



UNITED STATES DEPARTMENT OF COMMERCE  
National Oceanic and Atmospheric Administration  
NATIONAL MARINE FISHERIES SERVICE  
Southeast Regional Office  
263 13<sup>th</sup> Avenue South  
St. Petersburg, Florida 33701-5505  
<https://www.fisheries.noaa.gov/region/southeast>

F/SER31:ML  
SERO-2024-01334

Allison Collins  
Environmental Planning and Historic Advisor  
Federal Emergency Management Agency, Region IV  
U.S. Department of Homeland Security  
3003 Chamblee Tucker Road  
Atlanta, Georgia 30341-4112

Tracey Wheeler  
Permit Manager, Panama City Permits Section  
Jacksonville District Corps of Engineers  
Department of the Army  
1002 West 23rd Street, Suite 350  
Panama City, Florida 32405

Ref.: PA-04-4399-PW-02300 PN 77664, City of Mexico Beach, Public Fishing Pier  
Replacement, Mexico Beach, Bay County, Florida.

Dear Allison Collins,

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-2024-01334. Please use the NMFS tracking number in all future correspondence related to this action.

The Opinion considers the effects of the FEMA's proposal to fund, and the U.S. Army Corps of Engineers' (USACE) proposal to authorize, the complete replacement of a storm-damaged public fishing pier by the City of Mexico Beach (the applicant) in Mexico Beach, Bay County, Florida on the following listed species and critical habitats: green sea turtle (North Atlantic Distinct Population Segment [DPS]), Kemp's ridley sea turtle, loggerhead sea turtle (Northwest Atlantic DPS), smalltooth sawfish (U.S. DPS), giant manta ray, Gulf sturgeon, designated loggerhead sea turtle critical habitat (Unit LOGG-N-32), and designated Gulf sturgeon (Unit 11, Florida Nearshore) critical habitat. FEMA is the lead federal action agency for this proposed action. The Opinion is based on information provided by the FEMA, the USACE, the City of Mexico Beach, and the published literature cited within. NMFS concludes that the proposed action may affect, but is not likely to adversely affect smalltooth sawfish, Gulf sturgeon, designated loggerhead sea turtle critical habitat (Unit LOGG-N-32), and designated Gulf sturgeon critical habitat (Unit 11, Florida Nearshore). 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 DPS), Kemp's ridley sea turtle, loggerhead sea turtle (Northwest Atlantic DPS), and giant manta ray.

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 FEMA, the USACE, and the City of Mexico Beach must comply, to carry out the Reasonable and Prudent Measures.

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 Mitchell Lovell, Consultation Biologist, by phone at (301) 427-7849, or by email at [mitchell.lovell@noaa.gov](mailto:mitchell.lovell@noaa.gov).

Sincerely,

Andrew J. Strelcheck  
Regional Administrator

Enclosure:

NMFS Biological Opinion SERO-2024-01334

cc: [andia.casley@fema.dhs.gov](mailto:andia.casley@fema.dhs.gov)

[mary.maddox@associates.fema.dhs.gov](mailto:mary.maddox@associates.fema.dhs.gov)

[paula.largo@fema.dhs.gov](mailto:paula.largo@fema.dhs.gov)

[fema-r4ehp-florida@fema.dhs.gov](mailto:fema-r4ehp-florida@fema.dhs.gov)

[tracey.l.wheeler@usace.army.mil](mailto:tracey.l.wheeler@usace.army.mil)

[nmfs.ser.esa.consultations@noaa.gov](mailto:nmfs.ser.esa.consultations@noaa.gov)

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

**Action Agencies:** Federal Emergency Management Agency  
Permit number: PA-04-4399-PW-02300 PN 77664  
  
U.S. Army Corps of Engineers

**Applicant:** The City of Mexico Beach

**Activity:** Rebuild a Public Recreational Fishing Pier

**Location:** Mexico Beach, Bay County, Florida

**Consulting Agency:** National Oceanic and Atmospheric Administration, National  
Marine Fisheries Service, Southeast Regional Office,  
Protected Resources Division, St. Petersburg, Florida  
  
NMFS Tracking Number: SERO-2024-01334

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

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

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## ACRONYMS, ABBREVIATIONS, AND UNITS OF MEASURE

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ac	acre(s)
ADA	Americans with Disabilities Act
°C	degrees Celsius
CFR	Code of Federal Regulations
cm	centimeter(s)
DPS	Distinct Population Segment
ECO	Environmental Consultation Organizer
EFH	Essential Fish Habitat
ESA	Endangered Species Act of 1973, as amended (16 U.S.C. § 1531 et seq.)
°F	degrees Fahrenheit
FEMA	Federal Emergency Management Agency
ft	foot/feet
FR	Federal Register
ft <sup>2</sup>	square foot/feet
FWC	Florida Fish and Wildlife Conservation Commission
FWRI	Florida Fish and Wildlife Research Institute
in	inch(es)
IPCC	Intergovernmental Panel on Climate Change
km	kilometer(s)
lin ft	linear foot/feet
m	meter(s)
MHW	Mean High Water
mi	mile(s)
mi <sup>2</sup>	square mile(s)
MLLW	Mean Lower Low Water
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
nm	Nanometer
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
Opinion	Biological Opinion, Conference Biological Opinion, or Draft Biological Opinion
SERO PRD	NMFS Southeast Regional Office, Protected Resources Division
SAV	Submerged Aquatic Vegetation
SSRIT	Smalltooth Sawfish Recovery Implementation Team
STSSN	Sea Turtle Stranding and Salvage Network
U.S.	United States of America
USACE	United States Army Corps of Engineers
USFWS	United States Fish and Wildlife Service



# 1 INTRODUCTION

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## 1.1 Overview

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

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

This document represents NMFS’s Opinion based on our review of potential effects of the FEMA proposal to fund, and the USACE’s potential proposal to permit, the complete replacement of a storm-damaged public fishing pier by the City of Mexico Beach (the applicant), Bay County, Florida on the following listed species and critical habitat: green sea turtle (North Atlantic DPS), Kemp’s ridley sea turtle, loggerhead sea turtle (Northwest Atlantic DPS), giant manta ray, Gulf sturgeon, smalltooth sawfish (U.S. DPS), designated loggerhead sea turtle critical habitat (Unit LOGG-N-32), and designated Gulf sturgeon critical habitat (Unit 11, Florida Nearshore). Our Opinion is based on information provided by the action agencies, 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 FR 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 FR 24268; 84 FR 45015). We have considered the prior rules and affirm that the substantive analysis and conclusions articulated in this 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-2024-01334, City of Mexico Beach Fishing Pier.

On June 11, 2024, we received a request for formal consultation under section 7 of the ESA from the FEMA to fund a complete rebuild of a storm-damaged, public recreational fishing pier by the City of Mexico Beach (the applicant) in Mexico Beach, Bay County, Florida.

On November 1, 2024, we requested additional information related to all in-water construction activities. On December 16, 2024, we requested additional information related to certain in-water activities. We received a final response on January 8, 2025, and initiated formal consultation that day.

On January 28, 2025, we requested additional information during our internal quality control review process. We received a response on January 28, 2025.

On February 7, 2025, we requested additional information pertaining to the project design. We received a response from the Applicant on February 7, 2025 and consultation was initiated on that day.

On February 24, 2025, FEMA requested a meeting to further clarify part of the project design; however, this issue was later addressed in an email dated March 3, 2025.

On March 6, 2025, FEMA confirmed that the USACE is a co-action agency and that FEMA is serving as the lead action agency to fulfill the Federal agencies' consultation and conference responsibilities.

## **2 PROPOSED ACTION**

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### **2.1 Project Details**

#### *2.1.1 Project Description*

FEMA proposes to provide funding for the City of Mexico Beach (the applicant) to rebuild and expand a previously existing, storm-damaged public fishing pier. The City of Mexico Beach Fishing Pier was originally constructed in 1965 and extended by 260 ft in 2008. For roughly 10 years, the structure remained until the pier sustained significant damage from Hurricane Michael

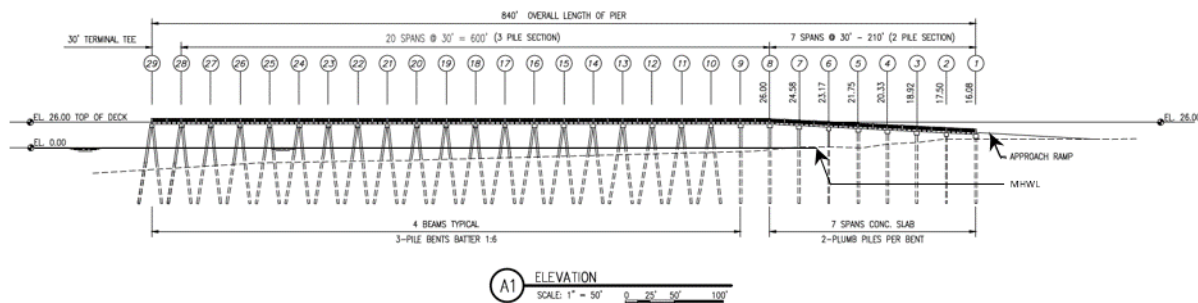
in 2018. The damaged portions of the pier that remained after the hurricane were removed in 2019 under Emergency Consultation SER-2019-19764 (issued January 28, 2019). Since 2019, when the remainder of the damaged pier was removed under Emergency Consultation SER-2019-19764 (issued January 28, 2019), the pier's footprint has been non-existent. The City of Mexico Beach has applied for a USACE permit and the application is pending USACE review. USACE has been included as a co-action agency to cover any future USACE permit issued for the pier replacement project described below.

The proposed project involves a full replacement of the pre-disaster fishing pier, plus a 230-ft seaward extension to ensure that the pier terminal reaches waters at least 15 ft deep MHWL, as recommended by the FDEP. This extension is necessary because the water depth beneath the fishing pier has decreased due to the accretion of sand from onshore coastal erosion, which was exacerbated during Hurricane Michael. The proposed construction also includes the rebuild of a public bathroom at the pre-disaster location; however, construction of the public bathroom will occur below the coastal construction line, and will not have any in-water impacts.

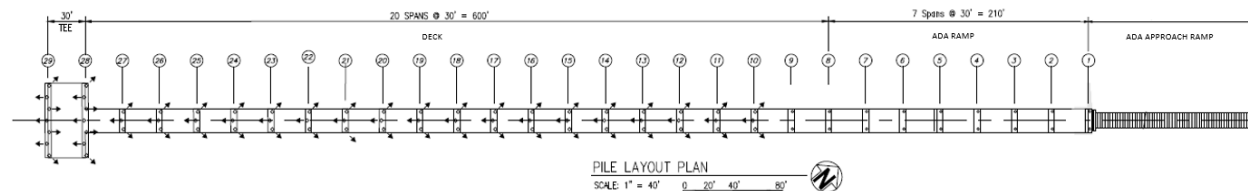
The City of Mexico Beach plans to hire contractors to complete the construction of the fishing pier. Work will include both land- and water-based construction activities. The majority of the proposed work will be conducted from the newly constructed structure as it is built seaward. Work vessels will be used minimally, and primarily for safety, observation, and deployment of turbidity curtains. Work vessels will be launched from the Mexico Beach Municipal Boat Ramp, located 0.9 mi from the project site, and will operate out of the Mexico Beach Marina. Work vessels will travel to and from the marina using existing navigational channels. Vessel speeds, vessel types, and number of trips will vary and are dependent on contractor selection; however, vessel speeds will be reduced while also maintaining sufficient maneuverability and navigation.

The fishing pier will consist of four sections (Figure 1 & Figure 2); a concrete sidewalk, an ADA approach ramp, an ADA ramp (Bents 1-8), and the deck (Bents 9-29). The overwater portion of the project will include Bents 7-29 (74 in-water piles) and will have a deck elevation of 26.1 ft NAVD 88. The overwater portion of the ADA ramp (Bents 7-8) will be supported by 4 new 24-in square concrete piles (2 piles each bent) and will be constructed with pre-stressed concrete cap beams and concrete slab decking. The ADA ramp will provide access to the deck, which includes both the walkway and the T-shaped terminal end. The walkway portion of the deck (Bents 9-27) will measure 600-ft-long by 19-ft-wide, where Bent 9 will be supported by 2 new 24-in square concrete piles and Bents 10-27 will each be supported by three 24-in prestressed, octangular concrete piles. The terminal portion of the deck (Bents 28 and 29) will measure 30-ft-long by 60-ft-wide and will be supported by 14 new 24-in prestressed, octangular concrete piles. The concrete posts on the pier will feature a ConTech Lighting, STPL Series, turtle-friendly LED (Amber, 34 Lm) vertical louver light at each bent and midspan. The replacement pier will have concrete posts at each bent and mid-span, wooden rails with a composite wood top rail, as well as 12 benches along the walkway. Two fish cleaning stations with stainless steel tables (6 ft x 3 ft) and a quartz cutting board will be accessible to the public, with one station located mid-pier and the second located at the terminal end. At each fish cleaning station, there will be a sink with a water nozzle. The sinks will drain to a 4-in PVC pipe, which will extend below the water surface to approximately 2 ft above the sand bottom. The size of the PVC pipes (4-in) are recommended to minimize/avoid clogging. Each cleaning station will be accompanied with a

hook and fishing line disposal container. All debris, including fish carcasses, are to be disposed of in trash receptacles, which will be available at each of the two cleaning stations. FWC and NMFS signage will also be posted at these locations.



**Figure 1. From right to left, the ADA approach ramp, the ADA ramp, and the deck are shown. Note, MHWL occurs between Bents 6 and 7. Deck height above MHW is 26.1 ft NAVD 88.**



**Figure 2. Aerial view of the proposed pier highlighting pile placement and orientation of the terminal end.**

New piles will be installed by a combination of pressure jetting and impact hammering. The piles will be jetted to a maximum depth of 6 ft, followed by impact hammering to drive them to final placement depth, in accordance with the established parameters outlined in Table 1. Blowout panels/decking inserts will also be used. The bathroom facility associated with the pier will be constructed at the foot of the concrete sidewalk (29.949581°, -85.424065°) below the coastal construction line, and will not have any in-water impacts.

**Table 1. In-water Pile and Pile Driving Specifications**

Location	Pile Material	Pile Diameter (in)	Number of Piles	Installation/ Removal Method	Max Number of Piles Driven/Day	Average Strikes/ Pile	Confined Space or Open Water
ADA Ramp – Pier (Bents 7-8)	Concrete	24	4	Jetting/ Impact hammer	3 (1 span/ week)	40 to 80	Open
Deck – Pier (Bents 9-29)	Concrete	24	70	Jetting/ Impact hammer	3 (1 span/ week)	40 to 80	Open

No boat slips will be constructed as part of this project. Work will only occur during daylight hours. Any debris generated during construction will be moved offsite and staged in designated upland area for final disposal at a permitted landfill. The work will be conducted in an open, not confined, water space. Implementation to project completion is expected to take up to 12 months; however, in-water activities are only expected to take 3 months in total. Upon completion, approximately 75 anglers are expected to use the pier each day, which will be open 24 hours a day, 365 days a year. This estimate was sourced from the City of Mexico Beach and is based on the yearly average of anglers using the fishing pier.

The use of vessels during construction will be minimal. Vessels may be utilized to place erosion control measures, such as turbidity curtain. In addition, vessels may be utilized for safety and observation during construction. However, the construction of the pier will be land based and top-down in lieu of water-based construction from a barge/vessel. Any vessels utilized for observation or placement of in-water erosion control measures will be launched from the City of Mexico Beach's municipal boat ramp and will access the pier directly from the City's Marina (approximately 0.9 miles north of the project site). Based on channel conditions within the maintained marina, the average channel depth is 5 feet; therefore, any vessel utilized will be small (40 ft or less) and will have a shallow draft in order to navigate the route from the City boat ramp to the project site.

### *2.1.2 Mitigation Measures*

To minimize potential impacts to ESA-listed species, the action agencies will add the following conditions to the grant or permit, as applicable, to be followed by the applicant during construction:

- The applicant will adhere to the [\*SERO Protected Species Construction Conditions\*](#).
- The applicant will adhere to the [\*Vessel Strike Avoidance Measures\*](#).
- The existing parking lot or adjacent paved surface will be used for delivery and storage of the majority of construction material and equipment.
- For all in-water activities, work operations will only be completed during daylight hours.
- No more than 3 in-water piles per day will be installed.
- Prior to the onset of construction activities, the applicant or designated agent will conduct a meeting with all construction staff to discuss identification of protected species, what to do if any are observed within the project area, and applicable penalties that may be imposed if State or Federal regulations are violated. All personnel shall be advised that there are civil and criminal penalties for harming, harassing, or killing ESA-listed species or marine mammals.
- When in-water project construction takes place from floating equipment (e.g., barge), prop or wheel-washing is prohibited.
- The applicant will be required to obtain all applicable Federal, state, and local permits and will comply with conditions set forth in each. These requirements include all State of Florida and USACE permits. Failure to obtain permits or comply with these conditions may jeopardize the applicant's receipt of FEMA funding.

- The applicant shall report any injury to any ESA-listed species occurring during the construction phase of the project immediately to both:
  - NMFS SERO PRD via the NMFS SERO Endangered Species Take Report Form (<https://forms.gle/85fP2da4Ds9jEL829>). The applicant will include the SERO ECO tracking number in all correspondence, and
  - The following location stranding and rescue organization:
    - FWC Wildlife Alert Hotline: (888) 404-FWCC/(888) 404-3922
- The applicant shall report any injury or take of any marine mammal during the construction phase to 1-877-WHALE HELP (1-877-942-5343). The applicant will include the SERO ECO tracking number in all correspondence.
- Report any sightings of giant manta ray to [manta.ray@noaa.gov](mailto:manta.ray@noaa.gov). The applicant's agent will report during construction; the applicant will report post-construction.

### 2.1.3 Best Practices

To minimize potential impacts to ESA-listed species, the action agencies will add the following conditions to the grant or permit, as applicable, to be followed by the applicant post-construction:

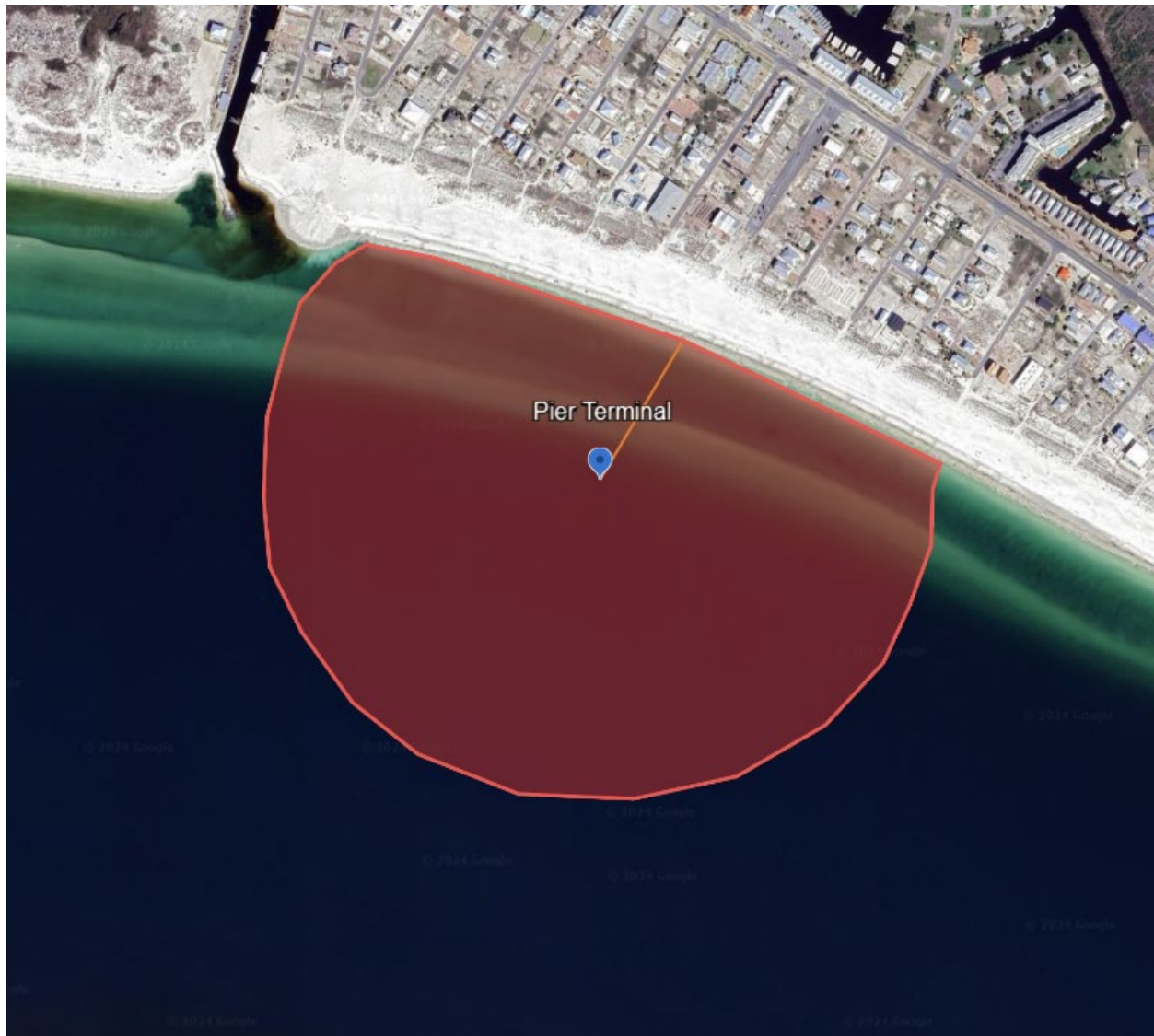
- The applicant will coordinate agreements with the Navarre Beach Sea Turtle Conservation Center or the FWC to assist as needed with the rehabilitation of recreational hook-and-line sea turtle captures: FWC Wildlife Alert Hotline: (888) 404-FWCC/(888) 404-3922. Website: <https://www.fisheries.noaa.gov/marine-life-distress/state-coordinators-and-state-liaisons-sea-turtle-stranding-and-salvage-network>.
- Fish cleaning stations will be clearly marked and have nearby trash receptacles with lids. The applicants will post signage on the pier asking fishermen to discard their fish carcasses in the trash bins. Receptacles will be clearly marked and will be emptied regularly.
- Monofilament recycling receptacles will be installed and will remain located at mid-pier and the terminal end in order to prevent fishing lines from being disposed of in the water or on the shore. Receptacles are to be clearly marked and emptied regularly to ensure they do not overfill and that fishing lines are disposed of properly.
  - Upon completion of the pier, the applicant will install NMFS-approved educational signs in visible locations at least at the entrance and at each fish cleaning station, alerting users of listed species in the area. The applicant will post at the pier the following signs, in both English and Spanish. Sign designs and installation methods are provided at the following website: <https://www.fisheries.noaa.gov/southeast/consultations/protected-species-educational-signs>. Signage to be posted includes: *Save Dolphins, Sea Turtles, Sawfish and Manta Rays*
  - *Do Not Catch or Harass Sea Turtles*
  - *Report A Sturgeon*
- The applicant agrees to conduct in-water pier cleanup on an annual basis. In addition, volunteer groups will hold a minimum of 2 clean ups annually to clear trash and loose debris from pier and adjacent areas to supplement regular pier maintenance.
- The applicant will use sea turtle friendly pier lighting (i.e., long wavelength amber, orange or red LED lighting) and angle the light towards the ground when possible.

## 2.2 Action Area

The project site is located at 29.9469°, -85.426° (NAD 83) in Mexico Beach, Bay County, Florida. The project site is located on Florida's northwest coast, along the eastern side of the Gulf of America, just south of the terminal end of Crooked Island. The Gulf of Mexico was renamed the Gulf of America pursuant to Executive Order 14172, and Secretary of the Interior Order No. 3423. All geographical references to the Gulf of America (hereafter, referred to as the Gulf) in this Opinion refer to the same body of water formerly known as the Gulf of Mexico. The proposed pier lies 0.33 mi due south of the Mexico Beach Canal outlet. The damaged structure, originally constructed in 1965, was a wooden frame boardwalk oriented northeast to southwest that included handrails, entrance ramps, 12 benches, lighting, and signage. The previously existing pier was 850 ft in overall length and 14 ft in width, with a terminal fishing platform that measured approximately 60 ft in length and 10 ft in width. The pier began at the top of the beach below the coastal construction control line and extended southwest over the sandy beach and surface waters of the Gulf above unconsolidated shoreline and bottom in water depths ranging from 0 ft to 15 ft MHW.

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 old pier's physical footprint, the new expanded pier's footprint, the surrounding water accessible to recreational anglers upon completion of the proposed action (i.e., casting distance or approximately 200-ft), and extends to the radius of anticipated effects. Therefore, the action area is equivalent to the largest radius of effects on ESA-listed species based on the proposed installation of 24-in-diameter octangular concrete piles by impact hammer, which is 1,306.1 ft from the proposed action (Figure 3). The proposed City of Mexico Beach public fishing pier, surrounding area, and the 1,306.1-ft radius (in red), denoting the extent of the action area based on behavioral noise effects to ESA-listed fishes (NMFS SERO Section 7 Mapper).). Per applicant-provided information, there are no corals, red mangroves, or SAV within the action area. A benthic survey was performed on September 21, 2021 (Ecological Assessment) and hydrophytic vegetation was not observed within the project area. Additionally, according to the FWC FWRI Seagrass Habitat Mapper, the location of the pier does not show any seagrass mapped in the area. The FWC FWRI Mangroves Habitat Mapper indicates that there are no mangroves identified in the action area. The action area is within the boundary of designated loggerhead sea turtle critical habitat (Unit LOGG-N-32) and designated Gulf sturgeon critical habitat (Unit 11, Florida Nearshore). The action area is located within the boundary of proposed critical habitat for green sea turtle (Unit FL01: Florida; 88 FR 46572, July 19, 2023); however, none of the proposed essential features for the conservation of the species are present within the action area.





