National Marine Fisheries Service
Endangered Species Act Section 7
Biological and Conference Opinion

Title: Biological and Conference Opinion on the Issuance of Scientific Research Permit No. 21043 to Florida Fish and Wildlife Conservation Commission for research on smalltooth sawfish (*Pristis pectinata*)

Consultation Conducted By: Endangered Species Act Interagency Cooperation Division, Office of Protected Resources, National Marine Fisheries Service

Action Agency: Permits and Conservation Division, Office of Protected Resources, National Marine Fisheries Service

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1 INTRODUCTION

The Endangered Species Act of 1973, as amended (ESA; 16 U.S.C. 1531 et seq.) establishes a national program for conserving threatened and endangered species of fish, wildlife, plants, and the habitat they depend on. Section 7(a)(2) of the ESA requires Federal agencies to insure that their actions are not likely to jeopardize the continued existence of endangered or threatened species or adversely modify or destroy their designated critical habitat. Federal agencies must do so in consultation with National Marine Fisheries Service (NMFS) for threatened or endangered species (ESA-listed), or designated critical habitat that may be affected by the action that are under NMFS jurisdiction (50 C.F.R. §402.14(a)). If a Federal action agency determines that an action "may affect, but is not likely to adversely affect" endangered species, threatened species, or designated critical habitat and NMFS concur with that determination for species under NMFS jurisdiction, consultation concludes informally (50 C.F.R. §402.14(b)).

The Federal action agency shall confer with NMFS on any action which is likely to jeopardize the continued existence of any proposed species or result in the destruction or adverse modification of proposed critical habitat under NMFS jurisdiction (50 CFR §402.10). If requested by the Federal agency and deemed appropriate, the conference may be conducted in accordance with the procedures for formal consultation in §402.14.

Section 7(b)(3) of the ESA requires that at the conclusion of consultation, or conference if combined with a formal consultation, NMFS provide a biological opinion (opinion) stating whether the Federal agency's action is likely to jeopardize ESA-listed species or destroy or adversely modifytheir designated critical habitat. If either Service determines that the action is likely to jeopardize listed species or destroy or adversely modify designated critical habitat, that Service provides a reasonable and prudent alternative that allows the action to proceed in compliance with section 7(a)(2) of the ESA. If an incidental take is expected, section 7(b)(4) requires the the Services to provide an incidental take statement that specifies the impact of any incidental taking and includes reasonable and prudent measures to minimize such impacts and terms and conditions to implement the Reasonable and Prudent Measures.

The action agency for this consultation is NMFS, Office of Protected Resources. NMFS proposes to issue a permit (Permit No. 21043) authorized under section 10(a)(1)(A) of the ESA. The purpose of the permit is the scientific research and collection of smalltooth sawfish, *Pristis pectinata* for the purposes of conservation and recovery to Florida Fish and Wildlife Conservation Commission (FFWCC). Included in this consultation are analysis of effects to Johnsons sea grass, north Atlantic right whales; Atlantic, shortnose, and Gulf sturgeon; green, leatherback, Kemp's ridley, hawksbill, and loggerhead sea turtles; along with elkhorn and staghorn corals. This consultation also considers north Atlantic right whale, Gulf sturgeon, elkhorn and staghorn coral, Johnsons sea grass, and loggerhead sea turtle designated critical habitat. And finally, this consultation includes a conference opinion on the effects to proposed Atlantic sturgeon critical habitat.

Consultation in accordance with section 7(a)(2) of the statute (16 U.S.C 1536 (a)(2)), associated implementing regulations (50 C.F.R. §402), and agency policy and guidance was conducted by NMFS Office of Protected Resources's ESA Interagency Cooperation Division (hereafter referred to as "we").This opinion and incidental take statement was prepared by the ESA Interagency Cooperation Division in accordance with section 7(b) of the ESA and implementing regulations at 50 CFR §402.

This document represents NMFS' opinion on the effects of these actions on endangered and threatened species and designated critical habitat for those species. A complete record of this consultation is on file at the NMFS Office of Protected Resources in Silver Spring, Maryland.

1.1 Background

Smalltooth sawfish research permits have been issued for similar research in the same action area under Permit Nos. 1352, 1475, 1538, 13330, 15802, 17316, and 17787. This permit is an extension of previous work, initiated in 2004 under Permit No. 1475 and continued under Permit No. 15802. The research proposed under this permit has been evaluated in all of these previous permits and is not new or being conducted in ways that differ from previous assessments. Past analyses have found that these research techniques are likely to adversely affect listed species, but are not likely to jeopardize their continued existence.

1.2 Consultation History

This opinion is based on information provided in the permit application, the proposed permit authorization, and the initiation memo provided by the Permits and Conservation Division (Permit Division), the previous opinions on smalltooth sawfish research, annual and final reports of those permits, and smalltooth sawfish publications arising from previously permitted research. Our communication with the Permit Division regarding this consultation is summarized as follows:

- February 26, 2017: Permit Division requests initiation of consultation and the Consultation Division agreed and initiated consultation at that time.
- March 22, 2017: Permit Division provided reference files from previous consultations to support the research in this proposed permit.

2 DESCRIPTION OF THE PROPOSED ACTION

"Action" means all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by federal agencies. The action proposed in this case is the authorization of a section 10(a)(1)(A) permit to research smalltooth sawfish. Sampling will occur year-round with up to five times weekly. Most sampling will occur between March and September, but sampling periods will be adjusted based on new data if necessary (e.g., encounter reports from the public, acoustic data). The goal is to characterize as much biological, ecological, and health information on the smalltooth sawfish as possible. Examples of this information include data on movements and habitat use (juveniles and adults), relative abundance of juveniles, juvenile recruitment, temporal and spatial distributions, and baseline assessments of health (e.g., parasitology). These data will improve the scientific understanding of this endangered fish and directly and indirectly address at least nine primary level action items outlined in the Smalltooth Sawfish Recovery Plan.

The FFWCC proposes to capture and study adult and juvenile smalltooth sawfish using longline, rod and reel, set lines (drum lines), gill nets, and beach seines each year (Table 1). All sawfish captured during field surveys will be handled, measured, tagged, sampled, and released alive. The proposed permit requests to conduct this research between June 1, 2017, and May 31, 2022. Specific permit terms and conditions are identified in the draft permit and will be included in the final permit. They are intended to minimize the potential adverse affects resulting from capturing, handling, sampling, and transmitter attachment/surgical implantation to smalltooth sawfish as well as minimizing or eliminating the potential for adverse affects to other ESA-listed species that could result from efforts to capture smalltooth sawfish.

Table 1. Proposed take of listed species under Permit No. 21043 as both target and incidental captures.

Species	Life Stage	Expected Take	Take/ animal	Procedures
Smalltooth sawfish	Juvenile	125	3	Internal acoustic tag; passive integrated transponder (PIT) tag; Roto tag; Acceleration data logger (ADL) or conductivity temperature depth (CTD) tag; Blood sample; Fin clip; Muscle biopsy
Smalltooth sawfish	Juvenile	15	3	Internal acoustic tag; PIT tag; Roto tag; ADL or CTD tag; Satellite tag; Blood sample; Fin clip; Muscle biopsy
Smalltooth sawfish	Adult	50	3	Internal acoustic tag; PIT tag; Roto tag; ADL or CTD tag; Blood sample; Fin clip; Muscle biopsy
Smalltooth sawfish	Adult	15	3	Internal acoustic tag; PIT tag; Roto tag; ADL or CTD tag; Satellite tag; Blood sample; Fin clip; Muscle biopsy
Smalltooth sawfish	Any	50	1	Salvage of parts

Any of Loggerhead, leatherback, hawksbill, green, or Kemp's ridley sea turtle	Any	15*	1	Incidental

*no more than 10 in any year and no more than 15 over the life of the permit.

Sampling for sawfish will be conducted using seines, hook and line, longlines, drum lines, and gill nets. The gear type is selected based on the location of encounter reports by the public. All gear except hook and line will be marked by visible buoys. Actively fished nets (e.g., seines) will be monitored constantly from the beginning of the set until the sample is completed. Passively fished gill nets will be constantly monitored while being set and checked a minimum of every 30 minutes, with the crew remaining on station. Longlines and drum lines will be fished for one hour. Hook and line will be continuously monitored for hooked fish and the presence of bait. These gear types are being used because they are known to have minimal effects on sawfish and their habitats. The application contains detailed information on each of these gear types.

To minimize stress, all sawfish caught will be immediately untangled (if necessary), processed (e.g., measured, tagged, tissue samples taken) as quickly as possible, and released. Small juvenile sawfish (<2 m) will be kept in a water-filled net well in the stern of the boat to minimize out-of-water-time. Aerator(s) are used to maintain dissolved oxygen levels in the net well. This technique has been used since 2004 and annual reports show it has been effective, resulting in no mortalities or injuries to captured sawfish. To prevent injury to specimens (e.g., chipping of rostral teeth) and to protect researchers, a designated crew member will immobilize the rostrum of any captured sawfish by grasping the rostrum while wearing padded welding gloves. This technique has been used successfully since 2004 for juvenile sawfish and has facilitated sawfish and researcher safety. Larger sawfish will be held similarly in the ambient water if they are too big for the net well. If necessary, a temporary holding pen is created using a portion of the seines.

Captured sawfish swim freely within the pen in ambient water. In shallow water, sawfish are released by gently placing them in the water and leading them away from the boat. In water too deep to stand, sawfish are released by gently placing them in the water and allowing them to descend. Captured sawfish will be measured, sexed, tagged and released. Measurements taken include precaudal length, fork length, stretch total length, disc width, and rostrum length. Rostral tooth counts will be taken, any parasites will be removed and a fin clip will be taken. Occasional recaptures will be measured and re-tagged if necessary and released.

A number of different tags are proposed for use under this permit. Rototags, PIT tags, ADL tags (also on permit #17316), and CTD tags or satellite tags will be applied directly to a dorsal fin, the base of the dorsal fin, or inserted below the ventral surface of captured sawfish. Duration of attachment depends on tag placement and sawfish habitat use, but in general external tag attachment will not exceed 6 months. Tag types have been chosen based on success with other elasmobranch species including sawfish (e.g., rototags) as well as new/developing technology (e.g., satellite tags).

The tags proposed for use are small (12 mm x 1.5 mm diameter for PIT tags, 27 mm x 9 mm diameter for acoustic tags [weight in air = 4.7 g; weight in water = 2.9 g], 175 mm long x 21 mm diameter for satellite tags [weight in air = 75 g], 40 mm x 28 mm 16.3 mm for ADL tags [weight in air = 18.0 g]) compared with the size of a sawfish and involve making small holes (e.g., with a leather punch) in or below dorsal fins to affix rototags and external acoustic or satellite tags or small holes (i.e., with a syringe needle) at the left side base of the first dorsal fin to inject internal PIT tags. Neoprene clasp tags may also be used to secure acoustic transmitters and CTD tags externally. Satellite tag harnesses will only be placed on sawfish at least 2 m in total length; they have been programmed to release after 5 to 6 months. Collectively, these tags have been used successfully since 2004 under Permit Nos. 1475 and 15802. Annual reports show these tags have been used on over 300 sawfish, and the application sites heal quickly and completely within a few days based on recaptures.

Small juvenile sawfish (<2 m) will have up to 4 tags (PIT tag, rototag, acoustic tag, CTD tag or ADL); large juvenile (2<= x < 3 m TL) and adult sawfish (>=3 m) will have up to 5 tags (PIT tag, rototag, acoustic tag, CTD tag or ADL, satellite tag). The CTD tags record environmental data, much like the satellite tags do, but they are smaller, need to be recovered, and usually more appropriate for small juveniles. The ADL's are slightly larger than the rototags, but stay on for a short period of time (~5 days) and also need to be recovered. More detailed information about each tag type is contained in the permit application.

Any tag type will be re-applied if fallen off. Re-application of PIT tags and internal acoustic tags is unlikely because research has indicated that these tags are long-term and not shed. If we know that a sawfish has been caught before, we will not take another tissue or fin clip sample unless it has a lesion that needs to be biopsied.

When holding smalltooth sawfish, researchers will fill the net well in the stern of the mullet skiff (boat with engine mounted in the bow) with water as a temporary environment during sample processing and data recording. Larger sawfish (>2 m) will be held in shallow water with welding gloves or will be tethered to the side of the boat using ropes wrapped around the rostrum and the caudal peduncle (base of tail). They will be secured in a manner such that their spiracles and gills will be submerged and aerator(s) will be used to maintain dissolved oxygen levels in the net well. The net well is a large open area at the stern of the vessel.

Researchers will take a fin clip for genetic analysis from each fish captured for the first time or in the case where it would be useful to obtain a second tissue sample. As has been done since 2004 under permits #1475 and #15802, using sterile techniques (e.g., iodine or alcohol swabbing the scissors), a small fin clip (~1 cm^2) will be taken for genetic and stable isotope (feeding ecology) analysis from the free rear tip of a dorsal fin of each sawfish. The sample will be stored in ethanol.

