UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southeast Regional Office
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https://www.fisheries.noaa.gov/region/southeast

02/26/2025

F/SER31:SG
SERO-2024-00107

Wayne Fitzpatrick
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Galveston District Corps of Engineers
Department of the Army
5151 Flynn Parkway, Suite 306
Corpus Christi, Texas 78411-4318

Ref.: SWG-2000-02968, City of Port Aransas, New Marina Construction, Port Aransas, Nueces County, Texas

Dear Wayne Fitzpatrick,

The enclosed Biological Opinion responds to your request for consultation with us, the National Marine Fisheries Service (NMFS), pursuant to Section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. § 1531 et seq.) for the above referenced action. The Opinion has been given the NMFS tracking number SERO-2024-00107. Please use the NMFS tracking number in all future correspondence related to this action.

The Opinion considers the effects of the U.S. Army Corps of Engineers' (USACE) proposal to authorize the construction of a new marina and entrance channel by the City of Port Aransas (the applicant) in Port Aransas, Nueces County, Texas, on the following listed species and critical habitat: green sea turtle (North and South Atlantic Distinct Population Segments [DPSs]), hawksbill sea turtle, Kemp's ridley sea turtle, leatherback sea turtle, loggerhead sea turtle (Northwest Atlantic DPS), giant manta ray, and proposed green sea turtle (North Atlantic DPS) critical habitat (Unit TX 01: Texas). The Opinion is based on information provided by the USACE, the applicant, and the published literature cited within. NMFS concludes that the proposed action will have no effect on the South Atlantic DPS of green sea turtle and proposed critical habitat for the North Atlantic DPS of green sea turtle (Unit TX01: Texas). NMFS concludes the proposed action is not likely to adversely affect hawksbill and leatherback sea turtles and giant manta ray. NMFS concludes that the proposed action is likely to adversely affect, but is not likely to jeopardize the continued existence of, green sea turtle (North Atlantic DPSs), Kemp's ridley sea turtle, and loggerhead sea turtle (Northwest Atlantic DPS).

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 and applicant must comply, to carry out the Reasonable and Prudent Measures.

USACE is voluntarily conferring with NMFS under ESA section 7(a)(4) on effects of the proposed action to critical habitat proposed for the North Atlantic DPS of green sea turtle (Unit TX01: Texas). The conference is being conducted following the procedures for formal consultation. This conference opinion may be adopted as the biological opinion when this critical habitat is designated, but only if no significant new information is developed (including that developed during the rulemaking process on the proposed critical habitat designation) and no significant changes to the Federal action are made that would alter the content of the 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: 2025.02.26 09:48:10 -05'00'

for Andrew J. Strelcheck
Regional Administrator

Enclosure:
NMFS Biological Opinion SERO-2024-00107
cc: wayne.c.fitzpatrick@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
	Permit number: SWG-2000-02968
Applicant:	City of Port Aransas
Activity:	New Marina and Entrance Channel Construction
Location:	Port Aransas, Nueces County, Texas
Consulting Agency:	National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Southeast Regional Office, Protected Resources Division, St. Petersburg, Florida
	NMFS Tracking Number: SERO-2024-00107

Approved by:

AMENDOLA.KIMBERLY.BARBARA.1365830769 Digitally signed by AMENDOLA.KIMBERLY.BARBARA.1365830769 Date: 2025.02.26 09:49:42 -05'00' for

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

Date Issued: 02/26/2025

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ACRONYMS, ABBREVIATIONS, AND UNITS OF MEASURE

ac	acre(s)
BOEM	Bureau of Ocean Energy Management
°C	degrees Celsius
CCL	curved carapace length
CCSC	Corpus Christi Shipping Channel
CFR	Code of Federal Regulations
cm	centimeter(s)
CONANP	Comisión Nacional de Areas Naturales Protegidas
CPUE	catch per unit effort
dB	decibel
DDT	dichlorodiphenyltrichloroethane
DNA	deoxyribonucleic acid
DPS	Distinct Population Segment
DTRU	Dry Tortugas Recovery Unit
DWH	Deepwater Horizon
ECO	Environmental Consultation Organizer
EEZ	Exclusive Economic Zone
EFH	Essential Fish Habitat
ESA	Endangered Species Act of 1973, as amended (16 U.S.C. § 1531 et seq.)
°F	degrees Fahrenheit
FERC	Federal Energy Regulatory Commission
FP	Fibropapillomatosis
FR/Fed. Reg.	Federal Register
ft	foot/feet
ft^2	square foot/feet
FWC	Florida Fish and Wildlife Conservation Commission
FWRI	Florida Fish and Wildlife Research Institute
g	gram(s)
GADNR	Georgia Department of Natural Resources
GCRU	Greater Caribbean Recovery Unit
GRBO	Gulf of Mexico Regional Biological Opinion
in	inch(es)
IPCC	Intergovernmental Panel on Climate Change
kg	kilogram(s)
km	kilometer(s)
lb	pound(s)
lin ft	linear foot/feet
m	meter(s)
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

MSA	Magnuson-Stevens Fishery Conservation and Management Act
N/A	not applicable
NAD 83	North American Datum of 1983
NAVD88	North American Vertical Datum of 1988
NCWRC	North Carolina Wildlife Resources Commission
NGRU	Northern Gulf of Mexico Recovery Unit
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NRC	Natural Resources Council
NRU	Northern Recovery Unit
Opinion	Biological Opinion, Conference Biological Opinion, or Draft Biological Opinion
oz	ounce(s)
PCB	polychlorinated biphenyls
PFC	perfluorinated chemicals
PFRU	Peninsular Florida Recovery Unit
PK	Peak Sound Pressure Level, the greatest value of the sound signal
PRD	Protected Resources Division
RMS	Root Mean Square, the intensity of the sound signal over a given amount of time
SAV	Submerged Aquatic Vegetation
SCDNR	South Carolina Department of Natural Resources
SCL	straight carapace length
SEFSC	Southeast Fisheries Science Center
SEL	Sound Exposure Level, a measure of energy that takes into account both received sound pressure level and duration of exposure
SELcum	Cumulative Sound Exposure Level, the measure of energy that takes into account the received sound pressure level over a 24-hour period
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
TWPD	Texas Wildlife and Parks Department
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
yds^3	cubic yards

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 or appropriate to minimize such impact of incidental take on the species, and lists the Terms and Conditions to implement those measures. An Opinion may also develop Conservation Recommendations that help benefit ESA-listed species.

For species and critical habitat proposed for listing, each federal agency shall confer on any agency action that is likely to jeopardize the continued existence of any species proposed for listing or result in the destruction or adverse modification of proposed critical habitat (ESA section 7(a)(4)). Federal agencies may also request a conference on any proposed action that may affect proposed species or proposed critical habitat. Federal action agencies may request that the conference be conducted following the procedures for formal consultation and, subject to our agreement, the conference may be conducted formally.

A formal conference results in a Conference Biological Opinion in the same format and with the same content as a Biological Opinion. The Conference Biological Opinion may be adopted as the biological opinion when the species is listed or critical habitat is designated, but only if no significant new information is developed (including that developed during the rulemaking process on the proposed listing or critical habitat designation) and no significant changes to the Federal action are made that would alter the content of the opinion. An Incidental Take Statement provided with a conference opinion does not become effective unless we adopt the Opinion once the listing is final (50 CFR 402.10(d)).

This document represents NMFS's Opinion based on our review of potential effects of the USACE's proposal to authorize the construction of a new marina and entrance channel by the City of Port Aransas (the applicant) in Port Aransas, Nueces County, Texas, on the following listed species and critical habitat: green sea turtle (North and South Atlantic DPSs), hawksbill sea turtle, Kemp's ridley sea turtle, leatherback sea turtle, loggerhead sea turtle (Northwest Atlantic DPS), giant manta ray, and proposed critical habitat for the North Atlantic DPS of green sea turtle. Our Opinion is based on information provided by the USACE, the applicant, and the published literature cited within.

Updates to the regulations governing interagency consultation (50 CFR part 402) were effective on May 6, 2024 (89 Fed. Reg. 24268). We are applying the updated regulations to this consultation. The 2024 regulatory changes, like those from 2019, were intended to improve and clarify the consultation process, and, with one exception from 2024 (offsetting reasonable and prudent measures), were not intended to result in changes to the Services' existing practice in implementing section 7(a)(2) of the Act. 89 Fed. Reg. at 24268; 84 Fed. Reg. at 45015. We have considered the prior rules and affirm that the substantive analysis and conclusions articulated in this biological opinion and incidental take statement would not have been any different under the 2019 regulations or pre-2019 regulations.

1.2 Consultation History

The following is the consultation history for the NMFS ECO tracking number SERO-2024-00107, Port Aransas Marina.

On January 24, 2024, we received a request for expedited informal consultation under Section 7 of the ESA from the USACE to permit construction of a new marina and entrance channel by the City of Port Aransas (the applicant) in Port Aransas, Nueces County, Texas, in a letter dated August 1, 2023.

On July 9, 2024, we requested additional information related to project description details and best practices. Additional information related to dry storage of vessels was requested on August 28, 2024.

We received a final response on August 29, 2024, and initiated formal consultation that day.

2 PROPOSED ACTION

2.1 Project Details

2.1.1 Project Description

The USACE proposes to authorize the City of Port Aransas, Nueces County, Texas, to construct a new marina and entrance channel adjacent to the CCSC. The purpose of the proposed project is to provide additional capacity for public recreational boating access in the Port Aransas area and to relieve congestion at the existing public marina. The proposed construction will involve dredging outside of the federal channel limits of the CCSC, excavation of upland areas, discharges of excavated and dredged material within the project site, and installation of infrastructure for the marina. Infrastructure includes a weir, bulkhead, temporary dike, and steel sheet piling. Facilities such as a new entrance channel, jetties, and docks will be constructed after excavation and dredge and fill activities are completed. The proposed construction will result in a new entrance channel bounded by a jetty on each side, and a new marina with dry storage for a maximum of 120 vessels, and a total of 299 wet slips with a total overwater area of 78,772 ft^2. In-water construction is anticipated to take a total of approximately 12 months to complete.

In general, sheet piling for the jetties associated with the entrance channel along with upland excavation for the marina basin (above the water table) will be the first components of the project to be constructed. These activities would likely be conducted concurrently to reduce the overall duration of construction. Next, the marina basin will be excavated to the water table, followed by bulkhead installation and dredging of the marina basin to the required depths. Once the entrance channel and marina basin are completed, the harbor master's office along with various parking lots, docks/slips, retail shops, restaurants, bait stands, and boat dry stack units will be constructed. Each component of the proposed project is described in more detail below.

Entrance Channel and Breakwater Construction

The construction of the proposed entrance channel breakwater will consist of installing an approximately 728-ft-long breakwater on the west side and an approximately 552-ft-long breakwater on the east side of the proposed new, 160-ft-wide entrance channel. A total of approximately 96 wood support pilings (12-in diameter) and 1,176 ft of 24-in steel sheet piles (approx. 558 total sheet piles) will be installed using vibratory hammers. Silt curtains will be installed around pile driving activities to minimize turbidity within the water column, and they will be removed promptly once turbidity levels return to baseline. A Storm Water Pollution Prevention plan for the proposed marina will be in place until project construction is completed. No more than 4 wood pilings and 6 sheet piles will be installed per day. Construction of the breakwater is expected to take approximately 100 days to complete.

A mechanical, barge-mounted dredge will be used to remove approximately 41,000 yds^3 of existing substrate from an approximately 2.35-ac area outside the federal channel limits of the CCSC. The current water depths in the proposed entrance channel location ranges between -10 to -13 ft. The new proposed entrance channel will be dredged to -14 ft MLLW. All dredged material from the new proposed entrance channel will be placed within the uplands of the proposed project area to be used as foundations for the access road and other upland facilities within the project footprint. Dredging of the entrance channel is estimated to take 90 days.

Marina Basin Construction

The proposed new marina basin will be constructed by excavating an upland area adjacent to the proposed new entrance channel. The perimeter of the proposed basin will total approximately 4,705 ft and encompass 15.61 ac. Prior to commencing any excavation for the construction of the proposed marina basin, the applicant will install sheet pile bulkhead in the uplands of the proposed project site, including a temporary breakwater between the proposed entrance channel and the upland area that will become the new marina basin. After installation of the bulkhead, the applicant will excavate the marina to a depth of -10 ft below MLLW. The applicant proposes to excavate approximately 465,500 yds^3 of material from an approximately 15.61-ac upland area to create the new proposed marina basin. When the water table is reached the applicant will jet-in cast-in-place concrete or sheet steel bulkhead panels around the perimeter of the marina basin. Once set, the remaining volume of material will be dredged from the marina basin to the required depths. Construction of the new marina basin is expected to take 18 months to complete.

All excavated material will be placed within an upland designated material placement area that surrounds the excavation site. The upland designated material placement area consists of approximately 38.57 ac and borders the excavation site on 3 sides to the south, east, and west.

After excavation of the new marina basin is complete, and once the entrance channel dredging is completed and all pilings within the entrance channel have been installed, the applicant will finally pump water into the new marina basin via a 6-in pipe at a proposed rate of approximately 5,000 gallons per minute. After the water has been pumped into the basin, the applicant will remove the temporary breakwaters between the entrance channel and the new marina basin.

Dock Construction

The proposed project will result in the construction of a total of 299 new wet slips consisting of 83 lift slips and 216 in-water slips with a total overwater area of 78,772 ft^2 (i.e., 55,677 ft^2 of fixed wooden docks plus 23,095 ft^2 of concrete floating docks). Timber and sheet piles are proposed for installation. See Table 1 below. All in-water pile driving will occur first using vibratory hammer. An impact hammer will be used to complete pile installation, but only prior to the newly constructed marina basin being connected to the waters of the CCSC. A barrier between the newly-constructed basin and the waters of the CCSC would remain in place until all pile driving is complete. To reduce noise levels, wood cushion blocks will be placed on each pile prior to hammering. No more than 10 piles per day will be installed. The "ramp up" method (i.e., pile driving starts at a very low force and gradually builds up to full force) will be used to give any noise sensitive species the opportunity to leave the area prior to full-force pile driving. These procedures will be used for a minimum of 10 minutes prior to full-force pile driving.

Table 1. Pile Types and Installation Methods.

Pile Type and Material	Wood	Sheet Pile
Pile diameter (in)	12	24
Total Number of Piles	96	558
Installation Method	Vibratory and Impact	Vibratory and Impact
Number of strikes per pile	30 min;	30 min;
Number of piles installed per day	4	6
Duration of pile driving activity (days)	30	98
Substrate and water depth in pile installation area	Sand, 6-7 ft	Sand, 6-7 ft
Confined Space or open water	Confined	Confined
Noise abatement used	Ramp up method	Ramp up method
Turbidity control	Silt curtain	Silt curtain

The fixed wooden docks will have a final deck elevation of +3.5 NAVD88 with 1/8-in spacing between deck boards. Floating concrete docks will have a finished deck elevation of 12-18 in above the water line.

The new docks will accommodate 204 vessels measuring between 10 and 30 ft long; 25 vessels measuring between 30 and 50 ft long; and 21 vessels measuring over 50 ft long. The maximum estimated vessel size that could be accommodated by the new wet slips at the marina is 130 ft long.

Dry Storage
The maximum anticipated building footprint for the proposed dry storage units is 350-ft-long by 140-ft-wide, with vessels being stacked 2 levels high. It is anticipated that up to 120 vessels could be stored, with vessel sizes ranging between 12 ft and 40 ft long.

2.1.2 Mitigation Measures

- All work will be conducted during daylight hours only.
- Materials or equipment to be staged on site will be restricted to adjacent upland areas.
- The SERO Protected Species Construction Conditions will be implemented during construction.
- Vessel Strike Avoidance Measures will be implemented during construction.
- Project construction and operations employees will be instructed not to approach, feed or water protected species. Employees will be provided materials, such as a poster, to assist in identifying the species.
- Nesting, injured or cold stunned sea turtles will be reported to the Texas STSSN at (361) 949-8173, ext. 226 (Padre Island National Seashore), or the hotline number (866) 887-8535 (866-TURTLE5).
- Pile Installation –
  - Silt curtains will be installed around pile driving activities to minimize turbidity within the water column, and they will be removed promptly once turbidity levels return to baseline.
  - No more than 10 piles per day will be installed (i.e., no more than 4 wood piles and 6 sheet piles will be installed concurrently).
  - The "ramp up" method (i.e., pile driving starts at a very low force and gradually builds up to full force) will be used to give any noise sensitive species the opportunity to leave the area prior to full-force pile driving. These procedures will be used for a minimum of 10 minutes prior to full-force pile driving.
- A Storm Water Pollution Prevention plan for the proposed marina will be in place until project construction is completed.