**Figure 3. The proposed City of Mexico Beach public fishing pier, surrounding area, and the 1,306.1-ft radius (in red), denoting the extent of the action area based on behavioral noise effects to ESA-listed fishes (NMFS SERO Section 7 Mapper).**

### **3 EFFECTS DETERMINATIONS**

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Please note the following abbreviations are only used in Table 2 and Table 4 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**

<b>Species (DPS)</b>	<b>ESA Listing Status</b>	<b>Listing Rule/Date</b>	<b>Most Recent Recovery Plan (or Outline) Date</b>	<b>Agencies Effect Determination</b>	<b>NMFS Effect Determination</b>
<b>Sea Turtles</b>					
Green sea turtle (North Atlantic DPS)	T	81 FR 20057/ April 6, 2016	October 1991	<u>LAA</u>	<u>LAA</u>
Kemp's ridley sea turtle	E	35 FR 18319/ December 2, 1970	September 2011	<u>LAA</u>	<u>LAA</u>
Loggerhead sea turtle (Northwest Atlantic DPS)	T	76 FR 58868/ September 22, 2011	December 2008	<u>LAA</u>	<u>LAA</u>
<b>Fishes</b>					
Giant manta ray	T	83 FR 2916/ January 22, 2018	2019 (Outline)	<u>NE</u>	<u>LAA</u>
Gulf sturgeon (Atlantic sturgeon, Gulf subspecies)	T	56 FR 49653/ September 30, 1991	September 1995	<u>LAA</u>	<u>NLAA</u>
Smalltooth sawfish (U.S. DPS)	E	68 FR 15674/ April 1, 2003	January 2009	<u>NE</u>	<u>NLAA</u>

We believe that the project may affect, but is not likely to adversely affect the smalltooth sawfish. According to the U.S Sawfish Recovery Database (2015-2023), there have been six smalltooth sawfish sightings near the action area in Florida (A. Brame, NMFS, pers. comm. to M. Lovell, OAI Contractor with NMFS SERO on January 28, 2025). The closest sighting occurred in Saint Andrews Sound in April 2016, approximately 8 mi to the northwest of the action area. The next closest sighting occurred in Saint Joseph Bay in August 2022, approximately 17 mi south of the action area. Another sighting occurred at the southern end of Cape San Blas in April 2016, approximately 20 mi south of the action area. The next closest sighting occurred near Indian Pass in July 2019, approximately 28 mi south of the action area. Another sighting occurred in Apalachicola Bay in June 2018, approximately 52 mi southeast of the action area. The last sighting near the action area occurred in Miramar Beach in November 2017, approximately 62 mi northwest of the action area. Based on the best available scientific data, smalltooth sawfish may be present within the action area; however, the species presence is likely to be rare.

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

Smalltooth sawfish and Gulf sturgeon may be physically injured if struck by equipment or materials during construction activities. However, we believe that such route of effect is extremely unlikely to occur. These species are expected to exhibit avoidance behavior by moving away from physical disturbances. In addition, the implementation of NMFS SERO's *Protected Species Construction Conditions* (NMFS 2021) will require all construction workers to observe in-water activities for the presence of these species. Operation of any mechanical construction equipment shall cease immediately if a protected species are 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 will be limited to daylight hours so construction workers will be more likely to see listed species, if present, and avoid interactions with them.

The action area contains nearshore habitat that may be used by transient smalltooth sawfish and overwintering Gulf sturgeon. These species may be affected if they are temporarily unable to use the parts of the action area for forage or refuge habitat due to avoidance of construction activities, related noise, and physical exclusion from the use of turbidity curtains. Although species will be temporarily unable to access the construction area due to the placement of turbidity curtains, these effects will be insignificant given the project's limited footprint and availability of similar habitat nearby. Any disturbances to species would be temporary, limited to up to 90 days of in-water construction during daylight hours only, after which animals will be able to return to the action area.

Smalltooth sawfish and Gulf sturgeon may be injured due to entanglement in improperly discarded fishing gear from future use of the new pier after completion of the proposed action. We believe this route of effect is extremely unlikely to occur. To the best of our knowledge, there has never been a reported entanglement with these species at the Mexico Beach Public Fishing Pier. To help further reduce the risk of entanglement in improperly discarded fishing gear, the applicant will install and maintain fishing line recycling receptacles and trash cans with lids at the piers to keep debris out of the water, and we expect that anglers will appropriately dispose of fishing gear when disposal bins are available. The receptacles will be clearly marked and will be emptied regularly to ensure they are not overfilled and that fishing lines are disposed of properly. The applicant agrees to conduct in-water pier cleanup on an annual basis. In addition, volunteer groups will hold a minimum of 2 clean ups annually to clear trash and loose debris from pier and adjacent areas to supplement regular pier maintenance.

Potential effects to smalltooth sawfish and Gulf sturgeon also include the risk of physical injury from recreational hook-and-line capture from future use of the new pier after completion of the proposed action. We believe incidental capture of these species is extremely unlikely to occur. The likelihood of smalltooth sawfish presence in the project area is low due to the historically rare sightings of this species in the Florida Panhandle. Furthermore, while anecdotal evidence indicates sturgeon have been caught or snagged by recreational anglers (A. Kaeser, USFWS, pers. comm. to J. Reuter, NMFS SERO on June 29, 2017; C. Godwin, NCDNR, pers. comm. to J. Reuter, NMFS SERO, on July 6, 2017), reported and validated incidences are rare (B. Howard,

NMFS Habitat Conservation Division, pers. comm. to J. Rueter, NMFS SERO, on August 3, 2017). There is only 1 known recreational hook-and-line interaction of a sturgeon from a fishing structure; the FL FWC reported that a subadult was caught on hook-and-line from a Florida fishing pier, the Jacksonville Beach Pier (C. Brown, FL FWC, pers. comm. to K. Shotts, NMFS SERO, on January 8, 2014). The single reported recreational catch indicates that a recreational fishing capture is extremely unlikely. In addition, as stated below, educational signage for sturgeon will be posted on the pier upon completion of repairs. While signage will not reduce the potential risk of recreational hook-and-line interaction, it will encourage anglers to report interactions, thus providing valuable data to researchers and resource managers either confirming our analysis (by lack of reports) or ensuring we will be able to reinitiate consultation with the action agencies based on new information.

The NMFS educational signs “*Save Dolphins, Sea Turtles, Sawfish, and Manta Ray*”, “*Do Not Catch or Harass Sea Turtles*”, and “*Report a Sturgeon*” signs will be installed in visible locations at the Mexico Beach Public Fishing Pier upon completion of the proposed actions. The signs will provide information to the public on how to avoid and minimize encounters with these species as well as proper handling techniques. The signs will also encourage anglers to report sightings and interactions, thus providing valuable distribution and abundance data to researchers and resource managers. Accurate distribution and abundance data allows management to evaluate the status of the species and refine conservation and recovery measures.

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. 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>. NMFS uses the U.S. Navy Phase III criteria for all noise thresholds (U.S. Department of the Navy, 2017). As of December 2021, potential effects to ESA-listed fish and sea turtles may occur when impact pile driving produces sounds that exceed the thresholds in the following table. Below, PK and RMS are referenced to dB re: 1  $\mu$ PA, the relative unit used to specify the intensity of sound underwater. Further, SEL and SELcum are referenced to dB re: 1  $\mu$ PA<sup>2</sup>-

second. For underwater sounds, a reference pressure of 1 micropascal ( $\mu\text{Pa}$ ) is commonly used to describe sounds in terms of decibels (dB). Thus, 0 dB on the decibel scale would be a measure of sound pressure of 1  $\mu\text{Pa}$ .

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 action agencies propose to fund and permit the installation of sixty-eight, 24-in octagonal concrete piles (up to three per day) using an impact hammer not using noise abatement measures, during daylight hours only. The NMFS Multi-species Pile Driving Tool does not have sound source levels for 24-in octagonal, impact driven, concrete piles, 5 m water depth; therefore, we used the sound source levels for 24-in octagonal, impact driven, concrete piles 8 m water depth as a proxy for all spans. Pile driving will occur in an open-water environment. We define an open-water environment as any area where an animal would be able to move away from the noise source without being forced to pass through the radius of noise effects.

The installation of three 24-in octagonal concrete pilings per day by impact hammer not using bubble curtains as a noise abatement measure will cause PK injurious noise effects to ESA-listed fishes 1.1 ft away. We believe PK injurious noise effects are extremely unlikely to occur because this distance is within the 150-ft (46-m) “stop-work” radius defined in NMFS SERO’s *Protected Species Construction Conditions* (revised 2021). The SELcum may cause injury to ESA-listed fishes at a radius up to 79.9 ft (24.4 m) and to ESA-listed sea turtles at a radius of 3.2 ft (1 m) away from the pile-driving operations over a 24-hr period. We believe SELcum injurious noise effects are unlikely to occur because this distance is also within the 150-ft radius that will be visually monitored for listed species pursuant to NMFS SERO’s *Protected Species Construction Conditions* (revised 2021). Construction personnel will cease construction activities if an ESA-listed species is sighted within the 150-ft radius. In addition, we expect these species to move away from the noise disturbances before the exposure to the noise causes physical injury. Movement away from the injurious sound radius is a behavioral response, which is discussed below.

The installation of up to three 24-in octagonal concrete piles per day by impact hammer not using noise abatement measures could result in behavioral noise effects to ESA-listed fishes at a radius of up to 1,306.1 ft (398.1 m) away from the pile driving operations. Due to the mobility of these species and the open-water environment, we expect the animals to move away from noise disturbances. Because there is similar habitat nearby, we believe behavioral effects will be insignificant. If an animal chooses to remain within the behavioral response zone, 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. Therefore, we anticipate any behavioral effects will be insignificant.

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

The City of Mexico Beach Public Fishing Pier project is located in the ocean-facing waters of Zone 8, a statistical subarea used when reporting commercial fishing data. Zone 8 extends from 85° to 86° West longitude and 28° to ~30° North latitude along the west coast of Florida (Gulf). To help determine which sea turtle species are likely to occur within the action area, we reviewed the available years of STSSN stranding data (i.e., stranding data for all areas outside of protected waters for the years 2007-2016) for the offshore waters of Zone 8 (Table 3). This dataset is the best available in terms of STSSN data that has been processed to the granularity necessary to accurately determine strandings due to entanglement and hook-and-line captures from a structure. While more recent STSSN data is available, it has not been processed or validated to a level that accurately informs the mortality calculations we conduct in the Effects of Action (Section 6). Further, we conducted an analysis using the raw updated data to determine whether take calculations would be significantly different from those using the available processed 10-year dataset and determined that use of the available dataset is still the best available data.

Due to The City of Mexico Beach Pier project's location and ocean-facing orientation, we chose to analyze only the offshore component of the 2007-2016 STSSN dataset. Based on this data, we believe the green sea turtle (North Atlantic DPS), Kemp's ridley sea turtle, and loggerhead sea turtle (Northwest Atlantic DPS) may be affected by the proposed action (Table 3).

**Table 3. Summary of the STSSN Offshore Data for Zone 8 (2007-2016).**

<b>Species</b>	<b>Number of Known Sea Turtles Stranded or Salvaged (All Activities)</b>	<b>Number of Known Gear Entanglements</b>	<b>Number of Known Recreational Hook-and-line Captures</b>
Green sea turtle	147	4	0
Hawksbill sea turtle	1	0	0
Kemp's ridley sea turtle	149	8	7
Leatherback sea turtle	1	0	0
Loggerhead sea turtle	149	6	3
Unidentified	8	2	0
<b>Total</b>	<b>355</b>	<b>20</b>	<b>10</b>

While hawksbill sea turtle is represented in the data, we do not believe this species will be in the action area or caught on or entangled in recreational hook and line gear used at the pier. None of the STSSN records of hawksbill sea turtles are due to gear entanglement (commercial or recreational) or captures on recreational hook-and-line gear. Further, hawksbill sea turtles typically inhabit inshore and nearshore reef and hard bottom areas, which are not located within the action area, feeding primarily on encrusting sponges and not baits typically fished from piers. While leatherback sea turtle is also represented in the data, we do not believe this species will be in the action area or caught on or entangled in recreational hook and line gear used at the pier. The single STSSN record of leatherback sea turtles was due to a lethal, offshore vessel strike. Further, leatherback sea turtles tend to be pelagic feeders, feeding on jellyfish and not baits typically fished from piers.

Based on the above information, we have determined that green sea turtle (North Atlantic DPS), Kemp's ridley sea turtle, loggerhead sea turtle (Northwest Atlantic DPS), and giant manta ray 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 6.1) 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 Determinations

We have assessed the critical habitat(s) that overlap with the action area and our determination of the project's potential effects is shown in Table 4 below.

**Table 4. Critical Habitat in the Action Area and Effect Determinations.**

Species (DPS)	Critical Habitat Unit in the Action Area	Critical Habitat Rule/Date	Agencies Effect Determination	NMFS Effect Determination (Critical Habitat)
<b>Sea Turtles</b>				
Loggerhead sea turtle (Northwest Atlantic DPS)	<u>LOGG-N-32 Reproductive</u>	79 FR 39856/ July 10, 2014	<u>NLAA</u>	<u>NLAA</u>
<b>Fishes</b>				
Gulf sturgeon	<u>Florida Nearshore Gulf</u>	68 FR 13370/ March 19, 2003	<u>NLAA</u>	<u>NLAA</u>

#### 3.2.2 Effects Analysis for Critical Habitat Not Likely to be Adversely Affected by the Proposed Action

The project is located within the boundary of designated critical habitat for loggerhead (Northwest Atlantic DPS) sea turtle (Unit LOGG-N-32, Nearshore Reproductive Habitat). The following physical or biological features essential for the conservation of the species ("essential features" also referred to as primary constituent elements or "PCEs") are present in LOGG-N-32:

- 1) Nearshore waters directly off the highest density nesting beaches and their adjacent beaches as identified in [50 CFR 17.95\(c\)](#) to 1.6 km (1 mile) offshore;
- 2) Waters sufficiently free of obstructions or artificial lighting to allow transit through the surf zone and outward toward open water; and
- 3) Waters with minimal manmade structures that could promote predators (i.e., nearshore predator concentration caused by submerged and emergent offshore structures), disrupt wave patterns necessary for orientation, and/or create excessive longshore currents.

We believe the proposed action will not adversely affect any of the essential features of LOGG-N-32. Despite the absence of the pier for the past 5 years, we believe the proposed action will not meaningfully alter the ability of hatchlings to egress to the open-water environment or the ability of nesting females to transit between beach and open water, thus there will be no effect to PCE 1 – nearshore waters directly off the highest density nesting beaches. Despite the 230-ft extension seaward and the absence of the pier for the past 5 years, we believe the effects to PCE 2 from the proposed action will be insignificant for the following reasons: (1) the pier will have adequate spacing between bents (~ 30 ft) that allow protected species to freely move, and (2) the applicant will utilize sea turtle safe lighting that will not interfere with transient sea turtles. Lastly, we believe the project will not noticeably increase the historical baseline of predators (i.e., sharks) associated with the pier (PCE 3).

For these reasons, the proposed action is not likely to adversely affect the loggerhead Nearshore Reproductive Habitat, LOGG-N-32.

The project is also located within the boundary of designated Gulf sturgeon critical habitat (Unit 11, Nearshore Gulf). The following physical or biological features essential for the conservation of the species (“essential features” also referred to as primary constituent elements or “PCEs”) are present in Unit 11:

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

We believe the proposed action will not adversely affect any of the essential features of Unit 11 based on the following analysis.

The installation of pile-supported structures (i.e., a fishing pier) may cover and bury bottom substrates containing sturgeon prey species. We believe that the effect to PCE 1 from the installation of pile-supported structures will be insignificant due to the small area of impact and the availability of similar habitat nearby. Prey items will still be present in the surrounding sediment, allowing Gulf sturgeon to forage as normal in the area after construction. Further, not all of the habitat covered or buried may support prey items or serve as preferred foraging habitat. Since the fishing pier extends from the shoreline, only the portions of the pier in waters deeper than 6.5 ft (2 m) occur in areas where Gulf sturgeon tend to forage.

Localized and temporary reductions in water quality (PCE 2) through increased turbidity may result from the installation of pile-supported structures. We believe the effects to PCE 2 from localized and temporary turbidity due to pile placement will be insignificant because turbidity curtains will be used

to contain turbidity and we expect any small amounts of turbidity that may escape to have an insignificant effect on the water quality PCE.

Effects to temperature, salinity, pH, hardness, oxygen content, and other chemical characteristics of PCE 2 are not expected to result from the installation of pile-supported structures; therefore, there is no effect to these aspects of PCE 2 from the installation of pile-supported structures. We believe that the effects to sediment quality (PCE 3) from the installation of pile-supported structures will be insignificant since the area of impact from individual piles is very small and discontinuous (piles are typically spaced 4-10 ft apart). The surrounding benthos is expected to maintain the sediment quality characteristics necessary for normal behavior, growth, and viability of all life stages.

We believe the installation of pile-supported structures is not likely to adversely affect PCE 4. Noise generated during pile installation may temporarily affect safe and unobstructed migration, if the noise occurs near the mouth of a spawning river or between passes leading to spawning rivers. However, these effects are an insignificant effect on the migratory pathways PCE.

For these reasons, the proposed action is not likely to adversely affect the Gulf sturgeon critical habitat Unit 11.

## **4 STATUS OF ESA-LISTED SPECIES CONSIDERED FOR FURTHER ANALYSIS**

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### **4.1 Status of Sea Turtles**

There are 3 species of sea turtles considered further for analysis in this Opinion: green sea turtle (North Atlantic DPS), Kemp's ridley sea turtle, and loggerhead sea turtle (Northwest Atlantic DPS). All 3 species travel widely throughout the South Atlantic, the Gulf, and the Caribbean and therefore could occur within the action area. Section 4.1 of this Opinion will address the general threats that confront all sea turtle species. The remainder of Section 4.1.1 (Sections 4.1.1 – 4.1.3) will address information on the distribution, life history, population structure, abundance, population trends, and unique threats to each species of sea turtle further discussed in this Opinion.

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

#### *Coastal Development and Erosion Control*

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

### *Environmental Contamination*

Multiple municipal, industrial, and household sources, as well as atmospheric transport, introduce various pollutants such as pesticides, hydrocarbons, organochlorides (e.g., dichlorodiphenyltrichloroethane (DDT), polychlorinated biphenyls [PCB], and perfluorinated chemicals (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. An assessment has been completed on the injury to Gulf 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 or 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 and/or changes in prevailing currents, both of which could lead to increased beach loss via erosion (Antonelis et al. 2006; Baker et al. 2006).

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

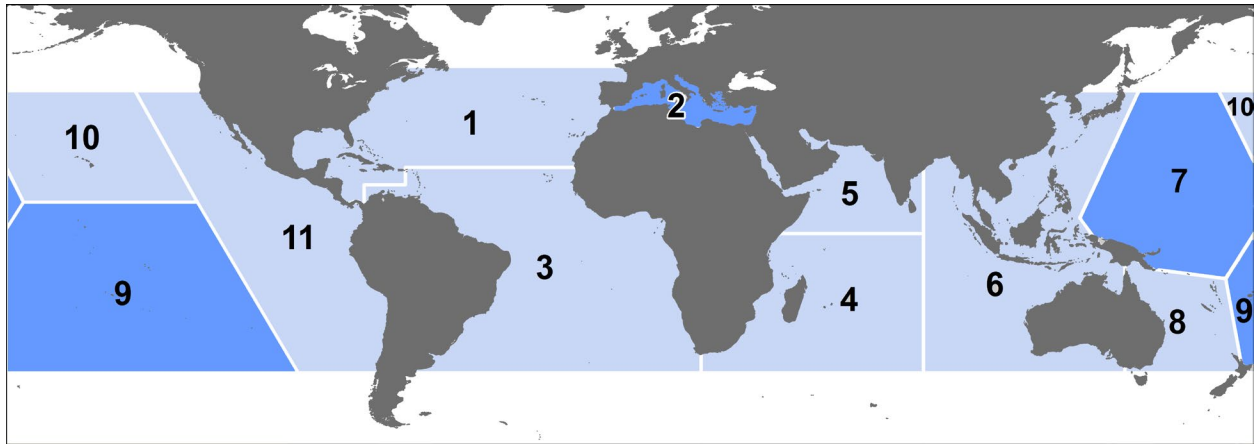
#### *Other Threats*

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

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

#### *4.1.1 Status of 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 distinct population segments (DPSs) (81 FR 20057 2016) (Figure 4). 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 4. 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 straight carapace length 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, Åkesson 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, Meylan et al. 1992, FitzSimmons, Farrington 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) 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, Singel 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, López-Jurado 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.

The North Atlantic DPS boundary is illustrated in Figure 4. 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 (NMFS and USFWS 1991, Dow, Eckert et al. 2007). The vast majority of green sea turtle nesting within the southeastern United States occurs in Florida (Johnson and Ehrhart 1994, Meylan, Schroeder 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 the Gulf 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 (Hildebrand 1982, Doughty 1984, Shaver 1994), the Gulf 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 1989). 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 1989). 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 ounces (25 grams). 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 (Zug and Glor 1998, Bresette, Scarpino et al. 2006). 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, Olabarria 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, Carthy 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, Allen 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.

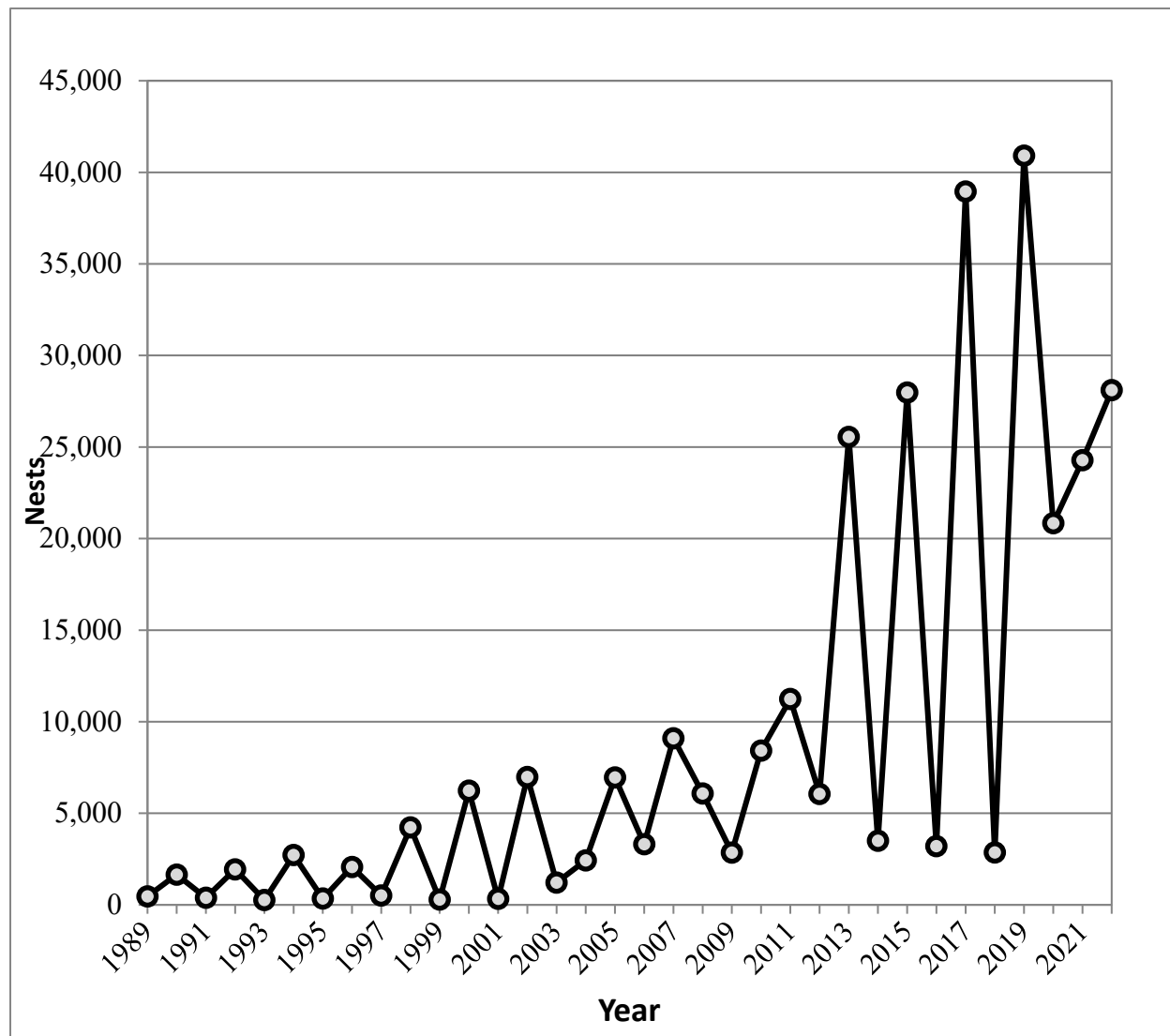
Quintana Roo, Mexico, accounts for approximately 11% of nesting for the DPS (Seminoff, Allen et al. 2015). In the early 1980s, approximately 875 nests/year were deposited, but by 2000 this increased to over 1,500 nests/year (NMFS and USFWS 2007). By 2012, more than 26,000 nests were counted in Quintana 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, Allen 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, Wetherall 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, Work 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, Schroeder et al. 1994, Weishampel, Bagley et al. 2003). Occasional nesting has also been documented along the Gulf Coast of Florida (Meylan, Schroeder 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](http://www.seaturtle.org)).