Biopsies will be taken using one standard, individually packaged, disposable, hand-held biopsy punch (6 mm diameter; 8 mm deep; with safety flange to prevent insertion beyond 8 mm). The sample will be taken from the dorsal flank of each sawfish to determine baseline levels of skin and muscle histology, environmental toxins such as mercury (total mercury) and organochlorines, as well as validation of stable isotope results derived from fin clips. In cases where a sawfish is observed to have gross external lesions, a biopsy punch will also be taken in this area for histopathological evaluation. This will allow for identification of pathogens (e.g., fungi, bacteria, viruses) or characterization of tumors. A new sterile punch will be used for each sample. This standard biopsy technique is currently used to take samples from other large fishes (e.g., sharks, billfish), smaller endangered freshwater fishes, and endangered mammals such as right whales and manatees. Biopsy sites (with diameters up to 5 cm) are known to heal quickly and completely when used on a variety of vertebrates such as sharks, teleosts, and marine mammals (annual reports from previous smalltooth sawfish permits).

It is necessary to take biopsies from healthy and unhealthy sawfish so comparisons can be made between healthy and necrotic tissue to assess abnormalities across the population. Further, some of the samples from healthy individuals will be used to determine/monitor levels of environmental toxins (e.g., the State of Florida has a mercury monitoring program) and validate stable isotope results from analysis of fin clips. Toxins are known to have negative effects on neurological and behavioral function as well as reproductive consequences in other species. Stable isotope results will be used with other data (ultrasound, necropsy, fin clips, observations) to learn about the feeding ecology of the species. In addition, it is important to characterize results of biopsy samples using fresh tissue as opposed to tissue derived from necropsies because in many cases, decomposition complicates interpretation.

Each sawfish will be given a PIT tag for identification purposes. PIT tag applicators are similar in size compared with the biopsies, have been used on over 300 sawfish, and these injection sites heal quickly and completely within a few days based on recaptures.

Blood sampling will be conducted using the same methodologies authorized under collaborator Permit No. 13330 (SEFSC; John Carlson). Small blood samples (1 to 5 ml) will be obtained via caudal venipuncture and less than 6 percent of total blood volume from any individual sawfish will be collected. The application contains detailed information about the size of the smalltooth sawfish and the appropriate volume of blood to collect.

Blood will be drawn using a sterile, disposable 1–1.5 inch 20–24 gauge needle and syringe. All sawfish will be restrained with the ventral side up by securing the saw and caudal tail. Small sawfish (<2 m) will be handled on the boat and secured by personnel holding the saw and caudal tail. Larger sawfish (>2 m) will be secured with ropes wrapped around the rostrum, mid-section and caudal tail which are secured to the boat or held by personnel. The needle will enter the tail at the ventral midline and remain as close to the midline position as possible during penetration of the muscle until the vertebral column is reached. Slight penetration of the caudal vertebrae allows access to the caudal vein (Walsh and Luer 2004). Annual reports have noted there are no harmful side effects from drawing blood and no known mortalities have resulted from the process.

The ultrasound examination will occur as part of the normal health assessment workup procedure. For juveniles, ultrasound will determine stomach contents and gonad size if possible. For adults, it will determine stomach contents, gonad size, and brood size (females). The time required for the ultrasound examination will be shorter for juveniles (~5 min) than for adults (~5–10 min) mainly because of quantity differences (adults will probably have more in their stomachs). The spiracles and gills of all sawfish will be kept in the water during the exam.

2.1 Action Area

"Action area" means all areas affected directly, or indirectly, by the Federal action, and not just the immediate area involved in the action (50 CFR 402.02).

The action area for the proposed permit is the entire coastline of the state of Florida from the Gulf of Mexico to the Atlantic Ocean (Figure 1). The areas with highest concentrations of smalltooth sawfish are from Sarasota County to Monroe County on the Gulf Coast and from Volusia County to Monroe County on the east coast. Sampling would extend offshore to the boundaries of the state waters of Florida. Research could occur during all months of the year.

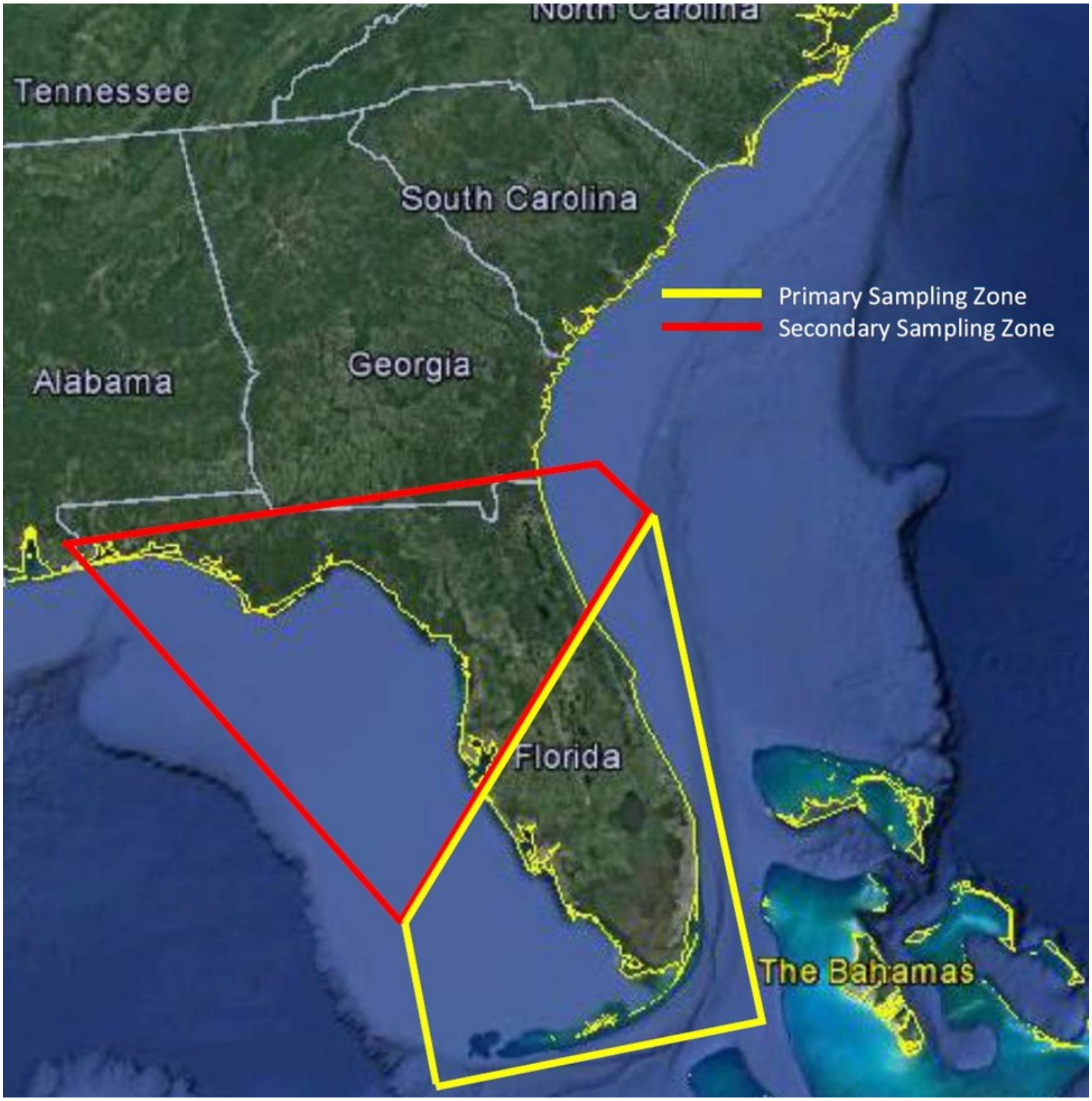

Figure 1. Map of the primary and secondary sampling areas along the entire coast of Florida.

2.2 Interrelated and Interdependent Actions

"Interrelated actions" are those that are part of a larger action and depend on that action for their justification. "Interdependent actions" are those that do not have independent use, apart from the action under consideration. There are no interrelated or interdependent actions associated with the issuance of this permit.

3 THE ASSESSMENT FRAMEWORK

Section 7 (a)(2) of the ESA requires Federal agencies, in consultation with NMFS, to insure that their actions either are not likely to jeopardize the continued existence of endangered or threatened species; or adversely modify or destroy their designated critical habitat.

"To jeopardize the continued existence of an ESA-listed species" means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of an ESA-listed species in the wild by reducing the reproduction, numbers, or distribution of that species (50 CFR §402.02). The jeopardy analysis considers both survival and recovery of the species.

Section 7 assessment involves the following steps:

1) We identify the proposed action and those aspects (or stressors) of the proposed action that are likely to have direct or indirect effects on the physical, chemical, and biotic environment within the action area, including the spatial and temporal extent of those stressors.

2) We identify the ESA-listed species and designated critical habitat that are likely to co-occur with those stressors in space and time.

3) We describe the environmental baseline in the action area including: past and present impacts of Federal, state, or private actions and other human activities in the action area; anticipated impacts of proposed Federal projects that have already undergone formal or early section 7 consultation, impacts of state or private actions that are contemporaneous with the consultation in process.

4) We identify the number, age (or life stage), and gender of ESA-listed individuals that are likely to be exposed to the stressors and the populations or subpopulations to which those individuals belong. We also consider whether the action "may affect" designated critical habitat. This is our exposure analysis.

5) We evaluate the available evidence to determine how individuals of those ESA-listed species are likely to respond given their probable exposure. We also consider how the action may affect designated critical habitat. This is our response analyses.

6) We assess the consequences of these responses of individuals that are likely to be exposed to the populations those individuals represent, and the species those populations comprise. This is our risk analysis.

7) The adverse modification analysis considers the impacts of the proposed action on the essential habitat features and conservation value of designated critical habitat.

8) We describe any cumulative effects of the proposed action in the action area.

   Cumulative effects, as defined in our implementing regulations (50 CFR §402.02), are the effects of future state or private activities, not involving Federal activities, that are reasonably certain to occur within the action area. Future Federal actions that are unrelated to the proposed action are not considered because they require separate section 7 consultation.

9) We integrate and synthesize the above factors by considering the effects of the action to the environmental baseline and the cumulative effects to determine whether the action could reasonably be expected to:

   a) Reduce appreciably the likelihood of both survival and recovery of the ESA-listed species in the wild by reducing its numbers, reproduction, or distribution; or

   b) Reduce the conservation value of designated or proposed critical habitat. These assessments are made in full consideration of the status of the species and critical habitat.

10) We state our conclusions regarding jeopardy and the destruction or adverse modification of designated critical habitat.

If, in completing the last step in the analysis, we determine that the action under consultation is likely to jeopardize the continued existence of ESA-listed species or destroy or adversely modify designated critical habitat, we must identify a reasonable and prudent alternative to the action. The reasonable and prudent alternative must not be likely to jeopardize the continued existence of ESA-listed species nor adversely modify their designated critical habitat and it must meet other regulatory requirements.

To comply with our obligation to use the best scientific and commercial data available, we conducted electronic searches for information relevant to smalltooth sawfish status, factors affecting smalltooth sawfish within the action area, and for information about how elasmobranchs respond to the stressors that are likely to result from the issuance of this permit. We also searched for research relevant to incidental capture and its effects to sea turtles. We used those studies to determine how target and non-target species may be affected by the proposed action to draw conclusions about the likely risks to the continued existence of these species and the conservation value of their critical habitat.

4 Status of Endangered Species Act Protected Resources

This section identifies the ESA-listed species that potentially occur within the action area (Figure 1) that may be affected by issuance of this smalltooth sawfish research permit (Table 2). It then summarizes the biology and ecology of those species and what is known about their life histories in the action area. The species potentially occurring within the action area are ESA-listed in Table 2, along with their regulatory status.

Table 2. Threatened and endangered species that may be affected by this proposed smalltooth sawfish research permit.

