SAN JUAN HARBOR, PUERTO RICO

NAVIGATION IMPROVEMENTS STUDY

Final Integrated Feasibility Report & Environmental Assessment

APPENDIX F
NMFS EFH ESA Consultation

June 2018

US Army Corps
of Engineers
Jacksonville District

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southeast Regional Office
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F/SER31: KL
SER-2017-18763

MAY 29 2018

Gina Paduano Ralph, Ph.D.
Chief, Environmental Branch
Planning and Policy Division
Jacksonville District Corps of Engineers
Department of the Army
701 San Marco Boulevard
Jacksonville, Florida 32207-0019

Ref: San Juan Harbor (SJH) Expansion, San Juan, Puerto Rico

Dear Sir or Madam:

The enclosed Biological Opinion ("Opinion") responds to your request for consultation with us, the National Marine Fisheries Service (NMFS), pursuant to Section 7 of the Endangered Species Act (ESA) for the following action.

The Opinion considers the effects of the U.S. Army Corps of Engineers (USACE) proposal to conduct dredging to expand the SJH and dispose of associated dredge material on the following listed species and/or critical habitat: leatherback, green (North Atlantic [NA] and South Atlantic [SA] distinct population segments [DPS]), hawksbill, and loggerhead (Northwest Atlantic [NWA] DPS) sea turtles; sperm, sei, blue and fin whales; elkhorn, staghorn, pillar, rough cactus, mountainous star, lobed star, and boulder star corals; scalloped hammerhead sharks (Southwest Atlantic [SWA] DPS); Nassau grouper; giant manta ray; and designated critical habitat for elkhorn and staghorn corals. NMFS concludes that the proposed action is not likely to adversely affect leatherback sea turtles, sperm, sei, blue, and fin whales, elkhorn, staghorn, pillar, rough cactus, mountainous star, lobed star, and boulder star corals, scalloped hammerhead sharks, Nassau grouper, and designated critical habitat for elkhorn and staghorn corals. NMFS also concludes that the proposed action may adversely affect but is not likely to jeopardize the continued existence of green, loggerhead, and hawksbill sea turtles.

We look forward to further cooperation with you on other projects to ensure the conservation of our threatened and endangered marine species and designated critical habitat. If you have any questions on this consultation, please contact Kelly Logan, Consultation Biologist, by phone at 727-460-9258, or by email at Kelly.Logan@noaa.gov.

Sincerely,

Roy E. Crabtree, Ph.D.
Regional Administrator

Enclosure
File: 1514-22.F.9

MAY 29 2018

Endangered Species Act - Section 7 Consultation
Biological Opinion

Action Agency: U.S. Army Corps of Engineers (USACE), Jacksonville District

Activity: U.S. Army Corps of Engineers (USACE), Jacksonville District

Expansion of SJH, San Juan, Puerto Rico

Consulting Agency: Protected Resources Division
Southeast Regional Office
National Marine Fisheries Service

Consultation Number SER-2017-18763

Approved by: Roy E. Crabtree, Ph.D., Regional Administrator
NMFS, Southeast Regional Office
St. Petersburg, Florida

Date Issued: May 29, 2018

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Acronyms and Abbreviations

ATON	Aids To Navigation
BIRNM	Buck Island Reef National Monument
CFMC	Caribbean Fisheries Management Council
CPUE	Catch Per Unit Effort
DPS	Distinct Population Segment
DTRU	Dry Tortugas Recovery Unit
DWH	Deep Water Horizon
EEZ	Exclusive Economic Zone
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FMP	Fisheries Management Plan
FP	Fibropapillomatosis
FWCC	Florida Fish and Wildlife Conservation Commission
FWRI	Florida Wildlife Research Institute
GADNR	Georgia Department of Natural Resources
GCRU	Greater Caribbean Recovery Unit
HMS	Highly Migratory Species
ITS	Incidental Take Statement
NAD83	North American Datum 1983
NCWRC	North Carolina Wildlife Resources Commission
NGMRU	Northern Gulf of Mexico Recovery Unit
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Association
NOS	National Ocean Service
NRC	National Research Council
NRU	Northern Recovery Unit
NTUs	Nephelometric Turbidity Units
ODMDS	Ocean Dredged Material Disposal Site
Opinion	Biological Opinion
PRDNER	Puerto Rico Department of Environment and Natural Resources
RPMs	Reasonable and Prudent Measures
SARBO	South Atlantic Regional Biological Opinion
SCDNR	South Carolina Department of Natural Resources
SCL	Straight Carapace Length
SEFSC	Southeast Fisheries Science Center
SJH	San Juan Harbor
SMMP	Site Management and Monitoring Plan
TEWG	Turtle Expert Working Group
USACE	U.S. Army Corps of Engineers
USCG	United States Coast Guard
USFWS	U.S. Fish and Wildlife Service
USVI	U.S. Virgin Islands

Units of Measurement

in	inch(es)
ft	foot/feet
m	meter(s)
mm	millimeters
cm	centimeter(s)
kt	knots
kg	kilograms
lb	pound(s)
oz	ounces
yd	yard(s)
ft^2	square foot/feet
yd^3	cubic yards

Background

Section 7(a)(2) of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. § 1531 et seq.), requires each federal agency to "insure that any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of critical habitat of such species." Section 7(a)(2) requires federal agencies to consult with the appropriate Secretary on any such action. National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS) share responsibilities for administering the ESA.

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. The Opinion states the amount or extent of incidental take of the listed species that may occur, develops measures (i.e., reasonable and prudent measures - RPMs) to reduce the effect of take, and recommends conservation measures to further the recovery of the species. Notably, no incidental destruction or adverse modification of designated critical habitat can be authorized, and thus there are no RPMs—only reasonable and prudent alternatives that must avoid destruction or adverse modification.

This document represents NMFS's Opinion based on our review of impacts associated with the U.S. Army Corps of Engineers (USACE) proposed action within San Juan, Puerto Rico. This Opinion analyzes the project's effects on threatened and endangered species and designated critical habitat, in accordance with Section 7 of the ESA. We based it on project information provided by the USACE and other sources of information, including the published literature cited herein.

1 CONSULTATION HISTORY

We received your letter requesting consultation on July 17, 2017. We requested additional information during a teleconference on November 8, 2017, and via email on November 30, 2017. We received a final response on December 1, 2017, and initiated consultation that day.

NMFS previously issued a concurrence letter (SER-2013-10961) on the placement of dredged material into the beneficial use area of the Condado Lagoon for seagrass restoration and determined that it was not likely to adversely affect any ESA-listed sea turtles or corals. NMFS also issued 2 concurrence letters (SER-2005-3186 and SER-2010-2658) for the use of the SJH Ocean Dredged Material Disposal Site and determined that it was not likely to adversely affect any ESA-listed sea turtles, elkhorn and staghorn corals, whale species, or coral critical habitat.

2 DESCRIPTION OF THE PROPOSED ACTION AND ACTION AREA

2.1 Proposed Action

The USACE proposes to conduct dredging to expand the SJH. The proposed action can be seen in Figure 1, below, and includes the following activities:

1. Dredging to remove approximately 2.1 million cubic yards (yd^3) of material.
2. Deepen Cut-6 from 42 feet (ft) to 46 ft.
3. Deepen Anegado Channel from 40 to 44 ft.
4. Deepen Army Terminal Channel from 40 to 44 ft and widen by 100 ft.
5. Deepen Army Terminal Turning Basin from 40 to 44 ft.
6. Deepen San Antonio Channel and Cruise Ship Basin East from 30 to 36 ft.
7. Placement of dredged material in the SJH Ocean Dredged Material Disposal Site (ODMDS) or the Condado Lagoon for seagrass restoration.

The construction will be performed using a variety of dredging methods which may include cutterhead, clamshell, hopper dredge, and/or backhoe. Methods of transporting dredged material to disposal sites may include self-propelled transport via hopper dredges or towing/pushing of loaded barges to disposal sites via tugboats. Dredged material will be transported and disposed of within the SJH ODMDS or transported and placed in previously dredged holes within the Condado Lagoon as beneficial use to restore seagrass habitat. Dredge material would be transported to the Condado Lagoon through the San Antonio Channel and then pumped into the Lagoon via pipeline. Bed leveling may also be used to redistribute sediments after dredging is completed.

The USACE reports that it has determined, based on geotechnical investigations, the material to be dredged is primarily silts and clay, historically and currently transported from upland areas by rivers and streams and deposited into SJH. More specifically, the material is soft clay and stiff plastic clay. The USACE's biological assessment notes that sand and gravel mixes with some limestone and sandstone were also encountered.

The USACE initially proposed to use relocation trawling; however, relocation trawling is authorized only when it can be done safely as a means to reduce sea turtle mortalities. Given the low number of sea turtles expected in and around the action area, NMFS and the USACE now agree that relocation trawling is not warranted for this project. Therefore, relocation trawling is not authorized by this Opinion.

In order to reduce the chances of turbidity and sedimentation impacts to ESA-listed corals and designated critical habitat from dredging and potential leaks from disposal vessels, the USACE will work in conjunction with the NMFS to develop a turbidity monitoring plan for inclusion in the project The monitoring plan will include turbidity monitoring stations adjacent to ESA-listed corals (if any are found during the pre-construction resource surveys) and at the edges of the designated critical habitat for elkhorn and staghorn corals near the disposal vessel transit route. The exact number and locations of the monitoring stations will be determined and detailed in the collaborative monitoring plan. Turbidity in these locations must not exceed 7 Nephelometric

Turbidity Units (NTUs) above background as measured at the control locations positioned 200 meters (m) upstream of the dredge. The monitoring plan will include adaptive management measures to be implemented to mitigate turbidity in the event that turbidity exceeds 7 NTUs above background at these locations. Adaptive management may include measures to correct disposal vessel leakage, reducing overflow, etc.

The USACE will require their contractor(s) to follow the Terms and Conditions in the 1997 (Appendix A) and 1995 South Atlantic Regional Biological Opinions (SARBO) (or any subsequent SARBO, when issued), with the exception of the conditions related to the southeast United States' North Atlantic Right Whale calving area, because the proposed project is not located in or near the calving area. The USACE will also incorporate the protective measures of NMFS' *Sea Turtle and Smalltooth Sawfish Construction Conditions*[1] into the project plans and specifications. The USACE will also adhere to the conditions in the February 1, 2011, Environmental Protection Agency's (EPA's) Site Management and Monitoring Plan (SMMP) for use of the ODMDS (Appendix B), including measures to limit sedimentation and NMFS' *Vessel Strike Avoidance Measures*[2]. Dredging is expected to occur year round and last approximately 14 months.

[1] NMFS. 2006b. Sea Turtle and Smalltooth Sawfish Construction Conditions revised March 23, 2006. National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Southeast Regional Office, Protected Resources Division, Saint Petersburg, Florida. http://sero.nmfs.noaa.gov/protected_resources/section_7/guidance_docs/documents/sea_turtle_and_smalltooth_sawfish_construction_conditions_3-23-06.pdf, accessed June 2, 2017.

[2] NMFS Southeast Region Vessel Strike Avoidance Measures and Reporting for Mariners; revised February 2008. http://sero.nmfs.noaa.gov/protected_resources/section_7/guidance_docs/documents/copy_of_vessel_strike_avoidance_february_2008.pdf

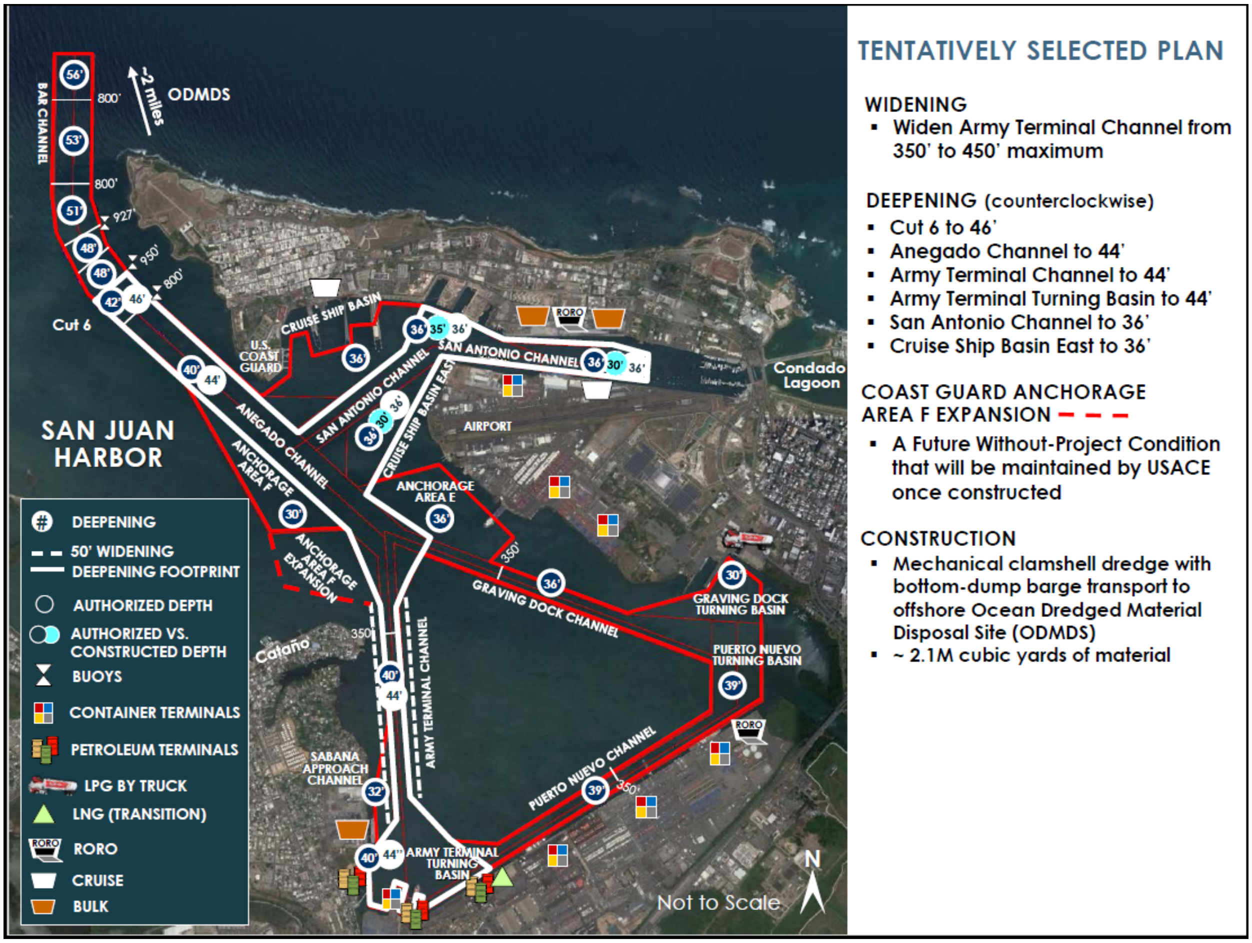

Figure 1. Project components. Figure is from cover page of Biological Assessment-San Juan Harbor Improvement Study, USACE, July 13, 2017.

2.2 Action Area

The action area is defined by regulation as "all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action" (50 CFR 402.02). The center of the SJH project site is located at latitude 18.449907°N, longitude 66.114265°W (North American Datum 1983 [NAD83]) (Figure 1). The action area includes the SJH (specific channels to be dredged are also shown in Figure 1.)

The action area also includes the Condado Lagoon (18.458055°N, 66.081298°W [NAD83]) (Figure 2), and the disposal vessel transit route through the San Antonio Channel between the lagoon and dredge site.

The action area also includes the ODMDS (18.502833°N, 66.158667°W, 18.502833°N, 66.141333°W, 18.519500°N, 66.141333°W, 18.519000°N, 66.158667°W [NAD83]) (Figure 3) and the disposal vessel transit route between the ODMDS and the dredge site. The ODMDS is approximately 1 square mile in area, located about 2.2 nautical miles northwest of the entrance to SJH in the Atlantic Ocean, with an average water depth of 965 ft.

Figure 2. SJH project location and Condado Lagoon (©2017 Google)

Figure 3. ODMDS location (©2017 Google).

3 STATUS OF LISTED SPECIES AND CRITICAL HABITAT

Tables 1 and 2 below provide a list of the ESA-listed species and critical habitat that may occur in or near the action area.

Table 1. Effects Determination(s) for Species the Action Agency or NMFS Believes May Be Affected by the Proposed Action

Species	ESA Listing Status	Action Agency Effect Determination	NMFS Effect Determination
Sea Turtles			
Green (North Atlantic and South Atlantic distinct population segments [DPSs])	T	LAA	LAA
Leatherback	E	NLAA	NLAA
Loggerhead (Northwest Atlantic Ocean DPS)	T	LAA	LAA
Hawksbill	E	LAA	LAA
Fish			

Species	ESA Listing Status	Action Agency Effect Determination	NMFS Effect Determination
Nassau Grouper	T	NLAA	NLAA
Scalloped hammerhead shark (Southwest Atlantic DPS)	T	NLAA	NLAA
Giant manta ray[3]	T	NLAA	NLAA
Invertebrates and Marine Plants			
Elkhorn coral (*Acropora palmata)*	T	NLAA	NLAA
Staghorn coral (*Acropora cervicornis)*	T	NLAA	NLAA
Boulder star coral (*Orbicella franksi)*	T	NLAA	NLAA
Mountainous star coral (*Orbicella faveolata)*	T	NLAA	NLAA
Lobed star coral (*Orbicella annularis)*	T	NLAA	NLAA
Rough cactus coral (*Mycetophyllia ferox)*	T	NLAA	NLAA
Pillar coral (*Dendrogyra cylindrus)*	T	NLAA	NLAA
Marine Mammals			
Blue whale	E	NLAA	NLAA
Fin whale	E	NLAA	NLAA
Sei whale	E	NLAA	NLAA
Sperm whale	E	NLAA	NLAA
E = endangered; T = threatened; NLAA = may affect, not likely to adversely affect; LAA = likely to adversely affect			

Table 2. Critical Habitat NMFS Believes May Be Affected by the Proposed Action

Species	Unit
Staghorn and elkhorn coral	Area 2: Puerto Rico and associated Islands Unit

3.1 Species and Critical Habitat Not Likely to be Adversely Affected

Whales

We believe that the proposed action is not likely to adversely affect blue, fin, sei, or sperm whales. Potential effects to these species are limited to the following: temporary avoidance of the area during offshore transportation and disposal operations, injury from potential interactions with construction equipment (e.g., a dredge or disposal vessel striking a whale), and effects from disposal of dredged material. The dredge crew and contractors will be required to abide by NMFS's *Southeast Region Vessel Strike Avoidance Measures and Reporting for Mariners*, per

[3] NMFS published a final rule to list the giant manta ray under the Endangered Species Act as threatened on January 22, 2018 (83 FR 2916), effective February 21, 2018.

the ODMDS SMMP, and all dredges will be required to have NMFS-approved endangered species observers aboard, per the SARBO.

Whales are not expected to be present within the harbor itself and so should not be in the vicinity of the dredging. Whales are also not expected to be present in the vicinity of the Condado Lagoon dredge material disposal site or transit routes. However, whales could be present near the ODMDS or along the disposal routes.

Whales may avoid the area around the ODMDS disposal site and vessel routes due to presence of construction equipment and related noise. The disposal is occurring in the open ocean environment, and similar habitat, which would support the same activities by whales, surrounds the project area. Thus, any animals disrupted by the disposal activities would be expected to continue to conduct the same activities in the surrounding areas that are not being disrupted by the project. Therefore, NMFS believes that avoidance effects will be temporary and insignificant.

NMFS has previously consulted on disposal operations in the ODMDS (SER-2005-03186 and SER-2010-02658) and determined that effects from vessel strikes from transiting vessels and exposure to dredge materials are not likely to adversely affect listed whale species (NMFS 2010). The USACE will dispose of material at the ODMDS in a manner consistent with the activities described in that previous consultation. We have no new information indicating that the conclusions in that consultation is no longer valid, and accordingly conclude the effects to blue, fin, sei, and sperm whales from disposal of dredged materials at the ODMDS will be either insignificant or discountable.

Leatherback sea turtles

Leatherbacks are not expected within the SJH because their life history, sheltering, and foraging requirements are not met within SJH. Leatherback sea turtles have a pelagic, deepwater life history, where they forage primarily on jellyfish. Further, no leatherbacks have been reported within the San Juan Bay. Leatherback nesting has been reported within the Condado Lagoon.

The first disposal option is placement of dredged material in the ODMDS. NMFS has previously consulted on disposal operations at the ODMDS (SER-2005-03186 and SER-2010-02658) and determined that effects from vessel strike from transiting vessels, exposure to dredge materials, and impacts to sea turtle habitat from dredge material spillage or vessel groundings are not likely to adversely affect listed leatherbacks or other listed sea turtles (NMFS 2010). As discussed above, the USACE will dispose of material at the ODMDS in a manner consistent with the activities described in those previous consultations. We have no new information indicating that the conclusions in those consultations are no longer valid, and accordingly conclude all the effects to leatherback sea turtles from disposal of dredged materials at the ODMDS will be either insignificant or discountable.

Dredged material may also be used to fill previously dredged holes within the Condado lagoon to restore seagrass habitat. NMFS has previously consulted on this action, and determined that the restoration may affect, but is not likely to adversely affect leatherbacks or other listed sea turtles (NMFS 2014a). The USACE will conduct the proposed disposal of dredged materials in Condado Lagoon in a manner consistent with the activities consulted on in that consultation. We have no new information regarding effects to leatherbacks as a result of the proposed restoration, and therefore conclude that any effects on leatherbacks associated with transit and disposal of dredged materials within the Condado lagoon will be discountable.

Even if leatherbacks are present in SJH, NMFS concludes that hopper and non-hopper dredging activities may affect, but are not likely to adversely affect, leatherback sea turtles. There has never been a reported take of a leatherback by a hopper dredge. Even if a leatherback turtle were to enter SJH, this species is unlikely to be entrained in hopper dredges, because the typical adult or sub-adult leatherback is as large as or larger than the industry-standard California-type hopper dredge trailing-suction draghead. Additionally, the California-type draghead design and level position during dredging (as opposed to more upright positioning of other dredge types), makes it less likely to entrain larger sea turtles (Studt 1987). NMFS determined in the 1997 SARBO that leatherback sea turtles are unlikely to be adversely affected by hopper dredging, and we have not received any new information that would change the basis of this determination.

NMFS has previously determined in dredging Opinions (NMFS 1991; NMFS 1995; NMFS 1997b; NMFS 2003a) that non-hopper type dredging methods (e.g., clamshell or bucket dredging, cutterhead dredging, pipeline dredging,) are slower and unlikely to adversely affect leatherback or other listed sea turtles. Sea turtles are highly mobile species and can avoid interactions with these slow moving dredge types. Further, NMFS believes that sea turtles are likely to avoid the areas during construction, due to the noise and associated disturbances. Thus, NMFS believes that injury or death from interactions with clamshell and/or hydraulic dredging equipment is extremely unlikely to occur, and is, therefore, discountable.

Leatherback or other sea turtles may be susceptible to being crushed by bed levelers if they remain burrowed into the sea floor as the bed leveler passes over them. The USACE performed a review of data from the use of bed leveling devices at Port Everglades, Port Canaveral, Miami Harbor, and Palm Beach Harbor did not find any correlation between bed leveling and sea turtle injuries or increased strandings (USACE 2013). Sea turtles are known to burrow into the sea floor when the water temperatures are cold; however, sea turtles are not expected to burrow in the SJH project area due to the year-round warm water temperatures at this location. Based on the above information NMFS believes that effects from bed leveling will be discountable.

Leatherback or other sea turtles may be temporarily unable to use portions of the action area for forage and shelter habitat due to avoidance of construction activities and related noise. The action area is surrounded by similar habitat, which would support the same activities by sea turtles. Thus, any animals disrupted by the dredging activities would be expected to continue to conduct the same activities in the surrounding areas, which are not being disrupted by dredging. NMFS believes that those avoidance effects will be temporary and insignificant. Additionally the previous consultations for the ODMDS (SER-2010-2658) and the Condado lagoon (SER-2013-10961) found that effects to sea turtles from impacts to forage and shelter habitat were discountable. Based on the above information, we believe that all the effects to leatherback sea turtles will be either insignificant or discountable.

Scalloped Hammerhead, Giant Manta Ray, and Nassau Grouper
Scalloped hammerhead sharks, giant manta ray, and Nassau grouper are unlikely to be found within the SJH and have not been reported within the San Juan Bay. The final rule listing DPS's of scalloped hammerhead shark as threatened, including the Southwest Atlantic DPS where Puerto Rico is located, indicated that we have not been able to establish that the species is present in waters around Puerto Rico (80 FR 71774). Giant manta ray are typically found in offshore in the open ocean and sometimes may be found around nearshore reefs and estuarine waters; none of these conditions are found within the SJH. Giant manta ray may transit the area around the ODMDS or vessel disposal routes. Nassau grouper are found in offshore waters among coral and hardbottom. These conditions are not present with the SJH but the species may be found transiting near the disposal routes in areas where hardbottom is present. Direct, physical injury impacts to these species are not expected from construction machinery or materials because scalloped hammerhead sharks, giant manta ray, and Nassau grouper have the ability to detect and move away from dredge and disposal vessels. Thus, direct physical impacts are considered extremely unlikely to occur and are therefore discountable.

NMFS previously analyzed the disposal of sediments from the SJH area into the ODMDS (SER-2010-2658) and determined that the deposition of materials would not impact ESA-listed sea turtles or whales. NMFS believes that this same rationale applies to scalloped hammerhead sharks, Nassau grouper, and giant manta ray, including possible effects from exposure to contaminants in the material or in the water column. Monitoring data indicate that levels of cadmium, chromium, mercury, nickel, and lead from samples taken in the ODMDS do not exceed the maximum concentrations for acute toxicity to aquatic organisms, but that the high end of the range of concentrations for arsenic, copper, and zinc do sometimes exceed these concentrations. However, arsenic occurs naturally in the volcanic soils of Puerto Rico and copper was used as an anti-fouling agent for vessels for many years and the dredge materials are from an active port. Further, neither EPA nor the USACE have reported that monitoring undertaken as part of the SMMP or reports from completed disposal activities indicate that the benthic habitat or water or sediment quality have been significantly altered in the area of the ODMDS. Therefore, NMFS believes that impacts to scalloped hammerheads, Nassau grouper, and giant manta ray related to exposure to contaminants in the dredge spoil during disposal in the ODMDS will be discountable.

Scalloped hammerhead sharks, giant manta ray, and Nassau grouper may be temporarily unable to use the area around the disposal vessel transit routes for forage and shelter habitat due to avoidance of construction activities and related noise. The action area is surrounded by similar habitat, which would support the same activities by these species. Thus, any animals disrupted by the disposal activities would be expected to continue to conduct the same activities in the surrounding areas that are not being disrupted by the project. Therefore, NMFS believes that avoidance effects will be temporary and insignificant. Based on the above information, we believe that all the effects to scalloped hammerhead sharks, giant manta ray and Nassau grouper will be either insignificant or discountable.

ESA-listed Corals
All 7 species of ESA-listed corals may be found in and around the action area. NMFS believes that the proposed action may affect, but is not likely to adversely affect all 7 species of ESA-

listed coral. No corals were recorded by the USACE or NMFS habitat conservation division staff during towed video surveys within the dredging areas and there will be no direct removal of ESA-listed corals as part of the project. ESA-listed corals may be found near the vessel disposal routes, particularly near the mouth of the SJH and may be affected by sedimentation and turbidity associated with dredging and leakage from disposal vessels. The USACE has not conducted resource surveys in these areas at this time but plans to do so prior to construction. According to the USACE the sediments to be dredged include mostly unconsolidated sediments mixed with sand and clay. In some areas rock may be mixed with more consolidated clays. This type of sediment does not require any blasting or pre-treatment, which leads to reduced sedimentation compared to projects that use those methods.

NMFS has previously consulted on disposal of dredged material in the Condado Lagoon for sea grass restoration, and determined that the restoration may affect, but is not likely to adversely affect ESA listed corals or designated critical habitat (NMFS 2014a). The USACE will conduct the proposed disposal of dredged materials in Condado Lagoon in a manner consistent with the activities consulted on in that consultation. We have no new information regarding effects to ESA listed corals or designated critical habitat as a result of the proposed restoration, and therefore conclude that any effects to corals and critical habitat associated with transit and disposal of dredged materials within the Condado lagoon will be discountable.

Although sedimentation occurs naturally in the SJH area, dredging can increase the duration, severity, and frequency of the sedimentation, with detrimental consequences for coral reefs (Erftemeijer et al. 2012a; Nugues and Roberts 2003; Riegl and Branch 1995). Sedimentation can directly smother corals, reduce feeding, and deplete energy reserves (Erftemeijer et al. 2012a) leading to lower calcification rates (Erftemeijer et al. 2012a; Rogers 1990) and reproductive output (Erftemeijer et al. 2012b; Jones et al. 2015; Richmond 1993). Global climate change has introduced additional stressors to coral reefs. Increased seawater temperature has led to increased bleaching events which cause reductions in coral tissue growth, fecundity, calcification, and overall survival rates (Abrego et al. 2010; Glynn et al. 1996). A recent study indicates that coral recruits survive better under warmer temperatures when anthropogenic sedimentation is maintained at the lowest level (30 mg/cm^2) (Fourney and Figueiredo 2017). The study also indicated that at current water temperatures, increasing turbidity from 4.62 to >14.2 NTUs leads to a 50% drop in the survival of *P.astreoides* recruits within the first month. Increasing amounts of anthropogenic sediment considerably increased turbidity and increased coral recruit mortality (Fourney and Figueiredo 2017). High turbidity levels indicate that the sediment which may settle on top of the coral is fine grained and thus highly deleterious for coral recruits (Erftemeijer et al. 2012a). Fourney and Figueiredo (2017), indicate that the maximum allowable turbidity in coral reefs during short-term construction events should be 7 NTU or less.

To ensure that ESA-listed corals are not impacted by turbidity and sedimentation from dredging and/or disposal vessels, the USACE will conduct turbidity monitoring in accordance with a monitoring plan that will be developed in partnership with NMFS prior to construction. The monitoring plan will include turbidity monitoring stations adjacent to ESA-listed corals if any are found during the resource surveys. Turbidity in these locations must not exceed 7 NTUs above background as measured at the control locations positioned 200 m upstream of the dredge. NMFS believes that limiting project related turbidity to 7 NTU or less above background at the monitoring stations will protect corals from project related effects. This metric is consistent with the Fourney and Figueiredo paper and is more conservative than the current EPA standard of 29 NTUs over background or the Puerto Rico standard of 10 NTU over background for project related turbidity. Additionally, the action area where corals may be found is subject to natural levels of turbidity due to its location near the mouth of the harbor and the associated run off and inputs from nearby rivers emptying into the area. The monitoring plan will include adaptive management measures to be implemented to mitigate turbidity in the event that turbidity exceeds 7 NTUs above background at these locations. With the implementation of adaptive management measures based on a monitoring threshold of 7 NTUs, NMFS believes that effects to ESA listed corals will be discountable. The development of monitoring plan with a 7 NTU over background threshold is the basis for NMFS' discountable finding; reinitiation would be required in the event that a monitoring plan is not completed prior to the beginning of construction, or turbidity persists at levels above 7 NTUs above background at stations near any known ESA listed coral which is not corrected by the adaptive management measures.

Designated Critical Habitat for Elkhorn and Staghorn Corals

Designated critical habitat for elkhorn and staghorn corals is located outside the mouth of the SJH approximately 2,500 ft north of the dredging area and adjacent to the disposal routes. Critical habitat consists of specific areas on which are found those physical or biological features essential to the conservation of the species. The physical feature essential to the conservation of staghorn and elkhorn corals is defined as substrate of suitable quality and availability, in water depths from mean high water to 30 m, to support larval settlement and recruitment, and reattachment of asexual fragments. Substrate of suitable quality and availability is defined as natural consolidated hard bottom or dead coral skeleton that is free from turf or fleshy macroalgae cover and sediment cover.

Coral critical habitat may be affected by sedimentation from dredging and leakage from disposal vessels. Sedimentation affects larval settlement and recruitment, and fragment attachment. Sediment accumulation on dead coral skeletons and exposed hard substrate reduces the amount of available substrate suitable for coral larvae settlement and fragment reattachment. Even small increases in sedimentation can significantly reduce coral recruitment and survivorship (Babcock and Smith 2000), and sediments coupled with turf algae further impede recruitment (Birrell et al. 2005). Further supporting the impact sedimentation has on recruitment, coral larvae of some species settle preferentially on vertical surfaces to avoid sediments and cannot successfully establish themselves in shifting sediment (U.S. Army Engineer Research Development Center 2005). Last, survivorship of branching coral fragments is significantly affected by the type of substrate, with increased mortality being linked to the presence of sandy sediments (Lirman 2000). NMFS has previously determined that sediment depths of 0.5cm (or more) of fine sediment precludes coral recruitment and fragment attachment meaning that the habitat would no longer be functioning as designated critical habitat (NMFS 2016).

