UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southeast Regional Office
263 13th Avenue South
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https://www.fisheries.noaa.gov/region/southeast

09/15/2022

F/SER31:DMB
SERO-2021-02331
https://doi.org/10.25923/pyk1-2459

James Duffy, Project Manager
United States Department of the Interior
Fish and Wildlife Service
Wildlife and Sport Fish Restoration Program
Legacy Region 4
1875 Century Boulevard
Atlanta, Georgia 30345

Ref.: FWS/LR4/WSFR/AL FIM, Alabama Marine Recreational Fishery-Independent Data Collection Survey

Dear James Duffy,

The enclosed Biological Opinion (Opinion) responds to your request for consultation with us, the National Marine Fisheries Service (NMFS), pursuant to Section 7 of the Endangered Species Act of 1973 as amended (16 U.S.C. § 1531 et seq.) (ESA) for the following action.

Applicant	**USFWS Tracking Number**	**SERO Tracking Number**	**Proposed Action**
Alabama Department of Conservation and Natural Resources, Marine Resources Division (ADCNR/MRD)	FWS/LR4/WSFR/AL FIM	SERO-2021-02231	Provide financial assistance to the ADCNR/MRD for fishery independent monitoring pursuant to the USWFS's Wildlife and Sport Fish Restoration Program

The Opinion considers the effects of the USFWS's proposal to provide financial assistance to the ADCNR/MRD on the following listed species and critical habitat: green sea turtle (North Atlantic and South Atlantic Distinct Population Segments [DPSs]), Kemp's ridley sea turtle, leatherback sea turtle, loggerhead sea turtle (Northwest Atlantic DPS), hawksbill sea turtle, smalltooth sawfish (U.S. DPS), Gulf sturgeon, giant manta ray, and Gulf sturgeon critical habitat (Unit 8 – Lake Ponchartrain/Mississippi Sound).

NMFS concludes that the proposed action will have no effect on smalltooth sawfish (U.S. DPS). NMFS concludes that the proposed action is not likely to adversely affect leatherback sea turtle, hawksbill sea turtle, Gulf sturgeon, giant manta ray, and Gulf sturgeon critical habitat (Unit 8 – Lake Ponchartrain/Mississippi Sound). NMFS concludes that the proposed action is likely to adversely affect, but not likely to jeopardize the continued existence of, green sea turtle (North

Atlantic DPS and South Atlantic DPS), Kemp's ridley sea turtle, and loggerhead sea turtle (Northwest Atlantic DPS).

NMFS is providing an Incidental Take Statement (ITS) with this Opinion (Section 10). The ITS lists the amount of authorized anticipated incidental take over any consecutive 3-year period and describes Reasonable and Prudent Measures NMFS considers necessary or appropriate to minimize the impact of incidental take associated with the proposed action. The ITS also specifies Terms and Conditions, including monitoring and reporting requirements with which the USFWS must comply, to carry out the Reasonable and Prudent Measures.

We look forward to further cooperation with you on other projects to ensure the conservation of our threatened and endangered marine species and critical habitat. If you have any questions regarding this consultation, please contact Dana M. Bethea, Consultation Biologist, by email at Dana.Bethea@noaa.gov.

Sincerely,

STRELCHECK.ANDREW.JAMES.1365863152 Digitally signed by STRELCHECK.ANDREW.JAMES.1365863152 Date: 2022.09.15 06:58:14 -04'00'

Andrew J. Strelcheck
Regional Administrator

Enclosures:
Biological Opinion SERO-2021-02231
Appendix A Sea Turtle, Smalltooth Sawfish, and Sturgeon Safe Handling and Release
Appendix B NOAA's Careful Release Protocols for Sea Turtle Release with Minimal Injury (NMFS-SEFSC-580)
Appendix C SERO Protected Species Incidental Take Reporting Form
Appendix D SERO Take Tracking Sheet

File: 1514-22.i

Endangered Species Act - Section 7 Consultation
Biological Opinion

Action Agency:	United States Fish and Wildlife Service
Applicant:	Alabama Department of Conservation and Natural Resources, Marine Resources Division FWS/LR4/WSFR/AL FIM
Activity:	Marine Recreational Fishery Statistical Data Collection Survey in the State of Alabama
Consulting Agency:	National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Southeast Regional Office, Protected Resources Division, St. Petersburg, Florida Tracking Number SERO-2021-02231 https://doi.org/10.25923/pyk1-2459

Approved by:

STRELCHECK.ANDREW.JAMES.1365863152 Digitally signed by STRELCHECK.ANDREW.JAMES.1365863152 Date: 2022.09.15 07:28:02 -04'00'

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

Date Issued: 09/15/2022

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ACRONYMS AND ABBREVIATIONS

ADCNR/MRD	Alabama Department of Conservation and Natural Resources, Marine Resources Division
ADEM	Alabama Department of Environmental Management
BOEM	Bureau of Ocean Energy Management
CCL	Curved carapace length
CFR	Code of Federal Regulations
DDE	Dichlorodiphenyldichloroethylene
DDT	Dichlorodiphenyltrichloroethane
DTRU	Dry Tortugas Recovery Unit of the loggerhead sea turtle
DO	Dissolved oxygen
DOD	Department of Defense
DOT	Department of Transportation
DPS	Distinct Population Segment
DWH	Deepwater Horizon
ECO	NMFS Environmental Consultation Organizer
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FEMA	Federal Emergency Management Agency
FIM	Fishery Independent Monitoring
FR	Federal Register
FWC	Florida Fish and Wildlife Conservation Commission
FWRI	Fish and Wildlife Research Institute
GADNR	Georgia Department of Natural Resources Division
GCRU	Greater Caribbean Recovery Unit
GRBO	Regional Biological Opinion on Hopper Dredging of Navigation Channels and Borrow Areas in the Gulf of Mexico (F/SER/2000/01287), including Revision 1 (F/SER/2004/02187) and Revision 2 (I/SER/2006/02953; I/SER/2006/01096)
ITS	Incidental Take Statement
LR4	USFWS Legacy Region
NCWRC	North Carolina Wildlife Resources Commission
NGMRU	Northern Gulf of Mexico Recovery Unit of the loggerhead sea turtle
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration

NRC	National Research Council
NRU	Northern Recovery Unit of the loggerhead sea turtle
PCE(s)	Primary Constituent Element(s)
PCB	Polychlorinated biphenyls
PFC	Perfluorochemicals
PFRU	Peninsular Florida Recovery Unit of the loggerhead sea turtle
PRD	Protected Resources Division
SAV	Submerged Aquatic Vegetation
SCDNR	South Carolina Department of Natural Resources
SCL	Straight carapace length
SEAMAP	Southeast Area Monitoring and Assessment Program
SERO	NMFS Southeast Regional Office
SSRIT	Smalltooth Sawfish Recovery Implementation Team
STSSN	Sea Turtle Stranding and Salvage Network
TED(s)	Turtle Exclusion Device(s)
TL	Total length
U.S.	United States
USACE	United States Army Corps of Engineers
USCG	United States Coast Guard
USFWS	United States Fish and Wildlife Service
YOY	Young-of-the-year

UNITS OF MEASUREMENT

°C	degrees Celsius
cm	centimeter(s)
°F	degrees Fahrenheit
ft	foot/feet
g	gram(s)
HP	horsepower
in	inch(es)
kg	kilogram(s)
km	kilometer(s)
kt	knot(s)
lb	pound(s)
lin ft	linear foot/feet
m	meter(s)
min	minute(s)
mm	millimeter(s)
oz	ounce(s)

1 INTRODUCTION

1.1 Overview

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

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

On July 5, 2022, the United States District Court for the Northern District of California issued an order vacating the 2019 regulations adopting changes to 50 CFR part 402 (84 FR 44976, August 27, 2019). This consultation was initiated when the 2019 regulations were still in effect. As reflected in this document, we are now applying the section 7 regulations that governed prior to adoption of the 2019 regulations (https://www.govinfo.gov/content/pkg/CFR-2018-title50-vol11/pdf/CFR-2018-title50-vol11-part402.pdf). For purposes of this consultation, we considered whether the substantive analysis and its conclusions regarding the effects of the proposed action articulated in the Opinion and Incidental Take Statement would be any different under the 2019 regulations. We have determined that our analysis and conclusions would not be any different.

This document represents NMFS's Opinion based on our review of potential effects of the USFWS's proposal to fund the ADCNR/MRD (the applicant) for the Marine Recreational Fishery Statistical Data Collection Survey in the State of Alabama (hereafter referred to as the Alabama Marine FIM Survey) on the following listed species and critical habitat: green sea turtle (North Atlantic Distinct Population Segment [DPS] and South Atlantic DPS), Kemp's ridley sea turtle, leatherback sea turtle, loggerhead sea turtle (Northwest Atlantic DPS), hawksbill sea turtle, smalltooth sawfish (U.S. DPS), Gulf sturgeon, giant manta ray, and Gulf sturgeon critical habitat (Unit 8 – Lake Ponchartrain/Mississippi Sound). Our Opinion is based on information provided by the USFWS, the applicant, the STSSN, the SSRIT, and the published literature cited within.

1.2 Consultation History

The following is the consultation history for the Alabama Marine Recreational Fishery Statistical Data Collection Survey (hereafter referred to as the Alabama Marine FIM Survey), the Opinion with the USFWS and with the NMFS ECO tracking number SERO-2021-02231.

On September 13, 2021, NMFS received a request for informal consultation under Section 7 of the ESA from the USFWS for project reference number FWS/LR4/WSFR/AL FIM in a letter dated September 13, 2021.

On October 21, 2021, NMFS requested additional information related to the survey design and sampling locations. We received your response on December 15, 2021.

On January 4, 2022, NMFS requested additional information related to historic survey data and interactions with ESA-listed species. We received your response on February 15, 2022.

On February 22, 2022, NMFS requested additional information related to gill net and otter/bottom trawl methodology, specifically soak and trawl times. We received your response on March 2, 2022, and initiated consultation that day.

On September 7, 2022, during our internal review process, we requested additional information related to the USFWS's effect determination for the giant manta ray. We received final response on September 8, 2022.

2 PROPOSED ACTION

2.1 Project Details

The USFWS proposes to provide financial assistance to the ADCNR/MRD for the Alabama Marine FIM Survey. The Alabama Marine FIM Survey is a fishery-independent monitoring program that helps to determine the status of populations of marine organisms throughout Alabama coastal waters. The data collected is available to fisheries managers to use in the analysis of growth, seasonal and geographical distributions, changes in population structures, and correlation of abundance with some abiotic factors for Alabama marine.

2.1.1 Design

The Alabama Marine FIM Survey has been operating in some capacity since 1980. Given the revisions of the SEAMAP program and the importance for similar sample collection and processing throughout the Gulf of Mexico, ADCNR/MRD adjusted the design of the Alabama Marine FIM Survey in order to produce data complementary to SEAMAP protocols beginning in May 2010. Other modification to sampling methods are noted below; however, in general, the Alabama Marine FIM Survey is standardized and uses a combination of fixed stations and a stratified random sampling design to conduct monthly biological collections with various gear types and hydrological sampling year-round in all areas of Alabama's coastal waters.

2.1.2 Gear

The Alabama Marine FIM Survey uses motorized vessels and a multi-gear approach to collect data on various life history stages of fishes and selected invertebrates from a variety of habitats.

Motorized Vessels

Various motorized vessels are used in the Alabama Marine FIM Survey. Vessels range in size from 22 to 26-ft; they vary in hull shape from flat-bottom to V-hulls commonly used in recreational fisheries. Depending on size, the vessels use either a 90 HP, 115 HP, or 150 HP outboard engines fitted with either single or twin engines, short (20-in) or long shaft (25-in) lower units. Maximum speed of vessels ranges between 26-kt and 36-kt. A minimum of 2, but up to 4, staff occupy each vessel with 1 trained operator captaining and 1 trained operator standing look-out.

50-ft Beach Seine

Routine fishing-independent beach seine sampling of Alabama's estuaries began in 1981. Monthly seine sampling has been conducted at fixed stations along the beaches, Mississippi Sound, the Perdido system, Bon Secour, and Mobile Bay since the inception of the seine program. Currently, 10 fixed stations are sampled each month. Two of the 10 current stations have been sampled monthly from 1981 to present, while the remaining 8 stations were added to the monthly sampling strategy in 2017. From 2017 to present, monthly seine sampling has been conducted at the same 10 fixed stations. Site selection and sample collection are executed to target a wide range of fauna during their early stages of life.

A bag seine, measuring 50-ft along the cork-line, is used for biological sampling at fixed stations. Wings and the bag are each constructed with 3/16-in knotless nylon webbing coated with a green, solvent base polymer to preserve the integrity of the net and selvages. Legs of the cork and lead lines are tied to 2-in-square wooden poles measuring 177-cm-long. Legs of the lead line are tied 7-cm from the bottom of the wooden poles and legs of the cork line are tied 128-cm from the bottom of the wooden poles. Distance between floats secured to the cork line is 44-cm and distance between weights along the lead line is 32-cm. The bag, centered in the middle of seine, measures 4-ft-long, 4-ft-wide, and 4-ft-deep.

To deploy the beach seine, 2 biologists don waders and 1 biologist carries the seine into deeper water to the full length of the 60-ft-long tether. Water depth where seining occurs typically ranges 0 to 4-ft-deep. The path of travel is selected to minimize perturbation of the intended sampling area. The second biologist follows and both begin to unfurl the seine. Once the seine is fully open, it is examined for twists and to ensure the bag is fully deployed. Once the seine is free of twists, with the lead line on the bottom and the floats on top, the biologists haul the seine toward the beach. Biologists ensure that the bottom of the poles remain in contact with the substrate during the entire haul. Once the shoreline has been reached, the lead line is brought in, maintaining constant contact with the substrate. The wings of the seine are shaken down so that all specimens reach the bag, which is then carefully lifted up and gently shaken so all specimens are confined at the bottom of the bag.

Gill Nets

ADCNR/MRD began fishery-independent gill net sampling in 2000. At that time, sampling was exploratory with locations chosen at will and sets made in a variety of fashions to help ascertain general locations of species and catch rates. A basic stratified random sampling design was established in May 2001 to ensure that all areas of Alabama's coastal waters were encompassed. Sampling was stratified by area, net type (small or large-mesh), and sites are randomly selected within each sampling area per month. From 2008 to current, the target has been 120 sets annually per net type (i.e., a total of 240 gill net sets per year).

