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NATIONAL MARINE FISHERIES SERVICE
Southeast Regional Office
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https://www.fisheries.noaa.gov/region/southeast

06/24/2020 F/SER31:DPO
SERO-2019-01838

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Ref.: FEMA PA-04-FL-4283-PW-00912, SAJ-2003-00237, City of Jacksonville, Jacksonville Beach Pier Repair and Replacement, Jacksonville Beach, Duval County, Florida

Dear Sir or Madam:

The enclosed Biological Opinion (Opinion) was prepared by the National Marine Fisheries Service (NMFS) pursuant to Section 7(a)(2) of the Endangered Species Act. The Opinion considers the effects of a proposal by the United States Army Corps of Engineers (USACE) and the Federal Emergency Management Agency (FEMA) to authorize the replacement of a public fishing pier. We base this Opinion on project-specific information provided in the consultation package as well as NMFS's review of published literature. This Opinion analyzes the potential for the project to affect the following species and critical habitat: green sea turtle (North Atlantic and South Atlantic distinct population segments [DPSs]), hawksbill sea turtle, Kemp's ridley sea turtle, leatherback sea turtle, loggerhead sea turtle (Northwest Atlantic DPS), smalltooth sawfish (United States DPS), Atlantic sturgeon (South Atlantic DPS), Nassau grouper, North Atlantic right whale, giant manta ray, loggerhead sea turtle designated critical habitat (Unit LOGG-N-14), and North Atlantic right whale designated critical habitat (Unit 2).

The project has been assigned the tracking number SERO-2019-01838 in our new NMFS Environmental Consultation Organizer (ECO). Please refer to the ECO number in any future inquiries regarding this consultation. We look forward to cooperation with you on other USACE and FEMA projects to ensure the conservation and recovery of our threatened and endangered marine species. If you have any questions regarding this consultation, please contact Daniel Owen, Consultation Biologist, by phone at 727-209-5961, or by email at Daniel.Owen@noaa.gov.

Sincerely,

CRABTREE.ROY.E.DR.1365849559 Digitally signed by CRABTREE.ROY.E.DR.1365849559 Date: 2020.06.24 14:31:13 -04'00'

Roy E. Crabtree, Ph.D.
Regional Administrator

Enclosure
File: 1514-22.f.4 and 1514-22.o

Endangered Species Act - Section 7 Consultation
Biological Opinion

Dual Action Agencies:	United States Army Corps of Engineers, Jacksonville District Federal Emergency Management Agency, Region IV
Applicant:	City of Jacksonville, Florida
Activity:	Jacksonville Beach Fishing Pier Repair and Replacement, Jacksonville Beach, Duval County, Florida USACE Project: SAJ-2003-00237 (NW-MAO) FEMA Project: PA-04-FL-4283-PW-00912
Consulting Agency:	National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Southeast Regional Office, Protected Resources Division, St. Petersburg, Florida Tracking Number: SERO-2019-01838
Approved by:	CRABTREE.ROY.E.DR.1365849559 Digitally signed by CRABTREE.ROY.E.DR.1365849559 Date: 2020.06.24 14:32:05 -04'00' Roy E. Crabtree, Ph.D., Regional Administrator NMFS, Southeast Regional Office St. Petersburg, Florida
Date Issued:	06/24/2020

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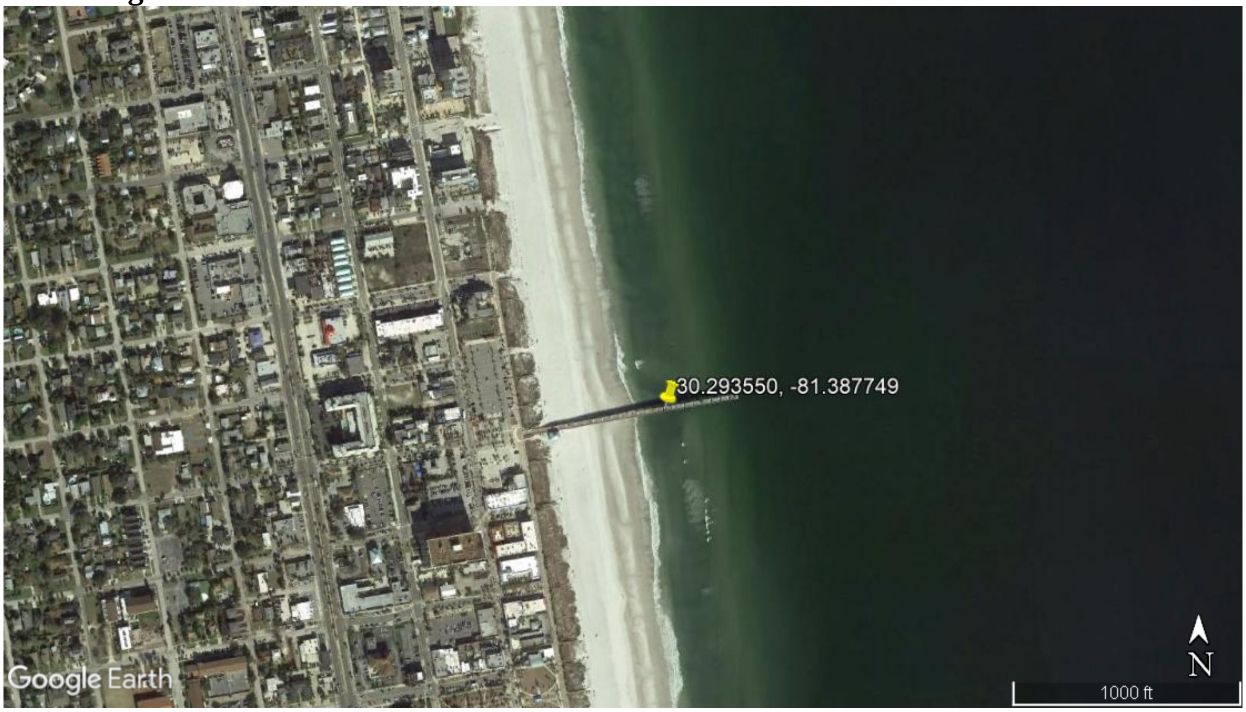

Acronyms and Abbreviations

BSTP	Beaches Sea Turtle Patrol
CCL	Curved Carapace Length
CFR	Code of Federal Regulations
CPUE	Catch per unit effort
CR	Conservation Recommendations
DCH	Designated Critical Habitat
DDT	Dichlorodiphenyltrichloroethane
DNA	Deoxyribonucleic acid
DO	Dissolved oxygen
DPS	Distinct Population Segment
DWH	*Deepwater Horizon*
DTRU	Dry Tortugas Recovery Unit
ECO	NMFS Environmental Consultation Organizer
ESA	Endangered Species Act
FDEP	Florida Department of Environmental Protection
FEMA	Federal Emergency Management Agency
FP	Fibropapillomatosis disease
FR	Federal Register
FWC	Florida Fish and Wildlife Conservation Commission
FWRI	Fish and Wildlife Research Institute
GADNR	Georgia Department of Natural Resources
GCRU	Greater Caribbean Recovery Unit
ICWW	Intracoastal Waterways
ITS	Incidental Take Statement
MHW	Mean High Water
MMF	Marine Megafauna Foundation
NA	North Atlantic
NCWRC	North Carolina Wildlife Resources Commission
NGMRU	Northern Gulf of Mexico Recovery Unit
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Association
NRU	Northern Recovery Unit
NWA	Northwest Atlantic
Opinion	Biological Opinion
PBF	Physical of Biological Features
PDC	Project Design Criteria
PCB	Polychlorinated Biphenyls
PFC	Perfluorinated Chemicals
PFRU	Peninsular Florida Recovery Unit
PRD	Protected Resources Division
PRM	Post-release Mortality
RPMs	Reasonable and Prudent Measures
SA	South Atlantic

SEFSC	Southeast Fisheries Science Center
SERO	Southeast Regional Office
SCDNR	South Carolina Department of Natural Resources
SCL	Straight Carapace Length
STSSN	Sea Turtle Stranding and Salvage Network
T&Cs	Terms and Conditions
TED	Turtle Exclusion Device
TEWG	Turtle Expert Working Group
U.S.	United States
USACE	United States Army Corps of Engineers
USFWS	United States Fish and Wildlife Service

Units of Measure

°C	Degrees Celsius
cm	Centimeter(s)
°F	Degrees Fahrenheit
ft	Foot/feet
ft^2	Square feet
g	Gram(s)
in	Inch(es)
kg	Kilogram(s)
km	Kilometer(s)
lb	Pound(s)
m	Meter(s)
mi	Mile(s)
nmi^2	Square nautical mile(s)
oz	Ounce(s)
yd	Yard(s)

Introduction

Section 7(a)(2) of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. §1531 et seq.), requires that each federal agency ensure that any action authorized, funded, or carried out by the 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 those species. When the action of a federal agency may affect a protected species or its critical habitat, that agency is required to consult with either the National Marine Fisheries Service (NMFS) or the U.S. Fish and Wildlife Service (USFWS), depending upon the protected species that may be affected.

Consultations on most listed marine species and their designated critical habitat are conducted between the action agency and NMFS. Consultations are concluded after NMFS determines the action is not likely to adversely affect listed species or critical habitats, or issues a Biological Opinion (Opinion) that determines whether a proposed action is likely to jeopardize the continued existence of a federally listed species, or destroy or adversely modify federally designated critical habitat. The Opinion also states the amount or extent of listed species incidental take that may occur and develops nondiscretionary measures that the action agency must take to reduce the effects of said anticipated/authorized take. The Opinion may also recommend discretionary conservation measures. No incidental destruction or adverse modification of critical habitat may be authorized. The issuance of an Opinion detailing NMFS's findings concludes ESA Section 7 consultation.

Based on our review associated with the United States Army Corps of Engineers (USACE) and Federal Emergency Management Agency (FEMA) proposal to repair and replace the Jacksonville Beach Pier in Jacksonville, Duval County, Florida (SAJ-2003-00237 [NW-MAO], PA-04-FL-4283-PW-00912), this Opinion analyzes the potential for the project to affect the following species and critical habitat: green sea turtle (North Atlantic [NA] and South Atlantic [SA] distinct population segments [DPSs]), hawksbill sea turtle, Kemp's ridley sea turtle, leatherback sea turtle, loggerhead sea turtle (Northwest Atlantic [NWA] DPS), smalltooth sawfish (United States [U.S.] DPS), Atlantic Sturgeon (South Atlantic DPS), Nassau grouper, North Atlantic right whale, Giant Manta Ray, loggerhead sea turtle designated critical habitat (Unit LOGG-N-14), and North Atlantic right whale designated critical habitat (Unit 2). Our determinations are based on information provided by USACE, the Florida Sea Turtle and Stranding and Salvage Network (STSSN), and the published literature cited herein.

Updates to the regulations governing interagency consultation (50 CFR part 402) were effective on October 28, 2019 [84 FR 44976]. This consultation was pending at that time, and we are applying the updated regulations to the consultation. As the preamble to the final rule adopting the regulations noted, "[t]his final rule does not lower or raise the bar on Section 7 consultations, and it does not alter what is required or analyzed during a consultation. Instead, it improves clarity and consistency, streamlines consultations, and codifies existing practice." We have reviewed the information and analyses relied upon to complete this biological opinion in light of the updated regulations and conclude the opinion is fully consistent with the updated regulations.

1. CONSULTATION HISTORY

The following is the consultation history for the NMFS Environmental Consultation Organizer (ECO) tracking number SERO-2019-01838 City of Jacksonville, Jacksonville Beach Pier Replacement.

- On June 27, 2019, NMFS received a request for consultation under Section 7 of the ESA from USACE for project number SAJ-2003-00237 (NW-MAO).
- NMFS requested additional information from USACE regarding project details on October 22, 2019, and March 14, May 7, May 8, May 11, May 13, 2020.
- NMFS became aware that FEMA was a dual action agency on or about May 11, 2020. NMFS was informed that the FEMA project number is FEMA PA-04-FL-4283-PW-00912.
- NMFS received final response to our request for additional information from USACE on May, 13 2020, and initiated consultation that day.
- During our internal quality control and legal review process, NMFS requested additional information on June 15, 2020. We received the response on June 16, 2020.

2. DESCRIPTION OF THE PROPOSED ACTION

2.1 Proposed Action

The applicant proposes to repair and replace the terminal 350 feet (ft) of the Jacksonville Beach Pier, as well as remove debris within the pier footprint. This project is necessary due to damages sustained during Hurricane Matthew in October 2016 and Hurricane Irma in October 2017, which destroyed 350 ft of the pier and damaged an additional 450 ft of remaining structure.

The proposed project includes the removal of the debris from the ocean floor and the reconstruction of the damaged and destroyed portions of the pier within the alignment of the previous structure. The new pier has been designed to incrementally increase in height from shore to the waterward extent. This design is meant to keep portions of the structure above the 50-year wave crest elevation in order to increase its durability in future storm events.

A temporary work trestle will be constructed before repairs and debris removal begins. Construction of the temporary work trestle will require the installation of 16 new 20-inch (in) steel pipe piles, 86 new 24-in steel pipe piles, 12 new 26-in steel pipe piles. All steel pipe piles will be installed by vibratory hammer and seated with an impact hammer. Additionally, approximately 64 new steel HP14 x73 H-piles and 94 new 24-in concrete piles will be installed. The H-piles will be installed via vibratory hammer only and the concrete piles will be installed via impact hammer. The applicant estimates that no more than 6 steel piles will be installed per day and that approximately 4 concrete piles will be installed per day. Steel piles and concrete piles will not be installed on the same days. Pile installation will not occur every day during construction.

Due to near shore wave action, the beginning of the temporary work trestle will be installed from land. As the trestle proceeds further over the beach and water, the competed portion of the trestle itself will be used as the construction platform for the next section of trestle. Temporary work trestle construction will begin immediately after receiving the final permit, and will occur only during daylight hours and is expected to last approximately 4 months (July through October, 2020). The temporary work trestle will be in place for an estimated 24 months. Upon project completion, the temporary work trestle will be removed via vibratory hammer using the trestle itself as the staging platform. Small watercraft may be used for observation and safety during the temporary work trestle construction and removal processes.

For removal of damaged pier structures, the caps of the existing pile bents that remain upright will be removed by cutting below the existing cap with an air saw and the 18-in square concrete piles will be jetted out. The pile bents that are on the ocean floor will be removed by cutting the pile off 0-2 in below the ocean floor. All of the debris will be removed via the temporary work trestle with a 200-ton crane. Divers will assist with removal of the debris field on the ocean floor. All removal work will occur during daylight hours only. The applicant has estimated approximately 4 months for all removal operations. All removed debris will be loaded onto trucks or dumpsters for disposal off-site at a recycling facility.

Before sustaining damage, the original pier structure was 22,550 square feet (ft^2). The project will replace a total of 860 linear feet of the 19,000-ft^2 wood deck pier of the original pier structure. This total includes the terminal 350 ft of destroyed pier, 450 ft of damaged pier that will be removed and replaced, and an additional 60 feet of pier that will be removed to tie into the existing, original pier structure. New piles and decking will be installed using a crane located on the temporary work trestle. Replacing the pier will take approximately 18 months, will occur during daylight hours only, and will have no seasonal restrictions.

The entire project from start to finish will take approximately 26 months to complete.

Table 1. Pile Installation Methodology for the Jacksonville Beach Pier Repair Project

Pile type(s)	Number of Piles	Installation Method	Maximum Number of Piles per Day
20-in steel pipe	16	Vibratory hammer, seated by impact hammer	6
24-in steel pipe	86	Vibratory hammer, seated by impact hammer	6
26-in steel pipe	12	Vibratory hammer, seated by impact hammer	6
HP14 x73 H-piles	64	Vibratory hammer	6
24-in concrete	94	Impact hammer	4

Upon completion, Jacksonville Beach Pier will be accessible to anglers both day and night. The pier will be open 365 days a year, with operational hours of 6 A.M. – 10 P.M., April through November, and 6 A.M. – 7 P.M., December through March. Estimated usage will vary daily and seasonally. The applicant estimates approximately between 100 to 200 anglers will use the pier per day. The pier will have an attendant during operational hours. The replacement pier will include fish cleaning stations and a bait shop.

To minimize potential impacts to ESA-listed species, the applicant will be required to implement the following conditions during construction:

- Prior to the onset of construction activities, the applicant or designated agent will conduct a meeting with all construction staff to discuss identification of the sea turtles, sturgeon, giant manta rays, and marine mammals, their protected status, 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.

- The existing parking lot, or other upland, non-beach parcels will be used for construction staging. If areas other than the existing parking lot are needed for staging, the contractor will be responsible for identifying available areas and obtaining permission for use. The beach will not be used for project staging.

- The applicant will adhere to NMFS's *Sea Turtle and Smalltooth Sawfish Construction Conditions*,[1] including the use of turbidity curtains, and which requires construction to cease immediately if a sea turtle or smalltooth sawfish is seen within a 50-ft radius of the equipment. Activities will not resume until the protected species has departed the project area of its own volition.

- Adherence to Project Design Criteria (PDC) for In-Water Activities.[2]

- Adherence to Federal Regulations Governing the Approach to North Atlantic Right Whales.[3]

- The applicant will rely on early morning (i.e., sunrise to 9 am) monitoring for sea turtle nesting evidence before any construction occurring May through October using Beaches Sea Turtle Patrol (BSTP), which is the local Florida Fish and Wildlife Conservation Commission (FWC)-permitted sea turtle patrol group in the area. The BSTP will report any evidence of sea turtle nesting to the applicant, and if a sea turtle nest is found within 0.25 miles (mi) of the pier, work will not begin until the proper mitigation measures have been put in place. Prior to construction resuming, the sea turtle nest will be properly marked and fenced off by BSTP. Based on the nest location, BSTP will make a determination of whether construction can safely resume or if restrictions and/or alterations to the construction activities need to be made. If BSTP is unsure of the safety of future construction, they will refer the matter to USFWS for a decision on mitigation measure(s). Once the mitigating measure(s) have been

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[1] NMFS. 2006. Sea Turtle and Smalltooth Sawfish Construction Conditions revised March 23, 2006. National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Southeast Regional Office, Protected Resources Division, Saint Petersburg, Florida. https://www.fisheries.noaa.gov/webdam/download/92937961

[2] NMFS. 2017. Endangered Species Act - Section 7 Consultation Biological Opinion for the Authorization of Minor In-Water Activities throughout the Geographic Area of Jurisdiction of the U.S. Army Corps of Engineers Jacksonville District, including Florida and the U.S. Caribbean (JAXBO).

[3] NMFS. 1997. North Atlantic Right Whale Protection. 62 FR 6729 - 62 FR 6738.

finalized, the engineer and contractor will meet with either BSTP or USFWS (as appropriate) to discuss the new construction procedures. The engineer will monitor for compliance or hire a third party consultant to monitor compliance.

- According to the proposed project timeline, the installation of 24-in concrete piles via impact hammer is anticipated to occur when North Atlantic right whale mother-calf pairs are expected to be in or near the action area. However, a dedicated whale observer will be present 1 hour prior to the start of all pile driving. The water will be scanned for whales for 20 minutes prior to pile driving and during all pile driving activities. If at any point a whale is observed within 500 yards (yd) of the work site, pile driving will cease until authorities have been notified (1-877-WHALE HELP [1-877-942-5343]) and the animal(s) have vacated on their own or the agency has granted permission to proceed.

