick or injured sea turtles will be evaluated by a specialist to determine the best course of action including euthanizing animals that are severely injured or rehabilitating sea turtles before releasing them back in to the wild.
- A specialist trained to evaluate sea turtles and a sea turtle rehabilitation center will be identified prior to starting a project. Directions of how sick or injured sea turtles will be transported for an evaluation or rehabilitation will be provided to the PSO and dredging or trawling staff. NMFS will assist with identifying specialist and rehabilitation centers, if needed.

6.3 Relocating

- Do not relocate leatherback sea turtles. Release them immediately, as described in PSO Section 4.2 above.
- Green, Kemp's ridley, loggerhead, and hawksbill sea turtles will be relocated and released not less than 3 nm from the dredge site, unless sick or injured. If 2 or more released turtles are later recaptured, subsequent turtle captures will be released not less than 5 nm away. If it can be done safely and without injury to the turtle, turtles may be transferred onto another vessel for transport to the release area to enable the relocation trawler to keep sweeping the dredge site without interruption. These turtles will be kept no longer than 12 hours prior to release. The area in which a turtle will be relocated is determined by the PSO.

6.4 Data Recording

- Record the carapace length and width (straight and curved measurements), plastron length and width, head width, and sex (if possible).
    - Follow the protocol outlined in the *Southeast Fisheries Science Center Sea Turtle Observer Manual*, updated January 2013 (NOAA Technical Memorandum NMFS-SEFSC-589, https://repository.library.noaa.gov/view/noaa/4392). Additional, specific handling techniques are required when handling turtles with fibropapilloma tumors. If a revised document is released, the PSO is required to follow the revised protocols. This document and any revisions will also be available on the NMFS dredge webpage (Https://www.fisheries.noaa.gov/content/southeast-dredging).

6.5 Tagging and Genetic Sampling

- Follow the protocol outlined in the *Southeast Fisheries Science Center Sea Turtle Observer Manual*, Updated January 2013 (NOAA Technical Memorandum NMFS-SEFSC-589, https://repository.library.noaa.gov/view/noaa/4392). If a revised document is released, the PSO is required to follow the revised protocols. This document and any revisions will also be available on the NMFS dredge webpage (Https://www.fisheries.noaa.gov/content/southeast-dredging).

- Tagging and genetic sampling of leatherback sea turtles is not required under this Opinion and priority should be given to quickly and safely release the animals due to the sensitivity of these animals to being handled.

6.6 Resuscitation

- Follow the protocol outlined in the *Southeast Fisheries Science Center Sea Turtle Observer Manual*, Updated January 2013 (NOAA Technical Memorandum NMFS-SEFSC-589, https://repository.library.noaa.gov/view/noaa/4392). If a revised document is released, the PSO is required to follow the revised protocols. This document and any revisions will also be available on the NMFS dredge webpage (https://www.fisheries.noaa.gov/content/southeast-dredging).

7 Smalltooth Sawfish Handling, Tagging and Genetic Sampling Protocol for Relocation Trawling

7.1 Identification

- The smalltooth sawfish is distinguished by the 22 to 29 teeth located on each side of the rostrum and the lack of a bottom lobe on the caudal (tail) fin (Figure 9).

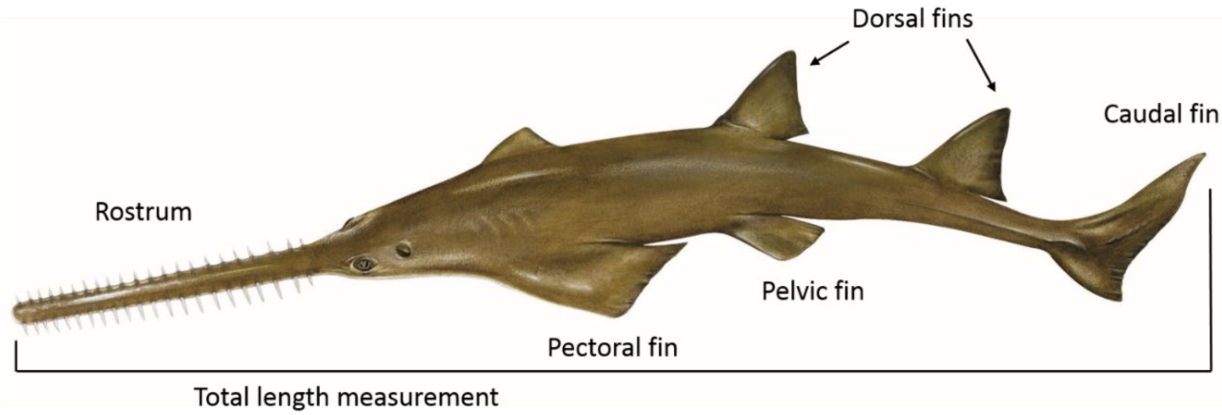


Figure 9. Image of a smalltooth sawfish.

7.2 Handling

- Attempt to release the sawfish directly from the net by pulling the net alongside the vessel and cutting the net sections that are entangled. Keep the sawfish in the water as much as possible during this process.
- Only bring the sawfish aboard the vessel if absolutely necessary to free it from the net. Larger animals should never be brought aboard due to the difficulty of returning them safely to the water. If necessary to bring a smaller animal aboard to free it from the net, make sure to keep sawfish wet and work quickly to get it safely back in the water. Smaller sawfish can be returned to the water by 2 people with the first person grasping the animal at the base of the rostrum with one hand and supporting the mid-section with the other. The second person can grasp the animal at the base of the tail and support the mid-section with the other hand.
- Use caution when near the rostrum as it can sweep side-to-side and cause injury during handling.
- Do not grab the sawfish by the spiracles (holes on the top of the head).

7.3 Relocating

- Do not relocate smalltooth sawfish. It is more important to release them as soon as possible as described above.

7.4 Data Recording

- Record the total length of the sawfish and the number of teeth on each side of the rostrum (saw). Estimate the length and number of teeth based on the photo taken of the sawfish in the net, if necessary.

