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NATIONAL MARINE FISHERIES SERVICE
Southeast Regional Office
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FEB 06 2014

F/SER31:KR
SER-2013-10716

Mr. Eric P. Summa
Chief, Environmental Branch
Department of the Army
Jacksonville District Corps of Engineers
P.O. Box 4970
Jacksonville, Florida 32232-0019

Subj: Jacksonville Harbor Deepening and Widening Project, Duval County, Florida, REVISED Biological Opinion

Dear Mr. Summa:

NOAA's National Marine Fisheries Service (NMFS) provides the attached revised final biological opinion (opinion) on species listed under the Endangered Species Act (ESA) of 1973. This opinion replaces the opinion issued on January 24, 2014. NMFS is providing the U.S. Army Corps of Engineers (USACE) this opinion pursuant to 50 CFR 402.14(h). This document is based on our review of impacts associated with the proposed federal navigational channel dredging activities for the Jacksonville Harbor Deepening and Widening Project (JHP) to be conducted by the Jacksonville District USACE.

Information concerning the proposed action was obtained by our review of the Biological Assessment (BA) and the Jacksonville Harbor Navigation Study, Draft Supplemental Environmental Impact Statement for the JHP in Duval County, Florida. This opinion concludes that the proposed action is not likely to jeopardize species listed under the ESA under NMFS purview and provides reasonable and prudent measures, along with their implementing terms and conditions.

We appreciate the USACE's efforts in working together with NMFS to identify methods and measures to address complex conservation issues that when implemented will provide protection for endangered species under NMFS's authority.

Our primary contact for endangered species issues is Karla Reece. She may be reached by phone at (727) 824-5312 or by e-mail at Karla.Reece@noaa.gov.

Sincerely,

Miles M. Croom

for Roy E. Crabtree, Ph.D.
Regional Administrator

Enclosure

Endangered Species Act – Section 7 Consultation
Final Biological Opinion

Action Agency:	U.S. Army Corps of Engineers (USACE), Jacksonville District
Activity:	Jacksonville Harbor Deepening and Widening Project
Consulting Agency:	National Oceanic and Atmospheric Administration, National Marine Fisheries Service (NMFS), Southeast Regional Office, Protected Resources Division, St. Petersburg, Florida NMFS Consultation No. SER-2013-10716
Approved By:	Miles M. Croom for Roy E. Crabtree, Ph.D., Regional Administrator NMFS, Southeast Regional Office St. Petersburg, Florida
Date Issued:	FEB 06 2014

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Acronyms

BA	Biological Assessment
CCL	Curved Carapace Length
CPUE	Catch Per Unit Effort
cy	Cubic yards
DPS	Distinct Population Segment
DTRU	Dry Tortugas Recovery Unit
DWH	Deepwater Horizon
EPA	Environmental Protection Agency
ESA	Endangered Species Act of 1973
EWS	Early Warning System
F/SER3	Southeast Regional Office Protected Resources Division
FP	Fibropapillomatosis
GCRU	Greater Caribbean Recovery Unit
GRBO	Gulf of Mexico Regional Biological Opinion
HMS	Highly Migratory Species
ITS	Incidental Take Statement
JAXPORT	The Port of Jacksonville
JHP	Jacksonville Harbor Deepening Project
mcy	million cubic yards
MMPA	Marine Mammal Protection Act of 1972
MRFSS	Marine Recreational Fishing Statistical Survey
NARW	north Atlantic right whale
NCWRC	North Carolina Wildlife Resources Commission
NGMRU	Northern Gulf of Mexico recovery unit
nm	nautical miles
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NRU	Northern Recovery Unit
NWA	Northwest Atlantic
ODMDS	Ocean Dredged Material Disposal Site
PFRU	Peninsular Florida Recovery Unit
RBO	Regional Biological Opinion
RPAs	Reasonable and Prudent Alternatives
RPMs	Reasonable and Prudent Measures
SAD	South Atlantic Division
SARBO	South Atlantic Regional Biological Opinion
SCDNR	South Carolina Department of Natural Resources
SCL	Straight Carapace Length
SEFSC	Southeast Fisheries Science Center
SERO	Southeast Regional Office
STDW	Sea Turtle Data Warehouse
STSSN	Sea Turtle Stranding and Salvage Network
TEDs	Turtle Excluder Devices
TSP	tentatively selected plan
USACE	United States Army Corps of Engineers
USFWS	United States Fish and Wildlife Service

Introduction

Section 7(a)(2) of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. § 1531 et seq.), requires that each federal agency shall 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. To fulfill this obligation, Section 7(a)(2) requires federal agencies to consult with the appropriate Secretary on any action that "may affect" listed species or designated critical habitat. The National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS) share responsibilities for administering the ESA. Consultations on most listed marine species and their designated critical habitat are conducted between the action agency and NMFS.

Consultation is required when a federal action agency determines that a proposed action "may affect" listed species or designated critical habitat. Consultation is concluded after NMFS determines that the action is not likely to adversely affect listed species or critical habitat or issues a biological opinion (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. If either of those circumstances is expected, the opinion identifies reasonable and prudent alternatives (RPAs) to the action as proposed that can avoid jeopardizing listed species or resulting in the destruction/adverse modification of critical habitat. The opinion states the amount or extent of incidental take of the listed species that may occur, develops reasonable and prudent measures (RPMs) to reduce the effect of take and monitoring to validate the expected effects of the action, and recommends conservation measures to further conserve the species.

This document represents NMFS's opinion based on our review of impacts associated with the proposed Jacksonville Harbor Deepening and Widening Project (JHP) to be conducted by the USACE's Jacksonville District. The opinion analyzes project effects on sea turtles (Northwest Atlantic loggerhead distinct population segment [DPS], Kemp's ridley, leatherback, hawksbill, and green), North Atlantic right whales, humpback whales, and shortnose sturgeon.

Information for this opinion was provided by the USACE, or was obtained from a variety of sources including published and unpublished literature cited herein.

1 CONSULTATION HISTORY

February 15, 2013: USACE provides a Biological Assessment of Threatened and Endangered Species (BA) for JHP to NMFS Southeast Regional Office (SERO) and requests ESA Section 7 consultation.

May 31, 2013: USACE publishes the Draft Integrated General Reevaluation Report II and Supplemental Environmental Impact Statement (USACE 2013).

July 18, 2013: NMFS sends a request for additional information to the USACE.

July 31, 2013: USACE responds to NMFS PRD's request for additional information.

September 9, 2013: NMFS initiates consultations stating, "Because the exact details for construction of the project are not yet determined, you provided us with a range of alternatives of what could occur during the project. We plan to complete our analysis with the available information, resolving any remaining uncertainties in a precautionary manner to protect the species."

October 23, 2013: USACE sends e-mail to NMFS changing the effect determination for the North Atlantic right whale from "may effect" to "not likely to adversely affect" based on the following: (1) no blasting would occur east of Reach 4 (about 4.8 river miles from open ocean), (2) in the unlikely event that a right whale swims into the harbor, all construction and blasting activities would cease, and (3) the proposed deepening and widening would not result in an increase in the number of vessels calling on the port.

November 18, 2013: NMFS requests additional information by e-mail about the quantity of rock that will be blasted and requests more information about the blasting plan.

November 20, 2013: USACE e-mails NMFS in response to the November 18 request for additional information.

November 22, 2013: NMFS e-mails USACE to confirm the extent of the JHP, from River Mile 0 to 13 of the St. Johns River.

November 25, 2013: NMFS receives e-mail from USACE stating: "In regard to the entrance channel, part of Bar Cut-3 (station 161+00 to intersection with Mayport Entrance Channel at station 198+63.25) could potentially require dredging since the Navy implemented a more narrow channel (-100' on both sides) than the Civil Works project for this portion."

November 25, 2013: NMFS sends e-mail to USACE to request clarification on blasting areas and duration.

November 26, 2013: NMFS sends e-mail to USACE requests a figure showing the proposed loggerhead sea turtle critical habitat areas in relation to the project and Ocean Dredged Material Disposal Site (ODMDS) locations.

November 27, 2013: NMFS receives response from the USACE to the information request of November 25, 2013.

December 2, 2013: NMFS e-mails the project description to the USACE for verification and receives a response on December 4, 2013.

December 4, 2013: NMFS calls USACE to verify edits to the project description, specifically regarding the destination of dredged material, and receives a response on

December 5, 2013, with the USACE confirming by e-mail that all dredged material will be placed in offshore ODMDS locations.

December 5-10, 2013: Numerous e-mails between the USACE and NMFS about graphics for the JHP to be used in this document.

December 13-17, 2013: Numerous e-mails and phone calls between the USACE and NMFS requesting additional St. Johns River river-mile-specific information on quantities of material to be dredged and potential relocation trawling requirements.

December 16, 2013: NMFS receives verbal confirmation (L. Dixon, USACE, to D. Bernhart, NMFS) that the USACE will implement the 10-knot dredge vessel speed limit for the protection of right whales in certain areas and seasons to protect migrating North Atlantic right whales from vessel strike risk.[1] NMFS subsequently receives written e-mail confirmation of USACE's modification to the original proposed action, to require use of the Dredge Management System (Silent Inspector) to ensure dredge vessel compliance with the 10-knot dredge vessel speed restriction (P. Stodola, USACE, personal communication to E. Hawk, NMFS, December 19,2013).

December 17: Conference call between NMFS (K. Reece) and the USACE (P. Stodola and J. Spinning) to discuss draft relocation trawling requirements and clarify dredging areas that may require special treatment due to inability to safely trawl there, and mud-clay substrate areas that render trawling/draghead deflector use ineffective.

December 18-19: E-mails between USACE and NMFS exchanging information and clarifying details regarding effectiveness of sea turtle deflectors in stiff, dense clay bottom substrates likely to be encountered in Bar Cut 3.

December 24: E-mails between MNFS and USACE discuss what the maximum charge weight per delay for blasting will be.

January 24, 2014: Final Biological Opinion issued to USACE.

February 6, 2014: Revised Biological Opinion issued to USACE. The revised opinion corrects minimal errors in the January 24, 2014 opinion.

2 DESCRIPTION OF THE PROPOSED ACTION AND ACTION AREA

Jacksonville Harbor consists of 27 river miles starting at the mouth of the St. Johns River where it empties into the Atlantic Ocean. The harbor is an increasingly attractive port to

[1] The agreement between NMFS and the USACE is limited to this biological opinion only, and is based on the 10-knot speed limit for the protection of right whales being eventually superseded by the final speed limit required in the soon-to-be-issued (presumably in 2014) revised South Atlantic Regional Biological Opinion (SARBO). The newly revised SARBO will replace the prevailing, in force, 1997 SARBO to the USACE's South Atlantic Division, and will continue to govern USACE-hopper dredging of navigation channels and borrow areas from North Carolina through Texas.

call due to its location relative to the Panama Canal; as well as its access to extensive intermodal connections including rail, water, and highway facilities. The harbor includes three segments. Segment 1 (entrance channel to River Mile 14) and Segment 2 (River Miles 14 to 20) have an existing authorized depth of 40 feet, and Segment 3 (West Blount Island Channel) has an existing authorized depth of 38 feet (Figure 1).

Figure 1. Jacksonville Harbor showing Segment 1 (blue), Segment 2 (yellow), and Segment 3 (green)

The BA originally stated the project would deepen the existing channel up to 50 feet in depth, however the USACE later determined the 47-foot depth alternative, known as the tentatively selected plan (TSP) in the Draft Report/SEIS (USACE 2013) shown in Figure 2, was the preferred alternative for this project. Thus, this opinion will address the TSP. The Port of Jacksonville (JAXPORT), as the non-federal sponsor, supports this alternative. The USACE will deepen the existing 40-foot channel to -47 feet from River Mile 0 (zero) to approximately River Mile 13 (yellow in Figure 2), as well as portions of the entrance channel extending four miles eastward from River Mile zero (red in Figure 2). The easterly limit of dredging will be adjusted as necessary to the 50-ft contour location at the time of construction. This work will result in the removal of approximately 18 million cubic yards (mcy). All dredged material will be disposed of at either the existing Jacksonville ODMDS or a new EPA-proposed ODMDS (green and blue areas in Figure 2). An additional 1 foot of required overdepth and 1 foot of allowable overdepth are included in the estimated excavation quantities. This is a total dredging depth of -49 feet. For Jacksonville Harbor, there is an additional 2 feet of advance maintenance dredging throughout the entire project. The 2 feet of advance maintenance will be performed only in areas that are predicted to shoal the most rapidly, thus avoiding any increase to the frequency of maintenance dredging that is currently performed for the existing project. In these select areas of high shoaling the total dredging depth will be to -51 feet.

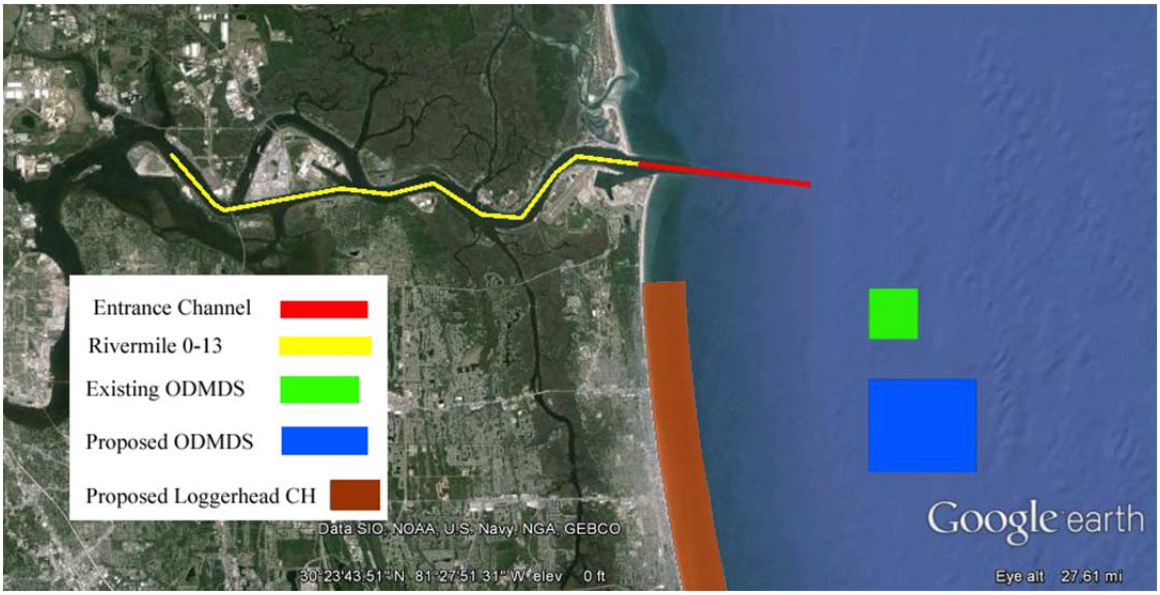

Figure 2. JHP Tentatively Selected Plan showing the areas to be dredged in red and yellow, the existing and proposed ODMDS sites in green and blue, and the proposed loggerhead critical habitat area (LOGG-N-14) in brown

The following areas of widening are included as part of the new channel footprint;

1. Mile Point: Widen to the north by 200 feet from Cuts 8 to 13 (~River Miles 3 to 5),
2. Training Wall Reach: Widen to the south 100 feet from Cuts 14 to 16 (~River Miles 5 to 6) transitioning to 250 feet for Cut 17 (~River Mile 6) and back to 100 feet from Cuts 18 to 19 (~River Mile 6), and
3. St. Johns Bluff Reach: Widen both sides of the channel varying amounts up to 300 feet from Cuts 40 to 41 (~River Miles 7 to 8).

In addition, widened turning basin areas include:

1. Blount Island: ~2,700 feet long by 1,500 feet wide located in Cut 42 (~River Mile 10) and
2. Brills Cut: ~2,500 feet long by 1,500 feet wide located in Cut 45 (~River Mile 13).

In addition to the initial project impacts, an estimated 1.2 mcy of material will be removed during annual maintenance dredging of the Port of Jacksonville and surrounding area including the Mayport Naval Station harbor and channel. Future Jacksonville harbor maintenance dredging events are covered under the 1997 SARBO, which is currently under reinitiation.

2.1 Dredging

The USACE states the type, timing, and duration of dredging would depend on the availability of equipment, weather, and other factors with the most likely methods of dredging being by hopper dredge and cutterhead suction dredge, although clamshell (bucket-type mechanical) dredging may also be used. In order to complete the proposed work in a reasonable amount of time, the USACE expects up to 3 to 4 contracts or crews

working simultaneously in different reaches of the harbor over a 5- to 6-year period. Since multiple contracts/crews would be working simultaneously, it is likely that some combination of equipment with various capacities would be used. The number of loads to and from the ODMDS's to transport 18 mcy would depend on the capacity of the available equipment. With a 3,000 cubic yard (cy) capacity, it would take approximately 6,000 loads over a period of 2 to 6 years depending on the number of crews and scows and other factors (Table 1). A larger scow with a 13,800 cubic yard capacity would require 1,304 trips to and from the ODMDS over a period of a few months to 2 years. For intermediate capacity scows (6,000, 8,000 and 10,000 cy), the number of loads and duration would fall somewhere in between. Approximately 2.7 million (~15%) of the 18 mcy is expected to be rock or rock fragments. The remainder is expected be sandy to silty material. Rock and rock fragments may be segregated to a specific location within the ODMDS or a separate ODMDS, but this location has not yet been determined.

Table 1. Number of Loads and Duration for Different Load Sizes

Capacity (cubic yards)	Number of Loads	Duration*
3,000	6,000	2 to 6 years
6,000	3,000	1 to 5 years
8,000	2,250	1 to 4 years
10,000	1,800	6 months to 3 years
13,800	1,304	4 months to 2 years

* Note that multiple crews and equipment of different capacities would likely be working simultaneously

2.2 Bed-Leveling Activities

Since dredging equipment does not typically result in a perfectly smooth and even channel bottom, a drag bar (bed-leveling device), chain, or other heavy-equipment item may be dragged along the channel bottom to smooth down high spots and fill in low spots left by the hopper dredge(s). This finishing technique also reduces the need for additional suction dredging to remove any high spots that may have been missed by the dredging equipment.

2.3 Blasting

Blasting may be performed wherever rock occurs within the project dredging footprint (River Miles 0-13). Locations of rock located from various borings are depicted in Figure 3. The USACE does not yet know how much blasting will be required during the JHP, but states the number of blasting events per day will not exceed six. Blasting will be restricted to December through February annually, as required by the USFWS to protect manatees. All blasting will occur under conditions summarized in Section 2.3 below, and listed in detail in the Jacksonville Harbor Study (USACE 2013). The amount of blasting will be partly determined by the capability of the specific equipment selected by the contractor.

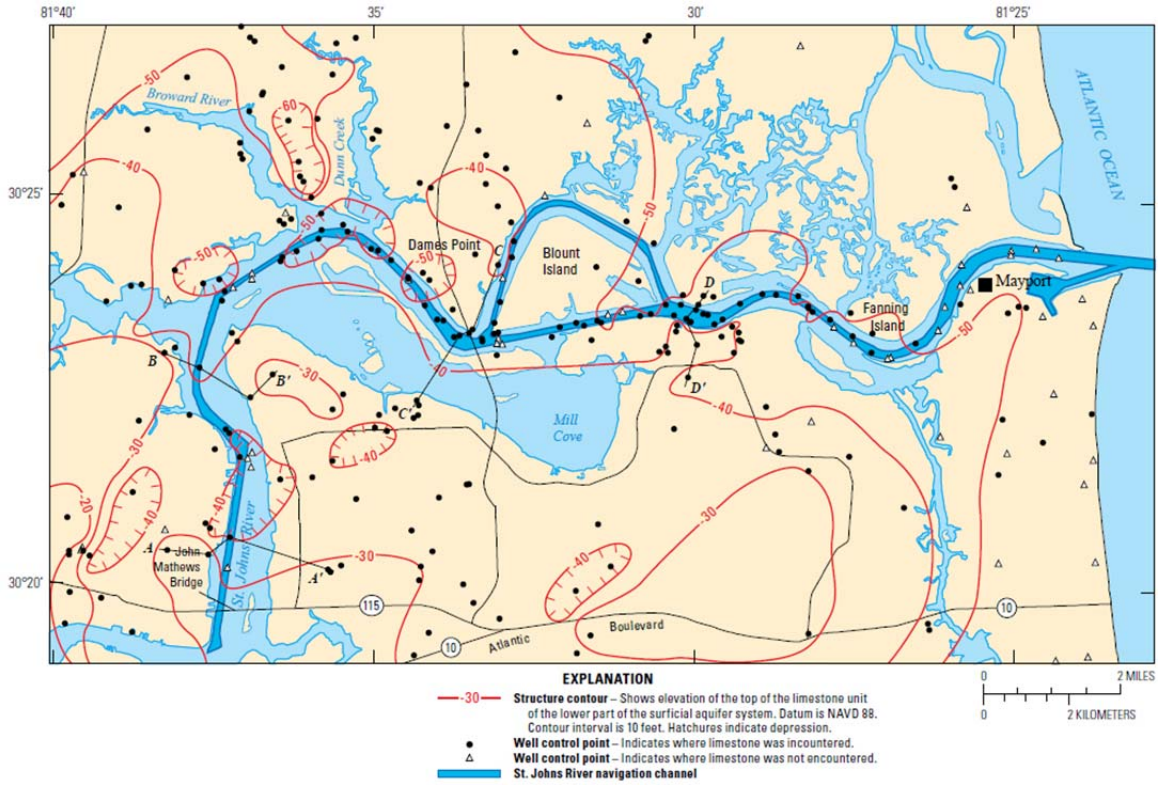

Figure 3. The estimated distribution of rock substrates in the Jacksonville Harbor Channel Deepening footprint and surrounding area

2.4 Environmental Commitments for In-Water Sea Turtles and Marine Mammals Dredging and placement of dredge materials:

1. Hopper dredge operations will follow South Atlantic Division Corps of Engineers Hopper Dredging Protocol of Atlantic Coast (SAD protocol, see Appendix A). Among the important requirements of this protocol, as related to the proposed action, are that: (1) sea turtle deflectors on the hopper dredge(s) suction dragheads ("sea turtle deflecting dragheads") will be used at all times, (2) sea turtle observers (i.e., NMFS-approved protected species observers), inflow screens and overflow screens shall be used at all times, except for during January and February, which are optional, and (3) a dredge shall not get closer than 750 yards to a right whale.
2. Monitoring for marine mammals will be required.
3. For mechanical (clamshell) dredging or impact hammer or punch barge operations, a dedicated marine mammal observer will be used. Operation of such equipment would stop when marine mammals are present.
4. For clamshell or impact hammer, the distance to shutdown is 50 feet as is the current practice for clamshell operations.
5. Dredged material would be placed in the EPA-approved ODMDS in accordance with the EPA-approved Site Monitoring and Management Plan.
    a. Dredge contractors will be required to participate, and respond as described below, in the north Atlantic right whale (NARW) Early

Warning System (EWS), where ships are alerted to the presence of NARWs in the project area during the calving season with the aid of aerial surveys. To the extent practicable, dredge vessel operations in the NARW calving area during the calving season will be minimized, and transit courses altered immediately if necessary, upon notification of a NARW sighting through the EWS or other observers.

b. The USACE will, during the period November 15 through April 15, require all dredge-related vessels (e.g., hopper dredges, cutterhead dredges, barges, tugboats pulling or pushing barges or scows, relocation trawlers) moving through the NARW calving area to take the following precautions: (1) vessels shall not travel at speeds in excess of 10 knots; (2) if whales have been spotted via EWS or other observers within 15 nautical miles (nm) of the vessel's path within the previous 24 hours, the tug/barge or dredge operator shall slow down to 5 knots or less during evening hours, or when there is limited visibility due to fog, or sea states greater than sea state Beaufort 3 (NMFS further defines limited visibility, for purposes of this conservation measure, as any condition including fog, rain, smoke, sea spray, waves, inclement weather, etc. that reduce visibility to ½ nm (1000 yards) or less). A vessel traveling at 10 knots will cover a distance of 1 nm in 6 minutes; thus, this conservation measure will allow at least a 3-minute reaction/detection window during periods of reduced visibility, as defined above; (3) as noted in the Consultation History section of this opinion, as per an agreement reached between NMFS and the USACE, the speed limits for hopper dredges and dredge-related vessels as set forth in this proposed action shall only apply until a new Regional Biological Opinion for South Atlantic hopper dredging (SARBO) is signed, at which time the project would abide by the conditions set forth in the new SARBO.

c. The USACE shall require the use of a Silent Inspector (Dredge Quality Management) on all dredge vessels to ensure compliance with the 10-knot speed limit during the right whale calving season (November 15 through April 15 of each year). Silent Inspector (Dredge Quality Management) reports will be provided to NMFS within 90 days following the close of right whale calving season, to: NMFS Protected Resources Division, 263 13th Avenue South, St. Petersburg, Florida 33701-5505.