- Installation of steel pipe piles will not occur for 1 hour after sunrise or for 1 hour before sunset.

- All construction personnel must watch for and avoid collision with ESA-listed species. Vessel operators must avoid potential interactions and operate in accordance with the following protective measures:
    - All vessels associated with the construction project shall operate at "Idle Speed/ No Wake" at all times while in water depths where the draft of the vessel provides less than a 4-foot (ft) clearance from the bottom and in all depths after a protected species has been observed in and has departed the area.
    - All vessels will follow marked channels and routes using the maximum water depth whenever possible.
    - Operation of any mechanical construction equipment, including vessels, shall cease immediately if a sea turtle species or smalltooth sawfish is observed within a 50-ft radius of construction equipment, and shall not resume until the species has departed the area of its own volition.
    - If the detection of species is not possible during certain weather conditions (e.g., fog, rain, wind), then in-water operations will cease until weather conditions improve and detection is again feasible.

- Any collision with or injury to any ESA-listed species occurring during the construction shall be reported immediately to NMFS's Protected Resources Division (PRD) by phone at 1-727-824-5312 or by email at takereport.nmfsser@noaa.gov.

To minimize potential impacts to ESA-listed species, the action agencies will include the following conditions to the permit (for USACE) or funding (for FEMA) for post-construction activities:

- There will be an on-site pier attendant during operational hours. The pier attendant will be able to assist with sea turtle recreational hook-and-line captures using large dip-nets and de-hooking equipment kept onsite.

- The applicant will put in place an agreement with the Florida Sea Turtle Stranding Coordinator to call, pick up, and assist with hooked, entangled, or stranded turtles. The Florida Stranding Coordinator's contact information can be found at the following web link: https://www.fisheries.noaa.gov/state-coordinators-sea-turtle-stranding-and-salvage-network

- Fishing cleaning stations will be clearly marked and have nearby trash receptacles with lids. The applicant will post signage that will ask anglers not to dispose of fish carcasses or debris in the water. Receptacles will be clearly marked and will be emptied regularly.

- Fishing line recycling receptacles will be placed along the pier in order to minimize gear from being disposed of in the ocean or on the beaches. Receptacles will be clearly marked and will be emptied frequently enough to ensure they do not overfill and that gear is disposed of properly.

- Upon completion of the pier, educational signs must be posted in a visible location(s), alerting users of listed species in the area. The applicant will post the "Save Dolphins, Sea Turtles, Sawfish and Manta Ray", "Report a Sturgeon", and the "Help Protect North Atlantic Right Whales" signs, which are available for download at: https://www.fisheries.noaa.gov/southeast/consultations/protected-species-educational-signs

- The applicant (City of Jacksonville) will conduct at least 1 out-of-water and at least 1 in-water pier cleanup and maintenance per year in perpetuity. In addition to this regular pier maintenance, volunteer groups will also hold a minimum of two cleanups annually, to clear trash and loose debris from the pier and beach. These activities account for a total of at least 4 cleanups per year.

- The applicant will use sea turtle friendly pier lighting (i.e., long wavelength amber, orange, or red light-emitting diode lighting).

2.2 Action Area

The Jacksonville Beach Pier is located at 503 1st Street North, Jacksonville Beach, Duval County, Florida (Latitude: 30.293550, Longitude: -81.387749) on the Atlantic Ocean. The Jacksonville Beach Pier, in its current location, was destroyed by Hurricane Floyd in September 1999. In 2003, the Florida Department of Environmental Protection (FDEP) issued Joint Coastal Permit No. 0208187-001-JC, USACE issued Permit No. SAJ-2003-00237 (IP-RLW), and a 25-year sovereign submerged lands lease (160033702) was established. The City of Jacksonville constructed a new pier in 2004 in compliance with the above referenced permits and authorizations. Hurricanes Matthew (2016) and Irma (2017) affected the Jacksonville coast, destroying portions of the pier and severely damaging portions of the remaining structure.

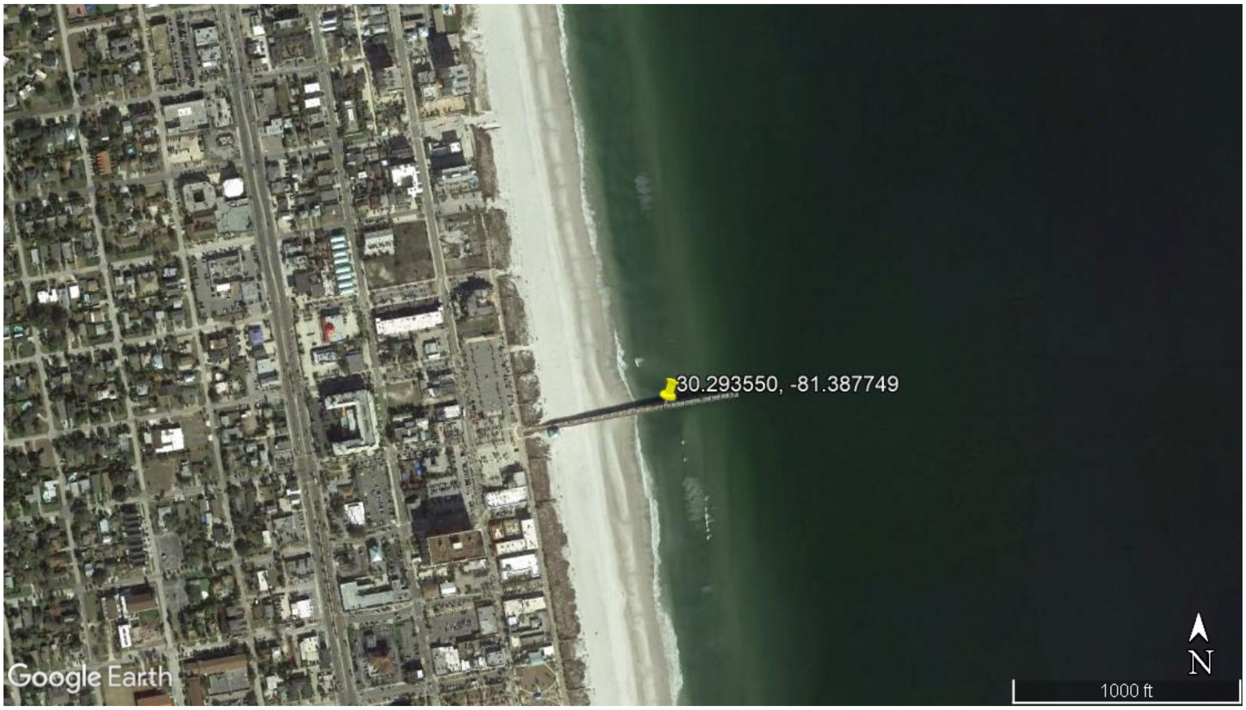

Figure 1. The Jacksonville Beach Pier (©Google 2018).

The action area is defined by regulation as all areas to be affected 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 is equivalent to the radius of behavioral noise effects to ESA-listed species based on the installation of 26-in steel pilings using an impact hammer, or specifically a 3,281-ft behavioral noise radius (Figure 2). This is the largest possible behavioral noise radius and, thus, the worst-case scenario. The action area occurs within loggerhead sea turtle nearshore reproductive critical habitat (LOGG-N-14) (79 FR 39856) and within Unit 2 of North Atlantic right whale designated critical habitat (81 FR 4837).

Figure 2. Image showing the action area in red defined by the extent of behavioral noise effects based on the installation of 26-in steel pipe piles using an impact hammer (i.e., 3,281-ft radius) (©2018 Google).

The water depth within the action area ranges from approximately 0 – 20 ft. The substrate consists of unconsolidated, bare, sand bottom. A February 2019 Joint Coastal Permit Environmental Narrative states no significant submerged resources (e.g., seagrasses, mangroves, hardbottom, or corals) were observed within 1,000 ft of the project site. The finished pier will be approximately 10-15 ft above mean high water (MHW) elevation.

3. STATUS OF THE SPECIES

Table 2 provides the effect determinations for ESA-listed species USACE and/or NMFS believe may be affected by the proposed action.

Table 2. Effects Determinations for Species USACE and/or NMFS Believes May Be Affected by the Proposed Action

Species	ESA Listing Status	Action Agency Effect Determination	NMFS Effect Determination
Sea Turtles			
Green (NA DPS)	T	NLAA	LAA
Green (SA DPS)	T	NLAA	LAA
Hawksbill	E	NLAA	NE

Species	ESA Listing Status	Action Agency Effect Determination	NMFS Effect Determination
Kemp's ridley	E	NLAA	LAA
Leatherback	E	NLAA	NLAA
Loggerhead (NWA DPS)	T	NLAA	LAA
Fish			
Atlantic sturgeon (SA DPS)	E	NLAA	NLAA
Giant manta ray	E	NE	LAA
Smalltooth sawfish (US DPS)	E	NE	NLAA
Nassau grouper	T	NLAA	NE
Marine Mammals			
North Atlantic right whale	E	NLAA	NLAA

E = endangered; T = threatened; NLAA = may affect, not likely to adversely affect; LAA = likely to adversely affect; NE = no effect

The Nassau grouper is, primarily, a shallow-water, insular species throughout the wider Caribbean, South Florida, Bermuda and the Bahamas (Carter et al. 1994). Anecdotal descriptions extend the range up the Atlantic coast to North Carolina, but confirmation of this distribution is currently lacking (NOAA, 2013). Adult Nassau grouper are typically found on high relief coral reefs or rocky substrate in clear waters (Sadovy and Eklund 1999), from the shoreline to a depth of about 100-130 m. Larger adults tend to occupy deeper, more rugose, reef areas (Semmens et al. 2008). Both adults and juveniles will use either natural or artificial reefs (Smith 1971, Beets and Hixon 1994, Colin et al. 1997). Since Nassau grouper are not known to be found as far north as Jacksonville Beach, and given the absence of reefs within the project area, we determine this project will have No Effect (NE) on Nassau grouper.

To determine which sea turtle species were most likely to occur within the action area, we reviewed the offshore STSSN data for Florida Zone 30 for the years 2007-2015. Zone 30 runs along the east coast of Florida from 30ºN to 31ºN and includes portions of St. John's, Duval, Nassau, and Camden counties. Based on this 9-year dataset, the hawksbill sea turtle is rarely present in offshore areas along the north east coast of Florida (Table 3). Furthermore, hawksbill sea turtles have very specific life history strategies, which are not supported at the project site. Hawksbill sea turtles typically inhabit inshore reef and hard bottom areas where they forage primarily on encrusting sponges and not baits typically fished from piers. Based on the foregoing, we do not believe hawksbill sea turtles are likely to occur in the action area. We believe green sea turtles (NA DPS and SA DPS), Kemp's ridley sea turtles, leatherback sea turtles, and loggerhead sea turtles (NWA DPS) may occur within the action area.

Table 3. Offshore Sea Turtle Data for Florida Zone 30 as supplied by the Florida STSSN (2007-2015)

Species	Number of Sea Turtles Stranded or Salvaged	Number of Sea Turtles Reported Caught on Recreational Hook-and-Line or Entangled in Gear
Green sea turtle	194	1

Species	Number of Sea Turtles Stranded or Salvaged	Number of Sea Turtles Reported Caught on Recreational Hook-and-Line or Entangled in Gear
Hawksbill sea turtle	1	0
Kemp’s ridley sea turtle	109	4
Leatherback sea turtle	10	0
Loggerhead sea turtle	532	12
Unknown	14	1
Total	860	18

Based on sightings data, NMFS expects North Atlantic right whale mother-calf pairs to be close into shore from December through March. The applicant is proposing no seasonal restrictions on the project. However, as stated above, only the installation of 24-in concrete piles via impact hammer is anticipated to occur when North Atlantic right whale mother-calf pairs are expected to be in or near the action area.

Table 4 provides the effect determinations for designated critical habitat (DCH) that can be found in the action area.

Table 4. Effects Determinations for Designated Critical Habitat Found in the Action Area

Species	DCH Unit	Action Agency Effect Determination	NMFS Effect Determination
Loggerhead sea turtle	LOGG-N-14	NE	NE
North Atlantic right whale	Unit 2	NE	NE

The project area overlaps portions of the boundaries of North Atlantic right whale designated critical habitat (Unit 2) and loggerhead sea turtle designated critical habitat (Nearshore Reproductive Habitat Unit LOGG-N-14).

The essential features (EFs) to the conservation of the North Atlantic right whale, which provide calving area functions in Unit 2, are:

1. Sea surface conditions associated with Force 4 or less on the Beaufort Scale;
2. Sea surface temperatures of 7°C to 17°C; and
3. Water depths of 6 to 28 meters (m), where these features simultaneously co-occur over contiguous areas of at least 231 square nautical miles (nmi²) of ocean waters during the months of November through April.

When these features are available, they are selected by North Atlantic right whale cows and calves in dynamic combinations that are suitable for calving, nursing, and rearing, and that vary, within the ranges specified, depending on factors such as weather and age of the calves. The project is not expected to affect either sea surface conditions, sea surface water temperatures or water depths. Therefore, we do not believe any of the EFs of North Atlantic right whale designated critical habitat (Unit 2) may be affected by this project.

The physical or biological features (PBF) of loggerhead nearshore reproductive habitat encompasses a portion of the nearshore waters adjacent to nesting beaches that are used by hatchlings to egress to the open-water environment, as well as by nesting females to transit between beach and open water, during the nesting season. The following primary constituent elements support loggerhead nearshore reproductive habitat:

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 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.

The proposed project involves the replacement of portions of an existing pier that were damaged during recent hurricanes. Therefore, we do not expect the project to affect the conditions of nearshore waters adjacent to nesting beaches of the loggerhead Nearshore Reproductive Habitat LOGG-N-14, or its primary constituent elements. The project will not introduce any new obstructions in the water and will remove obstructions that might have been caused by the damage portions of the pier. The applicant will utilize sea turtle safe lighting that will not interfere with the transit of sea turtles. As a replacement of portions of an existing pier damaged by recent hurricanes, will not significantly add to manmade structures at this location. In addition, the applicant will take measures to minimize the attraction of predators to the areas with the same measures proposed to minimize the attraction of sea turtles to the fishing pier. Therefore, we do not expect the project to affect the loggerhead Nearshore Reproductive Habitat LOGG-N-14.

3.1 Potential Routes of Effect Not Likely To Adversely Affect Listed Species

Effects to ESA-listed species include potential for injury from construction equipment or materials. We believe this effect is highly unlikely to occur. Because these species are highly mobile, we expect them to move away from the project site if disturbed. The applicants' implementation of NMFS's *Sea Turtle and Smalltooth Sawfish Construction Conditions* will further reduce the risk by requiring all construction workers to watch for sea turtles and smalltooth sawfish. Operation of any mechanical construction equipment will cease immediately if a sea turtle or smalltooth sawfish is seen within a 50-ft radius of the equipment. Activities will not resume until the species has departed the project area of its own volition. Further, if at any point a listed sea turtle species or smalltooth sawfish is observed within 50 ft of the work site, or if a whale is observed within 500 yd of the work site, all construction will cease until the species has departed the project area of its own volition.

Sea turtles and smalltooth sawfish 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. 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 or smalltooth sawfish for foraging and refuge is expected to be infrequent; however, Jacksonville Beach, Florida, is a known green sea turtle, loggerhead sea turtle, and leatherback sea turtle nesting beach. The applicant, in coordination with the local sea turtle volunteer group, BSTP, will monitor for sea turtle nesting evidence each morning before any construction occurring May through October (i.e., during nesting season). Additionally, all new pier lighting will be sea turtle friendly so as not to disrupt adult, female turtles entering or hatchlings leaving the adjacent nesting beaches post-construction. Further, the pier's footprint during and after construction is not expected to obstruct access to the adjacent nesting beaches along Jacksonville Beach, Florida. Finally, installation of steel pipe piles will not occur for 1 hour after sunrise and 1 hour before sunset in order to minimize affecting potential turtle nesting attempt behavior.

Atlantic sturgeon may be affected by the temporary and permanent loss of habitat due to the placement of pile-supported structures. However, the effect to Atlantic sturgeon from the potential loss of foraging habitat due to the placement of pile-supported structures is insignificant. Atlantic sturgeon are opportunistic feeders that forage over large areas and the area of impact is relatively small (4-month temporary loss of approximately 437 ft^2 from work trestle installation and permanent loss of 384 ft^2 of habitat from the 96 new 24-in concrete piles) compared to the surrounding area available. During foraging periods, Atlantic sturgeon generally occupy nearshore areas between 6.5-13 ft (2-4 m) deep characterized by low-relief sand substrate (Fox et al. 2002). While the project area contains nearshore areas of this description, given the large expanses of similar habitat in the area nearby, the small project area, and the small total footprint of the piles, we anticipate permanent habitat effects would be too small to detect. Further, the pier's footprint during and after construction is not expected to obstruct access to any potential foraging or migratory habitat.

The fall migration route of pregnant North Atlantic right whales hugs the U.S. Atlantic Ocean coastline from Nova Scotia, Canada, to Northeastern Florida. The applicant is proposing no seasonal restrictions on construction; however, according to the project timeline, the only construction activity anticipated to occur when North Atlantic right whale mother-calf pairs are expected to be in or near the action area is the installation of the 24-in concrete piles via impact hammer. We anticipate any habitat exclusion effects to North Atlantic right whale will be temporary and unmeasurable, and therefore insignificant. The proposed action is not expected to disrupt calving, nursing, and rearing if an individual or an individual with a calf chooses to use habitat within the action area during that phase of construction. The applicant will employ a dedicated whale observer 1 hour prior to the start of pile driving each day. The water will be scanned for whales for 20 minutes prior to pile driving and during all pile driving activities. If a whale is observed within 500 yd of the pier before or during pile driving, pile driving will not begin or will discontinue until the whale species has departed the project area of its own volition.

The process of installing piles into the substrate will increase turbidity during that aspect of the construction process. We anticipate any effects from increased turbidity on ESA-listed species will be temporary and unmeasurable, and therefore insignificant. The action is occurring in the open waters of the Atlantic Ocean and suspended sand particles will settle out within a short time frame.

Potential effects to leatherback sea turtle include the risk of physical injury from recreational hook-and-line capture upon completion of the pier. We believe any risk to leatherback sea turtles from potential interaction with future recreational fishing activities is highly unlikely to occur. Although Jacksonville Beach has had reported occurrences of leatherback nesting, there have been no recreational hook-and-line captures of leatherback sea turtles in the 9-year dataset.

Potential effects to smalltooth sawfish include the risk of physical injury from recreational hook-and-line capture upon completion of the pier. We believe that incidental capture of this species is also extremely unlikely to occur. The International Sawfish Encounter Database (unpublished data last updated January 2017) contains only 1 recreational hook-and-line capture in counties of Duval, Camden, St Johns, and Nassau, Florida, between the years of 1999-2017 (i.e., from species listing through the most-recent data).

In addition, as stated above, educational signage for smalltooth sawfish and the Florida Fish and Wildlife Conservation Commission (FWC) Wildlife Hotline will be posted at the entrance to the pier and on the terminal platform upon completion of the pier. Based on the best available data and the known biology and range of the species, we determined that the proposed action is not likely to adversely affect smalltooth sawfish. However, current data is limited and while signage will not reduce the potential risk of recreational hook-and-line interaction, it will encourage anglers to report an interaction if one unexpectedly occurs. This will provide valuable data to researchers and resource managers either confirming our analysis (by lack of reports) or ensuring we will be able reinitiate consultation with the USACE based on new information.