7.5 Tagging and Genetic Sampling

- Tagging and genetic sampling of smalltooth sawfish is not required under this Opinion and priority should be given to quickly and safely release the animals due to the sensitivity of these animals to being handled.
- If the sawfish is brought aboard the vessel to untangle it from the net, scan the sawfish for a PIT tag generally located in the muscles at the base of the first or second dorsal fin.
- If no PIT tags are found, implant a BIOMARK HPT 12 PIT tag (12.5 mm in length, 134.2 kHz) under the skin directly adjacent to the second dorsal fin.
- Scan the newly implanted tag following insertion to ensure it is readable before the animal is released. If the tag is not readable, 1 additional tag should be implanted on the opposite side following the same procedure, if doing so will not jeopardize the safety of the animal.
- If a tissue sample is taken, it should consist of a small (1.0 cm^2) fin clip taken from the posterior edge of one of the pelvic fins. Use a thoroughly cleaned (wiped with alcohol) knife, scalpel, or scissors to collect the sample.
- Collected genetic samples must be stored in accordance with the requirements described in PSO PDC Section 4 above.

7.6 Additional Resources for Review

- Sawfish Fact Sheet (https://www.fisheries.noaa.gov/resource/educational-materials/endangered-smalltooth-sawfish-fact-sheet)
- Sawfish Handling, Release, and Reporting Procedures (https://www.fisheries.noaa.gov/resource/educational-materials/endangered-sawfish-handling-release-and-reporting-procedures)

8 Giant Manta Handling Data Recording, and Genetic Sampling Protocol for Relocation Trawling

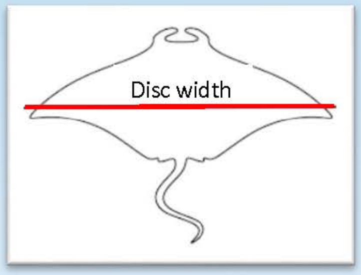
8.1 Identification

NOAA FISHERIES

Mobula Ray Identification Guide For Fisheries Observers

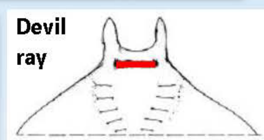
Purpose: This guide is intended to assist fishery observers in the visual identification of the giant manta ray and several devil ray species that occur in the Southeast and Mid-Atlantic.

General Observations: The size, coloring patterns, and a few morphological differences can be used to distinguish between species.



- Giant manta rays are larger than devil rays. Measurements should be taken by estimating the distance over their wingspan ["Disc Width" (DW)].
- Giant manta rays have a terminal mouth (i.e., mouth points straight forward, in front of the head); Devil rays have a sub-terminal mouth (i.e., mouth beneath the head).

Terminal mouth



Sub-terminal mouth

Manta birostris

Common Names: Giant Manta Ray, Oceanic Manta Ray

Status: U.S.: Listed as *Threatened* under Endangered Species Act.

Size: Up to 700 cm DW; appx. 200 cm DW at birth.

Dorsal Coloration: Black with distinct white patches creating a T-shaped shoulder pattern.

Ventral Coloration: White with dark spots; spots rarely found between gill slits. Dark shading along the posterior edges of the pectoral fins.

Photo credit: Joshua Stewart

NOAA Fisheries, Southeast Region, Protected Resources Division

Mobula mobular

Common Names: Giant Devil Ray, Spinetail Devil Ray

Status: U.S.: Not listed. International Union for Conservation of Nature (IUCN): *Endangered*

Size: Up to 520 cm DW

Dorsal Coloration: Predominantly dark gray; with a black (crescent shape) stripe that runs from side to side on upper shoulders. White tip on the dorsal fin.

Ventral Coloration: White.

Mobula tarapacana

Common Names: Chilean Devil Ray, Sicklefin Devil Ray, Box Ray

Status: U.S.: Not listed. IUCN: *Vulnerable*

Size: Up to 340 cm DW

Dorsal Coloration: Golden brown to olive green.

Ventral Coloration: Predominately white with gray shading along the posterior margin of pectoral fins.

Mobula hypostoma

Common Names: Atlantic Devil Ray, Lesser Devil Ray

Status: U.S.: Not listed. IUCN: *Data Deficient*

Size: Up to 120 cm DW

Dorsal Coloration: Variable, brown, gray to black. Sometimes have a dark gray/black stripe that runs from side to side on the "neck" right behind the eyes.

Ventral Coloration: White.

Figure 10. Mobula Ray Identification Guide

8.2 Handling

- Removing the giant manta ray from the water can increase the likelihood of injuries, mostly due to the crushing the animal's organs due to the weight of gravity.
- If a manta ray needs to be brought aboard, support the ray's weight by at least 2 points (i.e. one point of contact being the midsection, and the other being the posterior end of the body) or preferably have 2 or 3 people carry the ray by the sides of each wing.
- Follow the safe handling guidance: https://www.fisheries.noaa.gov/webdam/download/91927887

8.3 Relocating

- Do not relocate giant manta rays. Release them immediately, as described above.

8.4 Data recording

- Record the total disc width from wing tip to wing tip, as shown in the *Mobula Ray Identification Guide for Fisheries Observers* (Figure 10). Estimate the disc width, if released directly from the net and not brought aboard the vessel.
- Photograph animal. Manta's have unique spot patterns on the ventral side used for identification so photograph as much of the animal as possible without flipping or manipulating the animal.

8.5 Tagging and Genetic Sampling

- Tagging and genetic sampling of giant manta rays is not required under this Opinion and priority should be given to quickly and safely release the animals due to the sensitivity of these animals to being handled. Tagging of giant mantas is not recommended under SERO-2023-00049 Sabine-Neches Waterway Channel Section 2.1.2 and GRBO (SER-2000-01287) unless it is part of cooperative research with NMFS.
- If a tissue samples is taken, it should be a small tissue (1.0 cm^2) fin clip taken from dorsal fin or posterior edge of pectoral fin. Use a knife, scalpel, or scissors that has been thoroughly cleaned and wiped with alcohol.
- Collected genetic samples must be stored in accordance with the requirements described in PSO PDC Section 4 above.

8.6 Additional Resources for Review

- Giant manta ray safe handling guidelines, https://repository.library.noaa.gov/view/noaa/22926 (Carlson et al. 2019).
- The giant manta ray can be visually distinguished from other rays by size, coloring, and a few morphological differences, as shown in *Mobula Ray Identification Guide for Fisheries Observers* (Figure 10).