2.1.3 Best Practices

- Upon completion of the marina, NMFS-approved educational signs will be posted in visible locations throughout the marina dock area, alerting boaters of listed species in the area. The applicant will post at the marina the following signs, which are available for download at the following website: https://www.fisheries.noaa.gov/southeast/consultations/protected-species-educational-signs. It is suggested that both English and Spanish versions of the signs are posted.
  - *"Save Dolphins, Sea Turtles, and Manta Ray";*

    - *"[No Fishing at the Marina](#)"*
- Upon completion of the marina, copies of NMFS *Protected Marine Species Identification Guide* will be displayed and made available in a visible and accessible location within the Harbor Master's office.

2.2 Action Area

The center point for the proposed project site (e.g., marina) is located adjacent to the CCSC at 27.835157°, -97.078501° (NAD 83), approximately 3 mi from the Gulf of Mexico, in Port Aransas, Nueces County, Texas. The project site is includes an undeveloped 15.6-ac upland area and a 2.35-ac nearshore area within water adjacent to the CCSC. The CCSC is an active ship channel with frequent vessel traffic, and high wind and wave energy.

The upland parcel proposed for development consists of mudflats and wetlands, and is surrounded by residential development to the northeast, east, and southeast. The western boundary is bordered by Charlie's Pasture Nature Preserve.

Figure 1. Location of proposed project site (yellow pushpin icon) in relation to CCSC, inshore waters and bays, and the Gulf of Mexico (© 2024 Google Earth).

The 2.35-ac nearshore area proposed for dredging and construction of breakwaters consists of water depths ranging between -10 and -13 ft with sand substrate. The USACE concluded that seagrass is absent from the proposed project 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 56.56-ac footprint of the proposed entrance channel and marina basin, extends to the radius of anticipated noise effects from pile installation (i.e., 7,063.4-ft), and the surrounding water accessible to recreational boaters upon completion of the proposed action. Currently, there are 9,244 watercraft registered within Nueces County, Texas (TPWD Registered Boats Dataset; retrieved on July 9, 2024 from https://data.texas.gov/dataset/Registered-Boats/v2f5-4wth/data_preview).

No seagrass was identified within the proposed dredged footprint, and review of current and historical aerial imagery, as well as a review of previous sensitive resources surveys conducted in the area, indicated that seagrass is absent along this portion of the tow of the CCSC. There are also no coral species or red mangroves present within the action area. The action area is within the boundary of the proposed designation for critical habitat for green sea turtle (North Atlantic DPS).

3 EFFECTS DETERMINATIONS

Please note the following abbreviations are only used in Table 2 and Table 3 and are not, therefore, included in the list of acronyms: E = endangered; T = threatened; P = Proposed; LAA = likely to adversely affect; NLAA = may affect, not likely to adversely affect; NE = no effect.

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 2** below.

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

Species (DPS)	ESA Listing Status	Listing Rule/Date	Most Recent Recovery Plan (or Outline) Date	USACE Effect Determination	NMFS Effect Determination
Sea Turtles					
Green sea turtle (North Atlantic DPS)	T	81 FR 20057/ April 6, 2016	October 1991	NLAA	LAA
Green sea turtle (South Atlantic DPS)	T	81 FR 20057/ April 6, 2016	October 1991	NLAA	NE
Hawksbill sea turtle	E	35 FR 8491/ June 2, 1970	December 1993	No Determination	NLAA
Kemp's ridley sea turtle	E	35 FR 18319/ December 2, 1970	September 2011	NLAA	LAA

Species (DPS)	ESA Listing Status	Listing Rule/Date	Most Recent Recovery Plan (or Outline) Date	USACE Effect Determination	NMFS Effect Determination
Leatherback sea turtle	E	35 FR 8491/ June 2, 1970	April 1992	No Determination	NLAA
Loggerhead sea turtle (Northwest Atlantic DPS)	T	76 FR 58868/ September 22, 2011	December 2008	NLAA	LAA
Fishes					
Giant manta ray	T	83 FR 2916/ January 22, 2018	2019 (Outline)	NLAA	NLAA

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.

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

The proposed action includes dredging, upland excavation, and installation of new piles. Use of turbidity curtains, project activities, and related noise may preclude or deter green (North Atlantic DPS), Kemp's ridley, and loggerhead (Northwest Atlantic DPS) sea turtles and giant manta ray from entering the project area. Hawksbill and leatherback sea turtles are not likely to be present within the active construction area where these activities will occur. We believe the temporary exclusion from a project area due to the project activities, including related noise and presence of turbidity curtains, will have an insignificant effect on green (North Atlantic DPS), Kemp's ridley, and loggerhead (Northwest Atlantic DPS) sea turtles and giant manta ray. Construction activities will occur during daylight hours only. Turbidity curtains will enclose the project site, or portions of the project site, at any given time and will be removed after project completion. Green (North Atlantic DPS), Kemp's ridley, and loggerhead (Northwest Atlantic DPS) sea turtles or giant manta ray excluded from the project area will also be able to use surrounding areas with similar available habitat during the project and return to the project site when the activity is complete.

Green (North Atlantic DPS), Kemp's ridley, and loggerhead (Northwest Atlantic DPS) sea turtles and giant manta ray may be physically injured if struck by dredging equipment or other in-water construction activities. Hawksbill and leatherback sea turtles are not likely to be present within the active construction area where these activities will occur. We believe the risk of physical injury is extremely unlikely to occur due to these species' abilities to move away from the project site and into adjacent suitable habitat, if disturbed. NMFS previously determined in dredging Biological Opinions that, while oceangoing hopper-type dredges may lethally entrain protected species, non-hopper-type dredging methods, such as the mechanical methods proposed in this project, are slower and extremely unlikely to overtake or adversely affect them (NMFS 2020). Additionally, the implementation of NMFS Southeast Region's *Protected Species Construction Conditions* (NMFS 2021) will require all construction workers to observe in-water activities for the presence of this species. Operation of any mechanical construction equipment shall cease immediately if a protected species is seen within 150 ft of operations. 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. Further, construction would be limited to daylight hours so construction workers would be more likely to see listed species, if present, and avoid interactions with them.

Pile Driving Noise Effects
Noise created by pile driving activities can physically injure animals or change animal behavior in the affected areas. Animals can be physically injured in 2 ways. First, immediate adverse effects can occur if a single noise event exceeds the threshold for direct physical injury. Second, adverse physical effects can result from prolonged exposure to noise levels that exceed the daily cumulative sound exposure level for the animals. Noise can also interfere with an animal's behavior, such as migrating, feeding, resting, or reproducing and such disturbances could constitute adverse behavioral effects.

When an impact hammer strikes a pile, a pulse is created that propagates through the pile and radiates sound into the water, the ground substrate, and the air. Pulsed sounds underwater are typically high volume events that have the potential to cause hearing injury. Vibratory pile driving produces continuous, non-pulsed sounds that can be tonal or broadband. In terms of acoustics, the sound pressure wave is described by the peak sound pressure level (PK, which is the greatest value of the sound signal), the root-mean-square pressure level (RMS, which is the average intensity of the sound signal over time), and the sound exposure level (SEL, which is a measure of the energy that takes into account both received level and duration of exposure). Further, the cumulative sound exposure level (SELcum) is a measure of the energy that takes into account the received sound pressure level over a 24-hour period. Please see the following website for more information related to measuring underwater sound and the NMFS-accepted pile driving sound measurement thresholds for species in the NMFS Southeast Region: https://www.fisheries.noaa.gov/southeast/consultations/section-7-consultation-guidance. Please note that for vibratory pile driving, only behavioral sound measurement thresholds exist for fishes; NMFS does not recognize any injurious sound thresholds for fishes when vibratory pile driving is used.

We use the NMFS Multi-species Pile Driving Tool (dated May 2022) to calculate the radii of physical injury and behavioral effects on ESA-listed species that may be located in the action area based on the NMFS-accepted pile driving sound measurement thresholds for species in the NMFS Southeast Region reference above. The USACE proposes to permit vibratory and impact pile driving installation of 558 new 24-in AZ steel sheet piles and 96 new 12-in diameter timber piles during daylight hours only. All in-water pile driving will occur first using vibratory hammer. An impact hammer will be used to complete pile installation, but only prior to the newly constructed marina basin being connected to the waters of the CCSC. A barrier between the newly-constructed basin and the waters of the CCSC would remain in place until all pile driving is complete. To reduce noise levels, wood cushion blocks will be placed on each pile prior to hammering. No more than 10 piles per day will be installed. The "ramp up" method (i.e., pile driving starts at a very low force and gradually builds up to full force) will be used to give any noise sensitive species the opportunity to leave the area prior to full-force pile driving. These procedures will be used for a minimum of 10 minutes prior to full-force pile driving. Each pile will require approximately 30 minutes (vibratory) and up to approximately 297 strikes to install. Pile driving will occur in a confined space. We define a confined space as any area that has a solid, vertical structure (e.g., jetty or seawall) or natural shoreline that would effectively serve as a barrier or otherwise prevent an animal from exiting the area. That is, in order for the animal to move away from the noise source, the animal would be forced to pass through the radius of noise effects.

Because multiple pile-types (i.e., AZ steel sheet piles and timber piles) and installation methods (i.e., impact hammer using noise abatement measures and vibratory hammer) are proposed, the noise analysis in this consultation evaluates the pile-type and installation method with the greatest potential effects and largest potential effect radius (i.e., 7,068.4 ft from impact pile driving of AZ steel sheet pile). Any potential effects of pile driving noise from other proposed pile types and methods would not exceed those described below. Therefore, the potential pile driving noise effects from the other proposed pile types and methods, if any, are expected to occur within a radius of that size or smaller and would result in, at most, the potential effects described below.

The installation of 558 new 24-in AZ steel sheet piles by vibratory and impact hammer using noise abatement measure will cause PK injurious noise effects to ESA-listed fishes and sea turtles at radii of up to 13.1-ft-away and 0.2-ft-away from the pile driving operations, respectively. We believe PK injurious noise effects are extremely unlikely to occur because this distance is behind the barrier that will separate the new marina basin from the waters of the CCSC, and this distance is within the 150-ft (46-m) "stop-work" radius defined in SERO's Protected Species Construction Conditions (revised 2021). Additionally, the SELcum may cause injury to ESA-listed fishes and sea turtles at a radii of up to 764.3-ft-away and 56.3-ft-away from the pile-driving operations over a 24-hour period, respectively. We believe SELcum injurious noise effects are extremely unlikely to occur due to the presence of the barrier between the new marina basin and the waters of the CCSC, and due to the mobility of these species. That is, we expect the species to move away from the noise disturbances before the exposure to the noise causes physical injury. The "ramp up" method (i.e., pile driving starts at a very low force and gradually builds up to full force) will be used to give any noise sensitive species the opportunity to leave the area prior to full-force pile driving. These procedures will be used for a minimum of 10 minutes prior to full-force pile driving. Movement away from the injurious sound radius is a behavioral response and is discussed below.

The installation of 558 new 24-in AZ steel sheet piles by vibratory and impact hammer using noise abatement measure could result in behavioral effects to ESA-listed fishes and sea turtles at a radii of up to 7,068.4-ft-away and 152.3-ft-away from the pile driving operations, respectively. We believe behavioral noise effects to these species will be extremely unlikely to occur due to the presence of the barrier between the new marina basin and the waters of the CCSC and the use of the of “ramp up” method for pile driving. The largest radius for behavioral noise effects is for fish (i.e., giant manta ray), which does not extend into the Gulf of Mexico or beyond the confluence of the CSSC and Aransas Channel. While giant manta rays are occasionally sighted along Texas’ gulf coast and can be observed feeding within ocean inlets and river plumes (NMFS 2024), the mouth of the CCSC is not a location known to have a high or moderate occurrence of giant manta rays (Farmer et al. 2022). Although we generally expect mobile species to move away from noise disturbances, if an animal remains within the project area, it could be exposed to behavioral noise effects during pile installations. Because pile installations will occur intermittently during daylight hours only, these species will be able to resume normal activities during quiet periods between pile installations and at night.

For the reasons discussed above, pile driving noise effects resulting from the proposed action are not likely to adversely affect green sea turtle (North Atlantic DPS), hawksbill sea turtle, Kemp’s ridley sea turtle, leatherback sea turtle, loggerhead sea turtle (Northwest Atlantic DPS), and giant manta ray.

Vessel Strikes
The proposed project includes the construction of a new marina for the purpose of increasing capacity for public recreational boating access in the Port Aransas area. The proposed project will result in a total of 299 wet slips plus dry storage for up to 120 vessels. Vessel sizes accommodated by the new marina range between 12 and 130 ft in length. A maximum of 21 slips will accommodate vessels over 50 ft in length, with most wet slips accommodating vessels under 50 ft in length.

Vessel traffic, both recreational and commercial, has been documented to adversely affect protected species such as sea turtles and giant manta ray. Sea turtles may spend a considerable amount of time on or near the surface of the water, which introduces the potential risk of collision from vessel traffic. The potential threat moving vessels pose to sea turtles is not constant and is influenced by vessel type, vessel speed, and environmental conditions such as sea state and visibility (Barnette 2018). The risk of vessel strike for ESA-listed sea turtles is spatially and temporally variable and is influenced by vessel type, vessel speed, vessel density, and environmental conditions such as sea state and visibility (Barnette 2018).

To help determine which sea turtle species are likely to occur within the action area, we reviewed all the available years of STSSN stranding data for Zone 20 (see Table 5, Section 6.2.2). Zone 20 is a statistical subarea used when reporting commercial fishing data, and it includes the waters of the Gulf of Mexico between the latitudes 27°N and 28°N. Although hawksbill and leatherback sea turtles are represented in the STSSN data presented in Table 5 in Section 6.2.2, the preferred habitats of these species makes it unlikely that high numbers of these species will be present in the action area or potentially adversely affected by vessel strikes. Hawksbill sea turtles have a circumtropical distribution and usually occur between latitudes 30°N and 30°S in the Atlantic, Pacific, and Indian Oceans. Adult foraging habitat is typically coral reefs. The hawksbill sea turtle’s diet is highly specialized and consists primarily of sponges (Meylan 1988). Other food items, notably corallimorphs and zooanthids, have been documented to be important in some areas of the Caribbean (León and Díez 2000; Mayor et al. 1998; van

Dam and Díez 1997). While there have been a few hawksbill sea turtle strandings reported in Zone 20, they comprise approximately 1.7% of total sea turtle strandings due to vessel strike injuries (n=17; Table 5). Due to hawksbill sea turtles' preferred habitat and diet, and rarity of reported strandings due to vessel strike injuries, it is extremely unlikely that interactions with vessels originating from the new marina will occur and the proposed action is not likely to adversely affect them.

Leatherback sea turtles are the most pelagic of sea turtle species, only entering coastal waters on a seasonal basis to feed in areas where jellyfish are concentrated or to nest, which does not occur in the action area. While there have been a few leatherback sea turtle strandings reported in Zone 20, they comprise approximately 1.4% of total sea turtle strandings due to vessel strike injuries (n=14; Table 5; Section 6.2.2). Due to leatherback sea turtles' preferred habitat and diet, and rarity of reported strandings due to vessel strike injuries, we believe it is extremely unlikely that interactions with vessels originating from the new marina will occur and the proposed action is not likely to adversely affect them.

In sum, due to the preferred habitats and diets of hawksbill and leatherback sea turtles, and rarity of reported strandings due to vessel strike injuries in the action area, we believe it is extremely unlikely that interactions between these two species and vessels originating from the new marina will occur. Therefore, vessel strikes originating from the proposed marina are not likely to adversely affect hawksbill and leatherback sea turtles. In Section 6.2, we analyze how vessel traffic originating from the new marina *is* likely to adversely affect green (North Atlantic DPS), Kemp's ridley, and loggerhead (Northwest Atlantic DPS) sea turtles.