Blasting:

1. Blasting will be restricted to December through February annually, as required by the USFWS to protect manatees.
2. No more than six blasting events will occur during any day for a total of 3,240 blasting events for the project duration (6 events a day for 90 days each year).
3. As with the NMFS-approved Incidental Harassment Authorization for Miami Harbor, confined blasting (stemming) will be required along with sequential ignition and buffer zones to minimize risk to marine mammals and sea turtles.
4. An Incidental Harassment Authorization will be obtained from NMFS for the Jacksonville Harbor project prior to any blasting.

5. The maximum charge weight per delay (a simultaneous detonation of one or more charges within an array of charges) will be determined during the test blasting prior to initiating actual blasting for the project. The maximum charge will be based on vibration limitations determined by a number of variables (hole size, explosive density, proximity to closest structure, etc.).
6. Buffer zones would include the following:
    a. Danger Zone = The radius (r) in feet from the detonation beyond which no expected mortality or injury from an open water explosion is likely to occur equals 260 times the cube root (exponent 1/3) of the weight (W) of the explosive charge (tetryl or TNT) in pounds (r=260xW^(1/3)).
    b. The Safety zone (exclusion zone) = The approximate distance (s) in feet beyond which injury (Level A Harassment as defined by the MMPA) from an open water explosion is unlikely equals 520 times the cube root (exponent 1/3) of the weight (W) of the explosive charge (tetryl or TNT) in pounds (s=520xW^(1/3)).
    c. The Watch Zone is three times the radius of the Danger Zone to ensure that animals entering to traveling close to the Safety Zone are spotted and appropriate actions can be implemented before or as the animal enters the exclusion zone (i.e., a delay in blasting activities).
    d. Detonation will not occur if a marine mammal or sea turtle is known to be (or based on previous sightings, may be) within the circular area around the detonation site within the Danger Zone + 500 feet. Additionally, aerial/vessel surveys shall be coordinated within the Safety and Watch Zones.

Additional Conservation Measures that will be followed:

1. NMFS's *Sea Turtle and Smalltooth Sawfish Construction Conditions*, dated March 23, 2006 (Appendix B).

Summary

Because some of the exact details for construction of the project are not yet determined, we plan to complete our analysis with the available information, resolving any remaining uncertainties in a precautionary manner to protect the species. Therefore, in the absence of finalized project plans (dredge type, blasting locations, etc.), we will complete this opinion based on the following assumptions that could be considered the worst case scenario of all options:

1. Approximately 18 mcy of material will be removed from the Jacksonville Harbor.
2. Dredging where the material can be excavated without blasting will be carried out using a hopper dredge. Hopper dredging is the most harmful means of dredging to the species affected by the action. Consequently, we assume all dredging where blasting isn't required will be done by hopper dredging, which results in the estimating the largest potential take of listed species.[2]
3. Dredging will be conducted year-round for a period of 6 years.

[2] The USACE will not know which method of dredging (hydraulic, clamshell, or hopper) will be used until the contracts for this project are let and awarded.

4. Approximately 6,000 loads (depending on the size of the transport barges or hopper dredges used) of dredged material will transported to offshore ODMD locations, either the existing Jacksonville ODMDS or the proposed location to the south of the existing ODMDS.
5. Of the 18 mcy, approximately 2.7 mcy (15%) is expected to be rock or rock fragments likely resulting from blasting. It is unknown at this time how much blasting will be required. We will assume the maximum predicted, or six blasting events daily between December and February of each year, for a total of 3,240 blasting events over the project duration (six events a day for 90 days each year, for six years).

2.5 Action Area

50 CFR 404.02 defines action area as "all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action." The action area for the project includes all areas to be dredged from four miles east of River Mile 1 to River Mile 13 and from harbor mouth to the ODMDS locations offshore (shown in Figure 2)

3 SPECIES AND CRITICAL HABITAT OCCURRING IN THE ACTION AREA

Species and Critical Habitat:

Table 2 below lists the endangered (E) and threatened (T) species, and actual and proposed critical habitats under the jurisdiction of NMFS that may occur in the action area:

Table 2. Status of Listed Species in the Action Area (E= Endangered, T=Threatened)

Species		Scientific Name	Status	Geographic Area	USACE Effect Determination	NMFS Effect Determination
Sea Turtles	Loggerhead sea turtle, Northwest Atlantic (NWA) distinct population segment (DPS)	*Caretta caretta*	T	South Atlantic and Gulf	LAA (Likely to Adversely Affect)	LAA
	Green sea turtle	*Chelonia mydas*	E/T[3]	South Atlantic and Gulf	LAA	LAA
	Kemp's ridley sea turtle	*Lepidochelys kempii*	E	South Atlantic and Gulf	LAA	LAA
	Leatherback sea turtle	*Dermochelys coriacea*	E	South Atlantic and Gulf	LAA	NLAA (Not Likely to Adversely Affect)
	Hawksbill sea turtle	*Eretmochelys imbricata*	E	South Atlantic and Gulf	LAA	NLAA
Fish	Shortnose sturgeon	*Acipenser brevirostrum*	E	South Atlantic, within state waters only	LAA	NLAA
	Atlantic sturgeon	*Acipenser oxyrinchus oxyrinchus*	E	South Atlantic	NLAA	NLAA
	Smalltooth sawfish	*Pristis pectinata*	E	South Atlantic and Gulf	NLAA	NLAA
Whales	North Atlantic right whale	*Eubalaena glacialis*	E	South Atlantic	NLAA[4]	NLAA
Critical Habitat For:			**Geographic Area:**			
	North Atlantic right whale		South Atlantic		NLAA	NE (No Effect)
	Loggerhead sea turtle: Northwest Atlantic Ocean (NWA) distinct population segment (DPS)		Proposed (July 18, 2013). The final critical habitat rule is expected mid-2014.		NLAA	NE

3.1 Analysis of Species and Critical Habitats Not Likely to be Adversely Affected

We have determined that the proposed action being considered in this opinion is not likely to adversely affect leatherback sea turtles, hawksbill sea turtles, Atlantic sturgeon, smalltooth sawfish, and North Atlantic right whales; critical habitat for North Atlantic

[3] Green sea turtles in U.S. waters are listed as threatened except for the Florida breeding population, which is listed as endangered.

[4] The USACE initially determined the project "may affect" North Atlantic right whales and later changed their effect determination to "not likely to adversely affect" in an e-mail dated October 23, 2013, from Kenneth Dugger, USACE Jacksonville.

right whales; and proposed critical habitat for loggerhead sea turtles (the NWA DPS). These species and critical habitats are excluded from further analysis and consideration in this opinion. The following discussion summarizes our rationale for this determination.

3.1.1 Leatherback Sea Turtle

Leatherback sea turtles may be found in the action area, particularly when onshore winds and/or currents push jellyfish, their preferred prey, into inshore waters. However, leatherbacks are primarily a pelagic species, preferring deeper waters than those of the action area (the deepest portions of the offshore action area are less than 60 feet deep). Furthermore, in over 30 years of NMFS consultations with the USACE on hopper dredging projects carried out in the Jacksonville Harbor area (including dredging activities at Mayport), there has never been a documented take of a leatherback sea turtle by a hopper dredge. Because of this and their very large size (compared to hopper dredge dragheads or mechanical dredge equipment), pelagic nature (surface and mid-water), preference for deeper waters located beyond the project area further offshore, and feeding habits (which make it unlikely they would ever encounter a bottom-hugging hopper dredge draghead or be exposed to any project blasting which will occur upriver), NMFS believes the possibility that they would be adversely affected by a hopper dredge is discountable.

3.1.2 Hawksbill Sea Turtle

With respect to the United States, nesting occurs in Puerto Rico, the U.S. Virgin Islands, and along the southeast coast of Florida. Outside of the nesting areas, hawksbills have been seen off the U.S. Gulf of Mexico states and along the Eastern Seaboard as far north as Massachusetts, although sightings north of Florida are rare (NMFS and USFWS 1993). They are closely associated with coral reefs and other hard-bottom habitats, but they are also found in other habitats including inlets, bays, and coastal lagoons (NMFS and USFWS 1993). The hawksbill's diet is highly specialized and consists primarily of sponges (Meylan 1999). During the past 30 years of NMFS consultations with the USACE on hopper dredging projects carried out in the Jacksonville Harbor area there has never been a documented take of a hawksbill sea turtle by a hopper dredge.[5] Due to hawksbill sea turtles' preferred habitat and diet, it is not expected that interactions would occur upriver in areas of blasting, bed leveling, or in the action area; therefore, NMFS believes the possibility that they would be adversely affected is discountable.

3.1.3 Atlantic Sturgeon

Historically, Atlantic sturgeon sightings have been reported from Hamilton Inlet, Labrador, south to the St. Johns River, Florida. Overharvest led to wide-spread declines in abundance. Since a 1998 harvest moratorium, there have been few surveys to assess status and abundance. In their estuarine and freshwater habitats, Atlantic sturgeon face additional threats, including habitat degradation and loss from various human activities such as dredging, dams, water withdrawals, and other development. Since the impoundment of a major tributary, the Oklawaha River, at River Mile 95, there no longer appears to be a spawning population in the St. Johns River. In recent years, only two reports of Atlantic sturgeon in the St. Johns River, Florida, , have been confirmed. In

[5] http://el.erdc.usace.army.mil/seaturtles/index.cfm

February of 2011, two year-one/year-two juvenile (~40 centimeter) Atlantic sturgeon were caught on hook and line, from the shore, in the St. Johns River (Snyder, pers. comm. 2011). No other observations of Atlantic sturgeon have been made in the St. Johns River or local area. According to the Sea Tutle Data Warehouse (STDW)[6], during the past 30 years of NMFS consultations with the USACE on hopper dredging projects carried out in the Jacksonville Harbor area there has never been a documented take of an Atlantic sturgeon by a hopper dredge. Because Atlantic sturgeon are a rare occurrence in the project area, effects of the JHP on Atlantic sturgeon are discountable.

3.1.4 Shortnose Sturgeon

Anecdotal and archival data indicate that sturgeon were frequently caught in the St. Johns as bycatch in commercial gillnets between 1970 and 1990. Five shortnose sturgeon were collected in the St. Johns in the late 1970s (Dadswell et al. 1984) and, in 1981, three sturgeon were collected by the Florida Fish and Wildlife Conservation Commission (FWC). No sturgeon were caught incidentally during a survey aimed at other species between 1980 through 1993 when a total of 21, 381 hours of effort with 100-yard gillnets was conducted. The most recent directed survey for sturgeon in the St. Johns River was conducted by the Florida Fish and Wildlife Conservation Commission utilizing the NMFS survey protocol; the 2001-2004 FWC shortnose survey captured a single shortnose sturgeon south of Federal Point nearby Palatka on January 22, 2002, during 4,493 net hours and within three kilometers of the area where most historical catches occurred. Interestingly, none of the collections were recorded from the estuarine portion of the basin; all captures occurred far upstream in an area heavily influenced by artesian springs with high mineral content. Shortnose sturgeon are known to use freshwater springs in other southern rivers, but only eight individual fish have been observed in the numerous freshwater springs found upstream in the St. Johns River system, and these sightings occurred in the 1970s and early 1980s. Florida Fish and Wildlife Research Institute (FWRI) concluded that with the lack of current sightings in surveys, the patchy and extremely infrequent catch of small individuals, and the historic low numbers, it is highly unlikely that a significant population of shortnose sturgeon currently resides within the St. Johns River (FFWCC 2007). According to the STDW, during the past 30 years of NMFS consultations with the USACE on hopper dredging projects carried out in the Jacksonville Harbor area there has never been a documented take of a shortnose sturgeon by a hopper dredge. Because shortnose sturgeon are a rare occurrence in the project area, effects of the JHP on shortnose sturgeon are discountable.

3.1.5 Smalltooth Sawfish

NMFS has identified the following potential effects to smalltooth sawfish and has concluded that sawfish are not likely to be adversely affected by the proposed action. Smalltooth sawfish have been sighted twice near the action area, once in 2006 and again in 2010, both observations occurring in a tidal creek on the north side of the estuary.[7] In the unlikely event a sawfish is present in the project area, sawfish should not be affected by the dredging or construction activities because the dredges advance at a slow pace and

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[6] The STDW collects data on any species encountered during dredging operations.
[7] Mote Marine Laboratory's Sawfish Encounter Database, http://www.flmnh.ufl.edu/fish/sharks/sawfish/sawfishdatabase.html.

are noisy, giving mobile sawfish the opportunity to get out of the way (no sawfish take by a dredge has ever been reported to NMFS). Thus, we have determined that adverse effects to smalltooth sawfish from dredging and construction related activities are discountable.

Sawfish may also be affected by blasting. Underwater explosions produce a pressure waveform with rapid oscillations from positive pressure to negative pressure which results in rapid volume changes in gas-containing organs. In fish, the swim bladder, a gas-containing organ, is the most frequently damaged organ (Christian 1973; Falk and Lawrence 1973; Kearns and Boyd 1965; Linton et al. 1985). It is subject to rapid contraction and overextension in response to the explosive shock waveform (Wiley et al. 1981). Species lacking swim bladders (like smalltooth sawfish) or with small swim bladders are highly resistant to explosive pressures (Aplin 1947; Fitch and Young 1948; Goertner et al. 1994). For example, Wiley et al. (1981) and Goertner et al. (1994) noted that hogchokers (*Trinectes maculatus*), which lack swim bladders, were extremely tolerant of underwater explosions, and greatly exceeded the tolerance of any species with swim bladders that they had tested. Thus, we have determined that adverse effects to smalltooth sawfish from blasting related activities will be insignificant. Additionally, sawfish may be adversely affected by impacts of the action on prey, and therefore, sawfish foraging in the area. However, prey items (e.g., fish and crustaceans) are not limiting in Florida's east coast waters and, since mangroves are not affected, we have determined that the project effects on foraging habitats for smalltooth sawfish will be insignificant. For the reasons stated, smalltooth sawfish are not likely to be adversely affected by the proposed action

3.1.6 North Atlantic Right Whale

The nearshore waters of northeast Florida and southern Georgia were first identified as a likely calving and nursery area for right whales in 1984. While sightings off Georgia and Florida include primarily adult females and calves, but juveniles and adult males are also commonly observed. Annual right whale migration to and from, and use of, calving grounds off the southeastern U.S. coast, occur from November 1 through April 30.

Twenty percent of all right whale mortalities observed between 1970 and 1989 were caused by vessel collisions/interactions with right whales. Seven percent of the population exhibit scars indicative of additional, non-lethal vessel interactions (Kraus 1990). In 2011, of four deceased right whales encountered, half were associated with rope entanglement, one had multiple skull and vertebral fractures that are consistent with ship strike, and a fourth was found floating offshore with no evidence of entanglement. In January 2011, a live right whale was observed with approximately 14 propeller cuts across its body; it had been observed five days earlier with no injuries. On January 24, 2011, a right whale entered the St. Johns River in Florida and proceeded upstream. Its presence for nine hours in the navigational channel resulted in the closure of commercial marine traffic, Navy operations, and USACE dredging activities.

As a result of the potential for interactions between hopper dredges and right whales, the 1991 biological opinion for the dredging of channels in the southeastern United States

from North Carolina through Cape Canaveral, Florida (NMFS 1991) required observers on board hopper dredges operating from December through March off Georgia and northern Florida to maintain surveys for the occurrence of right whales during transit between channels and disposal areas. Since January 1994, aerial surveys funded by the USACE in association with dredging activities in the Southeast have been amplified through the implementation of the right whale early warning surveys (EWS). These surveys, jointly funded by the USACE, NMFS, the Navy, and the Coast Guard, are conducted to identify the occurrence and distribution of right whales in the vicinity of ship channels in the winter breeding area, and to notify nearby vessel operators of whales in their path.

Records of right whale ship strikes (Knowlton and Kraus 2001) and large-whale ship strike records (Jensen and Silber 2003; Laist et al. 2001) have been compiled, and all indicate vessel speed is a principal factor in ship strikes. In assessing records in which vessel speed was known, Laist et al. (2001) found "a direct relationship between the occurrence of a whale strike and the speed of the vessel involved in the collision." The authors concluded that most deaths occurred when a vessel was traveling in excess of 14 knots. Jensen and Silber (2003) identified 292 records of known or probable ship strikes of all large whale species from 1975 to 2002. In 58 of the records, ship speed at the time of collision was known: it ranged from 2 to 51 knots, with an average of 18.1 knots. A majority (79%) of ship strikes occurred at speeds of 13 knots or greater. Of the 58 cases where speed was known, 19 (32.8%) resulted in serious injury to the whale. The mean vessel speed that resulted in serious injury or death to the whale was 18.6 knots (Jensen and Silber 2003).

Using a total of 64 records of ship strikes in which vessel speed was known, Pace and Silber (2005) tested speed as a predictor of the probability of death or serious injury. The authors concluded that there was strong evidence that the probability of death or serious injury increased rapidly with increasing speed. Specifically, the predicted probability of serious injury or death increased from 45% to 75% as vessel speed increased from 10 to 14 knots, and exceeded 90% at 17 knots. Interpretation of the logistic regression curve (Jensen and Silber 2003)injury or death around 25 knots and faster. In a related study, Vanderlaan and Taggart (2007) analyzed all published historical data on vessels striking large whales. The authors found that the probability of a lethal injury resulting from a strike ranged from 20% at 9 knots to 80% at 15 knots and 100% at 21 knots or more.

Related studies of the occurrence and severity of strikes relative to vessel speed have been conducted for other species and locations. Panigada et al. (2006) concluded that vessel speed restrictions and the relocation of vessel routes in high cetacean density areas would reduce the likelihood of ship strikes of fin whales in the Mediterranean Sea. Speed zones were adopted in Florida in the early 2000s to reduce the numbers of collisions and manatee injuries resulting from collisions with boats. Laist and Shaw (2006) assessed the effectiveness of these speed zones at reducing watercraft-related manatee deaths. Watercraft-related manatee deaths did decline in the areas assessed in the paper, and the authors reported that this decline reflected the fact that well-designed speed restrictions could be effective if properly enforced. They further stated that "reduced speed allows

time for animals to detect and avoid oncoming boats, and that similar measures may be useful for other marine mammal species vulnerable to collision impacts with vessels (e.g., North Atlantic right whales)" (Laist and Shaw 2006).

The behavior of whales in the path of approaching ships is uncertain, but in some cases, last-second flight responses may occur. If a whale attempts to avoid an oncoming vessel at the last minute, a burst of speed coupled with a push from the bow wave could mean that mere seconds might determine whether the whale is struck (Laist et al. 2001). A reduction in speed from 18 knots to 10 knots would give whales an additional 8.6 seconds (at a distance of 100 m) to avoid the vessel in this flight response (Laist 2005, unpublished data). In a separate study involving whale behavior, Kite-Powell et al. (2007) developed a model that analyzed ship strike risk with respect to vessel speed and whale avoidance behavior. The authors of the ship strike analysis assert that ship strike risk decreases as speed decreases and the distance that the whale detects the vessel increases. Assuming certain whale behavior, the model suggests that the ship strike risk posed by a conventional ship (e.g., container ship) traveling at 20 to 25 knots can be reduced by 30% at a speed of 12 or 14 knots, and by 40% at 10 knots, due to the whales' increased ability to detect and avoid approaching vessels. If a whale detects and reacts to an oncoming vessel at a distance of 820 ft (250 m) or greater, it will likely avoid a ship strike, whereas at detection distances less than 328 ft (100 m), the probability of ship strike is almost 100% at speeds of 15 knots or faster. However, research on vessel-whale collisions indicates that of three speeds considered—10, 12, and 14 knots—adopting a speed limit of 10 knots would be the most beneficial to the recovery of the right whale population. Historically, only a small percentage of ship strikes occurred at 10 knots, and those that did usually resulted in injury rather than death (Laist et al. 2001). Although, it is important to note of the three speeds considered above, while a 10-knot speed restriction is most effective at reducing the risk of ship strikes, it will not eliminate the risk; there is still a 45% predicted probability of serious injury or mortality at 10 knots (Pace and Silber 2005).

NMFS review of the project indicates that the JHP will not result in increased level of container vessel visits to the area. The proposed action allows for larger and more fully loaded vessel to call on the port. In general, construction of the TSP would result in larger ships with fewer ship transits ; however, NMFS is expecting an increase in vessel traffic related to dredge activities transiting between the navigational channel and the disposal sites.