9 Shark Handling, Tagging and Genetic Sampling Protocol for Relocation Trawling

9.1 Identification

Scalloped hammerhead and oceanic whitetip shark are ESA-listed species occurring within the action area. However, oceanic whitetip shark are a deep water (pelagic) species that are not expected to be captured during relocation trawling. Scalloped hammerhead shark may be encountered during relocation trawling, but are only protected under the ESA if they are a part of the Central and Southwest Atlantic DPS, which would only expected in the U.S. Caribbean (79 FR 38242). Scalloped hammerhead sharks encountered outside of the U.S. Caribbean are not protected under the ESA, but are still expected to be handled according to the PSO guidance in this Appendix.

Identification of both scalloped hammerhead and oceanic whitetip shark are provided on the placard used for the *Shark Identification and Federal Regulations for the Recreational Fishery of the U.S. Atlantic, Gulf of Mexico, and Caribbean* shown in Figure 11 along with identification guidance for other sharks that may be encounter that are not ESA-listed. Safe handling practices outlined in this section will be followed regardless of the ESA-listing status of the shark encountered.

9.2 Handling

- Large sharks should be released directly from the net into the water and not brought aboard the vessel.
- If sharks must be brought aboard to safely remove them from the net, cut the net quickly and release them back to the water. If necessary to bring a smaller animal aboard to free it from the net, make sure to keep shark wet and work quickly to get it safely back in the water. Smaller sharks can be returned to the water by grasping the animal under the jaw and ensuring the jaw is closed. Depending on the size of the shark, this may require 2 hands to hold the jaw closed while a second crew member helps to carry the shark back to the water.
- Sharks are reported to frequently chew through a portion of the net and are retrieved trapped in the net at the gills. In instances such as this, the net will be quickly cut and the shark removed.
- Do not pull sharks free or carry them by the gills.

9.3 Relocating

- Do not relocate sharks. It is more important to release them as soon as possible and described above.

9.4 Data Recording

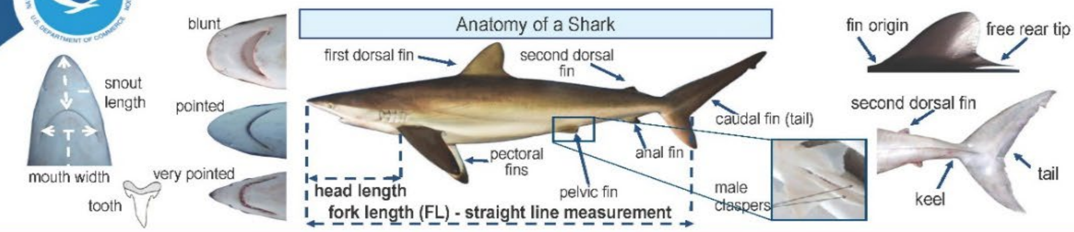
- Record the total length of the shark either by measuring the shark if brought aboard or by estimating the length based on the photo taken of the shark in the net, if necessary.

9.5 Tagging and Genetic Sampling

- Tagging and genetic sampling of sharks is not required under this Opinion and priority should be given to quickly and safely release the animals due to the sensitivity of these animals to being handled.

Shark Identification and Federal Regulations

for the Recreational Fishery of the U.S. Atlantic, Gulf of Mexico and Caribbean



Federal fishing permit required in federal waters. Purchase at hmspermits.noaa.gov.
HMS recreational permit holders that fish for sharks will need to obtain a shark endorsement.

Authorized species	Minimum size (fork lenth)	Bag limit (per trip)
Smoothhound Shark	None	None
Atlantic sharpnose Shark	None	1 per person
Bonnethead Shark	None	1 per person
Shortfin Mako Shark	71 inches male 83 inches female	1 shortfin mako, hammerhead, or other shark per vessel
Hammerheads (great, scalloped, and smooth)	78 inches	
Other sharks	54 inches	

Recreational anglers are required to use non-offset, non-stainless steel circle hooks except when fishing with flies or artificial lures.

Ridgeback sharks have an **interdorsal ridge** (a visible line, or crease of raised skin between dorsal fins)

All ridgeback sharks are prohibited, except **Tiger, Oceanic Whitetip, and Smoothhound**.
Prohibited ridgeback sharks include **Bignose, Caribbean Reef, Dusky, Galapagos, Night, Sandbar,** and **Silky**. For more details on prohibited species, please refer to the Prohibited Species Placard.

Tiger Shark: Snout length much shorter than mouth width; markings fade with age; max. size 15 feet; coastal and offshore

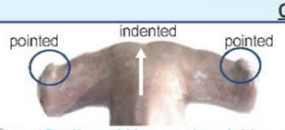
Oceanic Whitetip Shark: Young sharks have black mottling on most fins; does not always have interdorsal ridge; max. size 8 ft; offshore
Cannot be retained if tuna, swordfish, or billfish are onboard

Smoothhound: (a.k.a. smooth dogfish and Florida/Gulf smoothhound) Predorsal ridge present; second dorsal fin slightly smaller than first dorsal fin and much larger than anal fin; max. size 5ft; coastal and offshore

Spiny Dogfish: Max. size 4 ft; coastal and offshore
There are no recreational restrictions for **Spiny Dogfish**

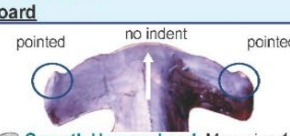
Scalloped Hammerheads, Great Hammerheads, and Smooth Hammerheads

Cannot be retained if tuna, swordfish, or billfish are onboard



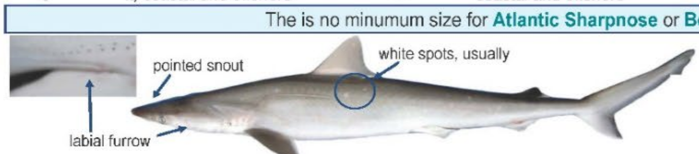
Scalloped Hammerhead: Max. size 11 ft; coastal and offshore

Great Hammerhead: Max. size 15 ft; coastal and offshore



Smooth Hammerhead: Max. size 12 ft; coastal and offshore

The is no minumum size for Atlantic Sharpnose or Bonnethead Sharks



Atlantic Sharpnose Shark: Max: size 3 ft; coastal and offshore; similar species: **Smalltail** sharks have very reduced labial furrows and **Caribbean Sharpnose** sharks lack white spots.