The nearest coral critical habitat is approximately 2,500 ft from the active dredging area. The USACE will also conduct turbidity monitoring in accordance with a monitoring plan to be developed in partnership with NMFS prior to construction. The plan will include turbidity monitoring stations at locations which will detect impacts to the designated critical habitat. The specific locations and number of monitoring stations will be detailed in the monitoring plan.

Turbidity at these stations must not exceed 7 NTUs above background as measured at the control locations positioned at 200 m upstream from the dredge. As discussed above, the action area is subject to natural levels of turbidity due to its location near the mouth of the harbor and the associated run off and inputs from nearby rivers emptying into the area. We will consider project related turbidity as anything measured above the control levels. Fourney and Figueiredo (2017) suggest that maintaining turbidity at 7 NTU or less is protective of coral recruits and correlates to lower levels of fine sediments settling on the corals and reef habitat. As such, and for the reasons discussed above, NMFS believes that limiting project related turbidity to 7 NTU or less above background at the monitoring stations at the edges of the designated critical habitat will ensure that the habitat remains available for coral recruitment. The monitoring plan will include adaptive management measures to be implemented to mitigate turbidity in the event that turbidity exceeds 7 NTUs above background. The USACE will also adhere to the conditions in the February 1, 2011, SMMP for use of the ODMDS (Appendix B) including all conditions that apply to transit of the disposal vessels. For purposes of this Opinion "transit" is defined as any movement of the disposal vessel once loaded at the dredge site and all conditions of the SMMP apply from that moment throughout the transit to the disposal site and back to the loading sites. Based on the implementation of the above measures, NMFS believes that sedimentation impacts to coral critical habitat from dredging and disposal vessel leakage will be discountable.

3.2 Status of Species Likely to be Adversely Affected

NMFS believes that the proposed project may adversely affect green, hawksbill, and loggerhead sea turtles.

3.2.1 Sea Turtles

The following subsections are synopses of the best available information on the status of the sea turtle species that are likely to be adversely affected by one or more components of the proposed action, including information on the distribution, population structure, life history, abundance, and population trends of each species and threats to each species. The biology and ecology of these species as well as their status and trends inform the effects analysis for this Opinion. 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), loggerhead sea turtle (NMFS and USFWS 2008a), and hawksbill sea turtle (NMFS and USFWS 1993); Pacific sea turtle recovery plans (NMFS and USFWS 1998b; NMFS and USFWS 1998c; NMFS and USFWS 1998d; NMFS and USFWS 1998b); and sea turtle status reviews, stock assessments, and biological reports (Conant et al. 2009b; NMFS-SEFSC 2001; NMFS-SEFSC 2009; NMFS and USFWS 1995; NMFS and USFWS 2007a; NMFS and USFWS 2007c; NMFS and USFWS 2007e; NMFS and USFWS 2007f; NMFS and USFWS 2007h; TEWG 1998; TEWG 2000a; TEWG 2007; TEWG 2009).

3.2.1.1 General Threats Faced by All Sea Turtle Species

Sea turtles face numerous natural and man-made threats that shape their status and affect their ability to recover. Many of the threats are either the same or similar in nature for all listed sea turtle species, those identified in this section are discussed in a general sense for all sea turtles.

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

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

Non-Fishery In-Water Activities
There are also many non-fishery impacts affecting the status of sea turtle species, both in the ocean and on land. In nearshore waters of the United States, the construction and maintenance of federal navigation channels has been identified as a source of sea turtle mortality. Hopper dredges, which are frequently used in ocean bar channels and sometimes in harbor channels and offshore borrow areas, move relatively rapidly and can entrain and kill sea turtles (NMFS 1997a). Sea turtles entering coastal or inshore areas have also been affected by entrainment in the cooling-water systems of electrical generating plants. Other nearshore threats include harassment and/or injury resulting from private and commercial vessel operations, military detonations and training exercises, in-water construction activities, and scientific research activities.

Coastal Development and Erosion Control

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

Environmental Contamination

Multiple municipal, industrial, and household sources, as well as atmospheric transport, introduce various pollutants such as pesticides, hydrocarbons, organochlorides (e.g., dichlorodiphenyltrichloroethane [DDT], polychlorinated biphenyls [PCB], and perfluorinated chemicals [PFC]), and others that may cause adverse health effects to sea turtles (Garrett 2004; Grant and Ross 2002; Hartwell 2004; Iwata et al. 1993). Acute exposure to hydrocarbons from petroleum products released into the environment via oil spills and other discharges may directly injure individuals through skin contact with oils (Geraci 1990), inhalation at the water's surface, and ingesting compounds while feeding (Matkin and Saulitis 1997). Hydrocarbons also have the potential to impact prey populations, and therefore may affect listed species indirectly by reducing food availability in the action area.

The April 20, 2010, explosion of the DEEPWATER HORIZON (DWH) oil rig affected sea turtles in the Gulf of Mexico. An assessment has been completed on the injury to Gulf of Mexico marine life, including sea turtles, resulting from the spill (DWH Trustees 2015). Following the spill, juvenile Kemp's ridley, green, and loggerhead sea turtles were found in *Sargassum* algae mats in the convergence zones, where currents meet and oil collected. Sea turtles found in these areas were often coated in oil and/or had ingested oil. The spill resulted in the direct mortality of many sea turtles and may have had sublethal effects or caused environmental damage that will impact other sea turtles into the future. Information on the spill impacts to individual sea turtle species is presented in the Status of the Species sections for each species.

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

Climate Change

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

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

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 1990b). 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 2007g). 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) could influence the distribution and abundance of lower trophic levels (e.g., phytoplankton, zooplankton, submerged aquatic vegetation, crustaceans, mollusks, forage fish) which could ultimately affect the primary foraging areas of sea turtles.

Other Threats

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

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

3.2.1.2 Loggerhead Sea Turtle – Northwest Atlantic DPS

The loggerhead sea turtle was listed as a threatened species throughout its global range on July 28, 1978. NMFS and USFWS published a final rule designating 9 DPSs for loggerhead sea turtles (76 FR 58868, September 22, 2011, and effective October 24, 2011). This rule listed the following DPSs: (1) Northwest Atlantic Ocean (threatened), (2) Northeast Atlantic Ocean (endangered), (3) South Atlantic Ocean (threatened), (4) Mediterranean Sea (endangered), (5) North Pacific Ocean (endangered), (6) South Pacific Ocean (endangered), (7) North Indian Ocean (endangered), (8) Southeast Indo-Pacific Ocean (endangered), and (9) Southwest Indian Ocean (threatened). The Northwest Atlantic (NWA) DPS is the only one that occurs within the action area and therefore is the only one considered in this Opinion.

Species Description and Distribution
Loggerheads are large sea turtles. Adults in the southeast United States average about 3 ft (92 centimeters (cm)) long, measured as a straight carapace length (SCL), and weigh approximately 255 lb (116 kg) (Ehrhart and Yoder 1978). Adult and subadult loggerhead sea turtles typically have a light yellow plastron and a reddish brown carapace covered by non-overlapping scutes that meet along seam lines. They typically have 11 or 12 pairs of marginal scutes, 5 pairs of costals, 5 vertebrals, and a nuchal (precentral) scute that is in contact with the first pair of costal scutes (Dodd 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). Subadult and adult loggerheads are primarily found in coastal waters and eat benthic invertebrates such as mollusks and decapod crustaceans in hard bottom habitats.

The majority of loggerhead nesting occurs at the western rims of the Atlantic and Indian Oceans concentrated in the north and south temperate zones and subtropics (NRC 1990a). For the Northwest Atlantic DPS, most nesting occurs along the coast of the United States, from southern Virginia to Alabama. Additional nesting beaches for this DPS are found along the northern and western Gulf of Mexico, eastern Yucatán Peninsula, at Cay Sal Bank in the eastern Bahamas (Addison 1997; Addison and Morford 1996), off the southwestern coast of Cuba (Gavilan 2001), and along the coasts of Central America, Colombia, Venezuela, and the eastern Caribbean Islands.

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

U.S. coast, 12% in the eastern Gulf of Mexico, and 5% in the western Gulf of Mexico (TEWG 1998).

Within the Northwest Atlantic DPS, most loggerhead sea turtles nest from North Carolina to Florida and along the Gulf Coast of Florida. Previous Section 7 analyses have recognized at least 5 western Atlantic subpopulations, divided geographically as follows: (1) a Northern nesting subpopulation, occurring from North Carolina to northeast Florida at about 29ºN; (2) a South Florida nesting subpopulation, occurring from 29°N on the east coast of the state to Sarasota on the west coast; (3) a Florida Panhandle nesting subpopulation, occurring at Eglin Air Force Base and the beaches near Panama City, Florida; (4) a Yucatán nesting subpopulation, occurring on the eastern Yucatán Peninsula, Mexico (Márquez M 1990; TEWG 2000b); 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 that there is no genetic distinction between loggerheads nesting on adjacent beaches along the Florida Peninsula. It also concluded that specific boundaries for subpopulations could not be designated based on genetic differences alone. Thus, the recovery plan uses a combination of geographic distribution of nesting densities, geographic separation, and geopolitical boundaries, in addition to genetic differences, to identify recovery units. The recovery units are as follows: (1) the Northern Recovery Unit (Florida/Georgia border north through southern Virginia), (2) the Peninsular Florida Recovery Unit (Florida/Georgia border through Pinellas County, Florida), (3) the Dry Tortugas Recovery Unit (islands located west of Key West, Florida), (4) the Northern Gulf of Mexico Recovery Unit (Franklin County, Florida, through Texas), and (5) the Greater Caribbean Recovery Unit (Mexico through French Guiana, the Bahamas, Lesser Antilles, and Greater Antilles) (NMFS and USFWS 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 Northwest Atlantic DPS, the recovery units for what was then termed the Northwest Atlantic population apply to the Northwest Atlantic DPS.

Life History Information

The Northwest Atlantic Loggerhead Recovery Team defined the following 8 life stages for the loggerhead life cycle, which include the ecosystems those stages generally use: (1) egg (terrestrial zone), (2) hatchling stage (terrestrial zone), (3) hatchling swim frenzy and transitional stage (neritic zone[4]), (4) juvenile stage (oceanic zone), (5) juvenile stage (neritic zone), (6) adult stage (oceanic zone), (7) adult stage (neritic zone), and (8) nesting female (terrestrial zone) (NMFS and USFWS 2008). Loggerheads are long-lived animals. They reach sexual maturity between 20-38 years of age, although age of maturity varies widely among populations (Frazer and Ehrhart 1985b; NMFS 2001). The annual mating season occurs from late March to early June, and female turtles lay eggs throughout the summer months. Females deposit an average of 4.1 nests within a nesting season (Murphy and Hopkins 1984), but an individual female only nests every 3.7 years on average (Tucker 2010). Each nest contains an average of 100-126 eggs (Dodd 1988) which incubate for 42-75 days before hatching (NMFS and USFWS 2008a). Loggerhead hatchlings are 1.5-2 inches (in) long and weigh about 0.7 ounces (oz)(20 grams).

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

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

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

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

Offshore, adults primarily inhabit continental shelf waters, from New York south through Florida, The Bahamas, Cuba, and the Gulf of Mexico. Seasonal use of mid-Atlantic shelf waters, especially offshore New Jersey, Delaware, and Virginia during summer months, and offshore shelf waters, such as Onslow Bay (off the North Carolina coast), during winter months has also been documented (Hawkes et al. 2007; Georgia Department of Natural Resources, unpublished data; South Carolina Department of Natural Resources, unpublished data). Satellite telemetry has identified the shelf waters along the west Florida coast, The Bahamas, Cuba, and the Yucatán Peninsula as important resident areas for adult female loggerheads that nest in Florida (Foley et al. 2008; Girard et al. 2009; Hart et al. 2012). The southern edge of the Grand Bahama Bank is important habitat for loggerheads nesting on the Cay Sal Bank in The Bahamas, but nesting females are also resident in the bights of Eleuthera, Long Island, and Ragged Islands. They also reside in Florida Bay in the United States, and along the north coast of Cuba (A. Bolten and K. Bjorndal, University of Florida, unpublished data). Moncada et al. (2010) report the recapture in Cuban waters of 5 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. 2009a; Heppell et al. 2003; NMFS-SEFSC 2001; NMFS-SEFSC 2009; NMFS and USFWS 2008a; TEWG 1998; TEWG 2000b; TEWG 2009) have examined the stock status of loggerheads in the Atlantic Ocean, but none have been able to develop a reliable estimate of absolute population size.

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

<u>Peninsular Florida Recovery Unit</u>
The Peninsular Florida Recovery Unit is the largest loggerhead nesting assemblage in the Northwest Atlantic. A near-complete nest census (all beaches including index nesting beaches) undertaken from 1989-2007 showed an average of 64,513 loggerhead nests per year, representing approximately 15,735 nesting females per year (NMFS and USFWS 2008a). The statewide estimated total for 2013 was 77,975 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 (1989-2015) (http://myfwc.com/research/wildlife/sea-turtles/nesting/loggerhead-trends/). Over that time period, 3 distinct trends were identified. From 1989-1998 there was a 24% increase that was then followed by a sharp decline over the subsequent 9 years. A large increase in loggerhead nesting has occurred since, as indicated by the 74% increase in nesting between 2008 and 2015. FWRI examined the trend from the 1998 nesting high through 2015 and found that the decade-long post-1998 decline was replaced with a slight but nonsignificant increasing trend. Looking at the data from 1989 through 2015 (an increase of over 38%), FWRI concluded that there was an overall positive change in the nest counts (http://myfwc.com/research/wildlife/sea-turtles/nesting/loggerhead-trends/).

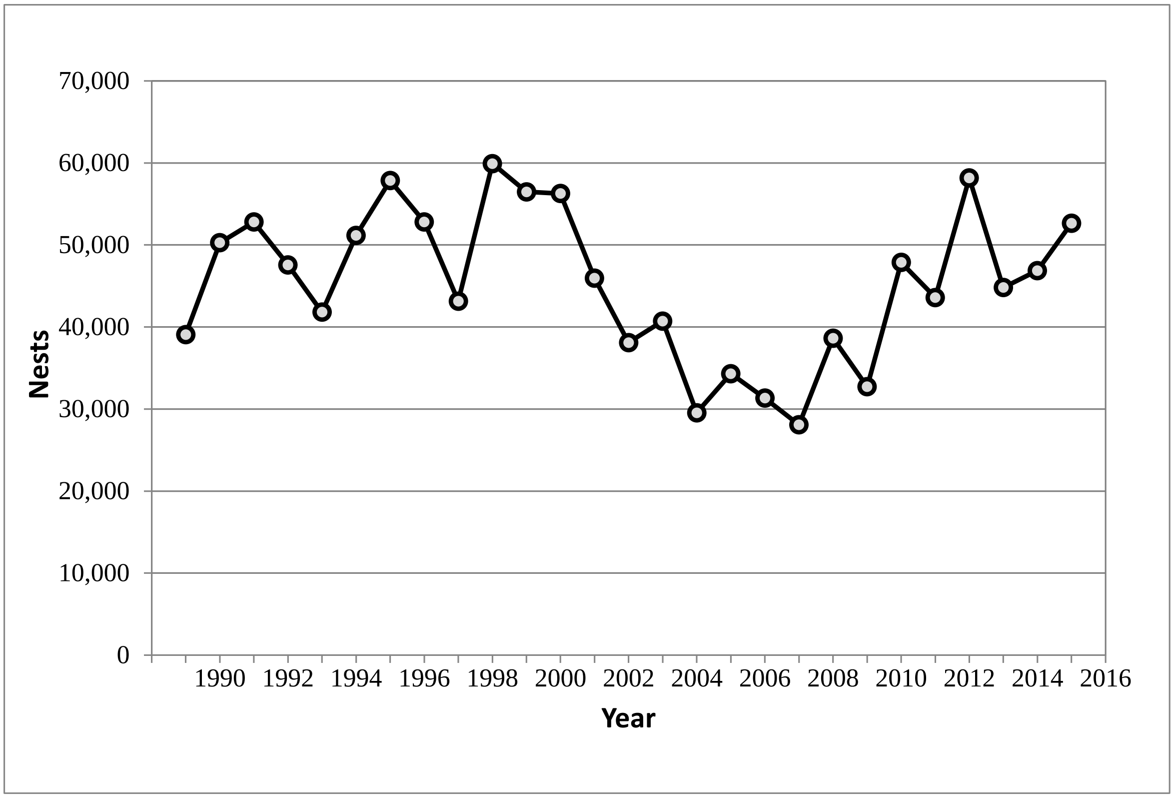

Figure 4. Loggerhead sea turtle nesting at Florida index beaches since 1989.

Northern Recovery Unit

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

Data since that analysis (Table 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 declining trend of the past.

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

Nests Recorded	2008	2009	2010	2011	2012	2013	2014
Georgia	1,649	998	1,760	1,992	2,241	2,289	1,196
South Carolina	4,500	2,182	3,141	4,015	4,615	5,193	2,083
North Carolina	841	302	856	950	1,074	1,260	542
Total	**6,990**	**3,472**	**5,757**	**6,957**	**7,930**	**8,742**	**3,821**

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).

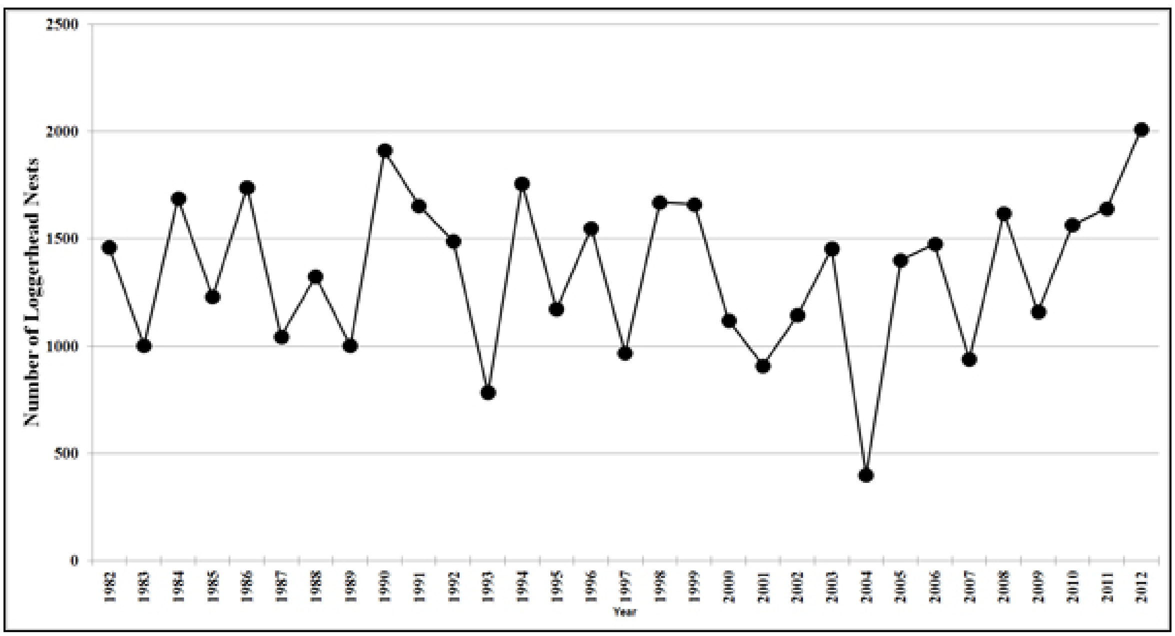

Figure 5. South Carolina index nesting beach counts for loggerhead sea turtles (from the SCDNR website, http://www.dnr.sc.gov/seaturtle/nest.htm).

<u>Other Northwest Atlantic DPS Recovery Units</u>
The remaining 3 recovery units—Dry Tortugas (DTRU), Northern Gulf of Mexico (NGMRU), and Greater Caribbean (GCRU)—are much smaller nesting assemblages, but they are still considered essential to the continued existence of the species. Nesting surveys for the DTRU are conducted as part of Florida's statewide survey program. Survey effort was relatively stable during the 9-year period from 1995-2004, although the 2002 year was missed. Nest counts ranged from 168-270, with a mean of 246, but there was no detectable trend during this period (NMFS and USFWS 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.

Nesting on the Florida Panhandle index beaches, which represents the majority of NGMRU nesting, had shown a large increase in 2008, but then declined again in 2009 and 2010 before rising back to a level similar to the 2003-2007 average in 2011. Nesting survey effort has been inconsistent among the GCRU nesting beaches, and no trend can be determined for this subpopulation (NMFS and USFWS 2008a). Zurita et al. (2003b) found a statistically significant increase in the number of nests on 7 of the beaches on Quintana Roo, Mexico, from 1987-2001, where survey effort was consistent during the period. Nonetheless, nesting has declined since 2001, and the previously reported increasing trend appears to not have been sustained (NMFS and USFWS 2008a).

In-water Trends

Nesting data are the best current indicator of sea turtle population trends, but in-water data also provide some insight. In-water research suggests the abundance of neritic juvenile loggerheads is steady or increasing. Although Ehrhart et al. (2007a) found no significant regression-line trend in a long-term dataset, researchers have observed notable increases in catch per unit effort (CPUE) (Arendt et al. 2009; Ehrhart et al. 2007a; Epperly et al. 2007). Researchers believe that this increase in CPUE is likely linked to an increase in juvenile abundance, although it is unclear whether this increase in abundance represents a true population increase among juveniles or merely a shift in spatial occurrence. Bjorndal et al. (2005), cited in NMFS and USFWS (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). In-water studies throughout the eastern United States, however, indicate a substantial decrease in the abundance of the smallest oceanic/neritic juvenile loggerheads, a pattern corroborated by stranding data (TEWG 2009).

Population Estimate

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

Threats (Specific to Loggerhead Sea Turtles)
The threats faced by loggerhead sea turtles are well summarized in the general discussion of threats in Section 3.2.1.1. Yet the impact of fishery interactions is a point of further emphasis for this species. The joint NMFS and USFWS Loggerhead Biological Review Team determined that the greatest threats to the Northwest Atlantic DPS of loggerheads result from cumulative fishery bycatch in neritic and oceanic habitats (Conant et al. 2009a).

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

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

3.2.1.3 Green Sea Turtle – North Atlantic and South Atlantic DPS

The green sea turtle was originally listed as threatened under the ESA on July 28, 1978, except for the Florida and Pacific coast of Mexico breeding populations, which were listed as endangered. On April 6, 2016, the original listing was replaced with the listing of 11 distinct population segments (DPSs) (81 FR 20057 2016). The Mediterranean, Central West Pacific, and Central South Pacific DPSs were listed as endangered. The North Atlantic, South Atlantic, Southwest Indian, North Indian, East Indian-West Pacific, Southwest Pacific, Central North Pacific, and East Pacific were listed as threatened. For the purposes of this consultation, only the South Atlantic DPS and North Atlantic DPS will be considered, as they are the only two DPSs with individuals occurring in the Atlantic and Gulf of Mexico waters of the United States.

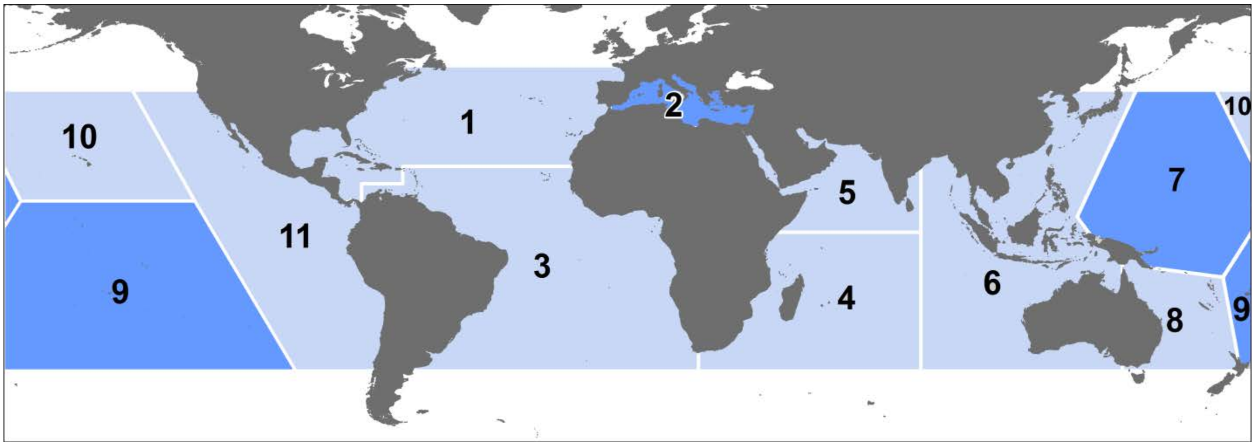

Figure 6. Threatened (light) and endangered (dark) green turtle DPSs: 1. North Atlantic, 2. Mediterranean, 3. South Atlantic, 4. Southwest Indian, 5. North Indian, 6. East Indian-West Pacific, 7. Central West Pacific, 8. Southwest Pacific, 9. Central South Pacific, 10. Central North Pacific, and 11.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

Species Description and Distribution

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

With the exception of post-hatchlings, green sea turtles live in nearshore tropical and subtropical waters where they generally feed on marine algae and seagrasses. They have specific foraging grounds and may make large migrations between these forage sites and natal beaches for nesting (Hays et al. 2001). Green sea turtles nest on sandy beaches of mainland shores, barrier islands, coral islands, and volcanic islands in more than 80 countries worldwide (Hirth 1997). The 2 largest nesting populations are found at Tortuguero, on the Caribbean coast of Costa Rica (part of the North Atlantic DPS), and Raine Island, on the Pacific coast of Australia along the Great Barrier Reef.

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

<u>North Atlantic DPS Distribution</u>
The North Atlantic DPS boundary is illustrated in Figure 6. Four regions support nesting concentrations of particular interest in the North Atlantic DPS: Costa Rica (Tortuguero), Mexico (Campeche, Yucatan, and Quintana Roo), U.S. (Florida), and Cuba. By far the most important nesting concentration for green turtles in this DPS is Tortuguero, Costa Rica. Nesting also occurs in the Bahamas, Belize, Cayman Islands, Dominican Republic, Haiti, Honduras, Jamaica, Nicaragua, Panama, Puerto Rico, Turks and Caicos Islands, and North Carolina, South Carolina, Georgia, and Texas, U.S.A. In the eastern North Atlantic, nesting has been reported in Mauritania (Fretey 2001).

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

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

<u>South Atlantic DPS Distribution</u>
The South Atlantic DPS boundary is shown in Figure 6, and includes the U.S. Virgin Islands in the Caribbean. The South Atlantic DPS nesting sites can be roughly divided into four regions:

western Africa, Ascension Island, Brazil, and the South Atlantic Caribbean (including Colombia, the Guianas, and Aves Island in addition to the numerous small, island nesting sites).

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

Life History Information

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

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

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

Status and Population Dynamics

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

<u>North Atlantic DPS</u>

The North Atlantic DPS is the largest of the 11 green turtle DPSs, with an estimated nester abundance of over 167,000 adult females from 73 nesting sites. Overall this DPS is also the most data rich. Eight of the sites have high levels of abundance (i.e., <1000 nesters), located in Costa Rica, Cuba, Mexico, and Florida. All major nesting populations demonstrate long-term increases in abundance (Seminoff et al. 2015).

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

In the continental United States, green sea turtle nesting occurs along the Atlantic coast, primarily along the central and southeast coast of Florida 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). Green sea turtle nesting is documented annually on beaches of North Carolina, South Carolina, and Georgia, though nesting is found in low quantities (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 10 years of regular monitoring Figure 7). According to data collected from Florida's index nesting beach survey from 1989-2016, 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 27,975 in 2015. Two consecutive years of nesting declines in 2008 and 2009 caused some concern, but this was followed by increases in 2010 and 2011, and a return to the trend of biennial peaks in abundance thereafter (Figure 7). 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%.

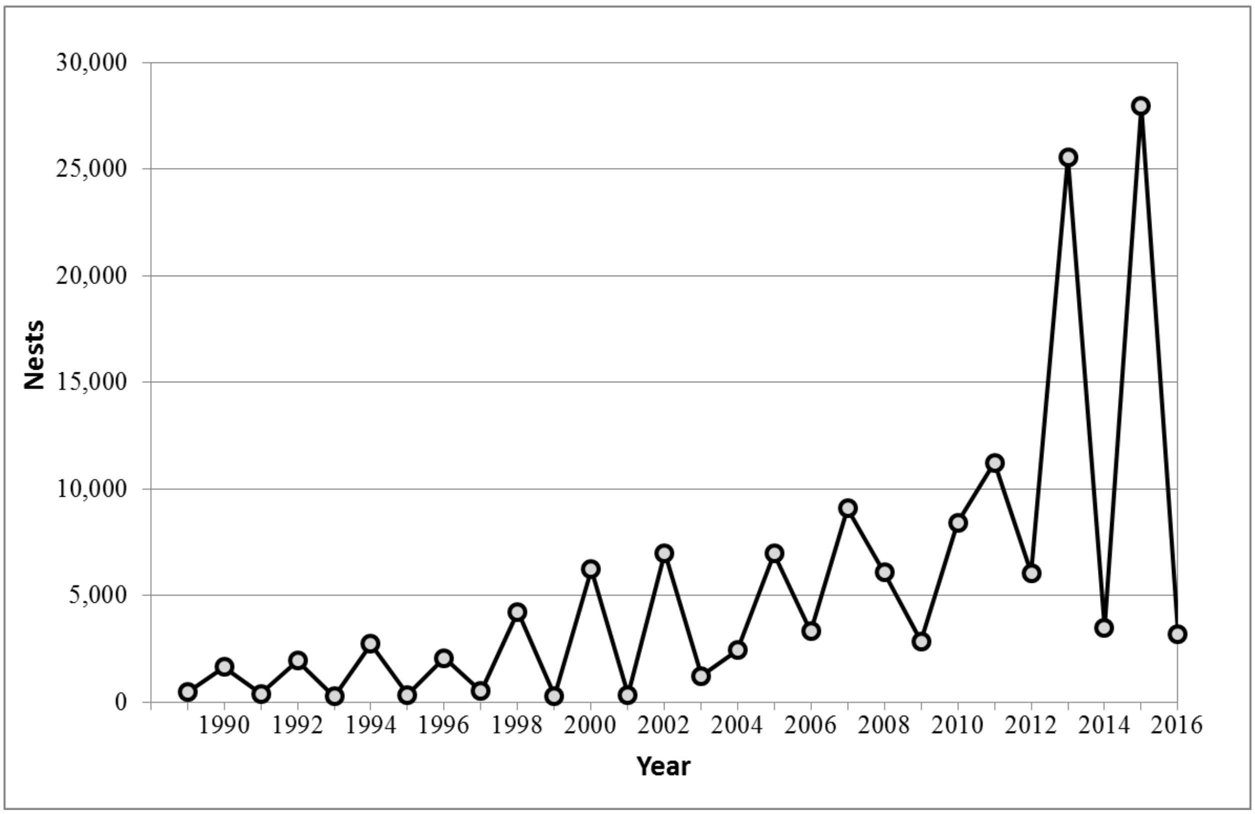

Figure 7. Green sea turtle nesting at Florida index beaches since 1989.

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

South Atlantic DPS

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

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

Threats

The principal cause of past declines and extirpations of green sea turtle assemblages has been the overexploitation of the species for food and other products. Although intentional take of green sea turtles and their eggs is not extensive within the southeastern United States, green sea turtles that nest and forage in the region may spend large portions of their life history outside the region and outside U.S. jurisdiction, where exploitation is still a threat. Green sea turtles also face many of the same threats as other sea turtle species, including destruction of nesting habitat from storm events, oceanic events such as cold-stunning, pollution (e.g., plastics, petroleum products, petrochemicals), ecosystem alterations (e.g., nesting beach development, beach nourishment and shoreline stabilization, vegetation changes), poaching, global climate change, fisheries interactions, natural predation, and disease. A discussion on general sea turtle threats can be found in Section 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 0.04 in (0.1 cm) to greater than 11.81 in (30 cm) in diameter and may affect swimming, vision, feeding, and organ function (Aguirre et al. 2002; Herbst 1994; Jacobson et al. 1989). Presently, scientists are unsure of the exact mechanism causing this disease, though it is believed to be related to both an infectious agent, such as a virus (Herbst et al. 1995), and environmental conditions (e.g., habitat degradation, pollution, low wave energy, and shallow water (Foley et al. 2005). FP is cosmopolitan, but it has been found to affect large numbers of animals in specific areas, including Hawaii and Florida (Herbst 1994; Jacobson 1990; Jacobson et al. 1991).