There have been several changes in the design of the gill nets over the years; however, since 2005, the small-mesh gill net consists of a 5-panel design. Panel sizes range from 2 to 4 in-stretch meshes in 0.5-in increments (i.e., 2.0, 2.5, 3.0, 3.5, and 4.0-in), and 8-ft-deep and 750-ft-long along the float line. The large-mesh gill net consists of a 4-panel design, 4.5 to 6-in-stretch mesh in 0.5-in increments (i.e., 4.5, 5.0, 5.5, and 6.0-in), and is 8-ft-deep and 600-ft-long along the float line. Small-mesh gill nets are typically set perpendicular to the shoreline at each site with the smallest mesh closest to the shore. Large-mesh gill nets are typically set parallel to the shore to capture flounder as they move from deep to shallow waters or vice versa for feeding purposes. Water depth where gill netting occurs typically ranges 0.5 to 10-ft-deep.

The total gill net soak time (net in-net out) does not typically exceed 1 hour and 30 minutes, unless inclement weather conditions or unusually large catches deem otherwise. This time period accounts for the time required to payout the gill net, timed sampling period (1 hour), and retrieval of the gear; catch is cleared as the gill net is brought back onboard. Biologists and the vessel remain in the immediate vicinity of the gill net at all times while it is in the water to respond quickly in case of navigation interference, protected species interactions, or other hazards.

16-ft Otter/Bottom Trawl

ADCNR/MRD began monthly fishery-independent otter/bottom trawl sampling for all penaeid shrimp, *Callinectes* sp. crabs, and finfish species in October 1980, while total catch data were recorded beginning in 1981. In 1990, all organisms were enumerated and weighed according to SEAMAP procedures. In 1998, the program shifted to an interagency program with ADEM; water quality parameters and the number of sites sampled were expanded, but effort was reduced to 1 sampling regime per quarter. After determining that quarterly sampling did not provide enough definition to accurately observe trends, monthly sampling was resumed in October 2000. Since 2010, the trawl component of the survey has been standardized to sample 24 fixed stations monthly.

A 16-ft, 2-seam otter/bottom trawl is used to collect biological samples at each fixed station every month. The cod-end of the otter/bottom trawl is fitted with 3/16-in knotless webbing as an interliner. The head rope is constructed with 3/28-in polydac line. The distance between end-point selvages along the head rope is 14.2-ft with two 3-in-square corks. The lead line is constructed with 3/8-in polydac line with 7 sections of 3/16-in chain secured to the lead line. The total length of the lead line between end-point selvages is 17.8-ft. Leg lines for the head rope and lead line are 6-ft-long. The tow gear consists of 3/8-in polydac line and features a 35.5-ft-long bridle and a single 55-ft-long main line extending from the bridle to the vessel. An additional 120-ft of 3/8-in polydac is use when sampling the Mobile Ship Channel due to depth. Dimensions of the doors are 24-in-long and 12.5-in-wide. Each door weighs 22-lb. The terminal ends of the bridle are shackled to the chain assembly on the doors. Water depth where otter/bottom trawling occurs typically ranges 2.5 to 50-ft-deep.

Upon arriving at each station, the trawl is examined for twists and other fouling problems. With the boat at idle speed, the trawl is set out cod end first, followed by the net being fed out to the doors, then the doors are set so they are uncrossed and not twisted. The bridle and tow lines are fed out with constant, light tension until all line is out. The boat speed then increases to 2.0-2.5-kts. This is considered the start of trawling and the time is recorded.

The total time trawl gear is in the water (doors in-doors out) does not typically exceed 25 minutes. This time period accounts for the time required to payout the gear/towline, timed sampling period (10 minutes), and retrieval of the gear/towline. The entire 25-minute time period is needed for the 3 deeper sampling locations along the Mobile Ship Channel; the other, shallower sampling location typically require the gear to be in the water for 20 minutes. Biologists observe the doors, head rope, bottom rope, and cod-end during retrieval to assess if the gear is fouled. In the event of fouled gear, the catch will be discarded, and additional trawls will be conducted until a correct sampling event is achieved. Once a “good” trawl is back on board, the cod end is emptied onto the sorting table or tub and trash removed.

Water Quality Meter

Hydrological data are collected at each seine, gill net set, and trawl sampling site using a hand-held water quality meter. Hydrological data are collected at the surface for gill net and seine sites, and while at depth for the trawl sites. These data include date, time, soak time, temperature, salinity, DO, and depth. There are also 9 additional sites where only hydrological data are collected.

2.1.3 Sample Work-up

The sample work-up technique is similar for all samples, regardless of gear type or sampling regime. All fish and selected invertebrate species captured are identified to the lowest practical taxonomic level, counted, and a random sample of at least 10 individuals per species is measured (standard length for teleosts, precaudal length for sharks, disc width for rays, carapace width for crabs, and rostrum-to-telson total length for shrimp) and weighed. All collected specimens are placed in a zip-top bag and labeled to indicate the date and sample site. All collected samples are placed in an ice chest until they can be put in a freezer at the lab for later processing. Sample processing for the gill net also includes determining the sex, weighing female ovaries, and otolith removal for age determination.

2.1.4 Minimization Measures

Professional fishery biologists and trained fishery technicians conduct the Alabama Marine FIM Survey, which follows a highly structured scientific protocol. All Alabama Marine FIM Survey activities are characterized by 100% professional observer coverage; no gear is left to soak unattended. Currently, all Alabama Marine FIM Survey sampling is conducted during daylight hours, between 1-hour after sunrise and 1-hour before sunset.

All vessels associated with the Alabama Marine FIM Survey operate at "Idle /No Wake" speeds at all times when engine must be trimmed/tilted to prevent disturbance of the seabed and remain at idle speed until sufficient depth is acquired to increase speed to plane the vessel. Depth needed to increase speed to plane varies between vessels; however, minimum depth needed to plane is generally 3-4-ft.

Protected species are avoided completely when possible and handled quickly and carefully when encountered. The Alabama Marine FIM Survey Procedure Manual includes a section on how to avoid and handle protected species encounters. ADCNR/MRD staff currently report all protected species encounters to NMFS using the SERO Protected Species Incidental Take Reporting Form (Appendix C NOAA Fisheries Southeast Region Protected Species Incidental Take Reporting Form) and utilize safe handling techniques identified in our Careful Release Protocols for Sea Turtle Release with Minimal Injury (NMFS-SEFSC-580; Appendix A).

2.2 Action Area

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). The Alabama Marine FIM Survey uses a combination of fixed stations and a stratified random sampling design to conduct monthly biological sampling year-round, using various gear-types and hydrological recorders in all Alabama coastal waters. **Figure 1** shows the action area for the Alabama Marine FIM Survey: (1) Mobile Bay, (2) lower Mobile Bay, (3) Mississippi Sound, (4) the Perdido Bay system, which includes two locations in the Gulf of Mexico adjacent to the mouth of Mobile Bay, and the entrance to Perdido Pass. The Grand Bay (3A) and Petit Bois Pass (3E) sample sites are located within the boundary of Gulf sturgeon critical habitat (Unit 8 – Lake Ponchartrain/Mississippi Sound).

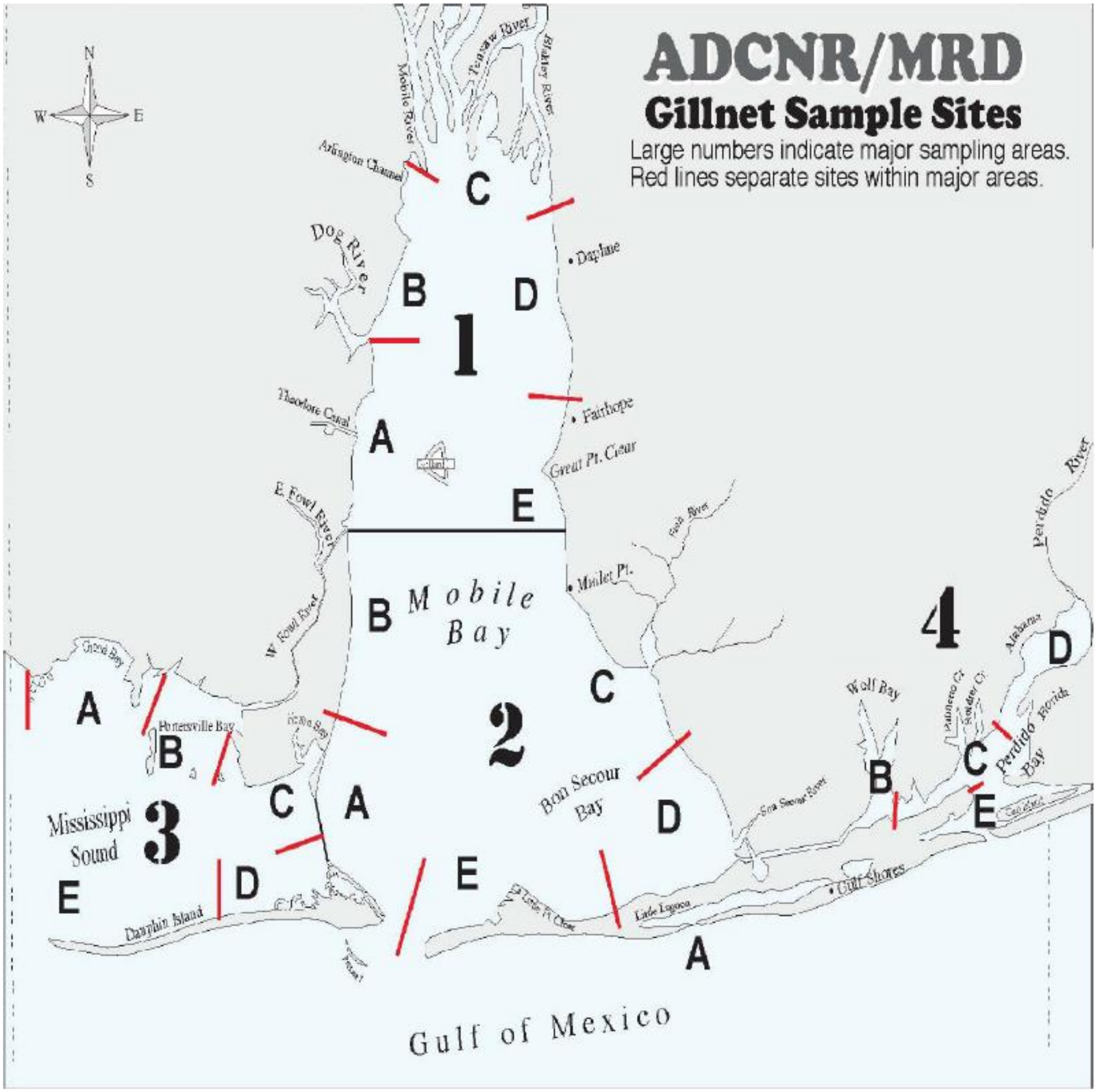

Figure 1. ADCNR/MRD sampling locations. (1) Mobile Bay, (2) lower Mobile Bay, (3) Mississippi Sound, (4) the Perdido Bay system. Grand Bay (3A) and Petit Bois Pass (3E) are located within the boundary of Gulf sturgeon critical habitat.

Table 1 through 4 provide basic information for Alabama Marine FIM Survey sites by gear type. Sampling is conducted over a wide range of habitats encompassing different bottom types, shoreline types, and open estuarine areas.

Table 1. Alabama Marine FIM Survey Sites for the 50-ft Beach Seine

Station Number	Location	Latitude	Longitude	Depth (ft)	Substrate
147E	Bon Secour	30° 16.7'	87° 45.3'	4.0	Sand
36E	Hollingers Island	30° 32.6'	88° 04.8'	2.5	Sand/Clay

Station Number	Location	Latitude	Longitude	Depth (ft)	Substrate
37E	Daphne	30° 35.9'	87° 54.8'	3.0	Sand
148E	Coffee Island	30° 20.0'	88° 15.7'	2.0	Silt/Sand/Shell
150E	Little Sand Island	30° 39.5'	88° 01.5'	2.5	Sand
146E	Navy Cove Marsh	30° 14.0'	87° 57.6'	3.0	Sand
151E	Cedar Island	30° 16.2'	88° 07.0'	3.0	Shell/Sand
42E	DI-Airport	30° 15.4'	88° 07.3'	2.5	Sand
149E	Hatchet Point	30° 18.4'	87° 32.3'	3.0	Sand
129E	Weeks Bay	30° 22.6'	87° 50.2'	3.0	Sand

Table 2. Alabama Marine FIM Survey Sites for Gill Nets

Station Number	Location	Latitude	Longitude	Depth (ft)	Substrate
1A	Theodore / Gaillard Island	30° 31.2'	88° 4.8'	2.5 - 7.5	Mud/Sand
1B	Arlington Flats	30° 36.6'	88° 3.0'	2.0 - 8.0	Mud/Shell/Sand
1C	5 Rivers / Delta	30° 39.3'	87° 58.5'	2.5 - 7.4	Mud/Shell
1D	Daphne	30° 35.1'	87° 55.2'	2.5 - 6.5	Sand
1E	Point Clear	30° 31.2'	87° 55.2'	3.0 - 7.0	Sand
2A	Dauphin Island Causeway	30° 17.4'	88° 7.2'	2.0 - 6.0	Shell/Sand
2B	Alabama Port	30° 24.3'	88° 6.0'	2.0 - 6.0	Sand
2C	Weeks Bay	30° 23.1'	87° 52.2'	0.8 - 5.5	Sand/SAV
2D	Bon Secour	30° 17.1'	87° 45.6'	2.0 - 5.5	Sand/Mud
2E	Fort Morgan	30° 15.7'	87° 56.5'	2.0 - 5.0	Sand
3A	Grand Bay	30° 23.4'	88° 20.7'	2.0 - 6.0	Sand/Shell
3B	Portersville Bay / Coffee Island	30° 21.0'	88° 15.0'	2.5 - 6.5	Sand/Shell/Mud
3C	Heron Bay	30° 19.2'	88° 9.3'	2.0 - 4.5	Shell/Mud
3D	Dauphin Island / DI-Bay	30° 15.3'	88° 10.2'	2.0 - 6.5	Sand/Mud
3E	West End / Dauphin Island	30° 14.4'	88° 16.8'	2.5 - 6.5	Sand/SAV
4A	Little Lagoon	30° 14.7'	87° 45.0'	0.7 - 10.1	Sand/SAV
4B	Wolf Bay	30° 19.2'	87° 35.4'	0.6 - 7.7	Mud/Sand
4C	Mid Perdidio Bay	30° 20.4'	87° 30.0'	0.7 - 8.9	Sand
4D	Upper Perdidio Bay	30° 25.2'	87° 24.3'	0.7 - 8.1	Sand
4E	Lower Perdido Bay	30° 17.7'	87° 30.6'	2.2 - 4.0	Sand