Bonnethead: small, black spots on body; max. size 4 ft; mostly coastal

All sharks are not identical. These are common characteristics. Young sharks can vary in appearance from adults. Maximum sizes are approximate.

Photographs and illustrations provided by NMFS, J. Castro, W.B. Driggers III, E.R. Hoffmayer, and S. Iglésias. Prohibited species are underlined in red
https://www.fisheries.noaa.gov/topic/atlantic-highly-migratory-species. Revised March 2019

If you don't know, let it go

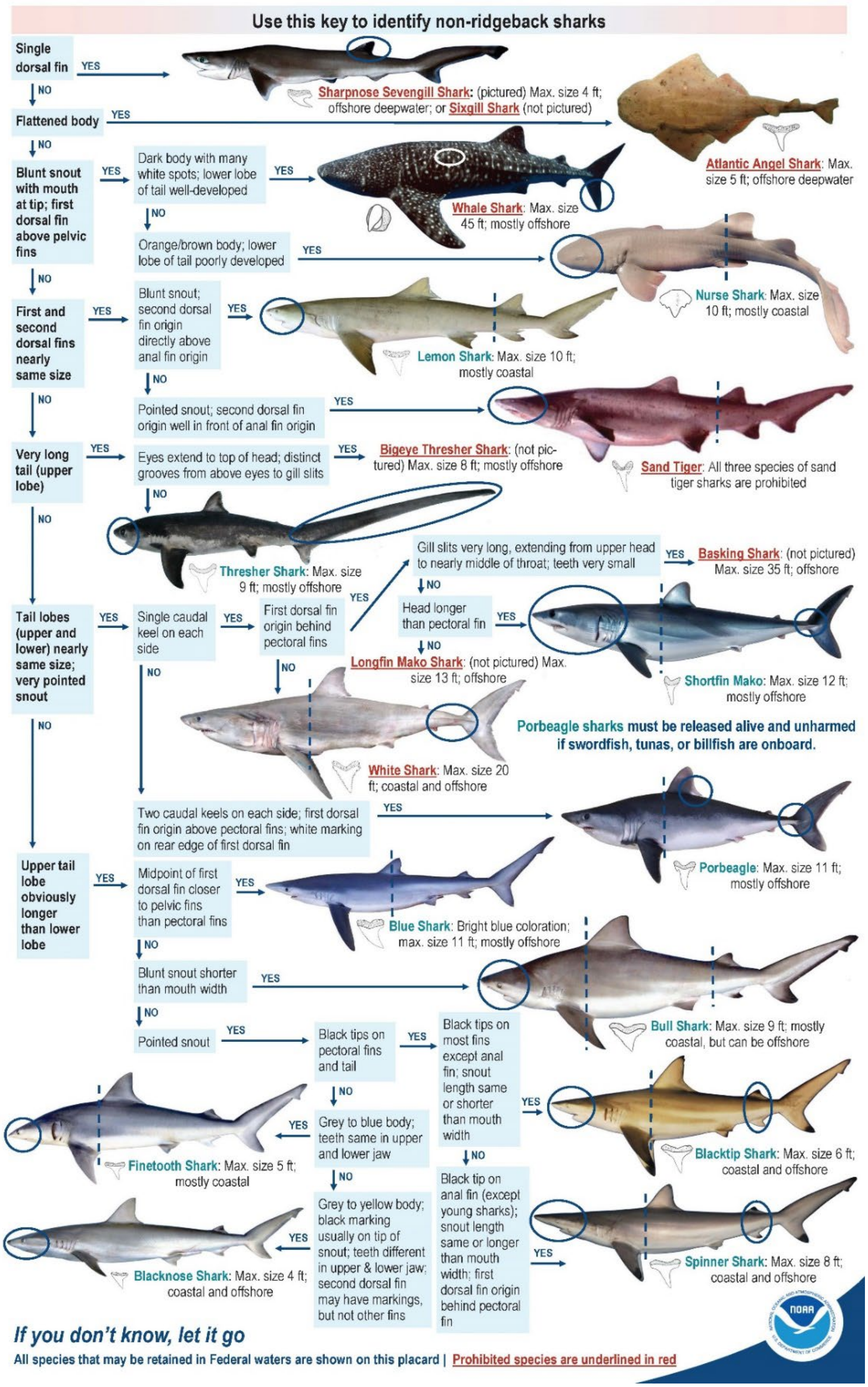


Figure 11. Shark Identification and Federal Regulations for the Recreational Fishery of the U.S. Atlantic, Gulf of Mexico, and Caribbean
(https://www.fisheries.noaa.gov/resource/outreach-and-education/shark-identification-placard)

APPENDIX B – IN-WATER DREDGING AND MATERIAL PLACEMENT REQUIREMENTS

The PDCs in this section apply to all in-water activities, if applicable.

INWATER.1 Species Movement: All work, including equipment, staging areas, and placement of materials, will be done in a manner that does not block access of ESA-listed species from moving around or past construction.

- Sand placed on the beach or in the nearshore littoral areas will be placed in a manner that does not create mounds or berms that could prevent nesting sea turtles or hatchings from entering or exiting the beach from nearshore waters.
- All placement, including ODMDS placement, will not create an obstruction of species movement in the area (e.g., does not create a mound that would deter or prevent species from moving through the area).

INWATER.2 Equipment placement: Equipment will be staged, placed, and moved in areas and ways that minimize effects to species and resources in the area, to the maximum extent possible. Specifically:

- All vessels will preferentially follow deep-water routes (e.g., marked channels) to avoid potential groundings or damaging bottom resources whenever possible and practicable.
- If barges, scows, and other similar support equipment are used, they will be positioned away from areas with sensitive bottom resources such as non-ESA-listed seagrasses, corals, and hardbottom, to the maximum extent possible.
- If pipelines are used, they will be placed in areas away from bottom resources and of sufficient size or weight to prevent movement or anchored to prevent movement or the pipeline will be floated over sensitive areas.