NMFS-approved endangered species observers will be required to be present to watch for marine mammals during all daytime hopper dredging and any vessel transits from the JPH to the ODMDS locations that occur during the right whale migration/calving season as described in Section 2.3. This will further reduce the chances of an inadvertent collision with a right whale by increasing vessel reaction time, whale reaction time, and likelihood of detection of a right whale. Depending on the size of the vessel used, it is estimated there could be up to 6,000 dredge trips during the project to dispose of the dredged material to be removed (18 mcy) during the JHP. Right whales occur in low densities and in irregular distribution within the area designated as critical habitat

including the areas between the entrance channel and the disposal areas (B. Zoodsma, NMFS, personal communication to K. Reece, NMFS, 2013). Given their reduced numbers and irregular habitat usage patterns, it is unlikely that right whales will be adversely impacted by dredge-related vessel transits. The likelihood of interaction is further reduced by the precautions stipulated for vessel avoidance and the RPMs of this opinion, which require dredge-related vessels (i.e., dredges and towed or self-propelled barges) to abide by the federal 10-knot speed restriction during right whale migration/calving season while in specified areas designated as right whale critical habitat. NMFS believes that the required RPM dredge-related-vessel speed limit during the right whale migration/calving season of no greater than 10 knots (no greater than 5 knots at night and during periods of limited visibility, will reduce the chance of an inadvertent collision with a right whale by (1) significantly increasing the watch stander(s) reaction time (i.e., the time between when s/he detects the whale and takes action to avoid it), (2) significantly increasing the likelihood of detection of a right whale that may be in, near, or approaching the path of the vessel, and (3) significantly increasing the likelihood that the whale will detect the oncoming vessel and avoid it. Thus, NMFS concludes that the project's vessel related effects on North Atlantic right whales are discountable based on the rarity of the species and on the implementation of the suite of whale conservation measures discussed above and in the RPMs of this opinion.

3.1.7 North Atlantic Right Whale Critical Habitat

Designated North Atlantic right whale critical habitat (50 FR 28793) can be found in the Atlantic portion of the action area from the mouth of the Altamaha River, Georgia, to Jacksonville, Florida, out 15 nm and from Jacksonville, Florida, to Sebastian Inlet, Florida, out 5 nm. The disposal of dredged material will not significantly impact water depth or the termperature of the ocean. The likelihood of interaction which may impact the distribution of right whale calf/cow pairs is further reduced by the precautions stipulated for vessel avoidance. Thus, the proposed action will have no effect on the physical and biological features (water depth, water temperature, and the distribution of right whale cow/calf pairs in relation to the distance from the shoreline to the 40-m isobath (Kraus et al. 1993)), which were the basis for determining this habitat to be critical.

3.1.8 Loggerhead NWA DPS Proposed Critical Habitat

NMFS proposed critical habitat for the loggerhead NWA DPS on July 18, 2013. The final critical habitat rule is expected to be published in mid-2014. Figure 2 shows the proposed nearshore reproductive area (LOGG-N-14) in relation to the JHP and the ODMDS locations. The nearshore reproductive area is inshore and just south and west of the ODMDS locations and thus is not in the action area and will not be affected by the proposed action. The USFWS addressed terrestrial areas (nesting beaches) in a separate document but since all dredged material disposal will occur in the ODMDS locations, nesting beaches will not be affected.

Summary
NMFS has determined that leatherback and hawksbill sea turtles, Atlantic and shortnose sturgeon, smalltooth sawfish, North Atlantic right whales, designated critical habitat for North Atlantic right whales, and proposed critical habitat for loggerhead sea turtles (NWA DPS) are not likely to be adversely affected by the proposed action. These species and critical habitats will not be considered further in this opinion.

3.2 Species Likely to be Adversely Affected

The following discussion focuses on the species of sea turtles that NMFS believes are likely to be adversely affected by the proposed action. The sea turtle subsections focus primarily on the natural history of Atlantic Ocean populations of these species since these are the populations that may be directly affected by the proposed action. As sea turtles are highly migratory, potentially affected species in the action area may make migrations in other areas of the Gulf of Mexico, Atlantic Ocean, and Caribbean Sea. The following subsections are synopses of the best available information on the life history, distribution, population trends, and current status of the three species of sea turtles that are likely to be adversely affected by one or more components of the proposed action. Additional background information on the status of sea turtle species can be found in a number of published documents, including: recovery plans for the Atlantic green sea turtle (NMFS and USFWS 1991a), Kemp's ridley sea turtle (NMFS and USFWS 1992), and loggerhead sea turtle (NMFS and USFWS 2008a); and status reviews, stock assessments, and biological reports (NMFS-SEFSC 2001; NMFS-SEFSC 2009b; NMFS and USFWS 1995; NMFS and USFWS 2007a; NMFS and USFWS 2007b; NMFS and USFWS 2007c; NMFS and USFWS 2007d; NMFS and USFWS 2007e; TEWG 1998; TEWG 2000a; TEWG 2007; TEWG 2009).

3.2.1 Loggerhead Sea Turtle – NW 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 designating nine DPSs for loggerhead sea turtles (76 FR 58868, September 22, 2011, effective October 24, 2011). The DPSs established by this rule include (1) Northwest Atlantic Ocean (threatened), (2) Northeast Atlantic Ocean (endangered), (3) South Atlantic Ocean (threatened), (4) Mediterranean Sea (endangered), (5) North Pacific Ocean (endangered), (6) South Pacific Ocean (endangered), (7) North Indian Ocean (endangered), (8) Southeast Indo-Pacific Ocean (endangered), and (9) Southwest Indian Ocean (threatened). The Northwest Atlantic (NWA) DPS is the only one that occurs within the action area and therefore is the only one considered in this opinion.

Species Description and Distribution
Loggerheads are large sea turtles with the mean straight carapace length (SCL) of adults in the southeast United States being approximately 3 ft (92 cm). The corresponding mass is approximately 255 lb (116 kg) (Ehrhart and Yoder 1978). Adult and sub-adult 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, five pairs of costals, five vertebrals, and a nuchal (precentral) scute that is in contact with the first pair of costal scutes (Dodd 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 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 1988). Sub-adult and adult loggerheads are primarily found in coastal waters and prey on 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). In the western North Atlantic, loggerhead nesting is concentrated along the coasts of the United States from southern Virginia to Alabama. Additional nesting beaches 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 United States and Caribbean Sea. Little is known about the distribution of adult males who are seasonally abundant near nesting beaches although aerial surveys suggest that loggerheads in U.S. waters are distributed as a whole in the following proportions: 54% in the southeast U.S. Atlantic, 29% in the northeast U.S. Atlantic, 12% in the eastern Gulf of Mexico, and 5% in the western Gulf of Mexico (TEWG 1998).

Within the NWA, 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 five 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 2000a); and (5) a Dry Tortugas nesting subpopulation, occurring in the islands of the Dry Tortugas, near Key West, Florida (NMFS-SEFSC 2001). The recovery plan for the Northwest Atlantic population of loggerhead sea turtles concluded, based on recent advances in genetic analyses, that there is no genetic distinction between loggerheads nesting on adjacent beaches along the Florida Peninsula and that specific boundaries for subpopulations could not be designated based on genetic differences alone. Thus, the 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 (1) the Northern Recovery Unit (Florida/Georgia border north through southern Virginia), (2) the Peninsular Florida Recovery Unit (Florida/Georgia border through Pinellas County, Florida), (3) the Dry Tortugas Recovery Unit (islands located west of Key West, Florida), (4) the Northern Gulf of Mexico Recovery Unit (Franklin County, Florida, through

Texas), and (5) the Greater Caribbean Recovery Unit (Mexico through French Guiana, the Bahamas, Lesser Antilles, and Greater Antilles) (NMFS and USFWS 2008a). 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 eight life stages for the loggerhead life cycle, including the ecosystems those stages generally use: (1) egg (terrestrial zone), (2) hatchling stage (terrestrial zone), (3) hatchling swim frenzy and transitional stage (neritic zone[8]), (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 organisms that reach sexual maturity between 20 and 38 years of age, although this varies widely among populations (Frazer and Ehrhart 1985; NMFS and SEFSC 2001). The annual mating season for loggerhead sea turtles occurs from late March to early June, and eggs are laid throughout the summer months. Female loggerheads 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). Along the southeastern United States, loggerheads lay an average of 100 to 126 eggs per nest (Dodd 1988) which incubate for 42 to 75 days before hatching (NMFS and USFWS 2008b).

As post-hatchlings, loggerheads hatched on U.S. beaches migrate offshore and become associated with Sargassum habitats[9], driftlines, and other convergence zones (Carr 1986), (Witherington 2002). Loggerheads originating from the NWA DPS are believed to lead a pelagic existence in the North Atlantic Gyre for a period as long as 7-12 years (Bolten et al. 1998) before moving to more coastal habitats. Recent 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 pelagic habitat in the North Atlantic longer than hypothesized or move back and forth between pelagic and coastal habitats interchangeably (Witzell 2002). Stranding records indicate that when immature loggerheads reach 15-24 inches (40-60 cm) SCL, they begin to occur 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, and numerous

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

[9] Sargassum is a type of free floating seaweed sometimes occurring in extensive rafts that provides habitat for distinctive communities of organisms adapted to the buoyant Sargassum habitat.

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.

Like juveniles, non-nesting adult loggerheads also use the neritic zone. However, these adult loggerheads use the relatively enclosed shallow-water estuarine habitats with limited ocean access are less frequently than the juveniles. Areas such as Pamlico Sound, North Carolina, and the Indian River Lagoon, Florida, are regularly used by juveniles but not adult loggerheads. In comparison, adult loggerheads tend to use estuarine areas with more open ocean access, such as 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. 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. 2007a; Georgia Department of Natural Resources, unpublished data; South Carolina Department of Natural Resources, unpublished data). Satellite telemetry has identified the shelf waters along the west Florida coast, The Bahamas, Cuba, and the Yucatán Peninsula as important resident areas for adult female loggerheads that nest in Florida (Foley et al. 2008; M. Lamont, Florida Cooperative Fish and Wildlife Research Unit, personal communication, 2009; M. Nicholas, National Park Service, personal communication, 2009). 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 as well as Florida Bay in the United States, and the north coast of Cuba (A. Bolten and K. Bjorndal, University of Florida, unpublished data). Moncada et al. (2010)report the recapture in Cuban waters of five adult female loggerheads originally flipper tagged in Quintana Roo, Mexico, indicating 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 2009a; NMFS and SEFSC 2001; NMFS and USFWS 2008a; TEWG 1998; TEWG 2000a; 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. However, nesting beach surveys 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 effort and methods are standardized [see, e.g., NMFS and USFWS (2008a)]. NMFS and USFWS (2008a) concluded that the lack of change in two important demographic parameters of loggerheads, remigration interval

and clutch frequency, indicate that time series on numbers of nests can provide reliable information on trends in the female population.

Peninsular Florida Recovery Unit

The Peninsular Florida Recovery Unit (PFRU) is the largest loggerhead nesting assemblage in the Northwest Atlantic. A near-complete nest census (all beaches including index nesting beaches) undertaken from 1989 to 2007 showed a mean of 64,513 loggerhead nests per year, representing approximately 15,735 nesting females per year (NMFS and USFWS 2008a). The statewide estimated total for 2012 was 98,601 nests (FWRI nesting database).

In addition to the total nest count estimates, the Florida Fish and Wildlife Research Institute (FWRI) uses an index nesting beach survey method. The index survey uses standardized data-collection criteria to measure seasonal nesting and allow accurate comparisons between beaches and between years. This provides a better tool for understanding the nesting trends (Figure 4). FWRI performed a detailed analysis of the long-term loggerhead index nesting data (1989-2012[10]). Three distinct trends over that time period were identified. From 1989-1998 there was a 23% increase, that was then followed by a sharp decline over the subsequent decade. However, recent large increases in loggerhead nesting occurred since then. FWRI examined the trend from the 1998 nesting high through 2012 and found the decade-long post-1998 decline had reversed and there was no longer a demonstrable trend. Looking at the data from 1989 through 2012 FWRI concluded that there was an overall positive change in the nest counts.

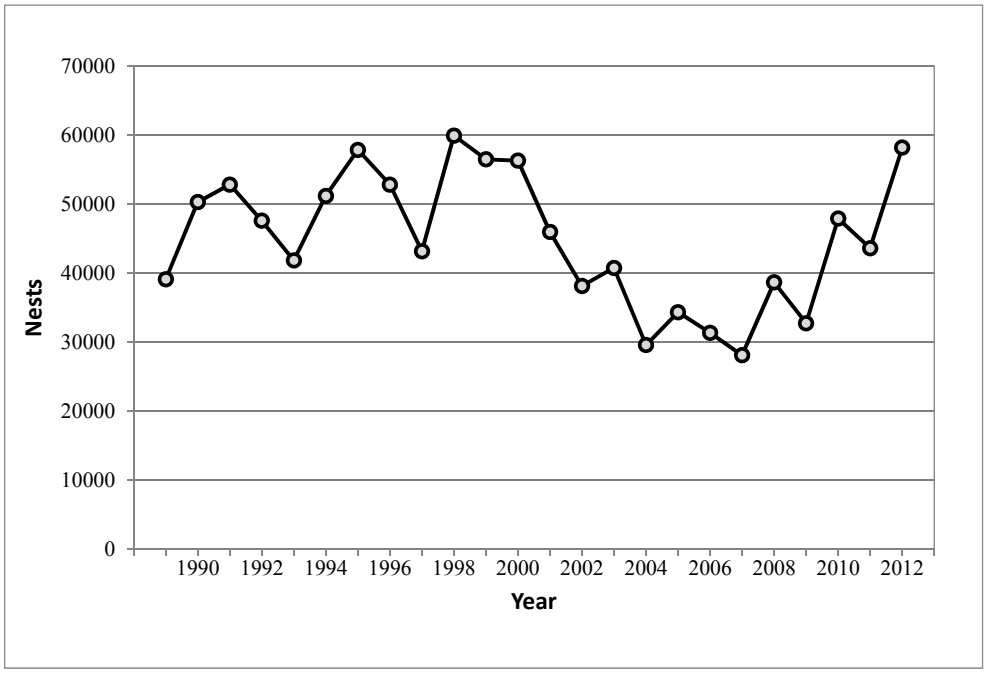

Figure 4. Loggerhead sea turtle nesting at Florida index beaches since 1989

[10] http://myfwc.com/research/wildlife/sea-turtles/nesting/loggerhead-trends

Northern Recovery Unit

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

Data since that analysis (Table 3) are showing improved nesting numbers and a departure from the declining trend. Georgia nesting has rebounded to show the first statistically significant increasing trend since comprehensive nesting surveys began in 1989 (Mark Dodd, GADNR press release, http://www.georgiawildlife.com/node/3139). South Carolina and North Carolina nesting have also begun to show a shift away from the past declining trend.

Table 3. Total Number of NRU Loggerhead Nests (GADNR, SCDNR, and NCWRC nesting datasets)

Nests Recorded	**2008**	**2009**	**2010**	**2011**	**2012**
Georgia	1,649	997	1,761	1,992	2,218
South Carolina	4,500	2,183	3,141	4,015	4,615
North Carolina	841	276	846	948	1,069
Total	6,990	3,456	5,748	6,955	7,902

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 2009-2012, with 2012 showing the highest index nesting total since the start of the program (Figure 5).[11]

[11] SCDNR website, http://www.dnr.sc.gov/seaturtle/nest.htm

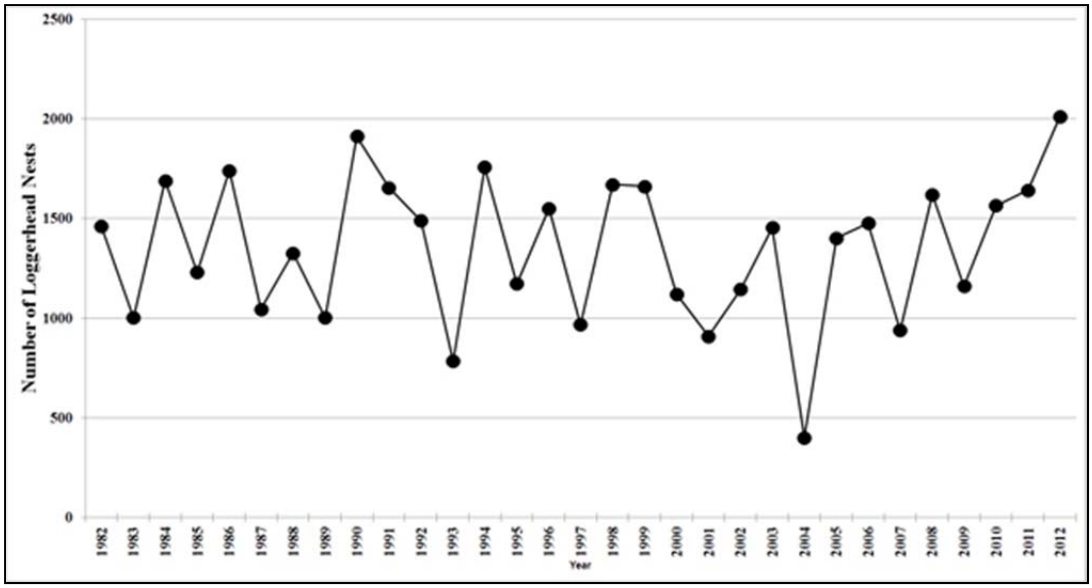

Figure 5. South Carolina Index Nesting Beach Counts for Loggerhead Sea Turtles

Other NW Atlantic DPS Recovery Units

The remaining three recovery units—Dry Tortugas (DTRU), Northern Gulf of Mexico (NGMRU), and Greater Caribbean (GCRU)—are much smaller nesting assemblages but 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 with no detectable trend during this period (NMFS and USFWS 2008a). 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 (NMFS and USFWS 2008a). Nesting on the Florida Panhandle index beaches, which represents the majority of NGMRU nesting, had shown a large increase in 2008, but then declined again in 2009 and 2010 before rising back to a level similar to the 2003-2007 average in 2011. Nesting survey effort has been inconsistent among the GCRU nesting beaches and no trend can be determined for this subpopulation. 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. However, nesting has declined since 2001, and the previously reported increasing trend appears to not have been sustained (NMFS and USFWS 2008a).

In-Water Trends

Nesting data are the best current indicator of sea turtle population trends; however, in-water data also provide some insight. Such 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) over the past several years (Ehrhart et al. 2007, Epperly et al. 2007, Arendt et al. 2009). Researchers believe that this increase in CPUE

is likely linked to an increase in juvenile abundance, though 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 (2008a), 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). However, in-water studies throughout the eastern United States also 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 Fishery 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 2009a). 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, as well as 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),suggests the adult female population size approximately 20,000 to 40,000 individuals, with a low likelihood of being up to 70,000 (NMFS-SEFSC 2009a). 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 2009a).

Threats

The threats faced by loggerhead sea turtles are well-summarized in the general discussion of threats in Section 3.2.1. However, the impact of fishery interactions is a point of further emphasis for this species. The Loggerhead Biological Review Team determined that the greatest threats to the NWA DPS of loggerheads result from cumulative fishery bycatch in neritic and oceanic habitats (Conant et al. 2009).

Regarding the impacts of pollution, loggerheads may be particularly affected by organochlorine[12] contaminants as they were observed to have the highest organochlorine concentrations in sampled tissues (Storelli et al. 2008). It is thought that dietary preferences were likely to be the main differentiating factor among 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).

[12] compounds that contain carbon, chlorine, and hydrogen.

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 clutches, leading to death (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), as well as short inter-nesting intervals (Hays et al. 2002) and shorter nesting season (Pike et al. 2006).

3.2.2 Green Sea Turtle

The green sea turtle was 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.

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) and a straight carapace length of greater than 3.3 ft (1 m). Green sea turtles have a smooth carapace with four 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 and USFWS 1997). The two largest nesting populations are found at Tortuguero, on the Caribbean coast of Costa Rica, 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. However, such mixing occurs at extremely low levels in Hawaiian foraging areas, perhaps making this central Pacific population the most isolated of all green sea turtle populations occurring worldwide (Dutton et al. 2008).

In U.S. Atlantic and Gulf of Mexico waters, green sea turtles are distributed in 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; Carr 1984), 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 Yucatan Peninsula.

The complete nesting range of green sea turtles within the southeastern United States includes sandy beaches between Texas and North Carolina, as well as the USVI and Puerto Rico (Dow et al. 2007; NMFS and USFWS 1991a). However, 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 through Broward counties. For more information on green sea turtle nesting in other ocean basins, refer to the 1991 Recovery Plan for the Atlantic Green Turtle (NMFS and USFWS 1991a) or the 2007 Green Sea Turtle 5-Year Status Review (NMFS and USFWS 2007a).

*Life History Informati*on

Green sea turtles reproduce sexually, and mating occurs in the waters off nesting beaches. Mature females return to their natal beaches (i.e., the same beaches where they were born) to lay eggs (Balazs 1982; Frazer and Ehrhart 1985) every 2-4 years while males are known to reproduce every year (Balazs 1983). In the southeastern United States, females generally nest between June and September, and peak nesting occurs in June and July (Witherington and Ehrhart 1989). During the nesting season, females nest at approximately two-week intervals, laying an average of 3-4 clutches (Johnson and Ehrhart 1996). Clutch size often varies among subpopulations, but mean clutch size is around 110-115 eggs. In Florida, green sea turtle nests contain an average of 136 eggs (Witherington and Ehrhart 1989). Eggs incubate for approximately two months before hatching. Survivorship at any particular nesting site is greatly influenced by the level of anthropogenic 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 (Campbell 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 2007b). Green sea turtles exhibit particularly slow growth rates of about 1-5 centimeters per year

(Green 1993; McDonald-Dutton and Dutton 1998), which may be attributed to their largely herbivorous, low-net energy diet (Bjorndal 1982). At approximately 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[13] 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 and Ingle 1974). However, some populations are known to also feed heavily on invertebrates (Carballo et al. 2002). Green sea turtles reach sexual maturity at 20-50 years of age (Chaloupka and Musick 1997; Hirth and USFWS 1997), which is considered one of the longest ages to maturity of any sea turtle species.

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, with some post-nesting turtles also residing in Bahamian waters as well (NMFS and USFWS 2007b).

Status and Population Dynamics

Population estimates for marine turtles do not exist because of the difficulty in sampling turtles over their geographic ranges and within their marine environments. However, researchers have used nesting data to study trends in reproducing sea turtles over time. A summary of nesting trends is provided in the most recent 5-year status review for the species (NMFS and USFWS 2007b) organized by ocean region (i.e., Western Atlantic Ocean, Central Atlantic Ocean, Eastern Atlantic Ocean, Mediterranean Sea, Western Indian Ocean, Northern Indian Ocean, Eastern Indian Ocean, Southeast Asia, Western Pacific Ocean, Central Pacific Ocean, and Eastern Pacific Ocean). Trends at 23 of the 46 nesting sites and found that 10 appeared to be increasing, 9 appeared to be stable, and 4 appeared to be decreasing. With respect to regional trends, the Pacific, the Western Atlantic, and the Central Atlantic regions appeared to show more positive trends (i.e., more nesting sites increasing than decreasing) while the Southeast Asia, Eastern Indian Ocean, and possibly the Mediterranean Sea regions appeared to show more negative trends (i.e., more nesting sites decreasing than increasing). These regional determinations should be viewed with caution since trend data was only available for about half of the total nesting concentration sites examined in the review and that site specific data availability appeared to vary across all regions.