Potential effects to Atlantic sturgeon include the risk of physical injury from recreational hook-and-line capture resulting from future use of the repaired pier after completion of the proposed action. We believe incidental capture of this species is extremely unlikely to occur. Anecdotal evidence indicates sturgeon have been caught or snagged by recreational anglers (A. Kaeser, USFWS, pers. comm. to J. Reuter, NMFS Southeast Region Office [SERO] on June 29, 2017; C. Godwin, North Carolina Department of Environmental and Natural Resources, pers. comm. to J. Reuter, NMFS SERO, on July 6, 2017); however, 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 an Atlantic sturgeon from a fishing structure; the Florida Fish and Wildlife Conservation Commission reported that a subadult was caught on hook-and-line from the subject fishing pier, Jacksonville Beach Pier (C. Brown, Florida Fish and Wildlife Conservation Commission, pers. comm. to K. Shotts, NMFS SERO, on January 8, 2014). The area around Jacksonville Beach Pier is not an area of high concentration for Atlantic sturgeon, and the single reported recreational catch indicates that a recreational fishing capture is extremely unlikely. In addition, as stated above, educational signage for sturgeon and the Southeast U.S Sturgeon Hotline will be posted at the entrance to the pier and on the terminal platform upon completion of the pier. 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 USACE based on new information.

ESA-listed species may be injured due to entanglement in improperly discarded fishing gear. We believe this route of effect is highly unlikely to occur. We expect that individuals will appropriately dispose of fishing gear when disposal bins are available, and the applicant will install and maintain fishing line recycling receptacles and trashcans with lids along the length of the pier to keep debris out of the water. 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 at least 1 out-of-water cleanup and 1 in-water cleanup annually. Additionally, volunteer groups will hold a minimum of two beach sweeps annually, to clear trash and loose debris from the pier and surrounding dune and beach areas. This will minimize the accumulation of fishing line over time. Improperly disposed of and lost/snagged fishing gear is considered below in the Effects of the Action.

As stated above, educational signage will be installed in visible locations upon completion of the pier. This will provide information to the public on how to handle and report encounters with sea turtle species, smalltooth sawfish, Atlantic sturgeon, and giant manta ray. Signs will not reduce the potential risk of recreational hook-and-line interaction with sea turtles or giant manta ray but they will help reduce the severity of injury to incidentally captured animals. The signs will also 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 USACE based on new information.

Noise created by pile driving activities can physically injure animals or change animal behavior in the affected areas. Injurious effects can occur in 2 ways. First, immediate adverse effects can occur to ESA-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 ESA-listed species as a result of noise created by construction activities is based on the analysis prepared in support of the Opinion for SAJ-82.[4] 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.

Based on our noise calculations, installation of 24-in concrete piles for the pier 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 ESA-listed fish and sea turtles up to 72 ft (22 m) away from the pile, and may cause injury to low frequency cetaceans, like the North Atlantic right whale, at 124 ft (37.8 m) away from the pile. Due to the mobility of sea turtles and ESA-listed fish species, and because the project occurs in open water, we expect those species 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 caused by the installation of 24-in concrete piles via impact hammer 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 24-in concrete piles using an impact hammer could also result in behavioral effects at radii 705 ft (215 m) for ESA-listed fish, 151 ft (46 m) for sea turtles, and 383 ft (117

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[4] NMFS. Biological Opinion on Regional General Permit SAJ-82 (SAJ-2007-01590), Florida Keys, Monroe County, Florida. June 10, 2014.

m) for low frequency cetaceans, like the North Atlantic right whale. Due to the mobility of these species, we expect them to move away from noise disturbances in this open-water environment. Because there is similar habitat nearby, we believe behavioral effects will be unmeasurable, and therefore 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 associated with the installation of 24-in concrete piles via impact hammer will be unmeasurable, and therefore insignificant.

As stated above, based on the project construction timeline, North Atlantic right whale mother-calf pairs are not expected to be in the action area during the installation of steel pipe piles. However, sea turtles and Atlantic sturgeon could be in the action area throughout the project timeline. Based on our noise calculations, the installation of 26-in steel pipe piles for the construction trestle by a vibratory hammer seated with an impact hammer will cause single-strike or peak-pressure injury to sea turtles or ESA-listed fish at a radius of up to 28.1 ft (8.6 m). In the analysis in SAJ-82 (SAJ-82, Appendix B, Table 11 footnote), the noise source level used for this analysis was based on the installation of a 30-in steel pipe pile installed by impact hammer as a surrogate for the impact hammer installation of a 26-in steel pipe pile. This is a conservative approach since the installation of a 30-in steel pipe pile via impact hammer would be louder than the installation of a 26-in steel pipe pile via a vibratory hammer seated with an impact hammer. Similarly, the installation of 20-in and 24-in steel pipe piles via a vibratory hammer seated with an impact hammer and the installation of the H-pipes via vibratory hammer would generate less noise that the installation of a 30-in steel pipe pile installed by impact hammer. The daily cumulative sound exposure level (cSEL) of multiple pile strikes over the course of a day may cause injury to ESA-listed fish and sea turtles at a radius of up to 172 ft (52.3 m). Due to the mobility of sea turtles and ESA-listed fish species, we expect them to move away from noise disturbances before cumulative injury actually occurs. Because there is similar habitat nearby, we believe this effect will be unmeasurable, and therefore 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, installation of steel pipe piles by vibratory hammer seated with an impact hammer will not result in any injurious noise effect. An animal’s movement away from the injurious sound radius is a behavioral response, the effects of which are discussed below.

Based on our noise calculations, vibratory hammer seated by impact hammer pile installation of the steel pipe piles could also cause behavioral effects at radii of 3,281 ft (1,000 m) for sea turtles, and 15,228.3 ft (4,641,641.6 m) for ESA-listed fish. Again, we believe that this is likely an overestimate due to 30-in steel pipe pile noise level used as a surrogate for 20-in, 24-in and 26-in steel pipe piles installed by a vibratory hammer seated by impact hammer and H-piles installed via vibratory hammer. Due to the mobility of these species, we expect them to move away from noise disturbances in this open-water environment before any injury actually occurs. If an individual chooses to remain within the behavioral response zone it could be exposed to behavioral noise impacts during the steel pile installation. Since installation will occur intermittently (throughout the day and between days), we anticipate any effects will be unmeasurable. These species will be able to resume normal activities during quiet periods between pile installations and at night. Therefore, we anticipate any behavioral effects associated with the installation of steel pipe piles via vibratory hammer seated by impact hammer will be insignificant.

3.2 Potential Routes of Effect Likely To Adversely Affect Listed Species

NMFS determined the potential route of effect likely to adversely affect sea turtles and giant manta ray is the risk of physical injury from recreational hook-and-line use resulting from future use of the pier after completion of the proposed action. We provide greater detail on the potential effects of entanglement, hooking, and trailing line to sea turtles, and giant manta ray in the Effects of the Action section below.

3.3 Status of Sea Turtles

Section 3.3.1 addresses the general threats that confront all sea turtle species. Sections 3.3.2 – 3.3.5 address information on the distribution, life history, population structure, abundance, population trends, and unique threats to each species of sea turtle likely to be adversely affected by the proposed action.

3.3.1 General Threats Faced by All Sea Turtle Species

Sea turtles face numerous natural and man-made threats that shape their status and affect their ability to recover. Many of the threats are either the same or similar in nature for all listed sea turtle species. Those 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 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 1991a; NMFS and USFWS 1992; NMFS and USFWS 1993; NMFS and USFWS 2008; NMFS et al. 2011a). Domestic fisheries often capture, injure, and kill sea turtles at various life stages. Sea turtles in the pelagic environment are exposed to United States (U.S.) Atlantic pelagic longline fisheries. Sea turtles in the benthic environment in waters off the coastal U.S. 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 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 U.S., 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 U.S., the construction and maintenance of federal navigation channels has been identified as a source of sea turtle mortality. Hopper dredges, which are frequently used in ocean bar channels and sometimes in harbor channels and offshore borrow areas, move relatively rapidly and can entrain and kill sea turtles (NMFS 1997). Sea turtles entering coastal or inshore areas have also been affected by entrainment in the cooling-water systems of electrical generating plants. Other nearshore threats include harassment and/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 hatchling 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 Deep Water Horizon (DWH) oil rig affected sea turtles in the Gulf of Mexico. An assessment has been completed on the injury to Gulf of Mexico marine life, including sea turtles, resulting from the spill (DWH Trustees 2015a). Following the spill, juvenile Kemp's ridley, green, and loggerhead sea turtles were found in *Sargassum* algae mats in the convergence zones, where currents meet and oil collected. Sea turtles found in these areas were often coated in oil and/or had ingested oil. The spill resulted in the direct mortality of many sea turtles and may have had sublethal effects or caused environmental damage that will impact other sea turtles into the future. Information on the spill impacts to individual sea turtle species is presented in the Status of the Species 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 ghost fishing gear) as they feed along oceanographic fronts where debris and their natural food items converge. This is especially problematic for sea turtles that spend all or significant portions of their life cycle in the pelagic environment (i.e., leatherbacks, juvenile loggerheads, and juvenile green turtles).

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 2007b). 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 degrees Celsius (°C) (Ackerman 1997). Increases in global temperature could potentially skew future sex ratios toward higher numbers of females (NMFS and USFWS 2007b).

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 2007c). 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 [DO] 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.

3.3.2 Status of Green Sea Turtle – North Atlantic and South Atlantic DPSs

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 3). 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. For the purposes of this consultation, only the South Atlantic DPS (SA DPS) and North Atlantic DPS (NA DPS) will be considered, as they are the only two DPSs with individuals occurring in the Atlantic and Gulf of Mexico waters of the United States.

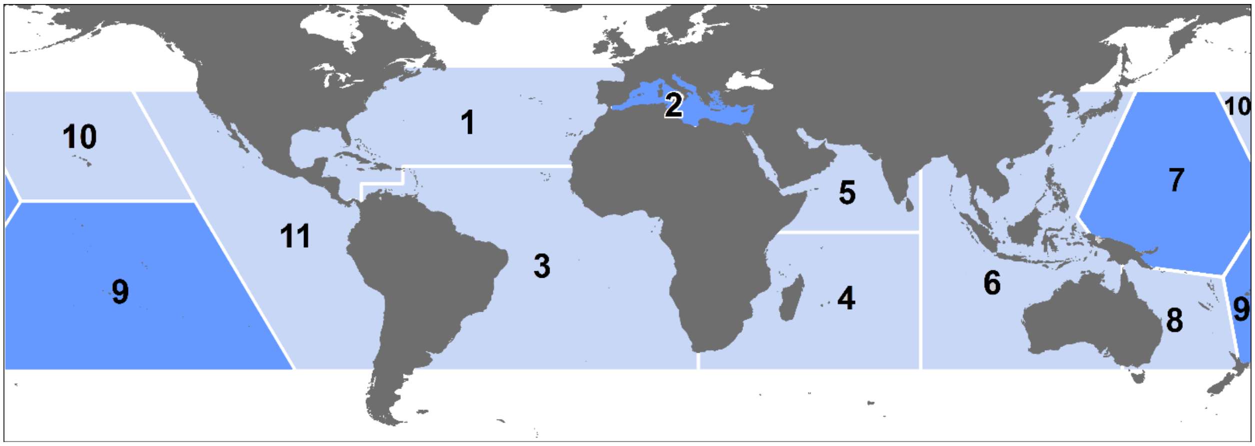

Figure 3. Threatened (light) and endangered (dark) green turtle DPSs: 1. North Atlantic, 2. Mediterranean, 3. South Atlantic, 4. Southwest Indian, 5. North Indian, 6. East Indian-West Pacific, 7. Central West Pacific, 8. Southwest Pacific, 9. Central South Pacific, 10. Central North Pacific, and 11. 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 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 2 largest nesting populations are found at Tortuguero, on the Caribbean coast of Costa Rica (part of the NA DPS), and Raine Island, on the Pacific coast of Australia along the Great Barrier Reef.

Differences in mitochondrial DNA properties of green sea turtles from different nesting regions indicate there are genetic subpopulations (Bowen et al. 1992; FitzSimmons et al. 2006). Despite the genetic differences, sea turtles from separate nesting origins are commonly found mixed together on foraging grounds throughout the species' range. Within U.S. waters individuals from both the NA and SA DPSs can be found on foraging grounds. While there are currently no in-depth studies available to determine the percent of NA and SA DPS individuals in any given location, two small-scale studies provide an insight into the degree of mixing on the foraging grounds. An analysis of cold-stunned green turtles in St. Joseph Bay, Florida (northern Gulf of Mexico) found approximately 4% of individuals came from nesting stocks in the SA DPS (specifically Suriname, Aves Island, Brazil, Ascension Island, and Guinea Bissau) (Foley et al. 2007). On the Atlantic coast of Florida, a study on the foraging grounds off Hutchinson Island found that approximately 5% of the turtles sampled came from the Aves Island/Suriname nesting assemblage, which is part of the SA DPS (Bass and Witzell 2000). All of the individuals in both studies were benthic juveniles. Available information on green turtle migratory behavior indicates that long distance dispersal is only seen for juvenile turtles. This suggests that larger adult-sized turtles return to forage within the region of their natal rookeries, thereby limiting the potential for gene flow across larger scales (Monzón-Argüello et al. 2010). While all of the mainland U.S. nesting individuals are part of the NA DPS, the U.S. Caribbean nesting assemblages are split between the NA and SA DPS. Nesters in Puerto Rico are part of the NA DPS, while those in the U.S. Virgin Islands are part of the SA DPS. We do not currently have information on what percent of individuals on the U.S. Caribbean foraging grounds come from which DPS.

North Atlantic DPS Distribution

The NA DPS boundary is illustrated in Figure 3. Four regions support nesting concentrations of particular interest in the NA 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 NA DPS green sea turtles within the southeastern United States includes sandy beaches between Texas and North Carolina, as well as Puerto Rico (Dow et al. 2007; NMFS and USFWS 1991). The vast majority of green sea turtle nesting within the southeastern United States occurs in Florida (Johnson and Ehrhart 1994; Meylan et al. 1995). Principal U.S. nesting areas for green sea turtles are in eastern Florida, predominantly Brevard south through Broward counties.

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

South Atlantic DPS Distribution

The SA DPS boundary is shown in Figure 3, and includes the U.S. Virgin Islands in the Caribbean. The SA DPS nesting sites can be roughly divided into four regions: western Africa, Ascension Island, Brazil, and the South Atlantic Caribbean (including Colombia, the Guianas, and Aves Island in addition to the numerous small, island nesting sites).

The in-water range of the SA DPS is widespread. In the eastern South Atlantic, significant sea turtle habitats have been identified, including green turtle feeding grounds in Corisco Bay, Equatorial Guinea/Gabon (Formia 1999); Congo; Mussulo Bay, Angola (Carr and Carr 1991); as well as Principe Island. Juvenile and adult green turtles utilize foraging areas throughout the Caribbean areas of the South Atlantic, often resulting in interactions with fisheries occurring in those same waters (Dow et al. 2007). Juvenile green turtles from multiple rookeries also frequently utilize the nearshore waters off Brazil as foraging grounds as evidenced from the frequent captures by fisheries (Lima et al. 2010; López-Barrera et al. 2012; Marcovaldi et al. 2009). Genetic analysis of green turtles on the foraging grounds off Ubatuba and Almofala, Brazil show mixed stocks coming primarily from Ascension, Suriname and Trindade as a secondary source, but also Aves, and even sometimes Costa Rica (North Atlantic DPS)(Naro-Maciel et al. 2007; Naro-Maciel et al. 2012). While no nesting occurs as far south as Uruguay and Argentina, both have important foraging grounds for South Atlantic green turtles (Gonzalez Carman et al. 2011; Lezama 2009; López-Mendilaharsu et al. 2006; Prosdocimi et al. 2012; Rivas-Zinno 2012).

Life History Information

Green sea turtles reproduce sexually, and mating occurs in the waters off nesting beaches and along migratory routes. Mature females return to their natal beaches (i.e., the same beaches where they were born) to lay eggs (Balazs 1982; Frazer and Ehrhart 1985) every 2-4 years while males are known to reproduce every year (Balazs 1983). In the southeastern United States, females generally nest between June and September, and peak nesting occurs in June and July (Witherington and Ehrhart 1989b). During the nesting season, females nest at approximately 2-week intervals, laying an average of 3-4 clutches (Johnson and Ehrhart 1996). Clutch size often varies among subpopulations, but mean clutch size is approximately 110-115 eggs. In Florida, green sea turtle nests contain an average of 136 eggs (Witherington and Ehrhart 1989b). Eggs incubate for approximately 2 months before hatching. Hatchling green sea turtles are approximately 2 inches (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 inches (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 inches (20-25 cm) carapace length, juveniles leave the pelagic environment and enter nearshore developmental habitats such as protected lagoons and open coastal areas rich in sea grass and marine algae. Growth studies using skeletochronology indicate that green sea turtles in the western Atlantic shift from the oceanic phase to nearshore developmental habitats after approximately 5-6 years (Bresette et al. 2006; Zug and Glor 1998). Within the developmental habitats, juveniles begin the switch to a more herbivorous diet, and by adulthood feed almost exclusively on seagrasses and algae (Rebel 1974), although some populations are known to also feed heavily on invertebrates (Carballo et al. 2002). Green sea turtles mature slowly, requiring 20-50 years to reach sexual maturity (Chaloupka and Musick 1997; Hirth 1997).

While in coastal habitats, green sea turtles exhibit site fidelity to specific foraging and nesting grounds, and it is clear they are capable of "homing in" on these sites if displaced (McMichael et al. 2003). Reproductive migrations of Florida green sea turtles have been identified through flipper tagging and/or satellite telemetry. Based on these studies, the majority of adult female Florida green sea turtles are believed to reside in nearshore foraging areas throughout the Florida Keys and in the waters southwest of Cape Sable, and some post-nesting turtles also reside in Bahamian waters as well (NMFS and USFWS 2007).

Status and Population Dynamics

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

North Atlantic DPS

The NA 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. All major nesting populations demonstrate long-term increases in abundance (Seminoff et al. 2015).

Quintana Roo, Mexico, accounts for approximately 11% of nesting for the DPS (Seminoff et al. 2015). In the early 1980s, approximately 875 nests/year were deposited, but by 2000 this increased to over 1,500 nests/year (NMFS and USFWS 2007d). By 2012, more than 26,000 nests were counted in Quintana Roo (J. Zurita, CIQROO, unpublished data, 2013, in Seminoff et al. 2015).

Tortuguero, Costa Rica is by far the predominant nesting site, accounting for an estimated 79% of nesting for the DPS (Seminoff et al. 2015). Nesting at Tortuguero appears to have been increasing since the 1970's, when monitoring began. For instance, from 1971-1975 there were approximately 41,250 average annual emergences documented and this number increased to an average of 72,200 emergences from 1992-1996 (Bjorndal et al. 1999). Troëng and Rankin (2005) collected nest counts from 1999-2003 and also reported increasing trends in the population consistent with the earlier studies, with nest count data suggesting 17,402-37,290 nesting females per year (NMFS and USFWS 2007). Modeling by Chaloupka et al. (2008) using data sets of 25 years or more resulted in an estimate of the Tortuguero, Costa Rica population's growing at 4.9% annually.