INWATER.3 Turbidity control: All work that may generate turbidity will be completed in a way that minimizes the risk of turbidity and sedimentation reaching non-mobile ESA-listed species (i.e., ESA listed corals and Johnson's seagrasses) as well as other non-ESA-listed non-mobile species (e.g., non-ESA-listed corals, sponges, and other natural resources) to the maximum extent practicable. This may include selecting equipment types that minimize turbidity and positioning equipment away or downstream of non-mobile species.

INWATER.4 Turbidity curtains: Turbidity curtains may be used to maintain water quality standards where appropriate and practicable with consideration given to ambient turbidity and if the curtains are practical based on current, wave action, or other factors.

- If turbidity curtains are used, barriers will be positioned in a way that does not block species' entry to or exit from designated critical habitat and does not entrap species within the construction area or block access for them to navigate around the construction area.

- Project personnel must take measures to monitor for entrapped species in areas contained by turbidity curtains and allow access for them to escape if spotted.
- Beach nourishment projects will be designed to minimize turbidity in nearshore waters by using methods that promote settlement before water returns to the water body (i.e., shore parallel dikes). Turbidity and marine sedimentation will be further controlled using land-based erosion and sediment control measures to the maximum extent practicable. Land-based erosion and sediment control measures will (1) be inspected regularly to remove excess material that could be an entanglement risk, (2) be removed promptly upon project completion, (3) and will not block entry to or exit from designated critical habitat for ESA-listed species.

INWATER.5 Entanglement: If lines or cables are used (e.g., to mark floating buoys, lines connecting pickup buoy lines, or for turbidity curtains):

- In-water lines (rope, chain, and cable) will be stiff, taut, non-looping. Examples of such lines are heavy metal chains or heavy cables that do not readily loop and tangle. Flexible in-water lines, such as nylon rope or any lines that could loop or tangle, will be enclosed in a plastic or rubber sleeve/tube to add rigidity and to prevent the line from looping or tangling. In all instances, no excess line is allowed in the water. Requirements for lines associated with relocation trawling are handled separately in Appendix C.
- All lines or cables will be immediately removed upon project completion.
- All in-water line and materials will be monitored regularly to ensure nothing has become entangled.
- Cables or lines with loops used to move pipelines or buoys will not be left in the water unattended.

INWATER.7 Dredging or material placement in areas not previously used for dredging or placement are allowed under this Opinion for borrow sites, side-cast dredging, beach nourishment, nearshore placement associated with beach nourishment, if they meet all of the PDCs in this Opinion, including those listed below:

- Within 400 ft of any significant non-coral hardbottom areas or bottom structures that serve as attractants to sea turtles for foraging or shelter: For purposes of this Opinion (SERO-2023-00049 Sabine-Neches Waterway), NMFS considers significant non-coral hardbottom to be an area with a horizontal distance of 150 ft that has an average elevation above the sand of 1.5 ft or greater and has algae growing on it. Walls of federally-maintained navigation channels (i.e., jetties and other such man-made structures) are not considered hardbottom for the purpose of this Opinion.
- In areas with seagrass: Dredging and placement in new areas will avoid areas with non-listed seagrasses to the maximum extent practicable.

INWATER.8 Lighting near sea turtle nesting beaches: For dredges and any support vessels operating at night in front of nesting beaches, lighting will be limited to the minimal lighting necessary to comply with U.S. Coast Guard and Occupational Safety and Health Administration requirements (most up-to-date version of Engineering Manual 385-1-1). Lighting associated with beach nourishment construction activities will be minimized through reduction, shielding, lowering, and/or use of turtle friendly lights, to the extent practicable without compromising safety, to reduce potential disorientation effects on female sea turtles approaching the nesting beaches and sea turtle hatchlings making their way seaward from their natal beaches. As technology changes, so do turtle friendly lighting options. New information/technology should be used as soon as published guidance for types of appropriate lights and appropriate shielding and positioning of lights is available that is protective of sea turtles (e.g., those outlined by the Florida Fish and Wildlife Conservation Commission's website http://myfwc.com/wildlifehabitats/managed/sea-turtles/lighting/).

APPENDIX C – RELOCATION TRAWLING REQUIREMENTS

The relocation trawling requirement describes the type of trawling allowed. Handling and reporting of ESA-listed species captured are provided in the PSO PDCs in Appendix A of this Opinion.

RELOCATE.1 USACE is authorized and will utilize relocation trawling and/or non-capture trawling in association with dredging activities in reasonable circumstances as an avoidance and minimization measure to reduce the risk of potential lethal take of ESA-listed species.

RELOCATE.2 If relocation trawling is deemed appropriate to minimize the risk of lethal take, trawlers will mobilize as quickly as possible.

RELOCATE.3 Trawling specifications listed below and in the PSO PDCs in Appendix A of this Opinion will be followed.

- Trawl tow-time duration will not exceed 42 minutes (doors in - doors out).
- Trawl speeds will not exceed 3.5 knots for normal operations; however, speeds may be increased to the minimum speed needed to maintain control of the vessel.
- Lazy lines will be designed according to the design specifications in Appendix B of this Opinion to minimize the risk of entanglement with captured species.

APPENDIX D – GRBO REASONABLE AND PRUDENT MEASURES

Regulations (50 CFR 402.02) implementing section 7 of the ESA define reasonable and prudent measures as actions the Director believes necessary or appropriate to minimize the impacts, i.e., amount or extent, of incidental take. The reasonable and prudent measures that NOAA Fisheries believes are necessary to minimize the impacts of hopper dredging in the Gulf of Mexico have been discussed with the COE and include use of temporal dredging windows, intake and overflow screening, use of sea turtle deflector dragheads, observer and reporting requirements, and sea turtle relocation trawling. The following reasonable and prudent measures and associated terms and conditions are established to implement these measures, and to document incidental takes. Only incidental takes that occur while these measures are in full implementation are authorized. These restrictions remain valid until reinitiation and conclusion of any subsequent section 7 consultation.

Terms and Conditions

1. *Hopper Dredging*: Hopper dredging activities in Gulf of Mexico waters from the Mexico-Texas border to Key West, Florida up to one mile into rivers shall be completed, whenever possible, between December 1 and March 31, when sea turtle abundance is lowest throughout Gulf coastal waters. Hopper dredging of Key West channels is covered by the existing August 25, 1995, RBO to the COE's SAD. The COE shall discuss with NOAA Fisheries why a particular project cannot be done within the December 1-March 31 "window."