Species	ESA Status	Critical Habitat	Recovery Plan
Marine Mammals – Cetaceans			
North Atlantic Right Whale (Eubalaena glacialis)	E – 73 FR 12024	59 FR 28805	70 FR 32293
Sea Turtles			
Green Turtle (*Chelonia mydas*)	E – 43 FR 32800	63 FR 46693	63 FR 28359
Hawksbill Turtle (*Eretmochelys imbricata)*	E – 35 FR 8491	63 FR 46693	NMFS and USFWS 1993
Kemp's Ridley Turtle (*Lepidochelys kempii*)	E – 35 FR 18319	-- --	75 FR 12496
Leatherback Turtle (*Dermochelys coriacea*)	E – 35 FR 8491	44 FR 17710	63 FR 28359
Loggerhead Turtle (*Caretta caretta*) – Northwest Atlantic DPS	E – 76 FR 58868	-- --	63 FR 28359
Fishes			
Shortnose sturgeon (*Acipenser brevirostrum*)	E – 32 FR4001	-- --	63 FR 69613
Gulf sturgeon (Page: 11 *Acipenser oxyrinchus desotoi*)	T – 56 FR 49653	68 FR 13370	USFWS and GSMFC 1995
Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*)			
Atlantic Sturgeon, South Atlantic DPS	E – 77 FR 5914	-- --	-- --
Smalltooth Sawfish (*Pristis pectinata*)	E – 68 FR 15674	74 FR 45353	74 FR 3566
Corals			
Elkhorn Coral (*Acropora palmata*)	T – 71 FR 26852	-- --	-- --
Staghorn Coral (*Acropora cervicornis*)	T – 71 FR 26852	-- --	-- --
Plants			
Johnsons sea grass *(Halophila johnsonii)*	T – 63 FR 49035	65 FR 17786	67 FR 62230

4.1 Species and Critical Habitat Not Likely to be Adversely Affected

NMFS uses two criteria to identify the ESA-listed or critical habitat that are not likely to be adversely affected by the proposed action, as well as the effects of activities that are interrelated to or interdependent with the Federal agency's proposed action. The first criterion is exposure, or some reasonable expectation of a co-occurrence, between one or more potential stressors associated with the proposed activities and ESA-listed species or designated critical habitat. If we conclude that an ESA-listed species or designated critical habitat is not likely to be exposed to the proposed activities, we must also conclude that the species or critical habitat is not likely to be adversely affected by those activities.

The second criterion is the probability of a response given exposure. ESA-listed species or designated critical habitat that is exposed to a potential stressor but is likely to be unaffected by the exposure is also not likely to be adversely affected by the proposed action. We applied these criteria to the United States distinct population segment (DPS) of smalltooth sawfish, North Atlantic right whales, shortnose sturgeon, Gulf sturgeon, South Atlantic DPS Atlantic sturgeon, elkhorn coral, staghorn coral, and Johnson’s sea grass and we summarize our results below.

An action warrants a "may affect, not likely to be adversely affected" finding when its effects are wholly “beneficial,” “insignificant,” or “discountable.” “Beneficial effects” have an immediate positive effect without any adverse effects to the species or habitat. Beneficial effects are usually discussed when the project has a clear link to the ESA-listed species or its specific habitat needs and consultation is required because the species may be affected.

“Insignificant effects” relate to the size or severity of the impact and include those effects that are undetectable, not measurable, or so minor that they cannot be meaningfully evaluated. Insignificant is the appropriate effect conclusion when plausible effects are going to happen, but will not rise to the level of constituting an adverse effect. That means the ESA-listed species may be expected to be affected, but not harmed or harassed.

“Discountable effects” are those that are extremely unlikely to occur. For an effect to be discountable, there must be a plausible adverse effect (i.e., a credible effect that couldresult from the action and that would be an adverse effect if it did impact a listed species),but it is very unlikely to occur.

For designated critical habitat, we first assess the potential effects to each of the essential features and determine whether the effects are “beneficial,” “discountable,” or “insignificant.” In the context of designated critical habitat, “take” is not an issue so we define insignificant effects slightly differently. Insignificant effects are when there is an actual possibility of an effect to the essential feature and the effect is temporary, minor, or both, so that there is no discernible impact on the conservation function of that essential feature in that designated critical habitat unit. We assessed the impacts to designated and proposed critical habitat of North Atlantic right whales, Gulf sturgeon, Atlantic sturgeon, smalltooth sawfish, loggerhead sea turtles, leatherback sea turtles, hawksbill sea turtles, and green sea turtles.

North Atlantic right whales occur in Florida coastal waters, overlapping with smalltooth sawfish research activities. Gill netting for smalltooth sawfish could occur in locations that overlap in time and space with North Atlantic right whale calving. Entanglement could occur and the response would adversely affect this species. However, the probability of overlap is seasonal, number of North Atlantic right whales are minimal, the area affected by netting is very small, and therefore the chance of entanglement is extremely unlikely and therefore, discountable. Mitigation contained in the proposed permit further reduces any risks this activity may pose to right whales.

North Atlantic right whale designated critical habitat exists in Florida state waters and is solely identified to protect calving. The requirements for calving are related to wind, temperature, and depth. No activities proposed during this research would affect these components of designated critical habitat. Therefore, smalltooth sawfish research will have no effect to north Atlantic right whale designated critical habitat.

Smalltooth sawfish designated critical habitat is present within the action area. Critical habitat was designated to protect red mangroves and shallow euryhaline habitats. Sampling for smalltooth sawfish will overlap in time and space with these habitats, but there will be no effect from smalltooth sawfish sampling on these two components of designated critical habitat. Therefore, NMFS concludes this research will not effect smalltooth sawfish designated critical habitat and it will not be considered further in this opinion.

Shortnose sturgeon occasionally range south along the East Coast of Florida in coastal waters, overlapping with smalltooth sawfish research activities. Gill netting for smalltooth sawfish could occur in locations that overlap in time and space with shortnose sturgeon coastal migrations. Entanglement could occur, resulting in capture of shortnose sturgeon. However, the probability of overlap is extremely unlikely as shortnose sturgeon are rare visitors to the state of Florida, and mitigation contained in the proposed permit further reduces any risks this activity may pose to shortnose sturgeon. Critical habitat has not been designated for shortnose sturgeon. Because the probability of exposure is discountable and there is no designated critical habitat, NMFS concludes this research is not likely to adversely affect shortnose sturgeon and this species will not be considered further in this opinion.

Gulf sturgeon occur regularly in the northern Gulf Coast waters of Florida and occasionally range south along the Florida peninsula, overlapping with smalltooth sawfish research activities. Gill netting for smalltooth sawfish could occur in locations that overlap in time and space with Gulf sturgeon coastal migrations. Entanglement could occur, resulting in capture of Gulf sturgeon. However, the probability of overlap is extremely unlikely as Gulf sturgeon rarely overlap with the primary sampling region, and mitigation contained in the proposed permit further reduces any risks smalltooth sawfish research may pose to Gulf sturgeon by limiting the response Gulf sturgeon would experience if captured.

Critical habitat is designated in northern Florida waters for Gulf sturgeon. The primary constituent elements for Gulf sturgeon critical habitat are related to food, spawning locations, aggregating locations, water quantity, water quality, sediment quality, and migratory pathways. The only habitat element that could be affected by smalltooth sawfish research would be the disruption of migratory pathways, however, the researchers will not set gill nets for more than one hour at a time and no gear will be left behind. This momentary disruption of migratory pathways would have a negligible impact on migratory behavior. Because the probability of exposure is discountable and the impacts to designated critical habitat is insignificant, NMFS concludes this research is not likely to adversely affect Gulf sturgeon and is not likely to adversely affect Gulf sturgeon designated critical habitat. Therefore this species and designated critical habitat will not be considered further in this opinion.

Atlantic sturgeon occasionally range south along the East Coast of Florida in coastal waters, overlapping with the secondary research area for smalltooth sawfish research activities. While five DPSs of Atlantic sturgeon are listed, with the action area being to the south of most of the species' range, it is believed that only the South Atlantic DPS of Atlantic sturgeon may overlap with smalltooth sawfish research activities. In the event the South Atlantic DPS of Atlantic sturgeon overlaps with research activities, it would be during Atlantic sturgeon coastal migrations. Entanglement could occur, resulting in capture of Atlantic sturgeon. However, the probability of overlap is extremely unlikely as Atlantic sturgeon are rare visitors to the state of Florida, and mitigation contained in the proposed permit further reduces any risks this activity may pose to Atlantic sturgeon.

Critical habitat has been proposed for Atlantic sturgeon. The features protected are salinity with appropriate gradients for all life stages, hard bottom, water quality, and water generally that supports staging and movement of adults, sub-adults, and juveniles. The only feature of proposed Atlantic sturgeon critical habitat that could be affected by smalltooth sawfish research could be a temporary disruption of migratory pathways; however, the researchers will not set gill nets for more than one hour at a time and no gear will be left behind. It is highly unlikely that this momentary disruption of migratory pathways will have an impact on migratory behavior. Because the probability of exposure and response are discountable and the impacts to proposed critical habitat are insignificant, NMFS concludes this research is not likely to adversely affect Atlantic sturgeon nor is it likely to adversely affect proposed critical habitat, and therefore this species will not be considered further in this opinion.

Northwest Atlantic DPS of loggerhead sea turtles have designated critical habitat in the action area. Critical habitat was designated to protect reproductive, foraging, wintering, breeding, and migratory habitat. Sampling for smalltooth sawfish has the potential to interfere with migratory habitat. Because researchers will not set gill nets for more than one hour and no gear will be left behind, disruption of migratory pathways would be spatially miniscule and temporary. Therefore, NMFS concludes this research is not likely to adversely affect Northwest Atlantic DPS loggerhead sea turtle critical habitat because it will have an insignificant effect and therefore critical habitat for this species will not be considered further in this opinion.

Elkhorn and staghorn coral occur in Florida coastal waters, overlapping with smalltooth sawfish research activities. Gill netting for smalltooth sawfish could occur in locations with elkhorn or staghorn corals. It is possible anchored gill nets could hit and damage corals. However, the probability of an anchor impacting a coral is discountable due to the rarity of these corals, the locations of sampling, and mitigation contained in the proposed permit further reduces any risks this activity may pose to corals extremely unlikely. Elkhorn and staghorn coral critical habitat exists in Florida state waters. The only aspect of designated critical habitat for these species is substrate of suitable quality and availability necessary for recruitment. Gill nets and anchors should not alter the substrate quality or availability in any way and therefore any potential threats to designated critical habitat are extremely unlikely. Because the probability of exposure is discountable and any risks to critical habitat are also discountable, NMFS concludes this research is not likely to adversely affect elkhorn or staghorn corals and these species will not be considered further in this opinion.

Johnsons sea grass occurs in Florida coastal waters, overlapping with smalltooth sawfish research activities. Gill netting for smalltooth sawfish could occur in locations with Johnson’s sea grass. The only means of adverse effects of gill nets on Johnson’s sea grass is anchor drag, but in areas where Johnson’s sea grass is found, the researcher would be fishing for juvenile smalltooth sawfish using drift gill nets or baited lines. Because of this, the chance of the lead line dragging on the bottom is the only threat and the potential of exposure and response rising to an adverse effect is extremely unlikely. Johnson’s sea grass critical habitat exists in Florida state waters, requiring protection of substrate and water where Johnson’s sea grass is growing. Smalltooth sawfish research could only affect substrates and as discussed, would cause a discountable disturbance in the event the lead line of a gill net dragged across the substrate. Because the probability of exposure is discountable and any risks to critical habitat are negligible, NMFS concludes this research is not likely to adversely affect Johnson’s sea grass and this species will not be considered further in this opinion.

4.2 Species and Critical Habitat Likely to be Adversely Affected

This consultation examined the status of each species that would be affected by the proposed action. The status is determined by the level of risk that the ESA-listed species face, based on parameters considered in documents such as recovery plans, status reviews, and listing decisions. The species status section helps to inform the description of the species’ current “reproduction, numbers, or distribution” as described in 50 CFR 402.02. More detailed information on the status and trends of these ESA-listed species, and their biology and ecology can be found in the listing regulations and critical habitat designations published in the Federal Register, status reviews, recovery plans, and on NMFS’ Web site: http://www.nmfs.noaa.gov/pr/species/index.htm.

4.2.1 Smalltooth Sawfish

Species Description

Although this species is reported to have a circumtropical distribution, NMFS identified smalltooth sawfish from the Southeast United States as a DPS. Within the United States, smalltooth sawfish have been captured in estuarine and coastal waters from New York southward through Texas, although peninsular Florida has historically been the region of the United States with the largest number of recorded captures (NMFS 2010) (Figure 2).

The smalltooth sawfish is a tropical marine and estuarine elasmobranch. Although they are rays, sawfish physically resemble sharks, with only the trunk and especially the head ventrally flattened. Smalltooth sawfish are characterized by their "saw," a long, narrow, flattened rostral blade with a series of transverse teeth along either edge (NMFS 2009). The United States DPS of smalltooth sawfish was listed as endangered under the ESA effective May 1, 2003.

Reference Table: Smalltooth Sawfish Portion of Table 2.