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

Florida accounts for approximately 5% of nesting for this DPS (Seminoff et al. 2015). 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 4). According to data collected from Florida's index nesting beach survey from 1989-2018, green sea turtle nest counts across Florida have increased dramatically, from a low of 267 in the early 1990s to a high of 38,954 in 2017. Two consecutive years of nesting declines in 2008 and 2009 caused some concern, but this was followed by increases in 2010 and 2011, and a return to the trend of biennial peaks in abundance thereafter (Figure 4). Modeling by Chaloupka et al. (2008) using data sets of 25 years or more resulted in an estimate of the Florida nesting stock at the Archie Carr National Wildlife Refuge growing at an annual rate of 13.9% at that time. Increases have been even more rapid in recent years.

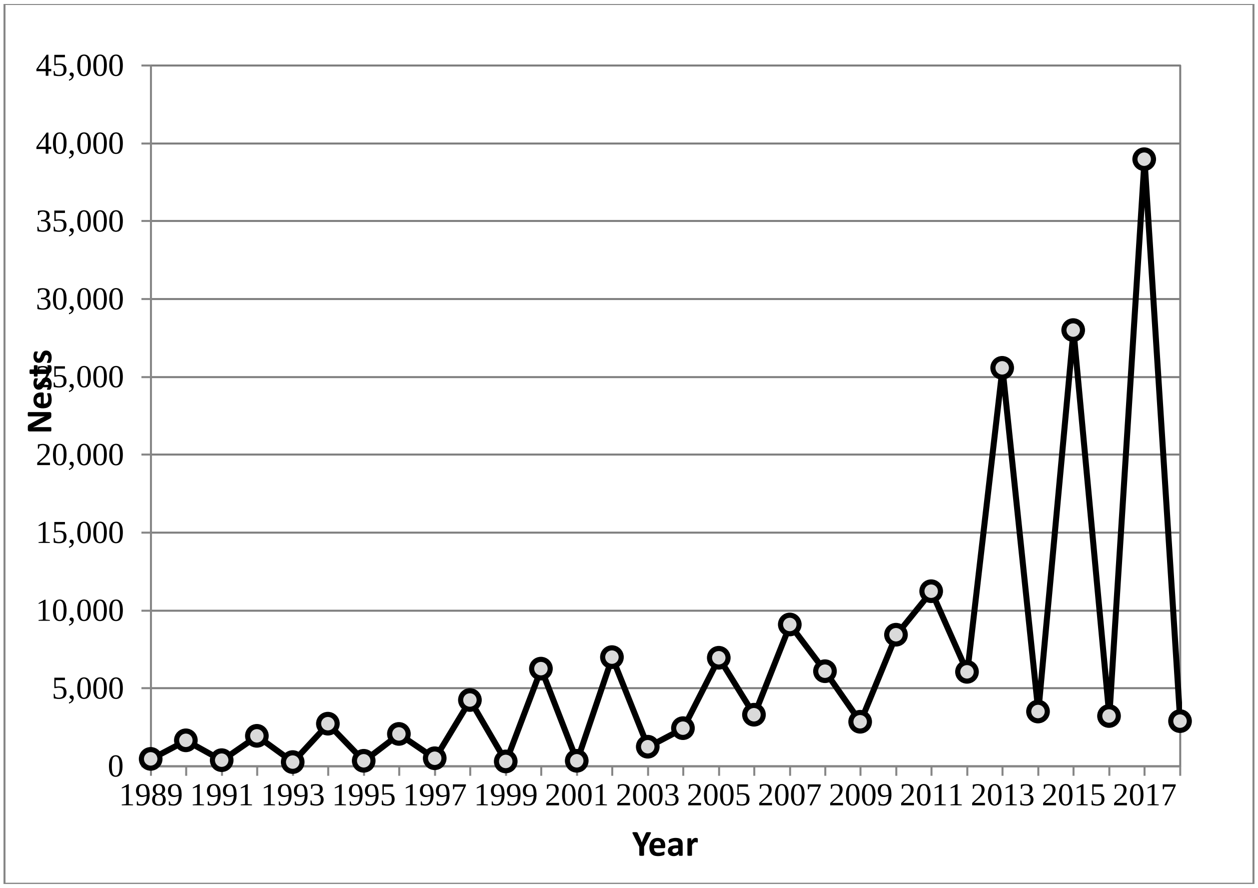

Figure 4. Green sea turtle nesting at Florida index beaches since 1989

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

South Atlantic DPS

The SA DPS is large, estimated at over 63,000 nesters, but data availability is poor. More than half of the 51 identified nesting sites (37) did not have sufficient data to estimate number of nesters or trends (Seminoff et al. 2015). This includes some sites, such as beaches in French Guiana, which are suspected to have large numbers of nesters. Therefore, while the estimated number of nesters may be substantially underestimated, we also do not know the population trends at those data-poor beaches. However, while the lack of data was a concern due to increased uncertainty, the overall trend of the SA DPS was not considered to be a major concern as some of the largest nesting beaches such as Ascension Island (United Kingdom), Aves Island (Venezuela), and Galibi (Suriname) appear to be increasing. Others such as Trindade (Brazil), Atol das Rocas (Brazil), and Poilão (Guinea-Bissau) and the rest of Guinea-Bissau seem to be stable or do not have sufficient data to make a determination. Bioko (Equatorial Guinea) appears to be in decline but has less nesting than the other primary sites (Seminoff et al. 2015).

In the U.S., nesting of SA DPS green turtles occurs on the beaches of the U.S. Virgin Islands, primarily on Buck Island. There is insufficient data to determine a trend for Buck Island nesting, and it is a smaller rookery, with approximately 63 total nesters utilizing the beach (Seminoff et al. 2015).

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 3.3.1.

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

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

Whereas oil spill impacts are discussed generally for all species in Section 3.3.1, specific impacts of the DWH spill on green sea turtles are considered here. Impacts to green sea turtles occurred to offshore small juveniles only. A total of 154,000 small juvenile greens (36.6% of the total small juvenile sea turtle exposures to oil from the spill) were estimated to have been exposed to oil. A large number of small juveniles were removed from the population, as 57,300 small juveniles greens are estimated to have died as a result of the exposure. A total of 4 nests (580 eggs) were also translocated during response efforts, with 455 hatchlings released (the fate of which is unknown) (DWH Trustees 2015). Additional unquantified effects may have included inhalation of volatile compounds, disruption of foraging or migratory movements due to surface or subsurface oil, ingestion of prey species contaminated with oil and/or dispersants, and loss of foraging resources, which could lead to compromised growth and/or reproductive potential. There is no information currently available to determine the extent of those impacts, if they occurred.

While green turtles regularly use the northern Gulf of Mexico, they have a widespread distribution throughout the entire Gulf of Mexico, Caribbean, and Atlantic, and the proportion of the population using the northern Gulf of Mexico at any given time is relatively low. Although it is known that adverse impacts occurred and numbers of animals in the Gulf of Mexico were reduced as a result of the 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 of Mexico as a result of the spill will likely take decades of sustained efforts to reduce the existing threats and enhance survivorship of multiple life stages (DWH Trustees 2015).

3.3.3 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 (Groombridge 1982; TEWG 2000; Zwinenberg 1977).

Species Description and Distribution

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

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

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

Life History Information

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

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

Population Dynamics

Of the 7 species of sea turtles in the world, the Kemp's ridley has declined to the lowest population level. Most of the population of adult females nest on the beaches of Rancho Nuevo, Mexico (Pritchard 1969). When nesting aggregations at Rancho Nuevo were discovered in 1947, adult female populations were estimated to be in excess of 40,000 individuals (Hildebrand 1963). By the mid-1980s, however, nesting numbers from Rancho Nuevo and adjacent Mexican beaches were below 1,000, with a low of 702 nests in 1985. Yet, nesting steadily increased through the 1990s, and then accelerated during the first decade of the twenty-first century (Figure 5), which indicates the species is recovering.

It is worth noting that when the Bi-National Kemp's Ridley Sea Turtle Population Restoration Project was initiated in 1978, only Rancho Nuevo nests were recorded. In 1988, nesting data from southern beaches at Playa Dos and Barra del Tordo were added. In 1989, data from the northern beaches of Barra Ostionales and Tepehuajes were added, and most recently in 1996, data from La Pesca and Altamira beaches were recorded. Currently, nesting at Rancho Nuevo accounts for just over 81% of all recorded Kemp's ridley nests in Mexico. Following a significant, unexplained 1-year decline in 2010, Kemp's ridley nests in Mexico increased to 21,797 in 2012 (Gladys Porter Zoo 2013). From 2013 through 2014, there was a second significant decline, as only 16,385 and 11,279 nests were recorded, respectively. More recent data, however, indicated an increase in nesting. In 2015 there were 14,006 recorded nests, and in 2016 overall numbers increased to 18,354 recorded nests (Gladys Porter Zoo 2016). There was a record high nesting season in 2017, with 24,570 nests recorded (J. Pena, pers. comm., August 31, 2017), but nesting for 2018 declined to 17,945, with another steep drop to 11,090 nests in 2019 (Gladys Porter 2019). At this time, it is unclear whether the increases and declines in nesting seen over the past decade represents a population oscillating around an equilibrium point or if nesting will decline or increase in the future.

A small nesting population is also emerging in the United States, primarily in Texas, rising from 6 nests in 1996 to 42 in 2004, to a record high of 353 nests in 2017 (National Park Service data). It is worth noting that nesting in Texas has 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.

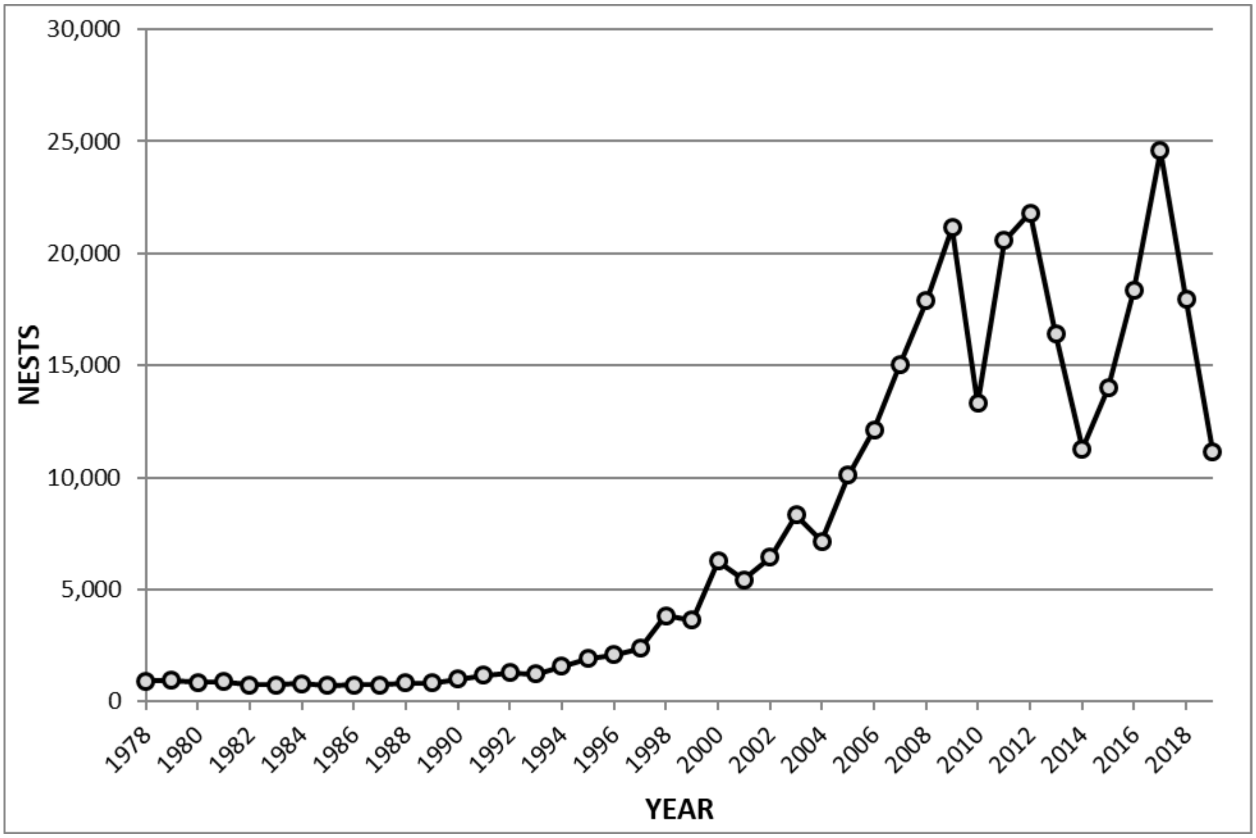

Figure 5. Kemp's ridley nest totals from Mexican beaches (Gladys Porter Zoo nesting database 2019)

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 over the last 2 decades is 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 there is cause for concern regarding the ongoing recovery trajectory.

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 3.3.1; 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*[5] 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 Sea Turtle Stranding and Salvage Network data, https://www.fisheries.noaa.gov/national/marine-life-distress/sea-turtle-stranding-and-salvage-network) elevated sea turtle strandings in the Northern Gulf of Mexico, particularly throughout the Mississippi Sound area. For example, in the first 3 weeks of June 2010, over 120 sea turtle strandings were reported from Mississippi and Alabama waters, none of which exhibited any signs of external oiling to indicate effects associated with the DWH oil spill event. A total of 644 sea turtle strandings were reported in 2010 from Louisiana, Mississippi, and Alabama waters, 561 (87%) of which were Kemp's ridley sea turtles. During March through May of 2011, 267 sea turtle strandings were reported from Mississippi and Alabama waters alone. A total of 525 sea turtle strandings were reported in 2011 from Louisiana, Mississippi, and Alabama waters, with the majority (455) having occurred from March through July, 390 (86%) of which were Kemp's ridley sea turtles. During 2012, a total of 384 sea turtles were reported from Louisiana, Mississippi, and Alabama waters. Of these reported strandings, 343 (89%) were Kemp's ridley sea turtles. During 2014, a total of 285 sea turtles were reported from Louisiana, Mississippi, and Alabama waters, though the data is incomplete. Of these reported strandings, 229 (80%) were Kemp's ridley sea turtles. These stranding numbers are significantly greater than reported in past years; Louisiana, Mississippi, and Alabama waters reported 42 and 73 sea turtle strandings for 2008 and 2009, respectively. 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

[5] *Arribada* is the Spanish word for "arrival" and is the term used for massive synchronized nesting within the genus *Lepidochelys*.

events likely perished due to forced submergence, which is commonly associated with fishery interactions (B. Stacy, NMFS, pers. comm. to M. Barnette, NMFS PRD, March 2012). Yet, available information indicates fishery effort was extremely limited during the stranding events. The fact that 80% or more of all Louisiana, Mississippi, and Alabama stranded sea turtles in the past 5 years were Kemp's ridleys is notable; however, this could simply be a function of the species' preference for shallow, inshore waters coupled with increased population abundance, as reflected in recent Kemp's ridley nesting increases.

In response to these strandings, and due to speculation that fishery interactions may be the cause, fishery observer effort was shifted to evaluate the inshore skimmer trawl fisheries beginning in 2012. During May-July of that year, observers reported 24 sea turtle interactions in the skimmer trawl fisheries. All but a single sea turtle were identified as Kemp's ridleys (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) curved carapace length (CCL). Subsequent years of observation noted additional captures in the skimmer trawl fisheries, including some mortalities. The small average size of encountered Kemp's ridleys 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 feet and greater in length to use TEDs designed to exclude small sea turtles in their nets effective April 1, 2021.
. Given the nesting trends and habitat utilization of Kemp's ridley sea turtles, it is likely that fishery interactions in the Northern Gulf of Mexico may continue to be an issue of concern for the species, and one that may potentially slow the rate of recovery for Kemp's ridley sea turtles.

While oil spill impacts are discussed generally for all species in Section 3.3.1, specific impacts of the DWH oil spill event on Kemp's ridley sea turtles are considered here. Kemp's ridleys 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 ridleys for several reasons. All Kemp's ridleys in the Gulf belong to the same population (NMFS et al. 2011), so total population abundance could be calculated based on numbers of hatchlings because all individuals that enter the population could reasonably be expected to inhabit the northern Gulf of Mexico throughout their lives (DWH Trustees 2016).

A total of 217,000 small juvenile Kemp's ridleys (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 ridleys from the total population estimate of 430,000 oceanic small juveniles were exposed to oil. Furthermore, a large number of small juveniles were removed from the population, as up to 90,300 small juveniles Kemp's ridleys 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.

3.3.4 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 (NWA) 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 straight carapace length (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 NWA DPS, most nesting occurs along the coast of the United States, from southern Virginia to Alabama. Additional nesting beaches for this DPS are found along the northern and western Gulf of Mexico, eastern Yucatán Peninsula, at Cay Sal Bank in the eastern Bahamas (Addison 1997; Addison and Morford 1996), off the southwestern coast of Cuba (Moncada Gavilan 2001), and along the coasts of Central America, Colombia, Venezuela, and the eastern Caribbean Islands.

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

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

The recovery plan for the Northwest Atlantic population of loggerhead sea turtles concluded that there is no genetic distinction between loggerheads nesting on adjacent beaches along the Florida Peninsula. It also concluded that specific boundaries for subpopulations could not be designated based on genetic differences alone. Thus, the recovery plan uses a combination of geographic distribution of nesting densities, geographic separation, and geopolitical boundaries, in addition to genetic differences, to identify recovery units. The recovery units are as follows: (1) the Northern Recovery Unit (Florida/Georgia border north through southern Virginia), (2) the Peninsular Florida Recovery Unit (Florida/Georgia border through Pinellas County, Florida), (3) the Dry Tortugas Recovery Unit (islands located west of Key West, Florida), (4) the Northern Gulf of Mexico Recovery Unit (Franklin County, Florida, through Texas), and (5) the Greater Caribbean Recovery Unit (Mexico through French Guiana, the Bahamas, Lesser Antilles, and Greater Antilles) (NMFS and USFWS 2008). The recovery plan concluded that all recovery units are essential to the recovery of the species. Although the recovery plan was written prior to the listing of the NWA DPS, the recovery units for what was then termed the Northwest Atlantic population apply to the NWA 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[6]), (4) juvenile stage (oceanic zone), (5) juvenile stage (neritic zone), (6) adult stage (oceanic zone), (7) adult stage (neritic zone), and (8) nesting female (terrestrial zone) (NMFS and USFWS 2008). Loggerheads are long-lived animals. They reach sexual maturity between 20-38 years of age, although age of maturity varies widely among populations (Frazer and Ehrhart 1985; NMFS 2001). The annual mating season occurs from late March to early June, and female turtles lay eggs throughout the summer months. Females deposit an average of 4.1 nests within a nesting season (Murphy and Hopkins 1984), but an individual female only nests every 3.7 years on average (Tucker 2010). Each nest contains an average of 100-126 eggs (Dodd Jr. 1988) which incubate for 42-75 days before hatching (NMFS and USFWS 2008). Loggerhead hatchlings are 1.5-2 inches long and weigh about 0.7 oz (20 g).