2. *Non-hopper Type Dredging*: Pipeline or hydraulic dredges, because they are not known to take turtles, must be used whenever possible between April 1 and November 30 in Gulf of Mexico waters up to one mile into rivers. This should be considered particularly in channels such as those associated with Galveston Bay and Mississippi River - Gulf Outlet (MR-GO), where lethal takes of endangered Kemp's ridleys have been documented during summer months, and Aransas Pass, where large numbers of loggerheads may be found during summer months. In the MR-GO, incidental takes and sightings of threatened loggerhead sea turtles have historically been highest during April and October.

3. *Annual Reports*: The annual summary report, discussed below (#9), must give a complete explanation of why alternative dredges (dredges other than hopper dredges) were not used for maintenance dredging of channels between April and November.

4. *Observers*: The COE shall arrange for NOAA Fisheries-approved observers to be aboard the hopper dredges to monitor the hopper spoil, screening, and dragheads for sea turtles and Gulf sturgeon and their remains.

   a. Brazos Santiago Pass east to Key West, Florida: Observer coverage sufficient for 100% monitoring (i.e., two observers) of hopper dredging operations is required aboard the hopper dredges year-round from Brazos Santiago Pass to (not including) Key West, Florida between April 1 and November 30, and whenever surface water temperatures are 11EC or greater.

   b. Observer coverage of hopper dredging of sand mining areas shall ensure 50% monitoring (i.e., one observer).

   c. Observers are not required at any time in Mississippi River - Southwest Pass (MR-SWP).

5. *Operational Procedures*: During periods in which hopper dredges are operating and NOAA Fisheries-approved observers are *not* required, (as delineated in #4 above), the appropriate COE District must:

a. Advise inspectors, operators and vessel captains about the prohibitions on taking, harming, or harassing sea turtles

b. Instruct the captain of the hopper dredge to avoid any turtles and whales encountered while traveling between the dredge site and offshore disposal area, and to immediately contact the COE if sea turtles or whales are seen in the vicinity.

c. Notify NOAA Fisheries if sea turtles are observed in the dredging area, to coordinate further precautions to avoid impacts to turtles.

d. Notify NOAA Fisheries immediately by phone (727/570-5312) or fax (727/570-5517) if a sea turtle or Gulf sturgeon is taken by the dredge.

6. *Screening*: When sea turtle observers are required on hopper dredges, 100% inflow screening of dredged material is required and 100% overflow screening is recommended. If conditions prevent 100% inflow screening, inflow screening may be reduced gradually, as further detailed in the following paragraph, but 100% overflow screening is then required. NOAA Fisheries must be consulted prior to the reductions in screening and an explanation must be included in the dredging report.

a. Screen Size: The hopper's inflow screens should have 4-inch by 4-inch screening. If the COE, in consultation with observers and the draghead operator, determines that the draghead is clogging and reducing production substantially, the screens may be modified sequentially: mesh size may be increased to 6-inch by 6-inch, then 9-inch by 9-inch, then 12-inch by 12-inch openings. Clogging should be greatly reduced with these flexible options; however, further clogging may compel removal of the screening altogether, in which case effective 100% overflow screening is mandatory. The COE shall notify NOAA Fisheries beforehand if inflow screening is going to be reduced or eliminated, and provide details of how effective overflow screening will be achieved.

b. Need for Flexible, Graduated Screens: NOAA Fisheries believes that this flexible, graduated-screen option is necessary, since the need to constantly clear the inflow screens will increase the time it takes to complete the project and therefore increase the exposure of sea turtles to the risk of impingement or entrainment. Additionally, there are increased risks to sea turtles in the water column when the inflow is halted to clear screens, since this results in clogged intake pipes, which may have to be lifted from the bottom to discharge the clay by applying suction.

c. Exemption - MR-SWP: Screening is not required at any time in MR-SWP.

7. *Dredging Pumps*: Standard operating procedure shall be that dredging pumps shall be disengaged by the operator when the dragheads are not firmly on the bottom, to prevent impingement or entrainment of sea turtles within the water column. This precaution is especially important during the cleanup phase of dredging operations when the draghead frequently comes off the bottom and can suck in turtles resting in the shallow depressions between the high spots the draghead is trimming off.

8. *Sea Turtle Deflecting Draghead*: A state-of-the-art rigid deflector draghead must be used on all hopper dredges in all Gulf of Mexico channels and sand mining sites at all times of the year except that the rigid deflector draghead is not required in MR-SWP at any time of the year.

9. *Dredge Take Reporting*: Observer reports of incidental take by hopper dredges must be faxed to NOAA Fisheries' Southeast Regional Office (727-570-5517) by onboard endangered species observers within 24 hours of any sea turtle, Gulf sturgeon, or other listed species take observed.

   A preliminary report summarizing the results of the hopper dredging and any documented sea turtle or Gulf sturgeon takes must be submitted to NOAA Fisheries within 30 working days of completion of any dredging project. Reports shall contain information on project location (specific channel/area dredged), start-up and completion dates, cubic yards of material dredged, problems encountered, incidental takes and sightings of protected species, mitigative actions taken (if relocation trawling, the number and species of turtles relocated), screening type (inflow, overflow) utilized, daily water temperatures, name of dredge, names of endangered species observers, percent observer coverage, and any other information the COE deems relevant.

   An annual report (based on fiscal year) must be submitted to NOAA Fisheries summarizing hopper dredging projects and documented incidental takes.

10. *Sea Turtle Strandings*: The COE Project Manager or designated representative shall notify the Sea Turtle Stranding and Salvage Network (STSSN) state representative (contact information available at: http://www.sefsc.noaa.gov/seaturtleSTSSN.jsp) of the start-up and completion of hopper dredging operations and bed-leveler dredging operations and ask to be notified of any sea turtle/sturgeon strandings in the project area that, in the estimation of STSSN personnel, bear signs of potential draghead impingement or entrainment, or interaction with a bed-leveling type dredge.