Table 3. Alabama Marine FIM Survey Sites for the 16-ft Otter/Bottom Trawl

Station Number	Location	Latitude	Longitude	Depth (ft)	Substrate
18T	Perdido Pass	30° 15.9'	87° 33.3'	13.0	Sand/SAV
31T	Arnica Bay	30° 18.3'	87° 32.1'	14.0	Sand
59T	E. Little Lagoon	30° 15.3'	87° 41.7'	4.0	Sand/SAV

Station Number	Location	Latitude	Longitude	Depth (ft)	Substrate
60T	W. Little Lagoon	30° 14.3'	87° 47.2'	5.0	Sand/SAV
63T	Bayou St John	30° 17.1'	87° 31.8'	8.0	Sand/SAV
94T	Mid-Perdido	30° 22.5'	87° 26.9'	10.0	Sand/Mud
97T	Grassy Point	30° 25.3'	87° 23.7'	7.0	Sand/Mud
123T	Lagoon Pass	30° 14.8'	87° 44.2'	8.5	Sand/Mud
16T	Petit Bois Pass	30° 13.6'	88° 20.4'	12.0	Sand
20T	Tall Range C	30° 15.4'	88° 12.7'	11.0	Sand/Mud
24T	Heron Bay	30° 19.9'	88° 08.6'	3.0	Mud
61T	Grand Bay	30° 22.7'	88° 19.3'	3.5	Sand/Mud/SAV
8T	MSC 23	30° 15.7'	88° 02.2'	50.0	Mud
9T	ICW 135	30° 16.5'	87° 52.6'	7.0	Sand/Mud
12T	E. Fowl River	30° 27.1'	88° 05.6'	9.5	Mud
17T	Mobile Pass	30° 10.2'	88° 03.0'	40.0	Sand/Mud
27T	Weeks Bay	30° 23.4'	87° 49.8'	2.5	Mud
28T	Bon Secour River	30° 17.7'	87° 44.9'	5.0	Mud
56T	Oil Rig East	30° 15.5'	88° 01.6'	24.0	Sand/Mud
3T	MSC 57	30° 30.3'	88° 01.2'	50.0	Mud

Table 4. Alabama Marine FIM Survey Sites for Water Quality Sampling Only

Station Number	Location	Latitude	Longitude	Depth (ft)	Substrate
44HYDRO	Fish River Reef	30° 19.7'	87° 49.8'	12.0	Limestone
75HYDRO	Soldier Creek / Red Bluff	30° 20.3'	87° 29.3'	13.0	Sand/Silt
92HYDRO	Ross Point	30° 19.1'	87° 30.8'	16.0	Mud
95HYDRO	South of Lilian Bridge	30° 23.8'	87° 26.1'	10.0	Mud
99HYDRO	Perdido River #1	30° 27.4'	87° 24.7'	12.0	Mud
101HYDRO	Eleven Mile Creek	30° 27.5'	87° 22.7'	18.0	Mud
131HYDRO	Shellbank Reef	30° 15.6'	87° 51.7'	10.0	Shell/Limestone/ Concrete
136HYDRO	Klondike Reef	30° 27.4'	87° 55.9'	10.0	Shell/Limestone
137HYDRO	Denton Reef	30° 24.6'	88° 04.0'	12.0	Shell/Concrete

3 EFFECTS DETERMINATIONS

3.1 Effects Determinations for ESA-listed Species

3.1.1 Agency Effect Determination(s) for ESA-listed Species

Table 5 provides the effect determinations for ESA-listed species the USFWS and NMFS believe may be affected by the proposed action. Please note abbreviations used in the table: E =

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

Table 5. Effects Determination(s) for Species the USFWS and NMFS Believe May Be Affected by the Proposed Action

Species	ESA Listing Status	Listing Rule/Date	Most Recent Recovery Plan/Outline Date	USFWS Effect Determination	NMFS Effect Determination
Sea Turtles					
Green sea turtle (North Atlantic DPS)	T	81 FR 20057/ April 6, 2016	October 1991	NLAA	LAA
Green sea turtle (South Atlantic DPS)	T	81 FR 20057/ April 6, 2016	October 1991	NLAA	LAA
Kemp's ridley sea turtle	E	35 FR 18319/ December 2, 1970	September 2011	NLAA	LAA
Leatherback sea turtle	E	35 FR 8491/ June 2, 1970	April 1992	NLAA	NLAA
Loggerhead sea turtle (Northwest Atlantic DPS)	T	76 FR 58868/ September 22, 2011	December 2008	NLAA	LAA
Hawksbill sea turtle	E	35 FR 8491/ June 2, 1970	December 1993	NLAA	NLAA
Fishes					
Smalltooth sawfish (U.S. DPS)	E	68 FR 15674/ April 1, 2003	January 2009	NLAA	NE
Gulf sturgeon (Atlantic sturgeon, Gulf subspecies)	T	56 FR 49653/ September 30, 1991	September 1995	NLAA	NLAA
Giant manta ray	T	83 FR 2916/ January 22, 2018	2019	NLAA	NLAA

We believe the Alabama Marine FIM Survey will have no effect on the U.S. DPS of smalltooth sawfish as this species is not expected to be in the action area. The core range of this species is located in southwest Florida, outside of the action area.

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

Sea Turtles

Leatherback sea turtle and hawksbill sea turtle are not likely to be adversely affected by any activities conducted by the Alabama Marine FIM Survey. Although these species may be susceptible to vessel strike and capture by gear used during survey activities, we believe any effects to these species from survey operations are extremely unlikely to occur. First, there has never been a documented interaction, including vessel strike or capture in survey gear, between either of these two sea turtle species and the Alabama Marine FIM Survey. Next, while actively sampling, vessels move very slowly (i.e., up to 2.5 kt) or remain idle. Vessels transiting to and from port or between survey stations could travel at greater speeds. However, the biologists (i.e., at least captain and a designated lookout) watch for objects in the path of the vessel at all times. If a sea turtle is seen, the vessel's course can be immediately altered or speed reduced (or both) to avoid incidental collisions. Because the Alabama Marine FIM Survey effectively has 100% observer coverage and because there has never been a documented vessel strike or capture of these species during the 40+ years of the survey, it is likely that none has occurred and that any vessel strike or capture of these species is unlikely to occur in the future. Therefore, leatherback and hawksbill sea turtles will not be discussed further in this Opinion.

Marine Fish

Gulf Sturgeon

Gulf sturgeon may be caught in the 50-ft beach seine and 16-ft otter/bottom trawl. However, we believe that it is extremely unlikely that these gear types will capture a Gulf sturgeon. As stated above, there has never been a documented interaction between any ESA-listed species and the seine or trawl component of the Alabama Marine FIM Survey. Because the Alabama Marine FIM Survey effectively has 100% observer coverage and because there has been no documented capture of this species using these gear types during the 40+ years of the survey, it is likely that none has occurred and that any future capture of this species using these gear types is unlikely to occur.

Gulf sturgeon may be susceptible to capture in gillnets; however, we believe any effects to this species from gill net survey operations are extremely unlikely to occur. ADCNR/MRD began fishery-independent gill net sampling in 2000 and gill netting was standardized to 240 total sets in 2008. Since 2000, only 1 Gulf sturgeon has been captured during gill net operations; it occurred in November 2001 (prior to survey standardization) and resulted in a live release with no suspected post-release mortality. Because the Alabama Marine FIM Survey effectively has 100% observer coverage and because there has been no documented gillnet capture of this species during the last 20+ years of the survey since survey standardization, it is likely that none has occurred since 2001 and that any future capture of this species using this gear type is unlikely to occur.

We believe that it is extremely unlikely that Alabama Marine FIM Survey-related vessels will strike a Gulf sturgeon. In the action area, Gulf sturgeon spend most of their time at or near the bottom, where they are not subject to vessel interactions. Additionally, as stated above, the Alabama Marine FIM Survey effectively has 100% observer coverage and there has never been a documented vessel strike between any ESA-listed species and an Alabama Marine FIM Survey research vessel. Therefore, it is likely that any vessel strike of Gulf sturgeon is unlikely to occur in the future.

Gulf sturgeon use the interior waters of Alabama, particularly in Grand Bay and Petit Bois Pass, for migration and foraging. During deployment of survey gear, a relatively small fraction of the total area of available habitat may be unavailable for a relatively short amount of time, though no gear type is large enough to completely obstruct use of any of the sampling sites. Furthermore, gulf sturgeon may be affected by their temporary inability to access the in-water or nearshore portion of the sampling sites due to their avoidance of survey activities and related noise. We anticipate any habitat avoidance effects to this species will be so small as to be unmeasurable and, therefore, insignificant. Thus, we believe any adverse effects associated with the loss of habitat are extremely unlikely to occur.

Based on the foregoing, Gulf sturgeon will not be discussed further in this Opinion.

Giant Manta Ray

Giant manta ray are not likely to be adversely affected by any activities conducted by the Alabama Marine FIM Survey. Although this species may be susceptible to vessel strike and capture by gear used during survey activities, there has never been a documented interaction, including a vessel strike or capture in survey gear, between a giant manta ray and the Alabama Marine FIM Survey. Because the Alabama Marine FIM Survey effectively has 100% observer coverage and vessel strike or capture of this species has never been documented during the 40+ years of the survey, it is likely that none has occurred and that any vessel strike or capture of this species is unlikely to occur in the future. Therefore, we believe any effects to this species from survey operations are extremely unlikely to occur and giant manta ray will not be discussed further in this Opinion.

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

NMFS has determined that green sea turtle (North Atlantic DPS and South Atlantic DPS), Kemp's ridley sea turtle, and loggerhead sea turtle (NWA DPS) may be adversely affected by the Alabama Marine FIM Survey. Those effects are discussed in Section 6. The following sections describe the status of listed species that may be adversely affected.

3.2 Effects Determinations for Critical Habitat

3.2.1 Agency Effect Determinations for Critical Habitat

Table 6 provides the effects determinations for critical habitat occurring within the action area that the USFWS and NMFS believe may be affected by the proposed action. Please note abbreviations used in the table: NLAA = may affect, not likely to adversely affect.

Table 6. Effects Determination(s) for Designated Critical Habitat the USFWS and NMFS Believe May Be Affected by the Proposed Action

Species	Critical Habitat Unit in the Action Area	Critical Habitat Rule/Date	USFWS Effect Determination	NMFS Effect Determination (Critical Habitat)
Fishes				
Gulf sturgeon	Unit 8	68 FR 13370/ March 19, 2003	NLAA	NLAA

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

As stated above, the Grand Bay (**Figure 1**, 3A) and Petit Bois Pass (**Figure 1**, 3E) sample sites occur within the boundary of Gulf sturgeon critical habitat (Unit 8 – Lake Ponchartrain/ Mississippi Sound). Gulf sturgeon critical habitat includes riverine, estuarine, and marine units; NMFS is responsible for the estuarine and marine unit involved in this consultation (50 CFR 226.214). The PCEs essential for the conservation of Gulf sturgeon are those habitat components that support feeding, resting and sheltering, reproduction, migration, and physical features necessary for maintaining the natural processes that support these habitat components. The PCEs relevant to estuarine and marine areas are:

(1) Abundant prey items within estuarine and marine habitats and substrates for juvenile, subadult, and adult life stages;
(2) Water quality, including temperature, salinity, pH, hardness, turbidity, oxygen content, and other chemical characteristics, necessary for normal behavior, growth, and viability of all life stages;
(3) Sediment quality, including texture and other chemical characteristics, necessary for normal behavior, growth, and viability of all life stages; and
(4) Safe and unobstructed migratory pathways necessary for passage within and between riverine, estuarine, and marine habitats (e.g., a river unobstructed by any permanent structure, or a dammed river that still allows for passage).

The Alabama Marine FIM Survey may affect PCE 1 by potentially removing Gulf sturgeon prey species (PCE 1). While the mesh sizes used during gill netting (2.0-6.0-in stretch mesh in 0.5-in increments) would allow all Gulf sturgeon prey species (i.e., lancelets, brachiopods, amphipods, polychaetes, gastropods, grass shrimp, isopods, oligochaetes, and chironomid and ceratopogonid larvae) to pass through without retention, the mesh sizes used during seining and trawling are slightly smaller (both 3/16-in knotless nylon webbing). These two gear components would allow the vast majority of Gulf sturgeon prey species to pass through without retention, but could prevent some prey species from passing through. As a result, we believe these effects from the survey components on PCE 1 will be so small as to be unmeasurable and, therefore, insignificant.

Because all 3 gear types (gill net, beach seine and otter/bottom trawl) have the potential to be hauled along the substrate, they could disturb benthic habitat in which Gulf sturgeon prey species live, and thus may affect PCE 1. However, any disturbance to the benthic habitat would be temporary and Gulf sturgeon prey communities are likely to recover quickly because the sediment composition pre- and post-sampling will be similar. Furthermore, prey abundance elsewhere in the critical habitat unit will not be affected by these localized sampling events and sampling locations will be available for foraging once sampling is completed. Additionally, because of the randomized sampling methodology of the Alabama Marine FIM Survey, repetitive sampling over the same area is unlikely. Therefore, we believe the temporary effects to the benthic habitat in the sampling areas are insignificant.

We believe that the Alabama Marine FIM Survey will have no effect on both the water quality (PCE 2) and the sediment quality (PCE 3) because the survey will not alter either the chemical characteristics of the water quality or sediment quality necessary for normal behavior, growth, and viability of all life stages of Gulf sturgeon in any way.

The Alabama Marine FIM Survey could obstruct migratory pathways (PCE 4) for Gulf sturgeon spawning if any of the gears were to block access to a spawning river or occur in openings to an estuary leading to a spawning river. During deployment of the gill net, beach seine, and otter/bottom trawl, a relatively small fraction of the total area of any migratory pathway may be obstructed temporarily for a relatively short time. Ample other migratory pathway areas will remain available for migration. Additionally, once gear is removed, the entire migratory pathway will immediately become unobstructed. As result, we believe the effect of the Alabama Marine FIM Survey to PCE 4 will be temporary and so small as to be unmeasurable and, therefore, insignificant.

Based on the foregoing, we believe potential adverse effects from the proposed action on Gulf sturgeon critical habitat (Unit 8 – Lake Ponchartrain/Mississippi Sound) are unlikely to occur.

4 STATUS OF ESA-LISTED SPECIES CONSIDERED FOR FURTHER ANALYSIS

4.1 Rangewide Status of Species Considered for Further Analysis

Section 4.1.1 addresses the general threats that confront all sea turtle species. Sections 4.1.2 – 4.1.4 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.

4.1.1 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 ESA-listed sea turtle species. The threats identified in this section are discussed in a general sense for all sea turtles. Threat information specific to a particular species are then discussed in the corresponding Status of the Species sections where appropriate.