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

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

Like juveniles, non-nesting adult loggerheads also use the neritic zone. However, these adult loggerheads do not use the relatively enclosed shallow-water estuarine habitats with limited ocean access as frequently as juveniles. Areas such as Pamlico Sound, North Carolina, and the 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

[6] Neritic refers to the nearshore marine environment from the surface to the sea floor where water depths do not exceed 200 meters.

Bay in the U.S. mid-Atlantic. Shallow-water habitats with large expanses of open ocean access, such as Florida Bay, provide year-round resident foraging areas for significant numbers of male and female adult loggerheads (Conant et al. 2009).

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

Status and Population Dynamics

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

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

Peninsular Florida Recovery Unit

The Peninsular Florida Recovery Unit (PFRU) is the largest loggerhead nesting assemblage in the Northwest Atlantic. A near-complete nest census (all beaches including index nesting beaches) undertaken from 1989 to 2007 showed an average of 64,513 loggerhead nests per year, representing approximately 15,735 nesting females per year (NMFS and USFWS 2008). The statewide estimated total for 2017 was 96,912 nests (FWRI nesting database).

In addition to the total nest count estimates, the Florida Fish and Wildlife Research Institute (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. This provides a better tool for understanding the nesting trends (Figure 6). FWRI performed a detailed analysis of the long-term loggerhead index nesting data (1989-2017; http://myfwc.com/research/wildlife/sea-turtles/nesting/loggerhead-trend/). Over that time period, 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. 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 nonsignificant 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 slightly again to 48,983 in 2018, which is still the 4th highest total since 2001. However, 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).

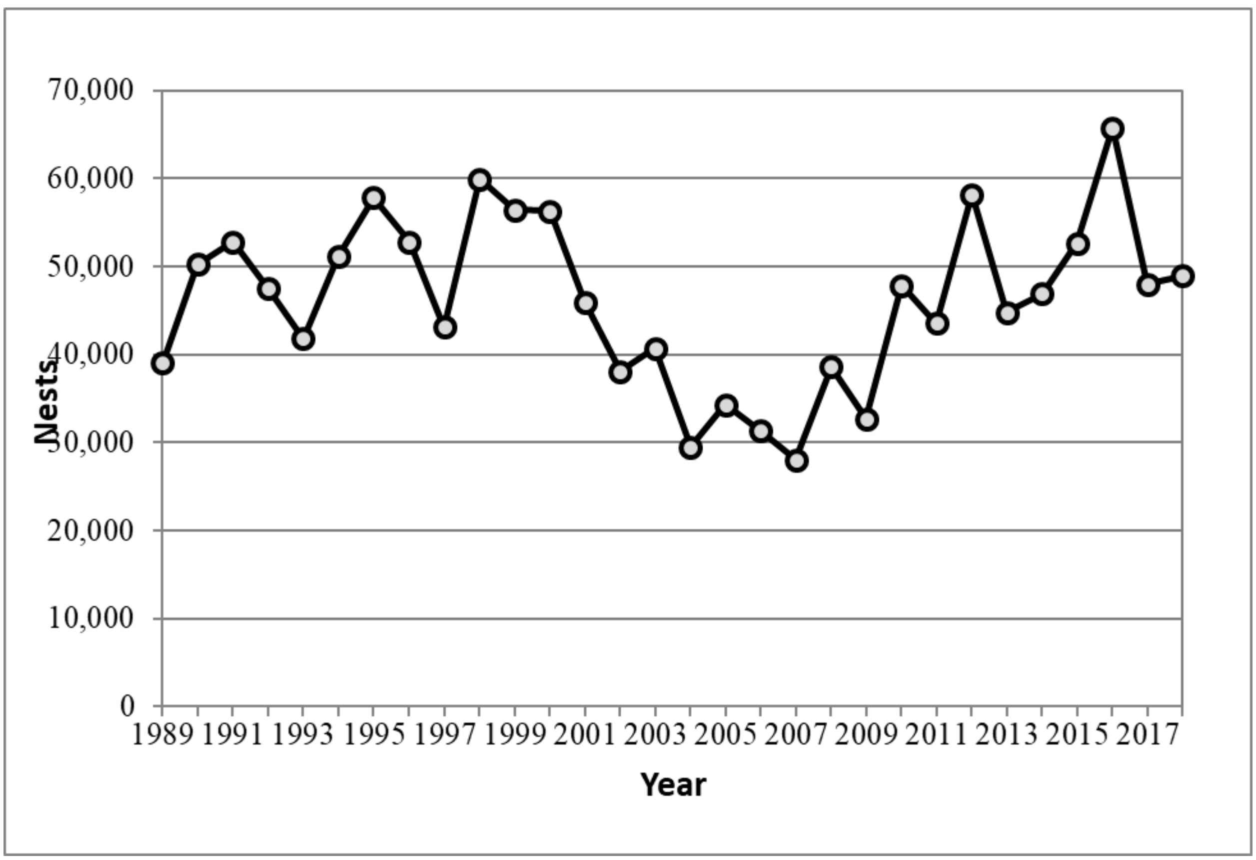

Figure 6. Loggerhead sea turtle nesting at Florida index beaches since 1989

Northern Recovery Unit

Annual nest totals from beaches within the Northern Recovery Unit (NRU) averaged 5,215 nests from 1989-2008, a period of near-complete surveys of NRU nesting beaches (Georgia Department of Natural Resources [GADNR] unpublished data, North Carolina Wildlife Resources Commission [NCWRC] unpublished data, South Carolina Department of Natural Resources [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 (Mark Dodd, GADNR press release, http://www.georgiawildlife.com/node/3139). 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 t 2015.

Table 5 Total Number of NRU Loggerhead Nests (GADNR, SCDNR, and NCWRC nesting datasets compiled at Seaturtle.org)

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

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 (Figure 7). South Carolina has not updated its Index Beach information, but it likely follows a similar pattern to the statewide data in Table 5 above.

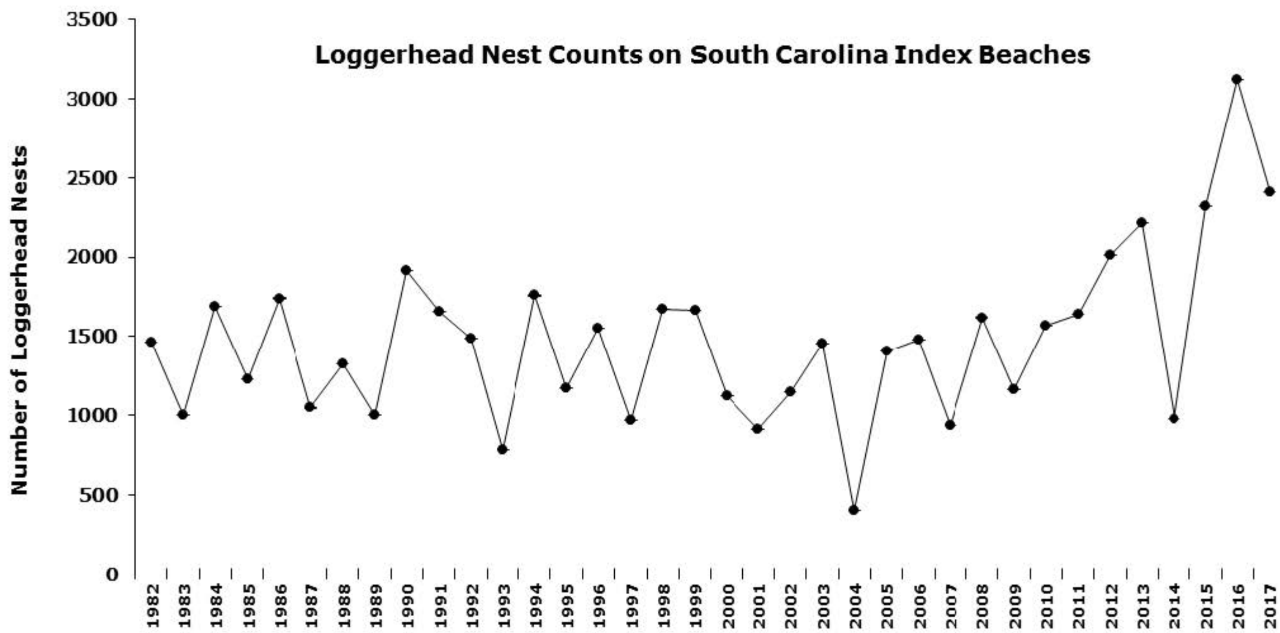

Figure 7. South Carolina index nesting beach counts for loggerhead sea turtles (from the SCDNR website: http://www.dnr.sc.gov/seaturtle/nest.htm)

Other Northwest Atlantic DPS Recovery Units

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

In-water Trends

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

Population Estimate

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

Threats (Specific to Loggerhead Sea Turtles)

The threats faced by loggerhead sea turtles are well summarized in the general discussion of threats in Section 3.3.1. 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 NWA DPS of loggerheads result from cumulative fishery bycatch in neritic and oceanic habitats (Conant et al. 2009).

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

While oil spill impacts are discussed generally for all species in Section 3.3.1, specific impacts of the Deepwater Horizon (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 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/or dispersants, and loss of foraging resources which could lead to compromised growth and/or reproductive potential. There is no information currently available to determine the extent of those impacts, if they occurred.

Unlike Kemp's ridleys, the majority of nesting for the Northwest Atlantic Ocean loggerhead 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 NWA loggerhead 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 Trustees estimated that approximately 20,000 loggerhead hatchlings were lost due to DWH oil spill response activities on nesting beaches. Although the long-term effects remain unknown, the DWH oil spill event impacts to the Northern Gulf of Mexico Recovery Unit may result in some nesting declines in the future due to a large reduction of oceanic age classes during the DWH oil spill event. Although adverse impacts occurred to loggerheads, the proportion of the population that is expected to have been exposed to and directly impacted by the DWH oil spill event is relatively low. Thus we do not believe a population-level impact occurred due to the widespread distribution and nesting location outside of the Gulf of Mexico for this species.

Specific information regarding potential climate change impacts on loggerheads is also available. Modeling suggests an increase of 2°C in air temperature would result in a sex ratio of over 80%

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

3.4 Status of Giant Manta Ray

NMFS listed the giant manta ray (*Manta birostris*) as threatened under the ESA (83 FR 2916, Publication Date January 22, 2018) and determined that the designation of critical habitat is not prudent on (84 FR 66652, Publication Date December 5, 2019). On December 4, 2019, NMFS published a recovery outline for the giant manta ray (NMFS 2019), which serves as an interim guidance to direct recovery efforts for giant manta ray.

Species Description and Distribution

The giant manta ray is the largest living ray, with a wingspan reaching a width of up to 7 m (23 ft), and an average size between 4-5 m (15-16.5 ft). The giant manta ray is recognized by its large diamond-shaped body with elongated wing-like pectoral fins, ventrally placed gill slits, laterally placed eyes, and wide terminal mouth. In front of the mouth, it has 2 structures called cephalic lobes that extend and help to introduce water into the mouth for feeding activities (making them the only vertebrate animals with 3 paired appendages). Giant manta rays have 2 distinct color types: chevron (mostly black back dorsal side and white ventral side) and black (almost completely black on both ventral and dorsal sides). Most of the chevron variants have a black dorsal surface and a white ventral surface with distinct patterns on the underside that can be used to identify individuals (Miller and Klimovich 2017). There are bright white shoulder markings on the dorsal side that form 2 mirror image right-angle triangles, creating a T-shape on the upper shoulders.

The giant manta ray is found worldwide in tropical and subtropical oceans and in productive coastal areas. They also occasionally occur within estuaries (e.g., lagoons and bays) and Intracoastal Waterways (ICWW). In terms of range, within the Northern hemisphere, the species has been documented as far north as southern California and New Jersey on the United States west and east coasts, respectively, and Mutsu Bay, Aomori, Japan, the Sinai Peninsula and Arabian Sea, Egypt, and the Azores Islands (CITES 2013; Gudger 1922; Kashiwagi et al. 2010; Moore 2012). In the Southern Hemisphere, the species occurs as far south as Peru, Uruguay, South Africa, New Zealand and French Polynesia (CITES 2013; Mourier 2012). Within its range, the giant manta ray inhabits tropical, subtropical, and temperate bodies of water and is commonly found offshore, in oceanic waters, and near productive coastlines (Figure 8) (Kashiwagi et al. 2011; Marshall et al. 2009).

Figure 8. The Extent of Occurrence (dark blue) and Area of Occupancy (light blue) based on species distribution (Lawson et al. 2017).

<u>Life History Information</u>

Giant manta rays make seasonal long-distance migrations, aggregate in certain areas and remain resident, or aggregate seasonally (Dewar et al. 2008; Girondot et al. 2015; Graham et al. 2012; Stewart et al. 2016). The giant manta ray is a seasonal visitor along productive coastlines with regular upwelling in oceanic island groups, and at offshore pinnacles and seamounts. The timing of these visits varies by region and seems to correspond with the movement of zooplankton, current circulation and tidal patterns, seasonal upwelling, seawater temperature, and possibly mating behavior. They have also been observed in estuarine waters inlets, with use of these waters as potential nursery grounds (J. Pate, Florida Manta Project, unpublished data; Adams and Amesbury 1998; Medeiros et al. 2015; Milessi and Oddone 2003).

Giant manta rays are known to aggregate in various locations around the world in groups usually ranging from 100-1,000 (Graham et al. 2012; Notarbartolo di Sciara and Hillyer 1989; Venables 2013). These sites function as feeding sites, cleaning stations, or sites where courtship interactions take place (Graham et al. 2012; Heinrichs et al. 2011; Venables 2013). The appearance of giant manta rays in these locations is generally predictable. For example, food availability due to high productivity events tends to play a significant role in feeding site aggregations (Heinrichs et al. 2011; Notarbartolo di Sciara and Hillyer 1989). Giant manta rays have also been shown to return to a preferred site of feeding or cleaning over extended periods of time (Dewar et al. 2008; Graham et al. 2012; Medeiros et al. 2015). In addition, giant and reef manta rays in Keauhou and Ho”ona Bays in Hawaii, appear to exhibit learned behavior. These manta rays learned to associate artificial lighting with high plankton concertation (primary food source) and shifted foraging strategies to include sites that had artificial lighting at night (Clark 2010). While little is known about giant manta ray aggregation sites, the Flower Garden Banks National Marine Sanctuary and the surrounding region might represent the first documented nursery habitat for giant manta ray (Stewart et al. 2018). Stewart et al. (2018) found that the Flower Garden Banks National Marine Sanctuary provides nursery habitat for juvenile giant manta rays because small age classes have been observed consistently across years at both the population and individual level. The Flower Garden Banks National Marine Sanctuary may be an optimal nursery ground because of its location near the edge of the continental shelf and proximity to abundant pelagic food resources. In addition, small juveniles are frequently observed along a portion of Florida's east coast, indicating that this area may also function as a nursery ground for juvenile giant manta rays. Since directed visual surveys began in 2016, juvenile giant manta rays are regularly observed in the shallow waters (less than 5 m depth) from Jupiter Inlet to Boynton Beach Inlet (J Pate, Florida Manta Project, unpublished data). However, the extent of this purported nursery ground is unknown as the survey area is limited to a relatively narrow geographic area along Florida's southeast coast.

The giant manta ray appears to exhibit a high degree of plasticity in terms of its use of depths within its habitat. Tagging studies have shown that the giant manta rays conduct night descents from 200-450 m depths (Rubin et al. 2008; Stewart et al. 2016) and are capable of diving to depths exceeding 1,000 m (A. Marshall et al. unpublished data 2011, cited in Marshall et al. (2011)). Stewart et al. (2016) found diving behavior may be influenced by season, and more specifically, shifts in prey location associated with the thermocline, with tagged giant manta rays (n=4) observed spending a greater proportion of time at the surface from April to June and in deeper waters from August to September. Overall, studies indicate that giant manta rays have a more complex depth profile of their foraging habitat than previously thought, and may actually be supplementing their diet with the observed opportunistic feeding in near-surface waters (Burgess et al. 2016; Couturier et al. 2013).

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 moderately sized fishes (Miller and Klimovich 2017). While it was previously assumed, based on field observations, that giant manta rays feed predominantly during the day on surface zooplankton, results from recent studies (Burgess et al. 2016; Couturier et al. 2013) indicate that these feeding events are not an important source of the dietary intake. When feeding, giant manta rays hold their cephalic lobes in an "O" shape and open their mouth wide, which creates a funnel that pushes water and prey through their mouth and over their gill rakers. They use many different types of feeding strategies, such as barrel rolling (doing somersaults repeatedly) and creating feeding chains with other mantas to maximize prey intake.

The giant manta ray is viviparous (i.e., gives birth to live young). They are slow to mature and have very low fecundity and typically give birth to only one pup every 2 to 3 years. Gestation lasts approximately 10-14 months. Females are only able to produce between 5 and 15 pups in a lifetime (CITES 2013; Miller and Klimovich 2017). The giant manta ray has one of the lowest maximum population growth rates of all elasmobranchs (Dulvy et al. 2014; Miller and Klimovich 2017). The giant manta rays generation time (based on *M. alfredi* life history parameters) is estimated to be 25 years (Miller and Klimovich 2017).

Although giant manta rays have been reported to live at least 40 years, not much is known about their growth and development. Maturity is thought to occur between 8-10 years of age (Miller and Klimovich 2017). Males are estimated to mature at around 3.8 m disc width (slightly smaller than females) and females at 4.5 m disc width (Rambahiniarison et al. 2018).

Status and Population Dynamics

There are no current or historical estimates of global abundance of giant manta rays, with most estimates of subpopulations based on anecdotal observations. The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES 2013) found that only ten populations of giant manta rays had been actively studied, 25 other aggregations have been anecdotally identified, all other sightings are rare, and the total global population may be small. Subpopulation abundance estimates range between 42 and 1,500 individuals, but are anecdotal and subject to bias (Miller and Klimovich 2017). The largest subpopulations and records of individuals come from the Indo-Pacific and eastern Pacific. Ecuador is thought to be home to the largest identified population (n=1,500) of giant manta rays in the world, with large aggregation sites within the waters of the Machalilla National Park and the Galapagos Marine Reserve (Hearn et al. 2014). Within the Indian Ocean, numbers of giant manta rays identified through citizen science in Thailand's waters (primarily on the west coast, off Khao Lak and Koh Lanta) was 288 in 2016. These numbers reportedly surpass the estimate of identified giant mantas in Mozambique (n=254), possibly indicating that Thailand may be home to the largest aggregation of giant manta rays within the Indian Ocean (MantaMatcher 2016). Miller and Klimovich (2017) concluded that giant manta rays are at risk throughout a significant portion of their range, due in large part to the observed declines in the Indo-Pacific. There have been decreases in landings of up to 95% in the Indo-Pacific, although similar declines have not been observed in areas with other subpopulations, such as Mozambique and Ecuador. In the U.S. Atlantic and Caribbean, giant manta ray sightings are concentrated along the east coast as far north as New Jersey, within the Gulf of Mexico, and off the coasts of the U.S. Virgin Islands and Puerto Rico. Because most sightings of the species have been opportunistic during other surveys, researchers are still unsure what attracts giant manta rays to certain areas and not others and where they go for the remainder of the time (84 FR 66652; Publication Date December 5, 2019).