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

Whereas oil spill impacts are discussed generally for all species in Section 3.2.1, specific impacts of the DWH spill on green sea turtles are considered here. Impacts to green sea turtles occurred to offshore small juveniles only. A total of 154,000 small juvenile greens (36.6% of the total small juvenile sea turtle exposures to oil from the spill) were estimated to have been exposed to oil. A large number of small juveniles were removed from the population, as 57,300 small juveniles greens are estimated to have died as a result of the exposure. A total of 4 nests (580 eggs) were also translocated during response efforts, with 455 hatchlings released (the fate of which is unknown) (DWH Trustees 2015). Additional unquantified effects may have included inhalation of volatile compounds, disruption of foraging or migratory movements due to surface or subsurface oil, ingestion of prey species contaminated with oil and/or dispersants, and loss of foraging resources which could lead to compromised growth and/or reproductive potential. There is no information currently available to determine the extent of those impacts, if they occurred.

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

3.2.1.4 Hawksbill Sea Turtle

The hawksbill sea turtle was listed as endangered throughout its entire range on June 2, 1970 (35 FR 8491), under the Endangered Species Conservation Act of 1969, a precursor to the ESA.

Critical habitat was designated on June 2, 1998, in coastal waters surrounding Mona and Monito Islands in Puerto Rico (63 FR 46693).

Species Description and Distribution

Hawksbill sea turtles are small- to medium-sized (99-150 pounds [lb] on average [45-68 kilograms [kg]]) although females nesting in the Caribbean are known to weigh up to 176 lb (80 kg) (Pritchard et al. 1983). The carapace is usually serrated and has a tortoise-shell" coloring, ranging from dark to golden brown, with streaks of orange, red, and/or black. The plastron of a hawksbill turtle is typically yellow. The head is elongated and tapers to a point, with a beak-like mouth that gives the species its name. The shape of the mouth allows the hawksbill turtle to reach into holes and crevices of coral reefs to find sponges, their primary adult food source, and other invertebrates. The shells of hatchlings are 1.7 in (42 millimeters [mm]) long, are mostly brown, and are somewhat heart-shaped (Eckert 1995; Hillis and Mackay 1989; van Dam and Sarti 1989).

Hawksbill sea turtles have a circumtropical distribution and usually occur between latitudes 30°N and 30°S in the Atlantic, Pacific, and Indian Oceans. In the western Atlantic, hawksbills are widely distributed throughout the Caribbean Sea, off the coasts of Florida and Texas in the continental United States, in the Greater and Lesser Antilles, and along the mainland of Central America south to Brazil (Amos 1989; Groombridge and Luxmoore 1989; Lund 1985; Meylan and Donnelly 1999a; NMFS and USFWS 1998a; Plotkin and Amos 1990; Plotkin and Amos 1988). They are highly migratory and use a wide range of habitats during their lifetimes (Musick and Limpus 1997; Plotkin 2003). Adult hawksbill sea turtles are capable of migrating long distances between nesting beaches and foraging areas. For instance, a female hawksbill sea turtle tagged at Buck Island Reef National Monument (BIRNM) in St. Croix, U.S. Virgin Islands (USVI), was later identified 1,160 miles (1,866 km) away in the Miskito Cays in Nicaragua (Spotila 2004a).

Hawksbill sea turtles nest on sandy beaches throughout the tropics and subtropics. Nesting occurs in at least 70 countries, although much of it now only occurs at low densities compared to that of other sea turtle species (NMFS and USFWS 2007b). Meylan and Donnelly (1999b) believe that the widely dispersed nesting areas and low nest densities is likely a result of overexploitation of previously large colonies that have since been depleted over time. The most significant nesting within the United States occurs in Puerto Rico and the U.S. Virgin Islands, specifically on Mona Island and BIRNM, respectively. Although nesting within the continental United States is typically rare, it can occur along the southeast coast of Florida and the Florida Keys. The largest hawksbill nesting population in the western Atlantic occurs in the Yucatán Peninsula of Mexico, where several thousand nests are recorded annually in the states of Campeche, Yucatán, and Quintana Roo (Garduño-Andrade et al. 1999; Spotila 2004a). In the U.S. Pacific, hawksbills nest on main island beaches in Hawaii, primarily along the east coast of the island. Hawksbill nesting has also been documented in American Samoa and Guam. More information on nesting in other ocean basins may be found in the 5-year status review for the species (NMFS and USFWS 2007b).

Mitochondrial DNA studies show that reproductive populations are effectively isolated over ecological time scales (Bass et al. 1996). Substantial efforts have been made to determine the nesting population origins of hawksbill sea turtles assembled in foraging grounds, and genetic research has shown that hawksbills of multiple nesting origins commonly mix in foraging areas (Bowen and Witzell 1996). Since hawksbill sea turtles nest primarily on the beaches where they were born, if a nesting population is decimated, it might not be replenished by sea turtles from other nesting rookeries (Bass et al. 1996).

Life History Information

Hawksbill sea turtles exhibit slow growth rates although they are known to vary within and among populations from a low of 0.4-1.2 in (1-3 cm) per year, measured in the Indo-Pacific (Chaloupka and Limpus 1997; Mortimer et al. 2003; Mortimer et al. 2002; Whiting 2000), to a high of 2 in (5 cm) or more per year, measured at some sites in the Caribbean (Diez and Van Dam 2002; León and Diez 1999). Differences in growth rates are likely due to differences in diet and/or density of sea turtles at foraging sites and overall time spent foraging (Bjorndal and Bolten 2002; Chaloupka et al. 2004). Consistent with slow growth, age to maturity for the species is also long, taking between 20 and 40 years, depending on the region (Chaloupka and Musick 1997a; Limpus and Miller 2000). Hawksbills in the western Atlantic are known to mature faster (i.e., 20 or more years) than sea turtles found in the Indo-Pacific (i.e., 30-40 years) (Boulan 1983; Boulon Jr. 1994; Diez and Van Dam 2002; Limpus and Miller 2000). Males are typically mature when their length reaches 27 in (69 cm), while females are typically mature at 30 in (75 cm) (Eckert et al. 1992; Limpus 1992).

Female hawksbills return to the beaches where they were born (natal beaches) every 2-3 years to nest (Van Dam et al. 1991; Witzell 1983) and generally lay 3-5 nests per season (Richardson et al. 1999). Compared with other sea turtles, the number of eggs per nest (clutch) for hawksbills can be quite high. The largest clutches recorded for any sea turtle belong to hawksbills (approximately 250 eggs per nest) ((Hirth and Latif 1980), though nests in the U.S. Caribbean and Florida more typically contain approximately 140 eggs (USFWS hawksbill fact sheet, http://www.fws.gov/northflorida/SeaTurtles/Turtle%20Factsheets/hawksbill-sea-turtle.htm). Eggs incubate for approximately 60 days before hatching (USFWS hawksbill fact sheet). Hatchling hawksbill sea turtles typically measure 1-2 in (2.5-5 cm) in length and weigh approximately 0.5 oz (15 g).

Hawksbills may undertake developmental migrations (migrations as immatures) and reproductive migrations that involve travel over many tens to thousands of miles (Meylan 1999a). Post-hatchlings (oceanic stage juveniles) are believed to live in the open ocean, taking shelter in floating algal mats and drift lines of flotsam and jetsam in the Atlantic and Pacific oceans (Musick and Limpus 1997) before returning to more coastal foraging grounds. In the Caribbean, hawksbills are known to almost exclusively feed on sponges (Meylan 1988; Van Dam and Diez 1997), although at times they have been seen foraging on other food items, notably corallimorphs and zooanthids (León and Diez 2000; Mayor et al. 1998; Van Dam and Diez 1997).

Reproductive females undertake periodic (usually non-annual) migrations to their natal beaches to nest and exhibit a high degree of fidelity to their nest sites. Movements of reproductive males are less certain, but are presumed to involve migrations to nesting beaches or to courtship stations along the migratory corridor. Hawksbills show a high fidelity to their foraging areas as well (Van Dam and Diez 1998). Foraging sites are typically areas associated with coral reefs, although hawksbills are also found around rocky outcrops and high energy shoals which are optimum sites for sponge growth. They can also inhabit seagrass pastures in mangrove-fringed bays and estuaries, particularly along the eastern shore of continents where coral reefs are absent (Bjorndal 1997; Van Dam and Diez 1998).

Status and Population Dynamics
There are currently no reliable estimates of population abundance and trends for non-nesting hawksbills at the time of this consultation; therefore, nesting beach data is currently the primary information source for evaluating trends in global abundance. Most hawksbill populations around the globe are either declining, depleted, and/or remnants of larger aggregations (NMFS and USFWS 2007b). The largest nesting population of hawksbills occurs in Australia where approximately 2,000 hawksbills nest off the northwest coast and about 6,000-8,000 nest off the Great Barrier Reef each year (Spotila 2004a). Additionally, about 2,000 hawksbills nest each year in Indonesia and 1,000 nest in the Republic of Seychelles (Spotila 2004a). In the United States, hawksbills typically laid about 500-1,000 nests on Mona Island, Puerto Rico in the past (Diez and Van Dam 2007), but the numbers appear to be increasing, as the Puerto Rico Department of Natural and Environmental Resources counted nearly 1,600 nests in 2010 (Puerto Rico Department of Environment and Natural Resources [PRDNER] nesting data). Another 56-150 nests are typically laid on Buck Island off St. Croix (Meylan 1999b; Mortimer and Donnelly 2008a). Nesting also occurs to a lesser extent on beaches on Culebra Island and Vieques Island in Puerto Rico, the mainland of Puerto Rico, and additional beaches on St. Croix, St. John, and St. Thomas, U.S. Virgin Islands.

Mortimer and Donnelly (2008a) reviewed nesting data for 83 nesting concentrations organized among 10 different ocean regions (i.e., Insular Caribbean, Western Caribbean Mainland, Southwestern Atlantic Ocean, Eastern Atlantic Ocean, Southwestern Indian Ocean, Northwestern Indian Ocean, Central Indian Ocean, Eastern Indian Ocean, Western Pacific Ocean, Central Pacific Ocean, and Eastern Pacific Ocean). They determined historic trends (i.e., 20-100 years ago) for 58 of the 83 sites, and also determined recent abundance trends (i.e., within the past 20 years) for 42 of the 83 sites. Among the 58 sites where historic trends could be determined, all showed a declining trend during the long-term period. Among the 42 sites where recent (past 20 years) trend data were available, 10 appeared to be increasing, 3 appeared to be stable, and 29 appeared to be decreasing. With respect to regional trends, nesting populations in the Atlantic (especially in the Insular Caribbean and Western Caribbean Mainland) are generally doing better than those in the Indo-Pacific regions. For instance, 9 of the 10 sites that showed recent increases are located in the Caribbean. Buck Island and St. Croix's East End beaches support 2 remnant populations of between 17-30 nesting females per season (Hillis and Mackay 1989; Mackay 2006). While the proportion of hawksbills nesting on Buck Island represents a small proportion of the total hawksbill nesting occurring in the greater Caribbean region, Mortimer and Donnelly (2008a) report an increasing trend in nesting at that site based on data collected from 2001-2006. The conservation measures implemented when BIRNM was expanded in 2001 most likely explains this increase.

Nesting concentrations in the Pacific Ocean appear to be performing the worst of all regions despite the fact that the region currently supports more nesting hawksbills than either the Atlantic or Indian Oceans (Mortimer and Donnelly 2008a). Even so, while still critically low in numbers, sightings of hawksbills in the eastern Pacific appear to have been increasing since 2007, though some of that increase may be attributable to better observations (Gaos et al. 2010). More information about site-specific trends can be found in the most recent 5-year status review for the species (NMFS and USFWS 2007b).

Threats
Hawksbills are currently subjected to the same suite of threats on both nesting beaches and in the marine environment that affect other sea turtles (e.g., interaction with federal and state fisheries, coastal construction, oil spills, climate change affecting sex ratios) as discussed in Section 3.2.1. There are also specific threats that are of special emphasis, or are unique, for hawksbill sea turtles discussed in further detail below.

While oil spill impacts are discussed generally for all species in Section 3.2.1, specific impacts of the DWH spill on hawksbill turtles have been estimated. Hawksbills made up 2.2% (8,850) of small juvenile sea turtle (of those that could be identified to species) exposures to oil in offshore areas, with an estimate of 615 to 3,090 individuals dying as a result of the direct exposure (DWH Trustees 2015). No quantification of large benthic juveniles or adults was made. Additional unquantified effects may have included inhalation of volatile compounds, disruption of foraging or migratory movements due to surface or subsurface oil, ingestion of prey species contaminated with oil and/or dispersants, and loss of foraging resources which could lead to compromised growth and/or reproductive potential. There is no information currently available to determine the extent of those impacts, if they occurred. Although adverse impacts occurred to hawksbills, the relative proportion of the population that is expected to have been exposed to and directly impacted by the DWH event is relatively low, and thus a population-level impact is not believed to have occurred due to the widespread distribution and nesting location outside of the Gulf of Mexico for this species.

The historical decline of the species is primarily attributed to centuries of exploitation for the beautifully patterned shell, which made it a highly attractive species to target (Parsons 1972). The fact that reproductive females exhibit a high fidelity for nest sites and the tendency of hawksbills to nest at regular intervals within a season made them an easy target for capture on nesting beaches. The shells from hundreds of thousands of sea turtles in the western Caribbean region were imported into the United Kingdom and France during the nineteenth and early twentieth centuries (Parsons 1972). Additionally, hundreds of thousands of sea turtles contributed to the region's trade with Japan prior to 1993 when a zero quota was imposed (Milliken and Tokunaga 1987), as cited in Brautigam and Eckert (2006).

The continuing demand for the hawksbills' shells as well as other products derived from the species (e.g., leather, oil, perfume, and cosmetics) represents an ongoing threat to its recovery. The British Virgin Islands, Cayman Islands, Cuba, Haiti, and the Turks and Caicos Islands (United Kingdom) all permit some form of legal take of hawksbill sea turtles. In the northern Caribbean, hawksbills continue to be harvested for their shells, which are often carved into hair clips, combs, jewelry, and other trinkets (Márquez M. 1990; Stapleton and Stapleton 2006). Additionally, hawksbills are harvested for their eggs and meat, while whole, stuffed sea turtles are sold as curios in the tourist trade. Hawksbill sea turtle products are openly available in the

Dominican Republic and Jamaica, despite a prohibition on harvesting hawksbills and their eggs (Fleming 2001). Up to 500 hawksbills per year from 2 harvest sites within Cuba were legally captured each year until 2008 when the Cuban government placed a voluntary moratorium on the sea-turtle fishery (Carillo et al. 1999; Mortimer and Donnelly 2008a). While current nesting trends are unknown, the number of nesting females is suspected to be declining in some areas (Carillo et al. 1999; Moncada et al. 1999). International trade in the shell of this species is prohibited between countries that have signed the Convention on International Trade in Endangered Species of Wild Flora and Fauna, but illegal trade still occurs and remains an ongoing threat to hawksbill survival and recovery throughout its range.

Due to their preference to feed on sponges associated with coral reefs, hawksbill sea turtles are particularly sensitive to losses of coral reef communities. Coral reefs are vulnerable to destruction and degradation caused by human activities (e.g., nutrient pollution, sedimentation, contaminant spills, vessel groundings and anchoring, recreational uses) and are also highly sensitive to the effects of climate change (e.g., higher incidences of disease and coral bleaching) (Crabbe 2008; Wilkinson 2004). Because continued loss of coral reef communities (especially in the greater Caribbean region) is expected to impact hawksbill foraging, it represents a major threat to the recovery of the species.

4 ENVIRONMENTAL BASELINE

This section is an analysis of the effects of past and ongoing human and natural factors leading to the current status of the species, its habitat (including designated critical habitat), and the ecosystem, within the action area. It does not include the effects of the action under review in this consultation.

By regulation, environmental baselines for Biological Opinions include the past and present impacts of all state, federal, or private actions and other human activities in the action area. We identify the anticipated impacts of all proposed federal projects in the specific action area of the consultation at issue, that have already undergone formal or early Section 7 consultation as well as the impact of state or private actions which are contemporaneous with the consultation in process (50 CFR 402.02).

Focusing on the impacts of the activities in the action area specifically, allows us to assess the prior experience and state (or condition) of the endangered and threatened individuals, and areas of designated critical habitat that occur in an action area, and that will be exposed to effects from the actions under consultation. This is important because, in some phenotypic states or life history stages, listed individuals will commonly exhibit, or be more susceptible to, adverse responses to stressors than they would be in other states, stages, or areas within their distributions. The same is true for localized populations of endangered and threatened species: the consequences of changes in the fitness or performance of individuals on a population's status depends on the prior state of the population. Designated critical habitat is not different: under some ecological conditions, the physical and biotic features of critical habitat will exhibit responses that they would not exhibit in other conditions.

4.1 Status of Green (North Atlantic and South Atlantic DPSs), Loggerhead (Northwest

Atlantic DPS), and Hawksbill Sea Turtles within the Action Area

In Sections 3.2.1.1 through 3.2.1.4, we described the range-wide status of green, loggerhead, and hawksbill sea turtles. Loggerhead sea turtles are not common around Puerto Rico. The only nesting of these animals reported for Puerto Rico has been on the east coast of the main island and a beach on Culebra Island, also off the east coast of the main island (PRDNER, unpublished data). Both of these areas are outside of the action area. Similarly, over a period of more than 20 years, only 4 strandings of this species have been reported around Puerto Rico (PRDNER, unpublished data). Past aerial surveys around the entire island of Puerto Rico estimated that this species represented only 0.5% of all sea turtle species observed (Rathbun et al. 1985).

Based on information from previous aerial surveys around Puerto Rico, green sea turtles comprised approximately 30% of the sightings and hawksbills approximately 8% (Rathbun et al. 1985). PRDNER also has unpublished stranding data for the period from 1992 to 2008 and there have been several reports of green and hawksbill sea turtles near the project area, all of which stranded due to incidental or targeted capture by fishers or for unknown reasons. Aerial survey data from the USFWS manatee project has also recorded sightings of sea turtles during periodic overflights around all of Puerto Rico and Culebra and Vieques Islands in 1984 – 1985, 1992 – 1995, and 1996 – 2003, in years when sea turtles were observed during surveys, the majority could not be identified to species and, when they could, there were approximately as many green sea turtles observed as hawksbills. A total of 26 sea turtles were observed over all survey time periods and of these 4 were green, 3 were hawksbill and 19 could not be identified to species. During most survey years, 1 – 2 turtles were observed but during surveys in 1984, 12 turtles were observed with 2 being green, 1 hawksbill, and the rest unidentified. Over the past 5 years reported sightings within the SJH action area include 6 juvenile or sub-adult green turtles and 1 adult hawksbill (Carlos Diez, PRDNER, pers. comm. to Kelly Logan, NMFS, December 14, 2017).

Green sea turtle nesting activity is low in Puerto Rico when compared to other areas of the Caribbean and Atlantic. In addition, PRDNER nesting data is gathered mainly for leatherback sea turtles so nesting by other species and beaches that are not part of PRDNER's set survey sites is largely unreported. There has been no nesting reported within La Esperanza Park on the west side of the SJH or within the action area (Carlos Diez, PRDNER, pers. comm. to Paul DeMarco, USACE, July 12, 2016). However, leatherback and hawksbill sea turtle nesting has been reported along the beach area within the Condado Lagoon (USFWS 2005), within the action area for the proposed beneficial use disposal.

ESA-listed sea turtles are highly mobile and therefore not as susceptible to localized stressors, though as juveniles green and hawksbill sea turtles have been found to establish home ranges in some areas of Puerto Rico, particularly Culebra for greens and Mona/Monito for hawksbills. There is evidence of increases in nesting by hawksbill sea turtles, particularly on Mona Island where hawksbill nesting is closely monitored. However, there is no in-water data for Puerto Rico or regular nesting surveys of beaches around the island that enable us to estimate populations of each sea turtle species. Therefore, we believe the status of ESA-listed sea turtle species described in Sections 3.2.1.1 through 3.2.1.4 is an accurate reflection of the species' status within the action area.

4.2 Factors Affecting Green (North Atlantic DPS and South Atlantic DPS), Loggerhead (Northwest Atlantic DPS), and Hawksbill Sea Turtles within the Action Area

4.2.1 Federal Actions

Federally-managed fisheries operate in federal waters near the action area from 9 nautical miles from shore (the limit of Commonwealth jurisdictional waters) out to the limits of the Exclusive Economic Zone (EEZ). NMFS has previously determined that threatened and endangered sea turtles are adversely affected by fishing gears used throughout the continental shelf in the action area. Net and hook-and-line gear have been documented as interacting with sea turtles in Puerto Rico based on stranding data from Commonwealth waters (PRDNER unpublished data). Incidental catch in fishing gear accounted for 1% of reported sea turtle strandings around Puerto Rico for the period from 1991 – 2008 while directed capture, including shooting, accounted for 40% of strandings (PRDNER unpublished data). Abandoned or lost fishing gear can also affect the quality of refuge and foraging habitat for green, loggerhead, and hawksbill sea turtles as abandoned gear can lead to abrasion and breakage in hard bottom and coral reef habitats and have shading impacts on seagrass and macroalgae if the gear is large enough such as traps and nets.

Effects on listed species from Federal fishery management actions, including Fishery Management Plan (FMP) and FMP Amendments pursuant to the Magnuson-Stevens Fishery Conservation and Management Act, are evaluated under Section 7 of the ESA. All of these Opinions found that the actions described were not likely to jeopardize the continued existence of sea turtle species. Formal Section 7 consultations have been conducted on the following fisheries occurring in the action area and found fisheries actions to be likely to adversely affect threatened and endangered sea turtles, but not likely to jeopardize the continued existence of the species at issue: Caribbean Reef Fish (NMFS 2011) and Caribbean Spiny Lobster (NMFS 2009) FMPs under the jurisdiction of the Caribbean Fishery Management Council (CFMC). Anticipated levels of take associated with these actions reflect the impact on sea turtles and other listed species of each activity anticipated from the date of the ITS forward in time in the waters of the EEZ off Puerto Rico and the U.S. Virgin Islands. Anticipated levels of take under the Caribbean Reef Fish FMP are 75 lethal takes of green sea turtles over 3 years, and 51 lethal takes of hawksbill sea turtles with no more than 3 non-lethal takes over 3 years. No take of loggerhead sea turtles under the Caribbean Reef Fish FMP are anticipated, due to the scarcity of this species in the U.S. Caribbean. Anticipated levels of take under the Spiny Lobster FMP are 12 lethal takes of green and hawksbill sea turtles over 3 years. Section 7 consultations were also completed for the Caribbean Coral and Queen Conch FMPs. NMFS concluded that the implementation of the Coral and Queen Conch FMPs is not likely to adversely affect ESA-listed sea turtles.

Because green, loggerhead, and hawksbill turtles are highly migratory, their status in the action area can be affected by fishery activities occurring throughout their ranges, including federal management of fisheries in the Gulf of Mexico and South Atlantic. Section 7 consultations for Gulf of Mexico Fishery Management Council and South Atlantic Fishery Management Council FMP include anticipated levels of take of sea turtles. Anticipated levels of take under the Gulf of Mexico/South Atlantic Spiny Lobster FMP are 1 lethal or nonlethal take for hawksbills and 3 lethal or nonlethal takes for greens and loggerheads over 3 years. Anticipated levels of take under the South Atlantic Snapper-Grouper FMP (NMFS 2006a) are 111 North Atlantic DPS green takes with no more than 42 lethal, 6 South Atlantic DPS green takes with no more than 3 lethal, 629 Northwest Atlantic DPS loggerhead takes with no more than 208 lethal, and 6 hawksbill takes with no more than 4 lethal over 3 years. Anticipated level of take under the Gulf of Mexico Reef Fish FMP is 1,044 loggerhead takes with 575 lethal, 116 green takes with no more than 75 lethal, and 9 hawksbill takes with no more than 8 lethal over 3 years. The Southeast Region has also established anticipated levels of take for highly migratory species (HMS) fisheries. Anticipated levels of take under the Coastal Migratory Pelagics FMP (NMFS 2015) are 1 lethal take for hawksbills, 31 total takes of North Atlantic DPS greens over 3 years with 9 lethal, and 27 total takes of Northwest Atlantic DPS loggerheads with 7 lethal. Under the Dolphin-Wahoo FMP (NMFS 2003b), 12 loggerhead takes with no more than 2 lethal, and up to 3 green or hawksbill takes with no more than 1 lethal over 1 year. Under the HMS-Pelagic Longline FMP (NMFS 2007), 1,905 loggerhead takes with no more than 339 lethal, and 105 green and/or hawksbill takes with no more than 18 lethal over 3 years. And under the HMS-Shark Fisheries FMP (NMFS 2012), 126 loggerhead takes with no more than 78 lethal, 57 green takes with no more than 33 lethal, and 18 hawksbill takes with no more than 9 lethal. Anticipated levels of take have also been established for the Southeastern U.S. Shrimp Fishery (NMFS 2014b) as 1,453 green turtle mortalities, 7,778 loggerhead turtle mortalities, and 78 hawksbill turtle mortalities are expected per year. The take numbers for the shrimp fishery were estimated based on turtle excluder device enforcement as a surrogate for actual numbers of animals.

Potential sources of adverse effects from federal vessel operations in the action area include operations of the United States Coast Guard (USCG). NMFS and the USCG completed a programmatic consultation for the USCG's Aids to Navigation (ATONS) program to determine the magnitude of the adverse impacts resulting from ATON operations in portions of Florida, Puerto Rico, and the USVI (SER-2011-03196). The consultation ended on August 5, 2013 and NMFS's Opinion determined that ATON maintenance activities were not likely to adversely affect sea turtles. EPA conducts coral surveys at different locations around Puerto Rico, often annually, using motorized vessels. NMFS has not completed a Section 7 consultation with EPA for their coral survey program at this time. Similarly, NOAA, including NOS and other line offices, conduct coral reef monitoring, benthic surveys, sediment sampling and other scientific surveys in the action area. NOS and the Southeast Fishery Science Center lead the NOAA National Coral Reef Monitoring Program efforts that take place every 2 years at randomly selected sampling sites around Puerto Rico. NOAA's Coral Reef Conservation Program has been in conversations with NMFS's Office of Protected Resources in Silver Spring regarding the possibility of completing a programmatic Section 7 consultation for the monitoring program and other efforts that receive some or all of their funding from the coral program but no consultation has been completed to date. Through the Section 7 process, where applicable, NMFS will establish conservation measures for federal agency vessel operations to avoid or minimize adverse effects to sea turtles. At the present time, however, they present the potential for some level of interaction.

As noted in the Consultation History, NMFS previously issued a concurrence letter (SER-2013-10961) on the placement of dredged material into the beneficial use area of the Condado Lagoon, and 2 concurrence letters (SER-2005-3186 and SER-2010-2658) for the use of the SJH Ocean Dredged Material Disposal Site.

NMFS and the USCG completed an informal Section 7 consultation for the Caribbean Marine Event Program for annually occurring marine events in USVI and Puerto Rico. As a result of this consultation, the USCG now includes guidelines to avoid and minimize potential impacts of marine events, especially events involving motorized vessels such as speedboat races, to listed sea turtles and their habitat as permit conditions the event participants must follow. A programmatic consultation is now in progress with the USCG for their Caribbean Marine Event Program that will include all activities that may be covered by the USCG under the program.

4.2.2 State or Private Actions

Fisheries managed by the Commonwealth operate in or may have effects on species in the action area, as discussed in Section 3.2.1.1, especially since Commonwealth waters extend to 9 nautical miles from the shore meaning they encompass shallow and deep water areas where all 3 sea turtle species may be present. As noted above, incidental catch in fishing gear accounted for 1% of reported sea turtle strandings in the action area for the period from 1991 – 2008 and sea turtle poaching is common, accounting for 40% of strandings (PRDNER unpublished data).

Commercial and recreational vessel traffic can have adverse effects on sea turtles via propeller and boat-strike injuries. None of the sea turtle strandings reported in Puerto Rico were found to be due to vessels (PRDNER, unpublished data). Vessel operation and the associated proliferation of docks and other boating facilities have resulted in the loss or degradation of refuge and foraging habitat, particularly for greens and hawksbill sea turtles due to impacts to seagrass and coral habitats from propeller scarring, propeller wash, accidental groundings, and in-water construction. Coastal runoff, marina and dock construction, dredging, industrial operations, increased underwater noise, and boat traffic can degrade marine habitats used by sea turtles (Colburn et al. 1996). Fueling and pump-out facilities at marinas can sometimes discharge oil, gas, and sewage into sensitive coastal habitats. Although these contaminant concentrations do not likely affect pelagic waters, the species of turtles analyzed in this Opinion travel between near shore and offshore habitats and various life stages of green and hawksbill sea turtles in particular can be found in nearshore waters in the action area year-round.

4.2.3 Other Potential Sources of Impacts to the Environmental Baseline

Hurricanes and large coastal storms can significantly modify both nesting and in-water sea turtle habitat, including in the action area. Beach profiles change in response to wave action and storm-induced erosion on the coast, which can also lead to the loss of nests or the loss of nesting habitat for a single season or multiple seasons depending on the size of the beach and the extent to which the beach profile is altered. Intense storms that cover a broad area can eliminate or damage large expanses of reef or result in blowouts and loss of seagrass habitats. Recent major hurricanes, including Hurricanes Irma and Maria in 2017, have caused significant changes in the physical structure of many reefs around Puerto Rico. Tropical storms and hurricanes can also result in severe flooding, leading to significant sediment transport to nearshore waters and additional degradation of reef habitats. In addition to affecting the sessile benthic organisms themselves, these changes in the structure of the reef affect species like sea turtles, in particular greens and hawksbills that use reef habitats for refuge and foraging. In-water habitat for green and hawksbill sea turtles is temporarily lost or temporarily or permanently degraded depending on the magnitude of the storm.

4.2.4 Conservation and Recovery Actions Shaping the Environmental Baseline

NMFS has implemented a series of regulations aimed at reducing the potential for incidental capture and mortality of sea turtles from commercial fisheries in the action area. These include sea turtle release gear requirements for Caribbean fisheries, including long line and trap gears.

Under Section 6 of the ESA, NMFS may enter into cooperative research and conservation agreements with states to assist in recovery actions for listed species. We currently have an agreement with Puerto Rico and the Commonwealth has regulations to protect sea turtle species as well. Any projects conducted under Section 6 agreements must be reviewed for compliance with Section 7 of the ESA. Many of the projects are aimed at determining the population status of ESA-listed species within the jurisdiction and working toward the recovery of the species. The PRDNER conducts research on hawksbill sea turtles in the area of Mona and occasionally Desecheo Islands and on green sea turtles in Culebra. As part of a recent Section 6 proposal, PRDNER would like to expand this research to better determine population dynamics in various natural reserves around Puerto Rico. PRDNER also monitors beaches around Puerto Rico, although monitoring is mainly for leatherback sea turtle nesting. PRNDER is also working to strengthen its volunteer sea turtle nesting monitoring network in order to obtain more comprehensive information regarding nesting by all sea turtle species around the island.

NMFS has established stranding procedures to rescue and rehabilitate any live stranded sea turtles. The PRDNER responds to sea turtle strandings in Puerto Rico. NMFS has issued regulations (66 FR 67495, December 31, 2001) detailing handling and resuscitation techniques for sea turtles that are incidentally caught during scientific research or fishing activities. Persons participating in fishing activities or scientific research are required to handle and resuscitate (as necessary) sea turtles as prescribed in the Final Rule. These measures help to prevent mortality of hard-shelled turtles caught in fishing or scientific research gear.

A Final Rule (70 FR 42508, July 25, 2005) allows any agent or employee of NMFS, USFWS, USCG, or any other federal land or water management agency, or any agent or employee of a state agency responsible for fish and wildlife, when acting in the course of his or her official duties, to take endangered sea turtles encountered in the marine environment if such taking is necessary to aid a sick, injured, or entangled 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 also affords the same protection to sea turtles listed as threatened under the ESA (50 CFR 223.206(b)).

Recovery teams comprised of sea turtle experts have been convened to work toward revising sea turtle recovery plans based on the latest and best available information. Five-year status reviews are completed for green, hawksbill, leatherback, and loggerhead sea turtles. These reviews are 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 and loggerhead sea turtles resulted in a determination that DPS should be established for these species, which was done for loggerhead sea turtles in 2011 and for green sea turtles in 2016.

5 EFFECTS OF THE ACTION

Effects of the action include direct and indirect effects of the action under consultation. Indirect effects are those that result from the proposed action, occur later in time (i.e., after the proposed action is complete), but are still reasonably certain to occur.

As described below, NMFS believes that the proposed action may adversely affect loggerhead, green, and hawksbill sea turtles. Because the action will result in adverse effects to these species, we must evaluate whether the action is likely to jeopardize the continued existence of these species

5.1 Effects of Non-Hopper Dredging and Related Activities

For the reasons described in Section 3.1, we conclude that the following routes of effect are not likely to adversely affect NWA DPS of loggerhead sea turtles, NA and SA DPSs of green sea turtles, or hawksbill sea turtles: non-hopper dredging methods (clamshell, bucket dredging, cutterhead dredging, and pipeline dredging); placement of dredged material in the ODMDS including vessel strikes from dredges or disposal vessels, disposal of sediments, and exposure to contaminants; disposal of material within the Condado Lagoon; bed leveling activities; and temporary exclusion to forage and refuge habitat.