Fisheries

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

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

Non-Fishery In-Water Activities

There are also many non-fishery impacts affecting the status of sea turtle species, both in the ocean and on land. In nearshore waters of the United States, the construction and maintenance of federal navigation channels has been identified as a source of sea turtle mortality. Hopper dredges, which are frequently used in ocean bar channels and sometimes in harbor channels and offshore borrow areas, move relatively rapidly and can entrain and kill sea turtles (NMFS 1997a). 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., DDT, PCBs, and PFCs), 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 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 lost, abandoned or discarded fishing gear) as they feed along oceanographic fronts where debris and their natural food items converge. Marine debris can cause significant habitat destruction from derelict vessels, further exacerbated by tropical storms moving debris and scouring and destroying corals and seagrass beds, for instance. Sea turtles that spend significant portions of their lives in the pelagic environment (i.e., juvenile loggerheads, and juvenile green turtles) are especially susceptible to threats from entanglement in marine debris when they return to coastal waters to breed and nest.

Climate Change

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

Climate change impacts on sea turtles currently cannot be predicted with any degree of certainty; however, significant impacts to the hatchling sex ratios of sea turtles may result (NMFS and USFWS 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 °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 1990a). 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, 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 2008b).

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

4.1.2 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 2**). The Mediterranean, Central West Pacific, and Central South Pacific DPSs were listed as endangered. The North Atlantic, South Atlantic, Southwest Indian, North Indian, East Indian-West Pacific, Southwest Pacific, Central North Pacific, and East Pacific DPSs were listed as threatened. For the purposes of this consultation, only the South Atlantic DPS and North Atlantic 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.

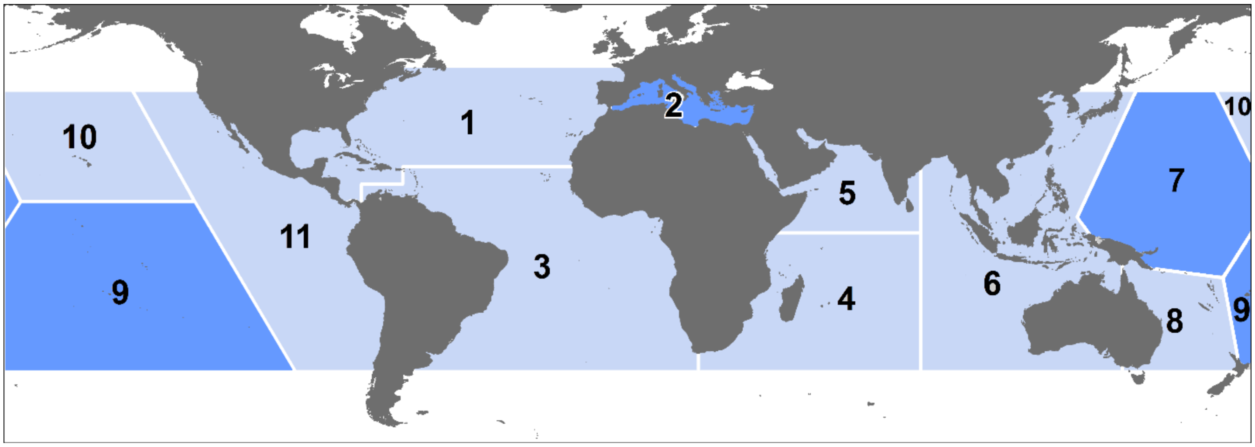

Figure 2. Threatened (light) and endangered (dark) green turtle DPSs: 1. North Atlantic, 2. Mediterranean, 3. South Atlantic, 4. Southwest Indian, 5. North Indian, 6. East Indian-West Pacific, 7. Central West Pacific, 8. Southwest Pacific, 9. Central South Pacific, 10. Central North Pacific, and 11.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

Species Description and Distribution

The green sea turtle is the largest of the hardshell marine turtles, growing to a weight of 350-lb (159-kg) with a 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 North Atlantic DPS), and Raine Island, on the Pacific coast of Australia along the Great Barrier Reef.

Differences in mitochondrial DNA properties of green sea turtles from different nesting regions indicate there are genetic subpopulations (Bowen et al. 1992; FitzSimmons et al. 2006). Despite the genetic differences, sea turtles from separate nesting origins are commonly found mixed together on foraging grounds throughout the species' range. Within U.S. waters individuals from both the North Atlantic and South Atlantic DPSs can be found on foraging grounds. While there are currently no in-depth studies available to determine the percent of North Atlantic and South Atlantic 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 South Atlantic DPS (specifically Suriname, Aves Island, Brazil, Ascension Island, and Guinea Bissau) (Foley et al. 2007). On the Atlantic coast of Florida, a study on the foraging grounds off Hutchinson Island found that approximately 5% of the turtles sampled came from the Aves Island/Suriname nesting assemblage, which is part of the South Atlantic DPS (Bass and Witzell 2000). 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 North Atlantic DPS, the U.S. Caribbean nesting assemblages are split between the North Atlantic and South Atlantic DPS. Nesters in Puerto Rico are part of the North Atlantic DPS, while those in the U.S. Virgin Islands are part of the South Atlantic 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 North Atlantic DPS boundary is illustrated in **Figure 2**. Four regions support nesting concentrations of particular interest in the North Atlantic DPS: Costa Rica (Tortuguero), Mexico (Campeche, Yucatan, and Quintana Roo), U.S. (Florida), and Cuba. By far the most important nesting concentration for green turtles in this DPS is Tortuguero, Costa Rica. Nesting also occurs in the Bahamas, Belize, Cayman Islands, Dominican Republic, Haiti, Honduras, Jamaica, Nicaragua, Panama, Puerto Rico, Turks and Caicos Islands, and North Carolina, South Carolina, Georgia, and Texas, U.S. In the eastern North Atlantic, nesting has been reported in Mauritania (Fretey 2001).

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

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

South Atlantic DPS Distribution

The South Atlantic DPS boundary is shown in **Figure 2**, and includes the U.S. Virgin Islands in the Caribbean. The South Atlantic 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 South Atlantic 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-in (5-cm) in length and weigh approximately 0.9-oz (25-g). Survivorship at any particular nesting site is greatly influenced by the level of man-made stressors, with the more pristine and less disturbed nesting sites (e.g., along the Great Barrier Reef in Australia) showing higher survivorship values than nesting sites known to be highly disturbed (e.g., Nicaragua) (Campell and Lagueux 2005; Chaloupka and Limpus 2005).

After emerging from the nest, hatchlings swim to offshore areas and go through a post-hatchling pelagic stage where they are believed to live for several years. During this life stage, green sea turtles feed close to the surface on a variety of marine algae and other life associated with drift lines and debris. This early oceanic phase remains one of the most poorly understood aspects of green sea turtle life history (NMFS and USFWS 2007). Green sea turtles exhibit particularly slow growth rates of about 0.4-2.0-in (1-5-cm) per year (Green 1993), which may be attributed to their largely herbivorous, low-net energy diet (Bjorndal 1982). At approximately 8-10-in (20-25-cm) carapace length, juveniles leave the pelagic environment and enter nearshore developmental habitats such as protected lagoons and open coastal areas rich in sea grass and marine algae. Growth studies using skeletochronology indicate that green sea turtles in the western Atlantic shift from the oceanic phase to nearshore developmental habitats after approximately 5-6 years (Bresette et al. 2006; Zug and Glor 1998). Within the developmental habitats, juveniles begin the switch to a more herbivorous diet, and by adulthood feed almost exclusively on seagrasses and algae (Rebel 1974), although some populations are known to also feed heavily on invertebrates (Carballo et al. 2002). Green sea turtles mature slowly, requiring 20-50 years to reach sexual maturity (Chaloupka and Musick 1997; Hirth 1997).

While in coastal habitats, green sea turtles exhibit site fidelity to specific foraging and nesting grounds, and it is clear they are capable of “homing in” on these sites if displaced (McMichael et al. 2003). Reproductive migrations of Florida green sea turtles have been identified through flipper tagging and/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). Modeling by Chaloupka et al. (2008) using data sets of 25 years or more resulted in an estimate of the Florida nesting stock at the Archie Carr National Wildlife Refuge growing at an annual rate of 13.9% at that time. Increases have been even more rapid in recent years. In Florida, index beaches were established to standardize data collection methods and effort on key nesting beaches. Since establishment of the index beaches in 1989, the pattern of green sea turtle nesting has generally shown biennial peaks in abundance with a positive trend during the 10 years of regular monitoring (**Figure 3**). According to data collected from Florida's index nesting beach survey from 1989-2021, green sea turtle nest counts across Florida have increased dramatically, from a low of 267 in the early 1990s to a high of 40,911 in 2019. Two consecutive years of nesting declines in 2008 and 2009 caused some concern, but this was followed by increases in 2010 and 2011. The pattern departed from the low lows and high peaks in 2020 and 2021 as well, when 2020 nesting only dropped by half from the 2019 high, while 2021 nesting only increased by a small amount over the 2020 nesting (**Figure 3**).

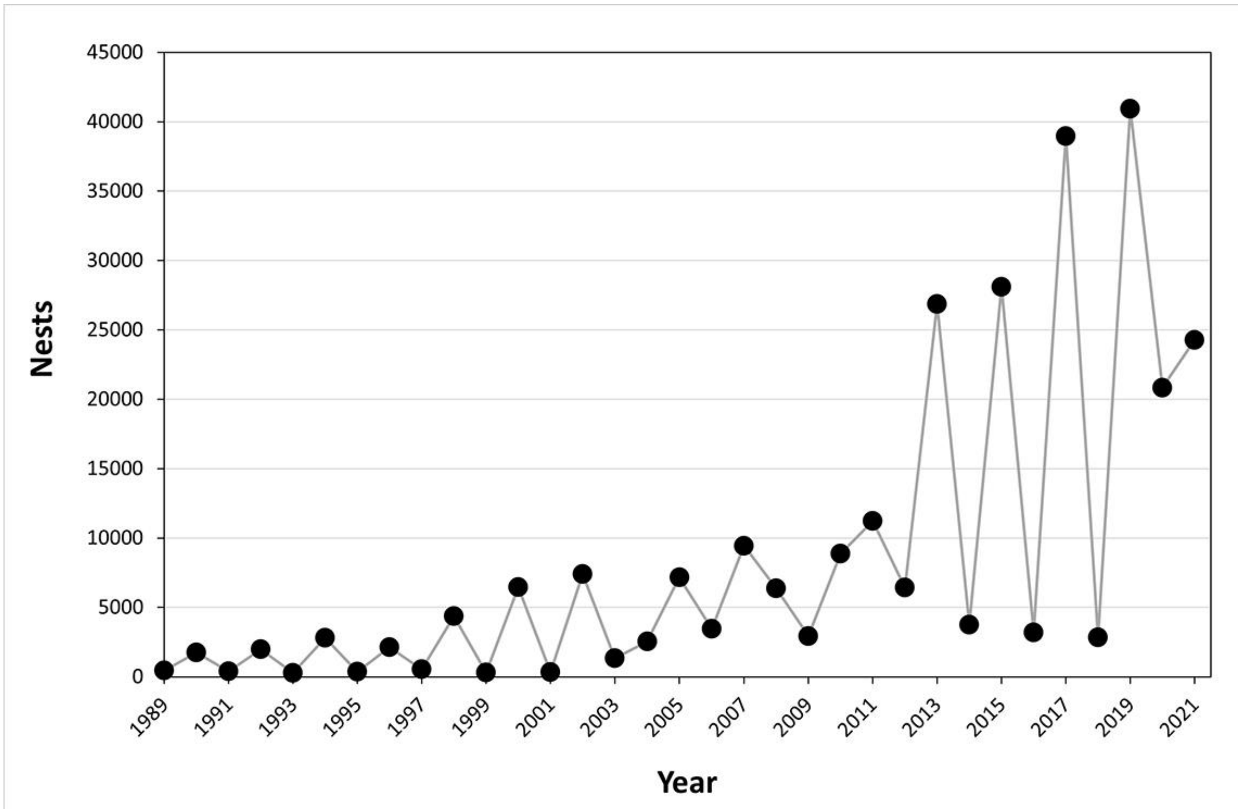

Figure 3. Green sea turtle nesting at Florida index beaches since 1989

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

South Atlantic DPS

The South Atlantic 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 South Atlantic 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 South Atlantic 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 4.1.1.

In addition to general threats, green sea turtles are susceptible to natural mortality from FP. 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-in (30-cm) in diameter and may affect swimming, vision, feeding, and organ function (Aguirre et al. 2002; Herbst 1994; Jacobson et al. 1989). Presently, scientists are unsure of the exact mechanism causing this disease, though it is believed to be related to both an infectious agent, such as a virus (Herbst et al. 1995), and environmental conditions (e.g., habitat degradation, pollution, low wave energy, and shallow water (Foley et al. 2005). FP is cosmopolitan, but it has been found to affect large numbers of animals in specific areas, including Hawaii and Florida (Herbst 1994; Jacobson 1990; Jacobson et al. 1991).

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

Whereas oil spill impacts are discussed generally for all species in Section 4.1.1, 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 DWH oil spill of 2010, the relative proportion of the population that is expected to have been exposed to and directly impacted by the DWH event, as well as the impacts being primarily to smaller juveniles (lower reproductive value than adults and large juveniles), reduces the impact to the overall population. It is unclear what impact these losses may have caused on a population level, but it is not expected to have had a large impact on the population trajectory moving forward. However, recovery of green turtle numbers equivalent to what was lost in the northern Gulf of Mexico as a result of the spill will likely take decades of sustained efforts to reduce the existing threats and enhance survivorship of multiple life stages (DWH Trustees 2015).

4.1.3 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) SCL, 1.26-1.73-in (32-44-mm) in width, and 0.3-0.4-lb (15-20-g) in weight. Their return to nearshore coastal habitats typically occurs around 2 years of age (Ogren 1989), although the time spent in the oceanic zone may vary from 1-4 years or perhaps more (TEWG 2000). Juvenile Kemp's ridley sea turtles use these nearshore coastal habitats from April through November, but they move towards more suitable overwintering habitat in deeper offshore waters (or more southern waters along the Atlantic coast) as water temperature drops.

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

Population Dynamics

Of the 7 species of sea turtles in the world, the Kemp's ridley has declined to the lowest population level. Most of the population of adult females nest on the beaches of Rancho Nuevo, Mexico (Pritchard 1969). When nesting aggregations at Rancho Nuevo were discovered in 1947, adult female populations were estimated to be in excess of 40,000 individuals (Hildebrand 1963). By the mid-1980s, however, nesting numbers from Rancho Nuevo and adjacent Mexican beaches were below 1,000, with a low of 702 nests in 1985. Yet, nesting steadily increased through the 1990s, and then accelerated during the first decade of the twenty-first century (**Figure 4**), which 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 Zoo data, 2019). Nesting numbers rebounded in 2020 (18,068 nests) and 2021 (17,671 nests) (CONAMP data, 2021). 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 U.S., 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, the record nesting in 2017, and then a drop back down to 190 nests in 2019, rebounding to 262 nests in 2020, and back to 195 nests in 2021 (National Park Service data).