For giant manta ray, vessel strikes are evident in every monitored manta ray population across the globe (Stewart et al. 2018a). Spending considerable time at the surface (e.g., while feeding and basking; Braun et al. 2014; Braun et al. 2015) manta rays are especially susceptible to vessel strikes (McGregor et al. 2019; Stevens and Froman 2019; Armstrong et al. 2020; Augliere 2020). Several studies have indicated that vessel strikes are significantly underestimated for manta rays. Documenting vessel strikes on manta rays is challenging because injuries are frequently misidentified and attributed to predation, fishing line, and entanglement injuries (McGregor et al. 2019). Vessel strikes are also underestimated due to the species ability to heal rapidly as the injury may not be recognizable in a quick underwater encounter (Marshall and Bennett 2010; McGregor et al., 2019; Pate and Marshall 2020). This misidentification of injuries and rapid wound healing indicates that vessel strikes are underestimated for manta ray populations (McGregor et al. 2019). It is also possible that manta rays are experiencing blunt force trauma from a vessel strike, yet are not exhibiting any obvious external injuries (Pate and Marshall 2020). In addition, any mortality caused by vessel strikes would likely be cryptic as manta rays are negatively buoyant and will sink after they die making documenting mortalities unlikely. While wound recovery is beneficial it likely requires significant energy cost and metabolic processes, which may shift energy allocation from reproductive effort, growth, and ability to feed, thereby reducing individual fitness (Archie 2013; Chin et al. 2015; Harvey-Carroll et al. 2021; Womersley et al. 2021).

The risk of vessel strike for giant manta rays is temporally and spatially variable (i.e., vessel strikes are more likely to occur where vessel density and manta ray density is high). In addition, when comparing the likelihood of vessel strikes on juveniles versus adults, the observed habitat use of juveniles may make them more prone to this threat. For example, in southeast Florida between Jupiter Inlet and Boynton Beach Inlet (i.e., Palm Beach County) vessel strikes were one of the most common sources of injuries to juvenile giant manta rays that frequent the shallow coastal waters there, where human activity and vessel traffic is heavily concentrated (Pate and Marshall 2020).

Any vessel traffic originating from the new marina at Port Aransas and entering coastal areas of the Gulf of Mexico via the CCSC are not likely to encounter giant manta rays. While giant manta rays are occasionally sighted along Texas' gulf coast and can be observed feeding within ocean inlets and river plumes (NMFS 2024), the mouth of the CCSC is not a location known to have a high or moderate occurrence of giant manta rays (Farmer et al. 2022). To estimate the potential risk for vessel strikes for giant manta ray, we first considered the best available science showing observed interactions between giant manta ray and vessel traffic. Southeast Florida is a known giant manta ray nursery area with a high occurrence of giant manta ray and high vessel traffic, and the only data we have available for calculating vessel strike risk for giant manta ray (Farmer et al. 2022; Pate and Marshall 2020). Of the known individual giant manta rays (n=179) occurring in Southeast Florida, 15 of those individuals (8%) have been recorded with vessel strike injuries between June 2016 and December 2023 (J. Pate, pers. comm. to C. Horn, NMFS SERO PRD, January 12, 2024). This calculates out to an average of 2 vessel strikes per year for giant manta ray in Palm Beach County, an area with a known and observed high occurrence of giant manta ray (i.e., 15 total strikes in 7.5 years = 2 strikes per year).

Next, we considered the potential frequency of vessel strikes by estimating the number of vessel trips per boater. While we do not have a maximum projected number of potential vessel trips within Palm Beach County waters (i.e., where there is high giant manta ray occurrence) for the 38,372 registered vessels in that county, Barnette (2018) calculated a maximum projected total of 2,214,757 potential vessel trips in Miami-Dade County waters during the course of a year. We use Miami-Dade County as a proxy for Palm Beach County because of the similarity between high vessel traffic observed and the high number of giant manta ray occurrences in both counties. Barnette (2018) assumed that each vessel trip possesses the same likelihood of resulting in the strike of a sea turtle or giant manta ray. Utilizing an average of 3 vessel strikes per year based on documented giant manta ray strandings data, coupled with the high-effort average annual number of vessel trips observed in the Miami-Dade area (2,214,757), we calculated that, on average, a vessel strike would occur every 738,252.33 vessel trips (i.e., 2,214,757 observed vessel trips/year ÷ 3 vessel strikes of giant manta ray/year). Based on the annual average of 36 vessel trips per boater (2.975 trips/vessel/month × 12 months/year), an average boater would strike a giant manta every 20,507 years in areas with known high giant manta ray occurrence and high observed vessel traffic.

While this is likely an underestimate, when compared to more than 419 vessels introduced into the action area (when taking into account the proposed dry storage), and the 9,244 vessels currently registered in Nueces County, vessel strikes of giant manta ray resulting from vessels originating from the proposed new marina are extremely unlikely to occur. The action area is not an area with known high occurrences of giant manta ray. Operation of the marina will not result in all 419 of the vessels moored and stored at the facility being in the water at the same time. Further, we do not have any data to support any assumption about where a majority of vessels originating from the new marina will travel – whether the majority of vessels will travel offshore to the Gulf of Mexico where the occurrence of giant manta ray is more likely, or travel to nearby inshore waters (e.g., Corpus Christi Bay, Redfish Bay) where the occurrence of giant manta ray is less likely. Therefore, NMFS believes any vessel traffic effects to giant manta ray will be extremely unlikely to occur.

For the reasons discussed above, vessel strikes resulting from the proposed action are not likely to adversely affect hawksbill sea turtle, leatherback sea turtle, and giant manta ray. Conversely, vessel strikes from the proposed action are likely to adversely affect green sea turtle (North Atlantic DPS), Kemp's ridley sea turtle, and loggerhead sea turtle (Northwest Atlantic DPS); these effects are discussed further in Section 6.2.

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

We have determined that green sea turtle (North Atlantic DPSs), Kemp's ridley sea turtle, and loggerhead sea turtle (Northwest Atlantic DPS) are likely to be adversely affected by the proposed action and thus 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 6.2) and whether those effects, when considered in the context of the Status of the Species (Section 4.1), the Environmental Baseline (Section 5), and the Cumulative Effects (Section 7), are likely to likely to jeopardize the continued existence of these ESA-listed species in the wild.

3.2 Effects Determinations for Critical Habitat

3.2.1 Agency Effects Determination

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

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

Species (DPS)	Critical Habitat Unit in the Action Area	Critical Habitat Rule/Date	USACE Effect Determination	NMFS Effect Determination (Critical Habitat)
Proposed				
Sea Turtle				
Green sea turtle (North Atlantic DPS)	TX01: Texas (Mexico border to and including Galveston Bay	88 FR 46572, July 19, 2023	No determination	NE

The action area is within the boundary of the proposed designation for critical habitat for green sea turtle (North Atlantic DPS). The physical or biological features (PBFs) of proposed critical habitat that are essential to the conservation of the North Atlantic DPS of green sea turtle are:

1. **Reproductive.** From the mean high water line to 20 m depth, sufficiently dark and unobstructed nearshore waters adjacent to nesting beaches designated as critical habitat by USFWS, to allow for the transit, mating, and internesting of reproductive individuals and the transit of post-hatchlings.
2. **Migratory.** From the mean high water line to 20 m depth, sufficiently unobstructed waters that allow for unrestricted transit of reproductive individuals between benthic foraging/resting and reproductive areas.
3. **Benthic foraging/resting.** From the mean high water line to 20 m depth, underwater refugia and food resources (i.e., seagrasses, macroalgae, and/or invertebrates) of sufficient condition, distribution, diversity, abundance, and density necessary to support survival, development, growth, and/or reproduction.
4. **Surface-pelagic foraging/resting.** Convergence zones, frontal zones, surface-water downwelling areas, the margins of major boundary currents, and other areas that result in concentrated components of the Sargassum-dominated drift community, as well as the currents which carry turtles to Sargassum-dominated drift communities, which provide sufficient food resources and refugia to support the survival, growth, and development of post-hatchlings and surface-pelagic juveniles, and which are located in sufficient water depth (at least 10 m) to ensure offshore transport via ocean currents to areas which meet forage and refugia requirements.

None of the 4 PBFs are present within the action area; therefore, the proposed action will have no effect on critical habitat for green sea turtle (North Atlantic DPS) proposed for designation.

4 STATUS OF ESA-LISTED SPECIES CONSIDERED FOR FURTHER ANALYSIS

There are 5 species of sea turtles (green, hawksbill, Kemp's ridley, leatherback, and loggerhead) 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 will address the general threats that confront all sea turtle species. The remainder of Section 4 (Sections 4.2-4.4) will address information on the distribution, life history, population structure, abundance, population trends, and unique threats to each species of sea turtle.

4.1 General Threats Faced by All Sea Turtle Species

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 sections 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 of this opinion for more specific information regarding federal and state managed fisheries affecting sea turtles within the action area). The Southeast U.S. 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 loggerheads and leatherbacks, 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 1997). 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 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, had ingested oil, or both. 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 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 loggerheads, and juvenile green 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 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 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.

4.2 Green Sea Turtle (North Atlantic DPS)

The green sea turtle was originally listed as threatened under the ESA on July 28, 1978, except for the Florida and Pacific coast of Mexico breeding populations, which were listed as endangered. On April 6, 2016, the original listing was replaced with the listing of 11 DPSs (81 FR 20057 2016) (Figure 2). The Mediterranean, Central West Pacific, and Central South Pacific DPSs were listed as endangered. The North Atlantic, South Atlantic, Southwest Indian, North Indian, East Indian-West Pacific, Southwest Pacific, Central North Pacific, and East Pacific DPSs were listed as threatened. Only individuals from the South Atlantic DPS and North Atlantic DPS may occur in waters under the purview of the NMFS SE Region, with South Atlantic DPS individuals only expected to occur in the U.S. Caribbean.

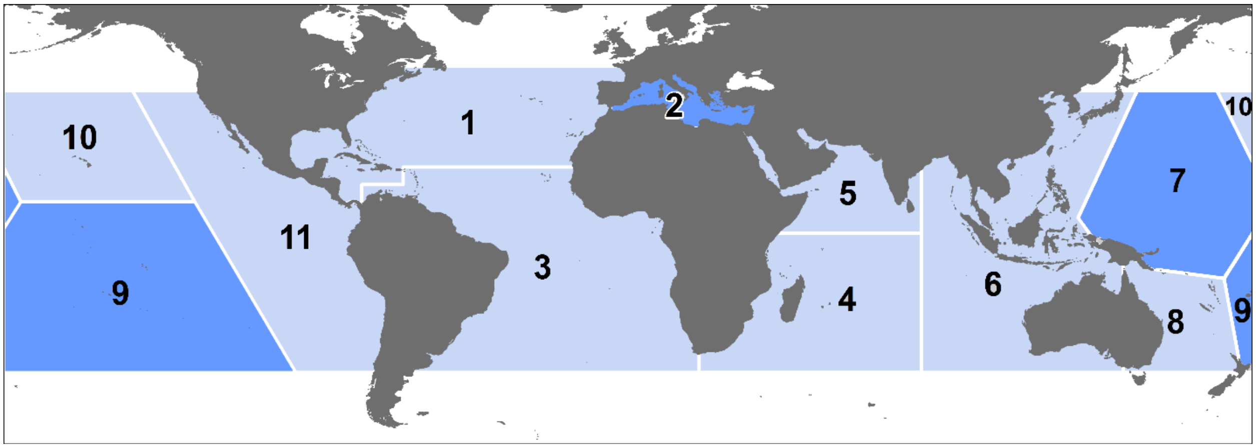

Figure 2. Threatened (light) and endangered (dark) green turtle DPSs: 1. North Atlantic, 2. Mediterranean, 3. South Atlantic, 4. Southwest Indian, 5. North Indian, 6. East Indian-West Pacific, 7. Central West Pacific, 8. Southwest Pacific, 9. Central South Pacific, 10. Central North Pacific, and 11. East Pacific.

Species Description and Distribution

The green sea turtle is the largest of the hardshell marine turtles, growing to a weight of 350 lb (159 kg) with a SCL of greater than 3.3 ft (1 m). Green sea turtles have a smooth carapace with 4 pairs of lateral (or costal) scutes and a single pair of elongated prefrontal scales between the eyes. They typically have a black dorsal surface and a white ventral surface, although the carapace of green sea turtles in the Atlantic Ocean has been known to change in color from solid black to a variety of shades of grey, green, or brown and black in starburst or irregular patterns (Lagueux 2001).

With the exception of post-hatchlings, green sea turtles live in nearshore tropical and subtropical waters where they generally feed on marine algae and seagrasses. They have specific foraging grounds and may make large migrations between these forage sites and natal beaches for nesting (Hays et al. 2001). Green sea turtles nest on sandy beaches of mainland shores, barrier islands, coral islands, and volcanic islands in more than 80 countries worldwide (Hirth 1997). The two largest nesting populations are found at Tortuguero, on the Caribbean coast of Costa Rica (part of the North Atlantic DPS), and Raine Island, on the Pacific coast of Australia along the Great Barrier Reef.

Differences in mitochondrial DNA properties of green sea turtles from different nesting regions indicate there are genetic subpopulations (Bowen et al. 1992; FitzSimmons et al. 2006). Despite the genetic differences, sea turtles from separate nesting origins are commonly found mixed together on foraging grounds throughout the species' range. Limited early information indicated that within U.S. waters benthic juveniles from both the North Atlantic and South Atlantic DPSs may be found on foraging grounds. Two small-scale studies provided an insight into the possible degree of mixing on the foraging grounds. An analysis of cold-stunned green turtles in St. Joseph Bay, Florida (northern Gulf of Mexico) found approximately 4% of individuals came from nesting stocks in the South Atlantic DPS (specifically Suriname, Aves Island, Brazil, Ascension Island, and Guinea Bissau) (Foley et al. 2007). On the Atlantic coast of Florida, a study on the foraging grounds off Hutchinson Island found that approximately 5% of the turtles sampled came from the Aves Island/Suriname nesting assemblage, which is part of the South Atlantic DPS (Bass and Witzell 2000). Available information on green turtle migratory behavior indicates that long distance dispersal is only seen for juvenile turtles. This suggests that larger adult-sized turtles return to forage within the region of their natal rookeries, thereby limiting the potential for gene flow across larger scales (Monzón-Argüello et al. 2010). However, with additional research it has been determined that South Atlantic juveniles are not likely to be occurring in U.S. mainland coastal waters in anything more than negligible numbers. Jensen et al. (2013) indicated that the earlier studies might represent a statistical artifact as they lack sufficient precision, with error intervals that span zero. More recent studies with better rookery baseline representation found negligible (<1%) contributions from the South Atlantic DPS among Texas and Florida Gulf of Mexico juvenile green turtle assemblages (Shamblin et al. 2016, 2018). Finally, an as-yet published genetic analysis of samples from various coastal areas in the Gulf of Mexico and Atlantic has now solidified the conclusion that South Atlantic juveniles represent at best a negligible number of individuals in mainland United States waters (Peter Dutton, SWFSC, pers. comm. April 2022). Therefore, we will not consider South Atlantic DPS individuals when conducting consultations for projects in the waters off the mainland United States.

The North Atlantic DPS boundary is illustrated in Figure 2. Four regions support nesting concentrations of particular interest in the North Atlantic DPS: Costa Rica (Tortuguero), Mexico (Campeche, Yucatan, and Quintana Roo), U.S. (Florida), and Cuba. By far the most important nesting concentration for green turtles in this DPS is Tortuguero, Costa Rica. Nesting also occurs in the Bahamas, Belize, Cayman Islands, Dominican Republic, Haiti, Honduras, Jamaica, Nicaragua, Panama, Puerto Rico, Turks and Caicos Islands, and North Carolina, South Carolina, Georgia, and Texas, U.S.A. In the eastern North Atlantic, nesting has been reported in Mauritania (Fretey 2001).

The complete nesting range of North Atlantic DPS green sea turtles within the southeastern United States includes sandy beaches between Texas and North Carolina, as well as Puerto Rico (Dow et al. 2007; NMFS and USFWS 1991). The vast majority of green sea turtle nesting within the southeastern United States occurs in Florida (Johnson and Ehrhart 1994; Meylan et al. 1995). Principal U.S. nesting areas for green sea turtles are in eastern Florida, predominantly Brevard south through Broward counties.