The available sightings data indicate that giant manta rays occur regularly along Florida's east coast. In 2010, Georgia Aquarium began conducting aerial surveys for giant manta rays. The surveys are conducted in spring and summer and run from the beach parallel to the shoreline (0 to 2.5 nautical miles), from St. Augustine Beach Pier to Flagler Beach Pier, Florida. The numbers, location, and peak timing of the manta rays to this area varies by year (H. Webb unpublished data). In addition, juvenile giant manta rays have also been regularly observed inshore off the southeast Florida. Since 2016, researchers with the Marine Megafauna Foundation have been conducting annual surveys along a small transect off Palm Beach, Florida, between Jupiter Inlet and Boynton Beach Inlet (~44 km, 24 nautical miles) (J. Pate, MMF, pers. comm. to M. Miller, NMFS OPR, 2018). Results from these surveys indicate that juvenile manta rays are present in these waters for the majority of the year (observations span from May to December), with re-sightings data that suggest some manta rays may remain in the area for extended periods of time or return in subsequent years (J. Pate unpublished data). In the Gulf of Mexico, within the Flower Garden Banks National Marine Sanctuary, 95 unique individuals have been recorded between 1982 and 2017 (Stewart et al. 2018).

Threats

The giant manta ray faces many threats, including fisheries interactions, environmental contaminants (microplastics, marine debris, petroleum products, etc.), vessel strikes, entanglement, and global climate change. Overall, the predictable nature of their appearances, combined with slow swimming speed, large size, and lack of fear towards humans, may increase their vulnerability to threats (Convention on Migratory Species 2014; O'Malley et al. 2013). The ESA status review determined that the greatest threat to the species results from fisheries related mortality (Miller and Klimovich 2017); (83 FR 2916, Publication Date January 22, 2018).

Commercial Harvest and Fisheries Bycatch

Commercial harvest and incidental bycatch in fisheries is cited as the primary cause for the decline in the giant manta ray and threat to future recovery (Miller and Klimovich 2017). We anticipate that these threats will continue to affect the rate of recovery of the giant manta ray. Worldwide giant manta ray catches have been recorded in at least 30 large and small-scale fisheries covering 25 countries (Lawson et al. 2016). Demand for the gills of giant manta rays and other mobula rays has risen dramatically in Asian markets. With this expansion of the international gill raker market and increasing demand for manta ray products, estimated harvest of giant manta rays, particularly in many portions of the Indo-Pacific, frequently exceeds numbers of identified individuals in those areas and are accompanied by observed declines in sightings and landings of the species of up to 95% (Miller and Klimovich 2017). In the Indian Ocean, manta rays (primarily giant manta rays) are mainly caught as bycatch in purse seine and gillnet fisheries (Oliver et al. 2015). In the western Indian Ocean, data from the pelagic tuna purse seine fishery suggests that giant manta and mobula rays, together, are an insignificant portion of the bycatch, comprising less than 1% of the total non-tuna bycatch per year (Chassot et al. 2008; Romanov 2002). In the U.S., bycatch of giant manta rays has been recorded in the coastal migratory pelagic gillnet, gulf reef fish bottom longline, Atlantic shark gillnet, pelagic longline, pelagic bottom longline, and trawl fisheries. Incidental capture of giant manta ray is also a rare occurrence in the elasmobranch catch within U.S. Atlantic and Gulf of Mexico, with the majority that are caught released alive. In addition to directed harvest and bycatch in commercial fisheries, the 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 monofilament 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 (anglers will cast at manta rays in an effort to hook cobia). In addition, giant manta rays are commonly observed swimming near or underneath public fishing piers where they may become foul-hooked. The current threat of mortality associated with recreational fisheries is expected to be low, given that we have no reports of recreational fishers retaining giant manta ray. However, bycatch in recreational fisheries remains a potential threat to the species.

Vessel Strike

Vessel strikes can injure or kill giant manta rays, decreasing fitness or contributing to non-natural mortality (Couturier et al. 2012; Deakos et al. 2011). Giant manta rays do not surface to breath, but they can spend considerable time in surface waters, while basking and feeding, where they are more susceptible to vessel strikes (McGregor et al., 2019). They show little fear toward vessels which can also make them extremely vulnerable to vessel strikes (Deakos 2010; C. Horn. NMFS, personal observation). Five giant manta rays were reported to have been struck by vessels from 2016 through 2018; individuals had injuries (i.e., fresh or healed dorsal surface propeller scars) consistent with a vessel strike. These interactions were observed by researchers conducting surveys from Boynton Beach to Jupiter, Florida (J. Pate, Florida Manta Project, unpublished data). The giant manta ray is frequently observed in nearshore coastal waters and feeding within and around inlets. As vessel traffic is concentrated in and around inlets and nearshore waters, this overlap exposes the giant manta ray in these locations to an increased likelihood of potential vessel strike. Yet, few instances of confirmed or suspected mortalities of giant manta ray attributed to vessel strike injury (e.g., via strandings) have been documented. This lack of documented mortalities could also be the result of other factors that influence carcass detection (i.e., wind, currents, scavenging, decomposition etc.). In addition, manta rays appear to be able to heal from wounds very quickly, while high wound healing capacity is likely to be beneficial for their long-term survival, the fitness cost of injuries and number vessel strikes occurring may be masked (McGregory et al., 2019).

Microplastics

Filter-feeding megafauna are particularly susceptible to high levels of microplastic ingestion and exposure to associated toxins due to their feeding strategies, target prey, and, for most, habitat overlap with microplastic pollution hotspots (Germanov et al. 2019). Giant manta rays are filter feeders, and, therefore can ingest microplastics directly from polluted water or indirectly through-contaminated planktonic prey (Miller and Klimovich 2017). The effects of ingesting indigestible particles include blocking adequate nutrient absorption and causing mechanical damage to the digestive tract. Microplastics can also harbor high levels of toxins and persistent organic pollutants, and introduce these toxins to organisms via ingestion. These toxins can bioaccumulate over decades in long-lived filter feeders, leading to a disruption of biological processes (e.g., endocrine disruption), and potentially altering reproductive fitness (Germanov et al. 2019). Jambeck et al. (2015) found that the Western and Indo- Pacific regions are responsible for the majority of plastic waste. These areas also happen to overlap with some of the largest known aggregations of giant manta rays. For example, in Thailand, where recent sightings data have identified over 288 giant manta rays (MantaMatcher 2016), mismanaged plastic waste is estimated to be on the order of 1.03 million tonnes annually, with up to 40% of this entering the marine environment (Jambeck et al. 2015). Approximately 1.6 million tonnes of mismanaged plastic waste is being disposed of in Sri Lanka, again with up to 40% entering the marine environment (Jambeck et al. 2015), potentially polluting the habitat used by the nearby Maldives aggregation of manta rays. While the ingestion of plastics is likely to negatively affect the health of the species, the levels of microplastics in manta ray feeding grounds and frequency of ingestion are presently being studied to evaluate the impact on these species (Germanov et al. 2019).

Mooring and Anchor Lines

Mooring and boat anchor line entanglement may also wound giant manta rays or cause them to drown (Deakos et al. 2011; Heinrichs et al. 2011). There are numerous anecdotal reports of giant manta rays becoming entangled in mooring and anchor lines (C. Horn, NMFS, unpublished data), as well as documented interactions encountered by other species of manta rays (C. Horn, NMFS, unpublished data). For example, although a rare occurrence, reef manta rays on occasion entangle themselves in anchor and mooring lines. Deakos (2010) suggested that manta rays become entangled when the line makes contact with the front of the head between the cephalic lobes, the animal's reflex response is to close the cephalic lobes, thereby trapping the rope between the cephalic lobes, entangling the manta ray as the animal begins to roll in an attempt to free itself. In Hawaii, on at least 2 occasions, a reef manta ray was reported to have died after entangling in a mooring line (A. Cummins, pers. comm. 2007, K. Osada, pers. comm. 2009; cited in Deakos (2011)). In Maui, Hawaii, Deakos et al. (2011) observed that 1 out of 10 reef manta rays had an amputated or disfigured non-functioning cephalic lobe, likely a result of line entanglement. Mobulid researchers indicate that entanglements may significantly affect the manta rays fitness (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). However, there is very little quantitative information on the frequency of these occurrences and no information on the impact of these injuries on the overall health of the species.

Climate Change Effects

Because giant manta rays are migratory and considered ecologically flexible (e.g., low habitat specificity), they may be less vulnerable to the impacts of climate change compared to other sharks and rays (Chin et al. 2010). However, as giant manta rays frequently rely on coral reef habitat for important life history functions (e.g., feeding, cleaning) and depend on planktonic food resources for nourishment, both of which are highly sensitive to environmental changes (Brainard et al. 2011; Guinder and Molinero 2013), climate change is likely to have an impact on their distribution and behavior. Coral reef degradation from anthropogenic causes, particularly climate change, is projected to increase through the future. Specifically, annual, globally averaged surface ocean temperatures are projected to increase by approximately 0.7 °C by 2030 and 1.4 °C by 2060 compared to the 1986-2005 average (Intergovernmental Panel on Climate Change 2013), with the latest climate models predicting annual coral bleaching for almost all reefs by 2050 (Heron et al. 2016). Declines in coral cover have been shown to result in changes in coral reef fish communities (Jones et al. 2004) (Graham et al. 2008). Therefore, the projected increase in coral habitat degradation may potentially lead to a decrease in the abundance of fish that clean giant manta rays (e.g., *Labroides* spp., *Thalassoma* spp., and *Chaetodon* spp.) and an overall reduction in the number of cleaning stations available to manta rays within these habitats. Decreased access to cleaning stations may negatively affect the fitness of giant manta rays by hindering their ability to reduce parasitic loads and dead tissue, which could lead to increases in diseases and declines in reproductive fitness and survival rates.

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 giant manta rays, which depend on these animals for food, may similarly be altered (Couturier et al. 2012). As research to understand the exact impacts of climate change on marine phytoplankton and zooplankton communities is still ongoing, the severity of this threat has yet to be fully determined (Miller and Klimovich 2017).

4. ENVIRONMENTAL BASELINE

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

Focusing on the impacts of the activities in the action area specifically allows us to assess the prior experience and state (or condition) of the endangered and threatened individuals. This consideration 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.

4.1 Status of Species within the Action Area

Based on nesting and recreational hook-and-line data, green sea turtle (NA DPS and SA DPS), Kemp's ridley sea turtle, and loggerhead sea turtle (NWA DPS) may be located in the action area and may be affected by recreational fishing resulting from future use of the pier upon completion of the proposed action. These sea turtle species are migratory, traveling to forage grounds or for reproduction purposes. The nearshore waters of Duval County, Florida, 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 area, although some individuals may be present at any given time. These same individuals will migrate into offshore waters of the Gulf of Mexico, 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 sea turtle species in the action area, as well as the threats to sea turtles in the action area are considered to be the same as those discussed in Sections 3.3.1-3.3.4. There has been 1 reported recreational hook-and-line capture of a sea turtle at Jacksonville Beach Pier according to STSSN data for the years 2007-2015.

Giant manta ray have been observed in estuarine waters near oceanic inlets, with use of these waters as potential nursery grounds, as well as near-shore for ocean-facing beaches. They are also commonly observed swimming near or underneath public fishing piers where they may become foul-hooked. Due to the pier's proximity to an inlet/pass, and position on an ocean-facing beach, we believe giant manta ray may be affected by recreational fishing resulting from future use of the pier upon completion of the proposed action. Therefore, the status of giant manta ray in the action area, including the threats, are the same as those discussed in Section 3.4. NMFS is aware of no known reported recreational hook-and-line captures of a giant manta ray at the Jacksonville Beach Pier.

4.2 Factors Affecting Sea Turtles within the Action Area

Federal Actions

In August of 2007, NMFS issued a regulation (72 FR 43176, August 3, 2007) to require any fishing vessels subject to the jurisdiction of the U.S. to take observers upon NMFS's request. The purpose of this measure is to learn more about ESA-listed species interactions with fishing operations, to evaluate existing measures to reduce take, and to determine whether additional measures to address prohibited takes may be necessary. Fishing vessels subject to the jurisdiction of the U.S. could operate in the action area, and therefore, could be required to take a NMFS observer.

Other than the proposed action, no other federally permitted projects are known to have undergone Section 7 consultation within the action area, as per a review of the NMFS Protected Resources Division's completed consultation database by the consulting biologist on May 7, 2020.

Sea turtles are the focus of research activities authorized by Section 10 permits under the ESA. The ESA allows the issuance of permits to take listed species for the purposes of scientific research and enhancement (Section 10(a)(1)(A)). In addition, the ESA allows for NMFS to enter into cooperative agreements with states, developed under Section 6 of the ESA, to assist in recovery actions for listed species. Prior to issuance of these authorizations, the proposal must be reviewed for compliance with Section 7 of the ESA. Per a search of the NOAA Fisheries Authorizations and Permits for Protected Species database[7] by the consulting biologist on May 22, 2020, there are 4 active Section 10(a)(1)(A) scientific research permits applicable to green, Kemp's ridley, and/or 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.

[7] https://apps.nmfs.noaa.gov/

State or Private Actions

Recreational Fishing

Jacksonville Beach Pier was originally built in the 1970s and was constructed to its current footprint in 2002. It was rebuilt in the same footprint in 2005, following the 2004 hurricane season. The pier was closed to the public after sustaining damage due to Hurricane Matthew in 2016. The pier was further damaged by Hurricane Irma in 2017. Some deck and handrails repairs were made to the pier after the Hurricane Irma damage, and approximately half of the original pier length was subsequently re-opened for public use. Most recently, the pier was completely closed for public use in November 2019 and has remained closed since then. There is 1 reported capture of a sea turtle from the Jacksonville Beach Pier according to the Florida STSSN. When completed, the pier will be open 24-hours a day, year-round. Use of the pier by anglers varies and is dependent on weather, tide, and fishing conditions. The estimated number of anglers per day can range from 100 to 200. The pier is operational 7 days a week, 6:00 A.M. – 10:00 P.M., April through November, and 6:00 A.M. – 7 P.M., December through March. As stated above, the 9-year STSSN dataset (2007-2015) contains 1 reported recreational hook-and-line capture of a sea turtle from the Jacksonville Beach Pier. NMFS is aware of no known reported captures of giant manta ray at the Jacksonville Beach Pier.

Recreational fishing as regulated by the State of Florida can affect sea turtles and giant manta ray or their habitats within the action area. Pressure from recreational fishing in and adjacent to the action area is likely to continue.

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, the 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 Turtle Expert Working Group (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 monofilament 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 (anglers will cast at manta rays in an effort to hook cobia). Giant manta rays are commonly observed swimming near or underneath public fishing piers where they may become foul-hooked.

Marine Debris and Acoustic Impacts

A number of activities that may affect ESA-listed sea turtle species and giant manta ray in the action area include anthropogenic marine debris and acoustic effects. The effects from these activities are difficult to measure. Where possible, conservation actions are being implemented to monitor or study the effects to these species from these sources.

Marine Pollution and Environmental Contamination

Sources of pollutants along the coastal areas include atmospheric loading of PCBs, 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). In addition, marina and dock construction, dredging, aquaculture, oil and gas exploration and extraction, and boat traffic can degrade marine habitats used by sea turtles and giant manta ray. 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. 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 areas.

Stochastic Events

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

5. EFFECTS OF THE ACTION

Effects of the action are all consequences to listed species or critical habitat that are caused by the proposed action, including the consequences of other activities that are caused by the proposed action. A consequence is caused by the proposed action if it would not occur but for the proposed action and it 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).

First, we will discuss general effects of the action and types of injuries that can occur to sea turtles and giant manta ray via recreational hook-and-line capture. Then, we will estimate the number of sea turtles anticipated to be captured at the pier based on the available data regarding the number of sea turtles that have been reported captured via recreational hook-and-line and the estimated number of unreported recreational hook-and-line captures in the surrounding area. We will then estimate the survival rate of sea turtles post capture (i.e., post-release mortality [PRM]) based on data from the Florida STSSN and rehabilitation facilities and the severity of the injury during capture. Finally, we will use the available data to estimate the numbers of captures at the proposed action by sea turtle species. We will then estimate the number of captures for giant manta ray.

5.1 Effects of Hook-and-Line Captures to Species

As discussed above in Section 3, hook-and-line gear commonly used by recreational anglers fishing from fishing piers can adversely affect sea turtles and giant manta ray. Here we provide more detail on the potential effects of entanglement, hooking, and trailing line.

5.1.1 Entanglement

Sea turtles are particularly prone to entanglement as a result 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 sub-lethal 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 (Marshal et al. 2008).

5.1.2 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 or when the animal has swallowed the bait (Balazs et al. 1995). Swallowed hooks are of 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 et al. 1995; Balazs 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 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 foul-hooking (i.e., a method that catches a fish using hooks without having the fish take the bait in its mouth). While foul-hooking will cause injury, it is considered sub-lethal to giant manta ray at this time.

5.1.3 Trailing Line

Trailing line (i.e., line left on a sea turtle 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 ("torsion"), or may cause a part of the intestine to slide into another part of intestine like a telescopic rod ("intussusception") which also leads to blockage. In both cases, death is a likely outcome (Watson 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.

5.2 Captures Total Captures of Sea Turtles

5.2.1 Estimating Reported Captures of Sea Turtles

In the STSSN for the years 2007-2015, there is only 1 reported capture of a sea turtle at a public, beach-facing pier in Zone 30, Jacksonville Beach Pier, which is the subject of this Opinion. Therefore, the estimated expected annual number of reported hook-and-line captures of sea turtles at the Jacksonville Beach pier is 0.1111 turtles annually (1 reported turtle capture ÷ 9 years = 0.1111) (Table 6, Line 1).[8]

5.2.2 Estimating Unreported Captures of Sea Turtles

While we believe the best available information for estimating future captures at the Jacksonville Beach Pier is the 1 reported capture at the subject fishing pier, 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. To the best of our knowledge, only 2 fishing pier surveys aimed at collecting data regarding unreported recreational

[8] Historic reported captures of sea turtle species is the best available data to estimate the potential for future reported captures of those species in light of the 20-year trend in increased nesting. There is no other data available to estimate taking of those species at fishing piers.

hook-and-line captures of ESA-listed species have been conducted in the Southeast. One is from Charlotte Harbor, Florida (Gulf of Mexico-side of 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 (Cook et al. 2014). This survey indicated that approximately 60% of anglers who incidentally captured a sea turtle on hook-and-line reported it (i.e., 40% of anglers would not have reported a sea turtle capture) (Cook et al. 2014). 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 (M. Cook, STSSN, per comm. to N. Bonine, NMFS Protected Resources Division, April 17, 2015) 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. Since it is illegal to harm an endangered species, anglers are often afraid to admit the incidental capture.