    Information on any such strandings shall be reported in writing within 30 days of project end to NOAA Fisheries' Southeast Regional Office. Because of different possible explanations for, and subjectivity in the interpretation of potential causes of strandings, these strandings will not normally be counted against the COE's take limit; however, if compelling STSSN observer reports and evidence indicate that a turtle was killed by a hopper dredge or a bed-leveling type dredge, that take will be deducted from the ITS' anticipated take level for that COE District where the take occurred.

11. *Reporting - Strandings*: Each COE District shall provide NOAA Fisheries' Southeast Regional Office with an annual report detailing incidents, with photographs when available, of stranded sea turtles and Gulf sturgeon that bear indications of draghead impingement or entrainment. This reporting requirement may be included in the end-of-year report required in Term and Condition No. 9, above.

12. *District Annual Relocation Trawling Report*: Each COE District shall provide NOAA Fisheries' Southeast Regional Office with end-of-project reports within 30 days of completion of relocation trawling projects, and an annual report summarizing relocation trawling efforts and results within their District. The annual report requirement may be included in the end-of-year report required in Term and Condition # 9, above.

13. *Conditions Requiring Relocation Trawling*: Handling of sea turtles captured during relocation trawling in association with hopper dredging projects in Gulf of Mexico navigation channels and sand mining areas shall be conducted by NOAA Fisheries-approved endangered species

observers. Relocation trawling shall be undertaken by the COE at all projects where any of the following conditions are met; however, other ongoing projects not meeting these conditions are not required to conduct relocation trawling:

a. Two or more turtles are taken in a 24-hour period in the project.

b. Four or more turtles are taken in the project.

c. 75% of a District's sea turtle species quota for a particular species has previously been met.

14. *Relocation Trawling Waiver*: For individual projects the affected COE District may request by letter to NOAA Fisheries a waiver of part or all of the relocation trawling requirements. NOAA Fisheries will consider these requests and decide favorably if the evidence is compelling.

15. *Relocation Trawling - Annual Take Limits*: This Opinion authorizes the annual (by fiscal year) take of 300 sea turtles (of one species or combination of species) and eight Gulf sturgeon by duly-permitted, NOAA Fisheries-approved observers in association with all relocation trawling conducted or contracted by the four Gulf of Mexico COE Districts to temporarily reduce or assess the abundance of these listed species during (and in the 0-3 days immediately preceding) a hopper dredging project in order to reduce the possibility of lethal hopper dredge interactions, subject to the following conditions:

a. *Trawl Time*: Trawl tow-time duration shall not exceed 42 minutes (doors in - doors out) and trawl speeds shall not exceed 3.5 knots.

b. *Handling During Trawling*: Sea turtles and sturgeon captured pursuant to relocation trawling shall be handled in a manner designed to ensure their safety and viability, and shall be released over the side of the vessel, away from the propeller, and only after ensuring that the vessel's propeller is in the neutral, or disengaged, position (i.e., not rotating). Resuscitation guidelines are attached (Appendix IV).

c. *Captured Turtle Holding Conditions*: Captured turtles shall be kept moist, and shaded whenever possible, until they are released.

d. *Weight and Size Measurements*: All turtles shall be measured (standard carapace measurements including body depth) and tagged, and weighed when safely possible, prior to release; Gulf sturgeon shall be measured (fork length and total length) and–when safely possible–tagged, weighed, and a tissue sample taken prior to release. Any external tags shall be noted and data recorded into the observers log. Only NOAA Fisheries-approved observers or observer candidates in training under the direct supervision of a NOAA Fisheries-approved observer shall conduct the tagging/measuring/weighing/tissue sampling operations.

e. *Take and Release Time During Trawling - Turtles*: Turtles shall be kept no longer than 12 hours prior to release and shall be released not less than three nautical miles (nmi) from the dredge site. If two or more released turtles are later recaptured, subsequent turtle captures shall be released not less than five nmi away. If it can be done safely, turtles may be transferred onto another vessel for transport to the release area to enable the relocation trawler to keep sweeping the dredge site without interruption.

f. *Take and Release Time During Trawling - Gulf Sturgeon*: Gulf sturgeon shall be released immediately after capture, away from the dredge site or into already dredged areas, unless the trawl vessel is equipped with a suitable (not less than: 2 ft high by 2 ft wide by 8 ft long), well-aerated seawater holding tank where a maximum of one sturgeon may be held for not longer than 30 minutes before it must be released or relocated away from the dredge site.

g. *Injuries and Incidental Take Quota*: Any protected species injured or killed during or as a consequence of relocation trawling shall count toward the appropriate COE District's incidental take quota. Minor skin abrasions resulting from trawl capture are considered non-injurious. Injured sea turtles shall be immediately transported to the nearest sea turtle rehabilitation facility.

h. *Flipper Tagging*: All sea turtles captured by relocation trawling shall be flipper-tagged prior to release with external tags which shall be obtained prior to the project from the University of Florida's Archie Carr Center for Sea Turtle Research. This Opinion serves as the permitting authority for any NOAA Fisheries-approved endangered species observer aboard these relocation trawlers to flipper-tag with external tags (e.g., Inconel tags) captured sea turtles. Columbus crabs or other organisms living on external sea turtle surfaces may also be sampled and removed under this authority.

i. *Gulf Sturgeon Tagging*: Tagging of live-captured Gulf sturgeon may also be done under the permitting authority of this Opinion; however, it may be done only by personnel with prior fish tagging experience or training, and is limited to external tagging only, unless the observer holds a valid sturgeon research permit (obtained pursuant to section 10 of the ESA, from the NOAA Fisheries' Office of Protected Resources, Permits Division) authorizing sampling, either as the permit holder, or as designated agent of the permit holder.

j. *PIT-Tag Scanning*: All sea turtles captured by relocation trawling (or dredges) shall be thoroughly scanned for the presence of PIT tags prior to release using a scanner powerful enough to read dual frequencies (125 and 134 kHz) and read tags deeply embedded deep in muscle tissue (e.g., manufactured by Biomark or Avid). Turtles which scans show have been previously PIT tagged shall never-the-less be externally flipper tagged. The data collected (PIT tag scan data and external tagging data) shall be submitted to NOAA, National Marine Fisheries Service, Southeast Fisheries Science Center, Attn: Lisa Belskis, 75 Virginia Beach Drive, Miami, Florida 33149. All data collected shall be submitted in electronic format within 60 working days to Lisa.Belskis@noaa.gov.