In U.S. Atlantic and Gulf of Mexico waters, green sea turtles are distributed throughout inshore and nearshore waters from Texas to Massachusetts. Principal benthic foraging areas in the southeastern United States include Aransas Bay, Matagorda Bay, Laguna Madre, and the Gulf inlets of Texas (Doughty 1984; Hildebrand 1982; Shaver 1994), the Gulf of Mexico off Florida from Yankeetown to Tarpon Springs (Caldwell and Carr 1957), Florida Bay and the Florida Keys (Schroeder and Foley 1995), the Indian River Lagoon system in Florida (Ehrhart 1983), and the Atlantic Ocean off Florida from Brevard through Broward Counties (Guseman and Ehrhart 1992; Wershoven and Wershoven 1992). The summer developmental habitat for green sea turtles also encompasses estuarine and coastal waters from North Carolina to as far north as Long Island Sound (Musick and Limpus 1997). Additional important foraging areas in the western Atlantic include the Culebra archipelago and other Puerto Rico coastal waters, the south coast of Cuba, the Mosquito Coast of Nicaragua, the Caribbean coast of Panama, scattered areas along Colombia and Brazil (Hirth 1971), and the northwestern coast of the Yucatán Peninsula.

Life History Information

Green sea turtles reproduce sexually, and mating occurs in the waters off nesting beaches and along migratory routes. Mature females return to their natal beaches (i.e., the same beaches where they were born) to lay eggs (Balazs 1982; Frazer and Ehrhart 1985) every 2-4 years while males are known to reproduce every year (Balazs 1983). In the southeastern United States, females generally nest between June and September, and peak nesting occurs in June and July (Witherington and Ehrhart 1989b). During the nesting season, females nest at approximately 2-week intervals, laying an average of 3-4 clutches (Johnson and Ehrhart 1996). Clutch size often varies among subpopulations, but mean clutch size is approximately 110-115 eggs. In Florida, green sea turtle nests contain an average of 136 eggs (Witherington and Ehrhart 1989b). Eggs incubate for approximately 2 months before hatching. Hatchling green sea turtles are approximately 2 in (5 cm) in length and weigh approximately 0.9 oz (25 g). Survivorship at any particular nesting site is greatly influenced by the level of man-made stressors, with the more pristine and less disturbed nesting sites (e.g., along the Great Barrier Reef in Australia) showing higher survivorship values than nesting sites known to be highly disturbed (e.g., Nicaragua) (Campell and Lagueux 2005; Chaloupka and Limpus 2005).

After emerging from the nest, hatchlings swim to offshore areas and go through a post-hatchling pelagic stage where they are believed to live for several years. During this life stage, green sea turtles feed close to the surface on a variety of marine algae and other life associated with drift lines and debris. This early oceanic phase remains one of the most poorly understood aspects of green sea turtle life history (NMFS and USFWS 2007). Green sea turtles exhibit particularly slow growth rates of about 0.4-2 in (1-5 cm) per year (Green 1993), which may be attributed to their largely herbivorous, low-net energy diet (Bjorndal 1982). At approximately 8-10 in (20-25 cm) carapace length, juveniles leave the pelagic environment and enter nearshore developmental habitats such as protected lagoons and open coastal areas rich in sea grass and marine algae. Growth studies using skeletochronology indicate that green sea turtles in the western Atlantic shift from the oceanic phase to nearshore developmental habitats after approximately 5-6 years (Bresette et al. 2006; Zug and Glor 1998). Within the developmental habitats, juveniles begin the switch to a more herbivorous diet, and by adulthood feed almost exclusively on seagrasses and algae (Rebel 1974), although some populations are known to also feed heavily on invertebrates (Carballo et al. 2002). Green sea turtles mature slowly, requiring 20-50 years to reach sexual maturity (Chaloupka and Musick 1997; Hirth 1997).

While in coastal habitats, green sea turtles exhibit site fidelity to specific foraging and nesting grounds, and it is clear they are capable of “homing in” on these sites if displaced (McMichael et al. 2003). Reproductive migrations of Florida green sea turtles have been identified through flipper tagging and satellite telemetry. Based on these studies, the majority of adult female

Florida green sea turtles are believed to reside in nearshore foraging areas throughout the Florida Keys and in the waters southwest of Cape Sable, and some post-nesting turtles also reside in Bahamian waters as well (NMFS and USFWS 2007).

Status and Population Dynamics

Accurate population estimates for marine turtles do not exist because of the difficulty in sampling turtles over their geographic ranges and within their marine environments. Nonetheless, researchers have used nesting data to study trends in reproducing sea turtles over time. A summary of nesting trends and nester abundance is provided in the most recent status review for the species (Seminoff et al. 2015), with information for each of the DPSs.

The North Atlantic DPS is the largest of the 11 green turtle DPSs, with an estimated nester abundance of over 167,000 adult females from 73 nesting sites. Overall, this DPS is also the most data rich. Eight of the sites have high levels of abundance (i.e., <1000 nesters), located in Costa Rica, Cuba, Mexico, and Florida. Quintana Roo, Mexico, accounts for approximately 11% of nesting for the DPS (Seminoff et al. 2015). In the early 1980s, approximately 875 nests/year were deposited, but by 2000 this increased to over 1,500 nests/year (NMFS and USFWS 2007d). By 2012, more than 26,000 nests were counted in Quintana Roo (J. Zurita, CIQROO, unpublished data, 2013, in Seminoff et al. 2015).

Tortuguero, Costa Rica is by far the predominant nesting site, accounting for an estimated 79% of nesting for the DPS (Seminoff et al. 2015). Nesting at Tortuguero appears to have been increasing since the 1970's, when monitoring began. For instance, from 1971-1975 there were approximately 41,250 average annual emergences documented and this number increased to an average of 72,200 emergences from 1992-1996 (Bjorndal et al. 1999). Troëng and Rankin (2005) collected nest counts from 1999-2003 and also reported increasing trends in the population consistent with the earlier studies, with nest count data suggesting 17,402-37,290 nesting females per year (NMFS and USFWS 2007). Modeling by Chaloupka et al. (2008) using data sets of 25 years or more resulted in an estimate of the Tortuguero, Costa Rica population's growing at 4.9% annually. However, a recent long-term study spanning over 50 years of nesting at Tortuguero found that while nest numbers increased steadily over 37 years from 1971-2008, the rate of increase slowed gradually from 2000-2008. After 2008 the nesting trend has been downwards, with current nesting levels having reverted to that of the mid 1990's and the overall long-term trend has now become negative (Restrepo et al. 2023).

In the continental United States, green sea turtle nesting occurs along the Atlantic coast, primarily along the central and southeast coast of Florida (Meylan et al. 1994; Weishampel et al. 2003). Occasional nesting has also been documented along the Gulf Coast of Florida (Meylan et al. 1995). Green sea turtle nesting is documented annually on beaches of North Carolina, South Carolina, and Georgia, though nesting is found in low quantities (up to tens of nests) (nesting databases maintained on www.seaturtle.org).

Florida accounts for approximately 5% of nesting for this DPS (Seminoff et al. 2015). Modeling by Chaloupka et al. (2008) using data sets of 25 years or more resulted in an estimate of the Florida nesting stock at the Archie Carr National Wildlife Refuge growing at an annual rate of 13.9% at that time. Increases have been even more rapid in recent years. In Florida, index beaches were established to standardize data collection methods and effort on key nesting beaches. Since establishment of the index beaches in 1989, the pattern of green sea turtle nesting has generally shown biennial peaks in abundance with a positive trend during the 10 years of regular monitoring (Figure 3). According to data collected from Florida's index nesting beach survey from 1989-2021, green sea turtle nest counts across Florida have increased dramatically, from a low of 267 in the early 1990s to a high of 40,911 in 2019. Two consecutive years of nesting declines in 2008 and 2009 caused some concern, but this was followed by increases in 2010 and 2011. The pattern departed from the low lows and high peaks in 2020 and 2021 as well, when 2020 nesting only dropped by half from the 2019 high, while 2021 nesting only increased by a small amount over the 2020 nesting, with another increase in 2022 still well below the 2019 high (Figure 3). While nesting in Florida has shown dramatic increases over the past decade, individuals from the Tortuguero, the Florida, and the other Caribbean and Gulf of Mexico populations in the North Atlantic DPS intermix and share developmental habitat. Therefore, threats that have affected the Tortuguero population as described previously, may ultimately influence the other population trajectories, including Florida. Given the large size of the Tortuguero nesting population, which is currently in decline, its status and trend largely drives the status of North Atlantic DPS.

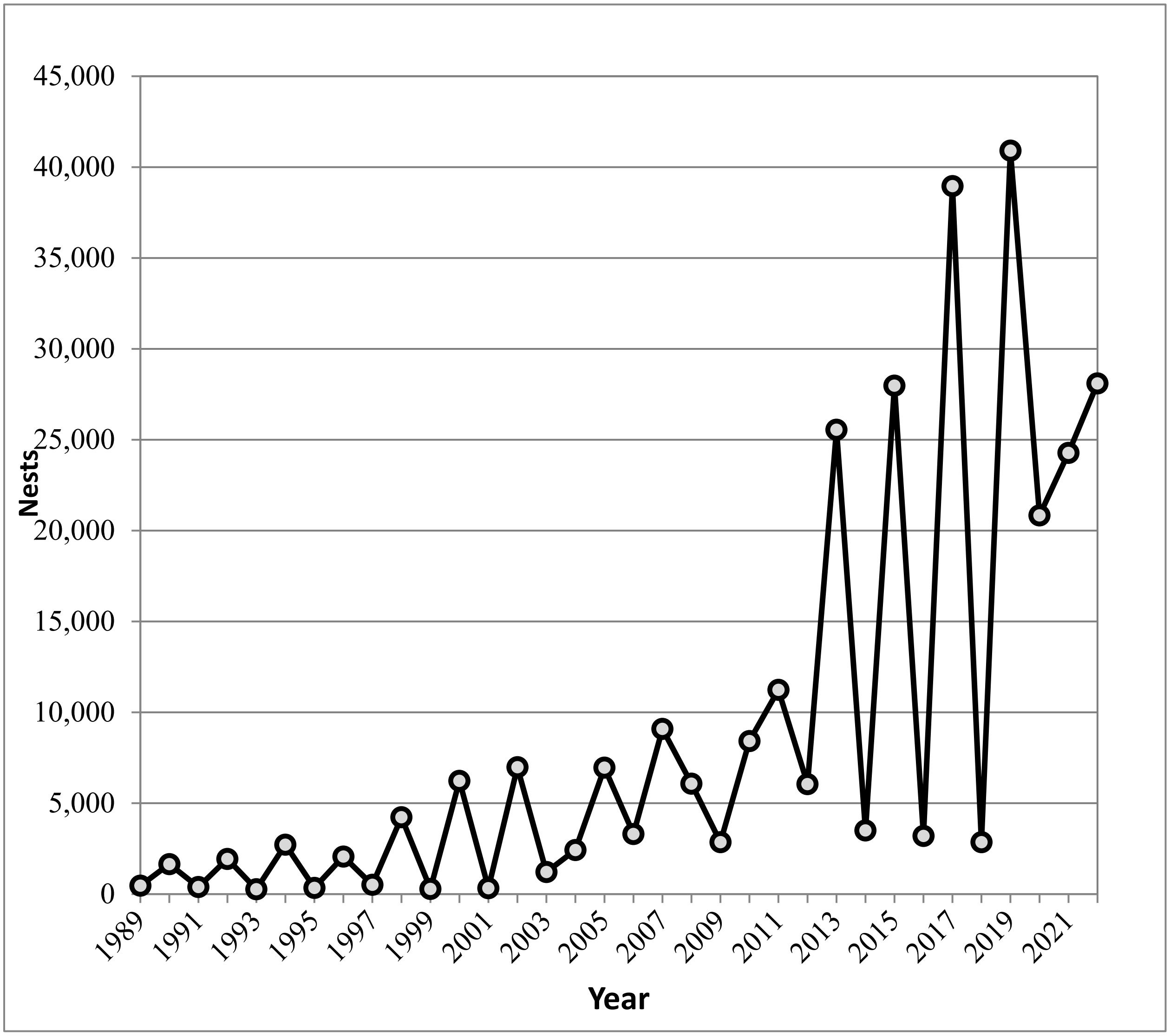

Figure 3. Green sea turtle nesting at Florida index beaches since 1989.

Similar to the nesting trend found in Florida, in-water studies in Florida have also recorded increases in green turtle captures at the Indian River Lagoon site, with a 661 percent increase over 24 years (Ehrhart et al. 2007), and the St Lucie Power Plant site, with a significant increase in the annual rate of capture of immature green turtles (SCL<90 cm) from 1977 to 2002 or 26 years (3,557 green turtles total; M. Bressette, Inwater Research Group, unpubl. data; (Witherington et al. 2006).

Threats

The principal cause of past declines and extirpations of green sea turtle assemblages has been the overexploitation of the species for food and other products. Although intentional take of green sea turtles and their eggs is not extensive within the southeastern United States, green sea turtles that nest and forage in the region may spend large portions of their life history outside the region and outside U.S. jurisdiction, where exploitation is still a threat. Green sea turtles also 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 (e.g., plastics, petroleum products, petrochemicals), ecosystem alterations (e.g., nesting beach development, beach nourishment and shoreline stabilization, vegetation changes), poaching, global climate change, fisheries interactions, natural predation, and disease. A discussion on general sea turtle threats can be found in Section 4.1.

In addition to general threats, green sea turtles are susceptible to natural mortality from Fibropapillomatosis (FP) disease. FP results in the growth of tumors on soft external tissues (flippers, neck, tail, etc.), the carapace, the eyes, the mouth, and internal organs (gastrointestinal tract, heart, lungs, etc.) of turtles (Aguirre et al. 2002; Herbst 1994; Jacobson et al. 1989). These tumors range in size from 0.04 in (0.1 cm) to greater than 11.81 in (30 cm) in diameter and may affect swimming, vision, feeding, and organ function (Aguirre et al. 2002; Herbst 1994; Jacobson et al. 1989). Presently, scientists are unsure of the exact mechanism causing this disease, though it is believed to be related to both an infectious agent, such as a virus (Herbst et al. 1995), and environmental conditions (e.g., habitat degradation, pollution, low wave energy, and shallow water (Foley et al. 2005). FP is cosmopolitan, but it has been found to affect large numbers of animals in specific areas, including Hawaii and Florida (Herbst 1994; Jacobson 1990; Jacobson et al. 1991).

Cold-stunning is another natural threat to green sea turtles. Although it is not considered a major source of mortality in most cases, as temperatures fall below 46.4°-50°F (8°-10°C) turtles may lose their ability to swim and dive, often floating to the surface. The rate of cooling that precipitates cold-stunning appears to be the primary threat, rather than the water temperature itself (Milton and Lutz 2003). Sea turtles that overwinter in inshore waters are most susceptible to cold-stunning because temperature changes are most rapid in shallow water (Witherington and Ehrhart 1989a). During January 2010, an unusually large cold-stunning event in the southeastern United States resulted in around 4,600 sea turtles, mostly greens, found cold-stunned, and hundreds found dead or dying. A large cold-stunning event occurred in the western Gulf of Mexico in February 2011, resulting in approximately 1,650 green sea turtles found cold-stunned in Texas. Of these, approximately 620 were found dead or died after stranding, while approximately 1,030 turtles were rehabilitated and released. During this same time frame, approximately 340 green sea turtles were found cold-stunned in Mexico, though approximately 300 of those were subsequently rehabilitated and released.

Whereas oil spill impacts are discussed generally for all species in Section 4.1, specific impacts of the DWH spill on green sea turtles are considered here. Impacts to green sea turtles occurred to offshore small juveniles only. A total of 154,000 small juvenile greens (36.6% of the total small juvenile sea turtle exposures to oil from the spill) were estimated to have been exposed to oil. A large number of small juveniles were removed from the population, as 57,300 small juveniles greens are estimated to have died as a result of the exposure. A total of 4 nests (580 eggs) were also translocated during response efforts, with 455 hatchlings released (the fate of which is unknown) (DWH Trustees 2015). 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 dispersants, and loss of foraging resources, which could lead to compromised growth and reproductive potential. There is no information currently available to determine the extent of those impacts, if they occurred.