Species	Common Name	Distinct Population Segments (DPS)	ESA Status	Recent Review Year	Listing	Recovery Plan	Critical Habitat
Pristis pectinata	Sawfish, smalltooth	US portion of range	Endangered	2010	2003 68 FR 15674	2009	2009 74 FR 45 353

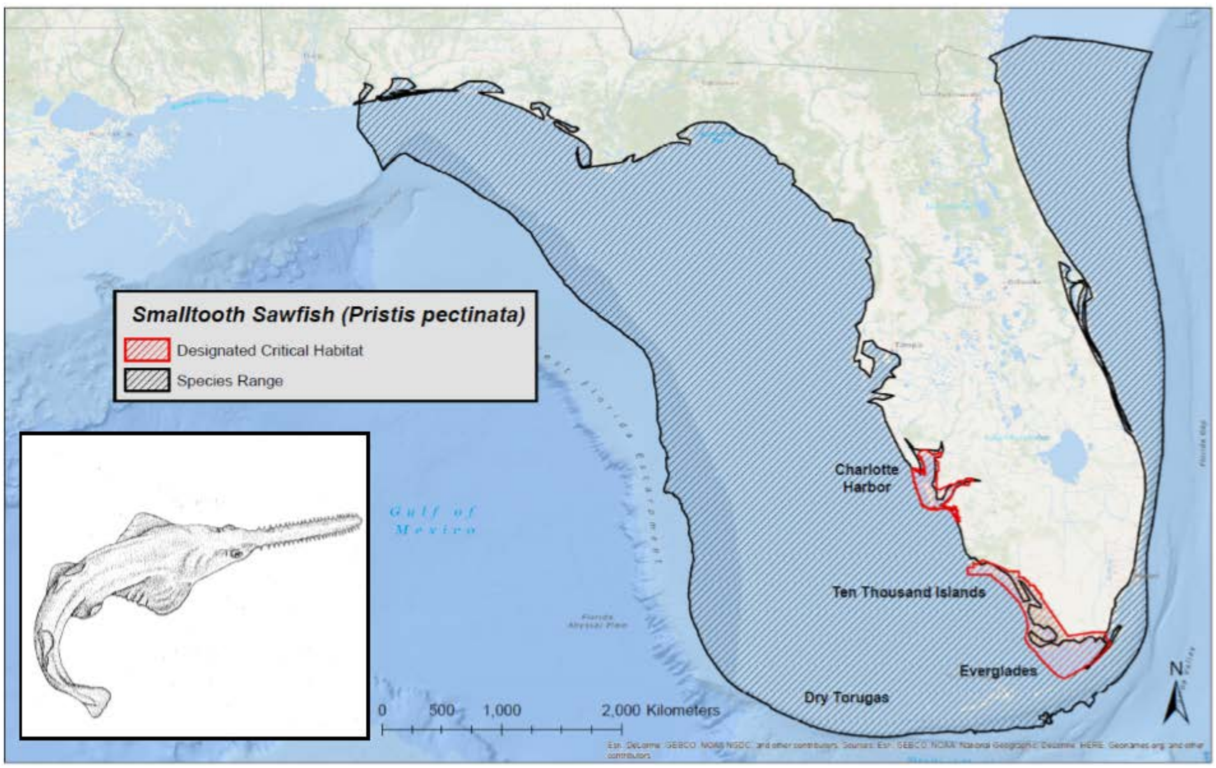

Figure 2. Smalltooth sawfish range and designated critical habitat.

Life History

Smalltooth sawfish size at sexual maturity has been reported as 360 cm total length by Simpfendorfer (2005). Carlson and Simpfendorfer (2015) estimated that sexual maturity for females occurs between 7 and 11 years of age. As in all elasmobranchs, smalltooth sawfish are viviparous; fertilization is internal. The gestation period for smalltooth sawfish is estimated at 5 months based on data from the largetooth sawfish (Thorson 1976). Females move into shallow estuarine and nearshore nursery areas to give birth to live young between November and July, with peak parturition occurring between April and May (Poulakis et al. 2011). Litter sizes range between 10 and 20 individuals (Bigalow and Schroeder 1953; Carlson and Simpfendorfer 2015; Simpfendorfer 2005).

Neonate smalltooth sawfish are born measuring 67 – 81 cm total length and spend the majority of their time in the shallow nearshore edges of sand and mud banks (Poulakis et al. 2011; Simpfendorfer et al. 2010). Once individuals reach 100 – 140 cm total length they begin to expand their foraging range. Capture data suggests smalltooth sawfish in this size class may move throughout rivers and estuaries within a salinity range of 18 and 30 (practical salinity units). Individuals in this size class also appear to have the highest affinity to mangrove habitat (Simpfendorfer et al. 2011). Juvenile sawfish spend the first 2-3 years of their lives in the shallow waters provided in the lower reaches of rivers, estuaries, and coastal bays (Simpfendorfer et al. 2008; Simpfendorfer et al. 2011). As smalltooth sawfish approach 250 cm total length they become less sensitive to salinity changes and begin to move out of the protected shallow-water embayments and into the shorelines of barrier islands (Poulakis et al. 2011). Adult sawfish typically occur in more open-water, marine habitats (Poulakis and Seitz 2004).

Population Dynamics

The abundance of smalltooth sawfish in U.S. waters has decreased dramatically over the past century. Efforts are currently underway to provide better estimates of smalltooth sawfish abundance (NMFS 2014). Current abundance estimates are based on encounter data, genetic sampling, and geographic extent. Carlson and Simpfendorfer (2015) used encounter densities to estimate the female population size to be 600. Chapman et al. (2011) analyzed genetic data from tissue samples (fin clips) to estimate the effective population size as 250-350 adults (95 percent confidence interval from 142 to 955). Simpfendorfer (2002) estimated that the U.S. population may number less than five percent of historic levels based on the contraction of the species' range.

The abundance of juveniles encountered in recent studies (Poulakis et al. 2014; Seitz and Poulakis 2002; Simpfendorfer and Wiley 2004) suggests that the smalltooth sawfish population remains reproductively viable. The overall abundance appears to be stable (Wiley and Simpfendorfer 2010). Data analyzed from the Everglades portion of the smalltooth sawfish range suggests that the population growth rate for that region may be around five percent per year (Carlson and Osborne 2012; Carlson et al. 2007). Intrinsic rates of growth (λ) for smalltooth sawfish have been estimated at 1.08-1.14 per year and 1.237-1.150 per year by Simpfendorfer (2000) and Carlson and Simpfendorfer (2015) respectively. However, these intrinsic rates are uncertain due to the lack of long-term abundance data.

Chapman et al. (2011) investigated the genetic diversity within the smalltooth sawfish population. The study reported that the remnant population exhibits high genetic diversity (allelic richness, alleles per locus, heterozygosity) and that inbreeding is rare. The study also suggested that the protected population will likely retain > 90 percent of its current genetic diversity over the next century.

Recent capture and encounter data suggests that the current distribution is focused primarily to south and southwest Florida from Charlotte Harbor through the Dry Tortugas (Poulakis and Seitz 2004; Seitz and Poulakis 2002) (Figure 2). Water temperatures (no lower than 16-18°C) and the availability of appropriate coastal habitat (shallow, euryhaline waters and red mangroves) are the major environmental constraints limiting the distribution of smalltooth sawfish (Bigalow and Schroeder 1953).

Status

The decline in the abundance of smalltooth sawfish has been attributed to fishing (primarily commercial and recreational bycatch), habitat modification (including changes to freshwater flow regimes as a result of climate change), and life history characteristics (i.e. slow-growing, relatively late-maturing, and long-lived species) (NMFS 2009; Simpfendorfer et al. 2011). These factors continue to threaten the smalltooth sawfish population. Recent records indicate there is a resident reproducing population of smalltooth sawfish in south and southwest Florida from Charlotte Harbor through the Dry Tortugas, which is also the last U.S. stronghold for the species (Poulakis and Seitz 2004; Seitz and Poulakis 2002; Simpfendorfer and Wiley 2004). Recent information indicates the smalltooth sawfish population is likely stable or increasing (Carlson and Osborne 2012; Carlson and Simpfendorfer 2015). While the overall abundance appears to be stable, low intrinsic rates of population increase suggest that the species is particularly vulnerable to rapid population declines (NMFS 2010).

Designated Critical Habitat

Critical habitat for smalltooth sawfish was designated in 2009 and includes two major units: Charlotte Harbor (221,459 acres) and Ten Thousand Islands/Everglades (619,013 acres) (Figure 2). These two units include essential sawfish nursery areas. Within the nursery areas, two features were identified as essential to the conservation of the species: red mangroves (*Rhizophora mangle*), and euryhaline habitats with water depths ≤0.9 m. See Section 4.1 for a more detailed discussion of loggerhead critical habitat within the action area.

4.2.2 Loggerhead Sea Turtles – Northwest Atlantic

Species Description

Loggerhead sea turtles are circumglobal, and are found in the temperate and tropical regions of the Indian, Pacific and Atlantic Oceans (Figure 3).

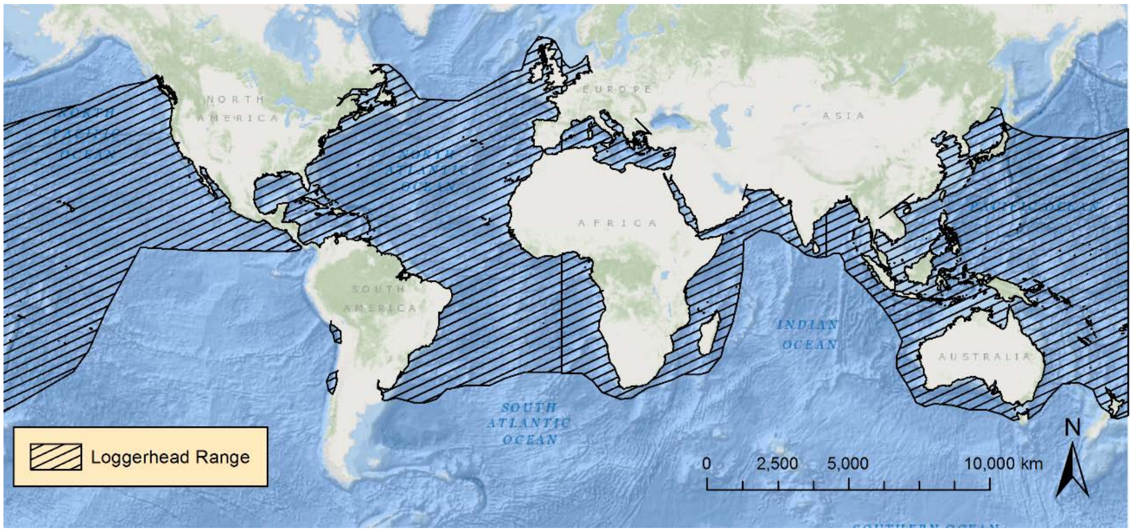

Figure 3. Map identifying the range of the loggerhead sea turtle.

The loggerhead sea turtle is distinguished from other turtles by its reddish-brown carapace, large head and powerful jaws. The species was first listed as threatened under the ESA in 1978. On September 22, 2011, the NMFS designated nine DPSs of loggerhead sea turtles, with the Northwest Atlantic Ocean DPS listed as threatened.

We used information available in the 2009 Status Review (Conant et al. 2009) and the final listing rule to summarize the life history, population dynamics and status of the species, as follows.

Life History

Mean age at first reproduction for female loggerhead sea turtles is thirty years. Females lay an average of three clutches per season. The annual average clutch size is 112 eggs per nest. The average remigration interval is 2.7 years. Nesting occurs on beaches, where warm, humid sand temperatures incubate the eggs. Temperature determines the sex of the turtle during the middle of the incubation period. Turtles spend the post-hatchling stage in pelagic waters. The juvenile stage is spent first in the oceanic zone and later in the neritic zone (i.e., coastal waters). Coastal waters provide important foraging habitat, inter-nesting habitat, and migratory habitat for adult loggerheads.

Reference Table: Loggerhead Sea Turtle Northwest Atlantic Ocean DPS Portion of Table 2.

Species	Common Name	Distinct Population Segments (DPS)	ESA Status	Recent Review Year	Listing	Recovery Plan	Critical Habitat
Caretta caretta	Loggerhead sea turtle	Northwest Atlantic Ocean	Threatened	2009	2011 76 FR 58868	2009 74 FR 2995	2014 79 FR 39855

Population Dynamics

Using a stage/age demographic model, the adult female population size of the DPS is estimated at 20,000 to 40,000 females, and 53,000 to 92,000 nests annually (NMFS-SEFSC 2009). Based on genetic information, the Northwest Atlantic Ocean DPS is further categorized into five recovery units corresponding to nesting beaches: Northern Recovery Unit; Peninsular Florida Recovery Unit; Dry Tortugas Recovery Unit; Northern Gulf of Mexico Recovery Unit; and the Greater Caribbean Recovery Unit. The Northern Recovery Unit, from North Carolina to northeastern Florida, and is the second largest nesting aggregation in the DPS, with an average of 5,215 nests from 1989 to 2008, and approximately 1,272 nesting females (NMFS and USFWS 2008). The Peninsular Florida Recovery Unit hosts more than 10,000 females nesting annually, which constitutes eighty-seven percent of all nesting effort in the DPS (Ehrhart et al. 2003). The Greater Caribbean Recovery Unit encompasses nesting subpopulations in Mexico to French Guiana, the Bahamas, and the Lesser and Greater Antilles. The majority of nesting for this recovery unit occurs on the Yucatán peninsula, in Quintana Roo, Mexico, with 903 to 2,331 nests annually (Zurita et al. 2003). Other significant nesting sites are found throughout the Caribbean, and including Cuba, with approximately 250 to 300 nests annually (Ehrhart et al. 2003), and over one hundred nests annually in Cay Sal in the Bahamas (NMFS and USFWS 2008). The Dry Tortugas Recovery Unit includes all islands west of Key West, Florida. The only available data for the nesting subpopulation on Key West comes from a census conducted from 1995 to 2004 (excluding 2002), which provided a mean of 246 nests per year, or about sixty nesting females (NMFS and USFWS 2007b). The Gulf of Mexico Recovery Unit has between one hundred to 999 nesting females annually, and a mean of 910 nests per year.