Florida accounts for approximately 5% of nesting for this DPS (Seminoff, Allen et al. 2015). Modeling by Chaloupka, Work 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 5). 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 5). While nesting in Florida has shown dramatic increases over the past decade, individuals from the Tortuguero, the Florida, and the other Caribbean and the Gulf 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 5. 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, Redfoot 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, Bressette 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 5.3.

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 (Jacobson, Mansell et al. 1989, Herbst 1994, Aguirre, Balazs et al. 2002). 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 (Jacobson, Mansell et al. 1989, Herbst 1994, Aguirre, Balazs et al. 2002). 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, Jacobson et al. 1995), and environmental conditions (e.g., habitat degradation, pollution, low wave energy, and shallow water (Foley, Schroeder et al. 2005). FP is cosmopolitan, but it has been found to affect large numbers of animals in specific areas, including Hawaii and Florida (Jacobson 1990, Jacobson, Simpson Jr. et al. 1991, Herbst 1994).

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 1989). 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 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 5.3.3, 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, they have a widespread distribution throughout the entire Gulf, Caribbean, and Atlantic, and the proportion of the population using the northern Gulf at any given time is relatively low. Although it is known that adverse impacts occurred and numbers of animals in the Gulf were reduced as a result of the Deepwater Horizon oil spill of 2010 (DWH), 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 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).

#### *4.1.2 Status of 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 (Zwinenberg 1977, Groombridge 1982, TEWG 2000).

##### *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 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  $2.2 - 2.9 \pm 2.4$  in per year ( $5.5 - 7.5 \pm 6.2$  cm/year) (Schmid and Woodhead 2000, Schmid and Barichivich 2006). 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).

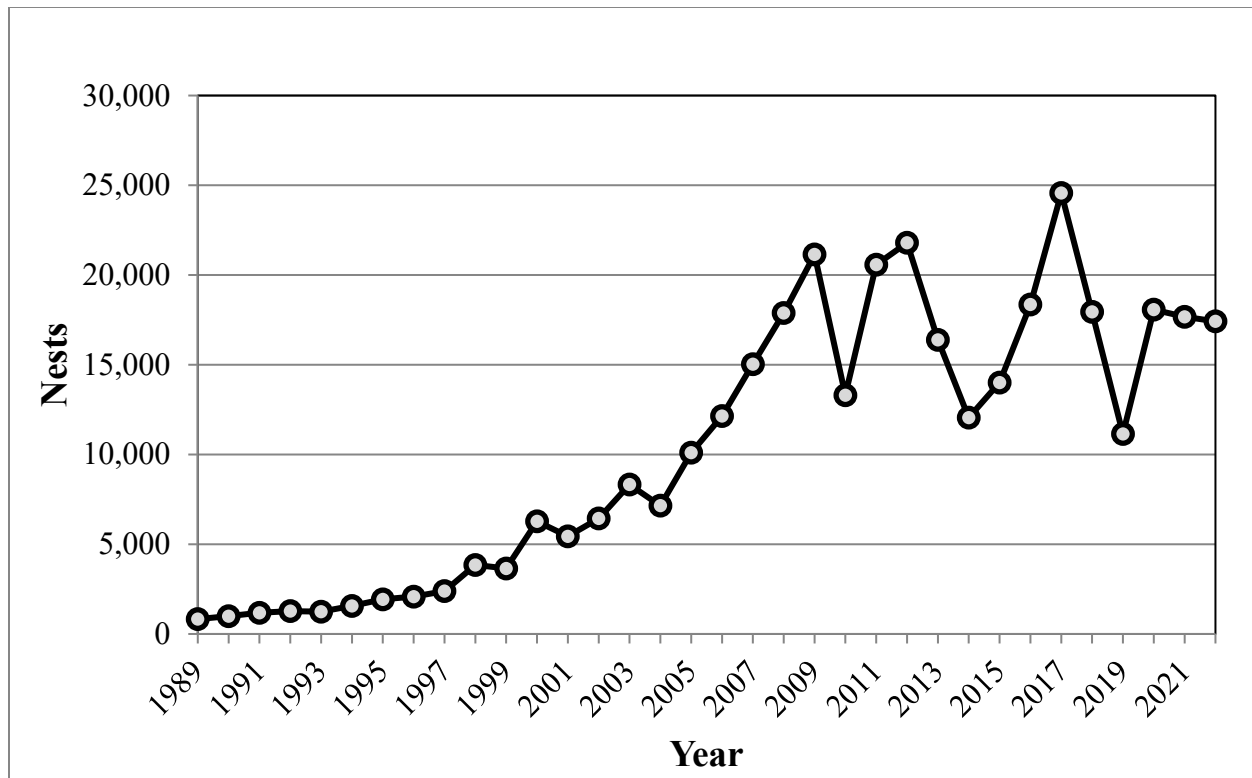
### *Population Dynamics*

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 6), 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 data, 2016). There was a record high nesting season in 2017, with 24,570 nests recorded (J. Pena, pers. comm., August 31, 2017), but nesting for 2018 declined to 17,945, with another steep drop to 11,090 nests in 2019 (Gladys Porter Zoo data, 2019). Nesting numbers rebounded in 2020 (18,068 nests), 2021 (17,671 nests), and 2022 (17,418) (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.

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). 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 (NPS data).



**Figure 6. 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, 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 ridley 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 (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-inch (in) bar spacing for all vessels using skimmer trawls, pusher-head trawls, or wing nets. Ultimately, we published a final rule on December 20, 2019 (84 FR 70048), that requires all skimmer trawl vessels 40 ft and greater in length to use TEDs designed to exclude small sea turtles in their nets effective April 1, 2021. Given the nesting trends and habitat utilization of Kemp's ridley sea turtles, it is likely that fishery interactions in the Northern Gulf 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 for several reasons. All Kemp's ridleys in the Gulf belong to the same population (NMFS, USFWS 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 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 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 Kemp's ridley juveniles 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.

#### *4.1.3 Status of 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, eastern Yucatán Peninsula, at Cay Sal Bank in the eastern Bahamas (Addison and Morford 1996, Addison 1997), off the southwestern coast of Cuba (Moncada-Gavilán 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, 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, and 5% in the western Gulf (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 NRU (Florida/Georgia border north through southern Virginia), (2) the PFRU (Florida/Georgia border through Pinellas County, Florida), (3) the DTRU (islands located west of Key West, Florida), (4) the NGMRU (Franklin County, Florida, through Texas), and (5) the GCRU (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, Witherington 2002, Conant, Dutton et al. 2009). Oceanic juveniles grow at rates of 1 – 2 in (2.9 – 5.4 cm) per year (Snover 2002, Bjorndal, Bolten et al. 2003) over a period as long as 7 – 12 years (Bolten, Bjorndal 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 (Laurent, Casale et al. 1998, Bolten and Witherington 2003). 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 the Gulf (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. 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, comprise important inshore habitat. Along the Atlantic and the Gulf shoreline, essentially all shelf waters are inhabited by loggerheads (Conant, Dutton 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, Dutton et al. 2009).

Offshore, adults primarily inhabit continental shelf waters, from New York south through Florida, The Bahamas, Cuba, and the Gulf. 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, Broderick 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, Schroeder et al. 2008, Girard, Tucker et al. 2009, Hart, Lamont 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 (Bolten, A. and K. Bjorndal, University of

Florida, unpublished data). Moncada, Abreu-Grobois 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. 2003b; NMFS-SEFSC 2009; NMFS 2001; NMFS and USFWS 2008; TEWG 1998, 2000, 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.

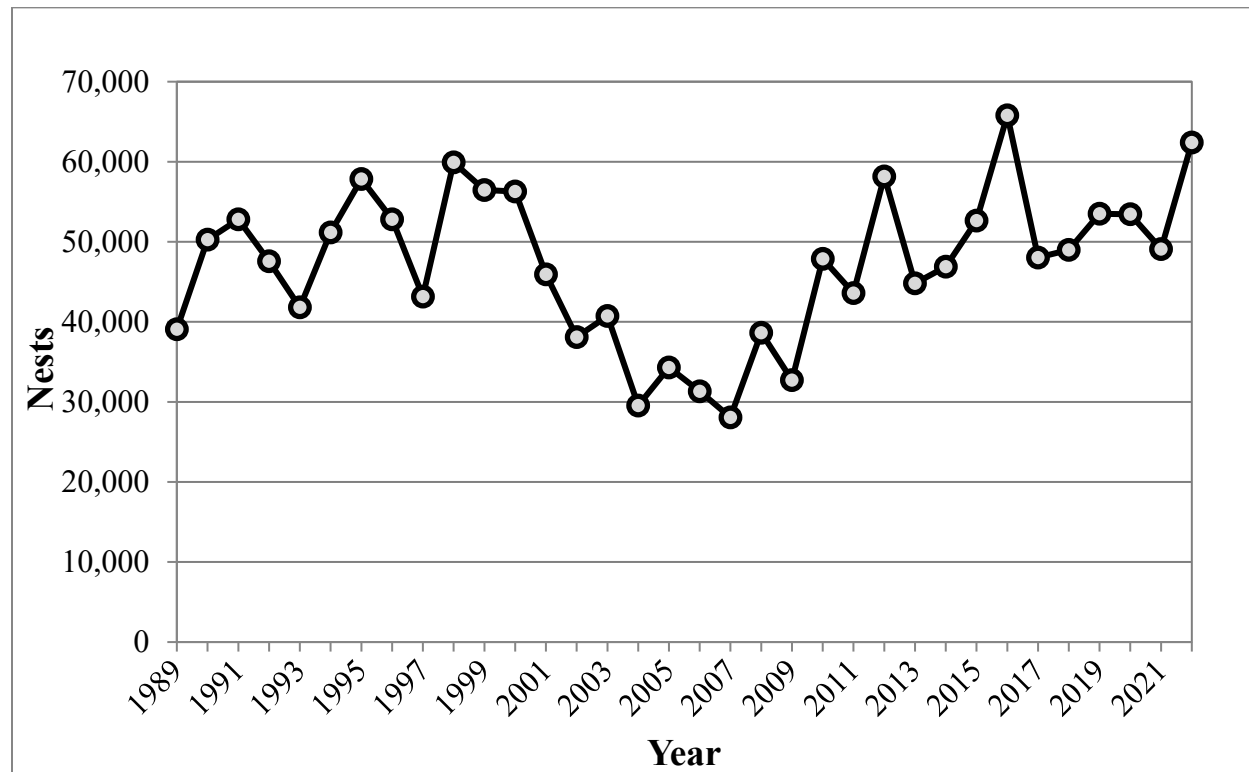
Numbers of nests and nesting females can vary widely from year to year. Nesting beach surveys, though, can provide a reliable assessment of trends in the adult female population, due to the strong nest site fidelity of female loggerhead sea turtles, as long as such studies are sufficiently long and survey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

### Peninsular Florida Recovery Unit

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

In addition to the total nest count estimates, the FWRI uses an index nesting beach survey method. The index survey uses standardized data-collection criteria to measure seasonal nesting and allow accurate comparisons between beaches and between years. FWRI uses the standardized index survey data to analyze the nesting trends (Figure 7) (<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 not 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 7. Loggerhead sea turtle nesting at Florida index beaches since 1989.**

#### Northern Recovery Unit

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.

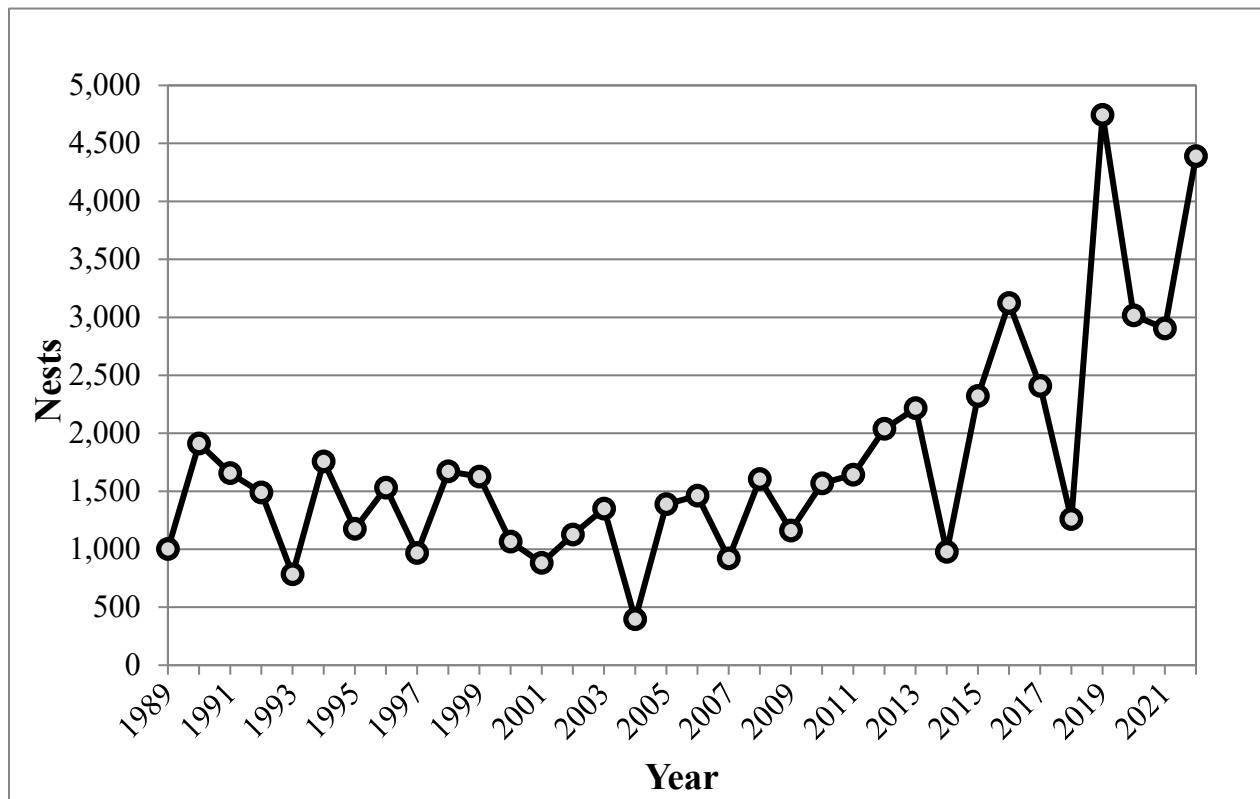
Data since that analysis (Table 5) are showing improved nesting numbers and a departure from the declining trend. Georgia nesting has rebounded to show the first statistically significant increasing trend since comprehensive nesting surveys began in 1989 (Dodd, M., GADNR press release, <https://georgiawildlife.com/loggerhead-nest-season-begins-where-monitoring-began>). 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 5. Total Number of NRU Loggerhead Nests (GADNR, SCDNR, and NCWRC nesting datasets compiled at Seaturtle.org).**

<b>Year</b>	<b>Georgia</b>	<b>South Carolina</b>	<b>North Carolina</b>	<b>Totals</b>
2008	1,649	4,500	841	<b>6,990</b>
2009	998	2,182	302	<b>3,482</b>
2010	1,760	3,141	856	<b>5,757</b>
2011	1,992	4,015	950	<b>6,957</b>
2012	2,241	4,615	1,074	<b>7,930</b>
2013	2,289	5,193	1,260	<b>8,742</b>
2014	1,196	2,083	542	<b>3,821</b>
2015	2,319	5,104	1,254	<b>8,677</b>
2016	3,265	6,443	1,612	<b>11,320</b>
2017	2,155	5,232	1,195	<b>8,582</b>
2018	1,735	2,762	765	<b>5,262</b>
2019	3,945	8,774	2,291	<b>15,010</b>
2020	2,786	5,551	1,335	<b>9,672</b>
2021	2,493	5,639	1,448	<b>9,580</b>
2022	4,071	7,970	1,906	<b>13,947</b>

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 8).



**Figure 8. South Carolina index nesting beach counts for loggerhead sea turtles (data provided by SCDNR).**

#### Other Northwest Atlantic DPS Recovery Units

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

### In-water Trends

Nesting data are the best current indicator of sea turtle population trends, but in-water data also provide some insight. In-water research suggests the abundance of neritic juvenile loggerheads is steady or increasing. Although Ehrhart et al. (2007) found no significant regression-line trend in a long-term dataset, researchers have observed notable increases in CPUE (Ehrhart, Redfoot et al. 2007, Epperly, Braun-McNeill et al. 2007, Arendt, Byrd et al. 2009). 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, Bolten 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 U.S. 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 U.S., however, indicate a substantial decrease in the abundance of the smallest oceanic/neritic juvenile loggerheads, a pattern corroborated by stranding data (TEWG 2009).

### Population Estimate

The NMFS SEFSC 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, Dutton et al. 2009).

Regarding the impacts of pollution, loggerheads may be particularly affected by organochlorine contaminants; they have the highest organochlorine concentrations (Storelli, Barone et al. 2008)

and metal loads (D'Ilio, Mattei et al. 2011) in sampled tissues among the sea turtle species. 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 or 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.

Unlike Kemp's ridleys, the majority of nesting for the Northwest Atlantic DPS occurs on the Atlantic coast and, thus, loggerheads were impacted to a relatively lesser degree. However, it is likely that impacts to the NGMRU of the Northwest Atlantic DPS would be proportionally much greater than the impacts occurring to other recovery units. Impacts to nesting and oiling effects on a large proportion of the NGMRU recovery unit, especially mating and nesting adults likely had an impact on the NGMRU. Based on the response injury evaluations for Florida Panhandle and Alabama nesting beaches (which fall under the NFMRU), the DWH Trustees (2016) estimated that approximately 20,000 loggerhead hatchlings were lost due to DWH oil spill response activities on nesting beaches. Although the long-term effects remain unknown, the DWH oil spill event impacts to the NGMRU 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 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, Broderick et al. 2007). Warmer sea surface temperatures have also been correlated with an earlier onset of loggerhead nesting in the



spring (Weishampel, Bagley et al. 2004, Hawkes, Broderick et al. 2007), short inter-nesting intervals (Hays, Broderick et al. 2002), and shorter nesting seasons (Pike, Antworth et al. 2006).

## **4.2 Status of Giant Manta Ray**

### *Physical Description of the Species*

The giant manta ray has a diamond-shaped body with wing-like pectoral fins; the distance over this wingspan is termed disc width (DW). It may be the largest living ray species, attaining a maximum size of 800 cm DW, with anecdotal reports up to 910 cm DW (Compagno 1999; Alava et al., 2002; Carpenter et al., 2023). Males mature at 350–400 cm DW and females mature at 380–500 cm DW (White et al., 2006; Last et al., 2016; Stewart et al., 2018b). There are two distinct color types: chevron and black (melanistic). Most of the chevron variants have a black dorsal surface and a white ventral surface with distinct patterns on the underside that can be used to identify individuals (Marshall et al., 2008; Kitchen-Wheeler 2010; Deakos et al., 2011). While these markings are assumed to be permanent, there is some evidence that the pigmentation pattern of giant manta ray may actually change over the course of development (based on observation of two individuals in captivity), and thus caution may be warranted when using color markings for identification purposes in the wild (Ari 2015). The black color variants are entirely black on the dorsal side and almost completely black on the ventral side, except for areas between the gill-slits and the abdominal area below the gill-slits (Kitchen-Wheeler 2013). They also have distinct spot patterns on their bellies that can be used to identify individuals (Luiz et al., 2009; Kitchen-Wheeler, 2010; Couturier et al., 2011; Deakos et al., 2011; Marshall et al., 2011).

### *Habitat*

The giant manta ray inhabits tropical, subtropical, and temperate bodies of water and is commonly found offshore, in oceanic waters, and near productive coastlines, with water temperatures generally between 20°C and 30°C (Duffy and Abbott 2003; Marshall et al., 2009; Kashiwagi et al., 2011; Freedman and Roy 2012; Graham et al., 2012; Hacothen-Domené et al., 2017; Farmer et al., 2022). Manta rays are commonly seen in surface waters or cleaning in shallow coral reef habitats typically in tropical or subtropical regions (Couturier et al., 2012; Braun et al., 2014). The giant manta ray can exhibit diel patterns in habitat use, moving inshore during the day to clean and socialize in shallow waters (10 – 20 m), and then moving offshore at night to feed to depths of 1,000 meters (Hearn et al. 2014; Burgess 2017). The coastal vertical movements of giant manta rays maybe motivated by a combined foraging and thermal recovery strategy, whereby giant manta rays dived to forage on vertically migrating zooplankton at night and returned to surface waters (< 2 m) to rewarm between dives (Andrzejczek et al., 2021). In coastal areas, giant manta rays have been observed in shallow waters, sometimes less than 3 meters deep, in estuarine waters, near coastal inlets, with use of these shallow waters as potential nursery habitats (Adams and Amesbury 1998; Milessi and Oddone 2003; Medeiros et al., 2015; Pate and Marshall 2020; Farmer et al., 2022).

### *Diet and Feeding*

Giant manta rays primarily feed on planktonic organisms such as euphausiids, copepods, mysids, decapod larvae and shrimp, but some studies have noted their consumption of small and moderate sized fishes (Bertolini 1933; Bigelow and Schroeder 1953; Carpenter and Niem 2001;

Rohner et al., 2017a; Stewart et al., 2017; Medeiros et al., 2022). While there are no studies that compare diet requirements for the different life stages, recent studies suggest that both juveniles and adults may occupy the same habitats within a location and, thus, target the same prey (Stewart et al., 2016b, Stewart et al., 2017, Graham et al., 2012). Manta rays have a complex depth profile of their foraging habitat (Andrzejaczek et al., 2021). Burgess et al., (2016) found that, on average, mesopelagic sources contributed 73% to the giant manta ray's diet, compared to 27% for surface zooplankton suggesting that giant manta rays may be supplementing their diet with opportunistic feeding in near-surface waters (Couturier et al., 2013; Burgess et al., 2016).

The feeding behaviors of manta species have also been studied to provide insight into their cognition and response to sensory stimuli. When feeding, groups of manta rays hold their cephalic fins in an "o" shape and open their mouths wide. They tend to swim at a speed around 30 pectoral fin beats per minute when feeding, which is almost twice as fast as they swim when being cleaned (Kitchen-Wheeler 2013). After collecting water with zooplankton in their mouths, manta rays use a transverse curtain on the roof of the mouth as a valve to hold the water in as the pharynx contracts during swallowing (Bigelow and Schroeder 1953). This movement of the pharynx pulls plankton towards the stomach when the gills are closed (Kitchen-Wheeler 2013). Intestinal eversion has also been observed, likely to clear the intestines of indigestible material and parasites (Clark and Papastamatiou 2008). The positioning of the cephalic fins was found to be a good indicator of feeding motivation, triggered by underwater visual stimuli or olfactory stimuli/sense of smell (Ari and Correia 2008).

#### *Listing History*

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

### *LIFE HISTORY INFORMATION*

#### *Reproduction*

The giant manta ray is ovoviviparous and is thought to produce a single offspring per pregnancy after a gestation period of 12 – 13 months (Rambahiniarison et al., 2018; Murakumo et al., 2020). An average female produces 4 – 7 pups during its lifespan (Marshall et al., 2022). Due to their low fecundity and late age of maturation, manta ray populations are slow to recover from population declines (Dulvy et al., 2014; 82 FR 3694).

#### *Age at Maturity*

Female giant manta rays mature at 8.6 years of age, although first pregnancy may be delayed by up to 4 years depending on food availability (Rambahiniarison et al., 2018). Maximum age is estimated at 45 years and generation length is estimated to be between 20 years (J. Carlson unpublished) to 29 years (Marshall et al., 2022).