While green turtles regularly use the northern Gulf of Mexico, they have a widespread distribution throughout the entire Gulf of Mexico, Caribbean, and Atlantic, and the proportion of the population using the northern Gulf of Mexico at any given time is relatively low. Although it is known that adverse impacts occurred and numbers of animals in the Gulf of Mexico were reduced as a result of the DWH oil spill of 2010, the relative proportion of the population that is expected to have been exposed to and directly impacted by the DWH event, as well as the impacts being primarily to smaller juveniles (lower reproductive value than adults and large juveniles), reduces the impact to the overall population. It is unclear what impact these losses may have caused on a population level, but it is not expected to have had a large impact on the population trajectory moving forward. However, recovery of green turtle numbers equivalent to what was lost in the northern Gulf of Mexico as a result of the spill will likely take decades of sustained efforts to reduce the existing threats and enhance survivorship of multiple life stages (DWH Trustees 2015).

4.3 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 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 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 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 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 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 nests in Mexico. Following a significant, unexplained 1-year decline in 2010, Kemp's ridley 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). Nesting for 2018 declined to 17,945, with another steep drop to 11,090 nests in 2019 (Gladys Porter Zoo data, 2019), but rebounded in 2020 (18,068 nests), 2021 (17,671 nests), and 2022 (17,418) (CONANP 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 at this time.

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).

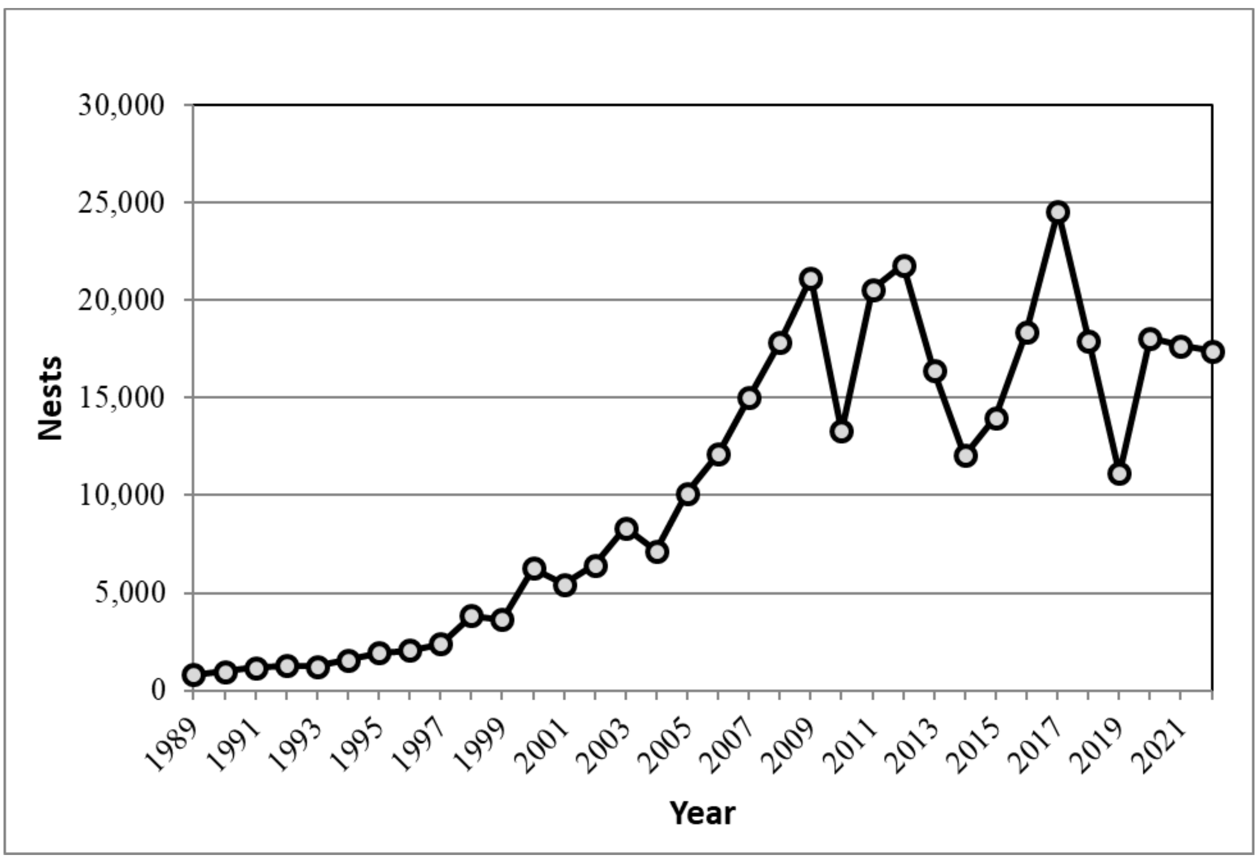

Figure 4. Kemp’s ridley nest totals from Mexican beaches (Gladys Porter Zoo nesting database 2019 and CONANP data 2020-2022).

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; the remainder of this section will expand on a few of the aforementioned threats and how they may specifically impact 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 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 2010's. 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 ridleys 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 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 Kemp's ridley sea turtles (1 sea turtle was an unidentified hardshell turtle). Encountered sea turtles 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 encountered Kemp's ridley sea turtles 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 feet 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, 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 loggerheads, 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 turtles 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 juvenile 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 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 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 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.

4.4 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 29°N; (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 m), (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 in 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 in (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; GADNR, unpublished data; 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.

<u>Peninsular Florida Recovery Unit (PFRU)</u>

The 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, 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 5) (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).

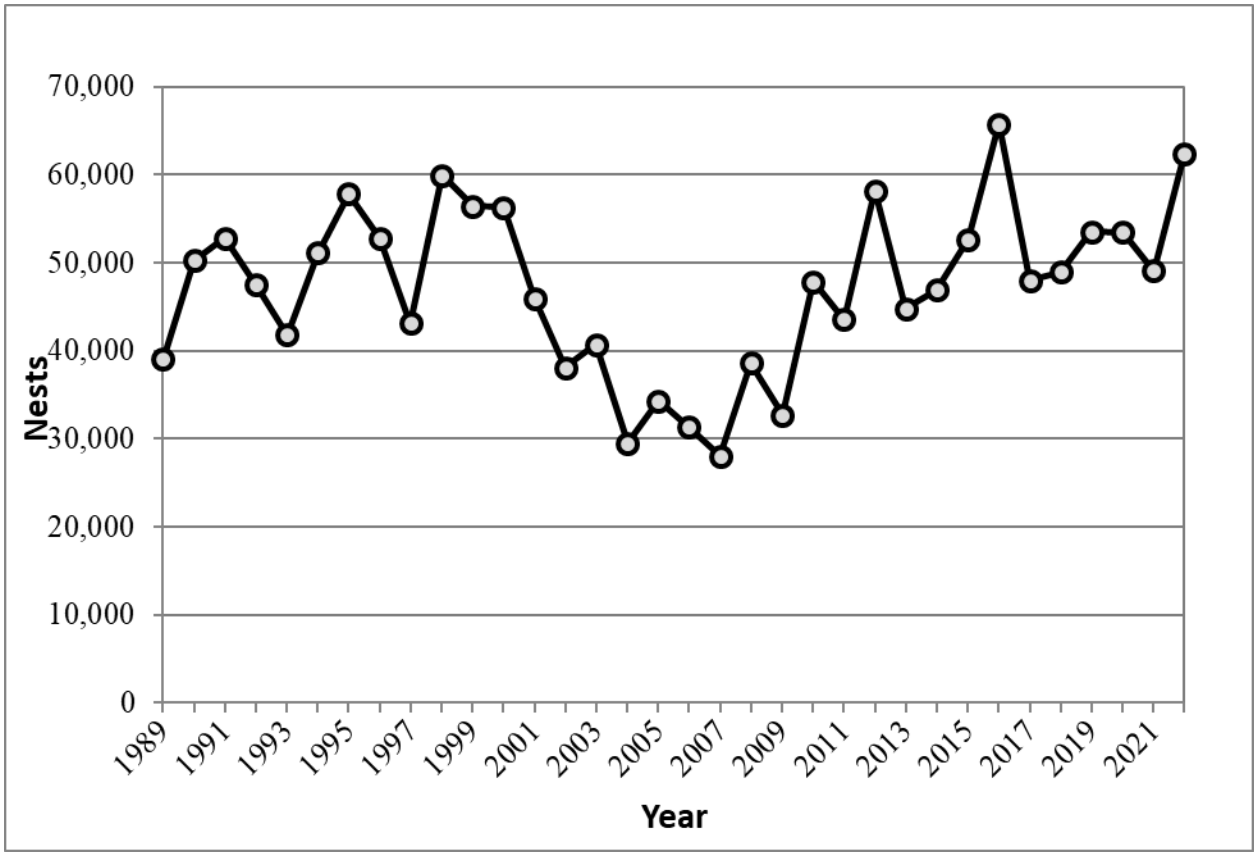

Figure 5. Loggerhead sea turtle nesting at Florida index beaches since 1989.

Northern Recovery Unit (NRU)

Annual nest totals from beaches within the 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 4) 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 4. 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	**3,482**
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 6).

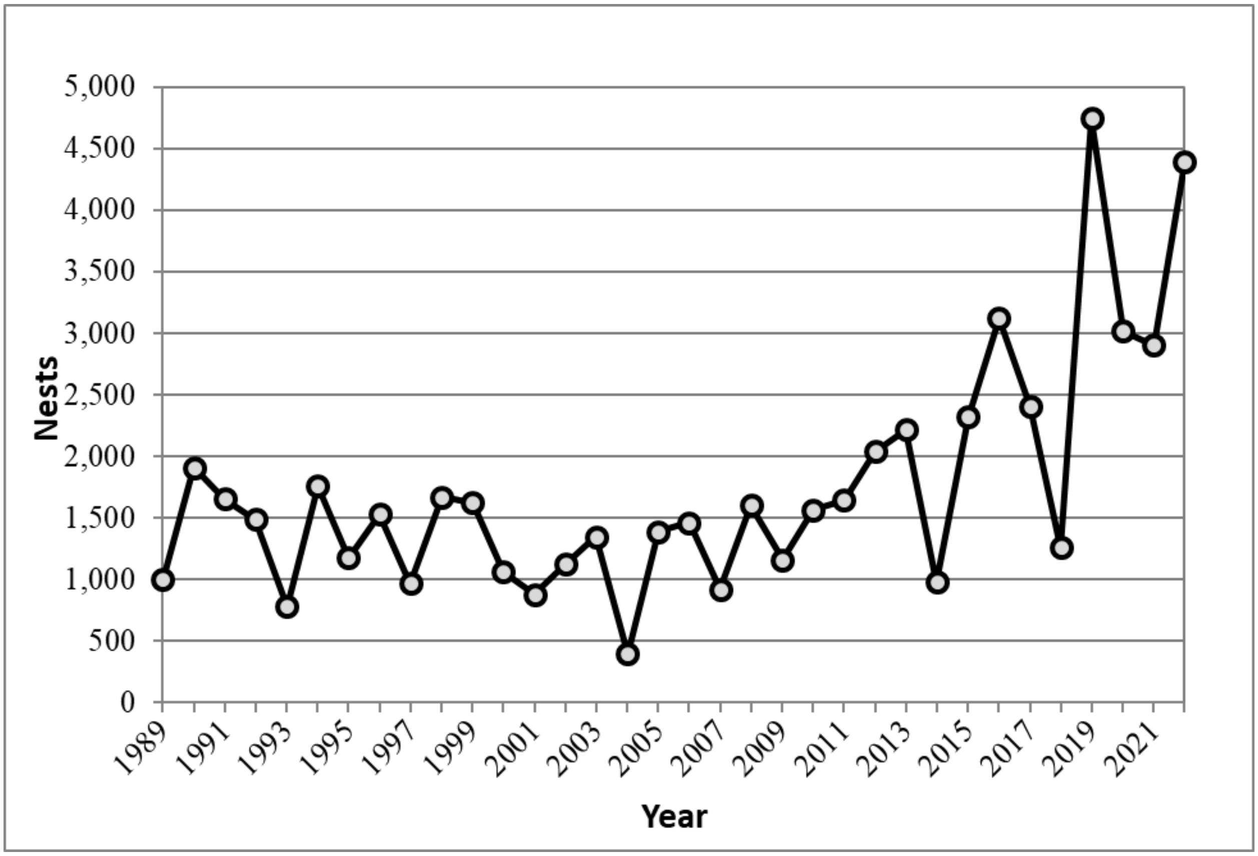

Figure 6. South Carolina index nesting beach counts for loggerhead sea turtles (data provided by SCDNR)

<u>Other Northwest Atlantic DPS Recovery Units</u>

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).

<u>In-water Trends</u>

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 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).

<u>Population Estimate</u>

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. 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, 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, dispersants, or both, and loss of foraging resources which could lead to compromised growth, reproductive potential, or both. 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 NGMRU), 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 NGMRU 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).

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 impacts to listed species or designated critical habitat from Federal agency activities or existing Federal 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

The status of this species in the action area, as well as the threats to this species, is supported by the species accounts in Section 4 (Status of the Species).

As stated in Section 2.2 (Action Area), the proposed action occurs adjacent to the CCSC, approximately 3 mi from the Gulf of Mexico, in Port Aransas, Nueces County, Texas. The project site is includes an undeveloped 15.6-ac upland area and a 2.35-ac nearshore area within water adjacent to the CCSC.

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

5.3.1 Federal Actions

We have undertaken a number of Section 7 consultations to address the effects of federally managed fisheries and other federal actions on threatened and endangered species, and when appropriate, have authorized the incidental taking of these species. Each of those consultations sought to minimize the adverse effects of the action on these affected species. The summary below of federal actions and the effects these actions have had on ESA-listed species includes only those federal actions in the action area, which have already concluded formal or early Section 7 consultation.

Fisheries

Within the action area, both recreational and commercial fisheries occur in state and federal waters. Globally, 6.4 million tons of fishing gear is lost in the oceans every year (Wilcox et al. 2015). Lost traps and disposed monofilament and other fishing lines are a documented source of mortality in sea turtles due to entanglement that may anchor an animal to the bottom. Materials entangled tightly around a body part may cut into tissues, enable infection, and severely compromise an individual's health (Derraik 2002). Entanglements also make animals more vulnerable to additional threats (e.g., predation and vessel strikes) by restricting agility and swimming speed. The majority of ESA-species that die from entanglement in fishing gear likely sink at sea rather than strand ashore, making it difficult to accurately determine the extent of such mortalities.

Fishery interaction remains a major factor in sea turtle recovery and, frequently, the lack thereof. Wallace et al. (2010) estimated that worldwide, 447,000 sea turtles are killed each year from bycatch in commercial fisheries. In the most recent Opinion on the Southeastern U.S. shrimp fisheries, we estimate 17,010 Kemp's ridley, 4,300 loggerhead, 3,400 green, 10 leatherback, and 10 hawksbill sea turtle mortalities over the next 10 years (NMFS 2021); this includes mortalities resulting from bycatch occurring in both state and federal waters. Although TEDs and other bycatch reduction devices have significantly reduced the level of bycatch to sea turtles and other marine species in U.S. waters, mortality still occurs. Giant manta ray are also caught as bycatch in fisheries.

In addition to commercial bycatch, recreational hook-and-line interactions also occur. Stacy et al. (2020) analyzed Texas sea turtle stranding data and determined evidence of fishing tackle/gear hooking injuries and entanglement in stranded turtles varied by species and stranding zone. For instance, evidence of fishing tackle/gear on stranded turtles were documented in 42.6% of stranded green sea turtles in Zone 20 (which includes Aransas Pass), but only 29.8% in Zone 21 to the south (Stacy et al. 2020). The authors concluded that presence of fishing tackle/gear injuries in stranded turtles was directly correlated to the proximity of inlets.

Fisheries in federal waters have been the subject of multiple Section 7 consultations in the action area and beyond. These fisheries include gillnet, longline, other types of hook-and-line gear, trawl gear, and pot fisheries. As described in Section 4 of this Opinion, available information suggests that mobile ESA-listed species can be captured in these gear types when the operation of the gear overlaps with the distribution of the species. For all fisheries for which there is a federal FMP, or for which any federal action has been taken to manage that fishery, impacts have been evaluated under Section 7. Formal Section 7 consultations have been conducted on the following fisheries within the action area: Atlantic shark fisheries, coastal migratory pelagic fisheries, and Southeast shrimp trawl fisheries. None of the consequent biological opinions concluded that the continued existence of any ESA-listed species was likely to be jeopardized or that any designated critical habitat was likely to be adversely modified.