The Western Atlantic region (i.e., the focus of this opinion) was one of the best performing in terms of abundance in the entire review as there were no sites that

[13] Skeletochronology is used to determine the chronological age of a species of animal by counting the concentric growth rings found in a cross section of bone.

appeared to be decreasing. The 5-year status review for the species identified eight geographic areas considered to be primary sites for green sea turtle nesting in the Atlantic/Caribbean and reviewed the trend in nest count data for each (NMFS and USFWS 2007a). These sites include (1) Yucatán Peninsula, Mexico; (2) Tortuguero, Costa Rica; (3) Aves Island, Venezuela; (4) Galibi Reserve, Suriname; (5) Isla Trindade, Brazil; (6) Ascension Island, United Kingdom; (7) Bioko Island, Equatorial Guinea; and (8) Bijagos Archipelago, Guinea-Bissau. Nesting at all of these sites was considered to be stable or increasing with the exception of Bioko Island and the Bijagos Archipelago where the lack of sufficient data precluded a meaningful trend assessment for either (NMFS and USFWS 2007a). Seminoff (2004) likewise reviewed green sea turtle nesting data for eight sites in the western, eastern, and central Atlantic, including all of the above with the exception that nesting in Florida was reviewed in place of Isla Trindade, Brazil. Seminoff (2004) concluded that all sites in the central and western Atlantic showed increased nesting, with the exception of nesting at Aves Island, Venezuela, while both sites in the eastern Atlantic demonstrated decreased nesting. These sites are not inclusive of all green sea turtle nesting in the Atlantic; however, other sites are not believed to support nesting levels high enough that would change the overall status of the species in the Atlantic (NMFS and USFWS 2007a). More information about site-specific trends for the other major ocean regions can be found in the most recent 5-year status review for the species (see NMFS and USFWS (2007a)).

By far, the largest known nesting assemblage in the Western Atlantic region occurs at Tortuguero, Costa Rica. According to monitoring data on nest counts, as well as documented emergences (both nesting and non-nesting events), there appears to be an increasing trend in this nesting assemblage since monitoring began in the early 1970s. 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 (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 2007a). Modeling by Chaloupka et al. (2008) using data sets of 25 years or more resulted in an estimate of the Tortuguero, Costa Rica, population 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 where an estimated 200-1,100 females nest each year (Meylan et al. 1994; Weishampel et al. 2003). Occasional nesting has also been documented along the Gulf coast of Florida (Meylan et al. 1995). More recently, green sea turtle nesting has occurred in North Carolina on Bald Head Island, just east of the mouth of the Cape Fear River, on Onslow Island, and on Cape Hatteras National Seashore. In 2010, a total of 18 nests were found in North Carolina, 6 nests in South Carolina, and 6 nests in Georgia (nesting databases maintained on www.seaturtle.org).

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 ten years of regular monitoring (Figure 6). According to data collected from Florida's index nesting beach survey from 1989-2012, green sea turtle nest counts across Florida have increased approximately ten-fold from a low of 267 in the early 1990s to a high of 10,701 in 2011. Two consecutive years of nesting declines in 2008 and 2009 caused some concern, but this was followed by increases in both 2010 and 2011 (Figure 6). Modeling by Chaloupka et al. (2008) using data sets of 25 years or more has resulted in an estimate of the Florida nesting stock at the Archie Carr National Wildlife Refuge growing at an annual rate of 13.9%.

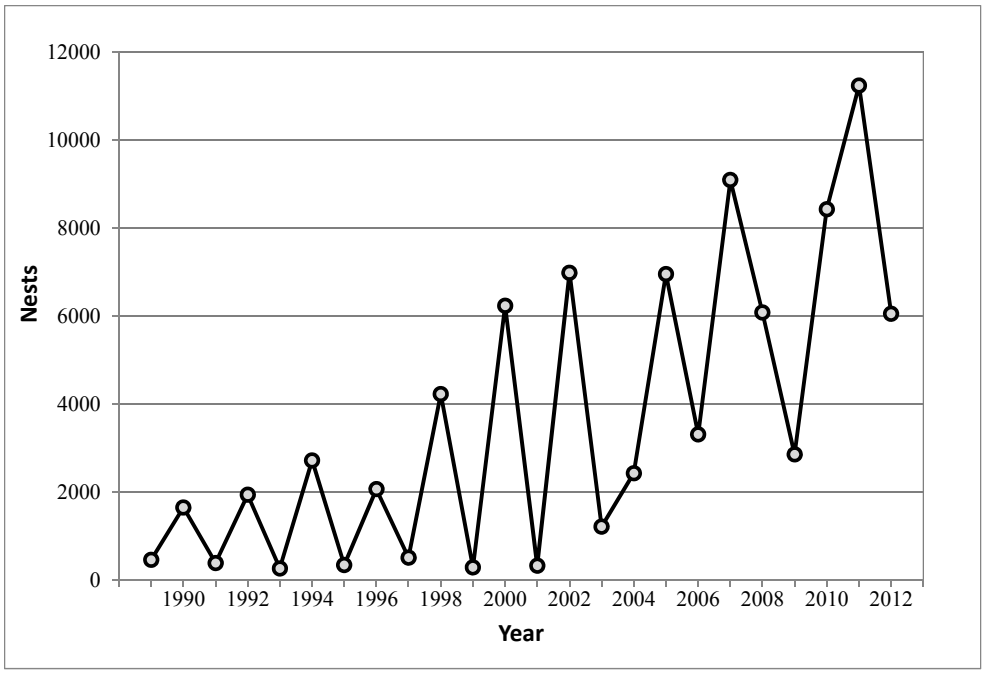

Figure 6. Green sea turtle nesting at Florida index beaches since 1989

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, etc.), ecosystem alterations (e.g., nesting beach development, beach nourishment and shoreline stabilization, vegetation changes, etc.), poaching, global climate change, fisheries interactions, natural predation, and disease. A discussion on general sea turtle threats can be found in Section 3.2.1.

In addition to general threats, green sea turtles are susceptible to natural mortality from Fibropapillomatosis (FP) disease. FP results in the growth of tumors on soft external

tissues (flippers, neck, tail, etc.), the carapace, the eyes, the mouth, and internal organs (gastrointestinal tract, heart, lungs, etc.) of turtles (Aguirre et al. 2002; Herbst 1994; Jacobson et al. 1989). These tumors range in size from 0.1 cm to greater than 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)]. Presently, FP is cosmopolitan, but 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 8°-10°C turtles may lose their ability to swim and dive, often floating to the surface. The rate of cooling that precipitates cold-stunning appears to be the primary threat, rather than the water temperature itself (Milton and Lutz 2003). Sea turtles that overwinter in inshore waters are most susceptible to cold-stunning because temperature changes are most rapid in shallow water (Witherington and Ehrhart 1989). During January 2010, an unusually large cold-stunning event in the southeastern United States resulted in around 4,600 sea turtles, mostly greens, found cold-stunned, with 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 being found cold-stunned in Texas. Of these, approximately 620 were found dead or died after stranding, and approximately 1,030 were rehabilitated and released. Additionally, 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.

3.2.3 Kemp's Ridley Sea Turtle

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

Species Description

The Kemp's ridley sea turtle is the smallest of all sea turtles. 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. 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 four 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 nesting records 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 is exponentially increasing, which may indicate a similar increase in the population as a whole (NMFS et al. 2011a; NMFS et al. 2011b).

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. The 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 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. (2011a) 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 two years. Nesting generally occurs from April to July and females lay approximately 2.5 nests per season with each nest containing approximately 100 eggs (Márquez M 1994).

Population Dynamics

Of the seven 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 21st century (Figure 7), indicating 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 reached a record high of 21,797 in 2012 (Gladys Porter Zoo nesting database 2013). A small nesting population is also emerging in the United States, primarily in Texas, rising from 6 nests in 1996 to 42 in 2004, to a record high of 209 nests in 2012.[14]

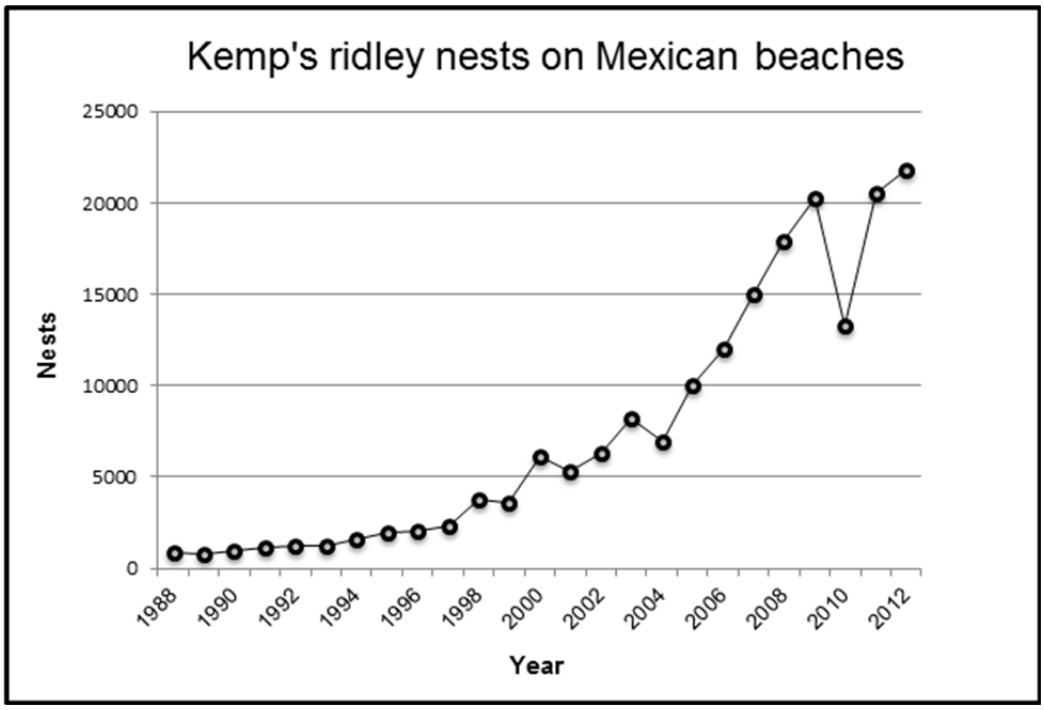

Figure 7. Kemp's ridley nest totals from Mexican beaches (Gladys Porter Zoo nesting database 2013)

Heppell et al. (2005) predicted in a population model that the population is expected to increase at least 12-16% per year and that the population could attain at least 10,000 females nesting on Mexico beaches by 2015. NMFS et al. (2011a) produced an updated model that predicted the population to increase 19% per year and 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 2012, it is clear that the

[14] National Park Service data, http://www.nps.gov/pais/naturescience/strp.htm, http://www.nps.gov/pais/naturescience/current-season.htm

population is steadily increasing. The recent increases in Kemp's ridley sea turtle nesting seen in the last two decades is likely due to a combination of management measures including elimination of direct harvest, nest protection, the use of turtle excluder devices (TED), reduced trawling effort in Mexico and the United States, and possibly other changes in vital rates (TEWG 1998; TEWG 2000b). 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 of which are often difficult to predict with any certainty.

Threats

Kemp's ridley sea turtles face many of the same threats as other sea turtle species, including destruction of nesting habitat from storm events, oceanic events such as cold-stunning, pollution (plastics, petroleum products, petrochemicals, etc.), ecosystem alterations (nesting beach development, beach nourishment and shoreline stabilization, vegetation changes, etc.), poaching, global climate change, fisheries interactions, natural predation, and disease. A discussion on general sea turtle threats can be found in Section 3.2.1; 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[15] 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 on emergence success.

Over the past three years, NMFS has documented (via the Sea Turtle Stranding and Salvage Network data, http://www.sefsc.noaa.gov/species/turtles/strandings.htm) elevated sea turtle strandings in the Northern Gulf of Mexico, particularly throughout the Mississippi Sound area. In the first three 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 Deepwater Horizon (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) occurring from March through July, 390 (86%) of which were Kemp's ridley sea turtles. During 2012, a total of 428 sea turtles were reported from Louisiana, Mississippi, and Alabama waters, though the data is incomplete. Of these reported strandings, 301 (70%) 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

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

sea turtle strandings for 2008 and 2009, respectively; however, 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, personal communication to M. Barnette, NMFS, 2012). Yet, available information indicates fishery effort was extremely limited during the stranding events. The fact that in both 2010 and 2011 approximately 85% of all Louisiana, Mississippi, and Alabama stranded sea turtles 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 fishery during the summer of 2012. During May-July, observers reported 24 sea turtle interactions in the skimmer trawl fishery, all but one of which were identified as Kemp's ridleys (one sea turtle was an unidentified hardshell turtle). Encountered sea turtles were all very small, juvenile specimens ranging from 7.6-19.0 in (19.4-48.3 cm) curved carapace length (CCL), and all sea turtles were released alive. 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-inch bar spacing of TEDs currently required in the shrimp fishery. Due to this issue, a proposed 2012 rule to require TEDs in the skimmer trawl fishery (77 FR 27411) was not implemented. Based on anecdotal information, these interactions were a relatively new issue for the inshore skimmer trawl fishery. 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.

3.2.4 General Threats Faced by All Sea Turtle Species

Sea turtles face numerous natural and anthropogenic threats that shape their status and affect their ability to recover. As many of the threats are either the same or similar in nature for all listed sea turtle species, those identified in this section below are discussed in a general sense for all listed sea turtles. Threat information specific to a particular species are then discussed in the corresponding status 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 1991a; NMFS and USFWS 1992; NMFS and USFWS 1993; NMFS and USFWS 2008a; NMFS et al. 2011b). Domestic fisheries often capture, injure, and kill sea turtles at various life stages. Sea turtles in the pelagic environment are exposed to U.S. Atlantic pelagic longline fisheries. Sea turtles in the benthic environment in waters

off the coastal United States are exposed to a suite of other fisheries in federal and state waters. These fishing methods include trawls, gillnets, purse seines, hook-and-line gear (including bottom longlines and vertical lines [e.g., bandit gear, handlines, and rod-reel]), pound nets, and trap fisheries. Refer to the Environmental Baseline section of this opinion for more specific information regarding federal and state managed fisheries affecting sea turtles within the action area). The Southeast U.S. shrimp fisheries have historically been the largest fishery threat to benthic sea turtles in the southeastern United States, and continue to interact with and kill large numbers of sea turtles each year.

In addition to domestic fisheries, sea turtles are subject to direct as well as incidental capture in numerous foreign fisheries, further impeding the ability of sea turtles to survive and recover on a global scale. For example, pelagic stage sea turtles, especially loggerheads and leatherbacks, circumnavigating the Atlantic are susceptible to international longline fisheries including the Azorean, Spanish, and various other fleets (Aguilar et al. 1995; Bolten et al. 1994; Crouse 1999). Bottom longlines and gillnet fishing is known to occur in many foreign waters, including (but not limited to) the northwest Atlantic, western Mediterranean, South America, West Africa, Central America, and the Caribbean. Shrimp trawl fisheries are also occurring off the shores of numerous foreign countries and pose a significant threat to sea turtles similar to the impacts seen in U.S. waters. Many unreported takes or incomplete records by foreign fleets make it difficult to characterize the total impact that international fishing pressure is having on listed sea turtles. Nevertheless, international fisheries represent a continuing threat to sea turtle survival and recovery throughout their respective ranges.

Non-Fishery In-Water Activities

There are also many non-fishery impacts affecting the status of sea turtle species, both in the ocean and on land. In nearshore waters of the United States, the construction and maintenance of federal navigation channels has been identified as a source of sea turtle mortality. Hopper dredges, which are frequently used in ocean bar channels and sometimes in harbor channels and offshore borrow areas, move relatively rapidly and can entrain and kill sea turtles (NMFS 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 re-nourishment, 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. In 2010, there was a massive oil spill in the Gulf of Mexico at BP's DWH well. Official estimates are that millions of barrels of oil were released into the Gulf of Mexico. Additionally, approximately 1.8 million gallons of chemical dispersant was applied on the seawater surface and at the wellhead to attempt to break down the oil. At this time the assessment of total direct impact to sea turtles has not been determined. Additionally, the long-term impacts to sea turtles as a result of habitat impacts, prey loss, and subsurface oil particles and oil components broken down through physical, chemical, and biological processes are not known.

Marine debris is a continuing problem for sea turtles. Sea turtles living in the pelagic environment commonly eat or become entangled in marine debris (e.g., tar balls, plastic bags/pellets, balloons, and ghost fishing gear) as they feed along oceanographic fronts where debris and their natural food items converge. This is especially problematic for sea turtles that spend all or significant portions of their life cycle in the pelagic environment (i.e., leatherbacks, juvenile loggerheads, and juvenile green turtles).

Climate Change

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

Climate change impacts on sea turtles currently cannot be predicted with any degree of certainty; however significant impacts to the hatchling sex ratios of sea turtles may result (NMFS and USFWS 2007c). 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 2007c).

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

Other changes in the marine ecosystem caused by global climate change (e.g., ocean acidification, salinity, oceanic currents, dissolved oxygen 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.[16] 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 2008a).

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.

Actions Taken to Reduce Threats

Actions have been taken to reduce man-made impacts to sea turtles from various sources, particularly since the early 1990s. These include lighting ordinances, predation control, and nest relocations to help increase hatchling survival, as well as measures to reduce the mortality of pelagic immatures, benthic immatures, and sexually mature age classes from various fisheries and other marine activities. Some actions have resulted in significant steps towards reducing the recurring sources of mortality of sea turtles in the environmental baseline and improving the status of all sea turtle populations in the Atlantic and Gulf of Mexico. For example, the TED regulation published on February

[16] *Solenopsis invicta*

21, 2003 (68 FR 8456), represents a significant improvement in the baseline effects of trawl fisheries on sea turtles, though shrimp trawling is still considered to be one of the largest source of anthropogenic mortality for most of our sea turtle species (NMFS-SEFSC 2009a).

4 ENVIRONMENTAL BASELINE

By regulation, environmental baselines for opinions include the past and present impacts of all state, federal, 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 that are contemporaneous with the consultation in process (50 CFR 402.02).

This section contains a description of the effects of past and ongoing human activities leading to the current status of the species, their habitat, and the ecosystem, within the action area. The environmental baseline is a snapshot of the factors affecting the species and includes federal, state, tribal, local, and private actions already affecting the species, or that will occur contemporaneously with the consultation in progress. Unrelated future federal actions affecting the same species in the action area that have completed formal or informal consultation are also part of the environmental baseline, as are implemented and ongoing federal and other actions within the action area that may benefit listed species.

The proposed action occurs in the Atlantic Ocean, Jacksonville Harbor Entrance Channel, and the navigational channel of the St Johns River. The following analysis examines actions that may affect these species' environment specifically within this defined action area. The environmental baseline for this opinion includes the effects of several activities affecting the survival and recovery of ESA-listed sea turtle species, in the action area. The activities that shape the environmental baseline in the action area of this consultation are primarily vessel operations and dredging.

4.1 Status and Distribution of Sea Turtles in the Action Area

Sea turtle species occurring in the project area that may be adversely affected by the proposed action are loggerhead, green, and Kemp's ridley. Sea turtles found in the immediate project area may travel widely throughout the Atlantic, Gulf of Mexico, and Caribbean Sea, and individuals found in the action area can potentially be affected by activities anywhere within this wide range. These impacts outside of the action area are discussed and incorporated as part of the overall status of the species as detailed in Section 3 above. The following environmental baseline includes past and ongoing human activities in the action area (Figure 2) that relate to the status of the species.

All of these species are highly migratory. The same individuals found in the action area may migrate into offshore waters and thus be impacted by activities occurring there; therefore, the species' statuses in the action area are considered to be the same as their range-wide statuses and supported by the species accounts in Section 3.

4.2 Factors Affecting Sea Turtles in the Action Area

As stated in Section 2.2 ("Action Area"), the proposed project is located Florida, within the Jacksonville Harbor on the St. Johns River from River Miles 0 to 13 and from the port entrance to the offshore ODMDS locations (Figure 2). The following analysis examines actions that may affect these species' environment specifically within the defined action area.

4.2.1 Federal Actions

In recent years, NMFS has undertaken several ESA Section 7 consultations to address the effects of federal actions on sea turtles, including green, Kemp's ridley, and loggerhead sea turtles, and when appropriate, has authorized the incidental taking of these species. Each of those consultations sought to develop ways of reducing the probability of adverse effects of the action on sea turtles. Similarly, NMFS has undertaken recovery actions under the ESA and is addressing the problem of take of sea turtles in the fishing industry and other activities such as USACE dredging operations. The summary below of sources of incidental take of sea turtles includes only those federal actions in the South Atlantic which have already concluded or are currently undergoing formal Section 7 consultation.

4.2.2 Dredging

Hopper Dredging

The construction and maintenance of federal navigation channels and sand mining ("borrow") areas using hopper dredges has been identified as a source of sea turtle mortality. Hopper dredges move relatively rapidly (compared to sea turtle swimming speeds) and can entrain and kill sea turtles as the drag arm of the moving dredge overtakes the slower-moving or stationary sea turtle. The USACE has biological opinions from NMFS covering the use of hopper dredges for maintenance dredging and beach re-nourishment activities in the Atlantic and Gulf of Mexico. Along the Atlantic coast of the southeastern United States (North Carolina through Florida), the USACE's current biological opinion authorizes annual take of up to 35 loggerheads, 7 greens, 7 Kemp's ridleys, and 2 hawksbill sea turtles from hopper dredging activities (NMFS 1997b). Consultation has been reinitiated on this opinion due to the listing of new species and designation of critical habitat.

The U.S. Navy has a biological opinion for the Homeporting of Additional Surface Ships at Naval Station Mayport, Duval County, Florida (USACE Permit No. SAJ-2002-2052). The consultation was originally completed in 2009 (NMFS Consultation No. F/SER/2008/03742). Activities included construction and dredging and the opinion authorized the Navy to lethally take up to 17 loggerhead, 3 green, and 2 Kemp's ridley sea turtles during the proposed project. Reinitiation of consultation was initially requested on May 9, 2011, to address green sea turtle takes in excess of the authorized level in the Incidental Take Statement of the opinion. This initial request was followed by additional Section 7(a)(2)/7(d) memos: (1) a memo on May 23, 2011, documenting the modifications made to the ongoing relocation trawling operations; (2) a memo on July 11, 2011, requesting additional green sea turtle takes; (3) a memo on August 19, 2011, analyzing additional dredge vessel transits to the Jacksonville Ocean Dredge Material Disposal Site (ODMDS); and (4) a memo on February 2, 2012, evaluating the revised

project's effects to green, loggerhead, and Kemp's ridley sea turtles. A new biological opinion (NMFS Consultation No. F/SER/2011/01906) was issued in 2012 with authorized take unchanged.

Mechanical Dredging
NMFS has previously determined in dredging biological opinions that, while oceangoing hopper-type dredges may lethally entrain protected species, non-hopper type dredging methods (e.g., clamshell or bucket dredging, cutterhead dredging, pipeline dredging, sidecast dredging) are slower and unlikely to overtake or adversely affect them. NMFS has no new information that would alter that finding.