5.2 Hopper Dredge Effects and Estimated Sea Turtle Mortality

Potential routes of adverse effects of the proposed action to loggerhead, green, and hawksbill sea turtles are limited to hopper dredging interactions.

Hopper 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 pump out operations is discountable, given the following reasons: (1) the vessel's slow speed (generally 3-5 kt during active dredging, and 10-12 kt during transits) (pers. comm. Terri Jordan-Sellers, USACE to Kelly Logan, NMFS, February 19, 2014), (2) the ability of these species to move out of the way, and (3) anticipated avoidance behavior by sea turtles at the sea surface or in the water column.

Hopper Dredge Entrainment Effects
Previous NMFS Biological Opinions have determined that hopper dredges may adversely affect green, loggerhead, and hawksbill sea turtles through crushing and/or entrainment by the dredge's suction dragheads. A typical hopper dredge vessel operates with 2 trailing, suction dragheads

simultaneously, 1 on each side of the vessel. Material will be dredged from within the SJH and transported to the disposal sites at the ODMDS and/or the Condado Lagoon. During all phases of dredging operations, the dredge and crew will be required to adhere to NMFS's *Sea Turtle and Smalltooth Sawfish Construction Conditions* as well as the terms and conditions of the 1997 SARBO (or any subsequently issued SARBO).

We used data from previous hopper dredging projects in and around the action area as well as in areas of South Florida to determine the effects to sea turtles. Because there is little data available within the SJH area, we include South Florida as the nearest location with similar conditions where data was available. South Florida water temperatures and benthic habitats are similar to Puerto Rico and green, loggerhead, and hawksbill sea turtles are found in both locations. South Florida also has a history of dredging numerous ports using similar equipment. From 1995 through 2017, records indicate that 45 projects used hopper dredges in South Florida and Puerto Rico generating approximately 20,357,870 yd^3 of material (Table 4). Thirty sea turtles were documented/observed as taken in hopper dredges during these dredging events. This equates to a catch per unit effort (CPUE) of 0.00000147 turtles per cubic yard dredged (30 turtles/20,357,870 yd^3 of material = 0.00000147 turtles per y^3).

Table 4. Dredged Material Removed and Observed Sea Turtle Takes from Dredging Projects in and around SJH and South Florida, 1995-2017(Operations and Dredging Endangered Species System 2017).

No.	Project	Year/ Time of Year	Quantity of Material (yd^3)	Loggerhead	Green[5]	Total Turtles
1	**Palm Beach Harbor Beach Renourishment**	4/21/2005-7/2/2005	318,874	1		1
2	**Palm Beach Harbor/Lake Worth**	9/22/2004-10/14-2004	302,007	1		1
3	**Palm Beach Harbor/Lake Worth**	12/30/1994-2/14/1995	179,330	3	2	5
4	**Juno Beach Renourishment**	12/19/2009-3/26/2010	1,234,697			0
5	**Jacksonville Harbor**	11/27/2007-12//12/2007	191,103	1		1
6	**Palm Beach Harbor/Lake Worth**	2/24/2000-3/18/2000	187,340	1		1
7	**Brevard Beach Renourishment**	3/19/2005-5/14/2005	900,000	3		3
8	**Jupiter Beach Renourishment**	2/3/2006-4/27/2006	869,655	1		1
9	**Duval County Beach Renourishment**	6/10/2005-8/7/2005	616,000	1		1
10	**Palm Beach Harbor Beach Renourishment**	4/7/2003-4/23/2003	111,625	1		1
11	**Palm Beach Harbor Lake Worth**	3/17/1999	64,779			0
12	**Brevard Beach Renourishment**	10/8/2000-4/5/2001	4,596,516	1		1
13	**Brevard Beach Renourishment**	1/3/2002-4/2/2002	1,632,105	1		1
14	**Jupiter Beach Renourishment**	4/6/2002-5/1/2002	1,048,171	1		1
15	**Martin County Beach Renourishment**	3/25/2013-4/22/2013	613,000	2		2
16	**Key West Harbor**	3/12/2004	111,710			0
17	**West Palm Beach**	4/5/2008	157,828			0
18	**Miami Harbor**	3/23/2006	86,198			0
19	**Port Everglades**	8/9/2005	60,210			0
20	**Palm Beach Harbor Beach Renourishment**	2/15/1994	181,338			0
21	**Ft Pierce**	8/16/1995	193,773			0

[5] Given the location of the projects, this includes both NA and SA DPSs.

No.	Project	Year/ Time of Year	Quantity of Material (yd^3)	Loggerhead	Green [5]	Total Turtles
22	**Brevard County**	11/27/2013-4/22/2014	692,418	3		3
23	**Palm Beach Boca**	4/25/14	200,000	1		1
24	**Midtown Beach Renourishment**	1/20/2015-4/24/2015	920,000	4	1	5
25	**Ft Pierce Beach Renourishment**	2/18/2015-5/31/2015	300,000	1		1
26	**Palm Beach Harbor Lake Worth**	5/17/2004	41,763			0
27	**Palm Beach Harbor**	2/15/2007	120,000			0
28	**San Juan Harbor**	4/14/2000	1,594,940			0
29	**Palm Beach Harbor Beach Renourishment**	12/15/1996	219,177			0
30	**Palm Beach Harbor Beach Renourishment**	1/16/1998	73,349			0
31	**Palm Beach Harbor Beach Renourishment**	12/11/2000	112,446			0
32	**Palm Beach Harbor Lake Worth**	1/12/2002	184,935			0
33	**Ft Pierce Harbor**	1/16/1993	590,000			0
34	**Miami Harbor**	4/14/1990	171,294			0
35	**Palm Beach Harbor**	11/28/2005	70,698			0
36	**Key West**	4/22/2007	92,102			0
37	**Ft Pierce Harbor**	1/2/1998	12,672			0
38	**Ft Pierce Harbor**	2/28/1997	21,402			0
39	**San Juan Harbor**	11/1/2000	577,661			0
40	**Palm Beach Harbor**	6/1/2009	15,000			0
41	**Palm Beach Harbor**	12/27/2009	64,068			0
42	**Palm Beach Harbor**	8/19/2009	42,235			0
43	**Port Everglades**	2/25/2013	418,674			0
44	**Palm Beach Harbor**	3/23/2012	100,000			0
45	**Palm Beach Harbor**	1/28/2011	66,777			0
		Total	20,357,870	**27**	**3**	**30**
		CPUE	**0.00000147**			

Using this data, we can calculate that the proposed project will result in the observed take of 3 turtles (0.00000147 CPUE x 2,100,000 yd^3 of dredge spoils for SJH = 3.08, rounded to 3 turtles).

NMFS has previously determined that dredged material screening is only partially effective at detecting entrained turtles, and observed interactions 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 interactions may go unnoticed. Mortalities are only noticed and documented when 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 suction dragheads' 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.

It is not known how many turtles are killed but unobserved. Therefore, to be conservative towards the species, NMFS has previously estimated that up to 1 out of 2 impacted turtles may go undetected (i.e., that observed interactions constitute only 50% of total takes). This estimated rate of under-detection was used in the November 19, 2003 Regional Biological Opinion (SER-2000-01287) on hopper dredging issued to the U.S. Army Corps of Engineers for their Gulf of Mexico District's (i.e., Jacksonville, Mobile, New Orleans, and Galveston) maintenance dredging and beach renourishment operations. We apply this longstanding conservative assumption in the present Opinion, as we have no new information that would change the basis of that previous conclusion and estimate. Our Incidental Take Statement (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. Our jeopardy analysis accounts for total takes (observed takes plus undetected takes).

Experience has shown that the vast majority of hopper-dredge impacted turtles are immediately killed by being crushed or through dismemberment from being trapped underneath and rolled under the heavy suction dragheads and/or by the violent forces they are subjected to during entrainment through the dredges' powerful, high-velocity dredge pumps. A very few turtles (over the years, a fraction of a percent) survive entrainment in hopper dredges; these 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. Therefore, we are conservatively predicting that all entrainment events by hopper dredges will be lethal.

Based on the previously discussed 50% detection rate of dredge-impacted turtles, NMFS estimates that the proposed action will result in a total of 6 incidental, lethal interactions (3 observed and 3 unobserved). We anticipate that the turtles entrained will be a combination of green and either loggerhead or hawksbill sea turtles. As mentioned in Section 4.1 of the Environmental Baseline above, the majority of sea turtles observed in and around the action area are green sea turtles. During past aerial surveys approximately 30% of sea turtles were identified as greens; however, the majority of sea turtles spotted could not be identified to species, so NMFS expects that there are likely more green turtles present than identified through aerial observations. Other data mentioned in Section 4.1, above, which includes unpublished data from the DNER as well as personal communications also indicate that green sea turtles are the most abundant in and around the action area. Therefore, we believe that green sea turtles are likely to comprise the majority of the observed take for the proposed action. Based on available data, the second most commonly observed species are hawksbills. However, we cannot rule out that loggerheads may be taken, as they may also be present. Therefore, we believe that the observed take will consist of 2 greens (NA and SA DPS combined) and either 1 hawksbill or 1 loggerhead (3 observed sea turtle takes in total).

We estimated above that for this project, hopper dredge entrainment will result in 6 sea turtle mortalities due to entrainment (3 observed and 3 unobserved). However, the dredge draghead is actually interacting with a larger (but unknown) number of turtles. We assume that sea turtle deflector dragheads are fairly effective at pushing away turtles unharmed, based on studies conducted by the USACE (Banks and Alexander 1994; Nelson and Shafer 1996). To be conservative, we assume each draghead is only 50% effective (i.e., for every turtle killed, 1 is safely deflected); therefore, estimating that 6 turtles will be killed in this project leads us to conclude that 6 other turtles will be safely deflected. We believe that these deflection interactions will not cause injury to sea turtles and will not rise to the level of a take, as the deflectors themselves do not have sharp edges and move slowly; thus, we believe these deflection effects will be insignificant.

6 CUMULATIVE EFFECTS

Cumulative effects include the effects of future state, tribal, local or private actions that are reasonably certain to occur in the action area considered in this Biological Opinion. Future 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.

Sea turtle habitats have been degraded or modified throughout the southeastern United States and Caribbean from activities like coastal development, channel dredging, and boating activities. These threats were discussed above for each species. While the degradation and modification of habitat is not likely the primary reason for the decline of sea turtle abundance or distribution, it has likely been a contributing factor. No future actions with effects beyond those already described are reasonably certain to occur in the action area.

7 JEOPARDY ANALYSIS

The analyses conducted in the previous sections of this Opinion serve to provide a basis to determine whether the proposed actions would be likely to jeopardize the continued existence of loggerhead, green, and hawksbill sea turtles. In Section 5.0, we outlined how the proposed actions can affect these species. Now we turn to an assessment of the species response to these impacts, in terms of overall population effects, and whether those effects of the proposed actions, when considered in the context of the status of the species (Section 3.0), the environmental baseline (Section 4.0), and the cumulative effects (Section 6.0), will jeopardize the continued existence of the affected species.

This section evaluates whether the proposed actions are likely to jeopardize the continued existence of loggerhead, green, and hawksbill sea turtles in the wild. To *jeopardize the continued existence of* is defined as "to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and 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 proposed actions directly or indirectly reduce 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. Section 5 ("Effects of the Action") describes the effects of the proposed actions on these species, and the extent of those effects in terms of an estimate of the number of impacts.

7.1 Loggerhead Turtles (Northwest Atlantic DPS)

The lethal take of up to 2 loggerhead sea turtles (1 observed, 1 unobserved) will result in a reduction in both numbers (the individuals lethally taken) and reproduction as a result of lost reproductive potential, as the individuals could be a female who could have survived other threats and reproduced in the future, thus eliminating the female's contribution to future generations. For example, an adult female loggerhead sea turtle can lay 3 or 4 clutches of eggs every 2-4 years, with 100-130 eggs per clutch. The loss of an adult female sea turtle could preclude the production of thousands of eggs and hatchlings of which a small percentage would be expected to survive to sexual maturity. Because the potential lethal take would occur in a limited, discrete action area, and the NWA DPS of loggerhead sea turtles have large ranges in which they disperse, including along the coast of the United States, from southern Virginia to Alabama, where nesting may occur, the distribution of loggerhead sea turtles is expected to be unaffected by the lethal take.

Whether the reduction of up to 2 loggerhead sea turtles would appreciably reduce the likelihood of survival for loggerheads depends on what effect this reduction in numbers and reproduction would have on overall population sizes and trends. In other words, we consider whether the reduction would be of such magnitude that adverse effects on population dynamics would be appreciable when viewed within the context of the environmental baseline and status of the species. In Section 3.2, we reviewed the status of the species in terms of nesting and female population trends and several recent assessments based on population modeling (e.g., (Conant et al. 2009b; NMFS-SEFSC 2009). In Section 4.2, we evaluated the Environmental Baseline, including known sources of mortality affecting sea turtle populations in the action area.Below, we synthesize what that information means in general terms and also in the more specific context of the proposed action and the environmental baseline.

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

NOAA's Southeast Fisheries Science Center (SEFSC (2009)) estimates the adult female population size for the NWA DPS is likely between approximately 20,000-40,000 individuals, with a low likelihood of being up to 70,000 individuals. A more recent conservative estimate for the entire western North Atlantic population was a mean of 38,334 adult females using data from 2001-2010 (Richards et al. 2011). A much less robust estimate for total benthic females in the western North Atlantic was also obtained, with a likely range of approximately 30,000-300,000 individuals, up to less than 1 million. Further insight into the numbers of loggerhead sea turtles along the U.S. coast is available in (NMFS-NEFSC 2011), which reported a conservative estimate of 588,000 juvenile and adult loggerhead sea turtles present on the continental shelf from the mouth of the Gulf of St. Lawrence to Cape Canaveral, Florida. Researchers in this study used only positively identified loggerhead sightings from an aerial survey. A less conservative analysis from the same study resulted in an estimate of 801,000 loggerheads in the same geographic area when a proportion of the unidentified hardshell turtles were categorized as loggerheads. This study did not include Florida's east coast south of Cape Canaveral or the Gulf of Mexico, areas where large numbers of loggerheads are also expected.

A detailed analysis of Florida's long-term loggerhead nesting data (1989-2014) revealed 3 distinct annual trends. From 1989-1998, there was a 30% increase that was then followed by a sharp decline over the subsequent decade. Large increases in loggerhead nesting have occurred since then. FWRI examined the trend from the 1998 nesting high through 2013 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 2014 (an increase of over 32%), FWRI concluded that there was an overall positive change in the nest counts (http://myfwc.com/research/wildlife/sea-turtles/nesting/loggerhead-trends/).

We believe that the incidental take and resulting mortality of up to 2 loggerhead sea turtles associated with the proposed action, and in the context of the environmental baseline, is not reasonably expected to cause an appreciable reduction in the likelihood of survival of the NWA DPS of loggerhead sea turtles. We believe the current population is large (i.e., several hundred thousand individuals) and is showing encouraging signs of stabilizing and possibly increasing. We also expect that the proposed action will not cause the population to lose genetic heterogeneity, broad demographic representation, or successful reproduction, nor affect loggerheads' ability to meet their lifecycle requirements, including reproduction, sustenance, and shelter.

With respect to whether the proposed action would appreciably reduce the likelihood of the species' recovery, we evaluated the Services' recovery plan for the Northwest Atlantic population of the loggerhead sea turtle (NMFS and USFWS 2008a), which is the same population of sea turtles as the NWA DPS. The recovery plan anticipates that, with implementation of the plan, the western North Atlantic population will recover within 50-150 years, but notes that reaching recovery in only 50 years would require a rapid reversal of the then declining trends of the Northern, Peninsular Florida, and Northern Gulf of Mexico Recovery Units.

The objectives of the recovery plan most pertinent to the threats posed by the proposed actions are Objectives Nos. 1 and 2:

1. Ensure that the number of nests in each recovery unit are increasing and that this increase corresponds to an increase in the number of nesting females.
2. Ensure the in-water abundance of juveniles in both neritic and oceanic habitats is increasing and is increasing at a greater rate than strandings of similar age classes.

Recovery Objective No. 1, "Ensure that the number of nests in each recovery unit is increasing…," is the plan's overarching objective and has associated demographic criteria. Currently, none of the plan's criteria are being met, but the plan acknowledges that it will take 50-150 years to do so. Further reduction of multiple threats throughout the North Atlantic, Gulf of Mexico, and Greater Caribbean will be needed for strong, positive population growth, following implementation of more of the plan's actions. Although any continuing mortality can affect the potential for population growth, we believe the mortality of up to 2 loggerhead sea turtles from the proposed action will not impede or prevent achieving this recovery objective.

Recovery Objective No. 2 states, "Ensure the in-water abundance of juveniles in both neritic and oceanic habitats is increasing and is increasing at a greater rate than strandings of similar age classes." Currently, there are not enough data to determine if this objective is being met. In particular, data specific to loggerhead juvenile abundance is sparse. Therefore, research focusing on adults and nesting trends provides some alternative data to assess the status of juveniles. The nesting trends of the NWA DPS of loggerhead sea turtles appears to have stabilized and, as noted above, may even be showing a slight positive trend based on nest counts. Overall, loggerhead populations have a long way to go before the population decline is reversed and numerical increases in population meet the goals of the recovery plan. As with Recovery Objective No. 1 above, continuing mortality combined with the loss of up to 2 loggerhead sea turtles from the proposed action would not impede or prevent achieving this recovery objective over the anticipated 50- to 150-year time frame. Because of high inter-annual variation in nesting and stranding data, and due to the relatively long-term lens needed to discern species recovery for the NWA population of loggerheads, recovery trends are assessed over decades. The loss of up to 2 NWA DPS loggerhead over the 3 year periods for the proposed action would not impede recovery or significantly add to any negative recovery trend for this DPS.

The potential lethal take of up to 2 loggerhead sea turtles is not reasonably expected to cause an appreciable reduction in the likelihood of recovery of the NWA DPS of loggerheads. The potential lethal interaction associated with the proposed action would not impede progress on achieving the identified relevant recovery objectives or achieving the overall recovery strategy.

Conclusion

The lethal take of up to 2 NWA DPS of loggerhead sea turtles associated with the proposed action is not expected to cause an appreciable reduction in the likelihood of either the survival or recovery of the species in the wild.

7.2 Green Turtles (North Atlantic and South Atlantic DPSs)

Mixed-stock analyses of foraging grounds show that green sea turtles from multiple nesting beaches commonly mix at feeding areas across the Caribbean and Gulf of Mexico, with higher contributions from nearby large nesting sites and some contribution estimated from nesting populations outside the DPS (Bass et al. 1998; Bass and Witzell 2000; Bjorndal and Bolten 2008; Bolker et al. 2007). In other words, the proportion of animals on the foraging grounds from a given nesting beach is proportional to the overall importance of that nesting beach to the entire DPS. For example, Tortuguero, Costa Rica, is by far the largest nesting beach in the NA DPS and the number of animals from that nesting beach on foraging grounds in the same area was much higher than from any other nesting beach within the NA DPS. However, in some nesting locations within the NA DPS closer to the border of the SA DPS, there may be significant mixing between the DPSs. More specifically, Lahanas et al. (1998) showed through genetic sampling that juvenile green sea turtles in The Bahamas originate mainly from the western Caribbean (Tortuguero, Costa Rica) (79.5%) (NA DPS) but that a significant proportion may be coming from the eastern Caribbean (Aves Island/Suriname; 12.9%) (SA DPS). In general, the proportion of individuals on a given foraging ground is roughly proportional to the numbers of individuals on nearby nesting beaches.

Flipper tagging studies provide additional information on the co-mingling of turtles from the NA DPS and SA DPS. Flipper tagging studies on foraging grounds and/or nesting beaches have been conducted in Bermuda (Meylan et al. 2011), Costa Rica (Troeng et al. 2005), Cuba (Moncada et al. 2006), Florida (Johnson and Ehrhart 1996; Kubis et al. 2009), Mexico (Zurita et al. 2003a; Zurita et al. 1994), Panama (Meylan et al. 2011), Puerto Rico (Collazo et al. 1992; Patricio et al. 2011), and Texas (Shaver 1994; Shaver 2002). Nesters have been satellite tracked from Florida, Cuba, Cayman Islands, Mexico, and Costa Rica. Troeng et al. (2005) report that while there is some crossover of adult female nesters from the NA DPS into the SA DPS, particularly in the equatorial region where the DPS boundaries are in closer proximity to each other, NA DPS nesters primarily use the foraging grounds within the NA DPS.

As discussed in section 3.2, within U.S. waters individuals from both the NA and SA DPSs can be found on foraging grounds. While there are currently no in-depth studies available to determine the percent of NA and SA DPS individuals in any given location, two small-scale studies provide an insight into the degree of mixing on the foraging grounds. An analysis of cold-stunned green turtles in St. Joseph Bay, Florida (northern Gulf of Mexico) found approximately 4% of individuals came from nesting stocks in the SA DPS and that the remainder were from the NA DPS (Foley et al. 2007). On the Atlantic coast of Florida, a study on the foraging grounds off Hutchinson Island found that approximately 5% of the turtles sampled came from the SA DPS (Bass and Witzell 2000). All of the individuals in both studies were benthic juveniles. While all of the mainland U.S. nesting individuals are part of the NA DPS, the U.S. Caribbean nesting assemblages are split between the NA and SA DPS. Nesters in Puerto Rico are part of the NA DPS, while those in the U.S. Virgin Islands are part of the SA DPS. We do not currently have information on what percent of individuals on the U.S. Caribbean foraging grounds come from which DPS.

We anticipate up to 4 green sea turtles (2 observed, 2 unobserved) may be taken due to the proposed action. Since we have no information specific to U.S. Caribbean waters, we conservatively conduct a separate analysis for both the NA and the SA DPS as if all of the anticipated takes from the project would occur to each of the DPSs.

NA DPS

The potential lethal take of up to 4 green sea turtles from the NA DPS would reduce the number of green sea turtles, compared to their numbers in the absence of the proposed action, assuming all other variables remained the same. A lethal interaction would also result in a potential reduction in future reproduction, assuming the individuals would be female and would have survived otherwise to reproduce. For example, an adult green sea turtle can lay 1-7 clutches (usually 2-3) of eggs every 2-4 years, with 110-115 eggs/nest, of which a small percentage is expected to survive to sexual maturity. The anticipated lethal interactions are expected to occur in a small, discrete action area which is a tiny portion of the large range of the NA DPS of green sea turtles in which they disperse; thus, no reduction in the distribution of the NA DPS of green sea turtles is expected from this take.[6]

Whether the reduction in numbers and reproduction of this species would appreciably reduce its likelihood of survival depends on the probable effect the changes in numbers and reproduction would have relative to current population sizes and trends. In Section 3.2, we reviewed the status of the species in terms of nesting and female population trends and several recent assessments based on population modeling (e.g., . (Bjorndal et al. 1999; NMFS and USFWS 2007a; Troëng and Rankin 2005) In Section 4.2, we evaluated the Environmental Baseline, including known sources of mortality affecting sea turtle populations in the action area. Seminoff et al. (2015) estimate there are greater than 167,000 nesting females in the NA DPS. The nesting at Tortuguero, Costa Rica, accounts for approximately 79% of that estimate (approximately 131,000 nesters), with Quintana Roo, Mexico (approximately 18,250 nesters; 11%), and Florida, USA (approximately 8,400 nesters; 5%) also accounting for a large portion of the overall nesting (Seminoff et al. 2015).

At Tortuguero, Costa Rica, the number of nests laid per year from 1999 to 2003, was approximately 104,411 nests/year, which corresponds to approximately 17,402-37,290 nesting females each year (Troëng and Rankin 2005). The number of nests laid per year increased to an estimated 180,310 nests during 2010, corresponding to 30,052-64,396 nesters. This increase occurred despite substantial human impacts to the population at the nesting beach and at foraging areas (Campell and Lagueux 2005; Troëng 1998; Troëng and Rankin 2005).

Nesting locations in Mexico along the Yucatan Peninsula also indicate the number of nests laid each year has increased (Seminoff et al. 2015). In the early 1980s, approximately 875 nests/year were deposited, but by the year 2000 this increased to over 1,500 nests/year (NMFS and USFWS 2007a). By 2012, more than 26,000 nests were counted in Quintana Roo (J. Zurita, CIQROO, unpubl. data, 2013, in Seminoff et al. 2015)

[6] NA DPS green takes are anticipated from the action area at the Madeira Beach Fishing Pier but we expand outward within Florida in the Gulf of Mexico because post-release mortalities may occur somewhere further away from the action area from the time of release until the time of death. Usually, the time between release and mortality occurs over a period of hours to days, so we would not expect a sea turtle to range too far outside the action area before dying.

In Florida, most nesting occurs along the Atlantic coast of eastern central Florida, where a mean of 5,055 nests were deposited each year from 2001 to 2005 (Meylan et al. 2006) and 10,377 each year from 2008 to 2012 (B. Witherington, Florida Fish and Wildlife Conservation Commission, pers. comm., 2013). As described in the Section 3.5, nesting has increased substantially over the last 20 years and peaked in 2015 with 27,975 nests statewide. In-water studies conducted over 24 years in the Indian River Lagoon, Florida, suggest similar increasing trends, with green sea turtle captures up 661% (Ehrhart et al. 2007b). Similar in-water work at the St. Lucie Power Plant site revealed a significant increase in the annual rate of capture of immature green sea turtles over 26 years (Witherington et al. 2006).

Seminoff et al. (2015) also conducted a population viability analysis for the Tortuguero, Costa Rica, and Florida, USA nesting sites (as well as 2 others: Isla Aguada, Mexico and Guanahacabibes, Cuba).[7] The population viability analysis evaluated the probabilities of nesting populations declining to 2 separate biological thresholds after 100 years: (1) a trend-based reference point where nesting populations decline by 50% and (2) the number of total adult females falls to 300 or fewer at these sites (Seminoff et al. 2015).[8] Seminoff et al. (2015) point out that population viability analyses do not fully incorporate spatial structure or threats. They also assume all environmental and man-made pressures will remain constant in the forecast period, while also relying solely on nesting data.

The Tortuguero, Costa Rica, population viability analysis indicated a 0.7% probability that this population will fall below the 50% decline threshold at the end of 100 years, and a 0% probability that this population will fall below the absolute abundance reference point of 100 nesting females per year at the end of 100 years (Seminoff et al. 2015). For the Florida, USA, population, the population viability analysis indicated there is a 0.3% probability that this population will fall below the 50% decline threshold at the end of 100 years, and a 0% probability this population falls below the absolute abundance threshold of 100 nesting females per year at the end of 100 years (Seminoff et al. 2015).

Nesting at the primary nesting beaches has been increasing over the course of the decades, while anthropogenic sources of mortality have persisted, as noted in the environmental baseline. We believe these nesting trends are indicative of a species with a high number of sexually mature individuals. Since the abundance trend information for green sea turtles is clearly increasing, we believe the potential lethal take of up to 4 green sea turtles from the NA DPS attributed to the proposed action will not have any measurable effect on that trend. Therefore, we believe the proposed action is not reasonably expected to cause an appreciable reduction in the likelihood of survival of the NA DPS of green sea turtles in the wild.

The NA DPS of green sea turtles did not have a recovery plan in place at the time of listing. However, an Atlantic Recovery Plan for the population of Atlantic green sea turtles (NMFS and USFWS 1991b) does exist. Since the animals within the NA DPS all occur in the Atlantic Ocean

[7] Not enough information was available to conduct a population viability analysis on the Quintana Roo, Mexico, nesting population.

[8] Since green sea turtles are believed to nest every 3 years, the analysis evaluated the likelihood that population would fall to 100 or fewer nesters annually (300 adult females ÷ nesting every 3 years = 100 adult female nesters annually).

and would have been subject to the recovery actions described in that plan, we believe it is appropriate to continue using that Recovery Plan as a guide until a new plan specific to the NA DPS is developed. The Atlantic Recovery Plan lists the following relevant recovery objectives over a period of 25 continuous years:

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

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

Green sea turtle nesting in Florida between 2001-2006 was documented as follows: 2001 – 581 nests, 2002 – 9,201 nests, 2003 – 2,622, 2004 – 3,577 nests, 2005 – 9,644 nests, 2006 – 4,970 nests. This averages 5,039 nests annually over those 6 years (2001-2006) (NMFS and USFWS 2007a). Subsequent nesting has shown even higher numbers (i.e., 2007 – 12,751 nests, 2008 – 9,228, 2009 – 4,462, 2010 – 13,225 nests, 2011 – 15,352, 2012 – 9,617, 2013 – 25, 553, 2014 – 3,502; 2015 – 27,975 (http://myfwc.com/research/wildlife/sea-turtles/nesting/2015-nesting-trends/). 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 will also have increased.

The potential lethal take of up to 4 green sea turtles from the NA DPS will result in a reduction in numbers when takes occur, but it is unlikely to have any detectable influence on the recovery objective and trends noted above. In addition, because of the relatively small number of lethal takes as compared to the overall NA DPS population size, we would not anticipate any impact on the species' reproduction described above to have a detectable difference in the first recovery objective for this DPS noted above. Thus, the proposed action will not impede achieving the recovery objectives above and will not reasonably be expected to result in an appreciable reduction in the likelihood of the NA DPS of green sea turtles' recovery in the wild.

Conclusion

The lethal take of green sea turtles associated with the proposed action is not expected to cause an appreciable reduction in the likelihood of either the survival or recovery of the NA DPS of green sea turtle in the wild.

SA DPS

The potential lethal take of up to 4 green sea turtles from the SA DPS would reduce the number of green sea turtles, compared to their numbers in the absence of the proposed action, assuming all other variables remained the same. As discussed above, a lethal interaction would also result in a potential reduction in future reproduction, assuming the individuals would be female and would have survived otherwise to reproduce. The anticipated lethal interactions are expected to occur in a small, discrete action area which is a tiny portion of the large range of the SA DPS of green sea turtles in which they disperse; thus, no reduction in the distribution of the SA DPS of green sea turtles is expected from this take.

Whether the potential reduction in numbers of up to 4 green sea turtles would appreciably reduce the likelihood of survival of green sea turtles from the South Atlantic DPS depends on the probable effect the changes in numbers and reproduction would have relative to current population sizes and trends. In Section 3.2, we reviewed the status of the species in terms of nesting and female population trends and several recent assessments based on population modeling (e.g., (Seminoff et al. 2015). In Section 4.2, we evaluated the Environmental Baseline, including known sources of mortality affecting sea turtle populations in the action area. The SA DPS is large, estimated at over 63,000 nesting females, but data availability is poor with 37 of the 51 identified nesting sites not having sufficient data to estimate number of nesters or trends (Seminoff et al. 2015). While the lack of data was a concern due to increased uncertainty, the overall trend of the SA DPS was not considered to be a major concern as some of the largest nesting beaches such as Ascension Island and Aves Island in Venezuela and Galibi in Suriname appear to be increasing with others (Trindade, Brazil; Atol das Rocas, Brazil; Poilão and the rest of Guinea-Bissau) appearing to be stable. In the U.S., nesting of green sea turtles occurs in the SA DPS on beaches of the U.S. Virgin Islands, primarily on Buck Island and Sandy Beach, St. Croix, although there are not enough data to establish a trend. We believe the proposed action is not reasonably expected to cause, directly or indirectly, an appreciable reduction in the likelihood of survival of green sea turtles from the SA DPS in the wild. Although the potential mortality of up to 4 sea turtles from this DPS may occur as a result of the proposed action and would result in a reduction in absolute population numbers, the population of green sea turtles in the SA DPS would not be appreciably affected. Likewise, the reduction in reproduction that could occur due to lethal take of the individuals would not appreciably affect reproduction output in the South Atlantic.

The Atlantic Recovery Plan for the population of Atlantic green sea turtles (NMFS and USFWS 1991b) lists the following recovery objective over a period of 25 continuous years that is relevant to the impacts of the proposed action for the South Atlantic DPS:

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

There are no reliable estimates of the number of immature green sea turtles that inhabit coastal areas (where they come to forage) of the southeastern United States and the U.S. Caribbean. Juvenile greens from multiple rookeries frequently utilize the nearshore waters off Brazil as foraging grounds and juvenile and adult green turtles utilize foraging areas throughout the Caribbean areas of the south Atlantic based on captures in fisheries (Dow and Eckert 2007; Lima et al. 2010a; López-Barrera et al. 2012; Marcovaldi et al. 2009a). Culebra Island, which is on the border between the North and South Atlantic DPSs, is an important developmental habitat based on capture data from 2000 – 2006 of juveniles and subadults (Diez et al. 2007).

The potential lethal take of up to 4 green sea turtles from the SA DPS will result in a reduction in numbers when take occurs, but it is unlikely to have any detectable influence on the recovery objective and trends noted above. In addition, because of the relatively small number of lethal takes as compared to the overall SA DPS population size, we would not anticipate any impact on the species' reproduction described above to have a detectable difference in the first recovery objective for this DPS noted above. Thus, the proposed action will not impede achieving the recovery objectives above and is not reasonably expected to result in an appreciable reduction in the likelihood of the SA DPS of green sea turtles' recovery in the wild.