Federal Dredging Activity
Marine dredging vessels are common within U.S. coastal waters, and construction and maintenance of federal navigation channels and dredging in sand mining sites (borrow areas) have been identified as sources of sea turtle and mortality. Hopper dredges are capable of moving relatively quickly compared to sea turtle swimming speed and can thus overtake, entrain, and kill sea turtles as the suction draghead(s) of the advancing dredge overtakes the resting or swimming turtle. Entrained sea turtles rarely survive.

To reduce take of listed species, relocation trawling may be utilized to capture and move sea turtles. In relocation trawling, a boat equipped with nets precedes the dredge to capture sea turtles and then releases the animals out of the dredge pathway, thus avoiding lethal take. Seasonal in-water work periods, when the species is absent from the project area, also assists in reducing incidental take.

Although the underwater noises from dredge vessels are typically continuous in duration (for periods of days or weeks at a time) and strongest at low frequencies, they are not believed to have any long-term effect on sea turtles. In summary, dredging and disposal to maintain navigation channels, and removal of sediments for beach nourishment occurs frequently and throughout the range of sea turtles annually. This activity has, and continues to, threaten the species.

We originally completed regional Opinions on the impacts of USACE's hopper-dredging operation in 2003 for operations in the Gulf of Mexico (i.e., GRBO). We revised the GRBO in 2007 (NMFS 2007a), which 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. The above-listed regional Opinion considers maintenance dredging and sand mining operations.

We have produced numerous other individual, stand-alone Opinions that analyzed the impacts of hopper dredging projects (e.g., navigation channel improvements and beach restoration projects) that did not fall partially or entirely under the scope of actions contemplated by GRBO. Any individual, stand-alone Opinion had its own Incidental Take Statement and determined that hopper dredging during the proposed action would not jeopardize the continued existence of any species of sea turtles or other listed species, or destroy or adversely modify critical habitat of any listed species.

Watercraft are the greatest contributors to overall noise in the sea and have the potential to interact with sea turtles and giant manta ray though 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 and giant manta ray. Potential sources of adverse effects from federal vessel operations in the action area include operations of the BOEM, FERC, USCG, NOAA, and USACE.

Offshore Energy

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, and oil spills. Many Section 7 consultations have been completed on BOEM oil and gas lease activities. Until 2002, these Opinions concluded only 1 sea turtle take may occur annually due to vessel strikes associated with these activities. Through the Section 7 process, where applicable, we have and will continue to establish conservation measures for all these agency vessel operations to avoid or minimize adverse effects to listed species. Subsequent Opinions (e.g., NMFS 2007b) have concluded that sea turtle takes may also result from marine debris and oil spills.

Construction and Operation of USACE-Permitted Fishing Piers

We have consulted with the USACE and FEMA on the construction and operation of a number of fishing piers that may have adverse effects to sea turtles because of the potential impacts of recreational fishing from these piers on these species. For instance, in 2024 we consulted on the reconstruction of the Bob Hall Fishing Pier in Nueces County, Texas, which concluded the action would not jeopardize the continued existence of listed species and provided an Incidental Take Statement allowing the take of 1 green sea turtle [North Atlantic DPS], 1 hawksbill sea turtle,1 loggerhead sea turtle [Northwest Atlantic DPS]), and 9 giant manta ray over any consecutive three-year period. We have conducted other similar pier consultations in Texas and throughout the larger Gulf of Mexico region.

ESA Permits

Regulations developed under the ESA allow for the issuance of permits allowing take of certain ESA-listed species (including sea turtles) for the purposes of scientific research under Section 10(a)(1)(a) of the ESA. Since issuance of the permit is a federal activity, the action must be reviewed for compliance with Section 7(a)(2) of the ESA to ensure that issuance of the permit is not likely to jeopardize the continued existence of the species or result in the adverse modification of its critical habitat. Authorized activities range from photographing, weighing, and tagging sea turtles incidentally taken in fisheries, to blood sampling, tissue sampling (biopsy), and performing laparoscopy on intentionally captured sea turtles. The number of authorized takes varies widely depending on the research and species involved, but may involve the taking of hundreds of sea turtles annually. Most takes authorized under these permits are expected to be (and are) non-lethal.

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 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. Additional discussion on some of these activities follows.

State Fisheries

Various fishing methods used in state commercial and recreational fisheries, including gillnets, fly nets, trawling, pot fisheries, pound nets, and vertical line are all known to incidentally take sea turtles, but information on these fisheries is sparse (NMFS 2001). Most of the 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.

Trawl Fisheries

Trawls used to catch shrimp may interact with sea turtles in state waters. Many of these trawls are seasonally altered to target other species, such as blue crab and sheepshead. At this time, however, we lack sufficient information to quantify the level of anticipated take that may be occurring in non-shrimp trawl fisheries.

Recreational Fishing

Recreational fishing from private vessels may occur in the action area, and these activities may interact with sea turtles and giant manta ray. For example, observations of state recreational fisheries have shown that loggerhead sea turtles are known to bite baited hooks and frequently ingest the hooks. Hooked turtles have been reported by the public fishing from boats, piers, beaches, banks, and jetties and from commercial anglers fishing for reef fish and for sharks with both single rigs and bottom longlines. Additionally, lost fishing gear such as line cut after snagging on rocks, or discarded hooks and line, can also pose an entanglement threat to sea turtles in the action area. A detailed summary of the known impacts of hook-and-line incidental captures to loggerhead sea turtles can be found in the SEFSC TEWG reports (TEWG 1998; TEWG 2000).

Coastal Development

Beachfront development, lighting, and beach erosion control all are ongoing activities along the southeastern U.S. coastline (i.e., 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

In general, marine pollution includes a wide variety of impacts stemming from a diversity of activities and sources. Sources of pollutants within or adjacent to the action area include, but are not limited to, marine debris and plastics, noise pollution from vessel traffic and military training activities, atmospheric loading of pollutants such as PCBs, agricultural and industrial runoff into rivers and canals emptying into bays and the ocean (e.g., Mississippi River into the Gulf of Mexico), 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. An example is the large area of the Louisiana continental shelf with seasonally-depleted oxygen levels (< 2 mg/L) is caused by eutrophication from both point and non-point sources. Most aquatic species cannot survive at such low oxygen levels and these areas are known as "dead zones." The oxygen depletion, referred to as hypoxia, begins in late spring, reaches a maximum in mid-summer, and disappears in the fall. Since 1993, the average extent of mid-summer, bottom-water hypoxia in the northern Gulf of Mexico has been approximately 16,000 km^2, approximately twice the average size measured between 1985 and 1992. The hypoxic zone attained a maximum measured extent in 2002, when it was about 22,000 km^2, which is larger than the state of Massachusetts (Osterman et al. 2008). The 2020 Gulf of Mexico hypoxic zone measured 5,480 km^2 and was the 3rd smallest in the 34-year record of surveys; the 5-year average is now down to 14,007 km^2 (EPA 2020). The hypoxic zone has impacts on the animals found there, including sea turtles, and the ecosystem-level impacts continue to be investigated.

Additional direct and indirect sources of pollution include dredging (i.e., resuspension of pollutants in contaminated sediments), aquaculture, and oil and gas exploration and extraction, each of which can degrade marine habitats used by sea turtles (Colburn et al. 1996) and other listed species. 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. Although these contaminant concentrations do not likely affect the more pelagic waters, 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.

Sea turtles may ingest marine debris, particularly plastics, which can cause intestinal blockage and internal injury, dietary dilution, malnutrition, and increased buoyancy, which, in turn, can result in poor health, reduced growth rates and reproductive output, or death (Nelms et al. 2016). Entanglement in plastic debris (including ghost fishing gear) is known to cause lacerations, increased drag—which reduces the ability to forage effectively or escape threats—and may lead to drowning or death by starvation.

The Gulf of Mexico is an area of high-density offshore oil extraction with chronic, low-level spills and occasional massive spills (e.g., DWH oil spill event). Oil spills can impact wildlife directly through 3 primary pathways: 1) ingestion—when animals swallow oil particles directly or consume prey items that have been exposed to oil; 2) absorption—when animals come into direct contact with oil; and 3) inhalation—when animals breath volatile organics released from oil or from "dispersants" applied by response teams in an effort to increase the rate of degradation of the oil in seawater. Several aspects of sea turtle biology and behavior place them at particular risk, including the lack of avoidance behavior, indiscriminate feeding in convergence zones, and large pre-dive inhalations (Milton et al. 2003). When large quantities of oil enter a body of water, chronic effects such as cancer, and direct mortality of wildlife becomes more likely (Lutcavage et al. 1997). Oil spills in the vicinity of nesting beaches just prior to or during the nesting season could place nesting females, incubating egg clutches, and hatchlings at significant risk (Fritts et al. 1982; Lutcavage et al. 1997). Continuous low-level exposure to oil in the form of tar balls, slicks, or elevated background concentrations also challenge animals facing other natural and anthropogenic stresses. Types of trauma can include skin irritation, altering of the immune system, reproductive or developmental damage, and liver disease (Keller et al. 2004; Keller et al. 2006). Chronic exposure may not be lethal by itself, but it may impair a turtle's overall fitness so that it is less able to withstand other stressors (Milton et al. 2003).

The earlier life stages of living marine resources are usually at greater risk from an oil spill than adults. This is especially true for sea turtle hatchlings, since they spend a greater portion of their time at the sea surface than adults; thus, their risk of exposure to floating oil slicks is increased (Lutcavage et al. 1995). One of the reasons might be the simple effects of scale: for example, a given amount of oil may overwhelm a smaller immature organism relative to the larger adult. The metabolic machinery an animal uses to detoxify or cleanse itself of a contaminant may not be fully developed in younger life stages. Also, in early life stages, animals may contain proportionally higher concentrations of lipids, to which many contaminants such as petroleum hydrocarbons bind. Most reports of oiled hatchlings originate from convergence zones, ocean areas where currents meet to form collection points for material at or near the surface of the water.

Unfortunately, little is known about the effects of dispersants on sea turtles, and such impacts are difficult to predict in the absence of direct testing. While inhaling petroleum vapors can irritate turtles' lungs, dispersants can interfere with lung function through their surfactant (detergent) effect. Dispersant components absorbed through the lungs or gut may affect multiple organ systems, interfering with digestion, respiration, excretion, or salt-gland function, or any combination of these functions—similar to the empirically demonstrated effects of oil alone (Shigenaka et al. 2003). Oil cleanup activities can also be harmful. Earth-moving equipment can dissuade females from nesting and destroy nests, containment booms can entrap hatchlings, and lighting from nighttime activities can misdirect turtles (Witherington 1999).

There are studies on organic contaminants and trace metal accumulation in green and leatherback sea turtles (Aguirre et al. 1994; Caurant et al. 1999; Corsolini et al. 2000). Mckenzie et al. (1999) measured concentrations of chlorobiphenyls and organochlorine pesticides in sea turtles tissues collected from the Mediterranean (Cyprus, Greece) and European Atlantic waters (Scotland) between 1994 and 1996. Omnivorous loggerhead turtles had the highest organochlorine contaminant concentrations in all the tissues sampled, including those from green and leatherback turtles (Storelli et al. 2008). It is thought that dietary preferences were likely to be the main differentiating factor among species. Decreasing lipid contaminant burdens with turtle size were observed in green turtles, most likely attributable to a change in diet with age. Sakai et al. (1995) found the presence of metal residues points for material at or near the surface of the water. Sixty-five of 103 post-hatchling loggerheads in convergence zones off Florida's east coast were found with tar in the mouth, esophagus or stomach (Loehefener et al. 1989). Thirty-four percent of post-hatchlings captured in Sargassum off the Florida coast had tar in the mouth or esophagus and more than 50% had tar caked in their jaws (Witherington 1994). These zones aggregate oil slicks, such as a Langmuir cell, where surface currents collide before pushing down and around, and represents a virtually closed system where a smaller weaker sea turtle can easily become trapped (Carr 1987; Witherington 2002). Lutz and Lutcavage (1989) reported that hatchlings have been found apparently starved to death, their beaks and esophagi blocked with tarballs. Hatchlings sticky with oil residue may have a more difficult time crawling and swimming, rendering them more vulnerable to predation.

Frazier (1980) suggested that olfactory impairment from chemical contamination could represent a substantial indirect effect in sea turtles, since a keen sense of smell apparently plays an important role in navigation and orientation. A related problem is the possibility that an oil spill impacting nesting beaches may affect the locational imprinting of hatchlings, and thus impair their ability to return to their natal beaches to breed and nest (Milton et al. 2003). Whether hatchlings, juveniles, or adults, tar balls in a turtle's gut are likely to have a variety of effects – starvation from gut blockage, decreased absorption efficiency, absorption of toxins, effects of general intestinal blockage (such as local necrosis or ulceration), interference with fat metabolism, and buoyancy problems caused by the buildup of fermentation gases (floating prevents turtles from feeding and increases their vulnerability to predators and boats), among others. Also, trapped oil can kill the seagrass beds that turtles feed upon.

5.3.4 Acoustic Impacts

Acoustic effects are a known impact to ESA-listed sea turtles and they are difficult to measure. Watercraft are the greatest contributors to overall noise in the sea. 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. 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 (i.e., random) events, such as hurricanes, occur in the southeastern U.S., and can affect the action area. These events are by nature unpredictable, and their effect on the recovery of the species is unknown; yet, they have the potential to directly impede recovery if animals die as a result or indirectly if important habitats are damaged. Conversely, these events, such as the record 2020 Atlantic hurricane season, may also result in some benefits to listed species, particularly sea turtles. For example, the impacts of hurricanes may compromise fisheries infrastructure and reduce fishing effort, which may subsequently reduce fishery related bycatch. Other stochastic events, such as a winter cold snap, can injure or kill sea turtles.

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 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.

5.3.7 Conservation and Recovery Actions Shaping the Environmental Baseline

Under Section 6 of the ESA, we may enter into cooperative research and conservation agreements with states to assist in recovery actions of listed species. We have agreements with all states in the action area for sea turtles.

Along with cooperating states, we have established an extensive network of STSSN participants along the Atlantic and Gulf of Mexico coasts that not only collect data on dead sea turtles, but also rescue and rehabilitate any live stranded sea turtles. The network, which includes federal, state and private partners, encompasses the coastal areas of the 18-state region from Maine to Texas, and includes portions of the U.S. Caribbean. Data are compiled through the efforts of network participants who document marine turtle strandings in their respective areas and contribute those data to the centralized STSSN database

We published a final rule (66 FR 67495, December 31, 2001) detailing handling and resuscitation techniques for sea turtles that are incidentally caught during scientific research or fishing activities. Persons participating in fishing activities or scientific research are required to handle and resuscitate (as necessary) sea turtles as prescribed in the final rule. These measures help to prevent mortality of hard-shelled turtles caught in fishing or scientific research gear.

A final rule (70 FR 42508) published on July 25, 2005, allows any of our agents or employees, the USFWS, the USCG, or any other federal land or water management agency, or any agent or employee of a state agency responsible for fish and wildlife, when acting in the course of his or her official duties, to take endangered sea turtles encountered in the marine environment if such taking is necessary to aid a sick, injured, or entangled endangered sea turtle, or dispose of a dead endangered sea turtle, or salvage a dead endangered sea turtle that may be useful for scientific or educational purposes. We already afford the same protection to sea turtles listed as threatened under the ESA (50 CFR 223.206(b)).

Other Actions

We helped to complete 5-year status reviews for green (NMFS and USFWS 2007), Kemp's ridley (NMFS and USFWS 2015), and loggerhead (NMFS and USFWS 2023) sea turtles. These reviews were conducted to comply with the ESA mandate for periodic status evaluation of listed species to ensure that their threatened or endangered listing status remains accurate. Each review determined that no delisting or reclassification of a species status (i.e., threatened or endangered) was warranted at this time.

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 but that are not part of the 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. Where data are limited or equivocal, we have occasionally needed to make reasonable determinations based upon our best professional judgment to bridge the gap in the available data. 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 all instances the approach to our analysis is explained, including how uncertainty, causation, and the choice among a range of values are evaluated and addressed.