4.2.3 ESA Permits

The ESA allows the issuance of permits to take ESA-listed species for the purposes of scientific research (Section 10(a)(1)(A)). In addition, the ESA allows for 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.

Sea turtles are the focus of research activities authorized by a Section 10 permit under the ESA. Authorized activities range from photographing, weighing, and tagging sea turtles incidentally taken in fisheries, blood sampling, tissue sampling (biopsy), and performing laparoscopy on intentionally captured turtles. The number of authorized takes varies widely depending on the research and species involved but may involve the taking of hundreds of turtles annually. Most takes authorized under these permits are expected to be non-lethal. Before any research permit is issued, the proposal must be reviewed under the permit regulations (i.e., must show a benefit to the species). In addition, since issuance of the permit is a federal activity, issuance of the permit by NMFS must also be reviewed for compliance with Section 7(a)(2) of the ESA to ensure that issuance of the permit does not result in jeopardy to the species.

4.2.4 State or Private Actions

Vessel Traffic
Commercial traffic and recreational pursuits can adversely affect sea turtles through propeller and boat strikes. However, the threat is not constant and is influenced by vessel type, vessel speed, and environmental conditions such as sea state and visibility. Given these variables, it is difficult to definitively evaluate potential risk to sea turtles stemming from specific vessel traffic. This difficulty is compounded by a general lack of information on vessel use trends, particularly in regard to offshore vessel traffic.

The Sea Turtle Stranding and Salvage Network (STSSN) includes many records of vessel interaction (crush and/or propeller injury) with sea turtles. The STSSN has documented 39,966 Florida stranding records (all species and size classes) in their database from 1980 through 2012. The stranding records include all causes of mortality, such as disease, hopper dredge impacts, hypothermic stunning (i.e., cold-stunning), interactions with fisheries, interactions with pollution, and vessel strikes. However, due to the condition of stranded turtles in many cases (i.e., decomposition), it was impossible to definitively

determine actual cause of mortality for 70% of the specimens. In addition, it was not possible to determine in many cases whether the vessel strike occurred before or after the turtle's death. Additionally, it should be noted that many turtles killed by anthropogenic causes will not show up in the strandings database, as the mortality event may occur far offshore or the damage to the turtle is so significant the carcass sinks, preventing the turtle from washing ashore. This point is important to remember when considering apparent geographical trends in the data, which may be an artifact of other factors rather than increased mortality risk in one area versus another. For example, turtles injured/killed in Monroe and Miami-Dade Counties may potentially be more well-represented in the strandings data due to bathymetric constraints that concentrate both turtles and vessel traffic relatively close to shore when compared to other counties with a broader continental shelf, where turtles may not wash up and be documented in the database. Additionally, stranding information does not indicate where a potential mortality event (e.g., vessel strike) occurred, as a turtle could have been injured/killed at one location and then drifted with currents (i.e., generally northward with the Gulf Stream on the East Coast) for a considerable distance before coming ashore.

Given the variables described above, though there are numerous strandings of turtles indicating vessel strike impacts each year, the exact extent of the vessel traffic impact on sea turtles is not quantifiable at this time.

State Fisheries

Recreational fishing from private vessels and from shore occurs in the area. Observations of Florida recreational fisheries have shown that loggerhead, leatherback, and green sea turtles are known to take baited hooks, and loggerheads frequently ingest the hooks. Hooked turtles have been reported by the public fishing from boats, piers, and beach, banks, and jetties and from commercial fishermen fishing for reef fish and for sharks with both single rigs and bottom longlines (NMFS 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 loggerhead sea turtles can be found in the TEWG reports (TEWG 1998; TEWG 2000a). In August of 2007, NMFS issued a regulation to require any fishing vessels subject to the jurisdiction of the United States to take observers upon NMFS's request (72 FR 43176, August 3, 2007). The purpose of the regulation is to learn more about sea turtle 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.

4.2.5 Other Potential Sources of Impacts in the Environmental Baseline

A number of activities that may affect sea turtles in the action area of this consultation include anthropogenic marine debris. The impacts from these activities are difficult to measure. Where possible, conservation actions are being implemented to monitor or study impacts from these sources.

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

4.2.6 Conservation and Recovery Actions Shaping the Environmental Baseline
NMFS has promulgated a series of regulations aimed at reducing potential for incidental mortality of sea turtles from commercial fisheries in the action area. These include sea turtle release gear requirements for Atlantic Highly Migratory Species (HMS) fisheries and TED requirements for Southeast shrimp trawl. In addition to regulations, outreach programs have been established and data on sea turtle interactions with recreational fisheries is collected through the Marine Recreational Fishing Statistical Survey (MRFSS). The summaries below discuss all of these measures in more detail.

Regulations Reducing Threats to Sea Turtles from Fisheries
On July 6, 2004, NMFS published a final rule to implement management measures to reduce bycatch and bycatch mortality of Atlantic sea turtles in the Atlantic pelagic longline fishery (69 FR 40734). The management measures include mandatory circle hook and bait requirements, and mandatory possession and use of sea turtle release equipment to reduce bycatch mortality. The rulemaking, based on the results of the 3-year Northeast Distant Closed Area research experiment and other available sea turtle bycatch reduction studies, is expected to have significant benefits to endangered and threatened sea turtles.

Revised Use of Turtle Excluder Devices in Trawl Fisheries
NMFS has also implemented a series of regulations aimed at reducing potential for incidental mortality of sea turtles in commercial shrimp trawl fisheries. In particular, NMFS has required the use of TEDs in southeast United States shrimp trawls since 1989 and in summer flounder trawls in the Mid-Atlantic area (south of Cape Charles, Virginia) since 1992. It has been estimated that TEDs exclude 97% of the sea turtles caught in such trawls. These regulations have been refined over the years to ensure that TED effectiveness is maximized through proper placement and installation, configuration (e.g., width of bar spacing), floatation, and more widespread use.

Other Sea Turtle Conservation Efforts
Sea Turtle Handling and Resuscitation Techniques
NMFS published a final rule (66 FR 67495, December 31, 2001) detailing handling and resuscitation techniques for sea turtles that are incidentally caught during scientific research or fishing activities. Persons participating in fishing activities or scientific research are required to handle and resuscitate (as necessary) sea turtles as prescribed in

the final rule. These measures help to prevent mortality of hard-shelled turtles caught in fishing or scientific research gear. In addition, NMFS published NOAA Technical Memorandum SEFSC-524, "Careful Release Protocols for Sea Turtle Release with Minimal Injury," in June 2004.

Outreach and Education, Sea Turtle Entanglements, and Rehabilitation
There is an extensive network of Sea Turtle Stranding and Salvage Network participants along the Atlantic and Gulf of Mexico coasts who not only collect data on dead sea turtles, but also rescue and rehabilitate any live stranded sea turtles.

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

Other Actions
The recovery plans for Kemp's ridley and loggerhead sea turtles are in the process of being updated. Recovery teams comprised of sea turtle experts have been convened and are currently working towards revising these plans based upon the latest and best available information. Five-year status reviews have recently been completed for green, hawksbill, Kemp's ridley, leatherback, and loggerhead sea turtles. These reviews were conducted to comply with the ESA mandate for periodic status evaluation of listed species to ensure that their threatened or endangered listing status remains accurate. Each review determined that no delisting or reclassification of a species status (i.e., threatened or endangered) was warranted at this time. However, further review of species data for the green, hawksbill, leatherback, and loggerhead sea turtles was recommended, to evaluate whether distinct population segments (DPS) should be established for these species (NMFS and USFWS 2007a-e).

5 EFFECTS OF THE ACTION

In this section of the opinion, we assess the effects of the proposed action on loggerhead, green, and Kemp's ridley sea turtles within the action area. The analysis in this section forms the foundation for our jeopardy analysis in Section 7.0. A jeopardy determination is reached if we would reasonably expect the proposed action to cause reductions in numbers, reproduction, or distribution that would appreciably reduce listed species' likelihood of surviving and recovering in the wild.

The proposed JHP is likely to adversely affect loggerhead, green, and Kemp's ridley sea turtles by entrainment in hopper dredge suction dragheads. Impacts may include direct,

short-term impacts from dredging and disposal operations for the JHP as well as relocation trawling effects.

5.1 Effects of the Action on Sea Turtles

5.1.1 Dredging

The potential for adverse effects of dredging operations on sea turtles has been previously assessed by NMFS (NMFS 1991; NMFS 1997b; NMFS 2007b) in the various versions of the SARBO and the 2003 (revised in 2005 and 2007) Gulf of Mexico RBO. Additionally, the USACE has recently prepared a comprehensive analysis of data from Gulf and Atlantic hopper dredging projects to identify factors affecting sea turtle take rates (Dickerson et al. 2007). Furthermore, the USACE maintains an on-line Sea Turtle Data Warehouse[17] (STDW) with historical records of dredging projects and turtle interactions. These are the primary sources, discussed further below, for our analysis of dredging effects on sea turtles.

5.1.1.1 Mechanical (Clamshell/Bucket Dredges) and/or Cutterhead Dredging

The project may affect sea turtles by injury or death as a result of interactions with equipment or materials used during dredging; however, NMFS believes the chance of injury or death from interactions with clamshell and/or hydraulic dredging equipment is discountable as these species are highly mobile and are likely to avoid the areas during construction. NMFS has received very few reported sea turtle takes associated with these dredging methods in the South Atlantic region: only one live sea turtle has been taken by a clamshell dredge over the past 20 years. The take occurred at Cape Canaveral, Florida, which routinely has very high local turtle abundance. Cold-stunned turtles have also been taken by cutterhead dredging, but this also rarely happens and has been generally limited to shallow, confined waters (e.g., Laguna Madre, Texas) or bays where turtles get trapped and stunned when the rapid passage of a cold front causes the temperature of the shallow water body to drop abruptly. Due to the infrequency of interactions with these gear types and the project location and channel depths, NMFS believes that the likelihood of cold stunning occurring is discountable and also that the possibility of a sea turtle being taken by a hydraulic cutterhead or a clamshell dredge is discountable.

5.1.1.2 Bed-Leveler Type Dredging

Bed-leveling is often associated with hopper dredging (and other types of dredging) operations. Plows, I-beams, or other seabed-leveling mechanical dredging devices are often used in the "cleanup mode" to lower high spots left in channel bottoms and dredged material deposition areas by hopper dredges or other type dredges.[18] Bed-leveling "dredges" do not use suction; they redistribute sediments rather than removing them. Leveling devices typically weigh about 30 to 50 tons, and are fixed with cables to a derrick mounted on a barge pushed or pulled by a tugboat at about one to two knots.

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[17] http://el.erdc.usace.army.mil/seaturtles/index.cfm

[18] Cleanup mode is defined as using the hopper dredge draghead to go back over the dredged area and remove peaks or mounds of sediment that were left behind. During this process, the draghead may move over trenches while still in vacuum mode, which could result in turtle take if turtles are present in the trenches.

There is potential for sea turtles to be crushed as the leveling device passes over it if an unsuspecting sea turtle fails to move out of the way or is not pushed out of the way by the sediment wedge "wave" generated by and pushed ahead of the device.

Some evidence from Georgia Department of Natural Resources' (GADNR) biologists indicates that bed-leveling devices may be responsible for occasional sea turtle mortalities (Dodd 2003). Sea turtles at Brunswick Harbor may have been crushed and killed in 2003 by bed-leveling which commenced after the hopper dredge finished its work its work in the Brunswick Harbor Entrance Channel. The bed leveler used in 2003 consisted of a flat wooden platform on which a bulldozer blade was mounted with the blade approximately straight up with supports on the back side running from the top edge of the blade in a diagonal line to the back edge of the wooden platform. The leading edge of the platform contained an approximately nine-inch blade that met the surface at a low angle. The apparatus was suspended from a barge pulled by a tug usually at about 1.5 to 2 knots. The local sea turtle stranding network reported/documented six stranded crushed sea turtles (four loggerheads and two Kemp's ridleys) in the area where the bed leveler dredge was working, within days after the dredge was in the area. All of the turtles were found in the vicinity of the Brunswick Entrance Channel. The injuries exhibited by the stranded turtles were, according to the GADNR, crushing type injuries that did not appear to be consistent with those produced by hopper dredges.

Brunswick Harbor is also one of the sites where sea turtles captured by relocation trawlers sometimes show evidence of brumating (over-wintering) in the muddy channel bottom, presumably burying themselves in the soft bottom sediments to stay warm, which could explain why, if they were crushed by the bed-leveler dredge, they failed to react quickly enough to avoid the bed-leveler. Overall, however, NMFS believes the use of bed-levelers is probably preferable to the use of hopper dredges for cleanup operations. Turtles foraging, resting, or brumating on irregular bottoms subject to cleanup operations are probably more likely to be entrained by suction dragheads than crushed by bed-levelers, because (1) sea turtle deflector dragheads are less effective on uneven bottoms as compared to smooth bottoms (the plow-shaped deflector device does not bury itself as effectively or completely into the substrate, nor does it create as much of a sediment wave in front of itself as it does on sandy, smooth bottoms, thus exposing turtles to much greater suction forces and greater likelihood of crushing and/or entrainment), (2) hopper dredge dragheads move considerably faster (3-4 times) over the bottom than bed-leveler devices, and (3) bed-levelers do not use suction.

A bed leveler evaluation was conducted by the USACE during Brunswick Harbor dredging in March 2013 using closed-net trawlers behind the bed-leveler to capture/collect any sea turtles that may have been adversely affected by its passage during cleanup operations. The USACE evaluation/study did not result in or reveal any adverse impacts to sea turtles from bed leveling. A follow-up similar type of evaluation will be conducted again to assess potential effects and compare the results to the earlier evaluation. NMFS has just completed (December 23, 2013; 2013-12117) formal Section 7 consultation on the proposed second study.

Since the 2003 events in Georgia, there have been no reports implicating bed-leveling activities in any sea turtle mortalities. Those mortalities may have been associated with isolated brumation behaviors. Bed leveler use at other dredging operations has not resulted in observed or documented sea turtle mortalities; therefore, the best available evidence points to occasional potential interactions to brumating sea turtles at Brunswick. Sea turtles in the Jacksonville channel area are not known to brumate on the channel bottom in the action area. NMFS believes there is only a discountable risk that a sea turtle will be taken by potential bed-leveling activities during "high-spot cleanup" during the proposed action. If evidence or compelling STSSN observer reports indicate that a turtle was killed by a bed-leveler associated with the proposed action covered by this opinion, reinitiation of consultation will be required (see RPMs, Term and Condition No. 2).

5.1.1.3 Hopper Dredging

Hopper dredging was implicated in the mortality of South Atlantic endangered and threatened sea turtles as early as the late 1970s and in NMFS opinions issued in 1979, 1980, and others leading to the RBO issued in 1991. This determination was repeated in the 1995 and 1997 SARBOs (NMFS 1995; NMFS 1997b). The measures established in consecutive RBOs (NMFS 1991; NMFS 2007a) to avoid and minimize sea turtle interactions during hopper dredging operations permitted by the USACE in the southeastern United States are included in this project, with the exception of certain project-specific modifications to dredge timing (i.e., "dredging window"), to use of the sea turtle deflector dragheads,[19] and conditions of/requirements for relocation trawling. These modifications are discussed in further detail below and in the following sections.

To date, use of hopper dredges in USACE activities in northeast Florida and Georgia has been limited under the 1997 RBO to operating between December 1 through April 15, except in emergency situations, due to the presumption that the potential for lethal and injurious take of sea turtles by hopper dredges would be lower during winter periods of lower seasonal abundance. However, recent data analysis of hopper dredging projects from 1995-2008 by the USACE indicates that documented sea turtle take rates in projects from Georgia and the east coast of Florida are lower (on both a turtles-taken-per-project basis and turtles-taken-per-day basis) during May through November (when hopper dredging is discouraged) than during December through April, which is the NMFS-recommended dredging window. Turtles are typically more abundant during the warm summer months, but may not spend large amounts of time on or in the bottom sediments and may need to surface more often to breathe due to increased activity. Turtles resting on or in bottom sediments are more vulnerable to dredge entrainment than turtles swimming in the water column above the draghead. Although increased numbers of sea turtles are known to be encountered between June and September (peak nesting season), they may be less vulnerable to entrainment because of their biological requirements (e.g., reproductive activities, reduced feeding, increased metabolism), mandating that they spend more time in the upper water column.

[19] The leading edge of the deflector is designed to have a plowing effect of at least 6 inches depth when the draghead is being operated so as to deflect, rather than injure or entrain and kill, a sea turtle during dredging operations.

Given the above, limiting hopper dredging to the traditional December 1 through March 31 window of the 1997 RBO may result in more takes than during summer dredging. Given these uncertainties and past, long-standing history and experience with the USACE's proactive approach to sea turtle conservation, the limit on takes set by NMFS in the ITS of this opinion, and NMFS-required relocation trawling conditions specified in the RPMs, NMFS believes that a hopper dredging window restricting hopper dredging in the action area to winter months (e.g., the December 1-April 15 window established in the 1997 SARBO for Jacksonville channel dredging) is unnecessary for the proposed action, and its non-implementation will not result in adverse effects to sea turtles; nor is it proposed as part of the action by the USACE.

Calculation of Sea Turtle Entrainment Rates during Hopper Dredging
To calculate the expected rates of turtle entrainment in hopper dredging for this project, NMFS consulted the STDW to find the most applicable historic dredging information for the Port of Jacksonville.

From 2000 through 2012, maintenance dredging of the Jacksonville Harbor and the associated/nearby U.S. Naval Station Mayport generated approximately 8,529,731 cy of material (Table 4). Dredging during these dredging events occurred from the entrance channel to approximately River Mile 14. Forty-six sea turtles were documented/observed as taken in hopper dredges during these dredging events. This equates to a catch per unit effort (CPUE) of 0.00000539 turtles per cubic yard dredged.

Table 4. Dredged material removed and sea turtle takes during dredging in the Jacksonville area, 2000-2012 (STDW)

Year	Quantity of Dredged Material (Cubic yards) Mayport	Quantity of Dredged Material (Cubic yards) Jacksonville Harbor	Loggerhead	Green	Kemp's ridley	Total Turtles
2000		373,791	0	0	0	0
2001	172,792		1	2	0	3
2002		487,783	0	0	0	0
2003		2,422,186	2	0	0	2
2004		276,877	0	0	0	0
2006	692,300	644,000	1	0	0	1
2007		191,103	1	0	0	1
2008		291,151	0	0	0	0
2011	1,403,943	645,000	15	9	0	24
2012	928,805		5	9	1	15
Total	3,197,840	5,331,891	25	20	1	**46**
	Total	**8,529,731**	Percent of each species			
	Catch Per Unit Effort	**0.00000539**	0.543	0.4348	0.0217	

NMFS queried FWRI about potential sea turtle presence/abundance in the St. John River above River Mile 6. FWRI reported to NMFS (A. Foley, personal communication to E. Hawk, NMFS, December 20, 2013) that a query conducted of their sea turtle stranding database from 1980-2009 documented stranded sea turtles up to 17 miles into the St. Johns River. This included 5 live turtles (3 green turtles and 2 loggerheads) that were found in the intake of the JEA Northside Generating Plant (10 miles from the river mouth). He noted that it could be argued that the other stranded turtles were either dead or debilitated and could have floated farther into the river than they would normally be found. However, of the five live sea turtles recovered at the JEA Northside Generating Plant, four were apparently healthy (evaluated by Dr. Foley) and were immediately released after being rescued from the intake. This shows that both green turtles and loggerheads do occur around the area of that power plant. FWRI recommended requiring measures to protect sea turtles to extend at least 15 miles from the mouth of the river (area where the St. Johns turns to the south). Dr. Foley also noted that he had received personal reports of people who stated that had seen sea turtles even further up the river, and noted that in his opinion, this could certainly be possible.

Taking into account the FWRI data, and previous hopper dredging history in the St. Johns River, as well as reports from the USACE documenting that no sea turtle takes by hopper dredge have been detected by onboard observers above River Mile 3, and reports from relocation trawling experts (who are familiar with the area and have trawled there) that turtles are infrequently seen above River Mile 4, NMFS concludes that sea turtles may be present seasonally throughout the entire project area, likely at reduced densities the further upriver one travels. Turtles would also be more likely to be present in the summer than in the winter. However, we believe that above River Mile 3, sea turtles will not be present in significant numbers, even less so above River Mile 6, and most likely limited to summer months. Further, turtles can be present and not be impacted by dredging. Turtles may be more likely to be found in previously dredged, deeper portions of the river, rather than in new areas to be dredged. Therefore, we believe that hopper dredging above River Mile 6 will likely have only discountable effects on sea turtles, particularly with sea turtle deflector dragheads in place on hopper dredges operating in the river, and relocation trawling where it can be done safely, and also given that other dredge types not known to impact sea turtles will also be used to dredge significant portions of the project area in the river.

Reducing the figure for cubic yards to be dredged to only those cubic yards that will be dredged below River Mile 6 (an estimated 12.8 mcy, as per information provided to NMFS by USACE on December 18, 2013) results in a lower estimated amount to be dredged (i.e., 18 mcy – 12.8 mcy = 7.2 mcy) that could result in sea turtle interactions by hopper dredge entrainment. This will translate to potentially fewer sea turtle interactions. The type of dredge(s) to be used to remove the 7.2 mcy below River Mile 6 is not known and may not be solely a hopper dredge (it is at the discretion of the dredging contractor) and may include cutterhead and clamshell dredges (dredge types not known to adversely affect sea turtles), at least within the protected environment upstream of the Mayport jetties. To be conservative, however, NMFS will assume all dredging below River Mile

6 will be done by hopper dredge(s), because hopper dredges present the highest likelihood of adversely affecting sea turtles.

Of this below-river-mile-6 residual 7.2 mcy amount, 3.3 mcy is anticipated to be removed from between River Mile 6 and River Mile 2. NMFS believes few sea turtle interactions with hopper dredges will occur in this particular stretch of river since, although USACE has previously documented takes there, the upstream-most limit of a documented sea turtle take by hopper dredging in the St. Johns River occurred at River Mile 3.

The remaining project amount to be dredged is all in Bar Cut 3, which commences at River Mile 2 and extends in a straight line east-southeastward approximately 6 miles to the eastern edge (most-seaward limit) of the project area. Approximately 3.9 mcy (i.e., 7.2 – 3.3 = 3.9) of material will be dredged from Bar Cut 3. NMFS believes, based on past hopper dredging projects in the area and nearby, that most sea turtle takes by hopper dredge will occur in this area, and most of these takes will be juvenile green turtles and sub-adult loggerheads, as seen during recent (2011) dredging of Bar Cut 3, although Kemp's ridleys may also be taken. Food sources (e.g., blue crabs and horseshoe crabs) for all three of these species have been documented as hopper dredge bycatch during previous projects there. Takes in this area are also expected because some of these species feed on algae growing on the Mayport jetties, other rock structures, the hulls of ships in Mayport Basin, and other areas that will be dredged, and all of these species' populations appear to be increasing in the area, especially greens and Kemp's ridleys.