The population growth rate for each of the four of the recovery units for the Northwest Atlantic DPS (Peninsular Florida, Northern, Northern Gulf of Mexico, and Greater Caribbean) all exhibit negative growth rates (Conant et al. 2009). Nest counts taken at index beaches in Peninsular Florida show a significant decline in loggerhead nesting from 1989 to 2006, most likely attributed to mortality of oceanic-stage loggerheads caused by fisheries bycatch (Witherington et al. 2009). Loggerhead nesting on the Archie Carr National Wildlife Refuge (representing individuals of the Peninsular Florida subpopulation) has fluctuated over the past few decades. There was an average of 9,300 nests throughout the 1980s, with the number of nests increasing into the 1990s until it reached an all-time high in 1998, with 17,629 nests. From that point, the number of loggerhead nests at the Refuge have declined steeply to a low of 6,405 in 2007, increasing again to 15,539, still a lower number of nests than in 1998 (Bagley et al. 2013). For the Northern recovery unit, nest counts at loggerhead nesting beaches in North Carolina, South Carolina and Georgia declined at 1.9 percent annually from 1983 to 2005 (NMFS and USFWS 2007b). The nesting subpopulation in the Florida panhandle has exhibited a significant declining trend from 1995 to 2005 (Conant et al. 2009; NMFS and USFWS 2007b). Recent model estimates predict an overall population decline of seventeen percent for the St. Joseph Peninsula, Florida subpopulation of the Northern Gulf of Mexico recovery unit (Lamont et al. 2014).

Based on genetic analysis of nesting subpopulations, the Northwest Atlantic Ocean DPS is further divided into five recovery units: Northern, Peninsular Florida, Dry Tortugas, Northern Gulf of Mexico, and Greater Caribbean (Conant et al. 2009). A more recent analysis using expanded mitochondrial DNA sequences revealed that rookeries from the Gulf and Atlantic coasts of Florida are genetically distinct, and that rookeries from Mexico's Caribbean coast express high haplotype diversity (Shamblin et al. 2014). Furthermore, the results suggest that the Northwest Atlantic Ocean DPS should be considered as ten management units: (1) South Carolina and Georgia; (2) central eastern Florida; (3) southeastern Florida; (4) Cay Sal, Bahamas; (5) Dry Tortugas, Florida; (6) southwestern Cuba; (7) Quintana Roo, Mexico; (8) southwestern Florida; (9) central western Florida; and (10) northwestern Florida (Shamblin et al. 2012).

Loggerhead hatchlings from the western Atlantic disperse widely, most likely using the Gulf Stream to drift throughout the Atlantic Ocean. Mitochondrial DNA evidence demonstrates that juvenile loggerheads from southern Florida nesting beaches comprise the vast majority (seventy-one to eighty-eight percent) of individuals found in foraging grounds throughout the western and eastern Atlantic: Nicaragua, Panama, Azores and Madiera, Canary Islands and Adalusia, Gulf of Mexico and Brazil (Masuda 2010).

Status

Due to declines in nest counts at index beaches in the United States and Mexico, and continued mortality of juveniles and adults from fishery bycatch, the Northwest Atlantic Ocean DPS is at risk and likely to decline in the foreseeable future (Conant et al. 2009). Bycatch data from the southeastern United States (central North Carolina through central Florida) indicate a possible increase in the abundance of neritic loggerheads in this region over the past one to two decades. However, this increase in catch rates for the southeastern United States was not consistent with the declining trend in nesting seen over the same period. Aerial surveys and one in-water study conducted in the northeastern United States (north of Cape Hatteras, North Carolina) also indicate a decrease in abundance in recent years (TEWG 2009).

Critical Habitat

On July 10, 2014, NMFS and U.S. Fish and Wildlife Service designated critical habitat for the Northwest Atlantic Ocean DPS loggerhead sea turtles along the U.S. Atlantic and Gulf of Mexico coasts from North Carolina to Mississippi. These areas contain one or a combination of nearshore reproductive habitat, winter area, breeding areas, and migratory corridors. See Section 4.1 for a more detailed discussion of loggerhead critical habitat within the action area.

4.2.3 Leatherback Sea Turtles

Species Description

The leatherback sea turtle is unique among sea turtles for its large size, wide distribution (due to thermoregulatory systems and behavior), and lack of a hard, bony carapace. It ranges from tropical to subpolar latitudes, worldwide (Figure 4). Leatherbacks are the largest living turtle, reaching lengths of six feet long, and weighing up to one ton. Leatherback sea turtles have a distinct black leathery skin covering their carapace with pinkish white skin on their belly. The species was first listed under the Endangered Species Conservation Act and listed as endangered under the ESA since 1973.

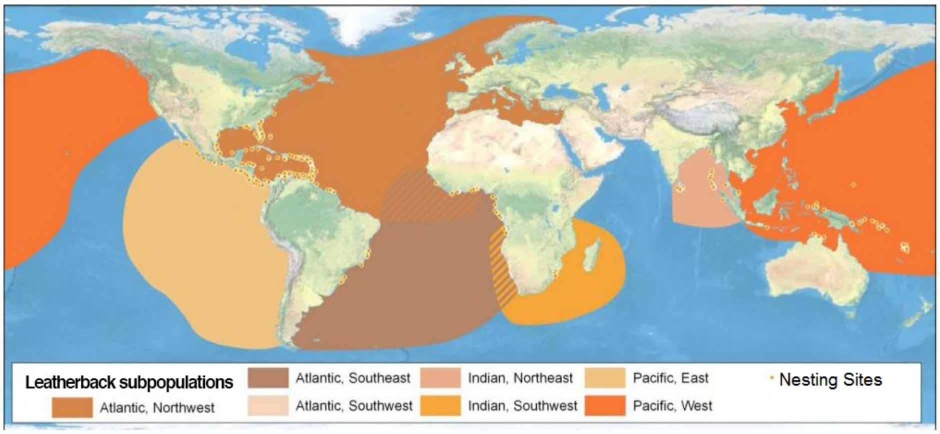

Figure 4. Map identifying the range of the endangered leatherback sea turtle. Adapted from (Wallace 2013).

We used information available in the five-year review (NMFS 2013b) and the critical habitat designation to summarize the life history, population dynamics and status of the species, as follows.

Reference Table: Leatherback Sea Turtle Portion of Table 2.

Species	Common Name	Distinct Population Segments (DPS)	ESA Status	Recent Review Year	Listing	Recovery Plan	Critical Habitat
Dermochelys coriacea	Leatherback sea turtle	None Designated	Endan-gered range wide	2013	1970 35 FR 8491	1992 63 FR 28359	1979 and 2012 44 FR 17710 and 77 FR 4170

Life History

Age at maturity has been difficult to ascertain, with estimates ranging from five to twenty-nine years (Avens et al. 2009; Spotila et al. 1996). Females lay up to seven clutches per season, with more than sixty-five eggs per clutch and eggs weighing greater than 80 g (Reina et al. 2002;

Wallace et al. 2007). The number of leatherback hatchlings that make it out of the nest on to the beach (i.e., emergent success) is approximately fifty percent worldwide (Eckert et al. 2012). Females nest every one to seven years. Natal homing, at least within an ocean basin, results in reproductive isolation between five broad geographic regions: eastern and western Pacific, eastern and western Atlantic, and Indian Ocean. Leatherback sea turtles migrate long, transoceanic distances between their tropical nesting beaches and the highly productive temperate waters where they forage, primarily on jellyfish and tunicates. These gelatinous prey are relatively nutrient-poor, such that leatherbacks must consume large quantities to support their body weight. Leatherbacks weigh about thirty-three percent more on their foraging grounds than at nesting, indicating that they probably catabolize fat reserves to fuel migration and subsequent reproduction (James et al. 2005; Wallace et al. 2006). Sea turtles must meet an energy threshold before returning to nesting beaches. Therefore, their remigration intervals (the time between nesting) are dependent upon foraging success and duration (Hays 2000; Price et al. 2004).

Population Dynamics

Leatherbacks are globally distributed, with nesting beaches in the Pacific, Atlantic, and Indian oceans. Detailed population structure is unknown, but is likely dependent upon nesting beach location. Based on estimates calculated from nest count data, there are between 34,000 and 94,000 adult leatherbacks in the North Atlantic (TEWG 2007). In contrast, leatherback populations in the Pacific are much lower. Overall, Pacific populations have declined from an estimated 81,000 individuals to less than 3,000 total adults and subadults (Spotila et al. 2000). Population abundance in the Indian Ocean is difficult to assess due to lack of data and inconsistent reporting. Available data from southern Mozambique show that approximately ten females nest per year from 1994 to 2004, and about 296 nests per year counted in South Africa (NMFS 2013b).

Population growth rates for leatherback sea turtles vary by ocean basin. Counts of leatherbacks at nesting beaches in the western Pacific indicate that the subpopulation has been declining at a rate of almost six percent per year since 1984 (Tapilatu et al. 2013). Leatherback subpopulations in the Atlantic Ocean, however, are showing signs of improvement. Nesting females in South Africa are increasing at an annual rate of four to 5.6 percent, and from nine to thirteen percent in Florida and the U.S. Virgin Islands (TEWG 2007), believed to be a result of conservation efforts.

Analyses of mitochondrial DNA from leatherback sea turtles indicates a low level of genetic diversity, pointing to possible difficulties in the future if current population declines continue (Dutton et al. 1999). Further analysis of samples taken from individuals from rookeries in the Atlantic and Indian oceans suggest that each of the rookeries represent demographically independent populations (NMFS 2013b).

Leatherback sea turtles are distributed in oceans throughout the world (Figure 4). Leatherbacks occur throughout marine waters, from nearshore habitats to oceanic environments (Shoop and Kenney 1992). Movements are largely dependent upon reproductive and feeding cycles and the oceanographic features that concentrate prey, such as frontal systems, eddy features, current boundaries, and coastal retention areas (Benson et al. 2011).

Status

The leatherback sea turtle is an endangered species whose once large nesting populations have experienced steep declines in recent decades. The primary threats to leatherback sea turtles include fisheries bycatch, harvest of nesting females, and egg harvesting. Because of these threats, once large rookeries are now functionally extinct, and there have been range-wide reductions in population abundance. Other threats include loss of nesting habitat due to development, tourism, and sand extraction. Lights on or adjacent to nesting beaches alter nesting adult behavior and are often fatal to emerging hatchlings as they are drawn to light sources and away from the sea. Plastic ingestion is common in leatherbacks and can block gastrointestinal tracts leading to death. Climate change may alter sex ratios (as temperature determines hatchling sex), range (through expansion of foraging habitat), and habitat (through the loss of nesting beaches, due to sea-level rise. The species' resilience to additional perturbation is low.

Populations in the eastern Atlantic (i.e., off Africa) and Caribbean appear to be stable; however, information regarding the status of the entire leatherback population in the Atlantic is lacking and it is certain that some nesting populations (e.g., St. John and St. Thomas, US Virgin Islands) have been extirpated (NMFS and USFWS 2007c).

Critical Habitat

On March 23, 1979, leatherback critical habitat was identified adjacent to Sandy Point, St. Croix, Virgin Islands from the 183 meter isobath to mean high tide level between 17° 42'12" N and 65°50'00" W. This habitat is essential for nesting, which has been increasingly threatened since 1979, when tourism increased significantly, bringing nesting habitat and people into close and frequent proximity; however, studies do not support significant critical habitat deterioration.

On January 20, 2012, NMFS issued a final rule to designate additional critical habitat for the leatherback sea turtle. This designation includes approximately 43,798 km^2 stretching along the California coast from Point Arena to Point Arguello east of the 3000 m depth contour; and 64,760 km^2 stretching from Cape Flattery, Washington, to Cape Blanco, Oregon, east of the 2,000 meter depth contour.

There is no overlap between the action area for this biological opinion and leatherback sea turtle designated critical habitat.