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

Routes of effects that are not likely to adversely affect green (North Atlantic DPS), Kemp's ridley, and loggerhead (Northwest Atlantic DPS) sea turtles were evaluated and discussed in Section 3.1.2.

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

The proposed project includes the construction of a new marina. The proposed project will result in a total of 299 new wet slips and dry storage for up to 120 vessels. Vessel sizes accommodated by the new marina range between 10 and 130 ft in length. A maximum of 21 wet slips will accommodate vessels greater than 50 ft in length and up to 130 ft in length, with most wet slips accommodating vessels less than 50 ft in length. Dry storage will accommodate vessels ranging in size between 12 ft and 40 ft long.

Vessel traffic, both recreational and commercial, has been documented to adversely affect protected species such as sea turtles. Sea turtles may spend a considerable amount of time on or near the surface of the water, which introduces the potential risk of collision from vessel traffic. The potential threat moving vessels pose to sea turtles (e.g., vessel strikes) is not constant and is spatially and temporally variable influenced by vessel type, vessel speed, and environmental conditions such as sea state and visibility (Barnette 2018).

To estimate the potential number and frequency of vessel strikes of ESA-listed sea turtles resulting from the proposed action, we use Barnette (2018) as a framework for our calculations. First, we looked at the STSSN data series from 1981 to 2023 – which we believe is the best dataset available – for the total number of reported strandings of sea turtles exhibiting Vessel Strike Injury in fishery statistical Zone 20. The data shows a total of 979 sea turtle strandings with evidence of Vessel Strike Injury between 1981 and 2023. Based on this stranding data, an average of 24 sea turtles per year were calculated to have been injured or killed due to vessel strikes (979 sea turtles ÷ 42 years = 23.31; rounded up to 24). This may be an under-representation to some degree, as a number of sea turtles struck by vessels will not be recorded in the stranding database because they sink and never wash ashore.

Next, we determined the maximum projected total of potential vessel trips in the action waters during the course of a year. In 2023, 9,244 pleasure and commercial vessels were registered in Nueces County, Texas (https://data.texas.gov/dataset/Registered-Boats/v2f5-4wth/about_data, queried by consulting biologist on July 8, 2024). Barnette (2018) discusses only Florida-specific data for vessel use patterns and estimated vessels trips per year to calculate the probability for vessel strikes of sea turtles. The best available data we have for vessel use patterns in the action area are several studies and surveys conducted on coastal recreational boat fishing and saltwater boat fishing in coastal Texas (Goode 1980; Ferguson and Green 1987; Warren et al. 1994; Wilemon et al. 1995; Kyle 2013). We use the more finite "fishing trips" calculated in these studies as a proxy for the greater universe of "vessel trips", for vessel activity originating from the new Port Aransas Marina.

Corpus Christi, the metropolitan area that includes Port Aransas, is where the second-highest percentage of saltwater anglers reside in Texas and supports the second-highest number of reported saltwater fishing trips (Kyle 2013). Further, Corpus Christi is where the most private-boat fishing pressure originates for Texas State waters and the EEZ (Warren et al. 1994). Galveston Bay, overall, reported the highest percentage of saltwater anglers and number of reported saltwater fishing trips (Kyle 2013). Ferguson and Green (1987) also calculated that 25-30% of registered Texas boat owners who use their boats for saltwater fishing originated from private residences and marina wet slips, and 60-65% originated from public and commercial boat ramps.

Goode (1980) determined that Galveston Bay was reported as initiating the highest volume of boat trips with over 430,000 annual recreational vessel trips. Additionally, the months of June, July, August, and September exhibited the highest reported use of coastal waters during the course of year (Goode 1980). Wileman et al. (1995) estimated a mean number of annual fishing trips to Galveston Bay of 15.98 trips, with recreational fishing pressure at Galveston Bay sites estimated to be 362,270 individual vessel trips per year.

Because we do not have data on vessel use patterns specific to the action area, we use the information presented in the studies for coastal fishing in Galveston Bay, above, as a proxy as it is the best available to NMFS. First, we calculate an average number of vessel trips per month using the Wileman et al. (1995) estimated mean number of annual fishing trips to Galveston Bay. We use the values presented in Wileman et al. (1995) because they are the most recent, and include an estimate for the number of fishing trips per year, which we can use to calculate the number of vessel trips per month.

15.98 fishing trips per year ÷ 12 months per year = 1.332 fishing trips per month

Additionally, Galveston Bay experiences an estimated 362,270 individual vessel trips per year (Wileman et al. 1995), and we would expect the same for the action area based on the coastal location and the information presented in Kyle (2013), which characterizes the reported number of saltwater fishing trips for Corpus Christi.

Using the average number of vessel trips per month for Galveston Bay (i.e., 1.332), we can calculate the anticipated increase in recreational vessel traffic in the action area with the construction of the new marina. The proposed action will result in 419 new vessel slips, and we assume that the new marina will operate at its full, proposed capacity.

1.332 vessel trips per month × (299 new wet slips + 120 dry slips) × 12 months/year = 6,697 new vessel trips per year for the new marina

We next assess the risk of a single vessel trip resulting in a strike of a sea turtle. Barnette (2018) assumed that each vessel trip possesses the same likelihood of resulting in a sea turtle strike. Utilizing the calculated average of 24 vessel strikes per year based on documented strandings data for Zone 20 and the average number of vessel trips Galveston Bay calculated by Wileman et al. (1995), we can calculate the frequency with which a vessel strike of a sea turtle may occur.

362,270 estimated individual vessel trips per year for Galveston Bay ÷ 24 average vessel strike strandings per year = 1 sea turtle vessel strike occurring every 15,095 vessel trips per year

Based on the annual average of 15.98 fishing trips per boater (Wileman et al. 1995), an average boater originating from the new marina would strike a sea turtle every 419 years (i.e., 6,697 vessel trips per year ÷ 15.98 vessel trips per boater).

Barnette (2018) also considered how to account for under-reporting of vessel strikes in stranding records due to carcasses not washing ashore. Epperly et al. (1996) evaluated beach strandings in North Carolina as an indicator of at-sea mortality of sea turtles in the summer flounder fishery. Assuming all strandings were fishery-related, Epperly et al. (1996) concluded only 7-13% of estimated fishery-induced mortalities appeared in stranding records. Because Epperly et al. (1996) is the only available data on unreported fishery strandings, we use these percentages to calculate a new total average number of vessel strikes of sea turtles per year.

Therefore, extrapolating out the estimated average of 24 annual vessel strikes to account for bias in stranding records yields a new estimated total average of 184-342 sea turtles (reported + unreported) subjected to vessel strikes annually (i.e., 24 vessel strikes per year ÷ 0.13 = 184 vessel strikes per year; 24 vessel strikes per year ÷ 0.07 = 342 vessel strikes per year). We then use this range of new averages, which accounts for under-reporting of sea turtle strandings, to determine the estimated potential for individual vessel strikes of sea turtles within the action area. Using this range of estimated average number of vessel strikes per year coupled with the estimated annual vessel trip total for Galveston Bay results in a vessel strike occurring anywhere between every 1,059 and 1,969 vessel trips per year on average.

362,270 vessel trips per year ÷ 184 vessel strikes per year = 1 sea turtle vessel strike occurring every 1,969 vessel trips per year.

362,270 vessel trips per year ÷ 342 vessel strikes per year = 1 sea turtle vessel strike occurring every 1,059 vessel trips per year.

Finally, we use the range of vessel strike occurrences (i.e., 1,059 and 1,969 vessel trips per year on average) and the estimated net total of 6,697 new vessel trips per year for the new marina to calculate potential sea turtle vessel strike mortalities per year.

6,697 vessel trips per year from new marina ÷ 1,059 vessel trips per year per sea turtle mortality = 6.32 sea turtle vessel strike mortalities per year from new marina

6,697 vessel trips per year from new marina ÷ 1,969 vessel trips per year per sea turtle mortality = 3.40 sea turtle vessel strike mortalities per year from new marina

Rounding up these totals to the nearest whole number, we estimate that a minimum of 4 new vessel strike mortalities and a maximum of 7 new vessel strike mortalities of sea turtles will occur each year of operation of the new marina. To determine how many of each ESA-listed sea turtle species present within the action area will comprise these vessel strike mortalities, we looked at the STSSN Inshore and Offshore Data for all activities in Zone 20 (1981-2023; Table 3).

Table 5. Summary of STSSN Inshore and Offshore Data for Zone 20 and Nueces County, Texas (1981-2023).

Sea Turtle Species	Number of Known Sea Turtles Stranded or Salvaged Exhibiting Vessel Strike Injury
Green Sea Turtle	739
Kemp's Ridley Sea Turtle	94
Leatherback Sea Turtle	14
Loggerhead Sea Turtle	110
Hawksbill Sea Turtle	17
Unknown Species	5
Total	**979**

Of the ESA-listed sea turtles within the STSSN Zone 20 data identifiable to species that may be adversely affected by the proposed action, 75.49% were green (n=739), 9.60% were Kemp's ridley (n=94), and 11.24% were loggerhead (n=110). (As discussed in Section 3.1.2 and shown in Table 5 above, the number of documented hawksbill (n=17 (1.74%)) and leatherback (n=14 (1.43%)) sea turtle vessel strikes in Zone 20 is negligible – supporting our determination that these two species are not likely to be adversely affected by the proposed action.) We will assume this is the same potential species composition for future vessel strike mortalities resulting from vessels originating from the proposed new marina because this is the best available data regarding the relative abundance of sea turtles that may be affected by vessel strikes in the action area.

Table 6 estimates the maximum number of vessel strike mortalities by sea turtle species for any year based on our calculations for estimated vessel strike mortalities, above. To capture whole animals, numbers of vessel strike mortalities are rounded up to the nearest whole number. While this results in an increase in the total number of sea turtles, compared to what is presented in the non-species-specific total estimate, above, this approach ensures that we are adequately analyzing the effects of the proposed action on whole animals, and that impacts from the proposed action can be more easily tracked.

Table 6. Estimated Vessel Strike Mortalities of Sea Turtle Species per Year

Species	Vessel Strike Mortalities per Year
Green sea turtle (North Atlantic DPS)	6 (7 × 0.7549 = 5.284)
Kemp's ridley sea turtle	1 (7 × 0.0960 = 0.6720)
Loggerhead sea turtle (Northwest Atlantic DPS)	1 (7 × 0.1124 = 0.7868)

For the reasons discussed above, vessel strikes resulting from the proposed action are likely to adversely affect green sea turtle (North Atlantic DPS), Kemp's ridley sea turtle, and loggerhead sea turtle (Northwest Atlantic DPS).

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.

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 green (North Atlantic DPS), Kemp's ridley, and loggerhead (Northwest Atlantic DPS) sea turtles. 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 4.0), the Environmental Baseline (Section 5.0), and the Cumulative Effects (Section 7.0), 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.

8.1.1 Green Sea Turtle (North Atlantic DPS)

As discussed in Section 4.3, only individuals from the North Atlantic DPS and South Atlantic DPS may occur in waters under the purview of the NMFS Southeast Region, with South Atlantic DPS individuals only expected to occur in the U.S. Caribbean. The action area is located adjacent to the CCSC, approximately 3 mi from the Gulf of Mexico, in Port Aransas, Nueces County, Texas; therefore, only individuals from the North Atlantic DPS are expected to be present. The proposed action may result in the lethal take of 4 green sea turtles from the North Atlantic DPS each year.

Survival
The potential lethal take of up to 6 green sea turtles from the North Atlantic DPS resulting from vessel strikes each year would reduce the species' population compared to the number that would have been present in the absence of the proposed action, assuming all other variables remained the same. A lethal take could also result in a potential reduction in future reproduction, assuming that at least some of the individuals taken are female and would have survived to reproduce in the future. For example, as discussed above, an adult green sea turtle can lay 3-4 clutches of eggs every 2-4 years, with approximately 110-115 eggs/nest, of which a small percentage is expected to survive to sexual maturity. Because of the location of the proposed project (i.e., not adjacent to a nesting beach) and because green sea turtles from the North Atlantic DPS generally have large ranges, 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. The North Atlantic DPS is the largest of the 11 green turtle DPSs, with an estimated nester abundance of over 167,000 adult females from 73 nesting sites (Seminoff et al. 2015). Tortuguero, Costa Rica is by far the predominant nesting site, accounting for an estimated 79% of nesting for the DPS (Seminoff et al. 2015). A recent long-term study spanning over 50 years of nesting at Tortuguero found that while nest numbers increased steadily over 37 years from 1971-2008, the rate of increase slowed gradually from 2000-2008. After 2008, the nesting trend has been downwards, with current nesting levels having reverted to that of the mid-1990's, and the overall long-term trend has now become negative (Restrepo, et al. 2023). Given the large size of the Tortuguero nesting population, which is currently in decline, its status and trend largely drives the status of North Atlantic DPS. Since we anticipate 6 vessel strike mortalities each year, which is only a small fraction of the reduced but still large overall nesting population, and we have no reason to believe nesting females will be disproportionately affected, we believe the potential mortality associated with the proposed action will have no detectable effect on current nesting trends.

Since we do not anticipate the proposed action will have any detectable impact on the population overall, or current nesting trends, we do not believe the proposed action will cause an appreciable reduction in the likelihood of survival of this species in the wild.

Recovery
The North Atlantic DPS of green sea turtles does not have a recovery plan separate from the existing Atlantic Recovery Plan for the population of Atlantic green sea turtles (NMFS and USFWS 1991). Because animals within the North Atlantic DPS all occur in the Atlantic Ocean and would be subject to the recovery actions described in that plan, we believe it is appropriate to continue using that Recovery Plan as a guide until a new plan, specific to the North Atlantic DPS, is developed. The Atlantic Recovery Plan lists the following relevant recovery objectives over a period of 25 continuous years:

> *Objective:* *The level of nesting in Florida has increased to an average of 5,000 nests per year for at least 6 years.*
>
> *Objective:* *A reduction in stage class mortality is reflected in higher counts of individuals on foraging grounds.*

According to data collected from Florida's index nesting beach survey from 1989-2021, green sea turtle nest counts across Florida have increased dramatically, from a low of 267 in the early 1990s to a high of 40,911 in 2019. Two consecutive years of nesting declines in 2008 and 2009 caused some concern, but this was followed by increases in 2010 and 2011. The pattern departed from the low lows and high peaks in 2020 and 2021 as well, when 2020 nesting only dropped by half from the 2019 high, while 2021 nesting only increased by a small amount over the 2020 nesting, with another increase in 2022 still well below the 2019 high. This overall increasing trend in nesting at Florida's index beaches indicates that the first listed recovery objective is being met. There are no estimates specifically addressing changes in abundance of individuals on foraging grounds currently available. Given the clear increases in nesting, however, it is likely that numbers on foraging grounds have also increased, consistent with the criteria of the second listed recovery objective.

The potential lethal take of up to 6 green sea turtles from the North Atlantic DPS each year resulting from vessel strike mortalities will cause a reduction in numbers when it occurs. This take is unlikely to have any detectable influence on the recovery objectives and trends noted above, and will not result in an appreciable reduction in the likelihood of North Atlantic DPS green sea turtles' recovery in the wild even when considered in the context of the of the Status of the Species and the Environmental Baseline discussed in this Opinion.

Conclusion
The lethal take of 6 green sea turtles from the North Atlantic DPS each year resulting from vessel strike mortalities is not expected to cause an appreciable reduction in the likelihood of either the survival or recovery of the North Atlantic DPS of green sea turtle in the wild.

8.1.2 Kemp's Ridley Sea Turtles

The proposed action may result in the lethal take of 1 Kemp's ridley sea turtle each year.

Survival

The potential lethal take of up to 1 Kemp's ridley sea turtle each year resulting from vessel strike mortalities would reduce the species' population compared to the number that would have been present in the absence of the proposed action, assuming all other variables remained the same. The TEWG (1998b) estimates age at maturity from 7-15 years, females return to their nesting beach about every 2 years. The mean clutch size for Kemp's ridley sea turtle is 100 eggs/nest, with an average of 2.5 nests/female/season. As a result, lethal take could also result in a potential reduction in future reproduction, assuming at least some of the individuals lethally taken are female and would have otherwise survived to reproduce in the future. The loss of 1 Kemp's ridley sea turtle could preclude the production of hundreds of eggs and hatchlings, of which a fractional percentage would be expected to survive to sexual maturity. Thus, the death of any female would eliminate their contribution to future generations, and result in a reduction in sea turtle reproduction. Because of the location of the proposed project (i.e., not adjacent to a nesting beach) and because Kemp's ridley sea turtles generally have large ranges, no reduction in the distribution is expected from the take of these individuals over the life of the proposed action.