No studies have been conducted to determine the rate of underreporting along the Atlantic coast of Florida. While most fishing piers in Florida have educational signs instructing the public on how to handle encounters with sea turtles, anecdotal reports to the STSSN from recreational anglers indicate sea turtles are caught much more frequently than are reported especially at more rural piers (M. Pate, South Carolina Division of Natural Resources, Marine Turtle Conservation Program Coordinator, pers. comm. to consulting biologist on March 4, 2019). Lack of reporting likely comes from lack of knowledge about reporting, fear of reporting due to perceived ticket issuance involving law enforcement, angler apathy, or any combination of those (M. Pate, South Carolina Division of Natural Resources, Marine Turtle Conservation Program Coordinator, pers. comm. to D. Bethea, NMFS SERO PRD, on March 4, 2019). Due to this anecdotal evidence, we believe it is reasonable (and conservative to the species) to use the higher unreported rate in the (Hill 2013) fishing pier study to estimate the unreported captures at Jacksonville Beach Pier. Therefore, we will address unreported captures by assuming that the expected annual reported captures of 0.1111 sea turtles per year at Jacksonville Beach Pier represent only 8% of the actual captures and 92% of sea turtle captures will be unreported. To calculate the annual number of unreported recreational hook-and-line captures of sea turtles at Jacksonville Beach Pier, we use the equation:

$$\begin{aligned} &Expected\ Annual\ Unreported\ Captures\ at\ Jacksonville\ Beach\ Pier \\ &= (Expected\ Annual\ Reported\ Captures\ \div 8\%) \times 92\% \end{aligned}$$

$= (0.1111 \div 0.08) \times 0.92$
$= 1.2778\ (Table\ 6, Line\ 2)$

5.2.3 Calculating Total Captures of 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 monitoring. The triennial takes are set as consecutive 3-year running sums (i.e., 2020-2022, 2021-2023, 2022-2024, and so on) and not for static 3-year periods (i.e., 2020-2022, 2023-2025, 2025-2027, and so on). This approach reduces the likelihood of reinitiation of ESA 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 calculates the total sea turtle captures for any 3-year period based on the expected annual reported and unreported captures at the Jacksonville Beach Pier.

Table 6. Summary of Expected Reported and Unreported Captures at Jacksonville Beach Pier

Captures	Total
1. Expected Annual Reported	0.1111
2. Expected Annual Unreported	1.2778
Annual Total	1.3889
Triennial (3-year) Total	4.1667

5.3 Estimating Total Post Release Mortality of Sea Turtles

5.3.1 Estimating Post Release Mortality for Reported Captures 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 a later date or 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. 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 offshore 9-year STSSN dataset for hook-and-line captures and entanglements in Zone 30 is a more accurate representation of post-release mortality for sea turtles because this dataset pertains specifically to Florida where the take is anticipated to occur. Table 7 provides a breakdown of final disposition of the 18 sea turtles caught or entangled in recreational hook-and-line gear in the dataset.

Table 7. Final Disposition of Sea Turtles from Reported Recreational Hook-and-Line Captures and Gear Entanglements in Zone 30, 2007-2015 (n=18)

	Dead or Died Onsite	Released Alive Immediately (Not Evaluated)	Released Alive, Immediately (Evaluated)	Taken to Rehab, Released Alive Later	Taken to Rehab, Kept or Died in Rehab
Number of Records	14	0	2	0	2
Percentage	77.8	0	11.1	0	11.1

Of the 18 sea turtles dataset, 88.9% were removed from the wild population either through death or being unable to be released from the rehabilitation facility (i.e., lethal capture, 77.8 + 11.1) and 11.1% were released alive back into the wild population immediately (i.e., non-lethal capture).

To calculate the annual estimated lethal captures of reported sea turtles at Jacksonville Beach Pier, we use the following equation:

$$\begin{aligned}&Annual\ Reported\ Lethal\ Captures =\\&Expected\ Annual\ Reported\ Captures\ [Table\ 6, Line\ 1] \times\\&Lethal\ Captures\ [calculated\ from\ Table\ 7]\\&= 0.1111 \times 0.889\\&= 0.0988\ (Table\ 11, Line\ 1A)\end{aligned}$$

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

$$\begin{aligned}&Annual\ Reported\ Non-lethal\ Captures =\\&Expected\ Annual\ Reported\ Captures\ at\ Jacksonville\ Beach\ Pier\ [Table\ 6, Line\ 1] \times\\&Non-lethal\ Capture\ [calculated\ from\ Table\ 6]\\&= 0.1111 \times 0.111\\&= 0.0123\ (Table\ 11, Line\ 1B)\end{aligned}$$

5.3.2 Estimating Post-Release Mortality for Unreported Captures 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/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/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 monofilament 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).

Table 8. Estimated Post Release Mortality Based on Injury Category for Hardshell Sea Turtles Captured via Hook-and-Line and Released in Release Condition B (NMFS 2012).

Injury Category	Description	Post-release Mortality
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%**

*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

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 Florida STSSN offshore dataset for Zone 30 (2007-2015) because this data includes the location of where on the animal the sea turtle was hooked or entangled (Table9).

Table 9. Category of Injury of Sea Turtles from Reported Recreational Hook-and-Line Captures and Gear Entanglements in Zone 30, 2007-2015 (n=18)

Injury Category*	I	II	III	IV	V	VI
Number	1	0	3	2	11	0
Percentage	5.6	0	16.7	11.1	61.1	0.0

*SERO PRD assigned an Injury Category of 0 to all records with unknown hooking and entanglement locations. We exclude Injury Category 0 these from the calculation because we are unsure of the location and therefore cannot assign a corresponding PRM. In this case, there is 1 interaction with an unknown hooking/entanglement location in the dataset.

Like above, we assume that 8% of the sea turtles captured at the pier will be reported, and that reported turtles will be sent to rehabilitation if needed. To estimate the fate of the 92% of sea turtles expected to go unreported, and therefore un-evaluated or rehabilitated, we use the injury category percentages in Table 8 along with the PRM estimates in Table 9 to calculate the weighted PRM rate expected for each injury category. We then sum the weighted PRMs across all injury categories to determine the total weighted PRM for sea turtles at the Jacksonville Beach Pier. This total 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 45.8% for 92% of the sea turtles captured, unreported, and released immediately at the Jacksonville Beach Pier (Table 10).

Table 10. Estimated Weighted and Overall Post Release Mortality for Sea Turtles Released Immediately from Jacksonville Beach Pier

Injury Category	% Captures [from Table 8]	% Post-release Mortality [from Table 7]	% Weighted Post-release Mortality*
I	5.6	20	1.1
II	0.0	30	0.0
III	16.7	45	7.5
IV	11.1	60	6.7
V	61.1	50	30.6
		Total % Weighted PRM	45.8

*% Weighted PRM = % PRM × % Captures for each category

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

$$
\begin{aligned}
&Annual\ Unreported\ Lethal\ Captures \\
&= \ Annual\ Expected\ Unreported\ Captures\ [Table\ 6, Line\ 2] \times Total\ Weighted\ Post \\
&\qquad\qquad - release\ Mortality\ [Table\ 10] \\
&= 1.2778\ \times 0.458 \\
&= 0.5856\ (Table\ 110, Line\ 2A)
\end{aligned}
$$

If the equation for calculating annual lethal captures of unreported sea turtles multiplies the annual unreported captures at Jacksonville Beach Pier by the total weighted PRM of 45.8%, then the equation for calculating annual non-lethal captures of unreported sea turtles would multiply the annual unreported captures by 54.2% (100% – 45.8%). Therefore, to calculate the estimated annual non-lethal captures of unreported sea turtles, we use the following equation:

$$Annual\ Unreported\ Non-lethal\ Captures$$
$$= Annual\ Unreported\ Captures\ [Table\ 6, Line\ 2] \times 54.2\%$$
$$= 1.2778 \times 0.542$$
$$= 0.6921\ (Table\ 11, Line\ 2B)$$

5.3.3 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 6 shows the total sea turtle captures at the 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 at the Jacksonville Beach Pier

Captures	A. Lethal	B. Non-lethal
1. Annual Reported Captures	0.0988	0.0123
2. Annual Unreported Captures	0.5856	0.6921
Annual Total	0.6844	0.7045
Triennial (3-year) Total	2.0532	2.1134

5.4 Estimating Captures by Species

5.4.3 Estimating Captures of Sea Turtles by Species

Of the sea turtles in the STSSN offshore stranding data for Zone 30 identifiable to species and which may be adversely affected by the proposed action (Table 3; n=835 of 860), 23.2% were green (n=194), 13.1% were Kemp's ridley (n=109), and 63.7% were loggerhead sea turtles (n=532). We will assume the same species composition for future captures at the Jacksonville Beach Pier. Table 12 estimates the number of lethal and non-lethal captures by sea turtle species for any consecutive 3-year period at the Jacksonville Beach Pier based on our calculations from Sections 5.2.1 through 5.3.3. To be conservative to the species, numbers of captures are rounded up to the nearest whole number. While this results in an increase in the total number of sea turtles, this approach is most conservative to the species, 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 green sea turtle DPSs are discussed in the Jeopardy Analysis (Section 7) and presented in the Incidental Take Statement (Section 9).

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

Species	Lethal Captures	Non-lethal Captures	Total Captures
Green sea turtle (NA or SA DPS)	1	1	2

Species	Lethal Captures	Non-lethal Captures	Total Captures
	(2.0532 × 0.232 = 0.4770)	(2.1134 × 0.232 = 0.4910)	
Kemp's ridley sea turtle	1 (2.0532 × 0.131 = 02680)	1 (2.1134 × 0.131 = 0.2759)	2
Loggerhead sea turtle (NWA DPS)	2 (2.0532 × 0.637 =1.3082)	2 (2.1134 × 0.637 = 1.3465)	4

5.5 Estimating Captures of Giant Manta Ray

The Marine Megafauna Foundation (MMF) conducts annual visual surveys between Jupiter Inlet and Boynton Beach Inlet, Florida. This is a known area of high abundance for juvenile giant manta ray. From 2016-2019, MMF documented 59 unique giant manta ray in the survey, of which 16 were entangled in fishing line or foul-hooked (J. Pate, MMF, unpublished data). In the absence of better data, we assume that all giant manta ray observed entangled or foul-hooked were due to recreational fishing from fishing piers. There are 4 public fishing piers between Jupiter Inlet and Boynton Beach Inlet, Florida. Because these piers are similar in size and location (i.e., relatively large, public beach-facing or inlet piers), they likely have similar angler effort. We also assume anglers fishing from these piers use similar baits, equipment, and fishing techniques. Therefore, if we believe that the potential for interactions with giant manta ray is likely the same at all 4 piers in the survey area, then approximately 4 animals were entangled or foul-hooked per pier (16 unique animals observed entangled or foul-hooked in 4 years ÷ 4 piers in survey area). This equates to 1 recreational fishing encounter per pier per year. This analysis is likely an overestimation of giant manta ray interactions that may occur at the Jacksonville Beach Pier because the survey occurred in a known area of high abundance; however, it is the best available data we have and most conservative to the species. As discussed above, we believe using a 3-year time period is appropriate for meaningful monitoring. Therefore, up to 3 entanglements or foul-hooking events of giant manta ray at the Jacksonville Beach Pier may occur in any 3-year consecutive period. As stated above, fishing-line entanglement and foul-hooking are considered non-lethal to giant manta ray based on the currently best available information.

6 CUMULATIVE EFFECTS

ESA Section 7 regulations require NMFS to consider cumulative effects in formulating their Opinions (50 CFR 402.14). Cumulative effects include the effects of future state, tribal, local, or private actions that are reasonably certain to occur in the action area considered in this Opinion (50 CFR 402.02). At this time, we are not aware of any other non-federal actions being planned or under development in the action area. Within the action area, major future changes are not anticipated in the ongoing human activities described in the environmental baseline. The present, major human uses of the action area are expected to continue at the present levels of intensity in the near future.

7 JEOPARDY ANALYSIS

The analyses conducted in the previous sections of this Opinion serve to provide a basis to determine whether the proposed action is likely to jeopardize the continued existence of green, Kemp's ridley, and loggerhead sea turtles, as well as giant manta ray. In the Effects of the Action, we outlined how the proposed action would affect these species at the individual level and the extent of those effects in terms of the number of associated interactions, captures, and mortalities of each species to the extent possible with the best available data. Now we assess each of these species' responses to this impact, 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, the environmental baseline, and the cumulative effects, are likely to jeopardize their continued existence in the wild.

To "jeopardize the continued existence of" 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. Then, if there is a reduction in 1 or more of these elements, we evaluate whether it 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 they 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." 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. Recovery means "improvement in the status of a 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 and/or threats to the species are removed so self-sustaining and self-regulating populations of listed species can be supported as persistent members of native biotic communities.

The status of each listed species likely to be adversely affected by the proposed action is reviewed in the Status of the Species. For any species listed globally, our jeopardy determination must find the proposed action will appreciably reduce the likelihood of survival and recovery at the global species range. For any species listed as DPSs, a jeopardy determination must find the proposed action will appreciably reduce the likelihood of survival and recovery of that DPS.

7.1 Green Sea Turtles (NA and SA DPSs)

Within U.S. waters, individuals from both the NA and SA DPS of green sea turtle can be found on foraging grounds. While there are currently no in-depth studies available to determine the percent of NA and SA DPS individuals in any given location, an analysis of cold-stunned green turtles in St. Joseph Bay, Florida (northern Gulf of Mexico) found approximately 4% of individuals came from nesting stocks in the SA DPS (specifically Suriname, Aves Island, Brazil, Ascension Island, and Guinea Bissau) (Foley et al. 2007). This information suggests that the vast majority of the anticipated captures in the Gulf of Mexico are likely to come from the NA DPS. However, it is possible that animals from the SA DPS could be captured by recreational hook-and-line gear upon completion of the proposed action. For these reasons, we will act conservatively and conduct 2 jeopardy analyses (1 for each DPS). The NA DPS analysis will assume based on Foley et al. (2007) that 96% of animals adversely affected during the proposed action are from that DPS. The SA DPS analysis will assume that 4% of the green sea turtles adversely affected by the proposed action are from that DPS.

Applying the above percentages to our estimated capture of 2 green sea turtles (1 lethal, 1 non-lethal) during any consecutive 3-year period, we estimate the following:

- Up to 2 green sea turtles will come from the NA DPS ($2 \times 0.96 = 1.92$, rounded up to 2), of which 1 will be lethal and 1 will be non-lethal.
- Up to 1 green sea turtle will come from the SA DPS ($2 \times 0.04 = 0.08$, rounded up to 1), which could be lethal or non-lethal.

We note rounding when splitting the captures into the two DPSs results in a slightly higher combined total (i.e., 3 instead of 2) than the 3-year estimate. While we use the higher numbers for purposes of analyzing the likelihood of jeopardy to the DPSs (Section 7.1.1 and 7.1.2), we do not expect more than 2 green sea turtle captures during any consecutive 3-year period.

7.1.1. NA DPS of Green Sea Turtle

<u>Survival</u>

The proposed action may result in the capture of up to 2 green sea turtles (1 lethal, 1 non-lethal) from the NA DPS over any consecutive 3-year period. The potential non-lethal capture of a green sea turtle from the NA DPS 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 is expected to fully recover such that no reductions in reproduction or numbers of green sea turtles are anticipated. The captures will occur in the action area, which encompass a small portion of the overall range/distribution of green sea turtles within the NA DPS. Any incidentally caught animals would be released within the general area where caught and no change in the distribution of NA DPS green sea turtles would be anticipated.

The potential lethal capture of up to 1 green sea turtles from the NA DPS during any consecutive 3-year period would reduce the number of NA DPS green sea turtles, compared to their numbers in the absence of the proposed action, assuming all other variables remained the same. A lethal interaction would also result in a potential 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/nest, of which a small percentage is expected to survive to sexual maturity. The anticipated lethal capture is expected to occur in a discrete action area and green sea turtles in the NA DPS generally have large ranges; thus, no reduction in the distribution is expected from the capture 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 NA 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 NA DPS. In the Cumulative Effects, we discussed the effects of future state, tribal, local, or private actions that are reasonably certain to occur within the action area.

In Section 3.3.2, we summarized the available information on number of green sea turtle nesters and nesting trends at NA DPS beaches; all major nesting populations demonstrate long-term increases in abundance (Seminoff et al. 2015). Therefore, nesting at the primary nesting beaches has been increasing over the course of the decades, against the background of the past and ongoing human and natural factors that have contributed to the Status of the Species. We believe these nesting trends are indicative of a species with a high number of sexually mature individuals. In the absence of any total population estimates, nesting trends are the best proxy for estimating population changes. Since the nesting abundance trend information for the NA DPS of green sea turtle is clearly increasing, we believe the potential lethal capture of up to 1 green sea turtles from the NA DPS during any consecutive 3-year period attributed to the pier will not have any measurable effect on that trend. After analyzing the magnitude of the effects, in combination with the past, present, and future expected impacts to the DPS discussed in this Opinion, we believe that recreational fishing from the pier is not reasonably expected to cause an appreciable reduction in the likelihood of survival of the green sea turtle NA DPS in the wild.

<u>Recovery</u>

The NA 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 1991b) does exist. Since the animals within the NA 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 NA 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 1989-2018 (see Figure 4), green sea turtle nest counts across Florida index beaches have increased substantially from a low of approximately 267 in the early 1990s to a high of approximately 38,954 in 2017 (http://myfwc.com/research/wildlife/sea-turtles/nesting/green-turtle/; reviewed by consulting biologist on February 19, 2019), and indicate that the first listed recovery objective is being met. The average number of nests in Florida for the six years prior to and including 2018 has been well above 5,000 (average of approximately 17,000 nests from 2013-2018; see Figure 4). At all beaches, not just index beaches, the high was 53,103 in 2017. 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 increased, which is consistent with the criteria of the second listed recovery objective.

The potential lethal capture of 1 green sea turtle from the NA DPS during any consecutive 3-year period will result in a reduction in numbers when a capture occurs; 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 of the Status of the Species, the Environmental Baseline, and Cumulative Effects discussed in this Opinion. The non-lethal capture of 1 green sea turtle from the NA DPS 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 NA DPS green sea turtles' recovery in the wild.

Conclusion

The combined lethal and non-lethal capture of green sea turtles from the NA DPS associated with the pier is not expected to cause an appreciable reduction in the likelihood of either the survival or recovery of the NA DPS of the green sea turtle in the wild.

7.1.2 SA DPS of Green Sea Turtle

Survival

The pier may result in the capture of up to 1 green sea turtle, which could be lethal or non-lethal, from the SA DPS over any consecutive 3-year period. The potential non-lethal capture of a green sea turtle from the SA DPS is not expected to have any measurable impact on the reproduction, numbers, or distribution of the species. The individuals suffering non-lethal injuries or stresses are expected to fully recover such that no reductions in reproduction or numbers of green sea turtles are anticipated. The captures will occur in the action area, which encompass a small portion of the overall range/distribution of green sea turtles within the SA DPS. Any incidentally caught animal would be released within the general area where caught and no change in the distribution of SA DPS green sea turtles would be anticipated.

The potential lethal capture of up to 1 SA DPS green sea turtle during any consecutive 3-year period would reduce the number of green sea turtles, compared to their numbers in the absence of the proposed action, assuming all other variables remained the same. Lethal interactions would also result in a potential reduction in future reproduction, assuming the individual would be female and would have survived otherwise to reproduce. Like above, the anticipated lethal capture is expected to occur in a small, discrete action area and green sea turtles in the SA DPS generally have large ranges; thus, no reduction in the distribution is expected from the capture 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 areas 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 areas.