4.2.4 Hawksbill Sea Turtles

Species Description

The hawksbill turtle has a circumglobal distribution throughout tropical and, to a lesser extent, subtropical oceans (Figure 5). The hawksbill sea turtle has a sharp, curved, beak-like mouth and a "tortoiseshell" pattern on its carapace, with radiating streaks of brown, black, and amber. The species was first listed under the Endangered Species Conservation Act and listed as endangered under the ESA since 1973.

We used information available in the five year reviews (NMFS 2013a; NMFS and USFWS 2007a) to summarize the life history, population dynamics and status of the species, as follows.

Life History

Hawksbill sea turtles reach sexual maturity at twenty to forty years of age. Females return to their natal beaches every two to five years to nest and nest an average of three to five times per season. Clutch sizes are large (up to 250 eggs). Sex determination is temperature dependent, with warmer incubation producing more females. Hatchlings migrate to and remain in pelagic habitats until they reach approximately twenty two to twenty five centimeters in straight carapace length.

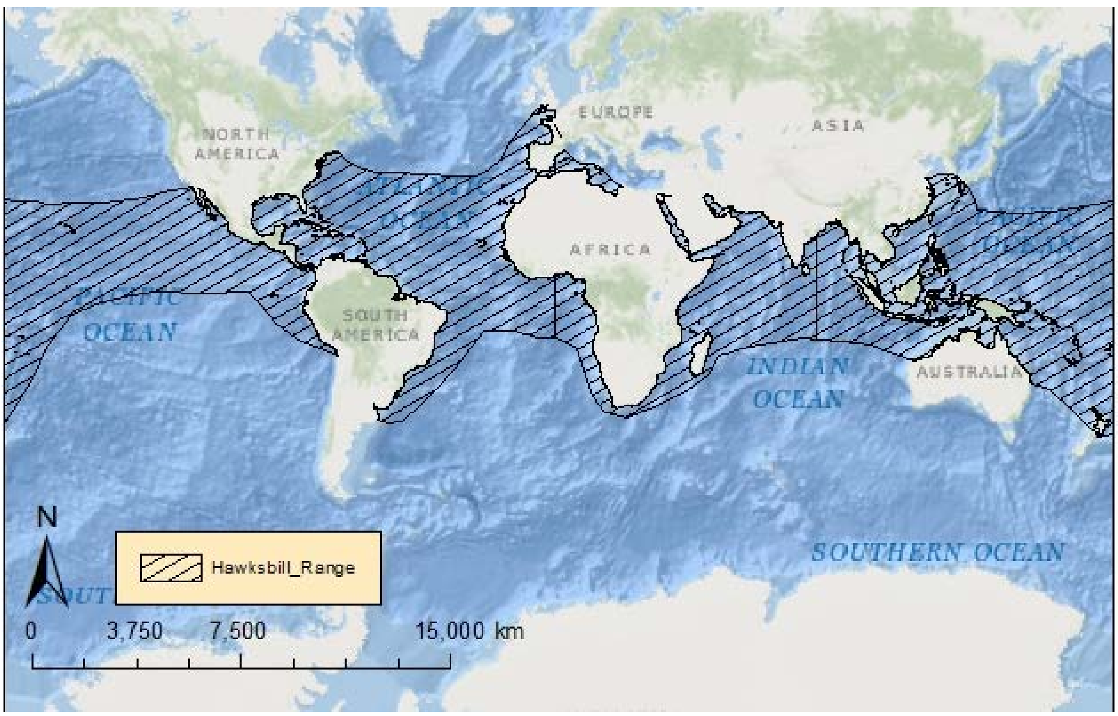

Figure 5. Map identifying the range of the endangered hawksbill turtle.

Juvenile hawksbills take up residency in coastal waters to forage and grow. Adults use their sharp, beak-like mouths to feed on sponges and corals. Hawksbill sea turtles are highly migratory and use a wide range of habitats during their lifetimes (Musick and Limpus 1997; Plotkin 2003). Satellite tagged turtles have shown significant variation in movement and migration patterns. Distance traveled between nesting and foraging locations ranges from a few hundred to a few thousand kilometers (Horrocks et al. 2001; Miller et al. 1998).

Reference Table: Hawksbill Sea Turtle Portion of Table 2.

Species	Common Name	Distinct Population Segments (DPS)	ESA Status	Recent Review Year	Listing	Recovery Plan	Critical Habitat
Eretmochelys imbricata	Hawksbill turtle	None designated	Endangered range wide	2013	1970 35 FR 8491	1992 57 FR 38818	1998 63 FR 46693

Population Dynamics

Surveys at eighty eight nesting sites worldwide indicate that 22,004 to 29,035 females nest annually (NMFS 2013a). In general, hawksbills are doing better in the Atlantic and Indian Ocean than in the Pacific Ocean, where despite greater overall abundance, a greater proportion of the nesting sites are declining. From 1980 to 2003, the number of nests at three primary nesting beaches (Rancho Nuevo, Tepehuajes, and Playa Dos) increased fifteen percent annually (Heppell et al. 2005); however, due to recent declines in nest counts, decreased survival at other life stages, and updated population modeling, this rate is not expected to continue (NMFS 2013a).

Populations are distinguished generally by ocean basin and more specifically by nesting location. Our understanding of population structure is relatively poor. Genetic analysis of hawksbill sea turtles foraging off the Cape Verde Islands identified three closely-related haplotypes in a large majority of individuals sampled that did not match those of any known nesting population in the western Atlantic, where the vast majority of nesting has been documented (McClellan et al. 2010; Monzon-Arguello et al. 2010). Hawksbills in the Caribbean seem to have dispersed into separate populations (rookeries) after a bottleneck roughly 100,000 to 300,000 years ago (Leroux et al. 2012).

The hawksbill has a circumglobal distribution throughout tropical and, to a lesser extent, subtropical waters of the Atlantic, Indian, and Pacific Oceans. In their oceanic phase, juvenile hawksbills can be found in *Sargassum* mats; post-oceanic hawksbills may occupy a range of habitats that include coral reefs or other hard-bottom habitats, seagrass, algal beds, mangrove bays and creeks (Bjorndal and Bolten 2010; Musick and Limpus 1997).

Status

Long-term data on the hawksbill sea turtle indicate that 63 sites have declined over the past twenty to one hundred years (historic trends are unknown for the remaining 25 sites). Recently, 28 sites (68 percent) have experienced nesting declines, 10 have experienced increases, three have remained stable, and 47 have unknown trends. Regarding 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 (e.g., 9 of the 10 sites showing recent increases were all located in the Caribbean). Surveys of Mona Island, Puerto Rico, nesting beaches indicate an increasing population trend spanning the past three decades. The greatest threats to hawksbill sea turtles are overharvesting of turtles and eggs, degradation of nesting habitat, and fisheries interactions. Adult hawksbills are harvested for their meat and carapace, which is sold as tortoiseshell. Eggs are taken at high levels, especially in southeast Asia where collection approaches one hundred percent in some areas. In addition, lights on or adjacent to nesting beaches are often fatal to emerging hatchlings and alters the behavior of nesting adults. The species' resilience to additional perturbation is low.

Critical Habitat

On September 2, 1998, NMFS established critical habitat for hawksbill sea turtles around Mona and Monito Islands, Puerto Rico. Aspects of these areas that are important for hawksbill sea turtle survival and recovery include important natal development habitat, refuge from predation, shelter between foraging periods, and food for hawksbill sea turtle prey.

There is no overlap between the action area for this biological opinion and hawksbill turtle designated critical habitat.

4.2.5 Kemp's Ridley Sea Turtles

Species Description

The Kemp's ridley turtle is considered the most endangered sea turtle, internationally (Groombridge 1982; Zwinenberg 1977). Its range extends from the Gulf of Mexico to the Atlantic coast, with nesting beaches limited to a few sites in Mexico and Texas (Figure 6).

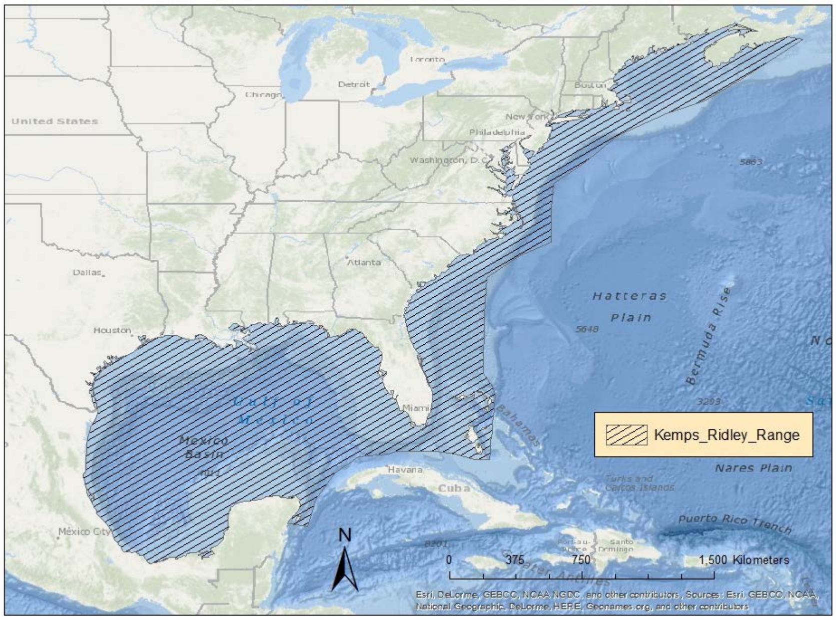

Figure 6. Map identifying the range of the endangered Kemp's ridley sea turtle.

Kemp's ridley sea turtles the smallest of all sea turtle species, with a nearly circular top shell and a pale yellowish bottom shell. The species was first listed under the Endangered Species Conservation Act and listed as endangered under the ESA since 1973.

Reference Table: Kemp's Ridley Sea Turtle Portion of Table 2.

Species	Common Name	Distinct Population Segments (DPS)	ESA Status	Recent Review Year	Listing	Recovery Plan	Critical Habitat
Lepidochelys kempii	Kemp's ridley turtle	None Designated	Endangered range wide	2015	1970 35 FR 18319	2010 75 FR 12496	None Designated

We used information available in the revised recovery plan (NMFS and USFWS 2011) and the Five-Year Review (NMFS and USWFS 2015) to summarize the life history, population dynamics and status of the species, as follows.

Life History

Females mature at twelve years of age. The average remigration is two years. Nesting occurs from April to July in large arribadas, primarily at Rancho Nuevo, Mexico. Females lay an average of 2.5 clutches per season. The annual average clutch size is ninety-seven to one hundred eggs per nest. The nesting location may be particularly important because hatchlings can more easily migrate to foraging grounds in deeper oceanic waters, where they remain for approximately two years before returning to nearshore coastal habitats. Juvenile Kemp's ridley sea turtles use these nearshore coastal habitats from April through November, but move towards more suitable overwintering habitat in deeper offshore waters (or more southern waters along the Atlantic Coast) as water temperatures drop. Adult habitat largely consists of sandy and muddy areas in shallow, nearshore waters less than 120 feet (37 m) deep, although they can also be found in deeper offshore waters. Adult Kemp's ridleys forage on swimming crabs, fish, jellyfish, mollusks, and tunicates (NMFS and USFWS 2011).

Population Dynamics

Of the sea turtles species in the world, the Kemp's ridley has declined to the lowest population level. Nesting aggregations at a single location (Rancho Nuevo, Mexico) were estimated at 40,000 females in 1947. By the mid-1980s, the population had declined to an estimated 300 nesting females. In 2014, there were an estimated 10,987 nests and 519,000 hatchlings released from three primary nesting beaches in Mexico (NMFS and USWFS 2015). The number of nests in Padre Island, Texas has increased over the past two decades, with one nest observed in 1985, four in 1995, 50 in 2005, 197 in 2009, and 119 in 2014 (NMFS and USWFS 2015).

From 1980 to 2003, the number of nests at three primary nesting beaches (Rancho Nuevo, Tepehuajes, and Playa Dos) increased fifteen percent annually (Heppell et al. 2005); however, due to recent declines in nest counts, decreased survival at other life stages, and updated population modeling, this rate is not expected to continue (NMFS and USWFS 2015).

Genetic variability in Kemp's ridley turtles is considered to be high, as measured by heterozygosis at microsatellite loci (NMFS and USFWS 2011). Additional analysis of the mitochondrial DNA taken from samples of Kemp's ridley turtles at Padre Island, Texas, showed six distinct haplotypes, with one found at both Padre Island and Rancho Nuevo (Dutton et al. 2006).