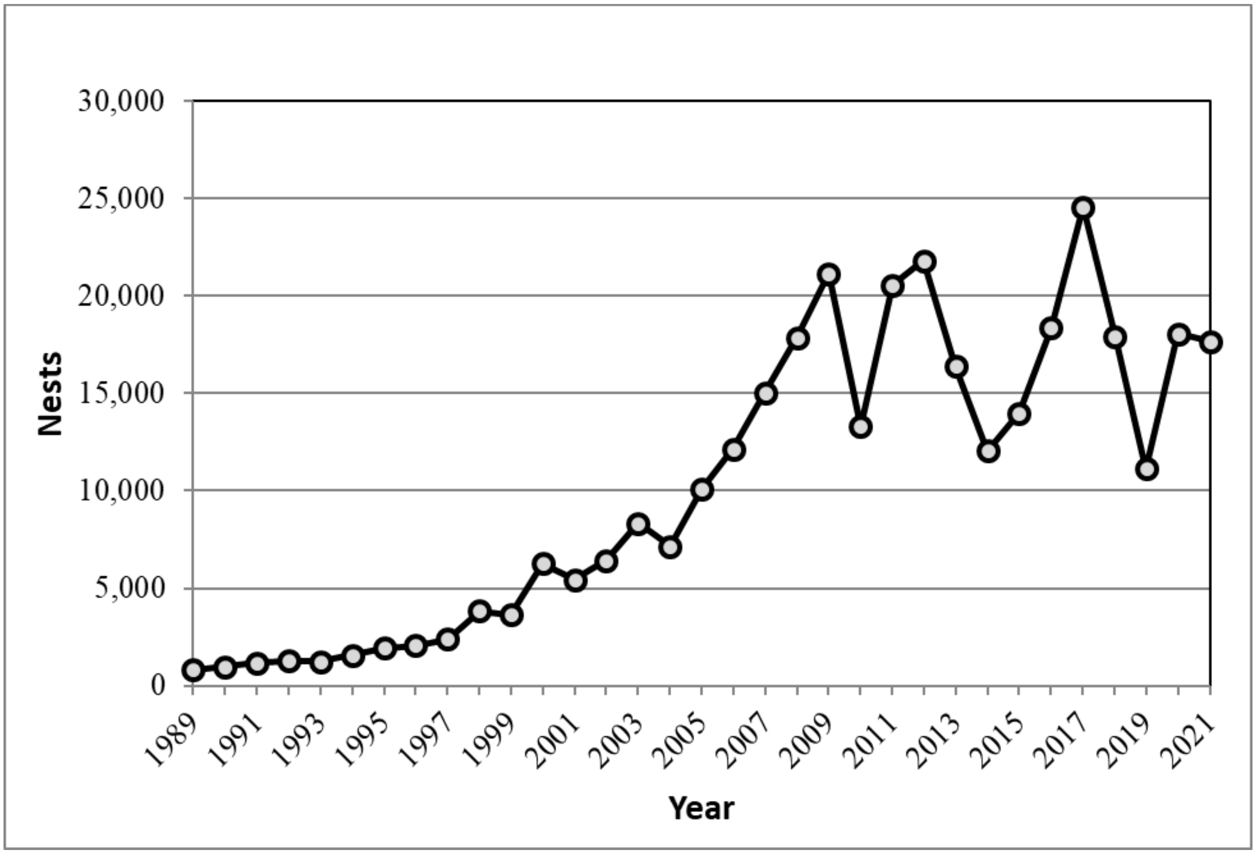

Figure 4. Kemp's ridley nest totals from Mexican beaches (Gladys Porter Zoo nesting database 2019 and CONAMP data 2020, 2021)

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 the ongoing recovery trajectory is unclear.

Threats

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

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

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

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

In response to these strandings, and due to speculation that fishery interactions may be the cause, fishery observer effort was shifted to evaluate the inshore skimmer trawl fisheries beginning in 2012. During May-July of that year, observers reported 24 sea turtle interactions in the skimmer trawl fisheries. All but a single sea turtle were identified as Kemp's 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) 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-in bar spacing for all vessels using skimmer trawls, pusher-head trawls, or wing nets. Ultimately, we published a final rule on December 20, 2019 (84 FR 70048), that requires all skimmer trawl vessels 40 feet and greater in length to use TEDs designed to exclude small sea turtles in their nets effective April 1, 2021. Given the nesting trends and habitat utilization of Kemp's ridley sea turtles, it is likely that fishery interactions in the Northern Gulf of Mexico may continue to be an issue of concern for the species, and one that may potentially slow the rate of recovery for Kemp's ridley sea turtles.

While oil spill impacts are discussed generally for all species in Section 4.1.1, 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.

4.1.4 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 that designated 9 DPSs for loggerhead sea turtles (76 FR 58868, September 22, 2011, and effective October 24, 2011). This rule listed the following DPSs: (1) Northwest Atlantic Ocean (threatened), (2) Northeast Atlantic Ocean (endangered), (3) South Atlantic Ocean (threatened), (4) Mediterranean Sea (endangered), (5) North Pacific Ocean (endangered), (6) South Pacific Ocean (endangered), (7) North Indian Ocean (endangered), (8) Southeast Indo-Pacific Ocean (endangered), and (9) Southwest Indian Ocean (threatened). The Northwest Atlantic DPS is the only one that occurs within the action area, and therefore it is the only one considered in this Opinion.

Species Description and Distribution

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

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

The majority of loggerhead nesting occurs at the western rims of the Atlantic and Indian Oceans concentrated in the north and south temperate zones and subtropics (NRC 1990). For the Northwest Atlantic DPS, most nesting occurs along the coast of the United States, from southern

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

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

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

The recovery plan for the Northwest Atlantic population of loggerhead sea turtles concluded that there is no genetic distinction between loggerheads nesting on adjacent beaches along the Florida Peninsula. It also concluded that specific boundaries for subpopulations could not be designated based on genetic differences alone. Thus, the recovery plan uses a combination of geographic distribution of nesting densities, geographic separation, and geopolitical boundaries, in addition to genetic differences, to identify recovery units. The recovery units are as follows: (1) the NRU (Florida/Georgia border north through southern Virginia), (2) the PFRU (Florida/Georgia border through Pinellas County, Florida), (3) the DTRU (islands located west of Key West, Florida), (4) the NGMRU (Franklin County, Florida, through Texas), and (5) the GCRU (Mexico through French Guiana, the Bahamas, Lesser Antilles, and Greater Antilles) (NMFS and USFWS 2008). The recovery plan concluded that all recovery units are essential to the recovery of the species. Although the recovery plan was written prior to the listing of the 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, referring to the nearshore marine environment from the surface to the sea floor where water depths do not exceed 200 meters.), (4) juvenile stage (oceanic zone), (5) juvenile stage (neritic zone), (6) adult stage (oceanic zone), (7) adult stage (neritic zone), and (8) nesting female (terrestrial zone) (NMFS and USFWS 2008). Loggerheads are long-lived animals. They reach sexual maturity between 20-38 years of age, although age of maturity varies widely among populations (Frazer and Ehrhart 1985; NMFS 2001). The annual mating season occurs from late March to early June, and female turtles lay eggs throughout the summer months. Females deposit an average of 4.1 nests within a nesting season (Murphy and Hopkins 1984), but an individual female only nests every 3.7 years on average (Tucker 2010). Each nest contains an average of 100-126 eggs (Dodd Jr. 1988) which incubate for 42-75 days before hatching (NMFS and USFWS 2008). Loggerhead hatchlings are 1.5-2 inches long and weigh about 0.7 oz (20 g).

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

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

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

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

Status and Population Dynamics

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

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

Peninsular Florida Recovery Unit

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

In addition to the total nest count estimates, the FWRI uses an index nesting beach survey method. The index survey uses standardized data-collection criteria to measure seasonal nesting and allow accurate comparisons between beaches and between years. FWRI uses the standardized index survey data to analyze the nesting trends (**Figure 5**) (https://myfwc.com/research/wildlife/sea-turtles/nesting/beach-survey-totals/). Since the beginning of the index program in 1989, 3 distinct trends were identified. From 1989-1998, there was a 24% increase that was followed by a sharp decline over the subsequent 9 years. A large increase in loggerhead nesting has occurred since, as indicated by the 71% increase in nesting over the 10-year period from 2007 and 2016. Nesting in 2016 also represented a new record for loggerheads on the core index beaches. While nest numbers subsequently declined from the 2016 high FWRI noted that the 2007-2021 period represents a period of increase. FWRI examined the trend from the 1998 nesting high through 2016 and found that the decade-long post-1998 decline was replaced with a slight but non-significant increasing trend. Looking at the data from 1989 through 2016, FWRI concluded that there was an overall positive change in the nest counts although it was not statistically significant due to the wide variability between 2012-2016 resulting in widening confidence intervals. Nesting at the core index beaches declined in 2017 to 48,033, and rose again each year through 2020, reaching 53,443 nests before dipping back to 49,100 in 2021. 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 or https://esajournals.onlinelibrary.wiley.com/doi/pdf/10.1002/ecs2.2936).

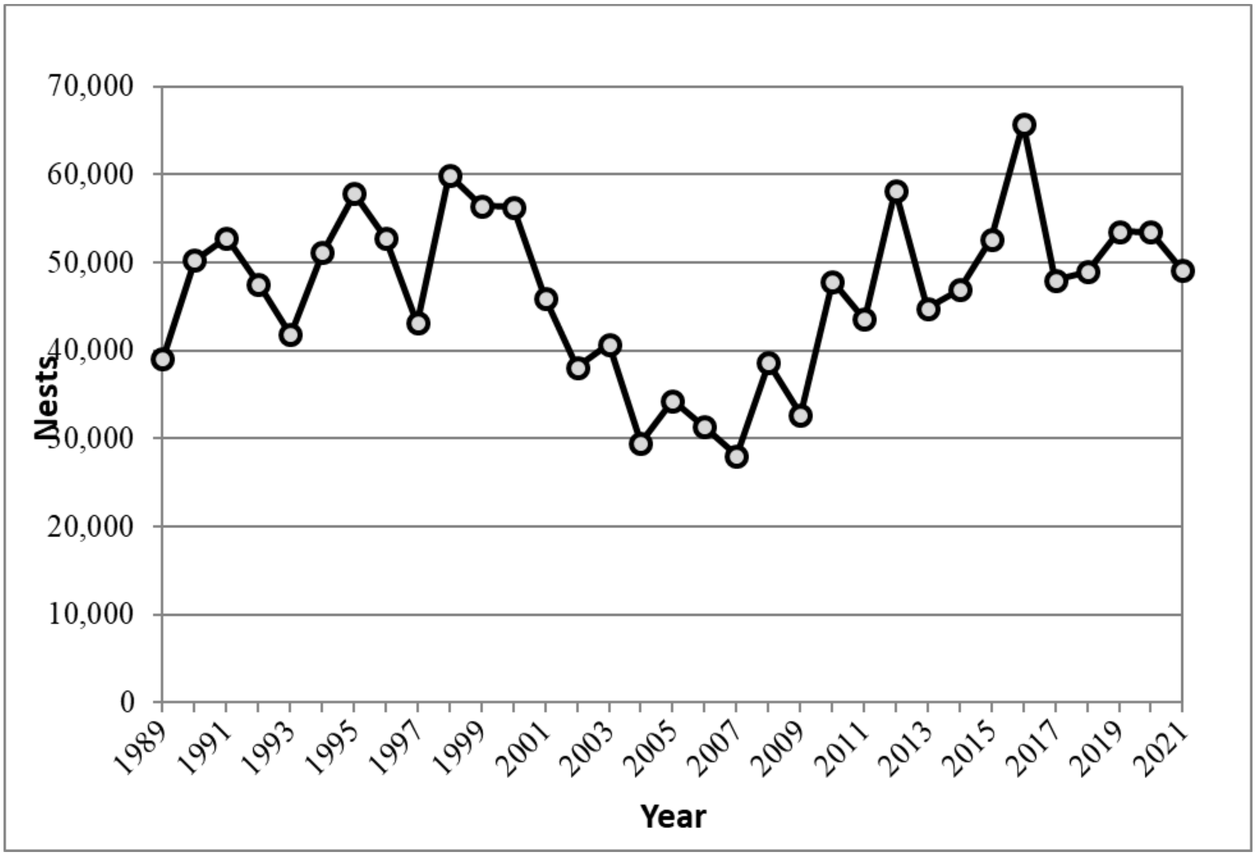

Figure 5. Loggerhead sea turtle nesting at Florida index beaches since 1989

Northern Recovery Unit

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

Data since that analysis (**Table 7**) are showing improved nesting numbers and a departure from the declining trend. Georgia nesting has rebounded to show the first statistically significant increasing trend since comprehensive nesting surveys began in 1989 (Mark Dodd, GADNR press release, https://georgiawildlife.com/loggerhead-nest-season-begins-where-monitoring-began). South Carolina and North Carolina nesting have also begun to shift away from the past declining trend. Loggerhead nesting in Georgia, South Carolina, and North Carolina all broke records in 2015 and then topped those records again in 2016. Nesting in 2017 and 2018 declined relative to 2016, back to levels seen in 2013 to 2015, but then bounced back in 2019, breaking records for each of the three states and the overall recovery unit. Nesting in 2020 and 2021 declined from the 2019 records, but still remained high, representing the third and fourth highest total numbers for the NRU since 2008.

Table 7. Total Number of NRU Loggerhead Nests (GADNR, SCDNR, and NCWRC nesting datasets compiled at Seaturtle.org)

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

South Carolina also conducts an index beach nesting survey similar to the one described for Florida. Although the survey only includes a subset of nesting, the standardized effort and locations allow for a better representation of the nesting trend over time. Increases in nesting were seen for the period from 2009-2013, with a subsequent steep drop in 2014. Nesting then rebounded in 2015 and 2016, setting new highs each of those years. Nesting in 2017 dropped back down from the 2016 high, but was still the second highest on record. After another drop in 2018, a new record was set for the 2019 season, with a return to 2016 levels in 2020 and 2021 (**Figure 6**).