#### *Habitat Use by Different Life Stages*

Identifying potential manta ray important habitats, such as nursery, feeding and reproductive areas, especially in data limited regions such as the northwest Atlantic Ocean, is essential to conservation and recovery of this species. A recent study conducted off the Atlantic coast of central Florida provided evidence of reproductive habitat for manta rays (Pate 2024). Each spring

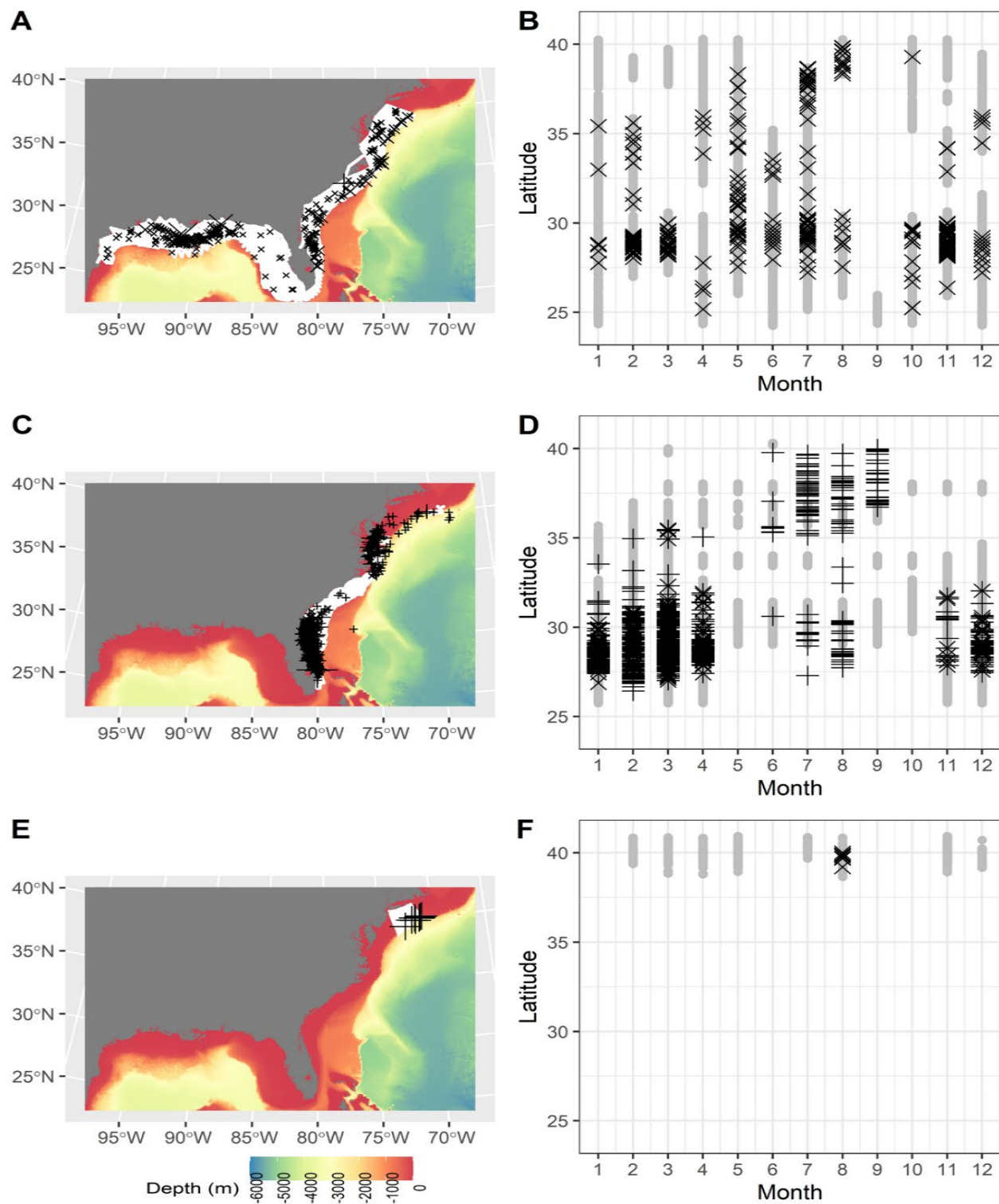
manta rays aggregate off the coast of central and northern Florida, between Indian River County, Florida and the Florida/Georgia border. Pate (2024) documented numerous courtship and breaching events indicating that this area is potentially seasonal reproductive habitat for manta rays. This same study suggested that this area maybe important feeding habitat as feeding behaviors and prey species were also documented (Pate 2024). These initial observations warrant future study to determine the importance of this area to manta ray feeding and reproduction, as well as characterization of the environmental influences that affect manta ray presence and behavior.

Documenting juvenile nursery habitats is a priority in manta ray research and conservation (Stewart et al., 2018a), yet few have been described. Worldwide few nursery areas for manta rays have been described; however, two manta ray nursery habitats have been described in the U.S Atlantic and the Gulf. Pate and Marshall (2020) described the nearshore area between St. Lucie Inlet and Boynton Beach Inlet, along southeast Florida as a nursery habitat for manta rays. Observations of juvenile giant manta rays as far south as Miami suggest this nursery habitat may extend farther south (J. Pate, MMF, pers comm. to C. Horn, NMFS, June 4, 2024). Nearly all (98%) of manta rays observed by Pate and Marshall (2020) were juveniles, many showed high site fidelity to the study area, which is characterized by a highly populated coastline (Palm Beach County and Martin County) with intensive vessel traffic. As of December, 2023, 151 juvenile manta rays had been identified, with 52% being re-sighted and 26% re-sighted over multiple years (Pate and Fong 2023). New individuals are being identified regularly along southeastern Florida (J. Pate unpublished data). In addition, the Flower Garden Banks National Marine Sanctuary and the surrounding banks in the northwest Gulf have been described as manta ray nursery habitat (Stewart et al., 2018a). These nursery habitats were described based on frequent observations of immature individuals in these areas, high site fidelity with individuals remaining in the areas, and extended use of these areas by individuals over multiple years (Heupel et al., 2017; Stewart et al 2018a; Pate and Marshall 2020).

### *Seasonal Distribution Patterns*

In the U.S Atlantic, giant manta rays are distributed from Florida to as far north as New York, with a clear expansion to the north during warmer months. The highest nearshore occurrence is predicted to take place off the Atlantic coast of Florida during April, with the distribution extending northward along the shelf-edge as temperatures warm, leading to higher occurrences north of Cape Hatteras, North Carolina from June to October, and then south of Savannah, Georgia from November to March as temperatures cool (Figure 9; Farmer et al., 2022). These findings are consistent with other lines of evidence that demonstrate that large numbers of giant manta rays are known to migrate to the Atlantic coast of Florida during the spring and summer (Levesque 2019; Pate and Fong 2023). Aerial observations of manta ray movements indicate that the Atlantic coast of Florida is potentially an important foraging and reproductive habitat (Pate and Fong 2023; Pate 2024). Each spring manta rays aggregate off the coast of central and northern Florida, between Indian River County, Florida, and the Florida/Georgia border. Typically, individuals are observed during March of each year in coastal waters off Indian River County, then migrate northward, possibly coinciding with rising water temperatures. Anglers reported that when temperatures fall between 68 and 72°F both manta ray and cobia abundance peaked, usually between March and April (Braun et al., 2024), which is consistent with findings in Farmer et al., (2022).

Additionally, several lines of evidence indicate that the Mississippi delta region is an important aggregation. Farmer et al., (2022) predicted that the highest nearshore occurrence of giant manta rays in the Gulf occurs around the Mississippi River Delta from April to June and again from October to November (Figure 9; Farmer et al., 2022). These findings are supported by directed research and survey efforts, public sightings, and fisheries bycatch data that indicate the Mississippi River Delta is likely an important aggregation site (NOAA 2024; NMFS, unpublished data).



**Figure 9. (A) Spatial distribution relative to coarse-scale bathymetry (red = shallow; blue = deep) and survey effort (white lines) and (B) spatio-temporal distribution of survey effort (gray circles) and manta ray sightings (X: on effort, + : off effort; scaled to number reported within survey) by Southeast Fisheries Science Center, (C, D) North Atlantic Right**

**Whale Consortium, and (E, F) Normandeau Associates aerial surveys for New York State Energy Research and Development Authority. Source: Farmer et al., (2022).**

### *Predators and Competitors*

Manta rays are frequently sighted with non-fatal injuries consistent with shark attacks, although the prevalence of these sightings varies by location (Homma et al. 1999; Ebert 2003; Mourier 2012). Deakos et al. (2011) reported that scars from shark predation, mostly on the posterior part of the body or the wing tip, were evident in 24% of reef manta ray individuals (n=70 individuals with injuries) observed at a manta ray aggregation site off Maui, Hawaii. Off eastern Australia, Couturier et al. (2014) observed 23% of reef manta rays had shark scars. Approximately 76% of reef manta rays bear bite wounds of predatory sharks in southern Mozambique (Marshall & Bennett 2010a). Because the damage from a shark bite usually occurs in the posterior region of the manta ray, there may be disfigurement leading to difficult clasper insertion during mating or inhibited waste excretion (Clark and Papastamatiou 2008).

## *POPULATION DYNAMICS*

### *Population Size*

Although the global population size is not known, regional populations have been estimated in Ecuador, Indonesia, Mexico, and Mozambique. Ecuador's Machalilla National Park and the Galapagos Marine Reserve is thought to be home to the largest identified population of giant manta ray in the world, with the estimated population size of 11,022 (95% CI: 9095–13 357) for females and 11,294 (9456–13 490) for males (Hearn et al., 2014; Harty et al., 2022). The next largest population has been noted in Raja Ampat, Indonesia, but is much smaller, estimated at around 1,875 individuals (Beale et al., 2019). The other estimated populations are similar in size, with 1,172 individuals the Revillagigedo Archipelago, Mexico (Cabral et al., 2023), more than 400 individuals in Banderas Bay, Mexico (Domínguez-Sánchez et al., 2023), and 600 individuals Mozambique (Marshall 2008). Preliminary (uncorrected for availability bias) relative abundance estimates for giant manta rays in the northwest Atlantic Ocean and the Gulf, U.S., suggest an abundance ranging from approximately 5,000–14,000 individuals with a coefficient of variation between 14–20%, depending on the month (N. Farmer unpubl. data 2023). Preliminary satellite tagging returns from nine individuals suggest manta rays in the southeast spend a median of 14% of their time within depths visible to aerial observers; adjusted estimates for this availability bias suggest  $47,802 \pm 121,032$  (mean  $\pm$  SD; range 8,206–161,804) individuals in the northwest Atlantic off the eastern U.S. (N. Farmer unpubl. data 2023). Locally, abundance varies substantially and may be based on food availability and the degree that they were, or are currently, being fished. In most regions throughout their range, the number of giant manta rays observed over the years appear to be small (fewer than 1,000 individuals) (NMFS 2024).

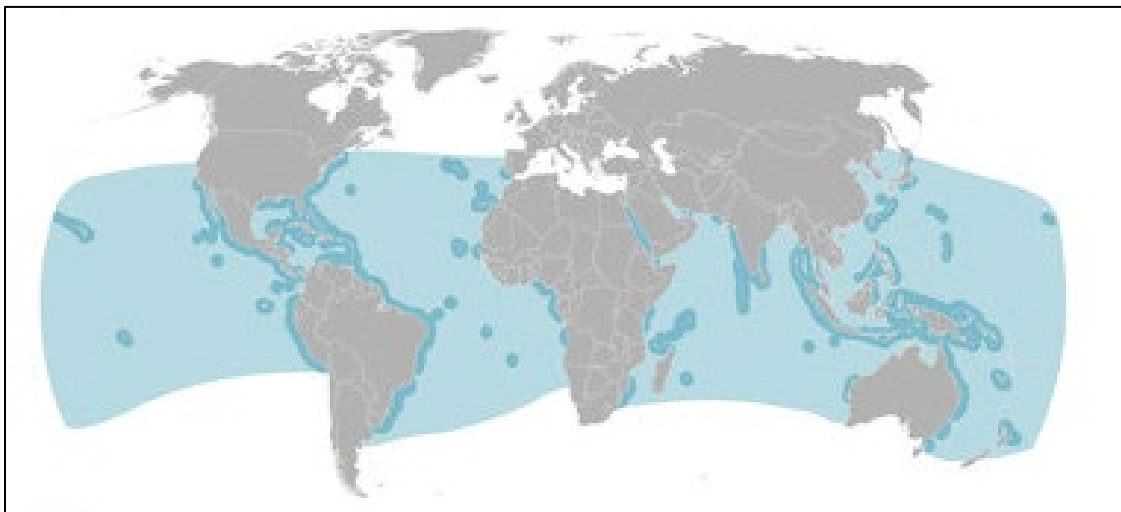
### *Population Variability*

The trend of the number of individuals within populations varies widely across the species range, but trends appear stable where they are protected and declining rapidly where fishing pressure is greater (Marshall et al., 2022). For example, sighting trends appear stable where they receive some level of protections, such as Hawaii (Ward-Paige et al., 2013) and Ecuador (Holmberg and Marshall 2018), although individuals sighted in Ecuador seasonally migrate to Peru (A. Marshall unpubl. data 2019) where directed fishing occurs (Heinrichs et al., 2011). Elsewhere, the number

of individuals is likely to be declining in places where the species is targeted or caught regularly as bycatch. For example, in southern Mozambique, a 94% decline in diver sighting records occurred over a 15-year period in a well-studied population (Rohner et al., 2017). Similarly, at Cocos Island, Costa Rica, there has been an 89% decline in diver sighting records of giant manta rays over a 21-year period (White et al., 2015). These steep declines have occurred in less than one-generation length (29 years) (Marshall et al., 2022). Although sparse, the available data suggest that target fisheries in some regions have rapidly depleted localized populations of the giant manta ray; local extinction is suspected to have occurred in many parts of their historical range. Globally, the suspected population reduction is 50–79% over three generation lengths, with a further population reduction suspected over the next several generations based on current and ongoing threats and exploitation levels, steep declines in monitored populations, and a reduction in area of occupancy (Marshall et al., 2022).

#### *Range and Distribution*

Within the Northern hemisphere, the giant manta ray has been documented as far north as the following locations: New York, U.S. and the Azores Islands in the Atlantic Ocean region; the Sinai Peninsula, Egypt in the Indian Ocean region; and Mutsu Bay, Aomori, Japan and southern California, U.S. in the Pacific Ocean region (Figure 10; Lawson et al., 2017; Kashiwagi et al., 2010; Moore 2012; CITES 2013; Sobral and Alfonso 2014; Knochel et al., 2022; Farmer et al., 2022). In the Southern Hemisphere, the species has been observed as far south as Peru in the eastern Pacific Ocean, Uruguay and St. Helena Island in the Atlantic Ocean, South Africa and Australia in the Indian Ocean, and off Tasmania, New Zealand, and French Polynesia in the western and central Pacific Ocean (Figure 10; Lawson et al., 2017; Mourier 2012; CITES 2013, Couturier et al., 2015; Carpentier et al., 2019, Beard et al., 2021).



**Figure 10. Geographic range of giant manta ray showing confirmed locations (extend in dark blue) as well as presumed range (possibly extant in light blue) (Lawson et al., 2017).**

#### *Biotic and Abiotic Factors Dictating Range / Distribution*

Giant manta rays are commonly sighted in aggregations at many locations throughout their range, including: Similan Islands (Thailand); Raja Ampat (Indonesia); Sharm el-Sheikh (Egypt); Fuvahmulah and Addu Atolls (Maldives); northeast North Island (New Zealand), Kona, Hawaii (U.S.); U.S. Atlantic and the Gulf, Brazil; Cabo Verde; Isla de la Plata (Ecuador); Ogasawara

Islands (Japan); Isla Margarita and Puerto la Cruz (Venezuela); northern coast of the Yucatan Peninsula; Isla Holbox; Revillagigedo Islands; and Bahía de Banderas (Mexico) (Notarbartolo-di-Sciara and Hillyer 1989; Homma et al., 1999; Duffy and Abbott 2003; Luiz et al., 2009; Clark 2010; Kashiwagi et al., 2010; Marshall et al., 2011a; Stewart et al., 2016a; Hacohe-Domené et al., 2017; Hilbourne and Stevens 2019; Pate 2024; Farmer et al., 2022; Knochel et al., 2022; Domínguez Sánchez et al., 2023; Garzon et al., 2023). The timing of these aggregations varies by region and seem to correspond with the movement of zooplankton, climatic fluctuations (e.g., El Niño Southern Oscillation), current circulation and tidal patterns, seasonal upwelling, seawater temperature, and possibly mating behavior (Couturier et al., 2012; De Boer et al., 2015; Armstrong et al., 2016; Hacohe-Domené et al., 2017; Beale et al., 2019; Nicholson-Jack et al., 2021; Domínguez Sánchez et al., 2023, Garzon et al., 2023). For example, in the U.S. Atlantic and the Gulf, the distribution of manta rays was found to be influenced primarily by sea surface temperature, with a clear expansion to the north during warmer months (Farmer et al., 2022). Additionally, within the preferred thermal range (approximately 68–86°F), manta rays occurred most frequently either nearshore or along the continental shelf-edge, at locations best predicted by proxies for productivity such as thermal fronts, bathymetric slope, and high chlorophyll-a concentration (Farmer et al., 2022).

### *Threats*

#### *Past and Current Threats Resulting in Population Declines*

The largest cause of direct mortality of giant manta rays globally is targeted fishing and capture as bycatch (Croll et al., 2016; NMFS 2024), though they face a range of other threats including marine pollution, vessel strikes, and entanglement (NMFS 2024). In addition, while there is no direct evidence, there is concern for this species as a result of impacts associated with climate change (Essumang 2010, Ooi et al., 2015, Stewart et al., 2018).

#### *Fisheries (Foreign)*

Giant manta rays are both targeted and caught incidentally in industrial and artisanal fisheries (Couturier et al., 2012; Croll et al., 2016; Stewart et al., 2018). These rays are captured in a wide range of gear types including harpoons, drift nets, purse seine nets, gill nets, traps, trawls, and longlines. Manta rays are also caught in bather protection nets (Cliff and Dudley 2011, Department of Agriculture and Fisheries 2018). Their coastal and offshore distribution, and tendency to aggregate, makes giant manta rays particularly susceptible to bycatch in purse seine and longline fisheries and targeted capture in artisanal fisheries (Croll et al. 2016; Duffy and Griffiths 2017). In particular, giant manta rays are easy to target because of their large size, slow cruising speed, tendency to aggregate, predictable habitat use, and lack of human avoidance (Couturier et al., 2012).

Manta ray catches have been recorded in at least 30 large and small-scale fisheries covering 25 countries (Lawson et al., 2016). The largest documented target fisheries are Indonesia, the Philippines, and India (NMFS 2024). While many artisanal fisheries have grown to meet international trade demand for gill plates as discussed below, some still target these manta rays mainly for food and local products (White et al., 2006, Essumang 2010, Rohner et al., 2017).

Global landings of mobulid species, including giant manta rays, have been increasing steadily due in large part to the recent rise (from the 1990s onwards) in demand for gill plates (Croll et



al., 2016; O'Malley et al., 2017). Many former bycatch fisheries have become directed commercial export fisheries (Dewar 2002; White et al., 2006; Heinrichs et al., 2011; Fernando and Stevens 2011). Between 2000 and 2007, total landings of 'Mantas, devil rays nei' ('nei' refers to 'not landed elsewhere') increased from 900 tons to over 3,300 tons according to the FAO Fishstat Capture Production database (Lack and Sant 2009). This equates to an average of 1,593 metric tons being landed annually, with this average increasing to 4,462 metric tons annually from 2008 to 2017 (Oakes and Sant 2019). These reported landings likely underestimate total fishing-related mortality (Ward-Paige et al. 2013; Marshall et al. 2022).

In the markets of Guangzhou, China, where 99% of mobulid products are routed, mobulid products are sourced from over 20 countries and regions (O'Malley et al. 2017). The source locations for the largest amounts of product are Indonesia, Sri Lanka, India, China, and Vietnam (O'Malley et al., 2017). Demand for products has driven up the price and traded volume of these products in recent decades. Between 2011 and 2013, there was an increase from 60 to 120 tons of mobulid product moved through shops in Guangzhou (O'Malley et al. 2017).

In the Western Indian Ocean, Romanov (2002) estimated that between 253 and 539 manta rays and devil rays were being caught per year as bycatch in purse seine fisheries, and between 2003 and 2007, 35 manta rays were observed in purse seine bycatch, most of which were likely giant manta rays (Amandè et al. 2012). In the Western and Central Pacific Ocean, from 1998 to 2015, approximately 4,646 individuals were caught by purse seine fisheries and 454 individuals caught by longline fisheries (Tremblay-Boyer and Brouwer, 2016). While a few individuals were released in good condition, post-release mortality which may occur after an individual has been released alive but later dies as a result of the stress and injury accrued during capture is likely to be high as most were released alive but injured (Tremblay-Boyer and Brouwer, 2016; Francis and Jones 2017). The Eastern Pacific purse seine fisheries show a substantial increase in the bycatch of mobulid rays, including giant manta rays, from 20 tons per year before 2005 to 150 tons per year by 2006, which then reduced to 10 tons per year by 2009 (Hall and Roman 2013; Marshall et al., 2022). The Inter-American Tropical Tuna Commission purse seine vessels operating from 1993 to 2015 reported an average catch of approximately 135 giant manta rays per year (Miller and Klimovich 2017). A susceptibility analysis indicated that negative interactions with fishing gear and unintended mortality will continue to be an issue with this species as these fisheries coincide with high productivity areas where giant manta rays are likely to aggregate for feeding (Duffy and Griffiths 2017; Duffy et al., 2019; Marshall et al., 2022).

#### *Federal Fisheries (Southeast U.S.)*

The giant manta ray is caught as bycatch in a number of U.S. commercial fisheries operating in the Atlantic Ocean and the Gulf. Much of the data comes from fisheries observer programs in the Southeast U.S. Fisheries observers are the only independent bycatch data collection source for commercial fishing. It is important to note that the new bycatch information is the result of the observer program efforts to expand data collection and species identification following the listing of the giant manta ray under the ESA. Federal fisheries observer programs in the Southeast began identifying and recording bycatch for the giant manta ray in 2019 providing a better understanding of U.S. commercial fisheries interactions with giant manta rays.

Based on the observer data, the Southeast U.S. commercial fisheries that use trawls, pelagic and bottom longlines, gillnet, and hook and line gears incidentally capture giant manta rays. Of these fisheries, shrimp trawl and pelagic longline gears appear to be interacting with giant manta rays the most, followed by bottom longline, and gillnet. Dispositions of the giant manta rays are recorded at the vessel (i.e., released alive, discarded dead, or disposition unknown). In addition, it is important to note that numerous records exist within the bycatch data where species identification was not determinable and thus generically recorded as “ray” or “mobulid”. This information does not include potential post-release mortality.

#### *The Southeast Shrimp Trawl Fishery*

The Southeast U.S. shrimp fishery operates within the EEZ in the Gulf and U.S. Atlantic. Based on data collected by the observer program, between 2019 and April 2024, approximately 37 giant manta rays were incidentally captured (NMFS unpublished data), with 26 released alive, 4 dead, and 7 discarded with an “unknown” disposition (NMFS unpublished data, 2024). It is likely that total giant manta ray bycatch is higher because the observer coverage in this fishery is less than 2%, meaning that bycatch data is only recorded for a very small percentage of the shrimp trawl fishery. The majority of interactions have been recorded off the coast of Louisiana, followed by coastal areas near the Florida/Georgia border. Yet, the lack of interactions observed in the U.S. Atlantic may be due to very low observer coverage, as several recent studies indicate that north and central Florida is likely an important habitat for migration, foraging and reproduction (Farmer et al., 2022; Pate and Fong 2023; 84 FR 66652). The majority of interactions have occurred in Federal waters, although there are records in State waters as well (NMFS unpublished data, 2024).

On April 26, 2021, the NMFS Southeast Regional Office (SERO) issued a Biological Opinion on the implementation of the sea turtle conservation regulations under the ESA and the authorization of the southeast U.S. shrimp fisheries in federal waters under the Magnuson-Stevens Act (NMFS 2021b). As part of the Opinion, an incidental take statement was issued that anticipated the non-lethal capture of 16,780 giant manta rays over 10 years (averaging 1,678 giant manta rays per year) in the shrimp trawl fishery. No giant manta ray mortalities were anticipated because there were no records of lethal interactions at that time. The incidental take estimate was based on 1 year of data, which included 12 interactions documented during that time, and was highly uncertain (Carlson 2020). In 2023, the Opinion was reinitiated because there were giant manta ray mortalities documented by the observer program.

#### *The Pelagic Longline Fishery*

The Pelagic Longline Fishery for Atlantic Highly Migratory Species incidentally captures giant manta rays during fishing operations. This fishery comprises relatively distinct segments including: Caribbean, the Gulf, Florida east coast, South Atlantic bight, mid-Atlantic bight, northeast coastal Atlantic, northeast distant waters, Sargasso Sea, and Offshore waters. Observer coverage is maintained at a minimum of 8%, but some years have higher coverage (NMFS 2020a). From 2020 through 2023, observers (9.9% coverage) recorded 9 giant manta rays captured in pelagic longline gear, with 3 documented at-vessel mortalities (NMFS unpublished data). These captures occurred in the mid-Atlantic bight, northeast coastal Atlantic, and Gulf fishing zones. Giant manta rays were not recorded as bycatch at the species level until 2019 (following listing late 2018); however, a review of photographs from observers confirmed at

least four giant manta rays were caught in the Gulf in 2008, 2013, and 2014, respectively (C. Jones, NMFS, pers. comm. to C. Horn, NMFS, December 20, 2018). Of note, the majority (approximately 71%) of mobulid bycatch records from 2019–2023 lacked identification to the species level; it is unclear what percentage of these records were comprised of giant manta ray.

On May 15, 2020, NMFS SERO issued an Opinion on the operation of the Pelagic Longline Fishery for Atlantic Highly Migratory Species in federal waters under the Magnuson-Stevens Act (NMFS 2020a). As part of the Opinion, an incidental take statement was issued that anticipated the non-lethal capture of 366 giant manta rays and 6 mortalities over 3 years in the Pelagic Longline Fishery. At that time, the incidental take estimate was uncertain as there was limited incidental capture data of giant manta rays, including mortality data. In addition, uncertainty surrounded species identifications made by the observers as most records pre-dated the ESA listing of giant manta rays and subsequent observer training. In 2022, the Opinion was reinitiated because the number of mortalities documented by the observers have exceeded what was authorized in the 2020 Opinion.

#### *The Shark and Reef Fish Bottom Longline Fisheries*

The shark and commercial reef fish bottom longline fisheries are active in the Atlantic Ocean from about the Mid-Atlantic Bight to south Florida and throughout the Gulf. Observer data coverage is 3.9% of total fishing effort (Decossas and Mathers, 2023). NMFS has documented four observations of giant manta ray captures in both the shark and reef fish bottom longline fisheries (NMFS unpublished data, 2023). These captures occurred in the Southeast Atlantic and the Gulf. All individuals were released alive.

#### *The Coastal Migratory Pelagic Fishery*

The Coastal Migratory Pelagic (CMP) Fishery operates in the Atlantic Ocean and the Gulf. The fishery primarily targets king mackerel, Spanish mackerel, and the Gulf Migratory Group of cobia. The main gear types used in the CMP fishery are hook-and-line (including trolling), cast net, and gillnet. Diver-held spear guns are also a main gear type specific to cobia. On May 1, 2023, NMFS SERO issued a Biological Opinion on the operation of the CMP Fishery in federal waters under the Magnuson-Stevens Act (NMFS 2023c). As part of the Opinion, an incidental take statement was issued that anticipated the non-lethal capture of 714 giant manta rays and 63 mortalities (including post-release mortality) over 3 years in the CMP Fishery. The incidental take is highly uncertain and is based on discard logbook and observer program data from 2010 to 2020. The discards have percent standard error values over 100 indicating a high level of uncertainty (NMFS 2023c).