The Kemp's ridley occurs from the Gulf of Mexico and along the Atlantic coast of the U.S. (TEWG 2000). Kemp's ridley sea turtles have occasionally been found in the Mediterranean Sea, which may be due to migration expansion or increased hatchling production (Tomas and Raga 2008). The vast majority of individuals stem from breeding beaches at Rancho Nuevo on the Gulf of Mexico coast of Mexico. During spring and summer, juvenile Kemp's ridleys occur in the shallow coastal waters of the northern Gulf of Mexico from south Texas to north Florida. In the fall, most Kemp's ridleys migrate to deeper or more southern, warmer waters and remain there through the winter (Schmid 1998). As adults, many turtles remain in the Gulf of Mexico, with only occasional occurrence in the Atlantic Ocean (NMFS et al. 2010).

Status

The Kemp's ridley was listed as endangered in response to a severe population decline, primarily the result of egg collection. In 1973, legal ordinances prohibited the harvest of sea turtles from May to August, and in 1990, the harvest of all sea turtles was prohibited by presidential decree. In 2002, Rancho Nuevo was declared a sanctuary. A successful head-start program has resulted in the reestablishment of nesting at Texan beaches. While fisheries bycatch remains a threat, the use of turtle excluder devices mitigates take. Fishery interactions and strandings, possibly due to forced submergence, appear to be the main threats to the species. It is clear that the species is steadily increasing; however, the species' limited range and low global abundance make it vulnerable to new sources of mortality as well as demographic and environmental randomness, all of which are often difficult to predict with any certainty.

4.2.6 Green Sea Turtles – North Atlantic

Species description

The green sea turtle is globally distributed and commonly inhabits nearshore and inshore waters. Green turtles from the North Atlantic DPS range from the boundary of South and Central America (7.5°N, 77°W) in the south, throughout the Caribbean, the Gulf of Mexico, and the U.S. Atlantic coast to New Brunswick, Canada (48°N, 77°W) in the north (Figure 7). The range of the DPS then extends due east along latitudes 48°N and 19°N to the western coasts of Europe and Africa. The green sea turtle is the largest of the hardshell marine turtles, growing to a weight of 350 lbs. (159 kgs) and a straight carapace length of greater than 3.3 feet (1 meter).

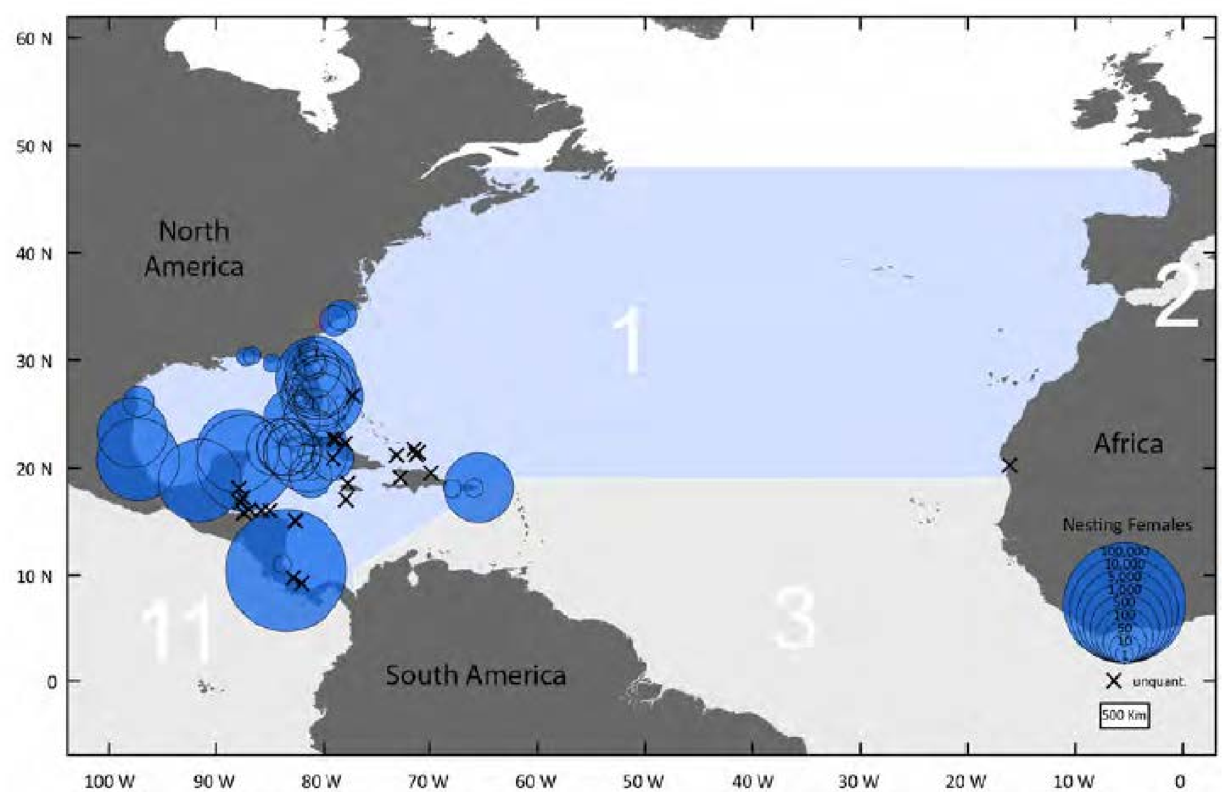

Figure 7. Geographic range of the green sea turtle North Atlantic DPS, with location and abundance of nesting females. From (Seminoff et al. 2015).

The species was listed under the ESA on July 28, 1978. The species was separated into two listing designations: endangered for breeding populations in Florida and the Pacific coast of Mexico and threatened in all other areas throughout its range. On April 6, 2016, NMFS listed 11

DPSs of green sea turtles as threatened or endangered under the ESA. The North Atlantic DPS is listed as threatened. We used information available in the 2007 Five-Year Review (USFWS 2007) and 2015 Status Review (Seminoff et al. 2015) to summarize the life history, population dynamics and status of the species, as follows.

Reference Table: Green Sea Turtle Portion of Table 2.

Species	Common Name	Distinct Population Segment	ESA Status	Recent Review Year	Listing	Recovery Plan	Critical Habitat
Chelonia mydas	**Green Turtle**	**North Atlantic** (4 sub-populations)	Threatened	2015	81 FR 20057	1991	63 FR 46693

Life history

Age at first reproduction for females is twenty to forty years. Green sea turtles lay an average of three nests per season with an average of one hundred eggs per nest. The remigration interval (i.e., return to natal beaches) is two to five years. Nesting occurs primarily on beaches with intact dune structure, native vegetation and appropriate incubation temperatures during summer months. 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. Adult turtles exhibit site fidelity and migrate hundreds to thousands of kilometers from nesting beaches to foraging areas. Green sea turtles spend the majority of their lives in coastal foraging grounds, which include open coastlines and protected bays and lagoons. Adult green turtles feed primarily on seagrasses and algae, although they also eat jellyfish, sponges and other invertebrate prey.

Population dynamics

The following is a discussion of the species' population and its variance over time. This section includes abundance, population growth rate, genetic diversity, and spatial distribution as it relates to the North Atlantic DPS green sea turtle.

Worldwide, nesting data at 464 sites indicate that 563,826 to 564,464 females nest each year (Seminoff et al. 2015). Compared to other DPSs, the North Atlantic DPS exhibits the highest nester abundance, with approximately 167,424 females at seventy-three nesting sites, and available data indicate an increasing trend in nesting. The largest nesting site in the North Atlantic DPS is in Tortuguero, Costa Rica, which hosts seventy-nine percent of nesting females for the DPS (Seminoff et al. 2015).

For the North Atlantic DPS, the available data indicate an increasing trend in nesting. There are no reliable estimates of population growth rate for the DPS as a whole, but estimates have been developed at a localized level. Modeling by Chaloupka et al. (2008) using data sets of twenty-five years or more show the Florida nesting stock at the Archie Carr National Wildlife Refuge growing at an annual rate of 13.9 percent, and the Tortuguero, Costa Rica, population growing at 4.9 percent.

The North Atlantic DPS has a globally unique haplotype, which was a factor in defining the discreteness of the population for the DPS. Evidence from mitochondrial DNA studies indicates that there are at least four independent nesting subpopulations in Florida, Cuba, Mexico and Costa Rica (Seminoff et al. 2015). More recent genetic analysis indicates that designating a new western Gulf of Mexico management unit might be appropriate (Shamblin et al. 2016).

Status

Historically, green turtles in the North Atlantic DPS were hunted for food, which was the principle cause of the population’s decline. Apparent increases in nester abundance for the North Atlantic DPS in recent years are encouraging but must be viewed cautiously, as the datasets represent a fraction of a green sea turtle generation, up to fifty years. While the threats of pollution, habitat loss through coastal development, beachfront lighting, and fisheries bycatch continue, the North Atlantic DPS appears to be somewhat resilient to future perturbations.

The estimated total green turtle nesting female abundance for Florida is 8,426 turtles (Seminoff et al. 2015). A Population Viability Analysis was conducted for the Florida population based on an index of adult female nesters from 1989 to 2012. Nesting beach monitoring data and the Population Viability Analysis indicate that there is a 0.3 percent probability that this population will fall below the trend reference point (50 percent decline) at the end of 100 years, and a 0 percent probability that this population will fall below the absolute abundance reference (100 females per year) at the end of 100 years (Seminoff et al. 2015).

Critical Habitat

On September 2, 1998, NMFS designated critical habitat for green sea turtles, which include coastal waters surrounding Culebra Island, Puerto Rico. Seagrass beds surrounding Culebra provide important foraging resources for juvenile, subadult and adult green sea turtles. Additionally, coral reefs surrounding the island provide resting shelter and protection from predators.

There is no overlap between the action area for this biological opinion and green turtle designated critical habitat.

5 ENVIRONMENTAL BASELINE

The “environmental baseline” includes the past and present impacts of all Federal, state, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section

7 consultation, and the impact of state or private actions which are contemporaneous with the consultation in process (50 CFR 402.02).

5.1 Destruction of Mangrove and Reef Habitat

Modification and loss of smalltooth sawfish habitat, especially nursery habitat, is a contributing factor in the decline of the species. Activities such as agricultural and urban development, commercial activities, dredge-and-fill operations, boating, erosion, and diversions of freshwater runoff contribute to these losses (SAFMC 1998).

5.1.1 Agriculture

Agricultural activities convert wetlands and shed nutrient, pesticide, and sediment-laden runoff. These in turn lead to excessive eutrophication, hypoxia, increased sedimentation and turbidity, stimulation of hazardous algal blooms, and delivery of chemical pollutants (SAFMC 1998). Freshwater wetlands associated with southeastern rivers have been extensively converted to agriculture or degraded by flood control and diversion projects in support of agriculture. Likewise, coastal wetlands have been converted to agricultural fields and degraded by flow alterations linked to agriculture. Agriculture is the single largest contributor of nutrients in southeastern watersheds (SAFMC 1998). Animal wastes and fertilizers are the largest sources of non-point source nutrient loading (USGS 1997). Agricultural non-point discharges are responsible for the introduction of a wide range of toxic chemicals into coastal waters around Florida (Scott 1997). Even areas not immediately adjacent to agricultural areas can be affected by these activities. For example, all of Florida Bay, including shore and reef habitat, has undergone biological, chemical, and physical change due to large scale agricultural practices and hydrologic modifications in the Everglades (Fourqurean and Robblee 1999).

Introduction of point and non-point source pollution can have impacts to smalltooth sawfish as there is evidence from other elasmobranches that pollution disrupts endocrine systems and potentially leads to reproductive failure (Gelsleichter et al. 2006). Sedimentation and pesticides increase turbidity, blocking out light, and poison coral reef systems. Both of these stressors physically kill coral reefs, which reduces feeding habitat for smalltooth sawfish.

5.1.2 Coastal and Urban Development

The population in the Southeast increased at approximately 25.7 percent between 1980 and 1990, primarily along the coast (Chambers 1992, Cordell and Macie 2002). Threats from development include loss of wetlands, point and non-point sources of toxins, eutrophication, and hydrologic modification. Since the mid 1980s, rates of habitat loss have been decreasing, but habitat loss continues. From 1998-2004, approximately 64,560 acres of coastal wetlands were lost along the Atlantic and Gulf coasts of the United States, of which approximately 2,450 acres were intertidal wetlands consisting of mangroves or other estuarine shrubs (Stedman and Dahl 2008). Further, Orlando et al. (1994) analyzed 18 major southeastern estuaries and recorded over 703 miles of navigation channels and 9,844 miles of shoreline with modifications.

Sawfish may also alter seasonal migration patterns in response to warm water discharges from power stations (Simpfendorfer and Wiley 2004). A major concern is the destruction of wetlands by filling for urban and suburban development (SAFMC 1998). In Florida, between 1943 and 1970, approximately 10,000 ha of this habitat were lost due to dredge fill and other activities related to accommodating the increasing human population. In addition, seawalls and canals for waterfront homes have replaced marsh and mangrove intertidal shorelines and shallow estuarine waters. Of particular concern are sawfish habitats in places such as the Indian River Lagoon (Gilmore 1995), where the species was once abundant, but now appear to have been extirpated (Snelson and Williams 1981). Many of the wetland habitats in the Indian River Lagoon were impounded for mosquito control (Brockmeyer et al. 1996) and the effects of these alterations on the smalltooth sawfish populations there are unknown.