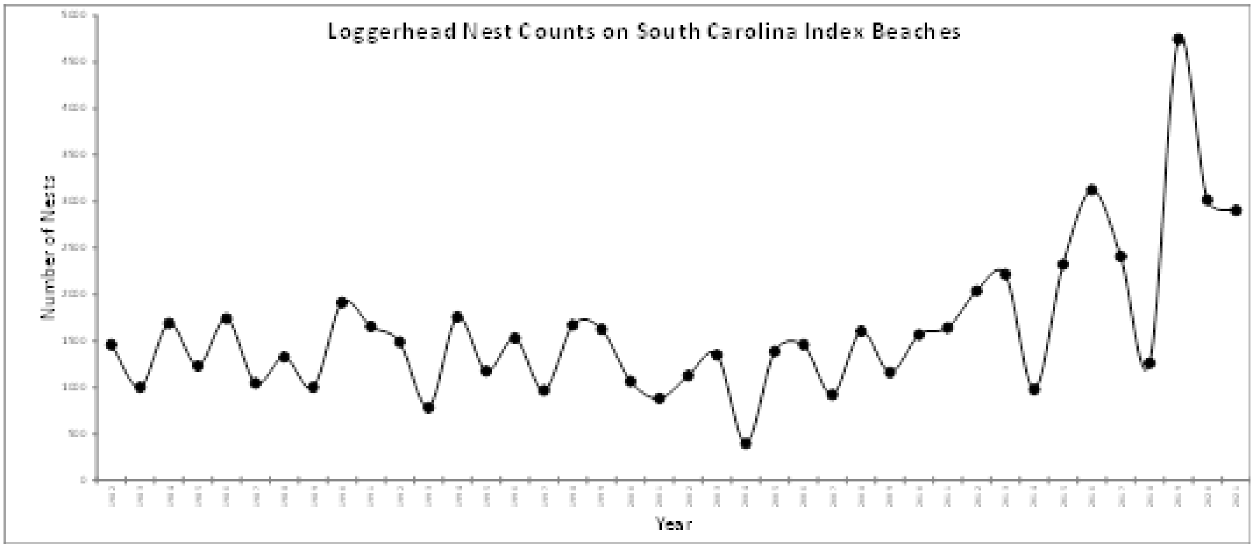

Figure 6. South Carolina index nesting beach counts for loggerhead sea turtles (from the SCDNR website: https://www.dnr.sc.gov/seaturtle/ibs.htm)

Other Northwest Atlantic DPS Recovery Units

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

In-water Trends

Nesting data are the best current indicator of sea turtle population trends, but in-water data also provide some insight. In-water research suggests the abundance of neritic juvenile loggerheads is steady or increasing. Although Ehrhart et al. (2007) found no significant regression-line trend in a long-term dataset, researchers have observed notable increases in 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

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

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

While oil spill impacts are discussed generally for all species in Section 4.1.1, specific impacts of the DWH oil spill event on loggerhead sea turtles are considered here. Impacts to loggerhead sea turtles occurred to offshore small juveniles as well as large juveniles and adults. A total of 30,800 small juvenile loggerheads (7.3% of the total small juvenile sea turtle exposures to oil from the spill) were estimated to have been exposed to oil. Of those exposed, 10,700 small juveniles are estimated to have died as a result of the exposure. In contrast to small juveniles, loggerheads represented a large proportion of the adults and large juveniles exposed to and killed by the oil. There were 30,000 exposures (almost 52% of all exposures for those age/size classes) and 3,600 estimated mortalities. A total of 265 nests (27,618 eggs) were also translocated during response efforts, with 14,216 hatchlings released, the fate of which is unknown (DWH Trustees 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 NWA DPS occurs on the Atlantic coast and, thus, loggerheads were impacted to a relatively lesser degree. However, it is likely that impacts to the NGMRU of the Northwest Atlantic DPS would be proportionally much greater than the impacts occurring to other recovery units. Impacts to nesting and oiling effects on a large proportion of the NGMRU recovery unit, especially mating and nesting adults likely had an impact on the NGMRU. Based on the response injury evaluations for Florida Panhandle and Alabama nesting beaches (which fall under the NFMRU), the DWH Trustees (2016) estimated that approximately 20,000 loggerhead hatchlings were lost due to DWH oil spill response activities on nesting beaches. Although the long-term effects remain unknown, the DWH oil spill event impacts to the Northern Gulf of Mexico Recovery Unit may result in some nesting declines in the future due to a large reduction of oceanic age classes during the DWH oil spill event. Although adverse impacts occurred to loggerheads, the proportion of the population that is expected to have been exposed to and directly impacted by the DWH oil spill event is relatively low. Thus, we do not believe a population-level impact occurred due to the widespread distribution and nesting location outside of the Gulf of Mexico for this species.

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

5 ENVIRONMENTAL BASELINE

5.1 Overview

This section describes the effects of past and ongoing human and natural factors leading to the current status of the species, their habitats (including designated critical habitat), and the ecosystem within the action area. In the case of ongoing actions, this section includes the effects that may contribute to the projected future status of the species, their habitats, and ecosystem. The environmental baseline describes the species' and critical habitat's health based on information available at the time of the consultation.

By regulation, the environmental baseline for an Opinion includes the past and present impacts of all proposed 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.

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

5.2 Status of ESA-listed Species Considered for Further Analysis

5.2.1 Green Sea Turtle – North Atlantic and South Atlantic DPSs

With the exception of post-hatchlings, green sea turtles live in nearshore tropical and subtropical waters where they feed on marine algae and seagrasses. The action area contains shallow protected waters where green sea turtles could be transient during the day. NMFS believes that no individual green 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 green sea turtles in the action area are considered to be the same as those discussed in Sections 4.1.2.

5.2.2 Kemp's Ridley Sea Turtle

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

NMFS believes that no individual Kemp's ridley 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 Kemp's ridley sea turtles in the action area are considered to be the same as those discussed in Sections 4.1.3.

5.2.3 Loggerhead Sea Turtle – Northwest Atlantic DPS

Adult loggerhead sea turtles may be found miles out to sea and in inshore areas such as bays, lagoons, salt marshes, creeks, ship channels and mouths of large rivers. Juveniles are omnivorous and forage on crabs, mollusks, jellyfish, and vegetation at or near the surface. The project site includes estuarine waters where adult and juvenile loggerhead sea turtles may be present. NMFS believes that no individual loggerhead 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 loggerhead sea turtles in the action area are considered to be the same as those discussed in Sections 4.1.4.

5.3 Factors Affecting ESA-listed Species Considered for Further Analysis

5.3.1 Federal Actions

ESA Section 10 Permits

Green sea turtle (North Atlantic DPS and South Atlantic DPS), Kemp's ridley sea turtle, and loggerhead sea turtle (Northwest Atlantic DPS) 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 of listed species. Prior to issuance of these authorizations, the proposal must be reviewed for compliance with Section 7 of the ESA.

Per a search of the NMFS APPS database (https://apps.nmfs.noaa.gov/) by the consulting biologist on August 19, 2022, there were 6 active Section 10(a)(1)(A) scientific research permits applicable to green, Kemp's ridley, or loggerhead sea turtles within the state of Alabama. These permits allow the capture, handling, sampling, and release of these turtle species (all life stages except hatchlings) and range in purpose from reducing bycatch in commercial fisheries to gaining better scientific knowledge.

Other Actions

Status reviews of the green sea turtle were completed on August 31, 2007, and March 30, 2015. Each review determined that no delisting or reclassification of a species status (i.e., threatened or endangered) was warranted at the time.

A draft bi-national recovery plan for Kemp's ridley sea turtle was published on March 6, 2010 (75 FR 12496). A 5-year review was completed in July 2015 and it determined that no delisting or reclassification of a species status (i.e., threatened or endangered) was warranted at the time.

A revised recovery plan for the loggerhead sea turtle was completed December 8, 2008 (NMFS and USFWS 2008a). Status reviews of the loggerhead sea turtle were completed on August 11, 2009, and August 31, 2007. Each review determined that no delisting or reclassification of a species status (i.e., threatened or endangered) was warranted at the time.

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 at 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 sea turtle takes, and to determine whether additional measures to address prohibited sea turtle 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.

On December 20, 2019, NMFS issued a final rule (84 FR 70048) that requires all skimmer trawl vessels 40 ft and greater in length to use TEDs designed to exclude small sea turtles in their nets effective April 1, 2021. See Section 4.2.6 for more detail.

Vessel Activity and Operations

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

Dredging

NMFS completed a programmatic Opinion, the GRBO, on the impacts of USACE's Gulf of Mexico hopper-dredging operations in 2003 for maintenance dredging in the USACE's South Atlantic Division (NMFS 1997b). The GRBO determined hopper dredging in the Gulf of Mexico would adversely affect 4 sea turtle species (i.e., green, hawksbill, Kemp's ridley, and loggerhead), but it would not jeopardize their continued existence.

In-Water Activities

We have consulted on several in-water projects in the coastal waters of Alabama that comprise the action area, as per a review of our Protected Resources Division's completed consultation database by the consulting biologist on February 22, 2022. While some of those projects were determined likely to adversely affect green sea turtle (North Atlantic DPS and South Atlantic

DPS), Kemp's ridley sea turtle, and loggerhead sea turtle (Northwest Atlantic DPS), none of those projects were determined likely to jeopardize the continued existence any of any of these species.

5.3.2 State or Private Actions

Maritime Industry

Private and commercial vessels, including fishing vessels, operating in the action area have the potential to interact with green sea turtle (North Atlantic DPS and South Atlantic DPS), Kemp's ridley sea turtle, and loggerhead sea turtle (Northwest Atlantic DPS). The effects of fishing vessels, recreational vessels, or other types of commercial vessels on these species may involve disturbance, injury or mortality due to collisions or entanglement in anchor lines. Commercial traffic and recreational pursuits can also adversely affect sea turtles through propeller and boat strikes. The STSSN includes many records of vessel interaction with sea turtles where there are high levels of vessel traffic. The extent of the problem is difficult to assess because we cannot know whether the majority of sea turtles are struck pre- or post-mortem. It is important to note that minor vessel collisions may not kill an animal directly, but may weaken or otherwise affect it so it is more likely to become vulnerable to effects such as entanglements or predation. NMFS and the USCG have completed several formal consultations on individual marine events that may affect sea turtles.

Coastal Development

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

State Fisheries

Recreational fishing as regulated by the State of Alabama can affect protected species 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. Hooked sea turtles have been reported by the public fishing from boats, piers, and beach, banks, and jetties and from commercial anglers fishing for reef fish and for sharks with both single rigs and bottom longlines (NMFS 2001). Additionally, lost fishing gear such as line cut after snagging on rocks, or discarded hooks and line, can also pose an entanglement threat to sea turtles in the area. A detailed summary of the known impacts of hook-and-line incidental captures to Kemp's ridley and loggerhead sea turtles can be found in the TEWG reports (1998; 2000).

Recreational fishing piers occur within the action area. We have consulted on the construction and rebuilding of some of these piers and issued Opinion(s) for effects to green sea turtle (North Atlantic DPS and South Atlantic DPS), Kemp's ridley sea turtle, and loggerhead sea turtle (Northwest Atlantic DPS) due to incidental recreational hook-and-line capture. Each Opinion determined the take of ESA-listed sea turtles from recreational fishing would adversely these species, but would not likely jeopardize their continued existence.

5.3.3 Marine Debris and Acoustic Impacts

A number of activities that may affect green sea turtle (North Atlantic DPS and South Atlantic DPS), Kemp's ridley sea turtle, and loggerhead sea turtle (Northwest Atlantic DPS) in the action area include anthropogenic marine debris and acoustic effects. The effects from these activities are difficult to measure. Marine debris is defined as any persistent solid material that is manufactured or processed and directly or indirectly, intentionally or unintentionally, disposed of or abandoned into the marine environment or the Great Lakes. NOAA is authorized by Congress to work on marine debris through the Marine Debris Act (2006). The Act requires the program to "identify, determine sources of, assess, prevent, reduce, and remove marine debris and address the adverse impacts of marine debris on the economy of the United States, marine environment, and navigation safety." NOAA's Marine Debris Program has regional coordinators (e.g., Gulf of Mexico Coordinator) actively working with local partners, researchers, and non-government organizations to prevent, remove and research the impacts and sources of marine debris. Where possible, conservation actions are being implemented to monitor or study the effects to sea turtles from these sources.

5.3.4 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 green sea turtle (North Atlantic DPS and South Atlantic DPS), Kemp's ridley sea turtle, and loggerhead sea turtle (Northwest Atlantic DPS)(Colburn et al. 1996). Nutrient loading from land-based sources such as coastal community discharges is known to stimulate plankton blooms in closed or semi-closed estuarine systems (Bowen and Valiela 2001; Rabalais et al. 2002). The effects on larger embayments are unknown. Although pathological effects of oil spills have been documented in laboratory studies of marine mammals and sea turtles (Vargo et al. 1986), the impacts of many other anthropogenic toxins have not been investigated. The development of marinas and docks in inshore waters can negatively impact nearshore habitats. An increase in the number of docks built increases boat and vessel traffic, which adds more pollutants into the water. 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, green sea turtle (North Atlantic DPS and South Atlantic DPS), Kemp's ridley sea turtle, and loggerhead sea turtle (Northwest Atlantic DPS) travel between near shore and offshore habitats and may be exposed to and accumulate these contaminants during their life cycles within the action area.

5.3.5 Stochastic Events

Stochastic (i.e., random) events, such as hurricanes, occur in Alabama and can affect ESA-listed species within the action area. These events are unpredictable and their effect on the recovery of green sea turtle (North Atlantic DPS and South Atlantic DPS), Kemp's ridley sea turtle, and loggerhead sea turtle (Northwest Atlantic DPS) is unknown; yet, they have the potential to directly impede recovery if animals die as a result or indirectly if important habitats are damaged. Other stochastic events, such as a cold snap, can also injure or kill these species.

5.3.6 Conservation and Recovery Actions

NMFS has implemented a number of regulations aimed at reducing potential for incidental mortality of sea turtles from commercial fisheries in the action area. These include TED requirements for the southeastern shrimp fisheries. Green sea turtle (North Atlantic DPS and South Atlantic DPS), Kemp's ridley sea turtle, and loggerhead sea turtle (Northwest Atlantic DPS) benefit from the use TEDs. TEDs and bycatch reduction device requirements may reduce sea turtle bycatch in Southeast trawl fisheries (ASSRT 2007). NMFS has required the use of TEDs in Southeast U.S. shrimp trawls since 1989 and in summer flounder trawls in the mid-Atlantic area (south of Cape Charles, Virginia) since 1992 to reduce the potential for incidental mortality of sea turtles in commercial trawl fisheries. These regulations have been refined over the years to ensure that TED effectiveness is maximized through more widespread use, and proper placement, installation, floatation, and configuration (e.g., width of bar spacing). 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.