#### *Consolidated Atlantic HMS Fishery*

The Consolidated Atlantic HMS Fishery (excluding pelagic longline) operates within Federal waters of the U.S. EEZ. The gear types authorized include bandit gear, bottom longline, buoy gear, gillnets, green-stick, handline, harpoon, purse seine, rod and reel, and speargun. Giant manta rays have been recorded as catch in shark bottom longline gear, in the research fishery. Giant manta rays have not been reported as catch from other federal HMS bottom longline fisheries. Between 2008 and 2016, there were 2 giant manta rays reported caught in the shark bottom longline research fishery (SEFSC unpublished data). The shark bottom longline research fishery has 100 percent observer coverage. Between 2008 and 2016, one giant manta ray was

observed caught in shark gillnet gear, including smoothhound gillnet gear, in 2012 (NMFS 2020). All were released alive. As part of the Opinion, an incidental take statement was issued that anticipated the non-lethal capture of 9 giant manta rays over 3 years in the Consolidated Atlantic HMS Fishery.

#### *The U.S. Southeast Gillnet Fisheries*

The U.S. Southeast gillnet fishery is active year round from North Carolina to the Gulf. Many states have banned gillnet fishing in state waters over the last decade and most gillnet fishing is restricted to Federal waters. The shark gillnet fishery, includes drift, strike, and sink gillnets, operates in Federal waters and is a component of the Consolidated Atlantic Highly Migratory Species Fisheries Management Plan (NMFS 2020). In addition, sink gillnets and strike gillnets, are also a component of the CMP Fishery (discussed above, NMFS 2023c) to target primarily King and Spanish mackerel, and the Gulf migratory group of cobia in Federal waters. Observer coverage in the Southeast gillnet fishery has ranged from 5–15% depending on the year and available funding (Kroetz et al., 2020). Between 2001 and 2023, observers recorded eight giant manta ray captures, including one mortality (NMFS unpublished data). Giant manta rays were captured in drift (n=7) and strike (n=1) nets primarily targeting sharks and mackerel. All these interactions occurred in the U.S. Atlantic, with the majority occurring along Florida's east coast, followed by nearshore North Carolina (Kroetz et al., 2020).

#### *State Fisheries*

Various fishing methods used in state commercial and recreational fisheries, including gillnets, trawling, pot fisheries, and vertical line are all known to incidentally take giant manta rays, but information on these fisheries is sparse (NMFS 2024). Most of the state data are based on extremely low observer coverage, or giant manta rays 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.

#### *Commercial and Recreational Cobia Fishery*

Two cobia stocks are found off the US Atlantic coast: Atlantic cobia and Gulf Migratory Group (Gulf cobia). Gulf cobia occur throughout the Gulf and extend to Florida's east coast, while Atlantic cobia occur from Georgia north (84 FR 4733; February 19, 2019). The Gulf migratory cobia group is federally managed under the CMP FMP (discussed above, NMFS 2024c). The Atlantic States Marine Fisheries Commission and each state maintains management of the Atlantic migratory cobia group. While relatively small by the standards of the major recreational fisheries in Florida, the recreational cobia fishery in Florida has the highest recreational cobia landings among Atlantic or Gulf Coast states (84 FR 4733; February 19, 2019; ASMFC 2020).

On the Atlantic coast of central and north Florida there is a locally well-known and historically active cobia fishery in which anglers track giant manta ray migrations for the purpose of targeting cobia (Pate 2023; Braun et al., 2024). This is a fishing practice where anglers will seek out giant manta rays casting at or near them to target the cobia that are associated with the manta rays (Bishop, 1999; McNally, 2012; Roberts, 2022). In Florida giant manta rays are often seen trailing fishing gear (Pate and Marshall, 2020) which is not necessarily or immediately fatal, but may impair feeding and swimming behaviors or cause serious bodily injury and direct mortality as a result of entanglement and subsequent drowning (Deakos et al., 2011; Gallagher et al., 2014;

Perryman et al., 2021). Recently, Braun et al., (2024) conducted a study that gathered data on angler knowledge, perceptions, and behavior in relation to the cobia fishery in central and north Florida and its relationship with resident and migrating giant manta ray. This study found that 60% of anglers reported actively tracking temperature changes in coastal waters to predict migration trends of both giant manta rays and cobia. Over 86% of anglers interviewed in this study reported they or their clients (charters) had incidentally hooked giant manta rays while casting at manta rays when fishing for cobia. In addition, 93% of anglers reported having observed giant manta rays with hooks and training lines or evidence of vessel strike injuries. In Braun et al. (2024), anglers described the hooked and entangled manta rays as looking “like a Christmas tree” or “like Mardi Gras”, suggesting individual manta rays are having a multitude of interactions with anglers in this fishery. Overcrowding and increased vessel activity is also a vessel strike concern as anglers have reported seeing an average maximum of 22 boats (range: 1–50) surrounding a single ray or group of rays at the same time (Braun et al., 2024). The available information indicates that this fishing practice results in a potentially significant amount of incidental hooking and an increased risk of vessel strike to the species in this area. Furthermore, it is likely that vessel overcrowding and incidental hooking are disrupting giant manta rays use of this area; including migration, feeding, and potentially reproduction as this area appears to be important habitat for this species (Pate 2023; 84 FR 66652; December 5, 2019).

#### *Menhaden Purse Seine Fishery*

The Gulf Menhaden Purse Seine Fishery occurs in state waters (e.g., bays, sounds, and nearshore coastal waters), primarily off Louisiana and Mississippi, with limited effort off Texas, Alabama, and Florida prohibits the use of purse seine gear (SEDAR 2018). This fishery is managed by the individual States under the Gulf States Marine Fisheries Commission Interstate Gulf Menhaden Fishery Management Plan (SEDAR 2018). The fishing season runs from the 3rd week of April through November 1st, approximately 140 days and the median number of sets per day is 4–5 (SEDAR 2018; Mroch 2018). The Mid-Atlantic Menhaden Purse Seine Fishery also occurs in state waters – this management unit is defined as the range of Atlantic menhaden within U.S. Atlantic, from the estuaries eastward to the offshore boundary of the EEZ (SEDAR 2020). The fishery is managed by the Atlantic States Marine Fisheries Commission under the Interstate Fishery Management Plan for Atlantic Menhaden (SEDAR 2020). Most sets occur within 3 miles of shore, with the majority of the effort occurring off North Carolina from November to January, and moving northward during warmer months to southern New England. Fishing effort is year-round with concentrated migratory peaks from May to September from Virginia northward, and November to January in North Carolina (MMPA LOF).

The gear and fishing methods used by the tuna purse-seine fisheries are similar to those used in the menhaden purse-seine fisheries in the Gulf and Mid-Atlantic. The tuna purse-seine fisheries operating in the Atlantic Ocean and Indo-Pacific Ocean are a significant source of mortality for giant manta rays. While the menhaden purse-seine fisheries deploy shorter nets (i.e., 100–1400 ft) (SEDAR 2018) compared to the tuna purse-seine fisheries (4900–6500 ft) (Hall and Roman, 2013), the menhaden purse-seine fisheries operate similarly, by dropping a large cylindrical net and cinching it together at the bottom, like a drawstring purse, so that everything above is caught. The timing and location of the menhaden purse-seine fisheries overlap with the highest occurrences of giant manta rays, particularly in the Gulf, suggesting that interactions may be occurring. The Gulf Menhaden Purse Seine Fishery fishes primarily within Louisiana and

Mississippi from the third week of April through the first week of November (SEDAR 2018). A species distribution model developed by Farmer et al., (2022), predicted the highest nearshore occurrence of giant manta rays within the Mississippi delta region from April to June and again from October to November. In addition, researchers conducting giant manta rays surveys (May and September, 2023) in coastal Louisiana have documented giant manta rays within close proximity of purse-seine fishing operations (C. Horn personal observations 2023; J. Pate unpublished 2023). Thus, multiple lines of evidence suggest the Gulf menhaden purse-seine fishing effort heavily overlaps with the peak nearshore occurrence of giant manta rays in the region. Along the U.S. Atlantic, Farmer et al., (2022) predicted the highest nearshore occurrence of giant mantas off northeast Florida during April, with the distribution extending northward along the shelf-edge as temperatures warm, leading to higher occurrences north of Cape Hatteras, North Carolina from June to October, and then south of Savannah, Georgia from November to March as temperatures cool. This suggests potential for spatiotemporal overlap between giant manta rays in the Atlantic and the Mid-Atlantic Purse Seine Fishery.

There is no direct evidence (i.e., bycatch data) showing that these fisheries are interacting with giant manta rays; however, the Gulf and Mid-Atlantic Purse Seine fisheries have inconsistent observer coverage and no requirements for reporting giant manta ray bycatch. Yet, it is widely understood that purse seine fisheries are a significant threat to giant manta rays (NMFS, 2024); considering this in combination with the spatiotemporal overlap between areas of high abundance and fishing effort, it is likely that interactions are occurring but being unobserved and/or unreported. To fully understand this potential threat, as well as potential management measures for minimizing any impacts to the species, more information is needed.

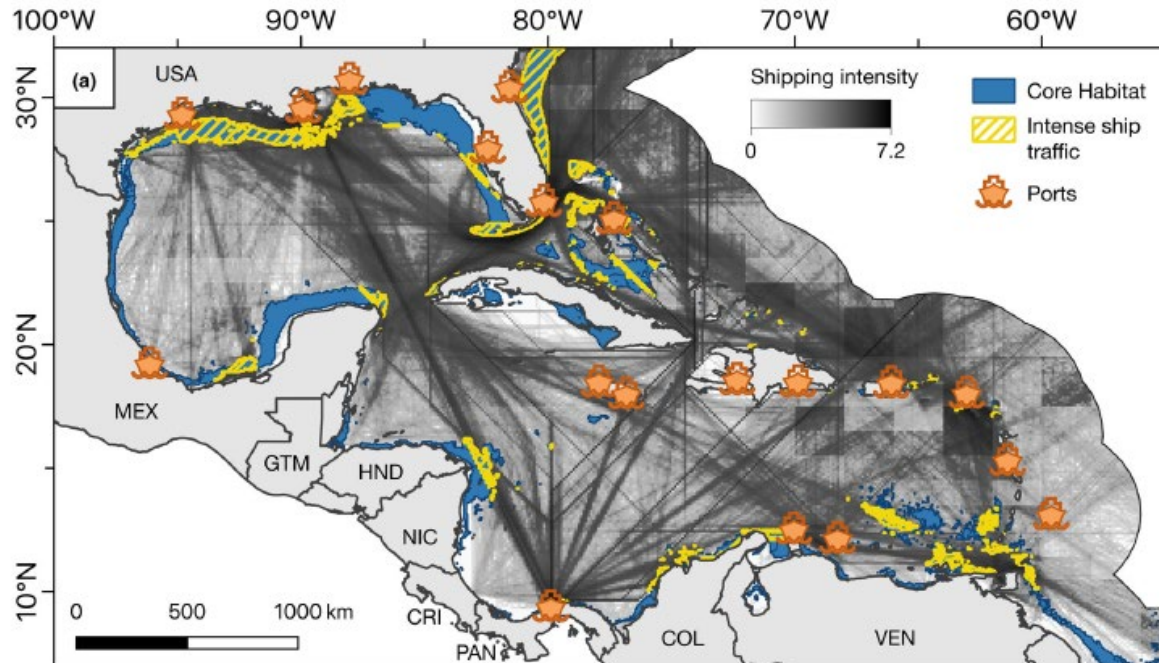
### *Recreational Fishing*

Recreational fishing from private vessels and fishing piers may interact with giant manta rays. For example, giant manta rays have been observed and reported foul-hooked from boats, fishing piers, jetties, and by recreational anglers fishing for sharks during tournaments. Pate and Marshall (2020) found that 27% of the observed giant manta rays in southeast Florida were foul-hooked or entangled in fishing line, and, of those, 38% interacted with fishing gear more than once. More recent data found that of 152 individual manta rays recorded in southeast Florida, 23.7% had interactions with recreational fishing gear and, of those, 61% had multiple interactions (C. Horn., NMFS, pers comm to J. Pate, 2023). These manta rays were commonly seen in the vicinity of fishing piers and inlet jetties (Pate and Marshall, 2020) and anglers have been observed casting at juvenile manta rays (J.H. Pate unpublished data). NMFS has also documented several manta ray captures by anglers targeting sharks from the shore and also from vessels (C. Horn unpubl. data). While some fishing interactions may result in minimal permanent injury to the manta ray, they likely cause considerable stress and possible sub-lethal effects. When fishermen have accidentally hooked manta rays, fight times have been over one hour (J. Pate unpubl. data cited in Pate and Marshall, 2020). Fight time is correlated with physiological stress (i.e., lactate production) in elasmobranchs, with smaller sharks producing more lactate than larger sharks (Gallagher et al. 2014). Fishing line entanglement can have non-lethal effects, including truncated cephalic fins (Deakos et al., 2011), deep lacerations to the body (Pate and Marshall 2020), stress (Gallagher et al., 2014), and impaired feeding or swimming. In addition, amputations and disfigurements, specifically those of the cephalic fin, may reduce feeding efficiency, and the absence of this fin may negatively affect size, growth rate and reproductive

success (Marshall and Bennett 2010, Deakos et al., 2011, Couturier et al., 2012, Stewart et al., 2018a). While no manta ray deaths have been directly attributed to recreational fishing, mortality may be cryptic as manta rays are negatively buoyant, reducing the likelihood of dead animals washing ashore.

### *Vessel Strike*

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). Occurrence of vessel strikes are spatially variable and are more likely to occur where vessel density and manta ray aggregation along surface waters is high. For example, off the Ningaloo Coast, vessel strikes were highest during the seasonal aggregation of manta rays, which was attributed to an abundance of zooplankton around the area (McGregor et al., 2019). In French Polynesia, manta rays near inhabited islands are more likely to be observed with sub-lethal injuries caused by fishing gear or boat strikes than manta rays near uninhabited islands (Carpentier et al., 2019). In southeast Florida where human activity is heavily concentrated, vessel strike injuries were one of the most common sources of injuries for juvenile giant manta rays in the region, (Pate and Marshall 2020). In addition, in some parts of their range, such as the northwest Atlantic, it is likely that the seasonal contraction of suitable manta ray habitat during the warmer months increases their proximity to busy ports and could pose a serious threat to the species (Garzon et al., 2020). For example, Garzon et al. (2020) found that the Southeast U.S. followed by Venezuela and The Bahamas had the largest areas of overlap between predicted core manta ray habitat areas and intense commercial vessel traffic (Figure 11).



**Figure 11. Core manta ray habitat predicted through ensemble ecological niche models with ship traffic, shipping routes and major ports displayed across the western central Atlantic. Source: Garzon et al. (2020).**

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 (Strikes et al., 2022). For example, human activity and vessel traffic is extremely high in the giant manta ray nursery habitat along Florida's Atlantic coast and vessel strikes are one of the most common sources of injuries to juvenile giant manta rays that frequent the coastal waters there (Pate and Marshall, 2020). Of the known individual giant manta rays ( $n=179$ ) occurring in southeast Florida, 15 individuals (8.4%) have been recorded with apparently non-lethal vessel strike injuries between June 2016 and December 2023 (J. Pate, pers. comm. to C. Horn, NMFS SERO PRD, January 12, 2024). However, interpreting reported vessel strike data can be difficult due to the fact that many vessel strikes are not detected and/or go unreported and there are reporting biases related to spatial coverage of reports (Pate and Marshall 2022; Garzon et al., 2020; McGregor et al., 2019). One source of underreporting for manta ray vessel strikes is the rapid wound healing characteristic of the species; McGregor et al. (2019) found that manta ray wound healing follows a negative exponential curve, with 37% of the wound closed after 33 days and 95% of the wound closed after 295 days. This suggests that for approximately 19% (295/365 days) of the year, surveys might not record a vessel strike due to rapid wound healing. Further, researchers note that identifying vessel strike injuries beyond the 95% healing is exceedingly difficult, especially when most photographs are poor quality making it difficult to observe the injury (C. Horn, NMFS pers comm. to J. Pate, MMF, July 18, 2024).

No information is currently available to estimate mortality rates to giant manta rays from vessel strikes. However, for sea turtles, greater than 75% of vessel strikes result in mortality with only



10 – 20% of vessel strikes being observed (Foley et al., 2019). The mortality rate for giant manta rays is likely higher because the giant manta ray's head and body cavity, which includes all major organs, is large, making up about approximately half of their body's surface area. While surface feeding and basking their body cavity and head are at the surface, unlike sea turtles, the giant manta ray has no hard shell to protect their vital organs, thus, making it more likely that injuries sustained to the head and body will be fatal. It is notable that all the vessel strike injuries documented within the southeast Florida survey domain have occurred on the individual's pectoral fins, not the head or body. Lethal vessel strikes are unlikely to be observed because giant manta rays sink once they die due to their lack of a swim bladder. For these reasons, the giant manta ray mortality rate and unobserved vessel strike death rate may be higher than sea turtles.

### *Entanglement*

The giant manta ray must constantly swim in order to move water over their gills to breathe and mooring line entanglement can significantly restrict their ability to swim, rapidly leading to asphyxiation and death (Manta Trust 2019). Entanglement in mooring, anchor line, and buoy lines can also cause disfigurements and amputations (i.e., missing cephalic lobes) (Braun et al., 2015; Convention on Migratory Species 2014; Couturier et al., 2012; Deakos et al., 2011; Germanov and Marshall 2014; Heinrichs et al., 2011). Giant manta rays cannot swim backwards and often cannot see a thin mooring line directly in front of them as they swim forward. It is likely that giant manta rays become entangled because when the line makes contact with the front of the head between the cephalic lobes, the animal's reflex response is to close the cephalic lobes, thereby trapping the rope, which entangles the animal as it begins to roll in an attempt to free itself (A. Marshall pers comm to C. Horn, NMFS, 2019). In 2017, a giant manta ray was documented as dead, entangled in a vessel exclusion line (steel cable) near Pompano Beach, Florida. The female measured 2.48 m in disc width and had no other signs of injury or fishing line entanglement. It is likely that the manta ray became entangled in the line and drowned (Pate et al., 2020). In Hawaii, numerous manta rays have been reported to have died or have evidence of injury (i.e., amputations or disfigurements) as a result of entanglement in mooring lines (Deakos, 2011). Mooring line entanglements have resulted in the death of numerous manta rays in the Maldives (Manta Trust, 2019). There have been several reported incidences of giant manta ray entanglements on vertical lines deployed during oil and gas activities. Oil and gas activities can deploy numerous vertical lines during operation including diver downlines, acoustic buoy release lines, acoustic pinger lanyards, nodal tether cables, and nodal lanyards etc. Similar to mooring line entanglements discussed above, the giant manta ray cannot see a vertical line directly in front of them and they become entangled once the line makes contact with their head. There have been several confirmed reports of giant manta rays becoming entangled in vertical lines deployed by commercial oil and gas divers in the Gulf in recent years (C. Horn and N. Famer unpubl. data 2022). For example, in 2013, 2021, and 2022, there were reports of giant manta rays entangled in a vertical downlines deployed by oil and gas divers. In addition, commercial oil and gas divers have reported numerous incidences of large rays, possibly giant manta rays in close proximity to underwater operations. It is thought that zooplankton are attracted to the underwater lights deployed by commercial divers. The amassing of zooplankton may be attracting giant manta rays to underwater operation sites where vertical lines are deployed increasing the risk of entanglement (C. Horn, NMFS, personal observation).

### *Marine Pollution*

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

### *Oil and Gas Activities*

A recent ecological vulnerability assessment of elasmobranchs and other large pelagic fish found that giant manta rays have the highest ecological vulnerability (compared to other elasmobranch species) to oil spills within the Gulf (Romo-Curiel et al., 2022). Giant manta rays are highly susceptible to the negative health effects associated with oil exposure as they are filter feeders that form seasonal aggregations near oil and gas infrastructure in the Gulf (Carpenter, 2002; De la Parra Venegas et al., 2011; Couturier et al., 2012; Hueter et al., 2013; Worm et al., 2017; Germanov et al., 2018; Stewart et al., 2018; Kahane-Rabbort et al., 2022).

Giant manta rays can also come into contact with oil while swimming, resting, basking, and feeding in their habitats impacted by oil spills. Because giant manta rays are negatively buoyant, carcasses will sink, suggesting a low probability of observing lethal oil impacts to the species. Direct contact with oil can result in significant health effects and jeopardize the giant manta ray's survival. The effects of ingesting indigestible particles such as oil include blocking adequate nutrient absorption and causing mechanical damage to the digestive tract. The giant manta ray may also ingest toxins through their prey since zooplankton can be contaminated with oil and other toxins (Fossi et al., 2014; Cole et al., 2013; Setälä et al., 2014; Goswami et al., 2023) causing significant health implications. While studies have suggested that highly mobile fish, like the giant manta ray, may actively shift habitat to avoid oil, thereby reducing or minimizing exposure, this active avoidance may alter important behavior (i.e., foraging and reproduction) and migration patterns having detrimental effects on populations (Pulster et al., 2020; Dornberger et al., 2020; Romo-Curiel et al., 2022).

### *Climate Change*

Warming oceans cause changes in ocean acidity, oxygen content, oceanic circulation, and primary productivity dynamics, ultimately affecting food web structure and the distribution and

availability of manta ray prey (Moloney et al., 2011). The major impact of climate change on manta rays is likely to be the projected decline in zooplankton biomass in tropical waters (Stewart et al., 2018a). Biogeochemical models project that global zooplankton biomass declined from 7 – 16% from 1980 to 2100 (Chust et al., 2014; Stock et al., 2014; Woodworth-Jefcoats et al., 2017; Heneghan et al., 2023), but some regions, particularly those in the tropics, could experience >50% decline in zooplankton biomass (Stock et al., 2014). While it is unknown how this broad-scale decline in zooplankton biomass at the tropics could impact local areas where giant manta rays feed, the most likely outcome is that there will be lower zooplankton biomass available for manta rays. In addition, changes in climate and oceanographic conditions, such as acidification, are also known to affect zooplankton structure (size, composition, and diversity), phenology, and distribution (Guinder and Molinero 2013). As such, the migration paths and locations of both resident and seasonal aggregations of manta rays, which depend on these animals for food, may similarly be altered (Australian Government 2012; Couturier et al., 2012). To date, warming in northern latitudes off the US East Coast appears to have resulted in a significant northerly shift of manta ray distribution (Farmer et al., 2022). Resulting changes in zooplankton availability could affect the behavior and health of giant manta ray populations. For example, shifts in seasonal migration patterns to feeding grounds and nursery areas could have profound impacts on the species' survival. Additionally, some giant manta rays use coral reefs as cleaning stations where small fish remove parasites and dead or diseased skin from their bodies. As sensitive reef habitats degrade due to climate-driven changes, the abundance of cleaning stations and cleaner fish may be reduced (Jones et al., 2004; Graham et al., 2008). The loss of cleaning opportunities can hinder the giant manta ray's ability to reduce parasitic loads and dead tissue, leading to increased disease and reduced survival.

### *Aquarium Trade*

The giant manta ray is traded internationally for display in public aquariums around the globe. Yet, there is limited information available on the number of animals taken from wild populations for the aquarium trade. There are several known aquariums that display manta rays harvested from wild populations for public display. These aquariums include the Georgia Aquarium (United States), Okinawa Churaumi Aquarium (Japan), Nausicaá National Sea Center (France), Atlantis Resort (The Bahamas), S.E.A Aquarium (Singapore), and uShaka Marine World (Durban, South Africa). The available information indicates that while some manta rays have died in captivity, others are transferred among aquariums. For example, the manta ray at uShaka Marine World outgrew its tank, and was eventually transferred to the Georgia Aquarium (Banks 2008). While most wild harvested individuals remain in captivity, the Atlantis Resort is one facility that has successfully returned 13 individuals to the wild populations (Rutger 2018). There is limited information available on the total number of individuals harvested for exhibition/aquarium purposes and whether those individuals are giant manta rays or reef manta rays. The only international trade data available comes from the CITES Trade Database. Since the giant manta ray was listed under Appendix II in 2016, the CITES Trade Database (<https://trade.cites.org/>) reports that two giant manta ray export permits were issued, both in 2018, for France to receive two giant manta rays from the United States for exhibition purposes.

With respect to domestic trade, Florida is the only state within the U.S. that authorizes giant manta ray harvest for aquarium and exhibition purposes. While giant manta rays are prohibited from harvest in Florida, the Florida Fish and Wildlife Conservation Commission's (FWC)

authorizes harvest under a Special Activity License (SAL) for exhibition purposes. In 2009 and 2010, three giant manta rays were harvested from Florida's waters for exhibition purposes for the Georgia Aquarium. More recently, from 2019 to 2022, the FWC has issued 17 SALs for harvest for exhibition purposes. These SALs were issued to a number of aquarium facilities that were not previously known to exhibit/display manta rays, including: Nausicaá National Sea Center (France), Hainan Ocean Paradise (Hainan, China), Rizhao Ocean Park (Shandong, China), Changxing Taihu Longzhimeng Sea World (Shanghai, China), Chongqing Andover Ocean Park (Chongqing, China), SeaWorld Abu Dhabi (United Arab Emirates), and The National Aquarium LLC (Maryland, United States) (L. Gregg pers comm to C.Horn July 18, 2023). Yet, despite the SALs being issued, the facilities were not successful in harvesting any individuals from Florida waters. In addition, no CITES export permits were issued for the harvest licensed by the FWC. The FWC sets its annual harvest quota based on the traditional level of harvest request that the state has received for exhibition purposes (L. Gregg pers com to C. Horn, July 18, 2023).