Furthermore, takes can be expected because sea turtle deflectors are ineffective in the stiff, dense, clay sediments encountered in Bar Cut 3 and cause serious operational problems to the dredges. Bed-leveling devices are also ineffective in the stiff, dense sediments encountered there, compounding the problem. Relocation trawling is also less effective, since the undulating bottom present in Bar Cut 3 causes the capture nets' lead lines to pass ineffectively over turtles that would be routinely captured during trawls on flat bottoms. Further, relocation trawling is less effective because bottom irregularities caused by previous passes of the dragheads resemble canyon walls (some of which can reach almost 10 feet high, and, due to the dense, stiff nature of the clay, do not slough off into the channel bottom) and yield the same negative results. During previous, recent dredging of Bar Cut 3 (2011), the deflectors' operating characteristics in the very dense and stiff, clay nature of the sediments caused the dredger much operational difficulty, and likely resulted in fewer relocation trawler captures, resulting in a USACE request to NMFS to waive draghead deflector use to complete the remaining 250,000 cy of proposed dredging in Bar Cut 3. NMFS and the USACE conferred and determined that removing the deflectors could be more beneficial to sea turtles than requiring them to remain in place, since it would lessen the amount of time sea turtles would be exposed to potential suction draghead entrainment. On December 7, 2011, NMFS authorized the USACE to dredge the remaining 250,000 cy of dense material without requiring previously mandatory sea turtle deflectors on the dredge's suction dragheads.

The USACE has since presented a post-action report with information suggesting that sea turtle takes during 2011 dredging of Bar Cut 3 were indeed reduced following removal of

the sea turtle deflectors from the dredge's dragheads. Making comparisons is difficult, however, given several factors: (1) Dredging in Bar Cut 3 occurred primarily in three distinct periods: April-May, September-October, and November-December, 2011, thus, sea turtle density in Bar Cut 3 likely varied between early summer and winter; (2) the April 16-May 18, 2011, sea turtle entrainment rate in dredge suction dragheads was 1 for every 14,286 cy dredged; the September 2-December 9, 2011, entrainment rate was 1 for every 97,368 cy dredged, possibly reflecting a distinct seasonal sea turtle density difference; (3) differences in dredge vessels and their operating/entrainment characteristics (three different hopper dredges conducted dredging in the Bar Cut 3); and (4) differences in substrates dredged within Bar Cut 3 (in some areas dredged first, the substrates had more overlying sand and less clay, making dredging easier and the deflector draghead more effective).

With further analysis, some conclusions may be drawn. From September 2 to December 9, about 1.85 mcy were dredged from Bar Cut 3; 19 sea turtles were taken by the dredges, an entrainment rate of 1 turtle for every 97,368 cy dredged. Rigid deflectors were removed from dragheads on December 9, 2011, after their mandatory use was waived by NMFS on December 7. Starting December 9, the dredge operated for 23 days without the deflectors in place and removed approximately 250,000 cy of dense clay material. Six turtles were taken from December 9 through project completion on January 2, 2012 (an entrainment rate of 1 turtle for every 41,666 cy dredged. Compared to the 6 turtles taken after deflector removal, 24 turtles were taken in Bar Cut 3 dredging prior to deflector removal (however, this direct comparison is subject to the caveats (1)-(4) noted above). The number of takes per dredge load was significantly reduced after deflector removal. From September 1 to December 9, with the deflectors in place, the number of hopper dredge loads achieved by the dredger before a take occurred ranged from 1 to 51, with an average of 14.5 loads between takes, over a total of 304 loads; commencing December 9 through the end of the project on January 2, the numbers ranged from 4 to 83 loads between takes, with an average of 25.6 loads between takes, over 128 loads, considerably less than with the deflectors in place. NMFS concludes that the 2011 NMFS-authorized removal of the deflectors did not adversely affect sea turtles during hopper dredging of the stiff, dense, clay sediments in Bar Cut 3.

Approximately 1.7 mcy of Bar Cut 3 sediments will be hopper dredged as part of the JHP. NMFS expects the same difficulties to arise as did in prior hopper dredging there. NMFS therefore believes it is in the interest of both agencies and the public to pre-authorize hopper dredging in Bar Cut 3 without the need for sea turtle deflector devices on the suction dragheads. This will save both agencies staff efficiencies and dredge downtime while the inevitable waiver request from USACE to NMFS is prepared, processed, reviewed, and ultimately approved. The USACE has estimated that hopper dredging of Bar Cut 3 will take (conservatively) 22 months to remove the remaining 1.73 mcy (P. Stodola, USACE, personal communication to E. Hawk, NMFS, December 18, 2013). NMFS believes, based on previous recent experience in the action area that is directly relatable to the present proposed action, and the above analysis, that Bar Cut 3 may be hopper dredged without sea turtle deflector devices affixed to the suction

dragheads, without adversely affecting sea turtles to a greater degree than will occur with the deflector devices in place.

Based on previously described evidence and reports on the lack of significant sea turtle presence upstream of River Mile 6, we will base our take estimate on dredging from River Mile 6 seaward, primarily on proposed Bar Cut 3 (River Mile 2 to sea buoy) hopper dredging. To be conservative, we will assume hopper dredging will be used for River Miles 6-2 and the entire length of Bar Cut 3 (River Mile 2 to the eastern end of Mayport Entrance Channel, a distance of approximately 6 miles), although it is possible that cutterhead and clamshell dredges (dredge types not known to adversely affect sea turtles) may be used for portions of the project area upstream of the Mayport jetties. Consequently, we will multiply the CPUE from Table 4 (0.00000539) by the amount to be dredged (7.2 mcy) and estimate 39 sea turtles (21 loggerhead, 17 green, and 1 Kemp's ridley) may be *observed* take during hopper dredging. We will later discuss sea turtles that may be killed by the hopper dredge, but not entrained and thus not observed or documented by shipboard protected species observers, but that are, nonetheless, dead as a result of project dredging.

To further refine our take estimates for this project, we will assume that the species' population percentages and relative abundance in the action area have not changed significantly since 2011 in relation to each other (i.e., that loggerheads still outnumber greens, and each of these species greatly outnumber Kemp's ridleys), that growth rates of each of the three species have remained constant, and that growth has occurred (and continues to occur) in the these populations at a combined average rate of 2.5% per year (a conservative estimate), or approximately 5% since 2011. We also assume that this average growth rate will continue to occur at 2.5% per year for the approximate 6-year duration of the project. By the end of the proposed project, local abundance of these sea populations may be approximately 15% higher (6 years x 2.5% per year) than at present time. Therefore, we anticipate that more sea turtles will be in the action area and more may be impacted by hopper dredge encounters than for a shorter duration project. Our revised take estimate for this project is that 44.65 (38.83 + 15% increase in population) sea turtles may be observed taken during the proposed project.

Table 5. Total sea turtles taken with adjustment for population growth.

	All Species	Loggerhead	Green	Kemp's Ridley
Catch Per Unit Effort	0.00000539	0.543	0.435	0.022
Total Sea Turtles Taken (7.2 mcy)	38.83	21.10	16.88	0.84
Population growth adjustment (+%)	5.82	3.17	2.53	0.13
Total Sea Turtles Taken	44.65	24.27	19.41	0.97

Earlier in this section (Table 4) we calculated the percentage distribution by species from recorded dredge takes that occurred in Jacksonville Harbor and Mayport Naval Station

dredging projects as 54.3% loggerheads, 43.5% greens, and 2.2% Kemp's ridleys over the 2000-2012 time period. To see if this distribution has changed over time, we recalculated this estimate using only the most recent, dredging project take data, i.e., the 2011-2012 Mayport dredging project, since this data may more accurately reflects current local sea turtle population distributions/densities, given the increased nesting seen in these species since 2000. During the 2011-2012 Mayport dredging project, 30 sea turtles were observed taken by hopper dredges working in Bar Cut 3 and Naval Station mooring areas/turning basin: 16 loggerheads, 13 greens, and 1 Kemp's ridley; roughly, a 53.3%, 43.3%, 3.3% (respectively) distribution. These numbers are very similar to our previous species-percentage-distribution estimate; therefore, we are confident of their overall usefulness for estimation purposes.

Our estimated, anticipated *detected* take estimates by species (i.e., those takes witnessed and documented by hopper dredge protected species observers) are 44.65 sea turtles—24.27 loggerhead, 19.41 green, and .97 Kemp's Ridley. Please see Table 5, above.

We would also expect that relocation trawling captures by species percentages would align similarly.

Detected vs. Actual Takes

NMFS-approved observers monitor dredged material inflow and overflow screening baskets on many hopper dredging projects, and observers will be required to monitor the proposed action. Dredged material screening, however, is only partially effective, and observed takes likely provide only partial estimates of total sea turtle mortality. NMFS believes that some turtles killed by hopper dredges go undetected because body parts are forced through the sampling screens by water pressure and are buried in the dredged material, or animals are crushed or killed but their bodies or body parts are not entrained by the suction and so the takes may go unnoticed. The only mortalities that are noticed and documented are those where body parts float, are large enough to be caught in the screens, and can be identified as sea turtle parts. Body parts that are forced through the 4-inch (or greater) inflow screens by the suction-pump pressure and that do not float are very unlikely to be observed, since they will sink to the bottom of the hopper and not be detected by the overflow screening. Unobserved takes are not documented, thus, observed takes may under-represent actual lethal takes. It is not known how many turtles are killed but unobserved. Because of this, in the Gulf of Mexico Regional Biological Opinion (GRBO)(NMFS 2003b), in making its jeopardy analysis, NMFS estimated that up to one out of two impacted turtles may go undetected (i.e., that observed take constituted only about 50% of total take. That estimate was based on region-wide (overall Gulf of Mexico) hopper dredging projects including navigation channel dredging and sand borrow area dredging for beach re-nourishment projects, year-round, including seasonal windows when no observers are required, times when 100% coverage is required, and times when only 50% observer coverage is required (i.e., at sand borrow sites).

The proposed dredging of the JHP will include observer coverage during hopper dredging operations for the duration of work (100% from jetties to seaward; 50-100% from jetties

to River Mile 4 or 6; 0% upstream of River Mile 6). The observer coverage that will be required for the proposed dredging action is twice as intensive (and theoretically, twice as effective) from the jetties to seaward as the 50% observer coverage requirement of the 2003 Gulf of Mexico Regional Biological Opinion and equal in coverage from the jetties to River Mile 4 or 6. In theory, then, a significantly greater number of turtles will be detected with 100% observer coverage than with just 50% observer coverage (but a significant number of turtle parts will still pass through the screens undetected). In NMFS's January 7, 2009, Mayport ship channel hopper dredging biological opinion to the U.S. Navy, under similar circumstances to the proposed action (i.e., it also required 100% observer coverage year-round), NMFS estimated that approximately 66% (two out of three entrained turtles or turtle parts) would be observed/documented by shipboard protected species observers. More recently, NMFS's biological opinion to the USACE's Galveston District on the Freeport Harbor navigation channel widening and deepening project (also with 100% observer coverage) again anticipated that approximately 66% of entrained turtles would be detected.

NMFS now has information provided by the USACE that, because of the stiff, dense sediments there, the use of deflector dragheads in Bar Cut 3 will be ineffective to protect sea turtles and their required use could even result in increased turtle takes (compared to their non-use). This is because of the stiff, dense clay sediments that will be encountered in Bar Cut 3 (based on the USACE's recent dredging experience there with new-material dredging during 2011-2012 Mayport entrance channel widening). Bar Cut 3 is where NMFS expects sea turtles are most likely to be encountered in significant numbers. NMFS now believes, based on this site-specific knowledge and previous experience dredging there, that for Bar Cut 3 new-material dredging a 50% estimate (of draghead-impacted turtles that will be detected) is more accurate and appropriate for total take estimation purposes. Therefore, NMFS estimates that with 50 to 100% observer coverage (100% from jetties to seaward; 50-100% from jetties to River Mile 4 or 6; 0% upstream of River Mile 6), protected species observers aboard hopper dredges for the proposed project will detect approximately just one of every two turtles that are struck by the suction draghead and either crushed and pushed away or entrained downstream of River Mile 6. This results in an additional estimated 44.65 sea turtles (24.27 loggerhead, 19.41 green, and .97 Kemp's Ridley) taken, but not detected, for a total of 89.31 sea turtles taken (killed) (Table 6). We will use these total, by species, estimates (49 loggerheads, 39 greens, 2 Kemp's ridleys; totaling 90 turtles) rounded up for our jeopardy analyses because it is not possible to take a fraction of a sea turtle. This results in an estimated average of 15 (observed and unobserved) sea turtle fatalities per year for each year of the 6-year project.

Table 6. Estimated sea turtle takes (observed and unobserved) with assumed 50% detection rate by onboard protected species observers over the 6-year life of the project

	All species	Loggerhead	Green	Kemp's Ridley
Observed Sea Turtles	44.65	24.27	19.41	0.97
Unobserved	44.65	24.27	19.41	0.97
Total Sea Turtles for JHP	89.31	48.54	38.83	1.94
Rounded up	90	49	39	2

As with previous NMFS biological opinions on hopper dredging, our subsequent (Section 7 of this opinion) jeopardy analysis is necessarily based on our knowledge (in this case, our best estimate) of the total number of turtles that will be lethally taken, which includes those that are killed but not detected. Our best estimate of turtles lethally taken will be the sum of the observed and unobserved takes, i.e., those observed and documented by onboard protected species observers, plus those unobserved, undocumented lethal takes (because the turtles/turtle parts were either not entrained, or were entrained but were not seen/counted by onboard protected species observers). For example, the 2003 GRBO on hopper dredging estimated that 80 loggerhead sea turtles would be killed annually by hopper dredges, but that only 40 would be detected by onboard observers. Similarly, in this opinion we have estimated that 90 sea turtles (49 loggerheads, 39 greens, 2 Kemp's ridleys) will be killed by dredges, but shipboard protected species observers will only detect half of each of these takes by species.

Our ITS is based on observed takes, not only because observed mortality gives us an estimate of unobserved mortality, but because observed, documented take numbers serve as triggers for some of the reasonable and prudent measures, and for potential reinitiation of consultation if actual observed takes exceed the anticipated/authorized number of observed takes. Furthermore, our ITS level of anticipated/authorized lethal takes is based on the implementation of relocation trawling, since it is an integral and important part of the proposed action. Without the implementation of relocation trawling, mortalities resulting from hopper dredge activities could be higher.

A very few turtles (over the years, a fraction of 1%) survive entrainment in hopper dredges, and those that do are usually smaller juveniles that are sucked through the pumps without being dismembered or badly injured. Often they will appear uninjured only to die days later of unknown internal injuries, while in rehabilitation. Experience has shown that the vast majority of hopper-dredge impacted turtles are immediately crushed or dismembered by the violent forces they are subjected to during entrainment. Therefore, we are conservatively predicting that all takes by hopper dredges will be lethal.

5.1.2 Dredge Vessel Collisions

NMFS believes that the possibility that the hopper dredge vessel(s) will collide with and injure or kill sea turtles during dredging and/or sand pumpout operations is discountable, given the vessel's slow speed (no more than 10 knots, per the requirements of the NARW 10-knot speed final rule and the USACE's proposed action statement), the ability of these

species to move out of the way, and anticipated avoidance behavior by sea turtles at the sea surface or in the water column.

5.1.3 Blasting

Underwater explosions may affect marine life by causing death, injury, temporary threshold shifts (TTS or recoverable hearing loss), or behavioral reactions, depending on the distance an animal is located from a blast. An underwater explosion is composed of an initial shock wave, followed by a succession of oscillating bubble pulses. A shock wave is a compression wave that expands radially out from the detonation point of an explosion. At a distance from a detonation, the propagation of the shock wave may be affected by several components including the direct shock wave, the surface-reflected wave, the bottom-reflected wave, and the bottom-transmitted wave. The direct shock wave results in the peak shock pressure (compression) and the reflected wave at the air-water surface produces negative pressure (expansion). For an explosion with the same energy and at the same distance, an underwater blast is much more dangerous to animals than an air blast. The shock wave in air dissipates more rapidly and tends to be reflected at the body surface; in water the blast wave travels through the body and may cause internal injury to gas-filled organs due to impedance differences at the gas-liquid interface.

Explosions are known to injure and kill sea turtles (Duronslet et al. 1986; Gitschlag 1990; Gitschlag and Herczeg 1994; Klima et al. 1988; O'Keeffe and Young 1984). NMFS studied the effects of offshore oil and gas structure removals using 23 kg (50 lb) of nitromethane {Klima, 1988 #20;Klima, 1988 #48958}. Loggerhead (*Caretta caretta*) and Kemp's ridley (*Lepidochelys kempii)* sea turtles were located at distances of 213.4 m (700 ft), 365.8 m (1,200 ft), 548.6 m (1,800 ft), and 914.4 m (3,000 ft) from the platform removed with explosives. The charges were placed inside platform pilings at a depth of 5 m below the mudline. Four sea turtles within 365.8 m of the detonation were unconscious, as well as an individual at 914.4 m (3,000 ft). Sea turtles were expected to have drowned if not recovered from the water following the detonation. All turtles exposed to the blast exhibited everted cloacas[20] and vasodilation[21] lasting 2-3 weeks.

The sea turtle ear appears to be adapted to both aerial and aquatic environments. Sea turtles have a primitive reptilian ear and are considered to be hearing generalists, having limited hearing abilities at lower frequencies. Although there is some variation in sea turtle hearing measurements between species and size classes (Ketten and Bartol 2005), the available data suggest that species of sea turtles are likely sensitive to frequencies from approximately 100 Hertz (Hz) to 2,000 Hz (Lendhardt 1994; McCauley et al. 2000a; McCauley et al. 2000b; Moein et al. 1994; O'Hara and Wilcox 1990), with greatest underwater hearing sensitivities below 1,000 Hz (Ketten and Bartol 2005). Behavioral reactions to the sound produced from explosions may be important if they occur in biologically important areas such as foraging areas, near nesting beaches during

[20] A cloaca /kloʊˈeɪkə/ is the posterior opening that serves as the only opening for the intestinal, reproductive, and urinary tracts of certain animal species. Everted means to turn (a structure or organ) outward or inside out.
[21] Vasodilation (or vasodilatation) refers to the widening of blood vessels.

nesting season, or in developmental juvenile habitats.

NMFS believes it is unlikely that turtles will be taken by blasting activities during the proposed action. In addition to the required safety zones and observer requirements described in the Proposed Action section, sea turtle presence is expected to be low. Sea turtles have been observed at least as far as River Mile 13 (A. Foley, FWRI, personal communication to E. Hawk, NMFS, December 20, 2013); however, blasting will be carried out during the colder winter months (December through February) when sea turtles are not likely to be in the project area or their densities will be lowest. Additionally, most blasting will occur from River Miles 4-13, with minimal blasting occurring from River Miles 0-4. As previously described, sea turtle presence is expected to be infrequent and seasonal from River Miles 3-5 and no hopper dredge takes have been recorded above River Mile 3, despite onboard protected species observer monitoring of inflowing dredged material, to at least River Mile 6. Finally, the harm avoidance measures required to be implemented in association with any blasting activities are designed to ensure it will only be carried out in areas where sea turtles are not expected to be encountered.

5.1.4 Relocation Trawling Activities and Estimated Take by Trawlers

Although the USACE has not proposed relocation trawling activities to reduce the density of sea turtles in the path of hopper dredges, NMFS will require relocation trawling, when it can be done safely, as a means to reduce sea turtle mortalities, because it is a proven method of reducing sea turtle density in front of an advancing hopper dredge and very likely results in reduced sea turtle/hopper dredge interactions. Nets are dragged on the bottom for 30 minutes or less before each retrieval and re-setting. Its effects are mostly non-lethal and non-injurious to trawl captured sea turtles. Over the course of 20+ years that relocation trawling has been conducted by the USACE, very few sea turtle mortalities (approximately 8, of which 3 died under unusual circumstances during relocation trawling associated with the Deepwater Horizon event) have occurred, while approximately 2,000 sea turtles have been safely relocated. NMFS has previously estimated in dredging opinions that the risk of a sea turtle being killed in a capture trawl net is less than 0.4% and has no new information to alter the basis of that conclusion. NMFS believes that the possibility that a sea turtle will be killed or injured during capture trawling (using modified shrimp trawl nets) or non-capture trawling (using open end, 2-inch mesh, trawl nets) is discountable, given the low historic injury/mortality rate and given that trawling is likely only to occur due to high river flow, navigation channel constrictions, and vessel and personnel safety concerns below River Mile 2, in Bar Cut 3.

Non-capture trawling is a non-traditional method of relocation trawling where a net is dragged with the cod end removed. USACE research has suggested that it is an effective way of reducing sea turtle entrainments in hopper dredges. The stimulation of the net going over the turtle, or the turtle getting initially trapped in and then passing through the net, is presumed to cause the turtle to move away from the area, at least long enough so that it is not entrained by the oncoming dredge. Non-capture trawling may adversely affect sea turtles if improperly conducted or if a turtle (juveniles may be particularly susceptible) get entangled in the webbing and drown, since non-capture nets are usually

dragged for several hours before being retrieved to clear debris from the nets that may obstruct sea turtle passage through them. This has only occurred once to date and was determined to have resulted from the trawl net's overly large mesh size (which has since been prohibited by the USACE); thus, NMFS considers the risk of non-capture trawling adverse effects to be insignificant.

Relocation trawling conducted at previous Jacksonville Harbor projects has been scarce; therefore, basing estimates of potential take during relocation trawling for the proposed action is difficult. During previous capture trawling from 2000-2013 associated with hopper dredging of harbors, turning basins, and/or entrance channels to Jacksonville Harbor, Mayport Naval Station, Kings Bay and Brunswick Harbor (the three other closest major channels nearest to the action area), a total of 40 sea turtles were safely trawled-captured and released over 113 days of relocation trawling[22] (Table 7). This averages out to be approximately 0.35 turtle captures per relocation trawling day. Estimating the expected number of trawl captured turtles during this project is difficult and necessarily imprecise, given the uncertainties associated with the project, the various seasons, trawling environments (riverine vs. ocean), varying water temperatures and differences in availability and location of sea turtle potential foraging habitat from year to year (which may cause turtles to move into or out of the action area), and different bottom substrates (sand and mud to hard clay) and topography (smooth vs. rough and undulating) over which the trawling may be performed (which affects capture trawling effectiveness). Although an average of 0.35 turtles per day of relocation trawling were captured, averaging, though useful, is imprecise. Relocation trawling for the JHP will only occur below River Mile 2, in Bar Cut 3 so while the entire project will take approximately 6 years of continuous dredging using multiple dredge types to complete, dredging in this area will take 22 months (660 days) to complete (P. Stodola, USFWS, personal communication to E. Hawk, NMFS, 2013).

Table 7. Relocation trawling efforts in Jacksonville Harbor, Mayprot Naval Station, Kings Bay, and Brunswick Harbor.