Conclusion
The lethal take of green sea turtles associated with the proposed action is not expected to cause an appreciable reduction in the likelihood of either the survival or recovery of the SA DPS of green sea turtle in the wild.

7.3 Hawksbill Turtles

The possible mortality of up to 2 hawksbill sea turtles (1 observed and 1 unobserved) would reduce the number of hawksbill sea turtles, compared to the number that would have been present in the absence of the proposed action, assuming all other variables remained the same. No reduction in the distribution of hawksbill sea turtles is expected from this take as hawksbill turtles will continue to be present throughout most waters surrounding Puerto Rico.

Whether the potential reduction in numbers due to lethal take or due to impacts to reproductive output would appreciably reduce the likelihood of survival of hawksbill sea turtles depends on the probable effect the changes in numbers and reproduction would have relative to current population sizes and trends. In Section 3.2, we reviewed the status of the species in terms of nesting and female population trends and several recent assessments based on population modeling (e.g. (NMFS and USFWS 2007b; Spotila 2004b) In Section 4.2, we evaluated the Environmental Baseline, including known sources of mortality affecting sea turtle populations in the action area. There are currently no reliable estimates of population abundance and trends for non-nesting hawksbills at the time of this consultation; therefore, nesting beach data is currently the primary information source for evaluating trends in abundance. Mortimer and Donnelly (2008b) found that for nesting populations in the Atlantic (especially in the Insular Caribbean and Western Caribbean Mainland), 9 of the 10 sites with recent data (within the past 20 years) that show nesting increases were located in the Caribbean. With increasing nesting trends in the Caribbean, we believe the losses expected due to the proposed action will be replaced due to increased nest production. Further, we believe the anticipated takes will not cause a change in the number of sexually mature individuals producing viable offspring to an extent that changes in nesting trends will occur.

We do not anticipate the mortality of up to 2 hawksbill sea turtles will have any detectable impact on the population overall, and the action will not cause the population to lose genetic diversity or the capacity to successfully reproduce. Therefore, we do not believe the proposed action will cause an appreciable reduction in the likelihood of survival of hawksbill sea turtles in the wild.

As to whether the proposed action will appreciably reduce the species' likelihood of recovery, the Recovery Plan for the population of the hawksbill sea turtle (NMFS and USFWS 1993) lists the following relevant recovery objectives over a period of 25 continuous years:

- The adult female population is increasing, as evidenced by a statistically significant trend in the annual number of nests at five index beaches, including Mona Island (Puerto Rico and Buck Island Reef National Monument (St. Croix).

- The numbers of adults, subadults, and juveniles are increasing, as evidenced by a statistically significant trend on at least five key foraging areas within Puerto Rico, U.S. Virgin Islands, and Florida.

Of the hawksbill sea turtle rookeries regularly monitored – Jumby Bay (Antigua/Barbuda), Barbados, Mona Island (Puerto Rico), and Buck Island Reef National Monument (USVI), all show increasing trends in the annual number of nests (NMFS and USFWS). In-water research projects at Mona Island, Buck Island, and the Marquesas, Florida, which involve the observation and capture of juvenile hawksbill turtles, are underway. Although there are over 15 years of data for the Mona Island project, abundance indices have not yet been incorporated into a rigorous analysis or a published trend assessment. The time series for the Marquesas project is not long enough to detect a trend (NMFS and USFWS 2007b).

The take of up to 2 hawksbill sea turtles from the proposed action are not likely to reduce overall population numbers over time due to expected recruitment based on the increasing trends in nesting. With increased nesting in the Caribbean, the proposed action is not expected to affect the numbers of adult females recruiting into the population nor the numbers of adults, subadults, and juveniles. Therefore, we believe the proposed action is not likely to impede the recovery objectives above and will not result in an appreciable reduction in the likelihood of hawksbill sea turtles' recovery in the wild. In conclusion, we believe the effects associated with the proposed action are not reasonably expected to cause an appreciable reduction in the likelihood of survival and recovery of hawksbill sea turtles in the wild.

Conclusion

The lethal takes of hawksbill sea turtles associated with the proposed action are not expected to cause an appreciable reduction in the likelihood of either the survival or recovery of the species in the wild.

8 CONCLUSION

After reviewing the current status of green (NA and SA DPSs), hawksbill, and loggerhead sea turtles, the environmental baseline, the effects of the proposed action, and cumulative effects, it is NMFS's Biological Opinion that the proposed action is not likely to jeopardize the continued existence of green NA DPS, green SA DPS, loggerhead (NWA DPS), or hawksbill sea turtles.

9 INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and federal regulations issued pursuant to Section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively. Section 7(b)(4) and Section 7(o)(2) provide that take that is incidental to an otherwise lawful agency action is not considered to be prohibited take under the ESA if that action is performed in compliance with the terms and conditions of this Incidental Take Statement.

9.1 Amount and Extent of Take

NMFS anticipates incidental take will consist of a total of 6 sea turtles killed (3 observed and 3 unobserved) during hopper dredging for the SJH project. Based on previous experience, we believe only 3 of these the 6 total takes may be entrained, detected, and/or documented by onboard protected species observers. Therefore, take exceedance shall be accounted for on the basis of *observed* takes.

The observed take as result of the proposed action will consist of up to 2 green sea turtles, which may be of either the SA or NA DPS, and 1 NWA DPS loggerhead sea turtles or 1 hawksbill sea turtle, not to exceed a total of 3 observed takes of all species combined.

Reinitiation of consultation will be required if any of the limits of observed take by hopper dredges is exceeded.

If any takes of species under NMFS's purview are taken during in-water construction authorized using this Opinion as the Section 7 consultation, it shall be immediately reported to takereport.nmfsser@noaa.gov (reference the NMFS Public Consultation Tracking System identifier number [SER-2017-18763]).

9.2 Effect(s) 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 green (North Atlantic DPS), loggerhead (Northwest Atlantic DPS), or hawksbill sea turtles.

9.3 REASONABLE AND PRUDENT MEASURES

Section 7(b)(4) of the ESA requires NMFS to issue a statement specifying the impact of any incidental take on listed species, which results from an agency action otherwise found to comply with Section 7(a)(2) of the ESA. It also states that the 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 or applicant that complies with the specified terms and conditions is authorized.

The RPMs and terms and conditions are specified as required by 50 CFR 402.14 (i)(1)(ii) and (iv) to document the incidental take by the proposed action and to minimize the impact of that take on sea turtles. These measures and terms and conditions are nondiscretionary, and must be implemented by USACE or the applicants in order for the protection of Section 7(o)(2) to apply. USACE has a continuing duty to regulate the activity covered by this Incidental Take Statement (ITS). If USACE or the applicants fail to adhere to the terms and conditions of the ITS through enforceable terms, and/or fails to retain oversight to ensure compliance with these terms and conditions, the protective coverage of Section 7(o)(2) may lapse. To monitor the impact of the incidental take, USACE must report the progress of the action and its impact on the species to NMFS as specified in the ITS [50 CFR 402.14(i)(3)].

NMFS has determined that the following RPMs are necessary and appropriate to minimize impacts of the incidental take of sea turtles related to the proposed action. 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. These restrictions remain valid until reinitiation and conclusion of any subsequent Section 7 consultation.

1. USACE will have measures in place to monitor and report all interactions with any protected species resulting from the proposed action. Reports shall be sent to the Assistant Regional Administrator (Mr. David Bernhart) for NMFS's Protected Resources Division, Southeast Regional Office, 263 13th Avenue South, St. Petersburg, Florida 33701-5505.

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

3. USACE will require NMFS-approved observers to monitor dredged material inflow and overflow screening baskets on the hopper dredge.

9.4 TERMS AND CONDITIONS

In order to be exempt from liability for take prohibited by Section 9 of the ESA, the USACE and/or their applicants must comply with the following terms and conditions, which implement the RPMs described above. These terms and conditions are nondiscretionary.

The following terms and conditions (T&Cs) implement the above RPMs:

1. A project report summarizing the results of the dredging and the sea turtle take (if any) must be submitted to NMFS within 30 working days of completion. Reports shall contain information on project location, start-up and completion dates, cubic yards of material dredged, problems encountered, incidental takings (include photographs, if available) and sightings of protected species, mitigating actions taken, screening type (inflow, overflow) utilized, daily water temperatures, name of dredge, names of endangered species observers, percent observer coverage, and any other information the USACE and/or contractor deems relevant. This report must be provided to NMFS's Protected Resources Division at the address provided in RPM No. 1 above, and notification of take shall be provided to NMFS at the following email address within 24 hours, referencing the present Opinion by NMFS identifier number (SER-2017-18763), title, and date: takereport.nmfsser@noaa.gov and will cc Kelly.Logan@noaa.gov (RPM 1).

2. To prevent impingement of sea turtles in the water column, every effort shall be made to keep the dredge pumps disengaged when the dragheads are not firmly on the bottom (RPM 2).

3. USACE will require the use of rigid sea turtle deflectors on all hopper dragheads. The hopper dredge's sea turtle deflector draghead is to be inspected prior to startup of hopper dredging operations to ensure they are functioning properly. In addition, USACE shall ensure that all contracted personnel involved in operating hopper dredges receive thorough training on measures of dredge operation that will minimize sea turtle takes (RPM 2).

4. USACE shall arrange for NMFS-approved protected species observers to be aboard the hopper dredge to monitor the hopper bin, screening, and dragheads for sea turtles and their remains. For the proposed action, 100% shipboard observer monitoring of inflow screens is required year-round. If conditions disallow 100% inflow screening, inflow screening can be reduced gradually, but effective, 100% overflow screening is then required, and an explanation must be included in the project report, and NMFS notified beforehand.

   The hopper's inflow screens should initially have 4-in by 4-in screening, for effective screening and capture of entrained protected species body parts. However, if USACE, in consultation with observers and the draghead operator, determines that the draghead is clogging and reducing production substantially, the mesh size may be increased after prior consultation with and approval by NMFS, to 8-in by 8-in; if this still clogs, then 16-in by 16-in openings. NMFS believes that this flexible, graduated-screen option is prudent since the need to constantly clear the inflow screens will increase the time it takes to complete the project; therefore, it will increase the exposure of sea turtles to the risk of impingement or entrainment. Inflow screen clogging should be greatly reduced with these flexible options; however, further clogging (e.g., as when encountering heavy clay or debris) may compel removal of the inflow screening altogether, in which case *effective* 100% overflow screening is mandatory.

   USACE shall notify NMFS *beforehand* if inflow screening is going to be reduced or eliminated, and provide details of how effective overflow screening will be achieved. NMFS, in consultation with the dredging company and USACE, shall determine what constitutes effective overflow screening (RPM 3).

10 CONSERVATION RECOMMENDATIONS

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

NMFS believes the following conservation recommendations further the conservation of listed species. NMFS strongly recommends that these measures be considered and implemented by USACE and/or the applicant:

1. To the extent practicable, USACE should schedule dredging operations at times of year when listed species are least likely to be present in the action area.

2. Whenever it is possible, outfit a hopper dredge with a rigid deflector draghead as designed by the USACE Engineering Research and Development Center. Or if that is unavailable, a rigid sea turtle deflector should be attached to the draghead.

3. To the extent practicable, USACE should minimize the use of hopper dredges in favor of cutterhead dredges.

4. USACE should conduct studies in conjunction with cutterhead dredging where disposal occurs on the beach to assess the potential for improved screening to: (1) establish the type and size of biological material that may be entrained in the cutterhead dredge, and (2) verify that monitoring the disposal site without screening is providing an accurate assessment of entrained material.

5. USACE should support studies to determine the effectiveness of using a sea turtle deflector to minimize the potential entrainment of sturgeon during hopper dredging.

Please notify NMFS if the federal action agency carries out any of these recommendations so that we will be kept informed of actions that are intended to improve the conservation of listed species or their designated critical habitats.

11 REINITIATION OF CONSULTATION

This concludes NMFS's formal consultation on the proposed actions. As provided in 50 CFR 402.16, reinitiation of formal consultation is required where discretionary federal action agency involvement or control over the action has been retained, or is authorized by law, and if: (1) the amount or extent of incidental take is exceeded, (2) new information reveals effects of the agency action on listed species or designated critical habitat in a manner or to an extent not considered in this Opinion, (3) the agency action is subsequently modified in a manner that causes an effect on the listed species or critical habitat not considered in this Opinion, or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

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APPENDIX A

DEPARTMENT OF THE ARMY

SOUTH ATLANTIC DIVISION, CORPS OF ENGINEERS
ROOM 313, 77 FORSYTH ST., S.W.
ATLANTA, GEORGIA 30335-6801

REPLY TO
ATTENTION OF:

CESAD-ET-PR (1105-2-10b)

29 OCT 1997

MEMORANDUM FOR

COMMANDER, CHARLESTON DISTRICT
COMMANDER, JACKSONVILLE DISTRICT
COMMANDER, SAVANNAH DISTRICT
COMMANDER, WILMINGTON DISTRICT

Subject: National Marine Fisheries Service, Regional Biological Opinion on Hopper Dredging along the South Atlantic Coast

1. Reference the Endangered Species Act Section 7 Consultation, Biological Opinion for The Continued Hopper Dredging of Channels and Borrow Areas in the Southeastern United States, National Marine Fisheries Service (NMFS) 25 September 1997 (Encl 1).

2. The referenced document was sent to your District Sea Turtle Coordinator by electronic mail on 29 September 1997, without the signed NMFS transmittal letter. The purpose of this memorandum is to transmit copies of the complete document to you, and to provide some guidance on its implementation.

3. During the spring of 1997 we experienced an unanticipated high level of sea turtle entrainments in our hopper dredges along the Atlantic coast. Within a month of starting work, we were approaching our incidental take limit for loggerheads, despite having taken all sea turtle protection measures we had available to us. Our commitment to protect sea turtles while maintaining safe navigation channels for defense and commerce, forced us to make some very hard choices. The result was that from March until the new Regional Biological Opinion (RBO) went into effect on 1 October 1997, we had taken 29 loggerhead sea turtles, completed work at six projects and terminated the remaining six projects with less than about half of the work being completed. Fortunately we did not take any of the endangered species of sea turtles and we were able to complete most of the critical work, or critical project reaches, during that period.

4. The Corps of Engineers has a commitment to protect sea turtles, as was exemplified by our willingness to terminate Corps projects and the NMFS reciprocated by being very cooperative during the Section 7 Consultation process.

CESAD-ET-PR 29 OCT 1997
Subject: National Marine Fisheries Service, Regional Biological Opinion on Hopper Dredging along the South Atlantic Coast

We received an Interim Biological Opinion which extended our incidental take of loggerhead sea turtles from 20 to 35, enabling us to resume our necessary hopper dredging after just a brief delay. We must continue to do everything we can to maintain this excellent working relationship with the NMFS.

5. In implementing the new 1997 RBO, we again renew our commitment to maintaining a balance between reducing sea turtle entrainments to the lowest levels we can achieve while performing necessary dredging for navigation. The Hopper Dredging Protocol for Atlantic Coast (Encl 2) is our guidance for helping achieve this objective. The Protocol is a living document and will be revised by CESAD as appropriate. Your input into improving the Protocol is welcomed at any time, as are any suggestions you may have on how we can further reduce sea turtle takes. I also encourage you to share your views and ideas on this through our Internet newsgroup, usace.sad.turtles.

6. Should you have any questions or would like additional information, you may contact John DeVeaux, CESAD-ET-CO, at (404) 331-6742 or Rudy Nyc, CESAD-ET-PR, at (404) 331-4619 or by e-mail which is preferred.

I know you all are working this hard... your thoughts/suggestions are welcome –

R. L. Vantantwerp

2 Encl
as

R. L. VANANTWERP
Brigadier General, USA
Commanding

CF (w/encls):
COMMANDER, MOBILE DISTRICT

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Silver Spring, Maryland 20910

SEP 25 1997

R. L. VanAntwerp
Brigadier General, U.S. Army
Division Engineer
South Atlantic Division, Corps of Engineers
Room 313, 77 Forshyth St., S.W.
Atlanta, Georgia 30355-6801

Dear Brigadier General VanAntwerp;

Enclosed is the regional biological opinion concerning the use of hopper dredges in channels and borrow areas along the Southeast U.S. Atlantic coast. This biological opinion amends the regional opinion conducted in 1995, and supersedes the interim biological opinion issued on April 9, 1997. The opinion recognizes the efforts of the Corps of Engineer's (COE) South Atlantic Division (SAD) to minimize sea turtle takes through application of new technology such as draghead deflectors, seasonal dredging windows, termination of projects in which high rates of turtle takes are observed, and elevated staff effort to identify and resolve site-specific problems. Despite these major efforts and continuing plans by the COE to improve the effectiveness of the rigid draghead deflector and to resolve dredging schedules to reduce the likelihood of sea turtle interactions, NMFS believes that further sea turtle takes are likely in future years. However, we believe that these takes are not likely to jeopardize the continued existence of any species. An annual incidental take, by injury or mortality of 35 loggerheads 7 Kemp's ridleys, 7 green turtles, 2 hawksbills, and 5 shortnose sturgeon is listed in the incidental take statement appended to the enclosed opinion. This annual take level can be monitored over fiscal years to be consistent with project contracts.

I appreciate your continued commitment to reduce sea turtle takes associated with dredging in your Division. COE Division and District staff have facilitated the excellent working relationship that exists between our offices within the SAD. We look forward to continuing these cooperative efforts in sea turtle conservation.

Sincerely,

for M Montano
Hilda Diaz-Soltero
Office Director
Office of Protected Resources

Endangered Species Act - Section 7 Consultation

Biological Opinion

Agency: U.S. Army Corps of Engineers, South Atlantic Division

Activity: The continued hopper dredging of channels and borrow areas in the southeastern United States

Consultation Conducted By: National Marine Fisheries Service, Southeast Regional Office

Date Issued: September 25, 1997

Background

Hopper dredging in channels and borrow areas along the southeastern coast of the United States during the spring of 1997 resulted in an unanticipated high rate of loggerhead turtle take. The number of takes quickly approached the incidental take level established in the regional biological opinion (BO) issued to the Army Corps of Engineers (COE) on August 25, 1995. A formal consultation considering the take rates as well as the dredging locations and conditions was conducted and an interim biological opinion (IBO) was issued on April 9, 1997 and is incorporated herein by reference. The IBO concluded that continued hopper dredging during the 1997 fiscal year was likely to take additional sea turtles but was not likely to jeopardize the continued existence of any species. The incidental take, by injury or mortality, of seven (7) documented Kemp's ridleys, seven (7) green turtles, two (2) hawksbills, sixteen (16) loggerhead turtles, and five (5) shortnose sturgeon was set pursuant in the IBO. This modification added 15 loggerheads to the annual incidental take level, bringing the 1997 fiscal year total incidental take level to 35 loggerheads.

The history of Endangered Species Act (ESA) Section 7 consultations on the deployment of hopper dredges to maintain the depths of southeastern channels is discussed in the August 25, 1995 BO and is incorporated herein by reference. Although no endangered sea turtles have been taken in any channel dredging projects during the 1997 fiscal year, 28 loggerheads have been taken, including 9 loggerheads taken subsequent to the issuance of the IBO (Table 1).

During 1997, the COE responded to high rates of sea turtle takes by assessing each dredging project, modifying draghead deflectors when apparently necessary, conducting relative abundance surveys and relocation trawling, and ultimately ending a number of projects prior to completion (Kings Bay, Brunswick Harbor, Savannah Harbor, Morehead City).

1991 Biological Opinion

Two hundred twenty-five sea turtle takes, including 22 live turtles, were documented between 1980 and 1990 in the Southeast channels despite limited observer coverage in most channels throughout most of that decade (Table 2a.). Seventy-one of these turtles were taken in four months of dredging in the Canaveral ship channel in 1980, the first year in which observers were required. Twenty-one were observed in over two years of dredging in the Kings Bay Channel in 1987-1989, after observers were first deployed on dredges in that channel. Observers were required on most hopper dredges after 1989. Documented takes of turtles on dredges in Brunswick and other Southeast U.S. channels indicated that sea turtles were vulnerable to hopper dredges in all southeastern channels during warmer months. These observations resulted in the Section 7 consultation that concluded with a BO issued on November 25, 1991.

The November 1991 BO was the first cumulative area consultation between NMFS and COE's South Atlantic Division (SAD) regarding hopper dredging. The BO considered hopper dredging in channels from the Canaveral in Florida through Oregon Inlet, North Carolina. The 1991 BO concluded that continued unrestricted hopper dredging in Southeast U.S. channels could jeopardize the continued existence of listed sea turtles. The Opinion established a reasonable and prudent alternative to unrestricted hopper dredging which prohibited the use of a hopper dredge in the Canaveral ship channel, and from April 1 through November 30 in other southeastern channels north of Canaveral. An incidental take level was established based on assumptions that takes would be significantly reduced due to limited dredging windows, but that water temperatures in some years would result in turtle presence in channels during December and March. Observers were required on dredges equipped with outflow and/or inflow screening in March and December. The presence or absence of turtles in December would determine the further need for observer coverage into January. The documented incidental take of a total of five (5) Kemp's ridley, green, hawksbill or leatherback turtle mortalities in any combination of which no more than two (2) are Kemp's ridley, or fifty (50) loggerhead turtle mortalities was set. The Opinion anticipated that seasonal restrictions on hopper dredging would be adjusted on a channel-by-channel basis as better information on turtle occurrence was collected.

Additionally, the development and testing of a draghead deflector was promoted.

1995 Biological Opinion

Between 1992 and 1995, only 16 sea turtle takes were documented (Table 2b.), including three that were alive when collected during dredging operations in the SAD under the dredging windows established in the November 1991 BO (see above). During that period COE developed a rigid draghead deflector that appeared to be effective during videotaped dredging trials using mock turtles, as well as during experimental dredging associated with trawling in the Canaveral Channel. COE also completed a study of six Southeast channels to determine seasonal abundance and spatial distribution of these turtles. A discussion of the findings can be found in the COE report entitled "Assessment of Sea Turtle Abundance in Six South Atlantic U.S. Channels" (Dickerson et al. 1994), summarized in the 1995 BO. Based on the new information, COE requested expanded dredging windows and observer requirements. NMFS considered their request and developed alternative dredging windows and observer requirements and added requirements for the use of hopper dredges in borrow areas along the east coast.

After 1995, COE districts within the SAD generally required observers in some channels, such as Kings Bay, throughout the winter, beyond the new monitoring windows. SAD hopper dredge projects were initially conducted in the middle of the dredging windows, when nearshore waters were cool. During 1996, only nine sea turtle takes, including one green turtle and eight loggerheads, were documented (Table 2c.). No more than three takes occurred in any project. The new dredging windows and draghead deflector requirements appeared to provide good protection to sea turtles.

Hopper dredging operations contracted for the 1997 fiscal year were planned for early in the calendar year, however a number of operations were not begun until late winter. Beginning on March 2, 1997, loggerhead takes occurred in Kings Bay at rates higher than previously observed. Six turtles were taken in four days of dredging. While consulting with NMFS regarding this unprecedented rate of loggerhead takes, a COE specialist from the Waterways Experiment Station proposed some modifications to the draghead with the potential to reduce sea turtle takes. Relocation trawling was also initiated, beginning March 9,1997; however, as can be seen on Table 2, these efforts did not preclude further sea turtle takes in Kings Bay. Dredging was terminated on March 12, 1997, with only 53 percent of the project completed.

Table 1 lists the sea turtle takes observed in hopper dredges throughout the SAD during 1997, as well as the steps taken by COE to reduce the likelihood of takes. Deflector dragheads were re-engineered to fit specific dredges wherever possible and relocation trawling was initiated. Dredging was terminated prior to completion of projects in Kings Bay, Brunswick Harbor, Savannah Harbor and Charleston Harbor. Consultation was reinitiated to consider the effects of the remaining hopper dredging projects anticipated for the 1997 fiscal year. In addition to those specific projects listed in the resulting April 1997 IBO, dredging at Reach II of the Myrtle Beach dredge disposal area is likely to begin before the fiscal year ends. Despite ongoing dredging at the Oregon Inlet, no sea turtle takes have been documented since May 15.

Proposed Activity

This consultation addresses the use of hopper dredges in channels and borrow areas along the Atlantic portion of COE's SAD within the existing dredging windows (Table 3). Channels dredged by hopper dredges include: Oregon Inlet, Morehead and Wilmington Harbors, Charleston, Port Royal and Savannah harbors, Brunswick, Kings Bay, Jacksonville, St. Augustine and Ponce de Leon inlets, West Palm Beach, Miami and Key west channels. Borrow areas that may be dredged by hopper dredges include areas off of Dade County Florida and Myrtle Beach South Carolina.

Draghead deflectors will be used on all projects and observers will be required at least during those periods identified in Table 3. Year-round observer coverage will likely be required by the COE for most channels, particularly those with histories of high sea turtle catch rates such as Kings Bay. Within the South Atlantic Division, the COE will try to schedule dredging of the highest risk areas (Canaveral, Brunswick, Savannah, and Kings Bay) during periods when nearshore waters are coolest -- after December 15 but well before March. Priority for winter dredging will also be given to areas that have substrates that reduce the efficiency of the deflector (Wilmington Harbor channel, Reach 1 of Myrtle Beach). Completion of all projects during the cold-water months will be attempted when possible.

Listed Species and Critical Habitat

Listed species under the jurisdiction of the NMFS that may occur in channels along the southeastern United States and which may be affected by dredging include:

THREATENED:
(1) the threatened loggerhead turtle - *Caretta caretta*

ENDANGERED:

(1) the endangered right whale - Eubalaena glacialis
(2) the humpback whale - Megaptera novaeangliae
(3) the endangered/threatened green turtle - Chelonia mydas
(4) the endangered Kemp's ridley turtle - Lepidochelys kempii
(5) the endangered hawksbill turtle - Eretmochelys imbricata
(6) the endangered shortnose sturgeon - Acipenser brevirostrum

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

Additional endangered species which are known to occur along the Atlantic coast include the finback (Balaenoptera physalus), the sei (Balaenoptera borealis), and sperm (Physeter macrocephalus) whales and the leatherback sea turtle (Dermochelys coriacea). NMFS has determined that these species are unlikely to be adversely affected by hopper dredging activities.

Information on the biology and distribution of sea turtles can be found in the 1991 and 1995 BOs, which are incorporated by reference. Channel specific information has been collected by COE for channels at Morehead City, Charleston, Savannah, Brunswick, Fernandina and Canaveral, and is presented in detail in COE summary report entitled "Assessment of Sea Turtle Abundance in Six South Atlantic US Channels" (Dickerson et al., 1994) and in the COE Biological Assessment.

There is no significant new information regarding the status of these species that has not been discussed in the BOs that have been incorporated by reference (March 12, 1997 and August 25, 1995).

Assessment of Impacts

The Biological Opinion issued in 1991 contained strict dredging windows that appeared to be very effective at limiting the number of sea turtles taken by hopper dredges during channel maintenance dredging in the Southeast U.S. along the Atlantic coast. Between 1991 and 1995, no more than 8 turtles were taken in any year, and many of those taken were released alive. Studies conducted by the COE (Dickerson et al., 1994) documented turtle distribution and abundance in six channels that suggesting the existing windows were accurate. However, the COE requested expansion of existing windows to lessen the burden of maintenance dredging while testing and further developing a rigid draghead deflector design. The deflector was effective at pushing aside mock turtles when tested during 1994, and preliminary field trials in the Canaveral shipping channel had encouraging results. NMFS considered this new information, presented by the COE in a biological assessment forwarded to NMFS in November 1994. The resulting BO, issued August 25 1995 expanded dredging windows and modified observer requirements.

Only 9 sea turtle takes were documented in 1996, suggesting that the expanded dredging windows and the deflector requirements provided protection to sea turtles that was similar to the previously more-restrictive windows. However, the COE's internal policy resulted in conduct of most of the hopper dredging projects during months when coastal waters were still cold, consistent with the previous dredging. The increased rate of take observed during 1997 and discussed below suggests that the restriction of hopper dredging to months when nearshore waters are cold remains the best method for minimizing sea turtle takes.

Unfortunately, a number of dredging projects contracted for early 1997 in the SAD but not restricted to mid-winter months, were delayed into the Spring. This delay coincided with a unseasonably warm winter, when the waters of Kings Bay reached 60°F in early March. The incidental take of nine loggerheads in Kings Bay over only 11 days of dredging indicated that the nearshore abundance of loggerheads was high, apparently higher than during the late 1980's when observers were first deployed on hopper dredges in Kings Bay.

There were other indicators of high nearshore sea turtle abundance along the Southeast U.S. Atlantic coast during 1997. Commercial shrimp trawling conducted without the use of turtle excluder devices (TEDs) offshore of South Carolina and Georgia between May 15 and July 15 resulted in sea turtle catch rates higher than previously documented. Sixty nine sea turtles were taken in 29 days of shrimping off of South Carolina, including 65 loggerheads, 3 ridleys and 1 leatherback. Forty-six sea turtles were taken in 17 days of towing off of Georgia. The sea turtle catch per unit effort (CPUE) for this operation is about 0.35 turtles per hour of trawling, standardized to 100 feet (30.5 m) of total headrope length fished. The CPUE (same units) for commercial shrimp trawling in the 1970s and 1980s reported by Henwood and Stuntz (1987a) was only 0.0487. Loggerhead turtles were the predominant species reported by Henwood and Stuntz and have also been predominantly observed in this study. They account for most of the increase in overall CPUE. The CPUE for loggerheads alone has been greater than 0.30 turtles per hour, while the value reported in Henwood and Stuntz was 0.0456 turtles per hour. The rates of taking for leatherback and Kemp's ridley turtles in the Atlantic study area have also been higher than anticipated.

The high relative density of sea turtles during 1997 may be due to an unseasonably warm winter or other factors contributing to annual variations in abundance, due to an actual increase in the abundance of benthic immature sea turtles in the loggerhead population, or due to a combination of these factors. Trends in the status of loggerheads are generally identified at the nesting beach, when the most accessible life stage, adult nesting females, can be counted. Because they mature at 20 to 30 years of age, increases or decreases in the abundance of benthic immature loggerheads as determined by incidental captures in nearshore waters would not be observed for decades. While nesting beach surveys suggest that the South Florida population of loggerheads increased and now appears to be stable, increases have not been apparent on nesting beaches of Georgia and South Carolina. Further work on the development of multi-year in-water sampling sites is needed to identify trends in multiple age-classes of the loggerhead population.

The COE noted that 14 of the 28 takes that occurred during 1997 were on the same dredge, the Eagle. The high rate of takes, particularly on this dredge, suggested that the deflecting draghead was not installed properly or was not being operated properly. Takes occurred in a number of the 1997 dredge projects during clean-up. Ridges left behind after the initial dredging are leveled during clean-up, but the draghead passes over troughs. Takes occurring during clean-up may be difficult to avoid since the draghead deflector must remain hard on the bottom to be effective.

The COE has been conducting meetings between districts within the SAD to discuss the results of assessments of channel conditions and dredge inspections. They have determined that the draghead deflector has not been working properly due to poor education of the dredge operators on its proper use, and due to poor tailoring of the deflector to specific dragheads. Increased efforts to educate dredge operators are planned. Additionally, since fewer than 10 private hopper dredges operate within SAD, engineers that have designed the conceptual deflector will be sent to the dredges to insure that the deflectors are adapted to each draghead and that the operators understand how to use the deflector effectively.

CUMULATIVE EFFECTS

"Cumulative effects" are those effects of future state or private activities, not involving Federal actions, that are reasonably certain to occur within the action area of the Federal action subject to consultation. These are discussed in detail in the biological opinions incorporated by reference.

Conclusion:

NMFS believes that the elevated rate of observed sea turtle takes by dredges in the southeastern United States during March of 1997 was likely due to increased abundance of loggerheads in nearshore waters due to an unseasonably warm winter. There is no way to predict whether similar conditions will be encountered in upcoming seasons. Over the past six years, the COE's SAD has continuously expressed a commitment to minimize sea turtle takes, and has conducted research and taken repeated steps to further this goal. Repeated termination of dredging operations due to high sea turtle takes during 1997 confirms their commitment to avoid sea turtle takes. Further efforts to educate the dredging industry and recruit their interest and involvement in avoiding sea turtle takes are necessary and are planned by the COE. Additionally, the COE has committed to additional efforts to improve the effectiveness of the deflecting draghead. The sea turtle deflector should be tailored to each hopper dredge draghead and the dredge operators should be fully trained in the operation of the draghead to ensure proper use and improve effectiveness. Improvements in operator and deflector performance are necessary prior to reliance on the draghead as a mechanism for reducing sea turtle takes.