### *Other Threats*

While the overwhelming cause of species decline is fishing mortality, other non-lethal effects occur from numerous lesser threats, such as coastal development, anthropogenic noise, toxic blooms from algae and other microorganisms, military detonations and training exercises, in-water construction activities, aquaculture, and tourism. Coastal shoreline and lagoon habitats, which may serve as important nursery areas, are especially sensitive to habitat degradation, pollution, and sedimentation (McCauley et al., 2012, 2014; Stewart et al., 2018b; Pate and Marshall 2020). While these threats are known, the extent to which these impacts may affect individual health and overall population fitness is unclear (Couturier et al., 2012; Croll et al., 2016; Stewart et al., 2018).

## **5 ENVIRONMENTAL BASELINE**

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### **5.1 Overview**

This section describes the effects of past and ongoing human and natural factors contributing to the current status of the 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 at 29.9469°, -85.426° (NAD 83) in Mexico Beach, Bay County, Florida. The proposed City of Mexico Beach Fishing Pier is located on Florida's northwest coast, along the eastern side of the Gulf, just south of the terminal end of Crooked Island. The proposed pier lies 0.33 mi due south of the Mexico Beach Canal outlet (Figure 3).

### *5.2.1 Sea Turtles*

There has been one reported capture of a loggerhead sea turtle at the City of Mexico Beach Public Fishing Pier according to the STSSN offshore data for the years 2007-2016. Based on STSSN recreational hook-and-line capture and entanglement data, we believe green sea turtle (North Atlantic DPSs), Kemp's ridley sea turtle, and loggerhead sea turtle (Northwest Atlantic DPS) may be in the action areas and adversely affected by recreational hook-and-line fishing that will occur at the pier upon completion of the proposed actions. All of these sea turtle species are migratory, traveling to forage grounds or for reproduction purposes. The Gulf waters within the action areas are likely used by these species of sea turtle for developmental and foraging habitat. NMFS believes that no individual sea turtle is likely to be a permanent resident of the action areas, although some individuals may be present at any given time. These same individuals will migrate into offshore waters of the Gulf, Caribbean Sea, and other areas of the North Atlantic Ocean at certain times of the year, and thus may be affected by activities occurring there. Therefore, the status of the sea turtles species in the action areas are considered the same as those discussed in Sections 4.1.1-4.1.3.

### *5.2.2 Giant manta ray*

NMFS is not aware of any reported recreational hook-and-line captures of a giant manta ray at the Mexico Beach Fishing Pier. Giant manta rays can occur in coastal bays, intracoastal waterways, tidal inlets, and in estuarine systems (e.g., sounds and lagoons). Giant manta rays are observed feeding in tidal outflows, inlets, and river mouths (feeding around outfall plumes) (Adams and Amesbury 1998; Milessi and Oddone 2003; Pate and Marshall 2020; Farmer et al. unpublished). They are also commonly observed swimming near or underneath public fishing

piers where they may become foul-hooked. Due to the proposed pier's position on an ocean-facing beach, we believe giant manta ray may be adversely affected by recreational fishing that will occur at the pier upon completion of the proposed action. NMFS believes that no individual giant manta ray is likely to be a permanent resident of the action area, although some individuals may be present at any given time. These same individuals will migrate into coastal and offshore waters of the Gulf and the North Atlantic Ocean, and thus may be affected by activities occurring there. Therefore, the status of giant manta ray in the action area, including the threats, are the same as those discussed in Section 4.2.

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

#### *5.3.1 Federal Actions*

##### *ESA Section 7 Consultations*

There have been two previously federally permitted projects known to have occurred within the action area, as per a review of the NMFS Protected Resources Division's completed consultation database by the consulting biologist on December 30, 2024. One of the federally permitted projects was an extension and continued operation of the City of Mexico Beach Fishing Pier in 2008 (SER-2008-06577, SAJ-2002-7363). As noted, above, however, the City of Mexico Fishing Pier was damaged in 2018 and removed in 2019 under Emergency Consultation SER-2019-19764. The second federally permitted project was the NC & FL Marine Debris Project (SERO-2020-01548), which received a letter of concurrence from NMFS on June 2, 2020. Other fishing piers (outside of the action area) that also require federal permits have been subject to formal consultation, resulting in Biological Opinions and measures to minimize the impact of associated take. Those consultations generally found fishing piers adversely affect sea turtles via incidental hooking and entanglement resulting from actively-fished lines, discarded, remnant, or broken-off fishing lines, and other marine debris.

##### *Federal Dredging Activity*

Marine dredging vessels are common within U.S. coastal waters. 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. Still, the construction and maintenance of federal navigation channels and dredging in sand mining sites (borrow areas) have been identified as sources of sea turtle mortality. Hopper dredges in the dredging mode 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. Relocation trawling has been successful and routinely moves sea turtles in the Gulf. We have consulted on numerous individual dredging projects (including maintenance dredging, beach nourishment, and sand mining operations), as well as conducted larger, regional Opinions. Each

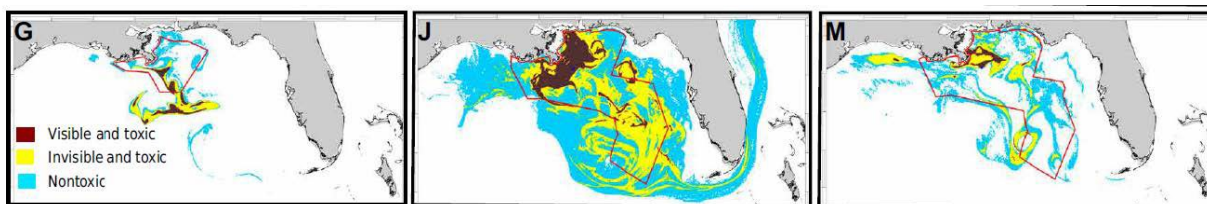
of these Opinions had its own ITS and determined that hopper dredging during the proposed actions would not jeopardize any species of sea turtles or other listed species, or destroy or adversely modify critical habitat of any listed species.

The construction and maintenance of federal navigation channels and sand mining (“borrow”) areas has also been identified as a source of sea turtle mortality. Hopper dredges move relatively rapidly (compared to sea turtle swimming speeds) and can entrain and kill sea turtles as the drag arm of the moving dredge overtakes the slower moving sea turtle. We originally completed a regional Opinion on the impacts of USACE’s maintenance dredging and sand mining operations in the Gulf in 2003 (i.e., GRBO). We revised the GRBO in 2007 (NMFS 2007c), and concluded that: 1) Gulf hopper dredging would adversely affect 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 would not adversely affect leatherback sea turtles. An Incidental Take Statement for adversely affected species was issued in this revised Opinion.

#### *Impact of DWH Oil Spill on Status of Sea Turtles*

On April 20, 2010, while working on an exploratory well approximately 50 mi offshore Louisiana, the semi-submersible drilling rig DWH experienced an explosion and fire. The rig subsequently sank and oil and natural gas began leaking into the Gulf. Oil flowed for 86 days, until the well was finally capped on July 15, 2010. Millions of barrels of oil were released into the Gulf. Additionally, approximately 1.84 million gallons of chemical dispersant was applied both subsurface and on the surface to attempt to break down the oil.

The DWH event and associated response activities (e.g., skimming, burning, and application of dispersants) have resulted in adverse effects on ESA-listed sea turtles. The maps below (Figure 12, Berenshtein et al. 2020) show the spread of the DWH spill and the areas affected, which includes the action area. The effects of the DWH spill on the ESA-listed sea turtles was discussed in Section 4.1, above.



**Figure 12. The spread of the impacts from the DWH spill; G from 15 May 2010, J from 18 June 2010, M from 2 July 2010 (Berenshtein et al. 2020).**

#### *ESA Permits*

Sea turtles are the focus of research activities authorized by Section 10 permits under the ESA. Regulations developed under the ESA allow for the issuance of permits allowing take of certain ESA-listed species for the purposes of scientific research under Section 10(a)(1)(a) of the ESA. 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) nonlethal. Before any

research permit is issued, the proposal must be reviewed under the permit regulations. In addition, since issuance of the permit is a federal activity, our issuance of the permit must also be reviewed for compliance with Section 7(a)(2) of the ESA to ensure that issuance of the permit does not result in jeopardy to the species or the destruction or adverse modification of its critical habitat. Per a search of the NMFS Authorizations and Permits for Protected Species database (<https://apps.nmfs.noaa.gov/>) by the consulting biologist on October 9, 2024 there are 32 active Section 10(a)(1)(A) scientific research permits applicable to green, Kemp's ridley, and loggerhead sea turtles that have the potential to occur within the action area. These permits allow the non-lethal capture, handling, sampling, tagging, and release of all life stages of these turtle species. There are no active Section 10(a)(1)(A) scientific research permits applicable to giant manta ray that have the potential to occur within the action area.

### *Fisheries*

Within the action area, both recreational and commercial fisheries occur in state/territorial 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 pots ("ghost gear") often wind up settling in and around coral reefs and habitat suitable for coral recruitment (hardbottom substrate) and is becoming better-documented as a source of human-caused mortality in sea turtles (Barnette 2017). 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. Reductions in fish populations, whether natural or human-caused from activities such as fishing, may affect the survival and recovery of ESA-listed species that feed on these fish.

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. NMFS (2002a) estimated that 62,000 loggerhead turtles have been killed as a result of incidental capture and drowning in shrimp trawl gear. Although sea turtle excluder devices 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. Data compiled by the Florida Sea Turtle Stranding and Salvage Network shows that along the coast of the Southeast U.S., from 2007-2015 approximately 300 sea turtles were reported as having recreational hook-and-line interactions (Florida Sea Turtle Stranding and Salvage Network). Recreational hook-and-line interactions are also known to giant manta ray.

Fisheries in federal waters have been the subject of multiple Section 7 consultations in the action area. 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 Fishery



Management Plan, 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, occurring at least in part within the action area, found likely to adversely affect threatened and endangered species: Atlantic swordfish/tuna/billfish, Atlantic shark fisheries, Caribbean reef fish fishery, Caribbean spiny lobster fishery, coastal migratory pelagic, dolphin/wahoo, South Atlantic snapper-grouper, Southeast shrimp trawl, and tilefish fisheries. An ITS has been issued for the take in each of these fisheries. None of the Opinions for these fisheries concluded that the fisheries at issue were likely to jeopardize ESA-listed species or adversely modify designated critical habitat. Detailed information regarding the effects of each fishery can be found in the respective Biological Opinions.

### *5.3.2 State and Private Actions*

#### *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 that operate in the action area may adversely affect sea turtles. On December 16, 2016, we published a notice of availability of our DEIS (EIS No. 20160294; 81 FR 91169) as well as a proposed rule (81 FR 91097) in the *Federal Register* to address incidental bycatch and mortality of sea turtles in the Southeastern U.S. shrimp fisheries. The proposed rule would have revoked the alternative tow time restrictions for skimmer trawls, pusher-head trawls, and wing nets (butterfly trawls) at 50 CFR 223.206(d)(2)(ii)(A)(3), and require those vessels to use TEDs designed to exclude small turtles while fishing. On December 20, 2019 (84 FR 70048), we published a final rule that requires all skimmer trawls 40 ft and greater in length to use TEDs designed to exclude small sea turtles in their nets effective August 1, 2021.

Other trawl fisheries, such as ones operating for blue crab and sheepshead, may also interact with sea turtle populations in state waters. Many of these vessels are shrimp trawlers that alter their gear in other times of the year to target these other species. At this time, however, we lack sufficient information to quantify the level of anticipated take that may be occurring in these other trawl fisheries.

#### *Recreational Fishing*

Recreational fishing as regulated by the State of Florida can affect green sea turtle (North Atlantic and South Atlantic DPSs), Kemp's ridley sea turtle, and loggerhead sea turtle (Northwest Atlantic DPS) within the action areas. Pressure from recreational fishing in and adjacent to the action areas is likely to continue.

As stated above, there has been 1 reported recreational hook-and-line capture of a loggerhead sea turtle at the Mexico Beach Fishing Pier according to the STSSN data for the years 2007-2016.

We have no way of knowing how many unreported captures of these species may have occurred at the pier in the past. Observations of state recreational fisheries have shown that loggerhead sea turtles are known to bite baited hooks and frequently ingest the hooks. Overall, hooked sea turtles have been reported to the STSSN by the public fishing from boats, piers, and beach, banks, and jetties and from commercial anglers fishing for reef fish and for sharks with both single rigs and bottom longlines (NMFS 2001). 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 area. A detailed summary of the known impacts of hook-and-line incidental captures to Kemp's ridley and loggerhead sea turtles can be found in the TEWG reports (1998; 2000).

Giant manta ray is incidentally captured by recreational fishers using vertical line (i.e., handline, bandit gear, and rod-and-reel). Researchers frequently report giant manta rays having evidence of recreational gear interactions along the east coast of Florida (i.e., manta rays have embedded fishing hooks with attached trailing fishing line) (J. Pate, Florida Manta Project, unpublished data). Internet searches also document recreational interactions with giant manta rays. For example, recreational fishers will search for giant manta rays while targeting cobia, as cobia often accompany giant manta rays. Giant manta rays are commonly observed swimming near or underneath public fishing piers where they may become foul-hooked.

#### *Coastal Development*

Beachfront development, lighting, and beach erosion control all are ongoing activities along the Florida coastline, including the barrier islands near 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. 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*

Sources of pollutants along the coast that may affect green sea turtle (North Atlantic DPSs), Kemp's ridley sea turtle, loggerhead sea turtle (Northwest Atlantic DPS) and giant manta ray include PCB loading, stormwater runoff from coastal towns and cities into rivers and canals emptying into bays and the ocean, and groundwater and other discharges (Vargo et al. 1986). Although pathological effects of oil spills have been documented in laboratory studies of marine mammals and sea turtles (Vargo et al. 1986), the impacts of many other anthropogenic toxins have not been investigated. Additionally, anthropogenic marine debris is known to affect ESA-listed sea turtle species and giant manta ray; however, the effects are difficult to measure. Where possible, conservation measures are being implemented to monitor or study the effects to sea turtles from these sources.

The development of marinas and docks in inshore waters can negatively affect 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 analyzed in this Opinion travel between near shore and offshore habitats and

may be exposed to and accumulate these contaminants during their life cycles within the action area.

The accumulation of organic contaminants and trace metals has been studied in loggerhead, green, and leatherback sea turtles (Aguirre et al. 1994, Caurant et al. 1999, McKenzie et al. 1999, Corsolini et al. 2000). Omnivorous loggerhead sea turtles had the highest organochlorine contaminant concentrations in all the tissues sampled, including those from green and leatherback turtles (Storelli, Barone et al. 2008). It is thought that dietary preferences were likely to be the main differentiating factor among species. (Sakai, Ichihashi et al. 1995) found the presence of metal residues occurring in loggerhead sea turtle organs and eggs. (Storelli, Ceci et al. 1998) analyzed tissues from 12 loggerhead sea turtles stranded along the Adriatic Sea (Italy) and found that characteristically, 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, Fileman et al. 1991). No information on detrimental threshold concentrations is available, and little is known about the consequences of exposure of organochlorine compounds to sea turtles. Research is needed on the short- and long-term health and fecundity effects of chlorobiphenyl, organochlorine, and heavy metal accumulation in sea turtles.

#### *5.3.4 Acoustic Impacts*

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

#### *5.3.5 Stochastic Events*

Seasonal stochastic (i.e., random) events, such as hurricanes or cold snaps, occur in the action area on a seasonal basis and can affect green sea turtle (North Atlantic DPS), Kemp's ridley sea turtle, loggerhead sea turtle (Northwest Atlantic DPS), and giant manta ray in the action area. These events are unpredictable, and their effect on the recovery of these ESA-listed sea turtles and giant manta ray is unknown; yet, they have the potential to directly impede recovery if animals die as a result or indirectly if important habitats are damaged.

#### *5.3.6 Climate Change*

There is a large and growing body of literature on past, present, and future impacts of global climate change. Potential effects commonly mentioned include changes in sea temperatures and salinity (due to melting ice and increased rainfall), ocean currents, storm frequency and weather patterns, and ocean acidification. These changes have the potential to affect species behavior and ecology including migration, foraging, reproduction (e.g., success), and distribution. For example, sea turtles currently range from temperate to tropical waters. A change in water temperature could result in a shift or modification of range. Climate change may also affect marine forage species, either negatively or positively (the exact effects for the marine food web upon which sea turtles rely is unclear, and may vary between species). It may also affect migratory behavior (e.g., timing, length of stay at certain locations). A shift to higher

temperatures could also affect hatchling sex ratios resulting in a higher number of females. These types of changes could have implications for sea turtle recovery within the action area.

With regard to the action area, global climate change may affect the timing and extent of population movements and their range, distribution, species composition of prey, and the range and abundance of competitors and predators. Changes in distribution including displacement from ideal habitats, decline in fitness of individuals, population size due to the potential loss of foraging opportunities, abundance, migration, community structure, susceptibility to disease and contaminants, and reproductive success are all possible impacts that may occur as the result of climate change. Still, more information is needed to better determine the full and entire suite of impacts of climate change on sea turtles and specific predictions regarding impacts in the action area are not currently possible.

## **6 EFFECTS OF THE ACTION**

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### **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.

### **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***

Green sea turtle (North Atlantic DPS), Kemp's ridley sea turtle, loggerhead sea turtle (Northwest Atlantic DPS), and giant manta ray may be physically injured if struck by equipment or materials during construction activities. As discussed in Section 3.1.2, we believe that such route of effect is extremely unlikely to occur. These species are expected to exhibit avoidance behavior by moving away from physical disturbances. In addition, the implementation of NMFS SERO's Protected Species Construction Conditions (NMFS 2021) will require all construction workers to observe in-water activities for the presence of these species. Operation of any mechanical construction equipment shall cease immediately if a sea turtle is seen within 150 ft of operations. Activities may not resume until the protected species has departed the project area of its own volition. 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.

Green (North Atlantic DPS), Kemp's ridley, and loggerhead (Northwest Atlantic DPS) sea turtles may be affected by their temporary inability to access the in-water or nearshore portion of the project area for foraging, refuge, and nesting habitat due to their avoidance of construction activities and related noise. As discussed in Section 3.1.2, we anticipate any habitat exclusion effects to these species will be temporary and unmeasurable and, therefore, insignificant. Given the action area's lack of seagrass, use of the in-water area by sea turtle species for foraging and refuge is expected to be infrequent. Additionally, all new pier lighting will be sea turtle friendly so as not to disrupt adult, female turtles entering or hatchlings leaving the adjacent beaches post-construction. Further, the pier's footprint during and after construction is not expected to obstruct access to the beaches adjacent to the pier.

Green, Kemp's ridley, and loggerhead sea turtles, and giant manta ray may be injured due to entanglement in improperly discarded fishing gear resulting from future use of the replacement pier after completion of the proposed action. As discussed in Section 3.1.2, we believe this route of effect is extremely unlikely to occur. The applicant will install and maintain fishing line recycling receptacles and trash cans with lids mid-pier and at the terminal end to keep debris out of the water, and we expect that anglers will appropriately dispose of fishing gear when disposal bins are available. The receptacles will be clearly marked and will be emptied regularly to ensure they are not overfilled and that fishing lines are disposed of properly. Further, the applicant will perform annual in-water and out-of-water fishing debris cleanup in addition to a minimum of 2 park clean ups annually by volunteer groups, minimizing the accumulation of fishing line over time. The effect of improperly disposed of and lost/snagged fishing gear is discussed generally in Section 4.1.

Furthermore, as discussed in Section 3.1.2, noise created by pile driving activities can physically injure animals or change animal behavior in the affected areas. Injurious effects can occur in two ways. First, immediate adverse effects can occur to listed species if a single noise event exceeds the threshold for direct physical injury. Second, effects can result from prolonged exposure to noise levels that exceed the daily cumulative exposure threshold for the animals, and these can constitute adverse effects if animals are exposed to the noise levels for sufficient periods. Behavioral effects can be adverse if such effects interfere with animals migrating, feeding, resting, or reproducing, for example. Our evaluation of effects to listed species as a result of noise created by construction activities is based on the analysis prepared in support of the Opinion. The noise analysis in this consultation evaluates effects to ESA-listed fish and sea turtles identified by NMFS as potentially affected in the table above.

As explained in Section 3.1.2, we use the proposed action's pile driving information and NMFS Multi-Species Pile Driving Tool 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.

Based on noise calculations for installation of up to sixty-eight, 24-inch octagonal concrete piles, we believe PK injurious noise effects are extremely unlikely to occur because this distance is within the 150-ft (46-m) "stop-work" radius defined in SERO's *Protected Species Construction Conditions* (revised 2021). The SELcum of multiple pile strikes over the course of a day may cause injury to sea turtles at a radius of up to 3.2 ft. Due to the mobility of sea turtles, and

because the projects occur in open water, we expect them to move away from noise disturbances. Because we anticipate the animal will move away, we believe that an animal's suffering physical injury from noise is extremely unlikely to occur. Even in the unlikely event an animal does not vacate the daily cumulative injurious impact zone, the radius of that area is smaller than the 150-ft radius that will be visually monitored for listed species. Construction personnel will cease construction activities if an ESA-listed species is sighted per NMFS's Protected Species Construction Conditions. Thus, we believe the likelihood of any injurious SELcum effects is extremely unlikely to occur. An animal's movement away from the injurious impact zone is a behavioral response, with the same effects discussed below.

Based on our noise calculations, installation of concrete piles by impact hammer will not cause single-strike or peak-pressure injurious noise effects. However, the cumulative sound exposure level of multiple pile strikes over the course of a day may cause injury to sea turtles up to 3.2 ft away from the pile. Due to the mobility of ESA-listed turtles, and because the projects occur in open water, we expect them to move away from noise disturbances. Because we anticipate the animal will move away, we believe that an animal's suffering physical injury from noise is extremely unlikely to occur. An animal's movement away from the injurious sound radius is a behavioral response, with the same effects discussed below.

The installation of piles using an impact hammer concrete piles could also result in behavioral effects at radii 28.1 ft for sea turtles. Due to the mobility of sea turtles, we expect them to move away from noise disturbances in these open-water environments. Because there is similar habitat nearby, we believe behavioral effects will be insignificant. If an individual chooses to remain within the behavioral response zone, it could be exposed to behavioral noise impacts during pile installation. Since installation will occur only during the day, these species will be able to resume normal activities during quiet periods between pile installations and at night. Therefore, we anticipate any behavioral effects will be insignificant.

While we have no information regarding noise effects specific to giant manta ray, we believe that effects to giant manta ray from pile driving noise would be very similar to effects on smalltooth sawfish because both species are elasmobranchs and lack swim bladders.

Furthermore, the NMFS educational signs "*Save Dolphins, Sea Turtles, Sawfish and Manta Ray*" and "*Do Not Catch or Harass Sea Turtles*" signs will be installed in visible locations at City of Mexico Beach Fishing Pier upon completion of the proposed action. The signs will provide information to the public on how to avoid and minimize encounters with this species as well as proper handling techniques. The signs will also encourage anglers to report sightings and interactions, thus providing valuable distribution and abundance data to researchers and resource managers. Accurate distribution and abundance data allows management to evaluate the status of the species and refine conservation and recovery measures.

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

We believe hook-and-line gear commonly used by recreational anglers fishing from the newly constructed pier may adversely affect green sea turtle (North Atlantic DPSs), Kemp's ridley sea turtle, loggerhead sea turtle (Northwest Atlantic DPS), and giant manta ray. In the discussion

below, we provide more detail on the potential effects of entanglement, hooking, and trailing line to these species from hook-and-line gear. Sections 6.3 addresses how we estimate future captures of sea turtles. Section 6.4 addresses how we estimate future captures of giant manta ray.

#### *Entanglement in Actively Fished Gear*

Sea turtles are particularly prone to entanglement because of their body configuration and behavior. Records of stranded or entangled sea turtles reveal that hook-and-line gear can wrap around the neck, flipper, or body of a sea turtle and severely restrict swimming or feeding. If the sea turtle is entangled when young, the fishing line becomes tighter and more constricting as the sea turtle grows, cutting off blood flow and causing deep gashes, some severe enough to remove an appendage. Sea turtles have been found entangled in many different types of hook-and-line gear. Entangling gear can interfere with a sea turtle's ability to swim or impair its feeding, breeding, or migration. Entanglement may even prevent surfacing and cause drowning.

Fishing line entanglement can cause effects to giant manta ray, including injury to cephalic fins (Deakos et al. 2011), stress, deep lacerations to the body (Gallagher et al. 2014), and impaired feeding or swimming (Marshall et al. 2008). The effects from entanglement are considered sub-lethal to giant manta ray because they do not immediately result in death, with documented evidence that manta rays can recover and survive post-injury (Pate and Marshall 2020).

#### *Hooking*

Sea turtles are also injured and killed by being hooked. Hooking can occur as a result of a variety of scenarios, some depending on the foraging strategies and diving and swimming behavior of the various species of sea turtles. Sea turtles are either hooked externally in the flippers, head, shoulders, armpits, or beak, or internally inside the mouth (known as foul-hooking, a method of capture without the animal having taken the bait in their mouth) or when the animal has swallowed the bait (Balazs, Pooley et al. 1995). Swallowed hooks are the greatest threat. A sea turtle's esophagus (throat) is lined with strong conical papillae directed towards the stomach (White 1994). The presence of these papillae in combination with an S-shaped bend in the esophagus make it difficult to see hooks when looking through a sea turtle's mouth, especially if the hooks have been deeply ingested. Because of a sea turtle's digestive structure, deeply ingested hooks are also very difficult to remove without seriously injuring the turtle. A sea turtle's esophagus is also firmly attached to underlying tissue; thus, if a sea turtle swallows a hook and tries to free itself or is hauled on board a vessel, the hook can pierce the sea turtle's esophagus or stomach and can pull organs from its connective tissue. These injuries can cause the sea turtle to bleed internally or can result in infections, both of which can kill the sea turtle. If an ingested hook does not lodge into, or pierce, a sea turtle's digestive organs, it can pass through the digestive system entirely (Aguilar, Mas et al. 1995, Balazs, Pooley et al. 1995) with little damage (Work 2000). For example, a study of loggerheads deeply hooked by the Spanish Mediterranean pelagic longline fleet found ingested hooks could be expelled after 53 to 285 days (average 118 days) (Aguilar, Mas et al. 1995). If a hook passes through a sea turtle's digestive tract without getting lodged, the hook probably has not harmed the turtle.