Relocation Trawling	Days of trawling	Sea Turtles captured/relocated
Brunswick FY07	12	32
Brunswick FY08	4	2
Jacksonville Harbor FY08	14	3
Kings Bay	45	3
Kings Bay FY2010	38	0
Total	113	40
	Turtles per day	0.3540
	Relocation dredging/days	660
	Total Turtles relocated inJHP	233.63

To determine the number of each species of turtle expected to be relocated, we will apply the CPUE from Table 4 to determine the quantity and species composition of the

[22] STDW

expected relocated sea turtles (Table 8). The estimates are all rounded up because it is not possible to take a fraction of a sea turtle.

Table 8. Relocation trawling species composition

Turtles relocated: 233.63	Loggerhead	Green	Kemp's Ridley
CPUE	0.54	0.43	0.02
Turtles relocated	126.97	101.58	5.08
Rounded up	127	102	6

The effects of this harassment of the turtles during capture and handling during relocation trawling can result in raised levels of stressor hormones, and can cause some discomfort during tagging procedures. Based on past observations obtained during similar research-trawling for turtles, these effects are expected to dissipate within a day (Stabenau and Vietti 1991). Since turtle recaptures are rare, and recaptures that do occur typically happen several days to weeks after initial capture, cumulative adverse effects of recapture are not expected. We believe that properly conducted and supervised relocation trawling (i.e.,observing trawl speed and tow-time limits, and taking adequate precautions to release captured animals) and tagging is unlikely to result in adverse effects to sea turtles. Thus, we believe that the probability that a sea turtle will be injured or killed during capture or non-capture relocation trawling is discountable.

5.1.5 Dredged Material Disposal

NMFS believes the proposed dredged material (approximately 18 mcy) disposal activities over the life of the project are not likely to adversely affect sea turtles. Sea turtles may be attracted to ODMDS sites, to forage on the bycatch that may be occasionally found in the dredged material being dumped. As such, turtles could be potentially impacted by the sediments being discharged overhead. However, NMFS has never received a report of an injury to a sea turtle resulting from burial in, or impacts from, hopper-dredge-released sediments, neither from inshore or offshore disposal sites, anywhere the USACE conducts dredged material disposal operations. Sea turtles are highly mobile and apparently are able to avoid a descending sediment plume discharged at the surface by a hopper dredge opening its hopper doors, or pumping its sediment load over the side. Even if temporarily enveloped in a sediment plume, NMFS believes the possibility of injury, or burial of normal, healthy sea turtles by dredged material (i.e., sand and silt) disposal, is discountable or its effects insignificant. NMFS believes that foraging habitat for sea turtles is not likely a limiting factor in the action area, and thus the loss of potential sand bottom foraging habitat adjacent to, or on the surface of, the disposal areas (compared to remaining foraging habitat) from burial by dredged material sediments will have insignificant effects on sea turtles. The risk of injury to sea turtles from collisions with dredge-related vessels (dredges/barges/scows) carrying dredge spoils to the ODMDS and/or returning to the dredging sites is also considered discountable, considering the species' mobility and the slow speed (maximum of 10 knots) permissible for hopper dredge vessels and associated barges and scows.

6 CUMULATIVE EFFECTS

Cumulative effects are the effects of future state, local, or private activities that are reasonably certain to occur within the action area considered in this biological opinion. Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to Section 7 of the ESA.

Within the action area, major future changes are not anticipated in ongoing human activities described in the environmental baseline. The present human uses of the action area, such as commercial shipping, boating, and fishing, are expected to continue at the present levels of intensity in the near future as are their associated risks of injury or mortality to sea turtles and shortnose sturgeon posed by incidental capture by fishermen, vessel collisions, marine debris, chemical discharges, and man-made noises.

Sea Turtles
Beachfront development, lighting, and beach erosion control are all ongoing activities along the southeastern coast of the United States. These activities potentially reduce or degrade sea turtle nesting habitats or interfere with hatchling movement to sea. Human activities and development 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 have or are adopting more stringent protective measures to protect hatchling sea turtles from the disorienting effects of beach lighting. Some of these measures were drafted in response to lawsuits brought against the counties by concerned citizens who charged the counties with failing to uphold the ESA by allowing unregulated beach lighting which results in takes of hatchlings.

NMFS presumes that any additional increases in recreational vessel activity in inshore and offshore waters of the Atlantic Ocean will likely increase the risk of turtles taken by injury or mortality in vessel collisions. Recreational hook-and-line fisheries have been known to lethally take sea turtles. Future cooperation between NMFS and the states on these issues should help decrease take of sea turtles caused by recreational activities. NMFS will continue to work with states to develop ESA Section 6 agreements and Section 10 permits to enhance programs to quantify and mitigate these takes.

7 JEOPARDY ANALYSIS

The analyses conducted in the previous sections of this opinion serve to provide a basis to determine whether the proposed action would be likely to jeopardize the continued existence of affected ESA-listed sea turtles and sturgeon. In Section 5, we outlined how the proposed action can affect sea turtles and sturgeon and the extent of those effects in terms of estimates of the numbers of each species expected to be killed. Now, we turn to an assessment of each species' response to this impact, in terms of overall population effects from the estimated take, and whether those effects of the proposed action, when considered in the context of the status of the species (Section 3), the environmental

baseline (Section 4), and the cumulative effects (Section 6), will jeopardize the continued existence of the affected species.

It is the responsibility of the action agency to ensure that "any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any endangered species or threatened species…" (ESA Section 7(a)(2)). Action agencies must consult with and seek assistance from the Services to meet this responsibility. The Services must ultimately determine in a biological opinion whether the action jeopardizes listed species. "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, NMFS must look at whether the action directly or indirectly reduces the reproduction, numbers, or distribution of a listed species. Then, if there is a reduction in one 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. In the following section we evaluate the responses of loggerhead (NWA DPS), green, and Kemp's ridley sea turtles, to the effects of the action.

Effects of the Action on Sea Turtles' Likelihood of Survival and Recovery in the Wild
The lethal take of 90 sea turtles (49 loggerheads, 39 greens, 2 Kemp's ridleys) by hopper dredges over the 6-year life of the project will result in a temporary reduction in total population numbers. Sea turtle mortality resulting from hopper dredges could result in the loss of reproductive value of an adult turtle. For example, an adult female loggerhead sea turtle can lay 3 or 4 clutches of eggs every 2 to 4 years, with 100 to 130 eggs per clutch. The annual loss of one adult female sea turtle, on average, could preclude the production of thousands of eggs and hatchlings, of which a small percentage is expected to survive to sexual maturity. Thus, the death of an adult female eliminates an individual's contribution to future generations, and the action will result in a reduction in sea turtle reproduction. However, based on past sea turtle take history by hopper dredges operating in Jacksonville Harbor, the St. Johns River, and Mayport Naval Station and entrance channel, the overwhelming majority of sea turtles that will be impacted will be juveniles and sub-adults. While the death of any individual is regrettable, their value in terms of reproductive potential is considerably less than that of an equal number of adults.

Loggerhead NWA DPS
The non-lethal take of approximately 127 loggerhead sea turtles by capture trawling will have no more than temporary, non-injurious effects on them. Considering the size of the loggerhead NWA DPS, we believe the loggerhead sea turtle population is sufficiently large enough to persist and recruit new individuals to replace those 49 expected to be lethally taken over the course of the 6-year dredging project. We use the following estimates to support our determination. Changes in distribution are not expected from lethal takes by hopper dredging during this action. Because the action area is small and sea turtles generally have large ranges in which they disperse, no reduction in the distribution of loggerhead sea turtles is expected from the take of 49 individuals.

NMFS SEFSC (2009a) estimated the likely minimum adult female population size for the western North Atlantic subpopulation in the 2004-2008 time frame to be between 20,000 to 40,000 (median 30,050) female individuals, with a low likelihood of there being as many as 70,000 individuals. The estimate of western North Atlantic adult loggerhead females was considered conservative for several reasons. The number of nests used for the western North Atlantic was based primarily on U.S. nesting beaches; as such, the results are a slight underestimate of total nests because of the inability to collect complete nest counts for many non-U.S. nesting beaches. In estimating the current population size for adult nesting female loggerhead sea turtles, NMFS SEFSC (2009b) simplified the number of assumptions and reduced uncertainty by using the minimum total annual nest count over the last five years (i.e., 48,252 nests). This was a particularly conservative assumption considering how the number of nests and nesting females can vary widely from year to year, (cf., 2008's nest count of 69,668 nests, which would have increased proportionately the adult female estimate to between 30,000 and 60,000). Further, minimal assumptions were made about the distribution of remigration intervals and nests per female parameters, which are fairly robust and well-known parameters.

Although not included in the NMFS SEFSC (2009) report, in conducting its loggerhead assessment NMFS SEFSC also produced a much less robust estimate for total benthic females in the western North Atlantic, with a likely range of approximately 60,000 to 700,000, up to less than one million. The estimate of overall benthic females is considered less robust because it is model-derived, assumes a stable age/stage distribution, and is highly dependent upon the life history input parameters. Relative to the more robust estimate of adult females, this estimate of total benthic female population is consistent with our knowledge of loggerhead life history and the relative abundance of adults and benthic juveniles: the benthic juvenile population is an order of magnitude larger than adults. Therefore, we believe female benthic loggerheads number in the hundreds of thousands.

Based on the total numbers of adult females and benthic juvenile females estimated by NMFS SEFSC for the western North Atlantic population of loggerhead sea turtles (now designated as the NWA DPS), the anticipated lethal take resulting from the proposed action (i.e., worst case, up to 50 loggerheads) represent the removal of, at most, a small fraction of a percent of the lowest estimate of adult loggerhead female population (0.25% of 20,000). This level of lethal take of sea turtles also represents the removal of a fractional percent of the estimated female benthic loggerheads population. These removals are very small and contribute only minimally to the overall mortality on the population. For adult females, the incremental effect on annual mortality rates is less than four one-hundredths of the range of possible mortality values for the species. For benthic juvenile females, the contribution to overall mortality is less. Further, these percentages are likely an overestimation of the impact of the anticipated lethal take resulting from the proposed project on loggerhead sea turtles because of the following reasons. These percentages represent impacts to adult and benthic juvenile female loggerhead sea turtles only, and not to the population as a whole. Because this estimated contribution to mortality is a tiny part of our range of uncertainty across what total

mortality might be for loggerhead sea turtles, we do not believe that the small effect posed by the lethal take resulting from the proposed project will be detectable or appreciable.

The potential lethal take of up to 50 loggerheads over a 6-year period will result in reduction in numbers when takes occur and possibly by lost future reproduction, but, given the magnitude of these trends and likely large absolute population size, it is unlikely to have any detectable influence on the population objectives and trends noted above. In the event that the take is non-lethal, the take would not be expected to impact the reproductive potential, fitness, or growth of the captured sea turtle because it will be immediately released unharmed, or released with only minor injuries from which it is expected to fully recover, or be rehabilitated prior to release. Thus, the proposed action will not result in an appreciable reduction in the likelihood of loggerhead sea turtles' survival in the wild.

The Atlantic recovery plan for the United States population of the loggerhead sea turtles (NMFS and USFWS 1991b), herein incorporated by reference, lists the following relevant recovery objective over a period of 25 continuous years:

> The adult female population in Florida is increasing and in North Carolina, South Carolina, and Georgia, it has returned to pre-listing nesting levels (NC = 800 nests/season; SC = 10,000 nests/season; GA = 2,000 nests/season).

The potential lethal take of up to 49 loggerheads by the action will result in reduction in numbers when takes occur and possibly by lost future reproduction, but, given the magnitude of these trends and likely large absolute population size, it is unlikely to have any detectable influence on the population objectives and trends noted above. Capture of sea turtles by relocation trawlers will not affect the adult female nesting population or number of nests per nesting season. Thus, the proposed action will not interfere with achieving the recovery objectives and will not result in an appreciable reduction in the likelihood of loggerhead sea turtles' recovery in the wild.

Green Sea Turtles

The non-lethal take of approximately 102 green sea turtles by capture trawling will have no more than temporary, non-injurious effects on them. The lethal take of up to 39 green sea turtles by the action would reduce the number of green sea turtles as compared to the number that would have been present in the absence of the action assuming all other variables remained the same. The lethal take could also result in the loss of reproductive value as compared to the reproductive value in the absence of the proposed action, if the individual is female, eliminating her contribution to future generations. Greens nest frequently (at approximately two week intervals) during a nesting season and nest about every 2-4 years. During each nesting, they can produce an average of 110-115 eggs in each nest. The loss of an adult female could preclude the production of thousands of eggs and hatchlings, of which a small percentage is expected to survive to sexual maturity. Changes in distribution are not expected from lethal takes by hopper dredging during this action. Because the action area is small and sea turtles generally have large

ranges in which they disperse, no reduction in the distribution of green sea turtles is expected from the take of three individuals.

The 5-year status review for green sea turtles states that of the seven green sea turtle nesting concentrations in the Atlantic basin for which abundance trend information is available, all were determined to be either stable or increasing (NMFS and USFWS 2007a). That review also states that the annual nesting female population in the Atlantic basin ranges from 29,243-50,539 individuals. Additionally, the pattern of green sea turtle nesting shows biennial peaks in abundance, with a generally positive trend during the twenty years of regular monitoring since establishment of index beaches in Florida in 1989. An average of 5,099 green turtle nests were laid annually in Florida between 2001 and 2006 with a low of 581 in 2001 and a high of 9,644 in 2005 (NMFS and USFWS 2007a).

Although the anticipated mortality of 40 green sea turtles expected from the proposed action would result in an instantaneous reduction in absolute population numbers, it is not likely these small reductions would appreciably reduce the likelihood of survival of the species. If the hatchling survival rate to maturity is greater than the mortality rate of the population, the loss of breeding individuals would be replaced through recruitment of new breeding individuals from successful reproduction of non-taken sea turtles. Capture of sea turtles by relocation trawlers will not affect the adult female nesting population or number of nests per nesting season. Considering that the species' nesting trends are either stable or increasing, we believe the loss of up to 40 green sea turtles associated with the proposed action is not expected to cause an appreciable reduction in the likelihood of survival of this species of sea turtle in the wild.

The Atlantic Recovery Plan for the population of Atlantic green sea turtles (NMFS and USFWS 1991) lists the following relevant recovery objectives over a period of 25 continuous years:

> The level of nesting in Florida has increased to an average of 5,000 nests per year for at least 6 years;

Green sea turtle nesting in Florida between 2001-2006 was documented as follows: 2001 – 581 nests; 2002 – 9,201 nests; 2003 – 2,622 nests; 2004 – 3,577 nests; 2005 – 9,644 nests; 2006 – 4,970 nests. The average is 5,039 nests annually over those 6 years (2001-2006) (NMFS and USFWS 2007a). Subsequent nesting has shown even higher average numbers (i.e., 2007 – 9,455 nests; 2008 – 6,385 nests; 2009 – 3, 000 nests; 2010 – 8,426 nests; 2011 – 10,701 nests), thus, this recovery criteria continues to be met.

> A reduction in stage class mortality is reflected in higher counts of individuals on foraging grounds.

Several actions are being taken to address this objective; however, there are currently no estimates available specifically addressing changes in abundance of individuals on foraging grounds. Given the clear increases in nesting, however, it is likely that numbers

on foraging grounds have increased by at least the same amount. This opinion's effects analysis assumes that in-water abundance has increased at the same rate as Tortuguero nesting.

The recovery plan includes three different recovery actions directly related to the proposed action of this opinion: (1) Implement and enforce TED regulations (Priority 1), (2) Promulgate regulations to reduce fishery related mortality (Priority 2), and (3) Provide technology transfer for installation and use of TEDs (Priority). The proposed action does all of these things, thus supports continued implementation of the recovery plan.

The potential injury or mortality of 39 green sea turtles attributed to the proposed action are not likely to reduce population numbers over time due to current population sizes and expected recruitment. Despite the higher level of lethal interactions that occurred in the past, we have still seen positive trends in the status of this species. Capture of sea turtles by relocation trawlers will not affect the adult female nesting population or number of nests per nesting season. Thus, the proposed action is not likely to impede the recovery objectives above and will not result in an appreciable reduction in the likelihood of green sea turtles' recovery in the wild.

Kemp's Ridley Sea Turtles

As demonstrated by nesting increases at the main nesting sites in Mexico, adult ridley numbers have increased over the last decade. The population model used by TEWG (2000) projected that Kemp's ridleys could reach the recovery plan's intermediate recovery goal of 10,000 nesters by the year 2015. Recent calculations of nesting females determined from nest counts show that the population trend is increasing towards that recovery goal, with an estimate of 4,047 nesters in 2006 and 5,500 in 2007 (Gladys Porter Zoo 2008). Recent nesting data indicated a population of an estimated 8,460 females in 2009 and 5,320 females in 2010 (J. Peña, Gladys Porter Zoo, personal communication to S. Heberling, NMFS, March 21, 2011). Based on this information, and similar to the conclusion reached for loggerhead sea turtles, the anticipated lethal take of up to 2 Kemp's ridley sea turtles would not be expected to have a detectable effect on the Kemp's ridley sea turtle population.

The non-lethal take of approximately 6 Kemp's ridley sea turtles by capture trawling will have no more than temporary, non-injurious effects on them. The lethal take of 2 Kemp's ridleys by hopper dredges over the 6-year duration of the proposed project could potentially result in short-term effects on individuals; however, these effects do not constitute an appreciable reduction in reproduction and numbers. Changes in distribution, even short-term, are not expected from non-lethal takes (interactions/releases from relocation trawling, vessel strikes, etc.) during the JHP. Interactions with vessels and/or relocation trawlers may elicit startle or avoidance responses and the effects of the proposed action may result in temporary changes in behavior of sea turtles (minutes to hours) over small areas, but are not expected to reduce the distribution of any sea turtles in the action area. The removal of up to 2 Kemp's ridleys is anticipated during the proposed project. Because all potential take is expected to occur anywhere in the action

area and sea turtles generally have large ranges in which they disperse, no reduction in the distribution of Kemp's ridley sea turtles is expected from the take of these individuals.

Based on the above analysis, we believe that take of Kemp's ridley sea turtles associated with the JHP is not reasonably expected to cause, directly or indirectly, an appreciable reduction in the likelihood of survival of these species in the wild.

The following analysis considers the effects of the take on the likelihood of recovery in the wild. We consider the recovery objectives in the recovery plans prepared for each species that relate to population numbers or reproduction that may be affected by the predicted reductions in the numbers or reproduction of sea turtles resulting from the proposed action.

The following analysis considers the effects of the take on the likelihood of recovery in the wild. We consider the recovery objectives in the recovery plans prepared for each species that relate to population numbers or reproduction that may be affected by the predicted reductions in the numbers or reproduction of sea turtles resulting from the proposed action.

The recovery plan for Kemp's ridley sea turtles (USFWS and NMFS 1992), herein incorporated by reference, lists the following relevant recovery objective:

> Attain a population of at least 10,000 females nesting in a season.

The potential injury or mortality of 2 Kemp's ridleys will result in a reduction in overall population numbers in any given year. We already have determined this take is not likely to reduce population numbers over time due to current population sizes and expected recruitment. Capture of sea turtles by relocation trawlers will not affect the adult female nesting population or number of nests per nesting season. Thus, the proposed action will not result in an appreciable reduction in the likelihood of Kemp's ridley sea turtles recovery in the wild.

8 CONCLUSION

We have analyzed the best available data, the current status of the species, environmental baseline, effects of the proposed action, and cumulative effects to determine whether the proposed action is likely to jeopardize the continued existence of the Northwest Atlantic DPS of loggerhead, green, and Kemp's ridley sea turtles.

Loggerhead (NWA DPS), Green, and Kemp's Ridley Sea Turtles
Because the proposed action is not reasonably expected to reduce appreciably the likelihood of survival and recovery of loggerhead (NWA DPS), green, or Kemp's ridley or sea turtles, it is our opinion that the JHP is not likely to jeopardize their continued existence.

9 INCIDENTAL TAKE STATEMENT (ITS)

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 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 RPMs and terms and conditions of the ITS.

Section 7(b)(4)(c) of the ESA specifies that in order to provide an incidental take statement for an endangered or threatened species of marine mammal, the taking must be authorized under Section 101(a)(5) of the Marine Mammal Protection Act (MMPA). Since no incidental take of listed marine mammals is expected or has been authorized under Section 101(a)(5) of the MMPA, no statement on incidental take of endangered whales is provided, and no take is authorized. Nevertheless, the USACE must immediately notify (within 24 hours, if communication is possible) NMFS's Office of Protected Resources should a take of a listed marine mammal occur.

9.1 Anticipated Amount or Extent of Incidental Take

Section 9 of the ESA and federal regulation pursuant to Section 4(d) of the ESA prohibit take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by NMFS to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. 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 ESA Section 7(b)(4) and Section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

Based on historical distribution data, hopper dredge observer reports, observations of past strandings, and increasing turtle populations of loggerhead, green, and Kemp's ridley sea turtles in the action area, we estimate that these three species may occur in the action area and may be taken by the hopper dredging operations of this project, by crushing and/or entrainment in suction dragheads. NMFS anticipates incidental take will consist of a total of 45 sea turtles killed during the six years of the JHP, which will be detected and documented by onboard protected species observers (Table 9). The total authorized take may consist of up to 25 loggerheads, up 20 greens, and up to1 Kemp's ridley. The species specific take numbers do not sum to the total take number from which they were derived due to rounding up all the species specific take estimates. All the take estimates were rounded up to account for the fact that it is not possible to take a fraction of a sea turtle. NMFS also anticipates that capture trawling may result in up to 235 non-injurious

captures and relocations of an estimated (up to) 127 loggerheads, 102 greens, and 6 Kemp's ridley.

Table 9. Amount of authorized observed take during the JHP project and associated relocation trawling.

During Dredging				
During Dredging	Total Sea Turtles	Loggerhead	Green	Kemp's Ridley
Total Sea Turtles Taken	44.65	24.27	19.41	0.97
Rounded up	45	25	20	1
During Relocation Trawling				
Total Sea Turtles Taken	235	127	102	6

9.1.1 Effect of the Take

NMFS has determined the anticipated level of incidental take specified in Section 9.1 is not likely to jeopardize the continued existence of loggerhead (NWA DPS), green, or Kemp's ridley sea turtles.

9.1.2 Reasonable and Prudent Measures

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

The RPMs and terms and conditions are specified as required, by 50 CFR 402.01(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 measures and terms and conditions are non-discretionary, and must be implemented by the USACE in order for the protection of Section 7(o)(2) to apply. The USACE has a continuing duty to regulate the activity covered by this incidental take statement. If the USACE fails to adhere to the terms and conditions 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.

Current regional opinions for hopper dredging require observer monitoring requirements, deflector dragheads, and conditions and guidelines for relocation trawling, which NMFS believes are necessary to minimize effects of these removals on listed sea turtle species that occur in the action area. Experience has shown that injuries sustained by sea turtles entrained in the hopper dredge dragheads are usually fatal. NMFS has determined that the following RPMs, patterned after long-standing hopper dredging requirements, are necessary and appropriate to minimize impacts of the incidental take of sea turtles during the proposed action. The RPMs that NMFS believes are necessary to minimize the impacts of the proposed hopper dredging have been discussed with the USACE in the past and are standard operating procedures, including use of sea turtle deflector

dragheads, of intake and overflow screening, observer and reporting requirements, and relocation trawling. The following RPMS 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.