NMFS anticipates that the COE's interest in improving the performance of the deflector, their commitment to limit the use of hopper dredges in channels of high sea turtle abundance during periods when nearshore waters are likely to be cold, and their overall goal of further reducing sea turtle takes during hopper dredge activities will minimize the interactions of hopper dredges with sea turtles. However, annual variation in the abundance of sea turtles in some channels and borrow areas make it likely that sea turtle takes will still occur. Additionally, overall increases in loggerhead and Kemp's ridley populations are anticipated due to TED requirements that have reduced the mortality rates of benthic lifestages of these species. Lastly, in some years high levels of hopper dredging activity may be necessary. For example, termination of projects prior to completion during FY 1997 may result in an increase in the number and length of hopper dredging projects necessary for channel maintenance during FY 1998. Therefore, NMFS believes that up to 35 loggerheads may be taken by injury or mortality, as well as 7 Kemp's ridleys, 7 green turtles, 2 hawksbills, and 5 shortnose sturgeon. These takes are not likely to jeopardize the continued existence of these species and the ongoing commitment by the COE to further minimize takes may reduce the likelihood of sea turtle takes in the future even if nearshore sea turtle abundances increase.

Conservation Recommendations

Pursuant to section 7(a)(1) of the ESA, conservation recommendations are made to assist COE in reducing or eliminating adverse impacts to loggerhead, green, and Kemp's ridley turtles that result from hopper dredging in the southeastern United States. The recommendations made in the 1995 BO are pertinent to this consultation as well, and therefore remain valid. Further recommendations are given below.

- Because of the possibility of annual variation in water temperatures, sea turtle abundance, and hopper dredging demand, NMFS has retained the dredging windows established in the 1995 BO. However, the COE has expressed a commitment to deploy hopper dredges during cold-water periods in channels with high sea turtle abundance or with substrates that render the deflector ineffective. NMFS appreciates the COE's commitment to do this, and recommends that the SAD priority list be finalized and distributed to the Districts and NMFS prior to the initiation of dredging during FY 1998.

- The COE should work with the dredging industry to insure their understanding of the importance of sea turtle conservation and to increase the industry's interest in minimizing sea turtle takes.

- Greater than 50% of the loggerheads taken in North Carolina may be from the northern nesting assemblage of loggerheads. While recent loggerhead nesting beach surveys did not identify a decline in the number of nesting females on beaches north of Cape Canaveral, increases observed in the south Florida nesting assemblage have not been noted. High sea turtle catch rates during only the early weeks of the wood debris clean-up conducted by COE off Cape Fear during 1997, as well as preliminary work conducted in North Carolina, suggest that turtles may be abundant in North Carolina channels primarily during migration into and emigration out of North Carolina inshore waters. The COE should work with the NMFS Beaufort Laboratory and the North Carolina Division of Marine Fisheries to document the movements of sea turtles off North Carolina during spring and fall months. Results from these studies may provide insights into further safe dredging windows to minimize the likelihood of takes of loggerheads from the more vulnerable northern nesting assemblage. Summer windows would reduce the pressure to complete all SAD hopper dredging during cold-water periods.

- The COE should investigate further modifications of the draghead to minimize the need for clean-up. Some method to level the peaks and valleys created by dredging would reduce the amount of time dragheads are removed from the bottom sediments.

Incidental Take Statement

Section 7(b)(4) of the Endangered Species Act (ESA) requires that when a proposed agency action is found to be consistent with section 7(a)(2) of the ESA, and the proposed action may incidentally take individuals of listed species, NMFS will issue a statement that specifies the impact of any incidental taking of endangered or threatened species. It also states that reasonable and prudent measures, and terms and conditions to implement the measures, be provided that are necessary to minimize such impacts. Only incidental taking resulting from the agency action, including incidental takings caused by activities approved by the agency, that are identified in this statement and that comply with the specified reasonable and prudent alternatives, and terms and conditions, are exempt from the takings prohibition of section 9(a), pursuant to section 7 of the ESA.

Based on the high rate of sea turtle takes observed during of 1997, increases in the Kemp's ridley population, possible increases in the benthic lifestages of loggerhead populations, annual variation in nearshore abundance of sea turtles and hopper dredge demands, the NMFS anticipates that hopper dredging in the Southeast U.S. Atlantic area of the SAD may result in the injury or mortality of sea turtles and shortnose sturgeon. Therefore, a low level of incidental take, and terms and conditions necessary to minimize and monitor takes, are established. The annual (by fiscal year) documented incidental take, by injury or mortality, of seven (7) Kemp's ridleys, seven (7) green turtles, two (2) hawksbills, thirty-five (35) loggerhead turtles, and five (5) shortnose sturgeon is set pursuant to section 7(b)(4) of the ESA.

To ensure that the specified levels of take are not exceeded early in any project, COE should reinitiate consultation for any project in which more than one turtle is taken within 24 hours, or once five or more turtles are taken. The Southeast Region, NMFS, will cooperate with COE in the review of such incidents to determine the need for developing further mitigation measures or to terminate the remaining dredging activity.

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 of 1972 (MMPA). Since no incidental take in the Atlantic Region has been authorized under section 101(a)(5) of the MMPA, no statement on incidental take of endangered right whales is provided.

The reasonable and prudent measures that the NMFS believes are necessary to minimize the impact of hopper dredging in channels and borrow areas in the southeastern United States have been discussed with COE. The following terms and conditions are established, in addition to those identified in the 1995 BO, to implement these measures and to document the incidental take should such take occur.

1. The COE's draghead deflector engineer that assistant in this design design should inspect the rigid draghead deflector annually to ensure that the deflector has been tailored appropriately to each draghead. Additionally, the inspector should assess whether the dredge operator appears to be familiar with the operation of the draghead deflector and provide necessary training where appropriate.

2. If the rigid draghead deflector appears to be ineffective in Wilmington Harbor and slows the dredging project such that the amount of time the hopper dredge will be deployed is increased, the deflector should be removed from the draghead for that channel.

3. The COE should develop an educational/training program for dredge operators to increase their understanding of how the draghead deflector works and why it is necessary.

Table 2a. Sea turtle takes (includes live, injured and killed) observed on hopper dredges prior to the regional consultation. Observers were not required on all projects until 1989, after which extensive monitoring was required.

Year	Project	Turtle Takes
1980 Total = 71	Canaveral	50 Cc, 3 Cm, 18 Unidentified
1981 Total = 6	Canaveral	3 Cc, 1 Cm, 2 Unidentified
1984/1985 Total = 12	Canaveral	1 Cc, 11 Unidentified
1986 Total = 9	Canaveral	5 Cc
	Kings Bay	1 Cc, 3 Cm
1987 Total = 5	Kings Bay	3 Cc, 1 Cm, 1 Unidentified
1988 Total = 46	Brunswick	1 Cc
	Canaveral	13 Cc, 3 Cm, 18 Unidentified
	Kings Bay	6 Cc, 3 Lk, 2 Cm
1989 Total = 21	Canaveral	9 Cm, 2 Unidentified
	Kings Bay	8 Cc, 1 Cm
	Savannah	1 Cc
1990 Total = 12	Canaveral	3 Cc, 5 Cm
	Kings Bay	4 Cc
1991 Total = 43	Brunswick	20 Cc, 1 Lk, 1 Unidentified
	Charleston	3 Cc
	Kings Bay	1 Cc
	Savannah	17 Cc

Cc = *Caretta caretta*, Loggerhead ; Cm = *Chelonia mydas*, Green turtle; Lk = *Lepidochelys kempi*, Kemp's ridley turtle

SOUTH ATLANTIC COAST HOPPER DREDGING (Calendar Year 97)

Project	Dredge Period	Approximate Amount of Work Completed	Turtle Takes	Mitigative Measures Taken	Remarks
Kings Bay	3/1/97 to 3/12/97	Removed 437,000 out of 821,000 CY Approximately 53% completed.	L 3/2/97 L 3/4/97 L 3/5/97 L 3/6/97 L 3/6/97 L 3/6/97 L 3/8/97 L 3/8/97 L 3/12/97	Sea turtle deflecting draghead used. Jacksonville Dist. specialist inspected deflector on 3/6/97. Relocation trawling started 3/9/97. Extensive, ongoing consultation with NMFS as takes occurred. All work terminated 3/12/97 due to high take levels even though relocation trawling had become operational.	Water temp. 57 to 58 F. Dredge Eagle 1. Two takes in one batch on 3/6/97 and 3/8/97. Contract required removal of relatively small veneer of material. Most takes occurred through starboard dragarm. Rapidity of takes was a surprise to all concerned.
Brunswick Harbor	2/6/97 to 3/19/97	Removed 975,400 CY. Work stopped at 50% completion.	L 3/9/97	Sea turtle deflecting draghead used. Sea turtle abundance, based on visual observations, prompted termination of work because of potential for unacceptable levels of entrainment.	Water temp 63 F. Dredge RN Weeks. Historic abundance of sea turtles and high levels of entrainment in 1991 was part of the reason for termination of work.
Savannah Harbor	3/4/97 to 3/22/97	Removed about 545,500 CY, or about 52% of what could have been dredged.	L 3/14/97 L 3/22/97 L 3/22/97	Sea turtle deflecting draghead used. Dredging terminated so as not to take any more sea turtles.	Water temp. 63 F. Numerous sea turtles sighted. Dredge Ouachita was 'skimming' high areas to bring depth to acceptable levels quickly before leaving for urgent work in Mississippi River.
Charleston Harbor	3/14/97 to 3/26/97	Bid qty 900,000 CY Req. qty 408,000 CY Removed qty 350,000 CY. About 39% completed.	L 3/19/97 L 3/20/97 L 3/21/97 L 3/25/97 L 3/26/97	WES expert / developer of sea turtle deflecting draghead system, conducted onboard inspection and made recommendations. Some changes to draghead and dredging operation made. Relocation trawling performed.	Water temp. 61 F. Dredge Eagle 1.
Myrtle Beach borrow area (Phase 1)	9/15/96 to 5/13/97	Bid qty 2.5 million CY. Work completed.	L 4/15/97 L 5/04/97 L 5/09/97	Sea turtle deflecting draghead used. Relative abundance trawling on 3/28-29/97, with 12 hours of "nets in water", yielded one loggerhead. Trawling on 5/8 thru 5/13/97 yielded no sea turtles.	This is one of 3 phases / reaches of total project. Part of work in all phases is by pipeline dredge. Total quantity of material to be dredged is about 6 million CY
Morehead City Harbor	4/25/97 to 5/16/97)	About 120,000 CY removed out of about 1,720,000 CY. About 7% of work completed.	L 4/27/97 L 4/30/97 L 5/01/97 L 5/02/97 L 5/15/97 L 5/15/97	Sea turtle deflecting draghead. Relocation trawling began 5/8/97 and continued until termination of dredging. One loggerhead captured on 5/9/97. Nighttime trawling performed 5/10 & 5/11 with no turtles captured. Because of concern over extensive takes, dredging terminated with only 7 % of work done.	Dredge Manhatten Island
Wilmington Harbor (Interior Channels)	2/14/97 to 3/13/97	About 217,300 CY removed. Work completed.	No takes		Dredge McFarland
MOTSU	3/14/97 to 4/3/97	About 60,000 CY. removed. Work completed.	No takes		Dredge McFarland
Wilmington Harbor (Ocean Bar)	4/3/97 to 4/30/97	About 300,000 CY Work completed.	L 4/07/97	Sea turtle deflecting draghead.	Dredge RN Weeks
Dade County Beach (Miami Reach)	3/30/97 7/20/97 (estimate)	About 380,00 of 475,000 CY completed as of 6/6/97.	No takes	Based on past dredging and anecdotal information about sea turtlesin area, takes are not anticipated.	

L = Loggerhead CY = Cubic Yards

TABLE 3: Current requirements for dredging windows, observer requirements and use of hopper dredges in borrow areas along the east coast established in the August 1995 BO.

AREA		SEA TURTLE MONITORING: NAVIGATION CHANNELS		SEA TURTLE MONITORING: BORROW AREAS	
	WHALE MONITORING	WINDOWS	MONITORING	WINDOWS	MONITORING
North Carolina to Pawleys Island, SC (includes channels at Oregon Inlet, Morehead City and Wilmington)	One observer (daytime coverage) between 1 Dec and 31 Mar. Monitoring by dredge operator and sea turtle observer between 1 Apr and 30 Nov.	Year Round	Two observers (100% monitoring) 1 Apr - 30 Nov	Year Round	One observer (50% monitoring) 1 Apr - 30 Nov
Pawleys Island, SC to Tybee Island, GA (includes channels at Charleston, Port Royal and Savannah)	One observer (daytime coverage) between 1 Dec and 31 Mar. Monitoring by dredge operator and sea turtle observer between 1 Apr and 30 Nov.	1 Nov - 31 May	Two observers (100% monitoring) 1 Nov - 30 Nov and 1 Apr - 31 May	Year Round	One observer (50% monitoring) 1 Apr - 30 Nov
Tybee Island, GA to Titusville, FL (includes channels at Brunswick, Kings Bay, Jacksonville, St. Augustine, and Ponce de Leon Inlet)	Aerial surveys in right whale critical habitat, 1 Dec thru 31 Mar. One observer (daytime coverage) between 1 Dec and 31 Mar.	1 Dec - 15 Apr	Two observers (100% monitoring) 1 Apr - 15 Apr	Year Round	One observer (50% monitoring) 1 Apr - 15 Dec
Titusville, FL to Key West, FL (includes channels at West Palm Beach, Miami and Key West)	Whale observations are not necessary beyond those conducted between monitoring of dredge spoil.	Year Round	Two observers (100% monitoring) year round	Year Round	One observer (50% monitoring) year round

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.

APPENDIX B

US Army Corps
of Engineers
Jacksonville
District

REGION 2

Site Management and Monitoring Plan for the San Juan Harbor Puerto Rico Dredged Material Disposal Site

January 6, 2011

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Jacksonville District
P.O. Box 4970
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REGION 2

To All Interested Parties:

Section 506 of the Water Resources and Development Act (WRDA) of 1992, which amended the Marine Protection, Research, and Sanctuaries Act of 1972 (MPRSA), requires the U.S. Environmental Protection Agency (EPA) and the U.S. Army Corps of Engineers (USACE) to prepare a Site Management and Monitoring Plan (SMMP) for all Ocean Disposal Sites.

Section 102 of MPRSA describes requirements for designated dredged material disposal sites, including the requirement of a schedule for review and revision of the SMMP ("which shall not be reviewed and revised less frequently than 10 years after adoption of the plan and every 10 years thereafter"). The SMMP for the San Juan Harbor, Puerto Rico Ocean Dredged Material Disposal Site (SJS) was finalized on January 5, 2000. On May 12, 2010, EPA Region 2 and USACE Jacksonville District issued a public notice for a 30-day public review of the draft revised SMMP. Comments were received from several Commonwealth of Puerto Rico and Federal agencies.

Based on the comments received on the draft SMMP, EPA Region 2 has prepared a Response to Comments, and has revised the SMMP accordingly. The SJS SMMP is hereby approved by the Region 2 Administrator, and will be in effect until the next required SMMP revision.

If you have any questions concerning the SJS SMMP or require a copy, please contact Mr. Mark Reiss (EPA Region 2) at (212) 637-3799/ Email: Reiss.Mark@epa.gov, or Mr. Ivan Acosta (USACE-Jacksonville District) at 904-232-1693/ Email: Ivan.Acosta@usace.army.mil

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Enclosures

REGION II FORM 1320-1 (9/85)

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List of Acronyms

COTP – Captain of the Port

DA – Department of the Army

DMI – Dredged Material Inspector, in this case approved by USACE-SAJ

EPA- U.S. Environmental Protection Agency

EPA-R2 – U.S. Environmental Protection Agency – Region 2

IA – Interagency Agreement

GPS – Global Positioning System

MP – Monitoring Plan

MPRSA – Marine Protection, Research, & Sanctuaries Act of 1972

NMFS – National Marine Fisheries Service

NOAA – National Oceanic and Atmospheric Administration

NODC – National Ocean Data Center

PCBs – Polychlorinated biphenyls

ODMDS – Ocean Dredged Material Disposal Site

SJH – San Juan Harbor

SJS – San Juan, Puerto Rico Ocean Dredged Material Disposal Site

SMMP – Site Management and Monitoring Plan

SPI – Sediment Profile Imaging

TOC – Total organic carbon

USACE – U.S. Army Corps of Engineers

USACE-SAJ – U.S. Army Corps of Engineers – South Atlantic Jacksonville

USCG – United States Coast Guard

USFWS – United States Fish & Wildlife Service

W/QAPP – Work/Quality Assurance Project Plan

WRDA – Water Resources and Development Act

1. Background

Section 506 of the Water Resources and Development Act (WRDA) of 1992, which amended the Marine Protection, Research, and Sanctuaries Act of 1972 (MPRSA), requires the U.S. Environmental Protection Agency (EPA) and the U.S. Army Corps of Engineers (USACE) to prepare a Site Management and Monitoring Plan (SMMP) for each ocean dredged material disposal site (ODMDS). For sites designated prior to January 1, 1995, such as the San Juan Harbor, Puerto Rico Dredged Material Disposal Site (SJS), WRDA provides that SMMPs shall be developed by January 1, 1997. Further permitting or authorization of projects for disposal at ocean sites not having SMMPs after that date were prohibited until an SMMP was prepared. The final SMMP for the SJS was adopted on January 5, 2000. MPRSA 102 (c)(3)(F) requires that the SMMP be reviewed and revised no less frequently than 10 years after adoption of the plan, and every 10 years thereafter.

This document revises the WRDA-required SMMP for the final-designated (40 CFR 228.15 (d)(11)) San Juan Harbor, Puerto Rico Dredged Material Site (SJS); prepared by EPA Region 2 (EPA-R2) and USACE Jacksonville District (USACE-SAJ). This SMMP identifies a number of actions, provisions, and practices to manage operational aspects of dredging and disposal activities and to perform site monitoring at the SJS.

1.1 History of the San Juan Harbor, Puerto Rico Dredged Material Disposal Site

Prior to 1974, all dredged material (except for Bar Channel material) taken from San Juan Harbor and its vicinity was placed in upland disposal areas. In 1974, these areas were exhausted and no new upland site could be obtained for dredged material disposal. Since 1975, all dredged material from San Juan Harbor has been disposed offshore.

The SJS was designated as an Interim Ocean Dredged Material Disposal Site in 1977 under MPRSA. In March 1988, the SJS was designated as a Final Ocean Dredged Material Disposal Site to receive materials from the San Juan Harbor area.

1.2 SJS Boundaries

The SJS is an approximately 1 square nautical mile area located approximately 2.2 nautical miles north-northwest of the entrance to San Juan Harbor positioned in a rectangle bounded by the following coordinates:

Degrees, Minutes, Seconds	**Degrees, Minutes (decimal)**
18° 30' 10" N 66° 09' 31" W	18° 30.17' N 66° 09.52' W
18° 30' 10" N 66° 08' 29" W	18° 30.17' N 66° 08.48' W
18° 31' 10" N 66° 08' 29" W	18° 31.17' N 66° 08.48' W
18° 31' 10" N 66° 09' 31" W	18° 31.17' N 66° 09.52' W

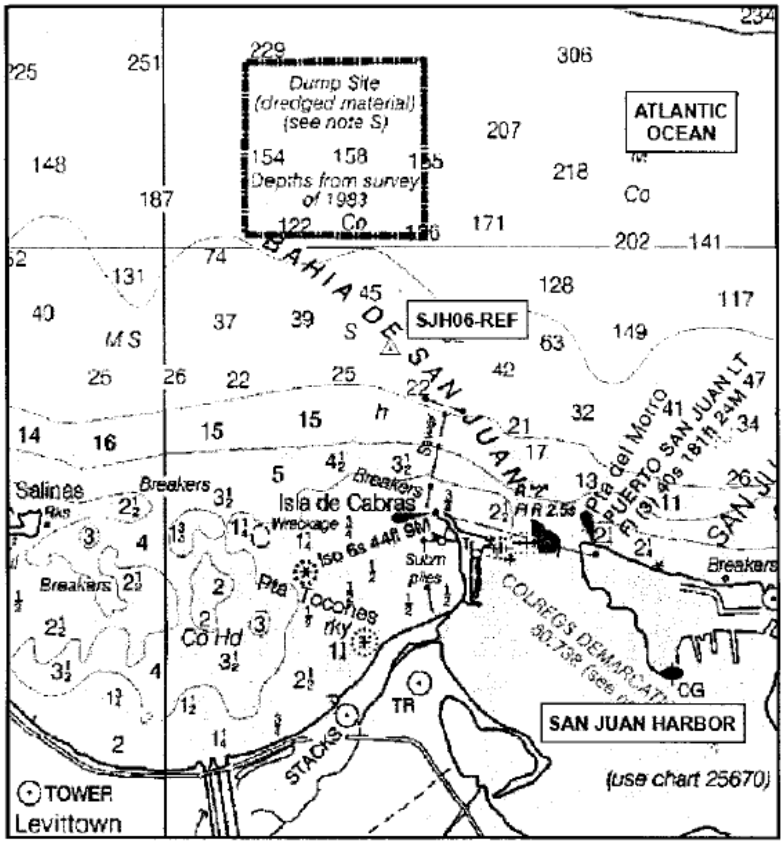

Figure 1. Location of San Juan Harbor, Puerto Rico Dredged Material Disposal Site.

1.3 Enforcement Activities at the SJS

Since the SJS was designated, no significant violations and/or enforcement actions have been taken (i.e. actions resulting in fines and/or criminal proceedings). However, both EPA-R2 and the USACE-SAJ have taken corrective actions to bring specific disposal projects into compliance with permit conditions.

EPA-R2 and the USACE-SAJ have used the experiences of these instances to modify the existing guidelines for disposal of dredged material at the SJS and to ensure that future dredged material disposal takes place in accordance/compliance with applicable permit or contract conditions.

1.4 Transportation and Disposal Methods Used at the SJS

Dredged material disposed at the SJS may be removed from project areas using hopper, clamshell, or other types of dredges. Dredged material has been placed at Puerto Rico ODMDS (San Juan and Ponce) primarily utilizing split-hull barges. Specific instructions/requirements are contained in the Department of the Army (DA) permits issued by the USACE-SAJ, listed as contract specifications in Federal dredging contracts, and provided to contractors in placement guidelines associated with each dredging project (see Section 10 of this SMMP).

2. Regulatory/Statutory Responsibilities Under MPRSA

USACE and EPA have been assigned various duties pertaining to ocean disposal site management under MPRSA. EPA and USACE share responsibility for MPRSA permitting and ocean disposal site designation and management, as briefly summarized below.

2.1 Section 102 of the MPRSA

Under Section 102, EPA designates recommended times and locations for material disposed at ocean sites (including dredged material) and develops the environmental criteria used in reviewing permit applications.

2.2 Section 103 of the MPRSA

Under Section 103, USACE is assigned regulatory responsibility for transportation and disposal of dredged material, subject to EPA review and concurrence that the material meets applicable ocean disposal criteria.

3. Dredged Material Testing Requirements

As part of the permitting process, applicants are required to test/characterize all dredged material proposed for disposal at SJS to determine if it meets the ocean disposal criteria (i.e., is suitable for ocean disposal). Dredged material testing procedures/requirements (including quality assurance requirements) are contained in the following documents:

-Ocean Dumping Regulations (40 CFR Part 227, "Criteria for the Evaluation of Permit Applications for Ocean Dumping of Materials")

-EPA/USACE 1991. "Evaluation of Dredged Material Proposed for Ocean Disposal, Testing Manual" as amended (otherwise known as the 'Green Book').

-EPA Region 2/USACE-NYD 1992 (or most recent revision). "Guidance for Performing Tests on Dredged Material proposed for Ocean Disposal" (otherwise known as the Regional Testing Manual).

EPA-R2 and USACE-SAJ will prepare a regional implementation manual that provides guidance specific to ocean disposal of dredged material at the SJS and other ocean sites in the Caribbean region. Until this guidance manual is prepared and approved, however, the EPA-R2 /USACE-NYD (1992) manual (or its most recent) revision will be used to evaluate the suitability of dredged material proposed for disposal at the SJS.

The suitability of dredged material for ocean disposal must be determined by the USACE-SAJ and concurred with by EPA-R2 in writing prior to each authorization. The determination of suitability will be valid for three years from the time of testing, unless it is determined that conditions at the dredging site may have changed significantly since that time (e.g., chemical spills). EPA-R2 may extend the authorization for an additional period without further testing if: 1) conditions at the dredging site are deemed to not have changed significantly since the time of testing (reduced levels of testing effort may, in fact, be required to confirm this); and 2) no unacceptable impacts have occurred or are expected at the dredging and disposal sites.

4. Past and Anticipated SJS Use and Quantity of Material Disposed

MPRSA 102 (c)(3)(D and E) requires that the SMMP include consideration of the quantity of material to be disposed of at the site, and the presence, nature, and bioavailability of contaminants in the material, as well as the anticipated use of the site over the long-term.

The following table reports volumes deposited by the USACE-SAJ for dredging and disposal at the SJS in FY00-FY10.

Completion Date	Type of Action	Volume (c.y.)	Composition
FY94	SJH Widening/Deepening	1,053,000	silty sand, fines
FY98	SJH Widening/Deepening	3,913,663	silty sand, fines
FY99	SJH Widening/Deepening	3,802,346	silty sand, fines
FY99-01	Rio Puerto Nuevo Flood Control Project Construction	1,500,000	sands, clays, fines
FY01	SJH Berthing Areas Maintenance	160,000	silt
FY06	SJH Maintenance	446,565	silty sand, fines

The following table reports volumes that are anticipated by the USACE-SAJ for dredging and disposal at the SJS in FY10-FY20.

Completion Date	Type of Action	Volume (c.y.)	Composition
FY10	Rio Puerto Nuevo Flood Control Project Construction	2,600,000	silty sand, fines
FY11	SJH Maintenance	420,000	silty sand, fines
FY11	SJH Berthing Maintenance	30,000	silt
FY15	SJH Maintenance	350,000	silty sand, fines
FY19	SJH Maintenance	350,000	silty sand, fines

The only source of material that is expected to be placed at the site during the projected period is dredged material resulting from maintenance of navigable depths in San Juan Harbor and dredged material resulting from construction and maintenance of the Rio Puerto Nuevo Flood Control Project. Materials will consist of variable percentages of silt, clay, and sand. There are no proposed limitations on the quantity of material that may be placed at the site.

5. Inter-Agency Coordination

5.1 Transfer of Information

EPA-R2 and the USACE-SAJ jointly manage the San Juan Harbor dredged material disposal program and the SJS. EPA-R2 and the USACE-SAJ will continue to coordinate the exchange of information, management and monitoring resources, and the documentation of site management decisions at SJS. EPA-R2 and USACE-SAJ will continue to provide each other with all pertinent data and information as it becomes available. Specifically, upon discovery/notification, any information concerning disposal/dredging violations will be shared between EPA-R2 and the USACE-SAJ.

This SMMP constitutes an official agreement between EPA-R2 and USACE-SAJ to continue to cooperatively manage and monitor the SJS and to coordinate the collection and transfer of information pertinent to the management and monitoring of the SJS as set forth herein.

5.2 Funding of SMMP Tasks and Activities

The costs of site management and monitoring will be shared between EPA-R2 and the USACE-SAJ to the extent allowed by funding levels in any given fiscal year (i.e., cost-sharing will be subject to appropriations).

Consistent with Section 102(c)(3) of the MPRSA, the SMMP developed by EPA-R2 in conjunction with the USACE-SAJ shall include a program for monitoring the site that includes the responsible agency(ies) for each monitoring activity. The SMMP and, as applicable, permit conditions will also specify when site users will be required to undertake monitoring activities associated with their projects in accordance with 40 CFR § 228.9. Each Agency will bear its own costs for activities it undertakes in furtherance of the responsibilities established in the SMMP except as provided for in duly executed Interagency Agreements (IAs) pursuant to the Economy Act or the cooperative authority of Section 203 of the MPRSA.

The USACE-SAJ will support the monitoring and management of Caribbean Ocean Dredged Material Disposal Sites. IAs between EPA-R2 and the USACE-SAJ are encouraged in order to pool resources to implement SMMP activities. When appropriate, the USACE-SAJ may provide funds to EPA-R2 via an IA for studies of prevailing current conditions, transport pathways, mapping of coral reef resources and assessments of baseline sediment conditions at or near Caribbean Ocean Dredge Material Disposal Sites, aboard the OSV BOLD (EPA's ocean monitoring vessel) or through contractual mechanisms. EPA-R2 has the highly specialized expertise and resources to conduct advanced technical work at the Caribbean Ocean Dredged Material Disposal Sites and to complement USACE-SAJ capabilities by providing support in specific areas of expertise in oceanography, marine ecology, and marine instrumentation that are required for work at the Caribbean Ocean Dredged Material Disposal Sites.

These IAs allow the Government to conduct work in the most reasonable and cost effective manner and to realize significant cost savings by using the OSV BOLD (EPA's ocean monitoring vessel) to support the lengthy surveys required for mapping resources and conducting sampling. EPA-R2 can also provide such specialized support as side scan SONAR and underwater videography via remote operating vehicle at no additional cost. EPA-R2 staff is uniquely capable to oversee the technical merits or limitations of any work products arising from any contractor providing individual site monitoring and management information services through contractual mechanisms.

5.3 Project specific coordination
Prior to issue of new permits for private dredging projects, Antilles Regulatory Section and EPA-R2 will discuss special conditions of the permit. As monitoring requirements and placement conditions change, the special conditions may also be changed to help ensure permit holders conduct dredged material disposal operations at the SJS as safely and efficiently as possible. Likewise, prior to Federal dredging projects, contract specifications are reviewed and updated as necessary to reflect changes in monitoring requirements and placement conditions.

6. Objectives of the SMMP
The objectives of this SMMP are to collect sufficient information to:

a. provide that no unacceptable environmental impacts occur from the disposal of dredged material at the SJS;

b. recognize and correct any potential unacceptable conditions before they cause any unacceptable impacts to the marine environment or present a navigational hazard to commercial waterborne vessel traffic;

c. determine/enforce compliance with MPRSA permit conditions;

d. provide a baseline assessment of conditions at the SJS;

e. outline a program for monitoring the SJS;

f. describe special management conditions/practices to be implemented at the SJS;

g. estimate the quantity of material to be disposed at the SJS, considering the presence, nature, and bioavailability of the contaminants in the dredged material;

h. specify the intended use and possible closure date, if necessary, of the SJS;

i. provide a schedule for review and revision of the SJS SMMP.

7. Site Description/Assessment of Baseline Conditions at SJS

MPRSA 102 (c)(3)(A) requires that the SMMP include a baseline assessment of conditions at the site. Baseline conditions measured by IE Corporation in 1980 were summarized in the Environmental Impact Statement prepared to support designation of the SJS (EPA, 1982). Additional baseline biological, geological and geochemical data was collected from the SJS in 1984 by JRB Associates (under contract to EPA). In November/December 1996 EPA-R2 collected sidescan sonar, sediment chemistry, and benthic community structure data in and around the SJS to augment the baseline assessment of conditions at the SJS. The data from the 1996 survey will be incorporated into the baseline assessment as it becomes available. Further efforts will be made to enhance our knowledge of baseline conditions during monitoring operations at the SJS.

7.1 Physical, Meteorological and Oceanographic Features of the SJS:

a. Water depths at the SJS average 292 m (965 ft). Bottom depths at the southern boundary are approximately 213 m (700 ft) and slope moderately to approximately 400 m (1,300 ft) at the northern boundary (EPA, 1982).

b. Easterly trade winds predominate at the SJS throughout the entire year, primarily from the ENE direction. Wind speeds in the area are moderate. The mean annual wind speed is 14.2 km/hr, but shows considerable daily and monthly variation. Maximum wind speeds occur in July (mean monthly velocity = 16.1 km/hr) and minimum wind speeds generally occur in October (11.3 km/hr). Infrequent tropical storms and hurricanes are sometimes severe, occur any time from August to October, and generally produce considerable rainfall (EPA, 1982).

c. Currents at the SJS are greatly influenced by the direction and strength of the trade winds. The trades blow primarily from the northeast, which in conjunction with the east-west alignment of the coastline results in a westerly, alongshore current. Surface currents show general westward drift (mean speed 0.6 knots) with a significant tidal component. Subsurface currents are not well defined, but appear to be weak. This fact is also evidenced by the relatively undisturbed depositional environment within the SJS and surrounding area.

d. Water column structure at the SJS is more or less uniform throughout the year. Salinity and temperature data reveal the existence of a well-mixed layer of surface water. The depth of this surface layer varies with season from less than 30 m (April - December) to deeper than 100 m (varies from 100 to 330 ft). The average annual temperature and salinity of this surface water range between 26-28 ^{o}C and 35.5 - 36.2 ppt. Below this surface layer, a permanent density gradient (pycnocline) extends to approximately 240 m.

e. Measurements of baseline dissolved oxygen, total suspended solids, and turbidity levels in the water column at the SJS were generally within ranges typically associated with unpolluted tropical conditions. Surface to bottom dissolved oxygen concentrations range from 5.4 to7.3 mg/l, decreasing with depth below the pycnocline. Total suspended solids concentrations measured at the SJS ranged from below detection limits to approximately 1.8 mg/l. Turbidity at the SJS ranged from 0.15 - 0.59 NTU. Suspended solids and turbidity tend to be high in surface waters due to phytoplankton production, increase to a localized maximum near the pycnocline and decrease significantly at depth.