k. *CMTTP:* External flipper tag and PIT tag data generated and collected by relocation trawlers shall also be submitted to the Cooperative Marine Turtle Tagging Program (CMTTP), on the appropriate CMTTP form, at the University of Florida's Archie Carr Center for Sea Turtle Research.

l. *Tissue Sampling*: All live or dead sea turtles captured by relocation trawling or dredging shall be tissue-sampled prior to release, according to the protocols described in Appendix II or Appendix III of this Opinion. Tissue samples shall be sent within 60 days of capture to: NOAA, National Marine Fisheries Service, Southeast Fisheries Science Center, Attn: Lisa Belskis, 75 Virginia Beach Drive, Miami, Florida 33149. All data collected shall be submitted in electronic format within 60 working days to Lisa.Belskis@noaa.gov. This Opinion serves as the permitting authority for any NOAA Fisheries-approved endangered species observers aboard relocation trawlers or hopper dredges to tissue-sample live- or dead-captured sea turtles, without the need for a section 10 permit.

m. *Cost Sharing of Genetic Analysis*: The COE's Gulf of Mexico Districts shall combine to provide a one-time payment of $10,000 to NOAA Fisheries to share the cost of NOAA-Fisheries' analysis of 300 tissue samples taken during COE hopper dredging/trawling operations in the Gulf of Mexico. This cost is currently estimated by NOAA Fisheries to be about $100-150 per sample, or $30,000-$45,000. COE funds shall be provided to NOAA Fisheries' Southwest Fisheries Center's Dr. Peter Dutton as a part of a Memorandum of Understanding (MOU) to be developed between Dr. Dutton and the COE's combined Gulf of Mexico Districts and Divisions within six months of the issuance of this Opinion.

n. *PIT Tagging:* PIT tagging is not required or authorized for, and shall not be conducted by, ESOs who do not have 1) section 10 permits authorizing said activity and 2) prior training or experience in said activity; however, if the ESO has received prior training in PIT tagging procedures and is also authorized to conduct said activity by a section 10 permit, then the ESO **must** PIT tag the animal prior to release (in addition to the standard external flipper tagging). PIT tagging must then be performed in accordance with the protocol detailed at NOAA Fisheries' Southeast Science Center's webpage: http://www.sefsc.noaa.gov/seaturtlefisheriesobservers.jsp. (See Appendix C on SEC's "Fisheries Observers" webpage). PIT tags used must be sterile, individually wrapped tags to prevent disease transmission. PIT tags should be 125 kHz, glass-encapsulated tags - the smallest ones made. Note: If scanning reveals a PIT tag and it was not difficult to find, then **do not** insert another PIT tag; simply record the tag number and location, and frequency, if known. If for some reason the tag is difficult to detect (e.g., tag is embedded deep in muscle, or is a 400 mHz tag), then insert one in the other shoulder.

o. *Other Sampling Procedures*: All other tagging and external or internal sampling procedures (e.g., PIT tagging, blood letting, laparoscopies, anal and gastric lavages, mounting satellite or radio transmitters, etc.) performed on live sea turtles or live sturgeon are **not permitted under this Opinion unless** the observer holds a valid sea turtle or sturgeon research permit (obtained pursuant to section 10 of the ESA, from the NOAA Fisheries' Office of Protected Resources, Permits Division) authorizing the activity, either as the permit holder, or as designated agent of the permit holder.

p. *Handling Fibropapillomatose Turtles*: Observers handling sea turtles infected with fibropapilloma tumors shall either: 1) clean all equipment that comes in contact with the turtle (tagging equipment, tape measures, etc.) with mild bleach solution, between the processing of each turtle or 2) maintain a separate set of sampling equipment for handling animals displaying fibropapilloma tumors or lesions. Tissue/tumor samples shall be sent within 60 days of capture to: NOAA, National Marine Fisheries Service, Southeast Fisheries Science Center, Attn: Lisa Belskis, 75 Virginia Beach Drive, Miami, Florida 33149. All data collected shall be submitted in electronic format within 60 working days to Lisa.Belskis@noaa.gov. This Opinion serves as the permitting authority for all NOAA Fisheries-approved endangered species observers aboard a relocation trawler or hopper dredge to tissue-sample fibropapilloma-infected sea turtles without the need for a section 10 permit.

16. *Hardground Buffer Zones*: All dredging in sand mining areas will be designed to ensure that dredging will not occur within a minimum of 400 feet from any significant hardground areas or bottom structures that serve as attractants to sea turtles for foraging or shelter. NOAA Fisheries considers (for the purposes of this Opinion only) a significant hardground in a project area to be one that, over a horizontal distance of 150 feet, has an average elevation above the sand of 1.5 feet or greater, and has algae growing on it. The COE Districts shall ensure that sand mining sites within their Districts are adequately mapped to enable the dredge to stay at least 400 feet from these areas. If the COE is uncertain as to what constitutes significance, it shall consult with NOAA Fisheries' Habitat Conservation Division and NOAA Fisheries' Protected Resources Division for clarification and guidance.

17. *Training - Personnel on Hopper Dredges*: The respective COE Districts must ensure that all contracted personnel involved in operating hopper dredges (whether privately-funded or federally-funded projects) receive thorough training on measures of dredge operation that will minimize takes of sea turtles. It shall be the goal of each hopper dredging operation to establish operating procedures that are consistent with those that have been used successfully during hopper dredging in other regions of the coastal United States, and which have proven effective in reducing turtle/dredge interactions. Therefore, COE Engineering Research and Development Center experts or other persons with expertise in this matter shall be involved both in dredge operation training, and installation, adjustment, and monitoring of the rigid deflector draghead assembly.

18. *Dredge Lighting*: From May 1 through October 31, sea turtle nesting and emergence season, all lighting aboard hopper dredges and hopper dredge pumpout barges operating within three nmi of sea turtle nesting beaches shall be limited to the minimal lighting necessary to comply with U.S. Coast Guard and/or OSHA requirements. All non-essential lighting on the dredge and pumpout barge shall be minimized through reduction, shielding, lowering, and appropriate placement of lights to minimize illumination of the water to reduce potential disorientation effects on female sea turtles approaching the nesting beaches and sea turtle hatchlings making their way seaward from their natal beaches.