1. The USACE shall implement best management measures, including use of sea turtle deflector dragheads, intake and overflow screening, and relocation trawling to reduce the risk of injury or mortality of listed species and lessen the number of sea turtles killed by the proposed action.

2. The USACE shall have measures in place (NMFS-approved protected species observers, and reporting requirements, to detect and report all interactions with any protected species (ESA or Marine Mammal Protection Act) resulting from the proposed action.

9.1.3 Terms and Conditions

In order to be exempt from the prohibitions of Section 9 of the ESA, the USACE must comply with the following terms and conditions, which implement the reasonable and prudent measures described above and outline required reporting and monitoring requirements. These terms and conditions are non-discretionary.

These terms and conditions are designed to ensure the observed protected species take limits (25 loggerheads, 20 greens, and 1 Kemp's ridleys) authorized by this opinion are not met or exceeded too early in the 6-year project, and enable the USACE and NMFS to develop any necessary additional or modified conservations measures to reduce hopper dredge/sea turtle interactions. The measures established in consecutive RBOs (NMFS 1991, 1995, 1997a) to avoid and minimize sea turtle interactions during hopper dredging operations permitted by the USACE in the southeastern United States are included in this project, with the exception of certain project-specific modifications to hopper dredge timing (i.e., "hopper dredging window"), use of sea turtle deflector dragheads,[23] and conditions and requirements for relocation trawling.

1) Hopper Dredging Window

Hopper dredging is allowed at anytime, anywhere; however, NMFS prefers that hopper dredging be conducted in winter months, in keeping with the 1997 SARBO dredging window. Also, the USACE should consider using alternative dredge types (e.g., cutterhead or clamshell type dredges) from River Mile 0-3 during the height of the summer, when sea turtle abundance in this area would be expected to be highest.

2) Sea Turtle Deflecting Draghead

In order to minimize the incidental takes of sea turtles, NMFS and the USACE typically require the use of sea turtle deflecting dragheads on all hopper-dredging projects where

[23] The leading edge of the deflector is designed to have a plowing effect of at least 6 inches depth when the draghead is being operated so as to deflect, rather than injure or entrain and kill, a sea turtle during dredging operations.

the potential for sea turtle interactions exists. Sea turtle deflecting dragheads are required for this project whenever they can be *effectively* used to reduce sea turtle mortalities by hopper dredges. NMFS expects that the deflectors will be effective in many areas. In certain circumstances—notably, parts of Bar Cut 3 of the proposed action area where the irregular, stiff, dense clay bottom substrates do not let the deflectors ride smoothly or plow effectively into the bottom substrates—they are difficult to use, ineffective at their intended role, and their use could be counterproductive (i.e., deflector use could result in more rather than less turtle entrainments). Consequently, NMFS has occasionally temporarily waived their use,[24] and specifically in Bar Cut 3 as recently as December 2011-January 2012 during Jacksonville/Mayport entrance channel dredging.

Deflector draghead removal may be necessary and/or prudent for certain portions of the proposed dredging areas where the substrate renders deflector use ineffective, or damages the dragheads (e.g., when stiff, dense clay or rock is encountered). The USACE shall consult with NMFS and receive NMFS's approval prior to removing sea turtle deflector dragheads, except within Bar Cut 3, where the deflectors are not required at any time nor is pre-approval by NMFS (to not use them) required.

Where sea turtle deflector dragheads are removed, NMFS requires 100% observer coverage.

3) Relocation Trawling

Unless specified, relocation trawling refers to capture and non-capture type trawling. NMFS authorizes capture or non-capture relocation trawling for the duration of the proposed action. Trawler crew safety shall be of paramount concern.

a) <u>From the jetties seaward</u>: The USACE must conduct *capture* trawling (year-round, subject to the requirements (i)-(vi) detailed further below) in areas from the seaward end of the Mayport jetties to the seaward-most portion of the ship channel being dredged/widened to reduce the number of sea turtle/hopper dredge interactions. Even though trawling over irregular bottoms is not as effective as over smooth bottoms, the number of sea turtle captures (if any) per trawling effort may give NMFS/USACE information on sea turtle abundance and potential need to modify the existing protective measures.

b) <u>Between the Mayport jetties</u>: Relocation trawling (capture or non-capture) is not required, but is recommended, due to high juvenile green sea turtle density. However, it is only recommended when it can be done safely, to be determined by relocation trawler Master.

c) <u>From River Mile 3-0</u>: Relocation trawling (capture or non-capture) is not required between River Mile 3 and River Mile 0. The St. Johns is the 3rd busiest port in the southeastern United States, with huge car carriers and container ships making up the bulk of its traffic and the channel is quite narrow from River Miles 0-3.

[24] Section 7(a)(2)/7(d) Supplemental Analysis Report to NMFS SERO PRD. February 2, 2012. Department of the Navy, Norfolk, Virginia. 5090: Ser N46/004

This combined with the power of the currents and the possibility of snagging nets on the bottom, which can limit maneuverability suddenly and without warning, can create dangerous situations for relocation trawling vessels and crews.

d) Above River Mile 3 to end of project area (approximately River Mile 13): Relocation trawling (capture or non-capture) is not required, but may be carried out by the USACE as a preventive measure if it can be done safely (the decision whether to trawl or not to be determined solely by the trawling Master). Although live, healthy, sea turtles have been documented as far upriver as mile 13 (Allen Foley, FWRI, personal communication to E. Hawk, NMFS, December 19, 2013), no turtles have been reported taken by hopper dredging above Mile 3. Sea turtle presence above Mile 3 is expected to be low and seasonal, based on past experience, observer reports, and high freshwater flow.

e) Additional capture-trawling requirements:
   i) These measures apply only to the particular area where a hopper dredge is working and only apply to dredges that incur takes. For example, if two hopper dredges are working independently in two different areas and one of them incurs takes that meet the following take rate criteria, only that dredge shall be subject to the following requirements. If the other dredge subsequently incurs takes that meet the following take rate criteria, then the below measures shall apply to it as well.
   ii) The USACE shall require a capture-type relocation trawler to start relocating as soon as possible (within 72 hours, to the maximum extent possible) in front of the hopper dredge if turtle takes by that hopper dredge reach or exceed two turtles in any consecutive 7-day period. Trawling may be suspended after 14 days pass with no turtle takes by the dredge. This relocation trawling requirement does not supersede the safety requirements previously listed.
   iii) The USACE shall require capture trawling to start as soon as possible (within 72 hours to the maximum extent possible) after 50% of any observed species take limit is reached (i.e., from Table 9: 25 Loggerhead, 20 Green, 1 Kemp's ridley is the take limit, 50% = 12 loggerheads, 10 greens or 1 Kemps ridley). Trawling may be suspended if no additional capture of that species occurs within 14 days. This relocation trawling requirement does not supersede the safety requirements previously listed.
   iv) The USACE shall require capture trawling to be conducted full time in Bar Cut 3, to the extent safely possible as determined by the Master of the relocation trawling vessel, after 75% of any relocation trawling species take limit is reached (i.e., from Table 9: 127 Loggerhead, 102 Green, 4 Kemp's ridley is the take limit, 75% = 96 Loggerhead, 76 Green, and 3 Kemp's ridleys). This relocation trawling requirement does not supersede the safety requirements previously listed.
   v) Exemptions from the trawling requirement: The USACE may request a waiver of relocation trawling requirements on a case by case basis from NMFS, which shall consider the circumstances of the request and make a determination.

vi) Non-capture trawling: When capture trawling is not required by any of the preceding terms and conditions, the USACE may initiate non-capture relocation trawling anywhere and anytime at its own discretion, wherever it can be done safely (the decision to trawl or not to be determined solely by the trawler Master) without prior consultation with NMFS. The trawling contractor shall only use non-capture trawl nets of mesh size and characteristics that are specifically designed to quickly exclude sea turtles that may pass through them, while minimizing entanglement risk. Based on its previous experience with 2011 Mayport dredging and non-capture trawling, the USACE has determined that a traditional shrimp trawling net between 30-50 feet in length with mesh size of approximately 2 inches is the best fit for non-capture trawling. Standard shrimp trawl nets of the type normally used for capture-type relocation trawling and from which the cod ends have simply been removed to allow sea turtles to escape are not authorized for use for non-capture trawling because of their demonstrated capacity to entangle and drown smaller turtles in their large meshes near the mouth of the net.[25]

4) *Protected Species Observer Coverage Aboard Hopper Dredges*

The USACE has proposed 100% observer coverage aboard hopper dredges used for the proposed action.

a) NMFS requires 100% observer coverage in any portions of the river or ocean where sea turtle deflector dragheads are not used.

b) From River Mile 6 downstream as far as the seaward-most extent of dredging, NMFS requires 100% observer coverage for hopper dredging.

c) From River Mile 6 to the upstream end of the project area (approximately, River Mile 13), NMFS requires 50% observer coverage[26] if deflectors are in place, per (a) above, 100% coverage if deflectors have been removed.[27]

5) Silent Inspector

The USACE shall require the use of a Silent Inspector[28] on all dredge vessels to ensure compliance with the 10-knot speed limit during the right whale calving season (November 15 through April 15 of each year). Silent Inspector reports will be provided to NMFS within 90 days following the close of right whale calving season, to: NMFS Protected Resources Division, 263 13th Avenue South, St. Petersburg, Florida 33701-5505 (RPM 1).

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[25] Section 7(a)(2)/7(d) Evaluation Report to NMFS SERO PRD. May 23, 2011. Department of the Navy, Norfolk, Virginia. 5090: Ser N4/018

[26] 50% coverage means an observer, monitoring 12-hours out of every 24 hour period.

[27] Above River Mile 6, sea turtle interactions with hopper dredges are likely to be rare, based on past experience, observer reports, and high freshwater flow; therefore, the use of 100% observer coverage is not necessary. It is also expected that the use of turtle deflector devices on the dragheads will reduce potential interactions.

[28] A Silent Inspector is a USACE tool that reports and describes dredge operations and analyzes the data to determine what the dredge is doing (dredging, turning, sailing, or dumping) where.

6) Bed-Leveling Takes
If compelling STSSN observer reports and evidence indicate that a turtle was killed by a bed-leveler associated with the proposed action covered by this opinion, the USACE shall reinitiate the consultation (RPM 1); however, these takes shall not be counted against the ITS.

7) Take Reporting
If any listed species are injured or killed during the proposed project, the USACE shall provide a report summarizing the incident, within 90 days of project completion, to: NMFS Protected Resources Division, 263 13th Avenue South, St. Petersburg, Florida 33701-5505. Notification of take shall be provided to NMFS at the following e-mail address within 24 hours of each take: **takereport.nmfsser@noaa.gov** (RPM 2).

8) *Tissue Sampling Requirements and Authority to Conduct Tissue Sampling for Genetic and Contaminants Analyses by NMFS and the USACE:*
   a) Every live or dead sea turtle captured by hopper dredging or relocation trawling during or associated with the proposed dredging action shall be tissue-sampled prior to release (if alive) or prior to disposal (if dead), for future genetic analysis by NMFS. Ultimately, tissue samples gathered during sampling will be used to obtain reliable genetic data on the nesting or sub-population identity of sea turtles being captured or lethally taken.

      This opinion serves as the permitting authority for any NMFS-approved protected species observer aboard a hopper dredge to handle and tissue-sample live- or dead-captured sea turtles without the need for an ESA Section 10 permit (RPM 2).

   b) Sea turtle tissue samples shall be taken in accordance with NMFS's SEFSC procedures for sea turtle genetic analyses (see SEFSC Web site) and may also be taken for contaminant analyses by NMFS. Sampling shall continue uninterrupted until such time as the project ends.

   c) The USACE shall ensure that tissue samples taken during the dredging project are collected and stored properly and mailed every three months until completion of the dredging project to: NOAA, National Marine Fisheries Service, Southeast Fisheries Science Center, Attn: Lisa Belskis, 75 Virginia Beach Drive, Miami, Florida 33149.

   d) The USACE shall notify NMFS when 75% of any species take limit is reached to discuss whether reinitiation might be necessary.

10 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 are discretionary agency

activities 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.

Pursuant to Section 7(a)(1) of the ESA, the following conservation recommendations are made to assist the USACE in contributing to the conservation of sea turtles by further reducing or eliminating adverse impacts that result from dredging.

1. Draghead Modifications and Bed-Leveling Studies: The USACE should supplement other efforts to develop modifications to existing dredges to reduce or eliminate take of sea turtles, and develop methods to minimize sea turtle take during "cleanup" operations when the draghead maintains only intermittent contact with the bottom. Some method to level the "peaks and valleys" created by dredging would reduce the amount of time dragheads are off the bottom. NMFS is ready to assist the USACE in conducting studies to evaluate bed-leveling devices and their potential for interaction with sea turtles, and develop modifications if needed.

2. Draghead Evaluation Studies and Protocol: Additional research, development, and improved performance is needed before the V-shaped rigid deflector draghead can replace seasonal restrictions as a method of reducing sea turtle captures during hopper dredging activities. Development of a more effective deflector draghead or other entrainment-deterring device (or combination of devices, including use of acoustic deterrents) could potentially reduce the need for sea turtle relocation or result in expansion of the preferred winter dredging window. NMFS should be consulted regarding the development of a protocol for draghead evaluation tests. NMFS recommends that USACE coordinate with ERDC, the Association of Dredge Contractors of America, and dredge operators (Manson, Bean-Stuyvesant, Great Lakes, Natco, etc.) regarding additional reasonable measures they may take to further reduce the likelihood of sea turtle takes.

3. Continuous Improvements in Monitoring and Detecting Takes: The USACE should seek continuous improvements in detecting takes and should determine, through research and development, a better method for monitoring and estimating sea turtle takes by hopper dredge. Observation of overflow and inflow screening is only partially effective and provides only partial estimates of total sea turtle mortality.

4. Overflow Screening: The USACE should encourage dredging companies to develop or modify existing overflow screening methods on their company's dredge vessels for maximum effectiveness of screening and monitoring. Horizontal overflow screening is preferable to vertical overflow screening because NMFS considers that horizontal overflow screening is significantly more effective at detecting evidence of protected species entrainment than vertical overflow screening.

5. Preferential Consideration for Horizontal Overflow Screening: The USACE should give preferential consideration to hopper dredges with horizontal overflow screening when awarding hopper dredging contracts for areas where new materials, large amounts of debris, or clay may be encountered, or have historically been encountered.

Excessive inflow screen clogging may in some instances necessitate removal of inflow screening, at which point effective overflow screening becomes more important.

6. Section 10 Research Permits, Relocation Trawling, Piggy-Back Research, and 50 CFR Part 223 Authority to Conduct Research on Salvaged, Dead Specimens: NMFS recommends that USACE ERDC apply to NMFS for an ESA Section 10 research permit to conduct additional endangered species research on species incidentally captured during traditional relocation trawling. SERO shall assist the USACE with the permit application process.

   NMFS also encourages the USACE to cooperate with NMFS scientists, other federal agencies' scientists, and university scientists holding appropriate research permits to make more use of turtles taken or captured by hopper dredges and relocation trawlers pursuant to the authority conferred by this opinion. NMFS encourages "piggy-back" research projects by duly-permitted or authorized individuals or their authorized designees.

   Important research can be conducted without a Section 10 permit on salvaged dead specimens. Under current federal regulations (see 50 CFR 223.206 (b): Exception for injured, dead, or stranded [threatened sea turtle] specimens), "Agents…of a Federal land or water management agency may…salvage a dead specimen which may be useful for scientific study." Similar regulations at 50 CFR 222.310 provide "salvaging" authority for endangered sea turtles.

7. Draghead Improvements - Water Ports: NMFS recommends that the USACE require, or at least recommend, that dredge operators have all dragheads on hopper dredges contracted by the USACE for dredging projects outfitted (eventually) with water ports located in the top of the dragheads to help prevent the dragheads from becoming plugged with sediments. When the dragheads become plugged with sediments, the dragheads are often raised off the bottom by the dredge operator with the suction pumps on in order to take in enough water to help clear clogs in the dragarm pipeline, which increases the likelihood that sea turtles in the vicinity of the draghead will be taken by the dredge. Water ports located in the top of the dragheads would relieve the necessity of raising the draghead off the bottom to perform such an action, and reduce the chance of incidental take of sea turtles.

   NMFS supports and recommends the implementation of proposals by ERDC and USACE personnel for various draghead modifications to address scenarios where turtles may be entrained during hopper dredging (Dickerson and Clausner 2003). These include: (1) An adjustable visor; (2) water jets for flaps to prevent plugging and thus reduce the requirement to lift the draghead off the bottom; and (3) a valve arrangement (which mimics the function of a "Hoffer" valve used on cutterhead type dredges to allow additional water to be brought in when the suction line is plugging) that will provide a very large amount of water into the suction pipe thereby

significantly reducing flow through the visor when the draghead is lifted off the bottom, reducing the potential to take a turtle.

8. Economic Incentives for No Turtle Takes: The USACE should consider devising and implementing some method of significant economic incentives to hopper dredge operators such as financial reimbursement based on their satisfactory completion of dredging operations, or X number of cubic yards of material moved, or hours of dredging performed, without taking turtles. This may encourage dredging companies to research and develop "turtle friendly" dredging methods; more effective, deflector dragheads; pre-deflectors; top-located water ports on dragarms; etc.

9. Sodium Vapor Lights on Offshore Equipment: On offshore equipment (i.e., hopper dredges, pumpout barges) shielded low-pressure sodium vapor lights are highly recommended for lights that cannot be eliminated when the vessels are operating with 10 miles of sea turtle nesting beaches.

11 REINITIATION OF CONSULTATION

This concludes formal consultation on the proposed Jacksonville Harbor Deepening and Widening Project. As provided in 50 CFR 402.16, reinitiation of formal consultation is required where discretionary federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) The amount or extent of taking specified in the incidental take statement is exceeded[29]; (2) new information reveals effects of the action may affect listed species or critical habitat in a manner or to an extent not previously considered; (3) the identified action is subsequently modified in a manner that causes an effect to listed species or critical habitat that was not considered in the biological opinion; or (4) a new species is listed or critical habitat designated that may be affected by the identified action. In instances where the amount or extent of take is exceeded, USACE must immediately request reinitiation of formal consultation.

[29] Please note that T&C 8.d requires reinitiating when 75% of any species take limit is reached.

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13 APPENDIX A

South Atlantic Division Corps of Engineers
Hopper Dredging Protocol for Atlantic Coast
FY 98 - FY 03

1. Sea turtle deflecting dragheads will be used at all times.

2. Districts will inspect sea turtle deflecting dragheads systems to ensure that they are fully operational, prior to initiation of work.

3. Districts will ensure that draghead operators know how to properly use the sea turtle deflecting system.

4. Maintenance dredging at Savannah, Brunswick and Kings Bay Harbors must be restricted to 15 December through the end of March. Maintenance dredging at Charleston and Wilmington Harbors must be restricted to 1 December through the end of March where the sea turtle deflecting draghead system can not be used effectively. Dredging may begin as soon as mid-November in those portions of the Wilmington and Charleston Harbor channels where the sea turtle deflecting draghead can be used effectively. All Districts will cooperate to ensure that their scheduling of hopper dredging contracts, does not interfere with this Division priority work area.

5. Sea turtle observers, inflow screens and overflow screens will be used during all dredging operations, except for the months of January and February, which are optional. Variations from this provision may be granted by Division, but must be justified from a technical perspective.

6. All sea turtle takes will be reported promptly to SAD-ET-CO/PD and posted at usace.sad.turtle newsgroup on the Internet.

7. If two sea turtle takes occur within 24 hours, you should immediately notify the Division POC so that he can initiate reconsultation with National Marine Fisheries Service.

8. If a third take occurs on the project the district will cease operations and notify the South Atlantic Division. Continuation of dredging will occur only after cleared by Division. Upon taking three turtles, District will develop a risk assessment along with an appropriate risk management plan, and submit that to Division for assessment. Generally relative abundance and relocation trawling would be an integral part of a risk assessment and management plan. Should a total take of 5 sea turtles occur, for whatever reason, all work will be terminated unless other prior agreements had been reached with Division.

9. If a total of two endangered species of sea turtles are taken during a project, work will be suspended until further guidance from Division has been received.

10. Arrangements will be made for appropriate observation of all species of whales. The hopper dredge must not get closer than 750 yards of a right whale. Jacksonville and Savannah Districts will contribute their share of funding for the Right Whale Early Warning System early enough in the year to ensure that this is not a cause for delay in the program.

11. From Jacksonville District north through Wilmington District, sea turtle observers will also be responsible for monitoring takes of shortnose sturgeon. All takes of shortnose sturgeon must be reported to Division. Should a total take of three shortnose sturgeons occur, District will terminate hopper dredging until further guidance has been received from Division.

14 APPENDIX B

SEA TURTLE AND SMALLTOOTH SAWFISH CONSTRUCTION CONDITIONS

The permittee shall comply with the following protected species construction conditions:

a. The permittee shall instruct all personnel associated with the project of the potential presence of these species and the need to avoid collisions with sea turtles and smalltooth sawfish. All construction personnel are responsible for observing water-related activities for the presence of these species.

b. The permittee shall advise all construction personnel that there are civil and criminal penalties for harming, harassing, or killing sea turtles or smalltooth sawfish, which are protected under the Endangered Species Act of 1973.

c. Siltation barriers shall be made of material in which a sea turtle or smalltooth sawfish cannot become entangled, be properly secured, and be regularly monitored to avoid protected species entrapment. Barriers may not block sea turtle or smalltooth sawfish entry to or exit from designated critical habitat without prior agreement from the National Marine Fisheries Service's Protected Resources Division, St. Petersburg, Florida.

d. All vessels associated with the construction project shall operate at "no wake/idle" speeds at all times while in the construction area and while in water depths where the draft of the vessel provides less than a four-foot clearance from the bottom. All vessels will preferentially follow deep-water routes (e.g., marked channels) whenever possible.

e. If a sea turtle or smalltooth sawfish is seen within 100 yards of the active daily construction/dredging operation or vessel movement, all appropriate precautions shall be implemented to ensure its protection. These precautions shall include cessation of operation of any moving equipment closer than 50 feet of a sea turtle or smalltooth sawfish. Operation of any mechanical construction equipment shall cease immediately if a sea turtle or smalltooth sawfish is seen within a 50-ft radius of the equipment. Activities may not resume until the protected species has departed the project area of its own volition.

f. Any collision with and/or injury to a sea turtle or smalltooth sawfish shall be reported immediately to the National Marine Fisheries Service's Protected Resources Division (727-824-5312) and the local authorized sea turtle stranding/rescue organization.

g. Any special construction conditions, required of your specific project, outside these general conditions, if applicable, will be addressed in the primary consultation.

Revised: March 23, 2006