7.2 Sediment Composition/Chemistry and Benthos at the SJS

a. Sedimentary Composition: Bottom sediments at the SJS are predominantly fine-grained (i.e. silts and clays) with localized sand and gravel areas. Samples of bottom sediments taken from the site the SJS average 48% silt and 45% clay. Side-scan sonar imaging conducted in 1996 revealed debris and active venting of biogenic gases over limited portions of the site.

b. Sediment Chemistry: As described above, sediments at the SJS are predominately fine-grained. The total organic carbon content (TOC) of SJS sediments ranges from 0.5% to 2.3%. Sediment samples collected in 1984 from within and outside the boundaries of the SJS were analyzed for concentrations of trace metals, hydrocarbons and chlorinated organic contaminants (i.e. PCBs and selected pesticides). Analysis of sediment samples for hydrocarbons and chlorinated organics, from a station at the center of the SJS, indicated the presence of variable levels of well-weathered petroleum and biogenic hydrocarbons. Low levels of PCBs were also detected. Pesticides were not detected in the samples. All sediment samples were analyzed for trace metal levels; the results are reported in Table 1. Concentrations of certain metals (chromium, copper, iron, nickel, and zinc) were found to be somewhat elevated at 2 stations within the SJS. However, trace metal concentrations at the remaining survey stations were not particularly high and within expected ranges for areas receiving some degree of anthropogenic input. Metals levels did not differ significantly between stations taken inside and outside of SJS boundaries.

Table 1. Concentrations of selected contaminants in sediment sampled at SJS (JRB, 1984).

Parameter (# of stations, observations)	**Unit**	**Concentration, dry wt.**
Total PCBs	ng/g (ppb)	<87-1580 (Aroclor 1260)
Arsenic (18 stns; 38 obs.)	μg/g (ppm)	ND - 84.7
Cadmium (18 stns; 38 obs.)	μg/g (ppm)	0.04 - 1.32
Chromium (18 stns; 38 obs.)	μg/g (ppm)	5.6 - 95.8
Copper (18 stns; 38 obs.)	μg/g (ppm)	2.3 - 122
Mercury (18 stns; 38 obs.)	μg/g (ppm)	0.008 - 1.34
Nickel (18 stns; 38 obs.)	μg/g (ppm)	2.1 - 48.1
Lead (18 stns; 38 obs.)	μg/g (ppm)	0.4 - 129.6
Zinc (18 stns; 38 obs.)	μg/g (ppm)	3.0 - 331

c. Benthic Biota: Benthic samples taken from the vicinity of the SJS yield low but highly variable numbers of taxa and individuals. The benthic community is characteristic of fine-grained bottoms, i.e. the community was dominated by deposit-feeding organisms. Numerically dominant taxa in the study area include polychaetes (197 taxa), crustaceans (97 taxa) and molluscs (60 taxa, primarily gastropods (snails) and pelecypods (bivalves)), echinoderms (19 taxa), and 25 minor taxa (primarily sipunculids, but also including phoronids, pogonophorans and cephalochordates). Significant differences in community composition between areas within and outside the SJS have not been detected and the diversity and abundance of organisms are positively correlated with increasing heterogeneity of the bottom sediment.

7.3 Usage of SJS by Fish, Marine Mammals and Endangered Species

a. Marine mammals and sensitive species: The SJS does not encompass any known breeding, feeding, or nursery areas of marine mammals, sea turtles or birds. Waters off San Juan are regularly visited during the winter months (January-mid-March) by migrating Humpback whales (*Megaptera novaeangliae*). Humpbacks do not feed while in tropical waters, but are often seen spy hopping and engaging in other social display behaviors. Newborn calves may accompany female whales, since both Silver Bank (off N. coast of Hispaniola) and Mona Island (W. of Puerto Rico) are known calving grounds for this species. Whales can pass within less than 1 mile of shore, but are also observed further offshore. Dolphins are common residents and may be present in waters of the SJS at any time. West Indian manatees have been sighted in shallower coastal waters of Puerto Rico.

Four species of sea turtles are also known to inhabit Puerto Rican waters. Juvenile green and hawksbill turtles may be found off the northern shore of Puerto Rico, associated with rafts of *Sargassum*. Waters of the SJS are too deep to provide foraging habitat for adults of green, hawksbill or loggerhead turtles. Leatherback marine turtles approach the north shore of Puerto Rico during their nesting season (March-June) and may be present in offshore waters during this time, but basically spend the rest of their adult lives in the temperate zone. The endangered brown pelican is resident to Puerto Rico, but is primarily present inshore.

b. Fish: Open waters of SJS may be feeding grounds for pelagic fish (e.g. tuna, jacks, mackerel) and deeper site waters may be feeding areas for various snappers and other species, but the SJS is not a critical area in this regard. Deep waters of the site may be inhabited by various species having wide depth ranges (e.g. elasmobranchs, conger eels, batfishes) as well as slope species (e.g. grenadiers).

A modest, but significant, commercial pot fishery operates out of San Juan. This fishery, however, is restricted to shallower, inshore shelf waters. Mackerel, sardine, snook and snappers constitute the bulk of landings in this fishery. A hand line fishery targeting snappers also operates out of San Juan; this fishery operates primarily in shallower water but extends to depths of approximately 600 ft. In addition, there are numerous private recreational and deep sea charter fishing operations centered at San Juan. Effort is generally directed at billfish, tuna, and other pelagics in this fishery.

c. Endangered and threatened corals: There are two species of corals in Puerto Rican waters listed by NOAA-NMFS under the Endangered Species Act (ESA) as threatened (*Acropora palmata* and *A. cervicornis*). Acropora spp.are important reef building corals, typically occurring in high energy, shallow water areas. NOAA identified critical habitat for Acropora spp. as areas having consolidated hardbottom substrates devoid of macroalgae and sediment cover in depths between the Mean High Water line and 30 meters. The SJS is located in waters substantially deeper and far removed from areas meeting this depth criterion. Critical habitat areas may however be located along the transport routes typically used by barges to travel to and from the SJS.

NOAA also identifies a species of deep water coral (Oculina spp.) as a species of concern in Puerto Rico. The presence of this species however has not been confirmed on the northern coast of Puerto Rico in the vicinity of the SJS. In addition, NOAA-NMFS is proposing to list additional species of coral as threatened under the ESA. Many of these species occur as part of coastal or shelf edge reef habitats (i.e., depths <61 m). The SJS is located in waters substantially deeper and far removed from areas meeting this depth criterion. (see Shelf Edge Reef Resources (section 7.4)

7.4. <u>Shelf Edge Reef Resources</u>

Reef resources on the Puerto Rican shelf and along the shelf edge have been identified by the National Oceanic and Atmospheric Administration (NOAA) as essential fish habitat. NOAA has indicated that these areas are generally restricted to areas shallower than 200 feet (61 m). Side scan SONAR and remotely operated video mapping showed that coral growth is limited along the coastline east of San Juan Harbor within this depth range. Sidescan SONAR and video mapping of areas that are potentially affected by transport and disposal of dredged material at SJS will be implemented as early monitoring efforts in implementation of this revised SMMP, before determining any further monitoring or management requirements at the site for protecting shelf edge reef resources.

8. SJS Monitoring Program

MPRSA 102 (c)(3)(B) requires that the SMMP for a given dredged material ocean disposal site include a program for monitoring the site.

EPA-R2/USACE-SAJ have developed a tiered monitoring approach to investigate the physical, biological, and chemical impacts of ocean disposal of dredged material at sites in the Caribbean. EPA-R2/USACE-SAJ's Ocean Disposal Site Monitoring Program (MP) addresses both regulatory and technical issues associated with the disposal of dredged material at the SJS. The tiered approach described herein is comprised of levels of increasing investigative intensity designed to generate the technical information necessary to properly manage the disposal site in an environmentally sound and cost-effective manner.

Monitoring effort under the SJS MP is dependent upon volume and frequency of disposal. In general, if no disposal occurs, then no monitoring will be required. Inversely, in a period during which there is disposal activity, monitoring would be conducted proportionate to volume of disposal, as necessary. Specific monitoring activities may also be required for individual projects.

8.1 Goals of the SJS MP

The SJS MP will focus on the overall impacts of dredged material on the entire SJS and surrounding area. In addition to addressing the Null Hypotheses (H_o) (see Section 8.2), the overall goals of the SJS SMMP are to:

a. verify that dredged material disposed at the SJS does not cause any unacceptable impacts.

b. assess and monitor (trends) conditions at the SJS as defined in 40 CFR Section 228.10, and compare them to baseline data.

8.2 Questions/Null Hypotheses (H_o) to be addressed by the SJS MP:

The SJS MP will focus specifically on verifying the following four null hypotheses (H_o) for individual projects and/or disposal locations:

H_o1: Dredged material disposal operations are consistent with the requirements of the ocean dumping permits.

Actions:

-Use the USACE-approved disposal inspector (ship rider) reports and information submitted by permittees to determine compliance.

-Require GPS-based automated disposal surveillance systems on all disposal scows at the SJS.

-Conduct independent surveillance of disposal operations

H_o2: Dredged material disposal operations are not causing unacceptable impacts (physical, chemical, and biological) at the SJS and surrounding area.

Actions:

-Conduct sediment profile imagery surveys (Tier 2) at the SJS and surrounding area.

-Conduct benthic community structure, sediment chemistry and body burden analyses within the SJS when deemed necessary based on results of Tier 2 physical and biological efforts

$H_0$3: Dredged material disposal has no significant impact on endangered species.

Actions:
-Review USACE-approved disposal inspector (ship rider) reports to ensure that no dredged material disposal occurs in the presence of any marine mammals/endangered turtles.
- Monitor marine mammals/sea turtle sightings, landings (bycatch), and strandings in the San Juan vicinity.

$H_0$4: Dredged material disposal does not significantly alter the benthic community structure of the area of the SJS.

Actions:
- Use sediment profile imaging (SPI) photography to assess sediment and benthos distribution.
-Conduct Tier 3 benthic community structure monitoring in and around the site

9. Monitoring Activities/Techniques

9.1 Work/Quality Assurance Project Plan

The SJS MP consists of a three-tiered approach to monitor the physical, chemical and biological effects of dredged material disposed at the SJS, the components of these tiers are outlined below in Sections 9.2 to 9.4. Information from these monitoring activities will be extremely important for determining the potential for unacceptable impacts to occur due to disposal of dredged material at the SJS. For this reason, the data obtained in these surveys must be of high quality. All monitoring work conducted in accordance with this SMMP must conform to a work/quality assurance project plan (W/QAPP) that has been reviewed and approved by USACE-SAJ and EPA-R2.

Monitoring and sampling will occur using a design that allows quantitative analysis of results; the sampling area may include all or part of the SJS, the surroundings and a reference area geographically removed from the effect of dredged material disposal at the SJS. W/QAPPs must reflect the design selected by the Agencies for the monitoring tasks.

9.2 Physical Monitoring

Physical monitoring is designed to determine the physical nature and distribution of dredged material during and after disposal at the SJS and environs. Measurements of the physical nature of the material proposed for disposal at the SJS will allow first order tracking of physical impacts at the site and support modeling of initial mixing and seafloor deposition following disposal. Sediment profile imaging (SPI) will be used to confirm the fate of the material following disposal. SPI technology consists of a frame-mounted apparatus that enables a camera to take a picture of the sediment-water interface. Useful information can be obtained from the pictures to produce fine scale description of the spread of material on the bottom and its effect on the environment. Under certain circumstances, the collection and analysis of sediment samples may be required to fully assess the final disposition of dredged material discharged at the SJS.

a. Tier 1: Dredged Material Testing/Modeling of Disposal Events/Disposal Inspection
Grain size distribution, percent moisture, Atterberg limits, and total organic content of proposed materials will be measured for all dredged materials proposed for disposal at the site. This data is acquired in support of the evaluation of dredged material proposed for ocean disposal, as required by the 1991 Green Book and the regional implementation manual governing disposal at the SJS.

Disposals will be modeled using available computer models (e.g., STFATE) to estimate the footprint and plume anticipated from a proposed project prior to commencement of disposal at the site. Results will be used to determine disposal locations at the SJS.

GPS-based automated disposal surveillance technology will be used to ascertain that loading and disposal of dredged material is occurring at authorized locations, that material is not being lost en route to the site, and that material has been discharged within the site boundaries. This technology simultaneously records the draft and position of the vessel to which it is attached. USACE-approved disposal inspectors (ship riders) will accompany all scows and hopper dredges disposing at the SJS.

Frequency: Testing and modeling conducted prior to each initial MPRSA concurrence. GPS-based automated disposal surveillance to be conducted with each scow load of material transported for disposal at SJS.

b. Tier 2: Sediment profile imagery (SPI)
Sediment profile imagery (SPI) cameras will be deployed at an array of stations extending radially outward from the center of the SJS to define the footprint of dredged material within and around the site. Sampling locations will be determined jointly by EPA-R2 and USACE-SAJ prior to the surveys. Because SPI has not yet been conducted at the site, the optimal length and spacing of radial transects will be determined from the first survey. From these images, grain size, sediment color and roughness can be determined and used to identify and map dredged material on the bottom. (Images obtained using SPI will also be used in Tier 2 biological evaluation of the site.)

Frequency: SPI records will be collected approximately every 5 years when the site has been active. USACE-SAJ and EPA-R2 will generally conduct these investigations, however the agencies may require surveys to be conducted by permittees (or by the USACE-SAJ), following disposal of large volume projects.

Note: The results of SPI will be used to adjust the Tier 1 model and/or disposal operations, as necessary

c. Tier 3: Sediment sampling and analysis
In cases where additional information is required to refine the final disposition of discharged dredged materials, it may be required to actually collect sediment samples from within the SJS and its vicinity for analysis. Box core sediment samples will be collected from areas of interest inside and/or outside the site. Grain size distribution, percent moisture and total organic content of sediment samples will be analyzed. Tier 3 physical monitoring may be conducted alone or in conjunction with Tier 2/3 chemical (bulk sediment chemistry/body burden analyses) or Tier 3 biological efforts (benthic community analyses). Samples of the sediment will be collected using appropriate methods to allow for Tier 2 chemical analysis (bulk sediment chemistry). Organisms screened from the sediment will be preserved and archived in a manner that allows Tier 3 biological (benthic community analysis) and/or chemical analyses (body burden analysis).

Frequency: The need for and the areal extent of Tier 3 physical monitoring efforts will be determined by Tier 2 physical and biological evaluations (i.e., SPI). In addition, Tier 2 monitoring may require confirmation/validation using box core samples.

Note: Sediment samples can also be used to assist in the interpretation of SPI imagery through examination of features present in the sample

d. Special Studies (Physical)

In the event that high resolution of site bathymetry is required, a survey using mid-water multibeam sounding equipment would be conducted at the site. This type of technology is required for obtaining bathymetry at the SJS because of the great depth of the water. However, owing to the high cost of this type of surveying and the expectation that accretion of deposited sediments will not result in seafloor features (this expectation is based on the results of monitoring of a deepwater dredged material ocean disposal site off San Francisco, CA) it is envisioned that bathymetric surveys of the SJS will not be conducted on a regular basis.

In the event that areas that warrant additional concern are identified in the vicinity of the site, arrays of sediment traps may be deployed along the margins of the site and in the direction of dredged material transport. Sediment traps can determine if significant quantities of dredged material are being transported off the site in the direction of the resource of concern. (The traps would have to be deployed for approximately six months of active disposal and would be compared to sedimentation rates at a reference site, i.e. an area that is within the area of influence of hydrographic regimes affecting the SJS but that is unaffected by dredged material disposal). It is not envisioned that sediment traps will need to be deployed on a regular basis.

Additional studies and technologies may be used as required to address specific data needs but are not intended for application on a routine basis. Examples include sub-bottom profiling and side-scan sonar technologies.

Frequency: As needed

9.3 Biological Monitoring
The review of 96-h exposures of sensitive marine organisms to the suspended and liquid phases, and 10-d exposures to the solid phase of dredged material, prior to approval for disposal at SJS, provides assurances that no acute toxicity is expected to result from disposal of dredged materials at the SJS. Determination of long term trends in the benthic community, however will require SPI photography or collection and analysis of benthic samples. SPI photography provides useful information on the abundances, taxa, and successional stage of communities present at a given location without the expense of sampling. Under certain circumstances, actual sampling and analysis of benthic communities in and around the SJS may be required.

Tier 1: Review of Testing Results/Monitoring for Sensitive and Fisheries Species Impacts
a. Toxicity of all project material proposed for ocean disposal will be assessed using sensitive marine organisms and the procedures outlined in the 1991 Green Book and the regional implementation manual governing disposal at the SJS. The results of toxicity tests will be used in conjunction with the STFATE mixing model to ensure that disposal of the project material does not result in violations of the initial mixing requirements following disposal at the SJS. By prohibiting materials that show acute toxicity in 10-d tests from disposal at the SJS, the first level of assurance that adverse impacts to the benthos or to other marine organisms are not occurring due to the disposal of dredged material is gained. The results of bulk sediment and bioaccumulation tests will be used by USACE-SAJ and EPA-R2 to identify and track impacted zones and direct biological sampling efforts at the higher monitoring tiers. Impacts to sensitive species (e.g. marine mammals, sea turtles, brown pelicans) will be avoided or minimized through the use of on board observers; disposal will not be allowed to occur in the presence of identified sensitive species. Fisheries issues are re-evaluated for the SJS during each permit/authorization process. (Impacts to fisheries due to disposal operations are <u>not</u> anticipated, however in the event that issues regarding fisheries are raised to the USACE-SAJ and/or EPA-R2, the agencies will consult with resource authorities at NMFS, USFWS and the Commonwealth of Puerto Rico to review the issues in the context of dredged material disposal at the SJS.)

<u>Frequency</u>: Testing and Essential Fish Habitat consultations will be conducted prior to each initial project 103 concurrence. On board disposal inspectors will accompany each load of material transported for disposal at SJS.

b. Tier 2: Sediment profile imagery (SPI)
SPI cameras will be used to identify and describe colonization and succession status of communities inside and outside site (SPI also serves as Tier 2 physical monitoring). If, based on comparisons with a reference site, areas outside the site appear to be biologically impacted by disposal activities then the areal extent of impact will be considered in the decision to pursue higher tier testing involving box core sampling (Tier 2 Chemical, Tier 3 Physical/ Chemical/ Biological) and may result in conditions placed on permits or contract specifications.

<u>Frequency</u>: SPI records will be collected approximately every 5 years when the site has been active or if modeling predicts exceedance of site boundary. USACE-SAJ and EPA-R2 will

generally conduct these investigations, however the agencies may require surveys to be conducted by permittees (or by the USACE-SAJ), following disposal of large volume projects.

c. Tier 3: Benthic sampling and analysis
Tier 3 biological monitoring entails counting and identifying benthic organisms collected with box cores to define the status and health of the benthic community (e.g. species identification, diversity, biomass, trophic status, successional stage). Identification of organisms will be to lowest practicable taxonomic unit. Sampling of benthos will occur in a stratified, random design to allow quantitative analysis of results; the sampling area may include all or part of the SJS the surroundings and a reference area geographically removed from the effect of dredged material disposal at SJS.

Frequency: Impacts within the site are expected due to the disturbances caused by disposal events. Impacts outside the site, or an absence of progress in the succession or in colonization of the site for extended periods of time after cessation of disposal, may be cause for concern and therefore prompt more definitive study in higher tiers of investigation (i.e. Tier 3 biological, Tiers 2/3 chemical). These indications would be detected using SPI in Tier 2.

Note: Tier 3 biological monitoring results will also be used to assist in the future interpretation of features present in SPI imagery

d. Special Studies (Biological)
In the event that concerns regarding local populations of fish or other species (e.g. crustacean macrofauna or sensitive species) are identified, standardized quantitative surveys and/or body burden surveys may be required. These surveys would use appropriate gear for capturing the target species (e.g. benthic sleds or trawls) and again use a reference area for comparisons.

Frequency: As needed

9.4 Chemical Monitoring
Chemical analyses of sediments and tissues of organisms exposed to the material proposed for ocean disposal enables USACE-SAJ and EPA-R2 to assess the presence, nature and bioavailability of contaminants in dredged material prior to authorizing disposal at the SJS. Periodic collection and analysis of sediment and resident organism tissue samples from the SJS and its environs will provide USACE-SAJ and EPA-R2 with information necessary to confirm that no unacceptable effects are occurring and to identify long term trends in and around the SJS.

a. Tier 1: Review of ocean disposal testing results
Bulk sediment chemistry (and a measure of its bioavailability through biological tests) of proposed dredged material will be determined using the procedures outlined in the 1991 Green Book and the regional implementation manual governing disposal at the SJS prior to commencement of any disposal of the material at the site.

GPS-based technology will be used to ascertain that loading and disposal of dredged material is occurring at the authorized locations and that material is not being lost en route to the site. Visual inspectors will also be deployed.

Frequency: Conducted with every project.

b. Tier 2: Bulk sediment chemical analysis
Bulk sediment chemistry will be conducted on surface samples collected from the SJS and its environs. This data will be used to help determine the areal extent and distribution of dredged material and specific contaminants. Depending on site management data needs, the list of contaminants for a given effort may include all contaminants of concern or a few contaminants selected for their usefulness as tracers of dredged material or for their ecological significance. All sediment samples collected for bulk chemistry analysis will also be analyzed for grain size and total organic carbon content (Tier 3 Physical Monitoring). Modeling of the theoretical bioaccumulation potential of non-polar organic contaminants will be used to estimate bioavailability and to determine whether there is a potential for bioaccumulation of these contaminants to unacceptable levels and need for body burden analyses.

Frequency: The need for Tier 2 chemical monitoring will be determined from the results of SPI conducted under Tier 2 biological and physical monitoring. Possible triggers include observations that dredged material appears to have spread significantly outside the site or if SPI imagery suggests that colonization/succession is not occurring at rates comparable to reference sites. It is anticipated that these analyses will be conducted on the order of every 10 years.

c. Tier 3: Analysis of body burdens of contaminants in benthic organisms
Conduct tissue chemical analysis of organisms from box core samples collected during Tier 3 Physical/Biological Monitoring. The species selected for body burden analyses will reflect their abundances in collected samples. The substrate in which collected organisms were residing will also be sampled and analyzed [Tier 2 chemical analyses (bulk sediment chemistry) and Tier 3 physical analyses (grain size/TOC/percent moisture)] and tissue lipid levels will be analyzed, to the maximum extent practicable. Ideally, Tier 3 chemical monitoring will also be conducted synoptically with an evaluation of the health of the benthic community (Tier 3, biological monitoring).

Frequency: Tier 3 chemical evaluation will be conducted if TBP modeling using Tier 2 (bulk sediment) chemistry results suggests that there is the potential for unacceptable bioaccumulation of contaminants from the dredged material or if sediment levels exceed reference concentrations by an order of magnitude.

Note: The results of Tier 3 analysis will be used (in conjunction with Tier 2 chemical (bulk sediment chemistry) and Tier 3 physical results (TOC)) to refine the inputs used in future TBP modeling

9.5 Frequency of Monitoring/Need for Higher Tier Investigations

Monitoring at Tier 1 will be conducted prior to disposal of each authorized project. An anticipated schedule for monitoring is listed in Table 2, however if results indicate the need for further investigations, any required monitoring (Tiers 2 and 3) would be initiated. Specific circumstances that "trigger" advancing to higher tiers of monitoring will be decided by EPA-R2 and the USACE-SAJ, in consultation with the Commonwealth of Puerto Rico and other stakeholders. Existing monitoring data, anticipated or proposed disposals (including the type and quantity of anticipated material), and other relevant factors will be considered to determine appropriate monitoring and management preferences. The actual frequencies and schedules for all jointly funded monitoring will be by mutual agreement of USACE-SAJ and EPA-R2.

9.6 Monitoring Data Management: Processing, Evaluation and Interpretation

a. Data collected from SJS surveys are to be processed and analyzed by (or as specified by) the USACE-SAJ and EPA-R2 (or their respective contractors). These data are used to make management decisions regarding dredged material disposal operations and permit decisions and must therefore be of reliable quality and in a consistent format.

b. EPA-R2 requires data to be in the National Ocean Data Center (NODC) format, where appropriate. Survey data will be summarized in a report generated by the action agency. The report will indicate how the survey related to the SMMP and to previous SJS surveys. Reports should be provided within 90 days after completion. Exception to the time limit will be possible if outside contracts stipulate a longer period of time. The report will provide data interpretations, conclusions, and recommendations relative to needs and goals of the SMMP.

Data collected will be made available to Federal and Commonwealth agencies and other stakeholders, as appropriate. Reports summarizing data will also be made available.

Table 2: SJS Monitoring Activities and Frequencies

Tier 1 monitoring activities will be conducted with each authorized project, as noted in text

Tier 2 - Monitoring Activity	Anticipated Frequency[a]	Triggered by...	Responsible Entity
Physical- SPI photography	5 Yrs	Usage	USACE-SAJ/EPA-R2, or permittee
Biological- SPI photography	5 Yrs	Usage	USACE-SAJ/EPA-R2
Chemical- SJS Sediments	10 Yrs	Tier 2 Physical and Biological	USACE-SAJ/EPA-R2

Tier 3 - Monitoring Activity	Anticipated Frequency[a]	Triggered by...	Responsible Entity
Physical-Sediment Analyses	10 Yrs	Volume, Usage	USACE-SAJ/EPA-R2
Chemical- Benthic Tissue	as needed	Tier 2 Chemical and Biological	USACE-SAJ/EPA-R2
Biological- Community Analysis	as needed	Tier 2 Chemical and Biological	USACE-SAJ/EPA-R2

Special Studies will be performed when deemed necessary to confirm that unacceptable effects are not occurring or to address any identified deficiencies in comprehension of baseline.

[a] Listed years are presented as targets for the anticipated frequency of conducting this monitoring tier. Targets are not intended to be binding and are dependent on site use history.

10. SJS Disposal Permit Conditions/Enforcement

MPRSA 102 (c)(3)(C) requires that the SMMP include special management conditions or practices to be implemented at the site that are necessary for the protection of the environment.

Within approximately ten days prior to the start of dredging of SJS-suitable material, a pre-construction meeting is held with dredging contractor representatives, permittees, and, members of the USACE-SAJ Regulatory Branch personnel for projects, or with USACE dredging contractor and Construction/Operations Division personnel for Federal construction and/or maintenance dredging projects. Permit requirements and placement conditions are discussed to ensure that everyone is familiar with SMMP requirements prior to the start of SJS-material dredging.

10.1 Regulatory Framework: Permit Conditions

Department of the Army (DA) permits will be issued for SJS disposal activities involving non-Corps projects, and typically are valid for a period of three years. Copies of the issued permits or the letters modifying these permits are maintained and made available upon request by the USACE-SAJ, which issues the documents. Placement of dredged material cannot occur at the SJS without a permit (or MPRSA Section 103 (e) equivalent, e.g. Federal projects authorized by Congress).

a) *General Conditions*: General permit restrictions reflecting standard maritime industry and U.S. Coast Guard requirements so that a waterborne/sea-going activity can be carried out within the minimum or basic guidelines set, primarily for safety reasons, by the regulating authority. In most, if not all, cases the U.S. Coast Guard is that authority.

b) *Special/Specific Conditions:* Special and/or specific permit restrictions will be listed in the text of the permit and will include, but not necessarily be limited to:

1. Seasonal restrictions or special conditions regarding dredging and disposal (assigned on a case by case basis). At present, no disposal restrictions related to seasonal variations in ocean current or biotic activity have been determined to be necessary for SJS disposal. Should any such restrictions appear necessary as monitoring results are compiled, they will be incorporated into future ocean disposal authorizations. Additionally, if new information indicates that endangered, or threatened, species are being adversely impacted, restrictions will be implemented.

2. Requirements for the submission of transportation and placement logs. USACE-SAJ approved Dredged Material Inspectors (DMIs) are required to document each placement trip on the **Transportation and Placement Log Form** (Appendix A) and notify the USACE-SAJ. The permittee shall hire a DMI independent of the dredge contractor.

3. Reporting requirements for un-anticipated events and discrepancies.

4. Guidance pertaining to aspects of the disposal activity; including boundary coordinates, release/discharge procedures, and requirements to discharge within specific areas. The guidance within the permit is also supplemented by the Guidelines provided in Appendix B of this document

10.2 Federal Authorization

In cases where permits are not issued, as is the case with Federal Navigation Projects, the above permit conditions will be incorporated into dredging contract specifications (see MPRSA Section 103 (e)). When USACE vessels, or their contractors, conduct the dredging, they will comply with the same requirements, monitoring, and safeguards that are included in permits issued to third party contractors. Permit-like instructions specifying all requirements are to be contained within the work specifications/orders for the project. These conditions are equivalent to permit conditions and will be enforceable on the contractor under applicable law.

10.3 Violation/Enforcement Cases

a. Disposal at the SJS is to occur only with prior USACE-SAJ approval and EPA-R2 concurrence. Projects not in compliance with the DA permit will be subject to enforcement action.

b. A USACE-SAJ approved Dredged Material Inspector (DMI) must accompany all trips for placement of dredged material at the SJS and be present during all dredged material discharge events in order to certify compliance with the USACE-SAJ permit conditions. The DMI must report independently to the applicant (not to the dredging contractor). The DMI is required to complete, sign, submit and maintain within the official record a Transportation and Placement Log Form (Appendix A) for each event.

c. The DMI must also complete, sign and submit an Inspector Checklist of requirements associated with each placement trip (Appendix C). The three sections of the Inspector Checklist are completed by the DMI during three phases of transportation and discharge. Many checklist items relate to the dredging site. Ensuring that all required equipment and procedures are followed prior to departure from the dredging site helps ensure safe and accurate discharge of dredged material at the SJS. Any item on the checklist that receives a "NO" answer, meaning that a required procedure has not been followed, or required equipment is not present or operable, requires an immediate telephone call to USACE-SAJ for follow-up action.

d. If any action takes place which does not conform to authorized activities described in any permit (Contract Specification and/or Work Order for Federal Projects), reauthorization, response letter, or other communicated requirements/restrictions, the USACE-SAJ should be notified immediately by the DMI. In cases where activities beyond the scope of those authorized occur, appropriate action will be determined by consultation between EPA-R2 and the USACE-SAJ.

10.4 Site Inspection/Surveillance

a. To ensure compliance with the DA permit conditions and Federal authorization, routine observations of dredging activities in the San Juan Harbor area are performed by the USACE-SAJ.

b. USACE-SAJ and EPA-R2 (and/or their designated representatives), reserve all rights under applicable law to free and unlimited access to and/or inspection of:

> -the dredging project site (including the dredge plant, towing vessel and scow) at any time during the project;
>
> -any equipment used for towing, surveying, monitoring or navigation;
>
> -any and all records pertaining to specific (Federal or non-Federal) dredging and disposal projects including logs, reports, memoranda, notes, etc.

c. For all disposal activities, the dredging contractor will be required to prepare and operate under an approved electronic verification plan for all disposal operations. As part of this plan, the contractor will provide an automated system that is operated by an independent (3rd party) contractor to continuously track the horizontal location and draft condition (vertical) of the disposal vessel from the point of dredging to the disposal area, and return to the point of dredging.

11. Disposal Reporting Requirements and Data Management

11.1. USCG Reporting Requirements:
The dredging/towing contractor must notify the Captain of the Port (COTP) of San Juan/USCG for a reference number before each vessel departs the dredging site for the SJS. Every trip made under the permit authorization is required to be recorded and endorsed by the master of the tow or the person acting in such a capacity.

11.2 Record Keeping/Documentation/Data Reporting:
a. Navigation logs will be maintained for each vessel (tugboat/barge) used for ocean disposal of dredged material. These logs should include accuracy, calibration methods, and any problems and actions taken associated with navigation. EPA-R2 and the USACE-SAJ require that each tugboat/barge used for the ocean disposal of dredged material use D-GPS for navigation purposes.

b. An electronic Transportation and Discharge Log form must be completed by the DMI to provide a record of each voyage involving an actual disposal event at the SJS. An example of the log form is included in Appendix A. The log forms must be emailed to USACE-SAJ and EPA-R2 within 2 hours of any discharge at the SJS. An electronic copy of each log form is to be saved with a filename that includes trip number and retained within a dedicated project folder to allow for auditing of information. These notification systems ensure that the USACE-SAJ and EPA-R2 are completely informed of daily dredging and disposal activities undertaken within the Port of San Juan.

c. The DMI must also complete, sign and submit an **Inspector Checklist** of requirements associated with each placement trip (Appendix C). An electronic copy of the checklist for each trip must be retained with the corresponding TDL form in the dedicated project folder to allow for auditing of information. The three sections of the Inspector Checklist are completed by the DMI during three phases of transportation and discharge. Many checklist items relate to the dredging site. Ensuring that all required equipment and procedures are followed prior to departure from the dredging site helps ensure safe and accurate discharge of dredged material at the SJS.

d. GPS-based automated disposal surveillance (i.e., vessel draft and position) data must be maintained for each vessel used to transport and dispose of dredged material at the SJS. Surveillance data is to be submitted to the Agencies on a weekly basis in electronic format. Reports should include views of loaded and unloaded paths taken by vessels used for transportation and disposal of dredged material at SJS and the discharge location at SJS. This information must be superimposed on a figure that includes the dredging area, adjacent shorelines, and SJS boundaries). In addition, a graphical depiction of draft versus time must be provided with the above information.