Hook-and-line gear commonly used by recreational anglers fishing from fishing piers can adversely affect giant manta ray via hooking or foul-hooking (i.e., when an animal is inadvertently hooked anywhere on the body without having taken the bait in its mouth). The

effects from hooking and foul-hooking are considered sub-lethal to giant manta ray because they do not immediately result in death, with documented evidence that manta rays can recover and survive post-injury (Pate and Marshall 2020).

#### *Trailing Line*

Trailing line (i.e., line left on an animal after it has been captured and released) poses a serious risk to sea turtles. Line trailing from a swallowed hook is also likely to be swallowed, which may irritate the lining of the digestive system. The line may cause the intestine to twist upon itself until it twists closed, creating a blockage, or may cause a part of the intestine to slide into another part of intestine like a telescopic rod, which also leads to blockage. In both cases, death is a likely outcome (Watson, Epperly et al. 2005). The line may also prevent or hamper foraging, eventually leading to death. Trailing line may also become snagged on a floating or fixed object, further entangling a turtle and potentially slicing its appendages and affecting its ability to swim, feed, avoid predators, or reproduce. Sea turtles have been found trailing gear that has been snagged on the sea floor, or has the potential to snag, thus anchoring them in place (Balazs 1985). Long lengths of trailing gear are more likely to entangle the sea turtle, eventually leading to impaired movement, constriction wounds, and potentially death.

The effects to giant manta ray from trailing line are the same as those discussed above under Entanglements.

### **6.3 Estimating Hook-and-Line Interactions with Sea Turtles**

#### *6.3.1 Estimating Future Reported Hook-and-Line Interactions with Sea Turtles*

We believe the best available data to estimate future reported recreational hook-and-line interactions with sea turtles at public fishing structures comes from the historic reported interactions at similar structures obtained from STSSN data, and any additional information regarding interactions at the structure under consultation. We believe that using this dataset, which includes available data for the pier included in this consultation, is a more accurate representation of the likely range of future interactions in the action area than the smaller subset of data of historical reported interactions at this pier, given the rarity of expected interactions and variability in species presence and angler behavior. The STSSN data contains number and location of sea turtle recreational hook-and-line interactions that were reported to the STSSN; it does not provide the total number of potential public fishing structures available in a particular zone, and NMFS does not have that information. Below, we provide additional discussion regarding why this is the best available information to estimate the expected annual number of reported recreational hook-and-line interactions with sea turtles at the City of Mexico Beach Fishing Pier in the future.

As previously stated, the City of Mexico Beach Fishing Pier is an ocean-facing pier located in Zone 8; therefore, it is appropriate to use only the offshore STSSN dataset (2007-2016) to best represent the pier's geography and surrounding natural processes. The STSSN dataset identifies 10 recreational hook-and-line interactions during this period, of which 6 interactions occurred at a fishing pier, while the other 4 interactions did not. Of these 10 interactions, one reported recreational hook-and-line interaction with a loggerhead sea turtle occurred at the City of Mexico



Beach Fishing Pier (see Table 3). In order to use the best available data, the 4 hook-and-line interactions that did not occur at a fishing pier were omitted from further analysis; therefore, a total of 6 reported hook-and-line interactions of sea turtles at 4 public fishing pier structures were used in the analysis below. Because these 4 fishing structures are in a similar habitat and location as City of Mexico Beach Fishing Pier (i.e., offshore, Zone 8), we assume sea turtle behavior, density, and species composition are comparable at these locations. Further, we assume anglers fishing from these structures use similar baits, equipment, and fishing techniques. Therefore, even though the historic reported hook-and-line interactions are different between these structures, the potential for interactions with sea turtles is likely comparable at all of these locations.

Whether interactions with sea turtles are reported varies depending on a number of factors, including whether there are educational signs encouraging reporting and angler behavior; sometimes anglers do not report encounters with ESA-listed species due to concerns over their personal liability or public perception at the time of the capture even if there are posted signs. Given this variability, it is difficult to estimate reporting behavior. However, we assume that similar fishing structures within the same statistical fishing zone (in this case, Zone 8) would have similar reporting rates. Because piers in the same reporting zone are in similar geographic locations, we assume public perception about reporting and angler reporting behavior is likely the same. Therefore, even though the historic reported hook-and-line interactions are different between these structures, the potential for reported interactions is the same at all locations.

Thus, we believe the best available data to estimate the number of future reported recreational hook-and-line interactions with sea turtles at the City of Mexico Beach Fishing Pier is the average of the historic reported recreational hook-and-line interactions at the similar fishing structure in the Zone 8 offshore STSSN dataset, which includes the 1 reported capture at the City of Mexico Beach Fishing Pier. Averaging the Zone 8 offshore data helps smooth variability in both the potential for interactions (i.e., number and species composition) and in reporting behavior among the locations and over time, providing for a more accurate overall estimate of future reported interactions at the consultation pier. There is no additional information that can be used to estimate potential reported interactions.

To calculate the average number of reported recreational hook-and-line interactions at these similar fishing structures in the offshore waters of Zone 8, we use available STSSN data and the following equation:

$$\begin{aligned} & \textit{Average Reported Captures Per Structure in 10 years} \\ &= \textit{Sum of Reported Captures in 10 years} \div 4 \textit{ Locations} \\ &= (2 + 2 + 1 + 1) \div 4 \\ &= 1.5 \textit{ per structure in 10 years} \end{aligned}$$

To calculate the estimated expected annual number of reported recreational hook-and-line interactions of sea turtles at the City of Mexico Beach Fishing Pier, we refer to the information above and use the following equation:

### *Expected Annual Reported Captures*

*= Average Reported Captures Per Structure in 10 years ÷ 10 years*

*= 1.5 ÷ 10*

*= 0.15 per year (Table 5, Line 1)*

### *6.3.2 Estimating Unreported Hook-and-Line Interactions with Sea Turtles*

While we believe the best available information for estimating expected reported captures at the consultation pier is the reported captures at similar public fishing structures in the surrounding area, we also recognize the need to account for unreported captures. In the following section, we use the best available data to estimate the number of unreported recreational hook-and-line captures that may occur. To the best of our knowledge, only 2 fishing pier surveys aimed at collecting data regarding unreported recreational hook-and-line captures of ESA-listed species have been conducted in the Southeast. One is from Charlotte Harbor, Florida, and the other is from Mississippi.

The fishing pier survey in Charlotte Harbor, Florida, was conducted at 26 fishing piers in smalltooth sawfish critical habitat (Hill 2013). During the survey, 93 anglers were asked a series of open-ended questions regarding captures of sea turtles, smalltooth sawfish, and dolphins, including whether or not they knew these encounters were required to be reported and if they did report encounters. The interviewer also noted conditions about the pier including if educational signs regarding reporting of hook-and-line captures were present at the pier. Hill (2013) found that only 8% of anglers would have reported a sea turtle hook-and-line capture (i.e., 92% of anglers would not have reported a sea turtle capture).

NMFS conducted the fishing pier survey in Mississippi that interviewed 382 anglers. This survey indicated that approximately 60% of anglers who incidentally caught a sea turtle on hook-and-line reported it (i.e., 40% of anglers who incidentally caught a sea turtle did not report it) (Cook et al., 2020). It is important to note that in 2012 educational signs were installed at all fishing piers in Mississippi, alerting anglers to report accidental hook-and-line captures of sea turtles. After the signs were installed, there was a dramatic increase in the number of reported sea turtle hook-and-line captures. Though this increase in reported captures may not solely be related to outreach efforts, it does highlight the importance of educational signs on fishing piers. The STSSN in Mississippi indicated that inconsistency in reporting of captures may also be due to anglers' concerns over their personal liability, public perception at the time of the capture, or other consequences from turtle captures (M. Cook, STSSN, pers. comm. to N. Bonine, NMFS SERO PRD, April 17, 2015). Anglers often do not admit the incidental capture for fear of liability.

We believe it is most appropriate to use the unreported rate in the Cook et al., (2020) fishing pier study to estimate the future unreported captures at proposed fishing pier due to geographical similarities. In the absence of additional information on factors that might affect angler reporting behavior, such as similarity of outreach and education, signage, or culture, we will err on the side of the species and assume fewer interactions were reported, as this will result in a higher total expected interactions. Therefore, we will address unreported captures by assuming that the expected annual reported captures of 0.15 sea turtles per year at the proposed fishing pier

represents 60% of the actual captures and 40% of sea turtle captures will be unreported. Reinitiation may be required if information reveals changes in reporting behavior.

*Expected Annual Unreported Captures*

$$= (\text{Expected Annual Reported Captures} \div 60\%) \times 40\%$$

$$= (0.15 \div 0.6) \times 0.4$$

$$= 0.10 \text{ per year (Table 5, Line 2)}$$

### 6.3.3 Calculating Total Hook-and-Line Interactions with Sea Turtles

The number of captures in any given year can be influenced by sea temperatures, species abundances, fluctuating salinity levels in estuarine habitats where piers may be located, and other factors that cannot be predicted. For these reasons, we believe basing our future capture estimate on a 1-year estimated capture is largely impractical. Using our experience monitoring other fisheries, a 3-year time period is appropriate for meaningful evaluation of future impacts and monitoring. The triennial takes are set as 3-year running sums (i.e., 2025-2027, 2026-2028, and so on) and not for static 3-year periods (i.e., 2026-2028, 2028-2030, and so on). This approach reduces the likelihood of reinitiation of the formal consultation process because of inherent variability in captures, while still allowing for an accurate assessment of how the proposed action is performing versus our expectations. Table 6 shows the projected total sea turtle captures at the consultation pier for any 3-year consecutive period based on the expected annual reported and unreported captures.

**Table 6. Summary of Expected Hook-and-Line Interactions with Sea Turtles**

<b>Captures</b>	<b>Total</b>
1. Expected Annual Reported	0.15
2. Expected Annual Unreported	0.10
<b>Annual Total</b>	0.25
<b>Triennial (3-year) Total</b>	0.75

### 6.3.4 Estimating Total Post Release Mortality for Hook-and-Line Interactions of Sea Turtles

Almost all sea turtles that are captured, landed, and reported to the STSSN are evaluated by a trained veterinarian to determine if they can be immediately released alive or require a rehabilitation facility; exceptions may happen if the sea turtle breaks free before help can arrive. Sea turtles that are captured and reported to the STSSN may die onsite, may be evaluated, released alive, and subsequently suffer PRM later, or may be evaluated and taken to a rehabilitation facility. Those taken to a rehabilitation facility may be released alive at later date or be kept in rehabilitation indefinitely (either due to serious injury or death). We consider those that are never returned to the wild population to have suffered PRM because they will never again contribute to the population. The risk of PRM to sea turtles from reported hook-and-line captures will depend on numerous factors, including how deeply the hook is embedded, whether or not the hook was swallowed, whether the sea turtle was released with trailing line, how soon and how effectively the hooked sea turtle was de-hooked or otherwise cut loose and released, and other factors which are discussed in more detail below.

We believe the 10-year STSSN dataset for all recreational hook-and-line captures and gear entanglements in the offshore waters of Zone 8 is the most accurate representation of PRM for reported captures of sea turtles in the action areas, because this dataset pertains specifically to Florida where future reported captures are anticipated to occur. Table 7 provides a breakdown of final disposition of the 30 sea turtles caught or entangled in fishing gear (recreational or commercial) in the STSSN dataset for the offshore waters of Zone 8.

**Table 7. Final Disposition of Sea Turtles from Reported Recreational Hook-and-Line Captures and Gear Entanglements in the offshore waters of Zone 8, 2007-2016 (n = 30)**

	<b>Dead or Died Onsite</b>	<b>Released Alive Immediately (Not Evaluated)</b>	<b>Released Alive, Immediately (Evaluated)</b>	<b>Taken to Rehab, Released Alive Later</b>	<b>Taken to Rehab, Kept or Died in Rehab</b>
Number of Records	15	3	0	10	2
Percentage	50.0	10.0	0	33.3	6.7

Of the 30 sea turtles in the dataset, 56.7% were removed from the wild population either through death or being unable to be released from the rehabilitation facility (i.e., lethal captures, 50.0 + 6.7) and 43.3% were released alive back into the wild population (i.e., non-lethal captures, 10.0 + 0 + 33.3).

To calculate the annual estimated lethal captures of reported sea turtles at the consultation pier, we use the following equation:

$$\begin{aligned}
 &\text{Annual Lethal Reported Captures} \\
 &= \text{Expected Annual Reported Captures [Table 6, Line 1]} \\
 &\quad \times \text{Lethal Captures [calculated from Table 7]} \\
 &= 0.15 \times 56.7\% \\
 &= 0.0850 \text{ per year (Table 11, Line 1A)}
 \end{aligned}$$

To calculate the estimated annual non-lethal captures of reported sea turtles at the consultation pier, we use the following equation:

$$\begin{aligned}
 &\text{Annual Non – lethal Reported Captures} \\
 &= \text{Expected Annual Reported Captures [Table 6, Line 1]} \times \text{Non} \\
 &\quad \text{– lethal Captures [calculated from Table 7]} \\
 &= 0.15 \times 43.3\% \\
 &= 0.0650 \text{ per year per pier (Table 11, Line 1B)}
 \end{aligned}$$

### 6.3.5 Estimating Post Release Mortality for Unreported Hook-and-Line Interactions of Sea Turtles

Sea turtles that are captured and not reported to the STSSN may be released alive and subsequently suffer PRM. The risk of PRM to sea turtles from hook-and-line captures will depend on numerous factors, including how deeply the hook is embedded, whether or not the

hook was swallowed, whether the sea turtle was released with trailing line, how soon and how effectively the hooked sea turtle was de-hooked or otherwise cut loose and released, and other factors which are discussed in more detail below. While the preferred method to release a hooked sea turtle safely is to bring it ashore and de-hook and/or disentangle it there and release it immediately, that cannot always be accomplished. The next preferred technique is to cut the line as close as possible to the sea turtle's mouth or hooking site rather than attempt to pull the sea turtle up to the pier. Some incidentally captured sea turtles are likely to break free on their own and escape with embedded and/or ingested hooks and/or trailing line. Because of considerations such as the tide, weather, and the weight and size of a hooked captured sea turtle, some will not be able to be de-hooked, and will be cut free by anglers and intentionally released. These sea turtles will escape with embedded or swallowed hooks, or trailing varying amounts of fishing line, which may cause post-release injury or death.

In January 2004, NMFS convened a workshop of experts to develop criteria for estimating PRM of sea turtles caught in the pelagic longline fishery based on the severity of injury. In 2006, those criteria were revised and finalized (Ryder et al. 2006). In February 2012, the Southeast Fisheries Science Center updated the criteria again by adding 3 additional hooking scenarios, bringing the total to 6 categories of injury (NMFS2012a). Table 8 describes injury categories for hardshell sea turtles captured on hook-and-line gear and the associated PRM estimates for sea turtles released with hook and trailing line greater than or equal to half the length of the carapace (i.e., Release Condition B as defined in (NMFS 2012)). We use these criteria when estimating the PRM for unreported captures of sea turtles because it accounts for the expected differences in handling and care of reported versus unreported sea turtles. Please note the following, there is no PRM estimate of Release Condition B for Injury Category V. For Injury Category V, we believe it is prudent to use the PRM for Release Condition A (Released Entangled) because we know the sea turtle was released entangled without a hook, but we do not know how much line was remaining. For Injury Category 6, we believe it is prudent to use the PRM Release Condition D (Released with All Gear Removed) because we believe that if a fisher took the time to resuscitate the sea turtle, then it is likely the fisher also took the time to disentangle the animal completely before releasing it back into the wild

**Table 8. Estimated Post Release Mortality Based on Injury Category for Hardshell Sea Turtles Captured via Commercial Pelagic Longline and Released in Release Condition B (NMFS 2012).**

<b>Injury Category</b>	<b>Description</b>	<b>Post-release Mortality</b>
I	Hooked externally with or without entanglement	20%
II	Hooked in upper or lower jaw with or without entanglement—includes ramphotheca (i.e., beak), but not any other jaw/mouth tissue parts	30%
III	Hooked in cervical esophagus, glottis, jaw joint, soft palate, tongue, and/or other jaw/mouth tissue parts not categorized elsewhere, with or without entanglement—includes all events where the insertion point of the hook is visible when viewed through the mouth.	45%
IV	Hooked in esophagus at or below level of the heart with or without entanglement—includes all events where the insertion point of the hook is not visible when viewed through the mouth	60%
V	Entangled only, no hook involved	50%
VI	Comatose/Resuscitated	60%

PRM varies based on the initial injury the animal sustained and the amount of gear left on the animal at the time of release. Again, we will rely on the STSSN dataset used in Table 7 since it includes what part of the body the sea turtle was hooked for 28 of the 30 interactions. SERO PRD assigned an Injury Category of 0 to all records with unknown hooking and entanglement locations. We exclude Injury Category 0 from the calculation because we are unsure of the location and therefore cannot assign a corresponding PRM. In this case, there are 2 (6.7%) interactions with an unknown hooking/entanglement location in the dataset.

**Table 9. Category of Injury of Sea Turtles from Reported Recreational Hook-and-Line Captures and Gear Entanglements in the offshore waters of Zone 8, 2007-2016 (n = 28)**

<b>Injury Category</b>	<b>I</b>	<b>II</b>	<b>III</b>	<b>IV</b>	<b>V</b>	<b>VI</b>
Number	4	0	4	5	15	0
Percentage	14.3	0	14.3	17.9	53.6	0

As above, we assume that 60% of the sea turtles captured at the consultation pier will be reported, and that reported sea turtles will be sent to rehabilitation if needed. To estimate the fate of the 40% of sea turtles expected to go unreported at the consultation pier, and therefore un-evaluated or rehabilitated, we use the estimated PRM for the injury categories in Table 8 along with the percentage of captures in each injury category in Table 9 to calculate the weighted PRM for each injury category. We then sum the weighted PRMs across all injury categories to determine the overall PRM for sea turtles (Table 10). This overall rate helps us account for the varying severity of future injuries and varying PRM associated with these injuries. Based on the assumptions we have made about the percentage of sea turtles that will be released alive without rehabilitation, the hooking location, and the amount of fishing gear likely to remain on an animal

released immediately at the pier, we estimate a total weighted PRM of 46.8% for the 40% of sea turtles captured, unreported, and released immediately at the consultation pier.

**Table 10. Estimated Weighted and Overall Post Release Mortality for Sea Turtles Released Immediately**

<b>Injury Category</b>	<b>PRM (%) [from Table 8]</b>	<b>Percentage [from Table 9]</b>	<b>% Weighted PRM (% PRM × % Captures for each Injury Category)</b>
I	20	14.3	2.9
II	30	0	0
III	45	14.3	6.4
IV	60	17.9	10.7
V	50	53.6	26.8
VI	60	0	0
		<b>Total % Weighted PRM</b>	46.8

To calculate the estimated annual lethal captures of unreported sea turtles at the consultation pier, we use the following equation:

*Annual Unreported Lethal Captures*

= *Annual Unreported Captures* [Table 6, Line 2] × *Total Weighted PRM* [Table 9]

= 0.1 × 46.8%

= 0.0468 *per year* (Table 11, Line 2A)

If the equation for calculating annual lethal captures of unreported sea turtles multiplies the annual unreported captures by the total weighted PRM of 46.8%, then the equation for calculating annual non-lethal captures of unreported sea turtles would multiply the annual unreported captures by 53.2% (100% – 46.8%). Therefore, to calculate the estimated annual non-lethal captures of unreported sea turtles at the consultation pier, we use the following equation:

*Annual Unreported Non – lethal Captures*

= *Annual Unreported Captures* [Table 6, Line 2] × 53.2%

= 0.1 × 53.2%

= 0.0532 *per year* (Table 11, Line 2B)

### 6.3.6 Calculating Total Post-Release Mortality of Sea Turtles

As we discussed above, we use a 3-year running total to evaluate future impacts to sea turtles due to PRM. Table 11 shows the total sea turtle captures at the consultation pier for any 3-year consecutive period based on the expected annual lethal and non-lethal reported and unreported captures.

**Table 11. Summary of Post Release Mortality of Sea Turtles**

<b>Captures</b>	<b>A. Lethal</b>	<b>B. Non-lethal</b>
1. Annual Reported Captures	0.0850	0.0650
2. Annual Unreported Captures	0.0468	0.0532
<b>Annual Total</b>	0.1318	0.1182
<b>Triennial (3-year) Total</b>	0.3954	0.3546

### 6.3.7 Estimating Hook-and-Line Interactions of Sea Turtles by Species

Of the sea turtles in the offshore waters of Zone 8 STSSN data identifiable to species and which may be adversely affected by the proposed action ( $n = 28$ ), 14.3% were green ( $n = 4$ ), 53.6% were Kemp's ridley ( $n = 15$ ), and 32.1% were loggerhead sea turtles ( $n = 9$ , Table 3). We will assume the same species composition for future captures at the consultation pier because this is the best available data regarding the relative abundance of sea turtle species that may be affected by hook and line gear in the action areas. We believe that using the offshore dataset for Zone 8 is a more accurate representation of which sea turtle species could be in the action area and affected by recreational hook and line interactions at the pier than the smaller subset of data of historical reported captures at the pier, given the variability in the species presence in the general area. In this case, the complete offshore dataset for Zone 8 contains the 1 capture of a loggerhead sea turtle at the City of Mexico Beach Fishing Pier, as well as all other STSSN encounter data for Zone 8. Thus, the offshore Zone 8 dataset accounts for the captures previously reported at the consultation pier, while also providing a basis to estimate take of other sea turtles species that are expected to be present in the area and affected by hook and line gear. Table 12 estimates the number of lethal and non-lethal captures by sea turtles species for any consecutive 3-year period based on our calculations from Section 6.3.6. Because the calculated estimates of sea turtle captures are fractions, we round the numbers of captures 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 estimates in Table 6 and Table 11, 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. The impacts of future captures to the individual green sea turtle DPSs are discussed in the Jeopardy Analysis (Section 8) and presented in the Incidental Take Statement (Section 10).

**Table 12. Estimated Captures of Sea Turtle Species for Any Consecutive 3-Year Period**

<b>Species</b>	<b>Lethal Captures</b>	<b>Non-lethal Captures</b>	<b>Total Captures</b>
Green sea turtle (North Atlantic DPS)	1 ( $0.3954 \times 0.143 = 0.0565$ )	1 ( $0.3546 \times 0.143 = 0.0507$ )	2
Kemp's ridley sea turtle	1 ( $0.3954 \times 0.536 = 0.2118$ )	1 ( $0.3546 \times 0.536 = 0.19$ )	2
Loggerhead sea turtle (Northwest Atlantic DPS)	1 ( $0.3954 \times 0.321 = 0.1271$ )	1 ( $0.3546 \times 0.321 = 0.114$ )	2

## 6.4 Estimating Observed Fishing Gear Interactions with Giant Manta Ray



Based on our professional judgement, we believe the best available data to estimate future observed fishing interactions with giant manta ray at public fishing structures come from the surveys conducted by MMF. In 2016, the MMF began conducting aerial and boat-based surveys between St. Lucie Inlet and Boynton Beach Inlet on the east coast of Florida in Palm Beach County, a known area of high abundance for juvenile giant manta ray (Pate and Marshall 2020). During survey efforts researchers documented high occurrences of recreational fishing interactions with giant manta ray (i.e., foul hooked or entangled) (Pate and Marshall 2020; Pate et al. 2022). NMFS is not aware of any reported recreational hook-and-line captures of a giant manta ray at the City of Mexico Beach Fishing Pier. In the absence of data specific to areas adjacent to or within the action area, we believe the MMF survey data is the best available for calculating the estimated number of future observed fishing gear interactions with giant manta ray at the City of Mexico Beach Fishing Pier.

Between 2016 and 2022, MMF documented 58 interactions between fishing gear and giant manta ray within the survey area (J. Pate, MMF, unpublished data). Entangled or foul-hooked giant manta rays typically were observed within an average of 1.2 mi (2.0 km) from a fishing pier or inlet (J. Pate, MMF, unpublished data). We assume that all giant manta rays observed entangled or foul-hooked during these surveys occurred from fishing piers due to their close proximity to fishing piers and the fact that individuals had multiple fishing gear interactions within the survey area.

In the MMF survey area (i.e., between St. Lucie Inlet and Boynton Beach Inlet, Palm Beach County, Florida), there are 4 public ocean-facing fishing structures – Jupiter Inlet, Juno Beach Pier, Lake Worth Pier, and Boynton Beach Inlet. These piers are similar in size and location (i.e., relatively large, public ocean facing or inlet fishing structures), and have similar angler effort. Pate et al. (2020) conducted semi-structured surveys to assess recreational anglers' knowledge of and attitudes toward giant manta ray. These surveys revealed anglers fishing from these locations use similar baits, equipment, and fishing techniques. Therefore, we believe that the potential for interactions with giant manta ray is likely the same at all 4 piers in the MMF survey area.