In Section 3.3.2, we summarized available information on number of green sea turtle nesters and nesting trends at SA DPS beaches; some of the largest nesting beaches such as Ascension Island, Aves Island (Venezuela), and Galibi (Suriname) appear to be increasing. Therefore, is likely that nesting at the primary nesting beaches has been increasing over the course of the decades, against the background of the past and ongoing human and natural factors that have contributed to the status of the species. We believe these nesting trends are indicative of a species with a high number of sexually mature individuals. Since the nesting abundance trend information for green sea turtles appears to be increasing, we believe the potential lethal capture of up to 1 green sea turtles from the SA DPS during any consecutive 3-year period attributed to recreational fishing at the pier will not have any measurable effect on that trend. After analyzing the magnitude of the effects, in combination with the past, present, and future expected impacts to the DPS discussed in this Opinion, we believe that recreational fishing from the pier is not reasonably expected to cause an appreciable reduction in the likelihood of survival of the SA DPS of the green sea turtle in the wild.

Recovery

Like the NA DPS, the SA DPS of green sea turtles does not have a separate recovery plan in place at this time. However, an Atlantic Recovery Plan for the population of Atlantic green sea turtles (NMFS and USFWS 1991b) does exist. Since the animals within the SA 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 SA DPS, is developed. In our analysis for the NA DPS, we stated that 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.*

Because the first objective listed above is specific to nesting in Florida, it is specific to the NA DPS, but demonstrates the importance of increases in nesting to recovery. As previously stated, nesting at the primary SA DPS nesting beaches appears to have been increasing over the course of the decades. There are currently no estimates available specifically addressing changes in abundance of individuals on foraging grounds. Given the likely increases in nesting, and likely correlation between increased nesting and increased overall population, it is likely that numbers on foraging grounds also have increased.

The lethal capture of up to 1 green sea turtles from the SA DPS during any consecutive 3-year period will result in a reduction in numbers when capture occurs; however, it is unlikely to have any detectable influence on the trends noted above, even when considered in context with the Status of the Species, the Environmental Baseline, and Cumulative Effects discussed in this Opinion. Non-lethal capture of a green sea turtle from the SA DPS would not affect the adult female nesting population or number of nests per nesting season. Thus, the recreational fishing from the pier will not impede achieving the recovery objectives above and will not result in an appreciable reduction in the likelihood of the SA DPS of green sea turtles' recovery in the wild.

Conclusion

The combined lethal and non-lethal capture of green sea turtles associated with pier is not expected to cause an appreciable reduction in the likelihood of either the survival or recovery of the SA DPS of the green sea turtle in the wild.

7.2 Kemp's Ridley Sea Turtle

Survival

The proposed action may result in the capture of up to 2 Kemp's ridley sea turtles (1 lethal, 1 non-lethal) during any consecutive 3-year period. The potential non-lethal capture of a Kemp's ridley sea turtle 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. The captures 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 capture of up to 1 Kemp's ridley sea turtle 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 action, assuming all other variables remained the same. The Turtle Expert Working Group (TEWG 1998b) estimates age at maturity from 7-15 years for this species. Females return to their nesting beach about every 2 years (TEWG 1998b). The mean clutch size for Kemp's ridley sea turtle is 100 eggs/nest, with an average of 2.5 nests per female per season. Lethal captures 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 of 1 Kemp's ridley sea turtles 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 anticipated lethal capture is expected to occur in small, discrete action area and Kemp's ridley sea turtle generally have large ranges; thus, no reduction in the distribution is expected from the capture 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 areas 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 areas.

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 3.3.3, 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 Kemp's ridley nesting seen over the past decade at nesting beaches in Mexico, or the similar trend with the emerging Texas population, represents a population oscillating around an equilibrium point or if nesting will decline or increase in the future. With the recent increase in nesting data (2015-17) and recent declining numbers of nests (2013-14 and 2018-2019), it is too early to tell whether the long-term trend line is affected; however, there may be cause for concern. Nonetheless, data from 1990 to present continue to support that Kemp's ridley sea turtle is increasing in population size. We believe this long-term increasing trend in nesting is evidence of an increasing population, as well as a population that is maintaining (and potentially increasing) its genetic diversity. We believe these nesting trends are indicative of a species with a high number of sexually mature individuals. Since the nesting trend information is increasing, we believe the potential lethal capture of 1 Kemp's ridley sea turtle during any consecutive 3-year period attributed to the proposed action will not have any measurable effect on that trend. After analyzing the magnitude of the effects, in combination with the past, present, and future expected impacts to the DPS discussed in this Opinion, we believe that recreational fishing from the pier is not reasonably expected to cause an appreciable reduction in the likelihood of survival of Kemp's ridley sea turtles in the wild.

Recovery

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

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

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. The 2012 nesting season recorded approximately 22,000 nests in Mexico. Yet, in 2013 through 2014, there was a significant decline, with only 16,385 and 11,279 nests recorded, respectively, which would equate to 6,554 nesting females in 2013 (16,385 / 2.5) and 4,512 in 2014 (11,279 / 2.5). Nest counts increased 2015-2017, they did not reach 25,000 by 2017, and they decreased 2018-2019; however, it is clear that the population has increased over the last 2 decades. The increase in Kemp's ridley sea turtle nesting is 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 U.S., and possibly other changes in vital rates (TEWG 1998a; TEWG 2000).

The lethal capture of 1 Kemp's ridley sea turtle 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 noted above. Given annual nesting numbers are in the thousands, the projected loss is not expected to have any discernable impact to the species. The non-lethal capture of 1 Kemp's ridley sea turtle 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.

Conclusion

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

7.3 NWA DPS of Loggerhead Sea Turtle

Survival

The proposed action may result in the capture of up to 4 loggerhead sea turtles (2 lethal, 2 non-lethal) from the NWA DPS during any consecutive 3-year period. The potential non-lethal capture of a loggerhead sea turtle from the NWA DPS is not expected to have any measurable impact on the reproduction, numbers, or distribution of the species. The individuals suffering non-lethal injuries or stresses are expected to fully recover such that no reductions in reproduction or numbers of green sea turtles are anticipated. The capture will occur in the action area, which encompasses a small portion of the overall range/distribution of loggerhead sea turtles within the NWA DPS. Any incidentally caught animal would be released within the general area where caught and no change in the distribution of NWA DPS of loggerhead sea turtle would be anticipated.

The lethal capture of 2 loggerhead sea turtle during any consecutive 3-year period represents a reduction in numbers. A lethal capture could also result in a potential reduction in future reproduction, assuming the individual would be female and would have survived to reproduce in the future. For example, an adult female loggerhead sea turtle can lay approximately 4 clutches of eggs every 3-4 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, a reduction in the distribution of loggerhead sea turtles is not expected from lethal capture attributed to the piers. The anticipated lethal capture is expected to occur in 1 small, discrete action areas and loggerhead sea turtles in the NWA DPS generally have large ranges; thus, no reduction in the distribution is expected from the capture 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 areas 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 areas.

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 3.3.4, 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.

The pier could lethally capture 2 loggerhead sea turtle during any consecutive 3-year period. While the loss of a 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 pier is not reasonably expected to cause an appreciable reduction in the likelihood of survival of the loggerhead sea turtle DPS in the wild.

Recovery

The recovery plan for the for the Northwest Atlantic population of loggerhead sea turtles (NMFS and USFWS 2009) was written prior to the loggerhead sea turtle DPS listings. However, this plan deals with the populations that comprise the current NWA 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 action:

- *Ensure that the number of nests in each recovery unit is increasing and that this increase corresponds to an increase in the number of nesting females.*
- *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 action 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 have been significantly increasing over several years. The lethal capture of 1 loggerhead sea turtle every 3-years is so small in relation to the overall population, that it would be hardly detectable, 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 non-lethal capture of 1 loggerhead sea turtle from the NWA 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 pier will not impede achieving the recovery objectives above and will not result in an appreciable reduction in the likelihood of the loggerhead sea turtles' recovery in the wild.

Conclusion

The combined lethal and non-lethal capture of loggerhead sea turtles associated with the pier is not expected to cause an appreciable reduction in the likelihood of either the survival or recovery of the NWA DPS of the loggerhead sea turtle in the wild.

7.4 Giant Manta Ray

The proposed action may result in the capture of 3 giant manta rays over any consecutive 3-year period. We expect all takes to be nonlethal.

Survival

The proposed action may result in the nonlethal take of 3 giant manta rays during any consecutive 3-year period. The potential nonlethal capture of giant manta rays is not expected to have any measurable impact on the reproduction, numbers, or distribution of the species since all captures will be nonlethal, and animals are expected to be returned to the marine environment from the net without significant stress or injury, within the vicinity of where they are caught.

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 2019a). The recovery outline identifies two primary interim goals: 1) to stabilize population trends through reduction of threats, such that the species is no longer declining throughout a significant portion of its range; and 2) to 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 post-release mortality), and other potential threats that may contribute to the species' decline. The recovery outline serves as an interim guidance to direct recovery efforts for giant manta ray. An increase in the population to a size that maintains a steady recruitment of individuals representing all life stages would provide population stability and enable the population to sustain itself even in the event of unforeseen and unavoidable impacts. The major threats affecting the giant manta ray were summarized in the proposed rule (82 FR 3694, Publication Date January 12, 2017) and the final listing rule (83 FR 2619, Publication Date January 22, 2018), which stated that the most significant threat 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 these manta rays from the heavy fishing pressure and related mortality in these waters outside of U.S. jurisdiction. Other threats to giant manta ray 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. None of the activities in this Opinion include activities that are considered threats 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 proposed or final listing rules.

The individuals suffering nonlethal injuries or stresses are expected to fully recover such that no reductions in reproduction or numbers of giant manta rays are anticipated. The captures will occur at one discrete location within the action area, which encompasses a small portion of the overall range/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 nonlethal take 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.

Conclusion

The nonlethal take of 3 giant manta ray associated with activities covered under this Opinion over any consecutive 3-year period is not expected to cause an appreciable reduction in the likelihood of either the survival or recovery of giant manta ray in the wild.

8 CONCLUSION

After reviewing the Status of the Species, Environmental Baseline, Effects of the Action, and Cumulative Effects using the best available data, it is NMFS's Opinion that the proposed action is not likely to jeopardize the continued existence of the NA or SA DPS of green sea turtle, Kemp's ridley sea turtle, the NWA DPS of loggerhead sea turtle, or the giant manta ray.

9 INCIDENTAL TAKE STATEMENT

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. *Incidental take* is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. 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 (ITS) of the Opinion.

9.1 Anticipated Amount or Extent of Incidental Take

The take estimates shown in Table 13 are our best estimates of the total amount of sea turtle, and giant manta ray take expected over any consecutive 3-year period.

As described in Section 5 above, some sea turtle captures are expected to go unreported. The take limits prescribed in this Opinion that will trigger the requirement to reinitiate consultation must be based on the amount of take that we expect to be *reported* as it will be impossible to count the incidents that go unreported. We believe the best available information for estimating the future level of reporting of captured sea turtles at each of the proposed piers is again the data collected from the Hill et al (2013) fishing pier study.

In Section 5.2.1, we developed an estimate of the total number of sea turtle captures expected to be reported annually (0.1111; Table 6, Line 1). We take that number and multiply by 3 to get the 3-year total estimate of reported sea turtle captures (0.1111 x 3 = 0.3333). We then apply the species breakdown reported in the STSSN data for recreational hook-and-line captures and gear entanglement in Zone 30 (those identifiable to species and which may be adversely affected by the proposed action; 23.2% were green, 13.1% were Kemp's ridley, and 63.7% were loggerhead sea turtle), to the 3-year reported total to estimate the number of each species of sea turtle we expect to be reported captured over any 3-year period (Table 13). For those estimates that come out to be less than 1, we round up to reach a whole number that can be used as a take limit. In Section 5.5, we estimated the total number of giant manta ray captures expected to occur at the Jacksonville Beach Pier in any 3-year consecutive period.

Table 13. Incidental Take Limits by Species for Any Consecutive 3-Year Period Based on Reported Sea Turtle Captures in Section 5.2.1 and Giant Manta Ray Captures in Section 5.5

Species	Total Estimated Reported Captures at the Pier	Incidental Take Limits at the Pier
Green sea turtle (NA or SA DPS)	0.3333 x 0.232 = 0.0774	No more than 1 reported capture*
Kemp's ridley sea turtle	0.3333 x 0.131 = 0.0435	No more than 1 reported capture
Loggerhead sea turtle (NWA DPS)	0.3333 x 0.637 = 0.2124	No more than 1 reported capture
Giant manta ray		No more than 3 reported captures

*We do not expect, and do not authorize, more than 1 green sea turtle take during any consecutive 3-year time period, which may come from either the NA or the SA DPS.

It is important to note that the mortality rates estimated above for captured sea turtles are not likely to be detected in the initial reporting of captures, as most turtles are expected to live for some period following capture. Some of these individuals may be sent to rehab 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 in Section 5.3.1 above. 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 [Terms & Conditions (T&Cs), Section 9.4]), we do not expect that result (see Section 5.1). At the time of the interaction, we expect the sea turtle take in this ITS to be non-lethal. As discussed in Section 5.3.1, up to 88.9% of this take could be lethal as a result of post-release mortality, and reports of such post-release mortality are consistent with the analysis in this Opinion and this ITS.

9.2 Effect of Take

NMFS has determined the anticipated incidental take is not likely to jeopardize the continued existence of the green sea turtle (NA or SA DPS), Kemp's ridley sea turtle, loggerhead sea turtle (NWA DPS), or giant manta ray.

9.3 Reasonable and Prudent Measures

Section 7(b)(4) of the ESA requires NMFS to issue a statement specifying the impact of any incidental take on listed species, which results from an agency action otherwise found to comply with Section 7(a)(2) of the ESA. It also states that the Reasonable and Prudent Measures (RPMs) necessary to minimize the impacts of take and the T&Cs to implement those measures must be provided and must be followed to minimize those impacts. Only incidental taking by the federal action agency or applicant that complies with the specified terms and conditions is authorized.

The RPMs and T&Cs are specified as required by 50 CFR 402.14(i)(1)(ii) and (iv) to document the incidental take by the proposed action and to minimize the impact of that take on sea turtles.

These measures and conditions are nondiscretionary, and must be implemented by the dual federal action agencies in order for the protection of Section 7(o)(2) to apply. If the applicant fails to adhere to the terms and conditions of this ITS through enforceable terms, and/or fail 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 applicant must report the progress of the action and its impact on the species to NMFS as specified in this ITS [50 CFR 402.14(i)(3)].

NMFS has determined that the following RPMs are necessary and appropriate to minimize impacts of the incidental take of sea turtles and giant manta ray related to the proposed action:

1. The dual federal action agencies must ensure that the applicant provides take reports regarding all interactions with ESA-listed species at this fishing pier.
2. The dual federal 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 this fishing pier.
3. The dual federal action agencies must ensure that the applicant reduces the impacts to incidentally captured ESA-listed species.
4. The dual federal action agencies must ensure that the applicant coordinates periodic fishing line removal (i.e., cleanup) events with non-governmental or other local organizations.

9.4 Terms and Conditions (T&Cs)

The following T&Cs implement the above RPMs:

1. To implement RPM 1, the dual federal action agencies must make it a condition of their permitting (USACE) or funding (FEMA) that the applicant reports all known angler-reported hook-and-line captures of ESA-listed species and any other takes of ESA-listed species to the NMFS SERO.
    a. Within 24 hours of any capture, entanglement, stranding, or other take, the applicant must notify NMFS's SERO by email at takereport.nmfsser@noaa.gov.
        i. Emails must reference this Opinion by the NMFS ECO tracking number for this Opinion (SERO-2019-01838 Jacksonville Beach Pier) and date of issuance.
        ii. The email must state the species, date and time of the incident, general location and activity resulting in capture (i.e., 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.
    b. Every year, a summary report of capture, entanglement, stranding, or other take of ESA-listed species must be submitted by the applicant to NMFS SERO by email at takereport.nmfsser@noaa.gov.
        i. The email and report must reference this Opinion by the NMFS ECO tracking number for this Opinion (SERO-2019-01838 Jacksonville Beach Pier) and date of issuance.

ii. The report will contain the following information: the total number of ESA-listed species captures, entanglements, strandings, or other take that occurred at or adjacent to the pier included in this Opinion.
iii. The report will contain all information for any ESA-listed species taken to a rehabilitation facility holding an appropriate USFWS Native Endangered and Threatened Species Recovery permit.
iv. The first report will be submitted by January 31, 2021, and will cover the time period from pier opening until December 31, 2020. The second report will be submitted by January 31, 2022, and will cover calendar year 2021 and the information in the first report. The third report will be submitted by January 31, 2023, and will cover the prior two calendar years (calendar years 2022 and 2021) and the information from the first report. The next report will be submitted by January 31, 2024 and will cover the prior three calendar years (calendar years 2023, 2022, and 2021). 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.
v. Reports will include current photographs of signs and bins required in T&C 2, below, and records of the clean-ups required in T&C 3 below.

2. To implement RPM 2 and 3, the dual federal action agencies must make it a condition of their permitting (USACE) or funding (FEMA) that the applicant must:
    a. Install and maintain the following NMFS Protected Species Educational Signs: "Save Dolphins, Sea Turtles, Sawfish and Manta Ray", "Report a Sturgeon", and "Help Protect North Atlantic Right Whales"
        i. Signs will be posted at least at the entrance to and the terminal end of the pier.
        ii. Signs will be installed prior to opening the pier for public use.
        iii. Photographs of the installed signs will be emailed to NMFS SERO at takereport.nmfsser@noaa.gov with the NMFS ECO tracking number for this Opinion (SERO-2019-01838 Jacksonville Beach Pier) and date of issuance.
        iv. Sign designs and installation methods are provided at the following website:https://www.fisheries.noaa.gov/southeast/consultations/protected-species-educational-signs
        v. Current photographs of the signs will be included in each report required by T&C 1, above.
    b. Install and maintain fishing line recycling bins and trash receptacles at the piers to reduce the probability of trash and debris entering the water.
        i. Fishing line recycling bins and trash receptacles will be installed prior to opening the pier for public use.
        ii. Photographs of the installed bins will be emailed to NMFS SERO at takereport.nmfsser@noaa.gov with the NMFS ECO tracking number for this Opinion (SERO-2019-01838 Jacksonville Beach Pier) and date of issuance.
        iii. The applicant must regularly empty the bins and trash receptacles and make sure they are functional and upright.

    iv. Additionally, current photographs of the bins will be included in each report required by T&C 1, above.

3. To implement RPMs 2, 3, and 4, the federal action agencies will make it a condition of permitting (USACE) or funding (FEMA) that the applicant must:
    a. Perform at least 1 annual underwater cleanup to remove derelict fishing line and associated gear from around the pier structure.
    b. Submit a record of each cleaning event in the report required by T&C 1 above.

10 CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA directs federal agencies to use their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation Recommendations (CRs) are designed to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

NMFS believes the following CRs further the conservation of the listed species that will be affected by the proposed action. NMFS strongly recommends that these measures be considered and implemented 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.

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 additional conservation recommendations.

11 REINITIATION OF CONSULTATION

As provided in 50 CFR Section 402.16, reinitiation of formal consultation is required where the discretionary federal agency involvement or control over the action has been retained (or is authorized by law) and if (1) the amount or extent of taking specified in the ITS is exceeded, (2) new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered, (3) the identified action is subsequently modified in a manner that causes an effect to listed species or critical habitat that was not considered in the Opinion, or (4) a new species is listed or critical habitat designated that may be affected by the identified action.

12 LITERATURE CITED

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