Discharge locations must be made available for EPA and USACE inspection via a website within

12 hours of discharge. The website must allow several view sizes to observe the location of discharge. Vessel draft readings must be clearly discernible; superimposed on a figure that includes the dredging area, adjacent shorelines, and SJS boundaries.

11.3 Federal SJS Data Management and Reporting

A spreadsheet file containing contractor-reported scow volumes information is maintained by the USACE-SAJ. All disposal records and submitted monthly disposal volumes for each project are proofread, verified and any discrepancies are corrected before entry of data into this spreadsheet. On a yearly basis, USACE-SAJ will compile all dredging, disposal and testing data and submit them to USACE Headquarters.

All dredged material disposal data submitted to USACE-SAJ will be compiled, analyzed and evaluated in a final end-of-the-year report that will be provided to EPA-R2 during the first quarter of each calendar year and/or upon request. An annual report will not be necessary if there has been no disposal activity during the previous calendar year.

The data file maintained by USACE-SAJ contains information pertaining to the following:

-Permit/Federal Project number

-Permittee or Federal Project name

-Waterway/Reach/Channel

-Was the project maintenance or improvement?

- Disposal area/buoy at which the material was released/discharged

- Coordinates at which the material was released/discharged

-Disposal activity commencement and completion dates

-Volume of material disposed

-The year-to-date volumes of private (non-federal) and federal navigation projects disposed at the SJS, noted separately and collectively

12. SJS SMMP Review and Revision

MPRSA 102 (c)(3)(F) requires that the SMMP include a schedule for review and revision of the SMMP which shall not be reviewed and revised less frequently than 10 years after adoption of the plan, and every 10 years thereafter.

A need for modification of the use of the SJS because of unacceptable impacts is not anticipated due to the management and monitoring outlined in this SMMP. However, should the results of monitoring surveys indicate that continuing use of the SJS will lead to unacceptable impacts; the SJS SMMP will incorporate further restrictions/revisions to alleviate the impacts. The SMMP will be reviewed annually, in conjunction with monitoring data, by the interagency SMMP team to identify necessary revisions for management of the SJS.

EPA-R2 and the USACE-SAJ will convene a Scientific Review Panel, consisting predominantly of professionals from the fields of engineering, oceanography, and representatives of governmental resource agencies, as necessary, to review the SJS SMMP and relevant monitoring data. Membership will include qualified representatives from academia, federal agencies, state agencies, public interest groups, port representatives, and consultants. Attendance at meetings will be by invitation only.

13. References

EPA. 1982. Environmental Impact Statement (EIS) for the San Juan Harbor, Puerto Rico Dredged Material Disposal Site Designation. Prepared by EPA, HQ. December 1982.

EPA-USACE. 2000. Site Management and Monitoring Plan for the San Juan Harbor, Puerto Rico Dredged Material Disposal Site. Final. January 5, 2000.

JRB Associates. 1984. Studies and Sample Analyses For San Juan, Puerto Rico Dredged Material Disposal Site. Report prepared under contract to U.S. Environmental Protection Agency, HQ. Contract No. 68-0106388, Work Assignment #63. September 1984.

Battelle Ocean Sciences. 1997. Survey Report for Oceanographic Survey of the Five Puerto Rico Dredged Material Ocean Disposal Sites. Report prepared under Contract to U.S. Environmental Protection Agency, HQ and Region 2. Contract No.68-C2-0134, Work Assignment #4-353. May 1997.

APPENDIX A- USACE TRANSPORTATION AND DISCHARGE LOG

Date:__________ Dredging Contractor:____________________

Project Information
Name and Reach:__________________
Permit No. (If applicable):_________________
Trip Number: __________

Tug Scow and Dredge Information
Tug Name:____
Scow_________________________Dredge___________________________
Tug Capt._______________________Scowman________________________
Inspector Name:____

Loading/Pre-Transit Information
Time of Loading Completion (hh:mm:ss):_______________
Volume (cubic yards): __________ Percent Rock: __________
Descript.: (e.g., color, water content, type):__________________
Scow Draft: Fore (ft): _________ Aft (ft): __________
Scow Condition:____

Discharge Site Conditions
Wind: Direction_____________ Speed ___________
Sea State: ______________ Wave Height: _____________
Visibility________________

Transit/Placement Information
Time of Departure:__________________
Marine Mammals/Sea Turtles Sighted (Yes / No)

START - Time (DOORS OPEN):________________
Speed (kts)________Bearing ________Draft (ft., immed. before opening)___________
Latitude (dec. deg.)______________Longitude (dec. deg.)_______________

END -- Time (DOORS CLOSED):________________
Speed (kts)________ Bearing _________ Draft (immed. after closing)_______________
Latitude (dec. deg.)______________Longitude (dec. deg.)_______________

NOTES: __ *Periodic Draft/Time/Position observations to be recorded here; conclusion as to whether there is evidence of potential leakage recorded here, statement as to which, if any items on Inspector Checklist required reporting/follow up; other observations as necessary*

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APPENDIX B - DISCHARGE GUIDELINES FOR AN SJS DISPOSAL PROJECT

1. Vessel speeds **must** not exceed 3 knots during discharge, weather and sea conditions permitting.

2. To help ensure proper discharge within the SJS, and reduce the need for loaded scows to return to the dredging site, the following discharge protocol **must** be followed:

a) Prior to leaving the dredging site, scows **must** be inspected to ensure correct operation of mechanical features. Scows **must** also be inspected for the presence of any conditions that may cause navigation problems. The scow radio-control system (if used on the project) and scow monitoring systems **must** be inspected for correct operation If any problems with the scow, radio-control system, or scow monitoring systems are encountered, corrections **must** be made before offshore transport of the scow may proceed. However, when the primary scow monitoring systems (PSMS) are malfunctioning, dredged material may be transported from the dredging site if scow monitoring contractor personnel are onboard, or are communicating with the USACE-SAJ approved DMI to fix/service the equipment. Alternatively, the backup scow monitoring system (BSMS) may be used while problems with the PSMS are being corrected. However, the BSMS is considered to be emergency backup equipment and may only be used on two consecutive trips offshore. The BSMS is not to be used as a long-term backup to the PSMS.

b) Scows **must** be monitored for possible leaks. After leaving the dredging site, the DMI should check the PSMS scow draft count values on a periodic basis and record the draft/time/position observations in the notes section of the transportation and discharge log form (in the notes section) along with a conclusion as to whether there is any evidence of possible leakage. If the counts begin to significantly change during transport, either leakage of dredge material from the scow may be occurring (counts decreasing), or the scow's hull may be taking on water (counts increasing). However, depending on the specific location of a leak, the opposite trend may occur, according to the direction of a list caused by a leak. Scows suspected of leaking **must** be inspected before using the scow again. If any leaks are found, they **must** be repaired prior to using the scow again.

c) Scows **must** be brought to the SJS using the DGPS (Differential Global Positioning System) navigation systems of the tugboat and scow. Scow position will be monitored by the PSMS onboard the tugboat. Discharge in SJS boundaries will be documented by the DMI using the PSMS while the scow position and draft information are monitored automatically by the PSMS.

d) If the PSMS does not show reliable DGPS coordinates in the vicinity of the SJS, the tugboat DGPS and BSMS **must** be used to estimate the scow position during discharge. Length of towlines **must** be estimated and the bearing to the scow from the towing vessel course **must** also be noted at the time of discharge. Tow lengths **must** be less than 200 feet unless ocean/weather conditions require longer lines for safe navigation. The DMI **must** record the following information if this option is used:

1) coordinates of the tug at the start and end of discharge
2) estimated length and bearing of tow line (distance from tug stern to scow bow)
3) estimate of lateral displacement of scow from target longitude

e) Discharge **must** only occur at the SJS when reliable GPS coordinates are displayed by navigation systems onboard the towing vessels or scows being used at the SJS.

f) If the PSMS fails after leaving the dredging site, the scow **must** not be used again until a fully operational PSMS is installed. If scow monitoring contractor personnel are onboard, or communicating by telephone with the DMI, to correct problems, or the BSMS is functional, offshore transport may occur. However, the BSMS is considered to be emergency backup to the PSMS, is not to be routinely used for offshore discharge, and may only be used on two consecutive offshore discharge trips.

g) If the PSMS is not functioning properly, discharge **must** occur within the SJS only if the scow and towing vessel are both within the SJS at the time scow doors are opened.

h) If a situation arises that requires emergency dumping of dredged material outside of the SJS, all reasonable efforts to dump outside of navigation channels and into areas deeper than 200 feet **must** be made.

i) If radio communication with the scow is lost, preventing operation of radio-controlled scows, a person **must** board the scow to either fix the problem or operate the scow. Persons must only ride aboard scows certified for passengers by the U.S. Coast Guard. Extreme care must be taken when boarding a scow at sea. Anyone on a scow **must** have at least two working radios. Voice contact, through radio or direct communication, **must** be maintained with the scowman while riding aboard the scow. Scow opening **must** only occur when a direct, voice command has been given to the scowman, or radio communication with radio-controlled scows is maintained. If the radio control system can not be fixed, the scow **must** be towed to the designated discharge location and manually discharged following steps (d) through (f). If the scow's engine can not be operated by the radio-control system, and the scow is boarded to attempt to fix the engine, the scow **must** be located at the designated discharge position if the scow's engine is started. Past use of radio-controlled scows revealed that manually starting a scow's engine after a failed radio-controlled engine start could cause the "scow open" command to be completed, causing the scow to dump at the location of engine startup. Any problems with a radio control system **must** be fixed prior to subsequent use of the scow.

3. Voice contact, through radio or direct communication, **must** be maintained with the scowman (if used) for the duration of trips. Scow opening **must** only occur when a direct, voice command has been given to the scowman, or, in the case of radio-controlled scows, direct radio communication with the scow is maintained. A backup radio **must** be onboard all manned scows. Hand signals **must never** be used to direct the scowman regarding scow opening/closing. Radio checks with the scowman **must** be performed prior to departing the dredge site and enroute in the vicinity of the harbor mouth. Manned scows **must not** be transported to the discharge location without at least two working modes of radio communication. Radios **must** have adequate power sources and extra sets of batteries **must** be kept with any battery operated radios. DMIs will note in their logs the status of radio checks made prior to site departure and enroute to the discharge location, in the comments section of the log form.

4. Scows containing dredged material **must not** be towed from the dredging site for ocean discharge unless all of the following items are present and fully operational aboard the towing vessel:

- Legible copy of the permit or contract specifications, as related to scow loading, transport, and dredged material discharge;
- A legible copy of the Discharge Guidelines and SJS boundary coordinates received at the pre-construction meeting, or any additional instructions or guidelines as related to scow loading, transport, and dredged material discharge
- PSMS and BSMS*, including bin level sensor on scow
- DGPS navigation system aboard tug
- Radio-control system for scow operation (if scowman is not used)
- Radio and backup radio system aboard scow (if scowman is used)
- Fathometer aboard tug
- a fully operational fax machine must be onboard the towing vessel for use by the SAJ Inspector within 2 hours of each discharge event at the SJS
- an 8" – 12" wide protractor with degrees printed or embossed on the curved surface
- 4" – 8" long dividers for scaling distances off of maps and charts
- scow loading tables for each scow used to transport dredged material
- access to the towing vessel DGPS, fathometer, and radar
- fully operable personal cellphones in possession of each DMI at all times with active phone numbers unique to each phone available for placing and receiving calls at all times

- suitable location for completing paperwork associated with DMI duties
- Full compliance with any other contract or regulatory requirements related to dredged material discharge

* If the PSMS is not functioning properly at the time a scow is ready to be transported from dredging site, the BSMS may be used while the PSMS problems are being corrected.

5. Scows containing dredged material **must not** be towed from the dredging site for ocean discharge unless ocean/weather conditions are forecast to allow safe and accurate discharge of dredged material within the SJS.

6. Dredged material **must** never be discharged anywhere outside of the SJS boundary except in cases of emergency. Any discharges at outside the boundaries will be investigated for potential enforcement actions.

7. Scow monitoring equipment, discharge guidelines, and other aspects of dredged material discharge at the SJS may be changed. Notice of any changes will be provided to the dredging contractor for implementation as soon as practicable.

8. Transportation and discharge log (TDL) forms will be completed electronically or by hand within 30 minutes of discharge at the SJS. An electronic copy of the TDL form is to be emailed to EPA-R2 and USACE-SAJ within two hours of scow's return from SJS. Printed copies of TDL forms **must** be signed by the DMI after completion of each trip and placed in a file/folder for submission to USACE-SAJ after project completion or when the DMI permanently or temporarily discontinues working on the project.

9. Disposal Inspectors who have been approved by USACE-SAJ (DMIs), but have not previously worked on a New York District or USACE-SAJ (i.e., EPA-R2) dredging project, must be accompanied by scow monitoring contractor personnel, or by a DMI who has been working on the project, during the first two trips the DMI works on the project. DMIs who have previously worked on at least one New York District or USACE-SAJ (i.e., EPA-R2) dredging project, but who have not worked on this project, must be accompanied by scow monitoring contractor personnel during their first trip serving as a DMI on this project.

10. Possible changes in the discharge guidelines may be provided after dredging begins.

11. To help ensure that dredged material is transported and placed at the SJS in accordance with the guidelines described above, the attached checklist has been prepared. Items in the checklist **must** be reviewed by the DMI at the dredging site, while underway, and at the SJS. Each item that is pertinent to the trip **must** be answered with a "YES" or "NO" answer, along with other information specific to a checklist item. Any item on the checklist that receives a "NO" answer **must** be reported immediately to the USACE-SAJ at NAME OF CONTACT, and a dredging

contractor representative not onboard the towing vessel. If the "NO" answer is related to the scow monitoring systems, the scow monitoring contractor **must** also be notified immediately at NAME OF CONTACT. Each discharge trip **must** use a checklist, to be completed by the DMI working aboard the towing vessel. Checklists **must** be signed and dated by the DMI and placed in a file. All original, signed checklists associated with this project **must** be submitted to the USACE-SAJ on a weekly basis for the duration of the project. Checklists **must** be hand delivered or mailed to:
USACE ADDRESS HERE

12. Original copies of TDL forms for each trip to the SJS, signed and dated by the DMI on duty during each trip, **must** be submitted to NAME OF CONTACT at the above address at the completion of the project.

13. Switching of tugs once an ocean discharge trip has begun **must not** occur. Towing of any scow loaded with dredged material must be monitored by the scow monitoring equipment/software and documented by a DMI riding aboard the towing vessel.

14. While underway, dredging contractor must adhere to all measures required in Appendix D of this SMMP (i.e., NMFS, Southeast Region Vessel Strike Avoidance Measures and Reporting for Mariners)

15. Upon arrival at the ODMDS, the DMI (dredging inspector) must maintain a watch at all times for marine mammals and sea turtles. Discharge of dredged material may not occur when there is a turtle or mammal present at the site; discharge must not occur until the sighted animal has left the disposal area. Animals may not be harassed in any manner to make them leave the area.

16. Failure to adhere to the specifications discussed in these discharge guidelines may result in revocation of the dredging permit and/or a monetary fine.

17. If there are any questions pertaining to the guidance given in this document, or additional clarification of procedures is needed, please contact Mr. Mark Reiss of the EPA at (212) 637-3799.

Appendix C - Inspector Checklist

DREDGING PROJECT/REACH: ______________________________
TUG NAME: ____________________ SCOW ___________________
TRIP NUMBER: _________ DATE __________________
INSPECTOR NAME: _________________________
INSPECTOR SIGNATURE: _________________________

Answer YES or NO to the following questions. Circle other choices and/or fill in blanks as appropriate. Any item on the checklist that receives a "NO" answer **must** be reported immediately to USACE-SAJ at: POINT OF CONTACT and a dredging contractor representative not onboard the towing vessel. If the "NO" answer is related to the scow monitoring systems, the scow monitoring contractor **must** also be notified immediately at POINT OF CONTACT. Items receiving "NO" answers **must** be indicated on the TDL form using the letter-number code next to each item description and described on the TDL form comments section. A supplemental report **must** be prepared and emailed to USACE-SAJ at POINT OF CONTACT to explain any discrepancies/deviations from the Inspector checklist.

PART A. DREDGING SITE

A1___ A legible copy of the contract specifications, as related to scow loading, transport, and dredged material discharge, is in possession of the DMI.

A2___ A legible copy of the Discharge Guidelines and ODMDS boundary coordinates received at the pre-construction meeting, or any additional instructions or guidelines as related to scow loading, transport, and dredged material discharge, is in possession of the DMI.

A3___ The scow being used to transport the dredged material is mechanically sound, does not leak, and has no visible damage that may cause leaking.

A4___ A regularly used scow was used, no backup scow was used.

A5___ A scow loading table for the scow being towed is aboard the towing vessel and available for the DMI to use.

A6___ The material being dredged has been observed by the DMI for general characteristics (grain size, color, consistency). Majority of material is dry/thick/watery, color:______, mud/sand/gravel/rock.

A7___ For scows loaded with any rock (rock is defined as any stones greater than 2.5 inches in diameter), the estimated rock percent has been recorded on the TDL form.

A8___ An estimate of the volume of material in the scow has been calculated by the DMI using the scow loading table and recorded on the TDL form.

A9___ Scow contains less volume of dredged material than the maximum volume allowed for discharge during a single trip.

If a scow contains a volume of dredged material greater than the maximum volume allowed for discharge during a single trip, the volume **must** be decreased below the maximum volume before the dredged material can be transported away from the dredge site.

A10__ The scow monitoring systems (PSMS and BSMS) are fully operational and are functioning. Any scow monitoring system malfunctions **must** be reported **<u>immediately</u>** to the scow monitoring contractor <u>POINT OF CONTACT</u>. Transportation vessels are not allowed to leave the dredging site with any dredged material if a PSMS is not fully operational. However, if scow monitoring system contractor personnel are onboard the transporting vessel to service the equipment, or in communication with the DMI via cellphone or radio, the vessel may depart from the dredging site while malfunctions are being repaired/corrected. Alternatively, if the BSMS is functional, the scow may be transported from the dredging site. If the PSMS is not functional, the BSMS may only be used on two consecutive offshore discharge trips.

A11__ The scow draft pressure value, as displayed by the PSMS system, has been recorded on the TDL form.

A12__ A fathometer is fully operational, functioning, and installed on the transporting vessel.

A13__ A radio onboard the transporting vessel is operable and can receive NOAA marine weather forecasts and ocean conditions.

A14__ Current and forecasted marine weather and ocean conditions at the designated discharge location have been monitored on the radio and will allow safe and accurate discharge of dredged material. Winds at a reporting station closest to the discharge location are presently blowing _______ from the ____, with _____ ft seas. Winds forecast for the discharge location are ______ from the ___, with ____ seas.

A15__ DGPS navigation system is fully operational, functioning, and installed aboard the transporting vessel.

A16__ A radar system is fully operational, functioning, and installed aboard the transporting vessel.

A17__ Radio-control system for scow operation (if scowman is not used) is fully operational and functioning.

A18__ Radio and backup radio system, for communication between scows and towing vessels, are aboard scow (if scowman is used), are fully operational and functioning.

A19__ A fully operable cell phone that can send and receive calls is in the possession of the DMI onboard the towing vessel.

A20__ A protractor is available for use by the DMI aboard the towing vessel.

A21__ A compass, for map/chart distance scaling, is available for use by the DMI aboard the towing vessel.

A22__ An up-to-date nautical chart that includes the discharge area is available for use by the DMI.

A23__ DMI is provided full access to fathometer, radar, vessel DGPS, and any other equipment/information necessary to conduct DMI duties.

A24__ Radio and backup radio checks with the scowman's radios have been performed with no problems detected, if a scowman is used.

A25__ Full compliance with any other contract or regulatory requirements related to dredged material discharge has been met.

A26__ Time of departure from dredging site has been recorded on the TDL form.

A27__ All other information relative to the dredging site has been entered into the TDL form.

PART B . ENROUTE TO THE DISCHARGE LOCATION

B1___ In the vicinity of the Harbor mouth, radio and backup radios aboard the scow have been checked to ensure they are both functioning, if a scowman is used.

B2___ Scow draft is being monitored with PSMS.

B3___ If the DMI is also a NMFS-approved marine mammal/endangered species observer, observation and appropriate reporting is conducted.

B4___ Scow draft pressue varies less than 20 points, or 1.5 feet of draft, from the value at the dredge site.

B5___ A gradual increase or decrease in scow draft pressure values (or actual scow draft) is not observed.

B6___ If visible, scow does not appear to be listing.

B7___ Water behind scow has been observed, if possible, to ensure that no turbid water plumes are present.

B8___ Towing vessel DGPS and scow DGPS positions agree using a fixed reference position (channel marker, buoy, etc.)

B9___ Marine weather and sea conditions present and forecast to be present at the discharge location are periodically monitored. An updated marine forecast does not predict conditions that requirereturning to the dredging site to await safer conditions.

PART C. IN THE VICINITY OF THE DESIGNATED DISCHARGE LOCATION

For discharge at the SJS:

C1___ Scow radio control equipment operates without any problems.

C2___ Discharge occurred in ODMDS boundaries and was coordinated with towing vessel crew.

C3___ Scow draft information immediately prior to scow door opening has been recorded on the TDL form.

C4___ TDL form was completed using the scow monitoring system, or by hand if the scow monitoring system malfunctions, within 30 minutes of scow door opening.

C5___ Scow monitoring equipment, transportation vessel navigation equipment, and all other equipment related to discharge of dredged material worked without any problems.

C6___ All activities associated with discharge of dredged materials appeared to be conducted in a safe manner.

C7__ Nothing occurred that may have resulted in incorrect discharge of dredged material.

C8__ TDL form and any supplemental reports e-mailed to POINT OF CONTACT within 2 hours of scow door, or hopper bin, opening.

C9___ A copy of the TDL form has been electronically signed by the DMI and saved to a file/folder to become part of the permanent record of the trip. A disc containing all the folder and all TDL forms, checklists and supplemental reports and information **must** be submitted to USACE-SAJ when offshore transport of dredged material associated with the project ends, or when the DMI finishes working on the project.

APPENDIX D -Vessel Strike Avoidance Measures and Reporting for Mariners NOAA Fisheries Service, Southeast Region (Revised September 2008)

Background

The National Marine Fisheries Service (NMFS) has determined that collisions with vessels can injure or kill protected species (e.g., endangered and threatened species, and marine mammals). The following standard measures should be implemented to reduce the risk associated with vessel strikes or disturbance of these protected species to discountable levels. NMFS should be contacted to identify any additional conservation and recovery issues of concern, and to assist in the development of measures that may be necessary.

Protected Species Identification Training

Vessel crews should use an Atlantic and Gulf of Mexico reference guide that helps identify protected species that might be encountered in U.S. waters of the Atlantic Ocean, including the Caribbean Sea, and Gulf of Mexico. Additional training should be provided regarding information and resources available regarding federal laws and regulations for protected species, ship strike information, critical habitat, migratory routes and seasonal abundance, and recent sightings of protected species.

Vessel Strike Avoidance

In order to avoid causing injury or death to marine mammals and sea turtles the following measures should be taken when consistent with safe navigation:

1. Vessel operators and crews should maintain a vigilant watch for marine mammals and sea turtles to avoid striking sighted protected species.

2. When whales are sighted, maintain a distance of 100 yards or greater between the whale and the vessel.

3. When sea turtles or small cetaceans are sighted, attempt to maintain a distance of 50 yards or greater between the animal and the vessel whenever possible.

4. When small cetaceans are sighted while a vessel is underway (e.g., bow-riding), attempt to remain parallel to the animal's course. Avoid excessive speed or abrupt changes in direction until the cetacean has left the area.

5. Reduce vessel speed to 10 knots or less when mother/calf pairs, groups, or large assemblages of cetaceans are observed near an underway vessel, when safety permits. A single cetacean at the surface may indicate the presence of submerged animals in the vicinity; therefore, prudent precautionary measures should always be exercised. The vessel should attempt to route around the animals, maintaining a minimum distance of 100 yards whenever possible.

6. Whales may surface in unpredictable locations or approach slowly moving vessels. When an animal is sighted in the vessel's path or in close proximity to a moving vessel and when safety permits, reduce speed and shift the engine to neutral. Do not engage the engines until the animals are clear of the area.

Additional Requirements for the North Atlantic Right Whale

1. If a sighted whale is believed to be a North Atlantic right whale, federal regulation requires a minimum distance of 500 yards be maintained from the animal (50 CFR 224.103 (c)).

2. Vessels entering North Atlantic right whale critical habitat are required to report into the Mandatory Ship Reporting System.

3. Mariners should check with various communication media for general information regarding avoiding ship strikes and specific information regarding North Atlantic right whale sighting locations. These include NOAA weather radio, U.S. Coast Guard NAVTEX broadcasts, and Notices to Mariners. Commercial mariners calling on United States ports should view the most recent version of the NOAA/USCG produced training CD entitled "A Prudent Mariner's Guide to Right Whale Protection" (contact the NMFS Southeast Region, Protected Resources Division for more information regarding the CD).

4. Injured, dead, or entangled right whales should be immediately reported to the U.S. Coast Guard via VHF Channel 16.

Injured or Dead Protected Species Reporting

Vessel crews should report sightings of any injured or dead protected species immediately, regardless of whether the injury or death is caused by your vessel.

Report marine mammals to the Southeast U.S. Stranding Hotline: 877-433-8299
Report sea turtles to the NMFS Southeast Regional Office: 727-824-5312

If the injury or death of a marine mammal was caused by a collision with your vessel, responsible parties should remain available to assist the respective salvage and stranding network as needed. NMFS' Southeast Regional Office should be immediately notified of the strike by email (takereport.nmfsser@noaa.gov) using the attached vessel strike reporting form.

For additional information, please contact the Protected Resources Division at:

NOAA Fisheries Service
Southeast Regional Office
263 13th Avenue South
St. Petersburg, FL 33701
Tel: (727) 824-5312
Visit us on the web at http://sero.nmfs.noaa.gov

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southeast Regional Office
263 13th Avenue South
St. Petersburg, Florida 33701-5505
http://sero.nmfs.noaa.gov

January 5, 2018 F/SER47:JAR/pw

(Sent via Electronic Mail)

Colonel Jason A. Kirk, Commander
Jacksonville District Corps of Engineers (CESAJ)
P.O. Box 4970
Jacksonville, FL 32232-0019

Attention: Paul M. DeMarco

Dear Colonel Kirk:

NOAA's National Marine Fisheries Service (NMFS) reviewed the *San Juan Harbor Puerto Rico Draft Integrated Feasibility Study and Environmental Assessment* dated August 2017 (Draft IFR/EA). To improve navigation efficiency and safety in San Juan Harbor, the Draft IFR/EA recommends widening and deepening several inner harbor channels and placing the dredged material in the San Juan Harbor Ocean Dredged Material Disposal Site (San Juan Harbor ODMDS). The Draft IFR/EA leaves open the possibility of beneficially using some dredged material to fill borrow holes in Condado Lagoon to restore seagrass habitat or to protect the Cataño municipal shoreline; evaluation of these uses will occur during the Project Engineering and Design phase after Congressional approval. The Draft IFR/EA indicates the proposed work would not affect seagrass, corals, or hardbottom. The Jacksonville District's initial determination is the recommended widening and deepening of several inner harbor channels and placing the dredged material in the San Juan Harbor ODMDS would not have an adverse effect on federally managed fisheries or their essential fish habitat (EFH). As the nation's federal trustee for conserving and managing marine, estuarine, and anadromous fishery resources, the NMFS provides the following comments and recommendations pursuant to authorities of the Fish and Wildlife Coordination Act and the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act).

Project Description

The study area for the Draft IFR/EA encompasses the bar (entrance) channel, offshore and inner harbor beneficial use dredged material disposal sites, inner harbor channels, and any extension of the water bodies and shorelines that could be impacted by proposed improvements. The Draft IFR/EA discusses several alternative plans, including various combinations of structural and nonstructural measures to improve the safety and efficiency of the existing navigation system. Navigation concerns include difficult wind and wave conditions, limited channel and turning basin widths, and insufficient Federal channel depths.

The Tentatively Selected Plan (TSP) in the Draft IFR/EA also is the National Economic Development (NED) Plan. The TSP recommends:

- Widening the Army Terminal Channel (ATC) 100 feet (from an existing width of 350 feet to a maximum width of 450 feet) at an existing depth of 40 feet.
- Deepening Cut-6 of Anegado Channel to a maximum of 46 feet, the remaining portion of Anegado Channel to a maximum of 44 feet, the ATC to a maximum of 44 feet, the Army Terminal Turning Basin (ATTB) to a maximum of 44 feet, and the San Antonio Channel and Cruise Ship Basin East to 36 feet.
- Placing the dredging material, estimated to be 2,100,000 cubic yards excavated by a clamshell dredge, in the San Juan Harbor ODMDS; no blasting is anticipated.
- Evaluating further beneficial uses of dredged material such as filling holes in Condado Lagoon to enhance sea grass planting and material placement islands with living shorelines.

While expanding and deepening Anchorage Area F is not part of the TSP, the IFR/EA anticipates the U.S. Coast Guard (USCG) will propose this work and pursue in the near future the necessary permits through the U.S. Army Corps of Engineers regulatory program. The USCG maintains expanding and deepening Anchorage Area F is necessary currently for safety reasons and it will be pursue this work regardless of whether Congress authorizes the project the IFR/EA recommends. Hence, expanding and deepening Anchorage Area F is not part of the action proposed in the IFR/EA.

Essential Fish Habitat at the Proposed Project Site
The Draft IFR/EA includes descriptions of the EFH in the study area as well as evaluations of project effects on EFH. The project site is characterized by the presence of both freshwater and saline waters. The IFR/EA discusses 17 species of fishes and invertebrates the Caribbean Fishery Management Council (CFMC) manages under the Reef Fish, Lobster, and Queen Conch Fishery Management Plans. The seagrasses *Halophila decipiens, Thalassia testudinum,* and *Syringodium filiforme* occur in depths less than 17 to 20 feet; *Halodule wrightii* occurs in shallower depths. The bay also has silty/muddy sediments. The limestone substrates found at the bay entrance are habitat for corals. The water column in the bay and the Puerto Nuevo River, the mangrove, seagrass, limestone substrates, and muddy habitats are designated EFH by the CFMC.

Impacts to Essential Fish Habitat and Recommendations
The IFR/EA anticipates minimal impacts to seagrass, corals, and hardbottom from the proposed channel widening and deepening. The IFR/EA bases this determination on dredging not occurring in these habitats, the long distance between these habitats and dredging operations allowing ample time for settlement and dilution of suspended dredged material, and an anticipated contract provision prohibiting construction vessels from anchoring within seagrass or hardbottom habitat.

While the NMFS generally agrees with this determination, the NMFS recommends:

- The Final IFR/EA should provide a more detailed examination of the potential for dredged material to leak from the barges when transiting near seagrass, coral, and hardbottom habitats. The Final IFR/EA should describe best management practices for ensuring such leakage does not occur during transit to the San Juan Harbor ODMDS or to beneficial use sites.

- The Jacksonville Distort should assist the USCG with developing detailed habitat maps of the areas proposed for the expansion and deepening of Anchorage Area F. The NMFS expects the modifications to Anchorage Area F will affect a substantial amount of seagrass habitat, as noted by the seagrass pictures in the Draft IFR/EA. The NMFS expects restoring seagrass habitat in Condado Lagoon to be a viable approach to providing the necessary mitigation, and the Jacksonville District should consider this need and opportunity to partner with the USCG when completing the beneficial use evaluations.

Closing
The NMFS appreciates the opportunity to provide these comments. Please direct related questions or comments to the attention of Mr. José A. Rivera at NOAA HCD, c/o U.S. Army Corps of Engineers, Fundacíon Angel Ramos, Annex Building, #383 Franklin Delano Roosevelt Avenue, Suite 202, San Juan, Puerto Rico, 00918. He may be reached by telephone at 787-729-6829 or by e-mail at Jose.A.Rivera@noaa.gov.

Sincerely,

Pace Willer

/ for

Virginia M. Fay
Assistant Regional Administrator
Habitat Conservation Division

cc: COE, Paul.M.DeMarco@usace.army.mil
CFMC, Graciela_CFMC@yahoo.com
F/SER3, Kelly.Logan@mnoaa.gov, Mark.Lamb@noaa.gov
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