To calculate the average number of observed interactions with fishing gear within the MMF survey area, we use the available MMF data and the following equation:

$$\begin{aligned} & \textit{Average Interactions in 7 years} \\ &= \textit{Sum of Reported Interactions in 7 years} \div 4 \textit{ locations} \\ &= 58 \div 4 \\ &= 14.5 \textit{ in 7 years} \end{aligned}$$

To calculate the estimated expected annual number of observed fishing gear interactions with giant manta ray at the City of Mexico Beach Fishing Pier we refer to the MMF data above and use the following equation:

$$\begin{aligned} & \textit{Expected Annual Interactions} \\ &= \textit{Average Reported Interactions in 7 years} \div 7 \textit{ years} \\ &= 14.5 \div 7 \\ &= 2.07 \textit{ interactions per year} \end{aligned}$$

While the survey occurred in a known area of high juvenile abundance, it is the best available data we have to estimate giant manta ray interactions that may occur at the consultation pier. As discussed above, we believe using a 3-year period is appropriate for meaningful monitoring. Because the calculated estimate is a fraction, we round the number of interactions up to the nearest whole number ( $2.07 \times 3 = 6.214$ ). Therefore, up to 7 interactions with giant manta ray at the consultation pier may occur in any consecutive 3-year period. As previously stated, we believe that all captures of giant manta ray will be non-lethal with no associated PRM.

## **7 CUMULATIVE EFFECTS**

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ESA section 7 regulations require NMFS to consider cumulative effects in formulating its Opinions (50 CFR 402.14). Cumulative effects include the effects of future state or private actions, not involving federal activities, that are reasonably certain to occur within the action area considered in this Opinion (50 CFR 402.02). NMFS is not aware of any 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**

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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 sea turtle (North Atlantic DPS), Kemp's ridley sea turtle, loggerhead sea turtle (Northwest Atlantic DPS), and giant manta ray. In Section 6, we outlined how the proposed action can adversely affect these species. Now we turn to an assessment of the species response to these impacts, in terms of overall population effects, and whether those effects of the proposed action, when considered in the context of the Status of the Species (Section 4), the Environmental Baseline (Section 5), and the Cumulative Effects (Section 7), will jeopardize the continued existence of the affected species. For any species listed globally, our jeopardy determination must evaluate whether the proposed action will appreciably reduce the likelihood of survival and recovery at the species' global range. For any species listed as DPSs, a jeopardy determination must evaluate whether the proposed action will appreciably reduce the likelihood of survival and recovery of that DPS.

## **8.1 Green Sea Turtle (North Atlantic DPS)**

### **8.1.1 *Survival***

The proposed action is expected to result in capture of up to 2 green sea turtles (1 lethal, 1 non-lethal) from the North Atlantic DPS over any consecutive 3-year period. Any potential non-lethal capture during any consecutive 3-year period are not expected to have a measurable impact on the reproduction, numbers, or distribution of the species. The individual suffering non-lethal injuries or stresses is expected to fully recover such that no reductions in reproduction or numbers of green sea turtles are anticipated. The non-lethal captures will occur in the action area, which encompass a small portion of the overall range or distribution of green sea turtles within the North Atlantic DPS. Any incidentally caught animals would be released within the general area where caught and no change in the distribution of North Atlantic DPS green sea turtles would be anticipated. The potential lethal captures during any consecutive 3-year period would reduce the number of North Atlantic DPS green sea turtles, compared to their numbers in the absence of the proposed action, assuming all other variables remained the same. A lethal capture would also result in a reduction in future reproduction, assuming the individual was female and would have survived otherwise to reproduce. For example, as discussed in this Opinion, an adult green sea turtle can lay up to 7 clutches (usually 3-4) of eggs every 2-4 years, with a mean clutch size of 110 -115 eggs per nest, of which a small percentage is expected to survive to sexual maturity. The potential lethal captures are expected to occur in a small, discrete area and green sea turtles in the North Atlantic DPS generally have large ranges; thus, no reduction in the distribution is expected from the take of these individuals.

Whether the reductions in numbers and reproduction of this species would appreciably reduce the species likelihood of survival depends on the probable effect the changes in numbers and reproduction would have relative to current population sizes and trends. In the Status of Species, we presented the status of the North Atlantic DPS, outlined threats, and discussed information on estimates of the number of nesting females and nesting trends at primary nesting beaches. In the Environmental Baseline, we outlined the past and present impacts of all state, federal, or private actions and other human activities in or having effects in the action area that have affected and continue to affect the North Atlantic DPS.

In Section 4.1.1, we summarized the available information on number of green sea turtle nesters and nesting trends at North Atlantic DPS beaches. In the absence of any total population estimates, nesting trends are the best proxy for estimating population changes. Eight nesting sites have high levels of abundance (i.e., < 1000 nesters), located in Costa Rica, Cuba, Mexico, and Florida. 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).

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). Florida accounts for approximately 5% of nesting for this DPS (Seminoff et al. 2015). While nesting in Florida has shown dramatic increases over the past decade, individuals from the Tortuguero, the Florida, and the other Caribbean and Gulf 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.

Aside from the long-term increasing nesting trend observed in Florida, the declining trend in nesting observed in Tortuguero indicates a species in decline. However, since the proposed project is anticipated to result in the lethal take of up to 1 green sea turtle from the North Atlantic DPS during any consecutive 3-year period, 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.

After analyzing the magnitude of the effects, in combination with the past, present, and future expected impacts to the DPS discussed in this Opinion, we believe that recreational fishing from the consultation pier is not reasonably expected to cause an appreciable reduction in the likelihood of survival of the green sea turtle North Atlantic DPS in the wild.

#### *8.1.2 Recovery*

The North Atlantic DPS of green sea turtles does not have a separate recovery plan at this time. However, an Atlantic Recovery Plan for the population of Atlantic green sea turtles (NMFS and USFWS 1991) does exist. Since the animals within the North Atlantic DPS all occur in the Atlantic Ocean and would have been 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:

- *The level of nesting in Florida has increased to an average of 5,000 nests per year for at least 6 years.*
- *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 increased over the 2020 nesting, with another increase in 2022 still well below the 2019 high. This indicates that the first recovery objective is currently being met. There are currently no estimates available specifically addressing changes in abundance of individuals on foraging grounds. 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 capture of up to 1 individual during any consecutive 3-year period will result in a reduction in numbers; however, it is unlikely to have any detectable influence on the recovery objectives and trends noted above, even when considered in the context of the Status of the Species, the Environmental Baseline, and Cumulative Effects discussed in this Opinion. Any non-lethal captures would not affect the adult female nesting population or number of nests per nesting season. Thus, the proposed action will not impede achieving the recovery objectives above and will not result in an appreciable reduction in the likelihood of North Atlantic DPS green sea turtles' recovery in the wild.

### *8.1.3 Conclusion*

The combined potential lethal and non-lethal captures during any consecutive 3-year period of green sea turtles from the North Atlantic DPS associated with the proposed action 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.

## **8.2 Kemp's Ridley Sea Turtle**

### *8.2.1 Survival*

The proposed action is expected to result in the capture of up to 2 Kemp's ridley sea turtles (1 lethal, 1 non-lethal) during any consecutive 3-year period. Any potential non-lethal capture is not expected to have any measurable impact on the reproduction, numbers, or distribution of the species. The individual suffering non-lethal injuries or stresses are expected to fully recover such that no reductions in reproduction or numbers of Kemp's ridley sea turtles are anticipated. A non-lethal capture will occur in the action area, which encompasses a small portion of this species overall range/distribution. Any incidentally caught animal would be released within the general area where caught and no change in the distribution of Kemp's ridley sea turtles would be anticipated. The potential lethal captures during any consecutive 3-year period would reduce

the species' population compared to the number that would have been present in the absence of the proposed actions, assuming all other variables remained the same. The TEWG (1998) estimates age at maturity from 7-15 years for this species. Females return to their nesting beach about every 2 years (TEWG 1998). The mean clutch size for Kemp's ridley sea turtle is 100 eggs per nest, with an average of 2.5 nests per female per season. A lethal capture could also result in a potential reduction in future reproduction, assuming at least one of these individuals would be female and would have survived to reproduce in the future. The loss could preclude the production of thousands of eggs and hatchlings, of which a fractional percentage would be expected to survive to sexual maturity. Thus, the death of any females would eliminate their contribution to future generations, and result in a reduction in sea turtle reproduction. However, the potential lethal take during any consecutive 3-year period is expected to occur in a small, discrete area and Kemp's ridley sea turtle generally have large ranges; thus, no reduction in the distribution is expected from the take of these individuals.

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

In the absence of any total population estimates, nesting trends are the best proxy for estimating population changes. It is important to remember that with significant inter-annual variation in nesting data, sea turtle population trends necessarily are measured over decades and the long-term trend line better reflects the population trend. In Section 4.1.2, we summarized available information on number of Kemp's ridley sea turtle nesters and nesting trends. 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 1980's and 1990's, but we cannot ascertain a current population trend or trajectory. We believe these nesting numbers are indicative of a species with a high number of sexually mature individuals and that the potential lethal capture of up to 1 individual during any consecutive 3-year period will not have any measurable effect on the overall population. After analyzing the magnitude of the effects, in combination with the past, present, and future expected impacts to the DPS discussed in this Opinion, we believe that recreational fishing from the proposed pier is not reasonably expected to cause an appreciable reduction in the likelihood of survival of Kemp's ridley sea turtle in the wild.

#### 8.2.2 *Recovery*

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

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

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

The potential lethal capture of up to 1 individual during any consecutive 3-year period by recreational fishing at the pier will result in a reduction in numbers and reproduction; however, it is unlikely to have any detectable influence on the nesting trends. Given annual nesting numbers are in the thousands, the projected loss is not expected to have any discernable impact to the species. Any non-lethal capture would not affect the adult female nesting population. Thus, recreational fishing at the pier will not impede achieving the recovery objectives above and will not result in an appreciable reduction in the likelihood of the Kemp's ridley sea turtles' recovery in the wild.

### 8.2.3 Conclusion

The combined potential lethal and non-lethal captures during any consecutive 3-year period of Kemp's ridley sea turtles associated with the proposed action is not expected to cause an appreciable reduction in the likelihood of either the survival or recovery of Kemp's ridley sea turtle in the wild.

## 8.3 Loggerhead Sea Turtle (Northwest Atlantic DPS)

### 8.3.1 Survival

The proposed action is expected to result in the capture of up to 2 loggerhead sea turtles (1 lethal, 1 non-lethal) from the Northwest Atlantic DPS during any consecutive 3-year period. Any potential non-lethal captures during any consecutive 3-year period are not expected to have a

measurable impact on the reproduction, numbers, or distribution of the species. The individual suffering non-lethal injuries or stresses is expected to fully recover such that no reductions in reproduction or numbers of green sea turtles are anticipated. All non-lethal captures will occur in the action area, which encompass a small portion of the overall range or distribution of loggerhead sea turtles within the Northwest Atlantic DPS. Any incidentally caught animals would be released within the general area where caught and no change in the distribution of Northwest Atlantic DPS of loggerhead sea turtles would be anticipated.

The potential lethal captures during any consecutive 3-year period would reduce the number of Northwest Atlantic loggerhead sea turtles, compared to their numbers in the absence of the proposed action, assuming all other variables remained the same. Potential lethal captures would also result in a reduction in future reproduction, assuming the individual was female and would have survived otherwise to reproduce. For example, an adult female loggerhead sea turtle can lay approximately 4 clutches of eggs every 3-4 years, with 100-126 eggs per clutch. Thus, the loss of adult females could preclude the production of thousands of eggs and hatchlings of which a small percentage would be expected to survive to sexual maturity. However, the potential lethal take during any consecutive 3-year period is expected to occur in a small, discrete area and loggerhead sea turtle generally have large ranges; thus, no reduction in the distribution is expected from the take of these individuals.

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

In the absence of any total population estimates, nesting trends are the best proxy for estimating population changes. Abundance estimates in the western North Atlantic indicate the population is large (i.e., several hundred thousand individuals). In Section 4.1.3, we summarized available information on number of loggerhead sea turtle nesters and nesting trends. Nesting trends across all of the recovery units have been steady or increasing over several years against the background of the past and ongoing human and natural factors that have contributed to the current status of the species. Additionally, in-water research suggests the abundance of neritic juvenile loggerheads is steady or increasing.

While the potential lethal capture of 1 loggerhead sea turtle during any consecutive 3-year period will affect the population, in the context of the overall population's size and current trend, we do not expect this loss to result in a detectable change to the population numbers or increasing trend. After analyzing the magnitude of the effects, in combination with the past, present, and future expected impacts to the DPS discussed in this Opinion, we believe the consultation pier is not reasonably expected to cause an appreciable reduction in the likelihood of survival of the Northwest Atlantic DPS of loggerhead sea turtle in the wild.



### 8.3.2 Recovery

The recovery plan for the Northwest Atlantic population of loggerhead sea turtles (NMFS and USFWS 2008) was written prior to the loggerhead sea turtle DPS listings. However, this plan deals with the populations that comprise the current Northwest Atlantic DPS and is therefore, the best information on recovery criteria and goals for the DPS. It lists the following recovery objectives that are relevant to the effects of the proposed actions:

- *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 female.*
- *Ensure the in-water abundance of juveniles in both neritic and oceanic habitats is increasing and is increasing at a greater rate than strandings of similar age classes.*

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

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

The potential lethal capture of up to 1 loggerhead sea turtle during any consecutive 3-year period is so small in relation to the overall population, even when considered in the context of the Status of the Species, the Environmental Baseline, and Cumulative Effects discussed in this Opinion. We believe this is true for both nesting and juvenile in-water populations. The potential non-lethal capture from the Northwest Atlantic DPS would not affect the adult female nesting population, number of nests per nesting season, or juvenile in-water populations. Thus, recreational fishing at the proposed pier will not impede achieving the recovery objectives above and will not result in an appreciable reduction in the likelihood of Northwest Atlantic DPS of loggerhead sea turtles' recovery in the wild.

### 8.3.3 Conclusion

The combined lethal and non-lethal captures during any consecutive 3-year period of loggerhead sea turtles associated with the proposed action is not expected to cause an appreciable reduction in the likelihood of either the survival or recovery of the Northwest Atlantic DPS of the loggerhead sea turtle in the wild.

## 8.4 Giant Manta Ray

The proposed action is expected to result in the capture of 7 giant manta rays over any consecutive 3-year period. We expect all captures to be non-lethal with no associated PRM.

### 8.4.1 Survival

The non-lethal capture of giant manta ray over any consecutive 3-year period is not expected to have any measurable impact on the reproduction, numbers, or distribution of this species. The individuals captured are expected to fully recover such that no reductions in reproduction or numbers of this species are anticipated. Since these captures may occur in the small, discrete action area and would be released within the general area where caught, no change in the distribution of giant manta ray is anticipated.

### 8.4.2 Recovery

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

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

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

manta ray, by significantly exacerbating effects of any of the major threats identified in the final listing rule.

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

#### 8.4.3 Conclusion

The potential non-lethal capture over any consecutive 3-year period associated with the proposed action is not expected to cause an appreciable reduction in the likelihood of either the survival or recovery of giant manta ray in the wild. Mortalities are not expected, and the proposed action furthers outreach efforts by ensuring signs are maintained at the pier to educate anglers about safe handling and reporting interactions with the species. Thus, the recreational fishing effects from the proposed pier will not result in an appreciable reduction in the likelihood of giant manta ray recovery in the wild.

## 9 CONCLUSION

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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 green sea turtle (North Atlantic DPS), Kemp's ridley sea turtle, loggerhead sea turtle (Northwest Atlantic DPS), and giant manta ray. Given the nature of the proposed action and the information provided above, we conclude that the action, as proposed, is not likely to jeopardize the continued existence of green sea turtle (North Atlantic DPS), Kemp's ridley sea turtle, loggerhead sea turtle (Northwest Atlantic DPS), and giant manta ray.

## 10 INCIDENTAL TAKE STATEMENT

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### 10.1 Overview

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

and Prudent Measures and the Terms and Conditions of the Incidental Take Statement of the Opinion.

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

Section 7(b)(4)(c) of the ESA specifies that to provide an Incidental Take Statement for an endangered or threatened species of marine mammal, the taking must be authorized under Section 101(a)(5) of the MMPA. Since no incidental take of listed marine mammals is anticipated as a result of the proposed action, no statement on incidental take of protected marine mammals is provided and no take is authorized. Nevertheless, the 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 applicant becomes aware of any take of an ESA-listed species under NMFS's purview that occurs during the proposed action, the applicant shall report the take to NMFS SERO PRD via the [NMFS SERO Endangered Species Take Report Form](https://forms.gle/85fP2da4Ds9jEL829) (<https://forms.gle/85fP2da4Ds9jEL829>). This form shall be completed for each individual known reported capture, entanglement, stranding, or other take incident. Information provided via this form shall include the title, City of Mexico Beach Fishing Pier, the issuance date, and ECO tracking number, SERO-2024-01334, 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 action agencies have a continuing duty to ensure compliance with the reasonable and prudent measures and terms and conditions included in this Incidental Take Statement. If the action agencies (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 action agencies 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

The take limits prescribed in this Opinion that will trigger the requirement to reinitiate consultation are based on the amount of take that we expect *to be reported* as it is not possible to directly monitor the incidents that go unreported. The best available information for estimating the amount of future take of sea turtles and giant manta ray that will be reported at the City of Mexico Beach Fishing Pier is described in Section 6.

In Section 6.3.1, we developed an estimate of the total number of sea turtle captures expected to be reported annually (0.15; Table 6, Line 1). We take that number and multiply by 3 to get the 3-year total estimate of reported sea turtle captures ( $0.15 \times 3 = 0.45$ ). We then apply that number to the species breakdown reported in the STSSN data for recreational hook-and-line captures and gear entanglement in the offshore waters of Zone 8 (described in Section 6.3.7) to obtain the 3-year total estimate of reported take of each species of sea turtle. For those estimates that come out to be less than 1, we round up to 1 to reach a whole number that can be used as the take limit. The anticipated, unreported sea turtle takes are not directly monitored but can be estimated from reported takes using the process described in Section 6.3.2. Based on the data collected from the Cook et al., (2016) fishing pier study, we anticipate 40% of sea turtle take will go unreported. Section 6.4 describes how we calculate the take limit for giant manta ray in the absence of annual reporting data. Therefore, the take limits shown in Table 13 are our best estimates of the amount of sea turtle and giant manta ray take expected to be reported over any consecutive 3-year period.

**Table 13. Anticipated Incidental Take Related to the City of Mexico Beach Fishing Pier for Any Consecutive 3-Year Period**

Species	Total Estimated Reported Captures	Incidental Take Limits that will Trigger Reinitiation
Green sea turtle (North Atlantic DPS)	$0.45 \times 0.143 = 0.0643$ , rounded up to 1	No more than 1 reported capture
Kemp's ridley sea turtle	$0.45 \times 0.536 = 0.241$ , rounded up to 1	No more than 1 reported capture
Loggerhead sea turtle (Northwest Atlantic DPS)	$0.45 \times 0.321 = 0.1445$ , rounded up to 1	No more than 1 reported capture
Giant manta ray	NA	No more than 7 reported captures

It is important to note that the mortality rates estimated in Section 6.3.4 for sea turtles are not likely to be detected in the initial reporting of captures, as most sea turtles are expected to live for some period following capture. Some of these individuals may be sent to rehabilitation facilities and later die in those facilities, or may be released and die in the wild from undetected injuries, as discussed in our PRM analysis. While it is also possible that some sea turtles may die immediately from severe injuries related to hook and line capture or entanglement (which will be included in the annual reports discussed below), we do not expect that result. At the time of the interaction, we expect sea turtle take in the above Incidental Take Statement to be non-lethal. As previously discussed in Section 6.3.5, up to 46.8% of the reported interactions could result in a

mortality, and reports of such PRM are consistent with the analysis in this Opinion and this ITS. Likewise, we expect PRM of the unreported sea turtle interactions, as described in Section 6.3.5.

Again, we expect all interactions with giant manta ray to be non-lethal with no associated PRM.

### **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, loggerhead sea turtle (Northwest Atlantic DPS), and giant manta ray 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 action agencies for the protection of section 7(o)(2) to apply. The action agencies have a continuing duty to ensure compliance with the reasonable and prudent measures and terms and conditions included in this Incidental Take Statement. If the action agencies fail 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 action agencies 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 action agencies must ensure that the applicant provides take reports regarding all interactions with ESA-listed species at the City of Mexico Beach fishing pier.
2. The action agencies must ensure that the applicant minimizes the likelihood of injury or mortality to ESA-listed species resulting from hook-and-line capture or entanglement by activities at the City of Mexico Beach fishing pier.
3. The action agencies must ensure that the applicant reduces the impacts to incidentally captured ESA-listed species.
4. The action agencies must ensure that the applicant coordinates periodic fishing line removal (i.e., cleanup) events with non-governmental or other local organizations.

## 10.5 Terms and Conditions

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

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

- The action agencies shall include a special condition of the grant or permit, as applicable, that directs the applicant to report all known angler-reported hook-and-line captures of ESA-listed species and any other takes of ESA-listed species to the NMFS SERO PRD and to the action agencies.
  - If and when the applicant becomes aware of any known reported capture, entanglement, stranding, or other take, the applicant must report it to NMFS SERO PRD via the [NMFS SERO Endangered Species Take Report Form \(https://forms.gle/85fP2da4Ds9jEL829\)](https://forms.gle/85fP2da4Ds9jEL829).
    - Emails must reference this Opinion by the NMFS tracking number (SERO-2024-01334 City of Mexico Beach Fishing Pier) and date of issuance.
    - This form shall be completed for each individual known reported 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., fishing from the pier by hook-and-line), 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 capture, entanglement, stranding, or other take of ESA-listed species to NMFS SERO PRD by email: [nmfs.ser.esa.consultations@noaa.gov](mailto:nmfs.ser.esa.consultations@noaa.gov).
    - All emails and summary reports must reference this Opinion by the NMFS tracking number (SERO-2024-01334 City of Mexico Beach Fishing Pier) and date of issuance.
    - The summary report will contain the following information: the total number of ESA-listed species captures, entanglements, strandings, or other take that was reported at or adjacent to the piers 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, 2026, and will cover the period from pier opening until December 31, 2025. Thereafter, reports will be prepared every year, covering the prior rolling three-year time period, and emailed no later than January 31 of any year.
- Copies of annual summary reports must be submitted to the FEMA at: Federal Emergency Management Agency, Region 4 Environmental and Historic Preservation (EHP) [fema-r4ehp-florida@fema.dhs.gov](mailto:fema-r4ehp-florida@fema.dhs.gov)
- Copies of annual summary reports must be submitted to the USACE at: [SAJ-RD-Enforcement@usace.army.mil](mailto:SAJ-RD-Enforcement@usace.army.mil)

The following Terms and Conditions implement Reasonable and Prudent Measures #2 and #3:

- The action agencies shall include a special condition of the grant or permit, as applicable, that directs the applicant to:
  - Install and maintain the following NMFS Protected Species Educational Signs: *“Save Dolphins, Sea Turtles, Sawfish, and Manta Ray”*, *“Do Not Catch or Harass Sea Turtles”*, and *“Report a Sturgeon”*
    - Signs will be posted at least at the entrance to and terminal end of the pier.
    - Signs will be installed prior to opening the pier for public use.
    - Photographs of the installed signs will be emailed to NMFS’s Southeast Regional Office ([nmfs.ser.esa.consultations@noaa.gov](mailto:nmfs.ser.esa.consultations@noaa.gov)) with the NMFS tracking number (SERO-2024-01334 City of Mexico Beach Fishing Pier) and date of issuance.
    - Sign designs and installation methods are provided at the following website: <https://www.fisheries.noaa.gov/southeast/consultations/protected-species-educational-signs>.
    - Current photographs of the signs will be included in each annual report required by the T&C above.
  - Install and maintain monofilament recycling bins and trash receptacles at the pier to reduce the probability of trash and debris entering the water.
    - Monofilament recycling bins and trash receptacles will be installed prior to opening the pier for public use.
    - Photographs of the installed bins will be emailed to NMFS’s Southeast Regional Office by email ([nmfs.ser.esa.consultations@noaa.gov](mailto:nmfs.ser.esa.consultations@noaa.gov)) with the



NMFS tracking number for this Opinion (SERO-2024-01334 City of Mexico Beach Fishing Pier) and date of issuance.

- The applicant must regularly empty the bins and trash receptacles and make sure they are functional and upright.
- Additionally, current photographs of the bins will be included in each report required by T&C 1, above.

The following Terms and Conditions implement Reasonable and Prudent Measures #2, #3, and #4:

- The action agencies shall include a special condition of the grant or permit, as applicable, that directs the applicant to:
  - Perform in-water pier cleanup on an annual basis. Additionally, volunteer groups will hold a minimum of 2 clean ups annually to clear trash and loose debris from pier and adjacent areas. These activities account for a total of at least 3 cleanups per year.
  - Submit a record of each cleaning event in the annual report required by T&C 1 above.

## **11 CONSERVATION RECOMMENDATIONS**

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

Sea Turtles:

- Conduct or fund research that investigates ways to reduce and minimize mortality of sea turtles in the recreational hook-and-line fishery.
- Conduct or fund outreach designed to increase the public's knowledge and awareness of ESA-listed sea turtle species.

Giant manta ray:

- Conduct or fund outreach designed to increase the public's knowledge and awareness of giant manta ray.
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In order for NMFS to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats, NMFS requests notification of the implementation of any of these or additional conservation recommendations.

## 12 REINITIATION OF CONSULTATION

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This concludes formal consultation on the proposed action. As provided in 50 CFR 402.16, reinitiation of formal consultation is required and shall be requested by the FEMA, 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 action agencies must immediately request reinitiation of formal consultation and project activities may only resume if the action agencies establish that such continuation will not violate sections 7(a)(2) and 7(d) of the ESA.

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