In the absence of any total population estimates for Kemp's ridley sea turtle, nesting trends are the best proxy for estimating population changes. Following a significant, unexplained 1-year decline in 2010, Kemp's ridley sea turtle nests in Mexico reached a record high of 21,797 in 2012 (Gladys Porter Zoo nesting database 2013). There was a second significant decline in Mexico nests 2013 through 2014; however, nesting in Mexico has increased 2015 through 2017 (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, followed by another decline to 11,090 in 2019 (Gladys Porter Zoo 2019). Nesting numbers rebounded in 2020 (18,068 nests), 2021 (17,671 nests), and 2022 (17,418) (CONAMP data, 2022).

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 [NPS data]. Nesting in Texas has 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 2015-2017, and then a drop back down to 190 nests in 2019. Numbers rebounded again in 2020 with 262 nests, dropped in 2021 to 195 nests, then rebounded to 284 nests in 2022 (National Park Service data).

Given the 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 increase in Kemp's ridley sea turtles. With the recent increase in nesting data (2015-17) and recent declining numbers of nesting females (2013-14 and 2018-19), it is too early to tell whether the long-term trend line is affected. Recent years have seen nesting data plateau, and it is unknown whether the population is stabilizing or is likely to increase again.

While it is clear that the population has increased over the long-term, the future trajectory of nesting trends is unclear. We anticipate 1 vessel strike mortality of Kemp's ridley sea turtles each year, which is only a small fraction of the oscillating but still large overall nesting population, and we have no reason to believe nesting females will be disproportionately affected. We believe the potential mortality associated with the proposed action will have no detectable effect on current nesting trends.

Since we do not anticipate the proposed action will have any detectable impact on the population overall, or current nesting trends, we do not believe the proposed action will cause an appreciable reduction in the likelihood of survival of this species in the wild.

Recovery
As to whether the proposed action 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:

> *Objective: A population of at least 10,000 nesting females in a season (as measured by clutch frequency/female/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.*

With respect to this recovery objective, the most recent nesting numbers in 2022 indicate there were a total of 17,418 nests on the main nesting beaches in Mexico. This number represents approximately 4,436 nesting females for the season based on 2.5 clutches/female/season. Although there has been a substantial increase in the Kemp's ridley population within the last few decades, the number of nesting females is still below the number of 10,000 nesting females per season required for downlisting (NMFS and USFWS 2015). Since we concluded that the potential loss of up to 1 Kemp's ridley sea turtle each year is not likely to have any detectable effect on nesting trends, we do not believe the proposed action will impede the progress toward achieving this recovery objective. Thus, we believe the proposed action will not result in an appreciable reduction in the likelihood of Kemp's ridley sea turtles' recovery in the wild.

Conclusion
The lethal take of 1 Kemp's ridley sea turtles each year resulting from vessel strike mortality 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.

8.1.3 Loggerhead Sea Turtles

The proposed action may result in the lethal take of 1 loggerhead sea turtle in the Northwest Atlantic DPS each year.

Survival
The potential lethal take of up to 1 loggerhead sea turtle in the Northwest Atlantic DPS each year resulting from vessel strike mortalities would reduce the species' population compared to the number that would have been present in the absence of the proposed action, assuming all other

variables remained the same. A lethal take could also result in a potential reduction in future reproduction, assuming at least some of the individuals taken are female and would have survived to reproduce in the future. For example, an adult female loggerhead sea turtle can lay approximately 4 clutches of eggs every 3 years, with 100-126 eggs per clutch. While we have no reason to believe the proposed action will disproportionately affect females, the loss of even 1 adult female could preclude the production of thousands of eggs and hatchlings of which a small percentage would be expected to survive to sexual maturity. Because of the location of the proposed project (i.e., not adjacent to a nesting beach) and because loggerhead sea turtles generally have large ranges, no reduction in the distribution is expected from the take of these individuals over the life of the proposed action.

Whether the reductions in loggerhead sea turtle numbers and reproduction attributed to the proposed action would appreciably reduce the likelihood of survival depends on what effect these reductions in numbers and reproduction would have on overall population sizes and trends (i.e., whether the estimated reductions, when viewed within the context of the environmental baseline, the status of the species and cumulative effects, are of such an extent that adverse effects on population dynamics are appreciable). In Section 4.4, we reviewed the status of this species in terms of nesting and female population trends and several assessments based on population modeling (i.e., Conant et al. 2009; NMFS 2009). Below we synthesize what that information means both in general terms and the more specific context of the proposed action.

Loggerhead sea turtles are a slow growing, late-maturing species. Because of their longevity, loggerhead sea turtles require high survival rates throughout their life to maintain a population. In other words, late-maturing species cannot tolerate much anthropogenic mortality without going into decline. Conant et al. (2009) concluded loggerhead natural growth rates are small, natural survival needs to be high, and even low- to moderate mortality can drive the population into decline. Because recruitment to the adult population is slow, population modeling studies suggest even small increased mortality rates in adults and subadults could substantially impact population numbers and viability (Chaloupka and Musick 1997; Crouse et al. 1987; Crowder et al. 1994; Heppell et al. 1995).

NMFS (2009) estimated the minimum adult female population size for the Northwest Atlantic DPS in the 2004-2008 timeframe to likely be between approximately 20,000-40,000 individuals (median 30,050), with a low likelihood of being as many as 70,000 individuals. Another estimate for the entire western North Atlantic population was a mean of 38,334 adult females using data from 2001-2010 (Richards et al. 2011). A much less robust estimate for total benthic females in the western North Atlantic was also obtained, with a likely range of approximately 30,000-300,000 individuals, up to less than 1 million.

NMFS (2011) preliminarily estimated the loggerhead population in the Northwestern Atlantic Ocean along the continental shelf of the Eastern Seaboard during the summer of 2010 at 588,439 individuals (estimate ranged from 381,941 to 817,023) based on positively identified individuals. The NMFS-NEFSC's point estimate increased to approximately 801,000 individuals when including data on unidentified sea turtles that were likely loggerheads. The NMFS-NEFSC (2011) underestimates the total population of loggerheads since it did not include Florida's east coast south of Cape Canaveral or the Gulf of Mexico, which are areas where large numbers of loggerheads are also expected. In other words, it provides an estimate of a subset of the entire population.

Florida accounts for more than 90% of U.S. loggerhead nesting. 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).

However, since we anticipate 1 vessel strike mortality each year, which is only a small fraction of the reduced but still large overall nesting population, and we have no reason to believe nesting females will be disproportionately affected, we believe the potential mortality associated with the proposed action will have no detectable effect on current nesting trends.

Since we do not anticipate the proposed action will have any detectable impact on the population overall, or current nesting trends, we do not believe the proposed action will cause an appreciable reduction in the likelihood of survival of the Northwest Atlantic DPS of the loggerhead sea turtle in the wild.

Recovery

The loggerhead recovery plan for the Northwest Atlantic population of loggerhead sea turtles defines the recovery goal as "…ensur[ing] that each recovery unit meets its Recovery Criteria alleviating threats to the species so that protection under the ESA is no longer necessary" (NMFS and USFWS 2008). The plan then identifies 13 recovery objectives needed to achieve that goal. The recovery plan for the Northwest Atlantic population of loggerhead sea turtles (NMFS and USFWS 2008) lists the following recovery objectives that are relevant to the effects of the proposed action:

> *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.

The recovery plan anticipates that, with implementation of the plan, the western North Atlantic population will recover within 50-150 years, but notes that reaching recovery in only 50 years would require a rapid reversal of the then-declining trends of the NRU, PFRU, and NGMRU. 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 (NMFS and USFWS 2008).

Nesting trends in most recovery units have been significantly increasing over several years. We do not believe the proposed action impedes the progress of the recovery program or achieving the overall recovery strategy because the amount of take expected to occur over a 150-year time period, as a result of the proposed action is not expected to be detectable on a population level or on nesting trends, and therefore it is not expected to affect population growth over the timeframe analyzed. We also indicated that the lethal take of 1 loggerhead sea turtle in the Northwest Atlantic DPS each year is minimal in relation to the overall population, and it would not impede achieving the Recovery Objectives, even when considered in the context of the Status of the Species and the Environmental Baseline discussed in this Opinion. We believe this is true for both nesting and juvenile in-water populations. For these reasons, we do not believe the proposed action will impede achieving the recovery objectives or overall recovery strategy.

Conclusion
The lethal take of 1 loggerhead sea turtle each year resulting from vessel strike mortalities 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.

9 CONCLUSION

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

The proposed action will result in the take of up to 4 green sea turtles (North Atlantic DPS), 1 Kemp's ridley sea turtle, and 1 loggerhead sea turtle (Northwest Atlantic DPS). 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 green (North Atlantic DPS), Kemp's ridley, or loggerhead (Northwest Atlantic DPS) sea turtles.

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.

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 applicant 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 or applicant becomes aware of any take of an ESA-listed species under NMFS's purview that occurs during the proposed action, the USACE or applicant 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, Port Aransas Marina, the issuance date, and ECO tracking number, SERO-2024-00107, 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)(4)).

10.2 Amount of Extent of Anticipated Incidental Take

Based on the above information and analyses, NMFS believes that the proposed action is likely to adversely affect green sea turtle (North Atlantic DPS), Kemp's ridley sea turtle, and loggerhead sea turtle (Northwest Atlantic DPS). These effects will result from vessel strike mortalities. NMFS anticipates the following annual incidental take may occur as a result of the proposed action (**Table 7**).

Table 7. Anticipated Annual Incidental Take Related to the proposed action.

Species	Take
Green sea turtle (North Atlantic DPS)	6
Kemp's ridley sea turtle	1
Loggerhead sea turtle (Northwest Atlantic DPS)	1

Based on the best available data, we do not anticipate any non-lethal take of the species listed above. The level of incidental take resulting from vessel strike mortalities occurring annually is highly variable and influenced by fuel prices, vessel registrations, weather, vessel use and traffic patterns, and other factors that cannot be predicted. Further, reporting of incidental take resulting from vessels originating from the new marina is not likely to be consistent, accurate, or probable once vessels operated by private owners leave the marina. As a result, there is a high level of uncertainty in monitoring the take numbers listed in Table 7, above, and a more reliably monitored metric is needed as an additional reinitiation trigger.

To calculate take and estimate the annual number of vessel strike mortalities resulting from the proposed project, we assumed 100% occupancy of the new marina, and we used the number of total vessel slips at the marina as the basis for our calculations (i.e., 299 wet slips plus 120 dry storage slips). Because the number of vessel slips forms the basis for our calculation of take, any future increase in vessel mooring or storage capacity associated with the action will necessitate reinitiation of consultation. Thus, any increase in vessel mooring or storage capacity within the marina, in addition to any reported take exceeding the numbers listed in Table 7, above, will be cause for reinitiation of consultation.

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 of green sea turtle (North Atlantic DPS), Kemp's ridley sea turtle, and loggerhead sea turtle (Northwest Atlantic DPS) if the project is developed 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 or appropriate 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" refer to those actions the Director considers necessary or appropriate to minimize the impact of the incidental take on the species" (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)(4)].

NMFS has determined that the following Reasonable and Prudent Measures are necessary or 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. The USACE must ensure that the applicant monitors and reports the impacts of its activities on ESA-listed species by including a special condition in its permit requiring the applicant to submit reports regarding all interactions with ESA-listed species at the proposed marina are forwarded to USACE and NMFS.
2. The USACE must ensure that the applicant minimizes the likelihood of injury or mortality to ESA-listed species resulting from vessel strike, capture, entanglement, or stranding at the marina by including a special condition in its permit requiring the applicant to install educational signage in visible locations at the marina, and to provide educational materials to customers utilizing the marina.

10.5 Terms and Conditions

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

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

- USACE shall include a special permit condition that directs the applicant to report all known vessel strike, capture, entanglement, stranding, or other take of ESA-listed species and any other takes of ESA-listed species at the Port Aransas Marina to the NMFS PRD SERO.
    - If and when the applicant becomes aware of any known reported vessel strike, capture, entanglement, stranding, or other take, 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-2024-00107 Port Aransas Marina) and date of issuance.
        - This form shall be completed for each individual known reported vessel strike, capture, entanglement, stranding, or other take incident.

    - The form must include the species name, state the species, date and time of the incident, general location and activity resulting in capture (e.g., vessel strike, entanglement, stranding), 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.
  - Every year, the applicant must submit a summary report of vessel strike, 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-2024-00107 Port Aransas Marina) and date of issuance.
    - The summary report will contain the following information: the total number of ESA-listed species vessel strikes, captures, entanglements, strandings, or other take that was reported at or adjacent to the marina and pier included in 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 summary report shall be submitted even when there have been no reported take of ESA-listed species.
    - The summary report will include current photographs of signs and bins required in T&Cs 2, below, and records of the clean-ups required in T&C 3 below.
    - The first summary report will be submitted by January 31 of the calendar year following the opening of facility operations. Thereafter, reports will be prepared every year, covering the prior calendar year, and emailed no later than January 31 of any year.
      - Copies of reports must be submitted to the USACE at: Fort Myers Field Office, Jacksonville District Corps of Engineers, Department of the Army, 1520 Royal Palm Square Boulevard, Suite 310, Fort Myers, Florida 33919.
      - Reports will include current photographs of signs and bins required in T&Cs No. 2 and 3 below.

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

- USACE shall include a special permit condition that directs the applicant to install and maintain the following NMFS Protected Species Educational Signs:
  - *Save Dolphins, Sea Turtles, and Manta Rays*
    - The signs will be posted on the exterior of the marina office.
    - Signs will be installed prior to opening the marina for use.
    - Photographs of the installed signs will be emailed to NMFS SERO PRD by email (takereport.nmfsser@noaa.gov) with the NMFS tracking number for this Opinion (SERO-2024-00107 Port Aransas Marina) and date of issuance.
    - Sign designs and installation methods are provided at the following website: http://sero.nmfs.noaa.gov/protected_resources/section_7/protected_species_educational_signs/index.html.
    - Additionally, current photographs of the signs will be included in each report required by T&C No. 1, above.

- USACE shall include a special permit condition that directs the applicant to provide and display copies of the NMFS *Protected Marine Species Identification Guide* in visible and accessible location within the marina office.
    - Copies of the NMFS *Protected Marine Species Identification Guide* will be printed and made available prior to the opening of the marina for use and operations.
    - Photographs of the display of available copies of NMFS *Protected Marine Species Identification Guide* will be emailed to NMFS SERO PRD by email (takereport.nmfsser@noaa.gov) with the NMFS tracking number for this Opinion (SERO-2024-00107 Port Aransas Marina) and date of issuance.
    - The applicant must keep a regular supply of NMFS *Protected Marine Species Identification Guide* available and visible within the marina office.
    - Additionally, current photographs of the display of available copies of NMFS *Protected Marine Species Identification Guide* will be included in each report required by T&C No. 1, above.

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:

Sea turtles:

- Conduct or fund research that investigates ways to reduce and minimize mortality of sea turtles from vessel strikes.
- Conduct or fund outreach designed to increase the public's knowledge and awareness of ESA-listed sea turtle species.
- Provide relevant education and outreach materials about threats to protected species and how to report sightings or strandings along with issued permits and permit-associated materials.

All species:

- Provide to all applicants relevant education and outreach materials about threats to affected protected species and how to report sightings or strandings along with all issued permits and permit-associated materials.
- Encourage marina applicants to conduct annual in-water and out-of-water marine debris removal (i.e., cleanup) activities at least annually.
    - Applicants are encouraged to coordinate with volunteer groups.
    - Applicants are encouraged to submit a record of each cleaning event NMFS SERO PRD by email (takereport.nmfsser@noaa.gov) with the NMFS tracking number for this Opinion (SERO-2024-00107 Port Aransas Marina) and date of issuance.

To stay abreast of actions that minimize or avoiding adverse effects or benefit listed species or their habitat, we request notification of the implementation of any conservation recommendations.

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, 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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