6 EFFECTS OF THE ACTION ON THE SPECIES

6.1 Overview

Effects of the action refers to the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated or interdependent with that action, that will be added to the environmental baseline. Indirect effects are those that are caused by the proposed action and are later in time, but still are reasonably certain to occur. Interrelated actions are those that are part of a larger action and depend on the larger action for their justification. Interdependent actions are those that have no independent utility apart from the action under consideration (50 CFR 402.02).

As stated above, we believe the Alabama Marine FIM Survey may adversely affect green sea turtle (North Atlantic DPS and South Atlantic DPS), Kemp's ridley sea turtle, and loggerhead sea turtle (Northwest Atlantic DPS).

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

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

Temporary Habitat Avoidance Effects

The action area occurs near known nesting areas for green sea turtle (North Atlantic DPS and South Atlantic DPS), Kemp's ridley sea turtle, and loggerhead sea turtle (Northwest Atlantic DPS) in Alabama. Juveniles of these species are known to use the interior waters of Alabama bays and inlets for developmental and foraging habitat. During deployment of survey gear, a relatively small fraction of the total area of available habitat may be unavailable for a relatively short amount of time, though no gear type is large enough to completely obstruct use of any the sampling sites. Furthermore, these species may be affected by their temporary inability to access the in-water or nearshore portion of the sampling sites due to their avoidance of survey activities and related noise. Because of the availability of other suitable habitat in the area and temporary nature of the survey activities and related noise, we anticipate any habitat avoidance effects to these species will be so small as to be unmeasurable and, therefore, insignificant. Thus, we believe any adverse effects associated with the loss of habitat are extremely unlikely to occur.

Vessel Interactions

Vessel strikes can cause injury to sea turtles via concussive impact. Depending on the type of vessel, the running gear (including the propeller and skeg of an outboard motor) may also cause cutting/slashing injuries. Green sea turtles (North Atlantic DPS and South Atlantic DPS), Kemp's ridley sea turtles, and loggerhead sea turtles (Northwest Atlantic DPS) near the surface of the water may be struck by research vessels used in the Alabama Marine FIM Survey. However, we believe that it is extremely unlikely that Alabama Marine FIM Survey-related vessels will strike these species of sea turtles. First, there has never been a documented interaction, including vessel strike, between any of these ESA-listed sea turtle species and an Alabama Marine FIM Survey research vessel. Next, while actively sampling, vessels move very slowly (i.e., up to 2.5 kt) or remain idle. Vessels transiting to and from port or between survey stations could travel at greater speeds. However, the biologists (i.e., at least captain and a designated lookout) watch for objects in the path of the vessel at all times. If a sea turtle is seen, the vessel's course can be immediately altered or speed reduced (or both) to avoid incidental collisions. Because the Alabama Marine FIM Survey effectively has 100% observer coverage and because there has never been a documented vessel strike of these species during the 40+ years of the survey, it is likely that none has occurred and that any vessel strike of these species is unlikely to occur in the future.

Capture by 50-ft Beach Seine

Green sea turtles (North Atlantic DPS and South Atlantic DPS), Kemp's ridley sea turtles, and loggerhead sea turtles (Northwest Atlantic DPS) may be caught in the 50-ft beach seine. However, we believe that it is extremely unlikely that the 50-ft beach seine will capture these sea turtle species. The 50-ft beach seine has been used in the Alabama Marine FIM Survey since 1981. There has never been a documented interaction between any of these ESA-listed sea turtle species and the seine component of the Alabama Marine FIM Survey since that time. Because the Alabama Marine FIM Survey effectively has 100% observer coverage and there has never been a documented capture of these species using this gear type during the 40+ years of the survey, it is likely that none has occurred and that any capture of these species using this gear type is unlikely to occur in the future.

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

Capture by Gill Net

Adverse Effects to Sea Turtles from Gill Nets

Gill nets can cause entanglement. Sea turtles are particularly prone to entanglement because of their body configuration and behavior. Sea turtles can be wedged (i.e., held by a mesh or meshes around the body) or become entangled when their mouth, maxillae, scutes, snout, or other projections become entangled in netting. Entanglement may lead to struggling that subsequently wraps the sea turtle in additional webbing. Sea turtles released alive from gill net gear may later succumb to injuries sustained at the time of capture or from netting otherwise still attached when they are released. Of the sea turtles entangled in gill nets that do not die from their wounds, some may suffer impaired swimming or foraging abilities, altered migratory behavior, and altered breeding or reproductive patterns. Numerous factors affect the survival rate of entangled sea turtles: activity level and condition of the sea turtle (i.e., disease and hormonal status); and how much netting, if any, was attached to the sea turtle at release.

Gill nets can also cause forced submergence. Generally, when sea turtles are underwater, their bodies create energy for their cells in a process that uses oxygen from their lungs. Sea turtles that are stressed from being forcibly submerged due to capture in a gill net eventually use up all their oxygen stores. Since they must continue to create energy with or without oxygen, when their oxygen stores are used up, they begin to create energy via a process that does not require oxygen (i.e., anaerobic glycolysis). However, this process can significantly increase the level of a certain type of lactic acid in a sea turtle's blood (Lutcavage and Lutz 1997); if the level gets too high it can cause death. Numerous factors affect the survival rate of forcibly submerged sea turtles: the size (larger sea turtles can dive for longer), activity level and condition of the sea turtle (i.e., disease and hormonal status); the ambient water temperature (anaerobic glycolysis may begin sooner during the warmer months); gill net soak time, and the number of times forced submergences have recently occurred to the animal.

Historic Captures by Gill Net

Loggerhead sea turtles (Northwest Atlantic DPS) may be caught in the gill nets. However, we believe that it is extremely unlikely that the gill nets will capture this species. ADCNR/MRD began fishery-independent gill net sampling in 2000. There has never been a documented interaction between loggerhead sea turtle and the gill net component of the Alabama Marine FIM Survey since that time. Because the Alabama Marine FIM Survey effectively has 100% observer coverage and because there has never been a documented capture of this species using this gear type, it is likely that none has occurred that any capture of this species using this gear type is unlikely to occur in the future.

The trawl component of the Alabama Marine FIM Survey was standardized to 120 sets annually per net type (i.e., a total of 240 gill net sets per year) in 2008. Since 2008, 4 green sea turtles and 1 Kemp's ridley sea turtle have been captured during Alabama Marine FIM Survey gill net operations. No other captures of any species of sea turtle have occurred during this time. All of the documented captures occurred in the past 5 years (**Table 8**) and resulted in live releases with no suspected post-release mortality. Therefore, we believe that future gill net operations during the Alabama Marine FIM Survey are likely to adversely affect green (North Atlantic and South Atlantic DPSs) and Kemp's ridley sea turtles via capture and handling. We anticipate that all gill net interactions with green sea turtles and Kemp's ridley sea turtles will be non-lethal based on historic data, 1-hr soak times, and the Alabama Marine FIM Survey minimization measures outlined in Section 2.1.4.

Table 8. Documented Captures of Sea Turtles during Alabama Marine FIM Survey Gill Net Operations.

Year	Green sea turtle Captures	Kemp's ridley sea turtle Captures
2017	2	0
2018	1	1
2019	0	0
2020	0	0
2021	1	0
Total	**4**	**1**

Anticipated Future Captures by Gill Net

The number of captures of ESA-listed species in any given year can be influenced by sea temperatures, species abundances, fluctuating salinity levels in estuarine habitats where the Alabama Marine FIM Survey may be occurring, and other factors that cannot be predicted. For these reasons, we believe basing our future capture estimate on a 1-year time period is largely impractical. Based on our experience monitoring fisheries, a 3-year time period is appropriate for meaningful monitoring. The triennial captures are set as 3-year running sums (i.e., 2022-2025, 2023-2026, 2024-2027 and so on) and not static 3-year periods (i.e., 2022-2024, 2025-2027, 2028-2030 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 Alabama Marine FIM Survey is performing versus our expectations.

ADCNR/MRD began fishery-independent gill net sampling in 2000 and gill netting was standardized to 240 total sets in 2008. We recognize that all known captures of green sea turtle and Kemp's ridley sea turtle have occurred only in the past 5 years (2017-2021) during 21 years of gill net sampling for the Alabama Marine FIM Survey; therefore, we consider this when determining future captures of these species. By using only the sea turtle gill net capture data from the last 5 years to determine potential future captures, we consider the standardized methodology while accounting for recent abundance trends and, therefore, reduce the likelihood of reinitiation of ESA consultation.

Table 9 calculates the anticipated future captures of green sea turtle (North Atlantic DPS and South Atlantic DPS) and Kemp's ridley sea turtles in the gill nets for any consecutive 3-year period based on recent past captures, 2017-2021. Because it is not possible to take only part of an individual, the numbers of captures are rounded up to the nearest whole number. This results in an increase in the total number of future captures. As stated above, we believe all captures of green sea turtle (North Atlantic DPS and South Atlantic DPS) and Kemp's ridley sea turtle will be non-lethal. As explained above, we do not anticipate any captures of loggerhead sea turtles during the gill net component of the Alabama Marine FIM Survey.

Table 9. Anticipated Future Captures of Sea Turtles during Alabama Marine FIM Survey Gill Net Operations during Any Consecutive 3-Year Period

Species	Past Captures (2017-2021)	Average Captures per Year	Future Captures Every 3 Years
Green sea turtle (North Atlantic DPS and South Atlantic DPS)	4	0.80 (4 ÷ 5)	3 (0.80 × 3 = 2.4, rounded up to 3)
Kemp's ridley sea turtle	1	0.20 (1 ÷ 5)	1 (0.20 × 3 = 0.60, rounded up to 1)

Capture by 16-ft Otter/Bottom Trawl

Adverse Effects to Sea Turtles from Otter/Bottom Trawls

Observers and naked-net studies have not indicated that otter/bottom trawl nets cause injuries to sea turtles via entanglement. However, otter/bottom trawls can cause forced submergence, which has the same effects as discussed above.

Tow-times have been identified as a significant factor in trawl-related mortalities of sea turtles caused by forced submergence. Tow-times less than 60 minutes had mortality rates of less than 1% (NRC 1990b). Based on these findings, exemptions to TED requirements were created for vessels that would normally be required to use TEDs so long as they limited their tow times. Tow-time requirements for vessels exempted from TED use are limited to 55 minutes from April 1 through October 31 and to 75 minutes from November 1 through March 31 (50 CFR 223.206(d)((3)). The regulatory tow-time limits include a 15-minute allowance for setting and retrieving gear, since the NRC analysis of tow-times looked at bottom time only. The Alabama Marine FIM Survey limits their tow-times to 25 minutes (doors in-doors out) and does not use a TED.

Historic Captures of Sea Turtles

Green sea turtles (North Atlantic and South Atlantic DPS) and Kemp's ridley sea turtles may be caught in the 16-ft otter/bottom trawl. However, we believe that it is extremely unlikely that this gear type will capture these two species. There has never been a documented interaction between these species and this component of the Alabama Marine FIM Survey. Because the Alabama Marine FIM Survey effectively has 100% observer coverage and because there has never been a documented capture of these species using this gear type during the 40+ years of the survey, it is likely that none has occurred and that any capture of these species using this gear type is unlikely to occur in the future.

The otter trawl component of the survey was standardized to sample 24 fixed stations monthly beginning in 2010. By using only the otter trawl capture data since 2010, we consider the standardized methodology while accounting for recent abundance trends and, therefore, reduce the likelihood of reinitiation of ESA consultation. Since 2010, only 1 loggerhead sea turtle (Northwest Atlantic DPS) has been captured during Alabama Marine FIM Survey otter/bottom trawl operations; it occurred in May 2013 and resulted in a live release with no suspected post-release mortality. Therefore, we believe that future otter/bottom trawl operations during the Alabama Marine FIM Survey are likely to adversely affect loggerhead sea turtle via capture and handling. We anticipate that these interactions will be non-lethal based on historic data, 10-min tow-times, and the Alabama Marine FIM Survey minimization measures outlined in Section 2.1.4.

Anticipated Future Captures by Otter/bottom Trawl

Like above, we believe a 3-year time period is appropriate for meaningful monitoring. Again, we set the triennial captures as 3-year running sums (i.e., 2022-2025, 2023-2026, 2024-2027 and so on) and not static 3-year periods (i.e., 2022-2024, 2025-2027, 2028-2030 and so on).

Table 10 calculates the anticipated future captures of loggerhead sea turtles (Northwest Atlantic DPS) in the 16-ft otter/bottom trawl for any consecutive 3-year period based on the past captures, 2010-2021. Because it is not possible to take only part of an individual, the numbers of captures are rounded up to the nearest whole number. This results in an increase in the total number of future captures. As stated above, we believe all captures of loggerhead sea turtle will be non-lethal and we do not anticipate any captures of green sea turtles (North Atlantic and South Atlantic DPS) and Kemp's ridley sea turtles during the 16-ft otter/bottom trawl component of the Alabama Marine FIM Survey.

Table 10. Anticipated Future Captures of ESA-Listed Species during Alabama Marine FIM Survey 16-ft Otter/bottom Trawl Operations during Any Consecutive 3-Year Period

Species	Past Captures (2010-2021)	Average Captures per Year	Future Captures in 16-ft Otter/bottom Trawl Every 3 Years
Loggerhead sea turtle (Northwest Atlantic DPS)	1	0.08 (1 ÷ 12)	1 (0.08 × 3 = 0.24, rounded up to 1)

Total Anticipated Future Captures of ESA-listed Species

We believe the summary in **Table 11** is an accurate representation of future anticipated captures of ESA-listed species in the Alabama Marine FIM Survey during any 3-year period. Because the Alabama Marine FIM Survey effectively has 100% observer coverage, we anticipate that all sea turtle interactions with survey gear will be documented and no undocumented or unreported interactions are expected to occur. Furthermore, as stated above, there have been no lethal interactions with any ESA-listed species during the Alabama Marine FIM Survey. Therefore, we conclude that all future anticipated interactions with ESA-listed species during the Alabama Marine FIM Survey will be non-lethal. The capture of green sea turtle by each DPS is discussed in the Jeopardy Analysis (Section 8) and presented in the Incidental Take Statement (Section 10; **Table 12**).

Table 11. Total Anticipated Future Captures of ESA-Listed Species in the Alabama Marine FIM Survey during Any Consecutive 3-Year Period

Species	Gill Nets (Table 9)	16-ft Otter/bottom Trawl (Table 10)	Total Future Captures
Green sea turtle (North and South DPS)	3	0	3
Kemp's ridley sea turtle	1	0	1
Loggerhead sea turtle (Northwest Atlantic DPS)	0	1	1

7 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. 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.

8 JEOPARDY ANALYSIS

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 actions directly or indirectly reduce 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 analyses conducted in the previous sections of this Opinion serve to provide a basis to determine whether the Alabama Marine FIM Survey is likely to jeopardize the continued existence of green sea turtle (North Atlantic DPS and South Atlantic DPSs), Kemp's ridley sea turtle, and loggerhead sea turtle (Northwest Atlantic DPS). In the Effects of the Action (Section 6), we outlined how the proposed actions is expected to adversely affect these species. Now we turn to an assessment of the species response to these impacts, in terms of overall population effects, and whether those effects of the proposed actions, when considered in the context of the Status of the Species (Section 4), the Environmental Baseline (Section 5), and the Cumulative Effects (Section 7), will jeopardize the continued existence of the affected species. For any species listed globally, our jeopardy determination must 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.

8.1 Green Sea Turtle (North Atlantic DPS and South Atlantic DPS)

Within U.S. waters, individuals from both the North Atlantic DPS and South Atlantic 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 North Atlantic and South Atlantic 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 South Atlantic 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 North Atlantic DPS. However, it is possible that animals from the South Atlantic DPS could be captured during the Alabama Marine FIM Survey. For these reasons, we will act conservatively and conduct 2 jeopardy analyses, 1 for each DPS. The North Atlantic DPS analysis will assume, based on Foley et al. (2007), that 96% of the green sea turtles captured during the Alabama Marine FIM Survey are from the North Atlantic DPS. Our analysis of the South Atlantic DPS will assume that 4% of the green sea turtles affected by the Alabama Marine FIM Survey are from the South Atlantic DPS.

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

- Up to 3 green sea turtles will come from the North Atlantic DPS ($3 \times 0.96 = 2.88$, rounded up to 3), all of which will non-lethal.
- Up to 1 green sea turtle will come from the South Atlantic DPS ($3 \times 0.04 = 0.12$, rounded up to 1), which will be non-lethal.

We note that rounding when splitting the take into the 2 DPSs results in a slightly higher combined total than the consecutive 3-year estimate presented in **Table 11** (i.e., 4 instead of 3). While we use the higher number for purposes of analyzing the likelihood of jeopardy to the DPSs below, we do not expect or authorize more than 3 green sea turtle non-lethal takes during any consecutive 3-year period the Alabama Marine FIM Survey is in operation.

8.1.1 Green Sea Turtle (North Atlantic DPS)

The Alabama Marine FIM Survey may result in the non-lethal take of up to 3 green sea turtles from the North Atlantic DPS over any consecutive 3-year period. The potential non-lethal capture of green sea turtles from the North Atlantic 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 may occur anywhere in the action area, which encompasses only a portion of green sea turtles' overall range/distribution within the North Atlantic DPS. Any incidentally caught animal would be released within the general area where caught and no change in the distribution of North Atlantic DPS green sea turtles would be anticipated. Therefore, the non-lethal take of green sea turtles from the North Atlantic DPS associated with the proposed action are not expected to cause an appreciable reduction in the likelihood of either the survival or recovery of the North Atlantic DPS of green sea turtle in the wild.

8.1.2 Green Sea Turtle (South Atlantic DPS)

The Alabama Marine FIM Survey may result in the non-lethal take of 1 green sea turtle from the South Atlantic DPS over any consecutive 3-year period. The potential non-lethal capture of a green sea turtle from the South Atlantic 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 capture may occur anywhere in the action area, which encompasses only a portion of green sea turtles' overall range/distribution within the SA DPS. The incidentally caught animal would be released within the general area where caught and no change in the distribution of South Atlantic DPS green sea turtles would be anticipated. Therefore, the non-lethal take of a green sea turtle from the South Atlantic DPS associated with the Alabama Marine FIM Survey is not expected to cause an appreciable reduction in the likelihood of either the survival or recovery of the South Atlantic DPS of green sea turtle in the wild.

8.2 Kemp's Ridley Sea Turtle

The Alabama Marine FIM Survey is anticipated to result in the non-lethal take of 1 Kemp's ridley sea turtle 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 is expected to fully recover such that no reductions in reproduction or numbers of Kemp's ridley sea turtles are anticipated. The capture may occur anywhere in the action area, which encompasses only a portion of this species overall range/distribution. The 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. Therefore, the non-lethal capture of a Kemp's ridley sea turtle associated with the Alabama Marine FIM Survey is not expected to cause an appreciable reduction in the likelihood of either the survival or recovery of Kemp's ridley sea turtle in the wild.

8.3 Loggerhead Sea Turtle (Northwest Atlantic DPS)

The Alabama Marine FIM Survey may result in the non-lethal take of 1 loggerhead sea turtle from the Northwest Atlantic DPS during any consecutive 3-year period. The potential non-lethal capture of a loggerhead sea turtle from the Northwest Atlantic 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 loggerhead sea turtles are anticipated. The capture may occur anywhere in the action area, which encompasses only a portion of loggerhead sea turtles' overall range/distribution within the Northwest Atlantic DPS. The incidentally caught animal would be released within the general area where caught and no change in the distribution of Northwest Atlantic DPS of loggerhead sea turtle would be anticipated. Therefore, the non-lethal take of a loggerhead sea turtles associated with the Alabama Marine FIM Survey is not expected to cause an appreciable reduction in the likelihood of either the survival or recovery of the Northwest Atlantic DPS of the loggerhead sea turtle in the wild.

9 CONCLUSION

After reviewing the Status of the Species, the Environmental Baseline, the Effects of the Action, and Cumulative Effects, it is NMFS's Opinion that USFWS's proposal to provide financial assistance to the ADCNR/MRD for the Alabama Marine FIM Survey is not likely to jeopardize the continued existence of green sea turtle (North Atlantic DPS and South Atlantic DPS), Kemp's ridley sea turtle, and loggerhead sea turtle (Northwest Atlantic DPS).

10 INCIDENTAL TAKE STATEMENT

10.1 Overview

Section 9 of the ESA and protective regulations issued pursuant to Section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without a special exemption. *Take* is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct. *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 ITS of the Opinion.

10.2 Amount or Extent of Anticipated Incidental Take

Based on the above information and analyses, NMFS believes that the proposed action is likely to adversely affect green sea turtle (North Atlantic DPS and South Atlantic DPS), Kemp's ridley sea turtle, and loggerhead sea turtle (Northwest Atlantic DPS). These effects will result from capture and handling in the gill net and 16-ft otter/bottom trawl components of the Alabama Marine FIM Survey. We anticipate the following non-lethal incidental take may occur as a result of the Alabama Marine FIM Survey over any consecutive 3-year period (i.e., 2022-2025, 2023-2026, 2024-2027 and so on) (**Table 12**).

Table 12. Estimated Non-Lethal Take for Any Consecutive 3-Year Period during the Alabama Marine FIM Survey

Species	Estimated Non-lethal Take
Green sea turtle (North Atlantic and South Atlantic DPS)	3
Kemp's ridley sea turtle	1
Loggerhead sea turtle (NWA DPS)	1

10.3 Effect of the Take

NMFS has determined that the anticipated incidental take specified in Section 10.2 is not likely to jeopardize the continued existence of green sea turtle (North Atlantic DPS and South Atlantic DPS), Kemp's ridley sea turtle, and loggerhead sea turtle (Northwest Atlantic DPS) if the Alabama Marine FIM Survey operates as proposed.

10.4 Reasonable and Prudent Measures

Section 7(b)(4) of the ESA requires NMFS to issue to any agency whose proposed action is found to comply with Section 7(a)(2) of the ESA, but may incidentally take individuals of listed species, a statement specifying the impact of that taking. It also states that Reasonable and Prudent Measures necessary to minimize the impacts from the agency action, and Terms and Conditions to implement those measures, must be provided and followed. Only incidental taking that complies with the specified terms and conditions is authorized.

The Reasonable and Prudent Measures and Terms and Conditions are required, per 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 ESA-listed species. These Reasonable and Prudent Measures and Terms and Conditions must be implemented by the USFWS for the protection of Section 7(o)(2) to apply. The USFWS has a continuing duty to regulate the activity covered by this ITS. If it fails to adhere to the Terms and Conditions of the ITS through enforceable terms, and/or fails to retain oversight to ensure compliance with these Terms and Conditions, the protective coverage of Section 7(o)(2) may lapse. To monitor the impact of the incidental take, the USFWS must report the progress of the action and its impact on the species to NMFS SERO PRD as specified in the ITS [50 CFR 402.14(i)(3)].

NMFS has determined that the following Reasonable and Prudent Measures are necessary or appropriate to minimize the impacts of future sea turtle and sturgeon takes or to limit adverse effects to these species to predictable levels, and to monitor levels of incidental take. The following Reasonable and Prudent Measures and associated Terms and Conditions are established to implement these measures, and to document incidental takes. Only incidental takes that occur while these measures are in full implementation are authorized. These restrictions remain valid until reinitiation and conclusion of any subsequent Section 7 consultation.

1. Green sea turtle (North Atlantic DPS and South Atlantic DPS), Kemp's ridley sea turtle, and loggerhead sea turtle (Northwest Atlantic DPS) released after interactions with gill net or otter/bottom trawl gear may experience some degree of physiological injury (lacerations, abrasions, etc.). The ultimate severity of these events depends upon the actual interaction and the handling of an animal. Therefore, the experience, ability, and willingness of Alabama Marine FIM Survey biologists to remove all gear prior to release are crucial to the survival of these species. NMFS requires that all captured sea turtles be handled in a way that minimizes adverse effects from incidental take and reduces mortality.

2. The jeopardy analyses for green sea turtle (North Atlantic DPS and South Atlantic DPS), Kemp's ridley sea turtle, and loggerhead sea turtle (Northwest Atlantic DPS) are based on the assumption that the frequency and magnitude of adverse effects that occurred in the past will continue into the future. If those prove to be underestimates, we risk having misjudged the potential adverse effects to these species. Thus, it is imperative that NMFS SERO PRD monitors and tracks the level of take occurring during the Alabama Marine FIM Survey. Therefore, we must ensure that monitoring and reporting of all ESA-listed species takes (1) detect captures and mortalities resulting from the Alabama Marine FIM Survey; (2) assess the actual level of incidental take in comparison with the anticipated incidental take documented in this Opinion; and (3) detect when the level of anticipated take is exceeded.

10.5 Terms and Conditions

In order to be exempt from the prohibitions of Section 9 of the ESA, the USFWS must comply with the following terms and conditions.

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

- The total time trawl gear is in the water shall not exceed 25 minutes (doors in-doors out). The trawl tow speed shall not exceed 2.5 kts.

- The total gill net soak time (net in-net out) shall not exceed 1 hour 30 minutes, unless inclement weather conditions or unusually large catches deem otherwise. Biologists and the vessel shall remain in the immediate vicinity of the gill net at all times while it is in the water to respond quickly in case of protected species interactions.

- Alabama Marine FIM Survey biologists must take the actions described in Appendix A (Sea Turtle, Smalltooth Sawfish, and Sturgeon Safe Handling and Release) and Appendix B (NOAA's Careful Release Protocols for Sea Turtle Release with Minimal Injury, NMFS-SEFSC-580) to safely handle and release all incidentally caught ESA-listed species.

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

- For any each individual known reported capture, entanglement, stranding, or other take incident of an ESA-listed species, the Alabama Marine FIM Survey must record the information as specified on the Protected Species Incidental Take Form (Appendix C). This form should also be used to notify NMFS Southeast Regional Office Protected Resources Division of any incidental take within 24 hours or a soon as reasonably possible via the online NMFS SERO Endangered Species Take Report Form (https://forms.gle/85fP2da4Ds9jEL829) and should also be submitted in accordance with the annual report, described below.

- The online NMFS SERO Endangered Species Take Report Form (https://forms.gle/85fP2da4Ds9jEL829) shall be completed for each individual known reported capture, entanglement, stranding, or other take incident of an ESA-listed species. Information provided via the online form shall include the title (Alabama Marine FIM Survey), the issuance date, and ECO tracking number (SERO-2021-02231), for this Opinion; the species name; the date and time of the incident; the general location and activity resulting in capture; condition of the species (i.e., alive, dead, sent to rehabilitation); size of the individual, behavior, and identifying features (i.e., presence of tags, scars, or distinguishing marks). All photos that may have been taken and the Protected Species Incidental Take Form (Appendix C) shall up uploaded via the online form. At that time, consultation may need to be reinitiated.

- The Alabama Marine FIM Survey must use the SERO Take Tracking Sheet (Appendix D) to keep a running tally of incidental take during any year of Alabama Marine FIM Survey sampling. This sheet should also be submitted in accordance with the annual report, described in the last bullet point.

- The Alabama Marine FIM Survey must submit an annual report detailing the amount of effort (i.e., number sets by gear type, inclusive of all gear types) and the number and location (i.e., latitude, longitude) of protected species incidentally taken. The annual report must be submitted within 90 working days of the completion of that year's activities to NMFS SERO PRD at: takereport.nmfsser@noaa.gov. Annual report emails shall reference the project name and year (Alabama Marine FIM Survey – Annual Report YEAR) and ECO tracking number (SERO-2021-02231) in the subject line and include the project name, year, and ECO tracking number in text of the email.

11 CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA directs federal agencies to utilize their authority to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation Recommendations identified in Opinions can assist action agencies in implementing their responsibilities under Section 7(a)(1). Conservation Recommendations are discretionary activities designed to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

The following Conservation Recommendations are discretionary measures that NMFS believes are consistent with this obligation and therefore should be carried out by the USFWS:

Sea turtles:

- The USFWS should support in-water abundance estimates of ESA-listed sea turtles to achieve more accurate status assessments for these species and to better assess the impacts of incidental take during the Alabama Marine FIM Survey.
- The USFWS should conduct or fund research that investigates ways to reduce and minimize mortality of sea turtles in commercial fisheries and dredging activities.
- The USFWS should conduct or fund outreach designed to increase the public’s knowledge and awareness of ESA-listed sea turtle species.

12 REINITIATION OF CONSULTATION

This concludes formal consultation on the Alabama Marine FIM Survey, SERO-2021-02231. As provided in 50 CFR 402.16, reinitiation of formal consultation is required where discretionary federal action agency involvement or control over the action has been retained, or is authorized by law, and if: (1) the amount or extent of incidental take is exceeded, (2) new information reveals effects of the agency action on listed species or designated critical habitat in a manner or to an extent not considered in this Opinion, (3) the agency action is subsequently modified in a manner that causes an effect on the listed species or critical habitat not considered in this Opinion, or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, the USFWS must immediately request reinitiation of formal consultation and project activities may only resume if the USFWS establishes that such continuation will not violate sections 7(a)(2) and 7(d) of the ESA.

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