Coastal development too close to the beach has influenced natural coastal processes such as erosion rates, resulting in accelerated erosion rates and interruption of natural shoreline migration. Where beachfront development occurs, the site is often fortified to protect the property from erosion. Beach armoring is a common type of construction that includes sea walls, rock revetments, riprap, sandbag installations, groins and jetties. Approximately 20 percent of Florida's coast has been armored. Groins and jetties are designed to trap sand during longshore transport or to keep sand from flowing into shipping channels. These structures prevent sediment deposition and cause increased erosion on upcurrent and downcurrent beaches.

In Florida, coastal development often involves the removal of mangroves and the armoring of shorelines through seawall construction. While loss of mangrove ecosystems throughout Florida is not overwhelming, losses at specific locations have been substantial (Odum et al. 1982, Veliela et al. 2001). Direct destruction of mangrove habitat is no longer allowed without a permit, but indirect damage to mangrove habitat from increased urbanization and the resulting overall habitat degradation still occurs.

Changes to the natural freshwater flows into estuarine and marine waters through construction of canals and other water control devices have also altered the temperature, salinity, and nutrient regimes; reduced both wetlands and submerged aquatic vegetation; and degraded vast areas of coastal habitat utilized by smalltooth sawfish (Gilmore 1995; Reddering 1988; Whitfield and Bruton 1989). While these modifications of habitat are not the primary reason for the decline of smalltooth sawfish abundance, it is likely a contributing factor and almost certainly hampers the recovery of the species. Juvenile sawfish and their nursery habitats are particularly likely to be affected by these kinds of habitat losses or alternations, due to their affinity for shallow, estuarine systems. Although many forms of habitat modification are currently regulated, some permitted direct and/or indirect damage to habitat from increased urbanization still occurs and is expected to continue to threaten survival and recovery of the species in the future.

5.2 Dredging

Modifications of natural freshwater flows into estuarine and marine waters through construction of canals and other controlled devices have changed temperature, salinity, and nutrient regimes;

reduced both wetlands and submerged aquatic vegetation; and degraded vast areas of coastal habitat (Gilmore 1995, Reddering 1988, Whitfield and Bruton 1989). Profound impacts to hydrological regimes have been produced in South Florida through the construction of a 1,400 mile network of canals, levees, locks, and other water control structures which modulate freshwater flow from Lake Okeechobee, the Everglades, and other coastal areas (Serafy et al. 1997). Dredges are used to maintain these canals and shipping channels. Of particular concerns are Biscayne Bay (Serafy et al. 1997), Florida Bay, the Ten Thousand Islands (Fourqurean and Robblee 1999), and Charlotte Harbor. Three of these four areas support the last remaining populations of smalltooth sawfish in U.S. waters (Seitz and Poulakis 2002, Poulakis and Seitz 2004, Simpfendorfer and Wiley 2004).

5.3 Fisheries Bycatch

Bycatch mortality is cited as the primary cause for the decline in smalltooth sawfish in the United States (NMFS 2010). Large-scale directed fisheries for smalltooth sawfish have not existed. Historically, smalltooth sawfish were often bycatch in various fishing gears, including otter trawl, trammel net, seine, and, to a lesser degree, hand line. Reports of smalltooth sawfish becoming entangled in fishing nets are common in early literature from areas where smalltooth sawfish were once common, but are now rare, if not extirpated, including Florida (Snelson and Williams 1981), Louisiana (Simpfendorfer 2002), and Texas (Baughman 1943) . Henshall (1895) noted that the smalltooth sawfish "does considerable damage to turtle nets and other set nets by becoming entangled in the meshes and is capable of inflicting severe wounds with its saw, if interfered with." Evermann and Bean (1898) noted that smalltooth sawfish could be concentrated in areas such as the Indian River Lagoon, where on fisherman reported taking an estimated 300 smalltooth sawfish in just one netting season. In another example, smalltooth sawfish landings data gathered by Louisiana shrimp trawlers from 1945-1978, which contained both landings data and crude information on effort (number of vessels, vessel tonnage, number of gear units), indicated declines in smalltooth sawfish landings from a high of 34,900 pounds in 1949 to less than 1,500 pounds in most years after 1967. The Florida net ban passed in 1995 has led to a reduction in the number of smalltooth sawfish incidentally captured, "by prohibiting the use of gill and other entangling nets in all Florida waters, and prohibiting the use of other nets larger than 500 square feet in mesh area in nearshore and inshore Florida waters[1]" (FLA. CONST. art. X, § 16).

The majority of the documented landings of smalltooth sawfish were from otter trawl fisheries. There were also landings from trammel nets, beach haul seines, pelagic longlines, cast nets, trap float lines, and hand lines. While there are no records of smalltooth sawfish captured in

[1] "nearshore and inshore Florida waters" means all Florida waters inside a line three miles seaward

[1]of the coastline along the Gulf of Mexico and inside a line one mile seaward of the coastline along the

[1]Atlantic Ocean.

Louisiana waters since 1978, anecdotal information collected by NMFS port agents indicates that smalltooth sawfish are now taken very rarely in the shrimp trawl fishery. Smalltooth sawfish are still occasionally documented in shrimp trawls in Florida, with four reports in the 1990s. Smalltooth sawfish are also occasionally captured in various Federal shark fisheries using drift gillnet and bottom longline. Based on mandatory observers placed on 2 percent of all shrimp trawls beginning in 2007 and 2008 for the Gulf of Mexico and South Atlantic, respectively, an increased number of smalltooth sawfish were reported, likely indicating that the previous observer coverage was missing a large number of interactions. In May of 2012, NMFS authorized 270 smalltooth sawfish to be captured by shrimp fishing boats over the next three years, with 90 mortalities approved during that time. Additionally in 2012, NMFS authorized 32 smalltooth sawfish to be captured in the shark fishery over the next three years with 7 mortalities approved during that time.

Smalltooth sawfish have historically occurred as occasional bycatch in the hook-and-line recreational fishery (Caldwell 1990). In Texas, Caldwell (1990) stated that sport fishermen in the bays and surf prior to the 1960's took many sawfish incidentally but retained and displayed as trophy fish, but most were released. Caldwell noted that the saws of smalltooth sawfish were consistently removed prior to their live releas, thereby reducing their chances for survival. Seitz and Poulakis (2002), Poulakis and Seitz (2004), and Simpfendorfer and Wiley (2004) indicate that smalltooth sawfish are still taken as bycatch, mostly by shark, red drum, snook, and tarpon fishers. Possession of smalltooth sawfish has been prohibited in Florida since April 1992. The records in the angler survey database indicate that only one sawfish was kept; this record was from 1990. There were 14 smalltooth sawfish recorded as kept in the guide survey database; one in 1991, one in 1992, and twelve in 1997.

5.4 Research

NMFS has authorized other research on smalltooth sawfish within the waters of the state of Florida. Much of this research already authorized will use the same methodology in the same locations as this permit. Permit Numbers 17316, 17787, and 15802 authorize the capture and study of 100 neonates, 150 juveniles, and 165 adult smalltooth sawfish per year. Of these authorizations, captures have averaged 35 neonates, 59 juveniles, and 17 adults per year.

5.5 Global Climate Change

Anthropogenic greenhouse gas emissions have increased tremendously since the pre-industrial era. This increase, driven largely by economic and population growth, has led to atmospheric concentrations of carbon dioxide, methane and nitrous oxide that are unprecedented in at least the last 800,000 years (IPCC 2014). Their effects, together with those of other anthropogenic drivers, have been detected throughout the climate system and are extremely likely to have been the dominant cause of the observed warming period since the mid-20th century (IPCC 2014). Average global land and sea surface temperature has increased by 0.85°C (± 0.2) since the late 1800s, with most of the change occurring since the mid-1900s (IPCC 2013; IPCC 2014). This temperature increase is greater than what would be expected given the range of natural climatic variability recorded over the past 1,000 years (Crowley and Berner 2001). The Intergovernmental Panel on Climate Change (IPCC) estimates that the last 30 years were likely the warmest 30-year period of the last 1,400 years, and that global mean surface temperature change will likely continue to increase in the range of 0.3 to 0.7°C by 2035 (IPCC 2014).

Climate change is projected to have substantial direct effects on individuals, populations, species, and the community structure and function of marine, coastal, and terrestrial ecosystems in the near future (IPCC 2007; IPCC 2013; McCarty 2001). The direct effects of climate change include increases in atmospheric temperatures, decreases in sea ice, and changes in sea surface temperatures, ocean acidity, patterns of precipitation, and sea level. Indirect effects of climate change include altered reproductive seasons/locations, shifts in migration patterns, reduced distribution and abundance of prey, and changes in the abundance of competitors and/or predators. Climate change will likely have its most pronounced effects on vulnerable species whose populations are already in tenuous positions (Williams et al. 2008). Increasing atmospheric temperatures have already contributed to changes in the quality of freshwater, coastal, and marine ecosystems and to the decline of endangered and threatened species populations (Karl 2009; Mantua et al. 1997).

6 Effects of the Action

Section 7 regulations define “effects of the action” as the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated or interdependent with that action, that will be added to the environmental baseline (50 CFR 402.02). Indirect effects are those that are caused by the proposed action and are later in time, but are reasonably certain to occur. This effects analyses section is organized following the stressor, exposure, response, risk assessment framework.

As was stated in Section 3, this opinion includes both a jeopardy analysis and an adverse modification analysis.

This opinion includes an effects analysis for the following ESA-listed species/DPSs: smalltooth sawfish, North Atlantic DPS green sea turtle, hawksbill sea turtle, Kemp’s ridley sea turtle, leatherback sea turtle, and Northwest Atlantic DPS loggerhead sea turtle. An adverse modification effects analysis was not conducted for this opinion since we determined the designated or proposed critical habitat within the action area was not likely to be affected by the proposed action.

The jeopardy analysis relies upon the regulatory definition of “to jeopardize the continued existence of a listed species,” which is “to engage in an action that 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). Therefore, the jeopardy analysis considers both survival and recovery of the species.

6.1 Stressors Associated with the Proposed Action

The specific stressors associated with the proposed permit are capture, handling and restraint during examinations, tagging, tissue sampling, muscle biopsy, and blood sampling. Activities like ultrasound will not have an impact beyond the stress of handling the sawfish. Bycatch may pose a threat to leatherback, loggerhead, hawksbill, Kemp's ridley, and green sea turtles. The following sections provide specific details of the stressors associated with each procedure and summarize the available data on the responses of individuals that have been exposed to the procedures.

6.2 Mitigation to Minimize Response

There are a number of mitigation measures meant to make capturing smalltooth sawfish safer. Actively fished nets (e.g., seines) will be monitored constantly from the beginning of the set until the sample is completed. Passively fished gill nets will be constantly monitored while being set and checked a minimum of every 30 minutes, with the crew remaining on station. Longlines and drum lines will be fished for one hour. Hook and line will be continuously monitored for hooked fish and the presence of bait. If sea turtles are observed in the sampling area, the researchers will not set gear or all gear will be removed immediately if sets have already been made.

Once captured, mitigation is in place to minimize the response of handling. All sawfish caught will be immediately untangled (if necessary), processed (e.g., measured, tagged, tissue samples taken) as quickly as possible, and released. Small juvenile sawfish (<2 m) will be kept in a water-filled net well in the stern of the boat to minimize out-of-water-time. Aerator(s) are used to maintain dissolved oxygen levels in the net well. This technique has been used since 2004 and annual reports show it has been effective, resulting in no mortalities or injuries to captured sawfish. To prevent injury to specimens (e.g., chipping of rostral teeth) and to protect researchers, a designated crew member will immobilize the rostrum of any captured sawfish by grasping the rostrum while wearing padded welding gloves. This technique has been used successfully since 2004 for juvenile sawfish and has facilitated sawfish and researcher safety. If a sea turtle is captured, it will be immediately released alive. No mortalities have been observed since 2004 or are expected under this permit due to mitigation measures in place.

For the various procedures researchers conduct on smalltooth sawfish, the mitigation to ensure they are done safely are fairly standard across research permits. The proposed mitigation for this permit is the same as for past permits and for other current permits for other researchers.

6.3 Exposure and Response Analysis

The following section identifies the expected amount of exposure to each stressor and the response to that exposure that would be expected. As identified in section 6.1, the stressors resulting from these research procedures will be capture, handling and restraint during examinations, tagging, tissue sampling, muscle biopsy, and blood sampling. The exposure and response to each stressor is addressed separately.

6.3.1 Capture

Between 2017 and 2022, 140 juvenile and 65 adult smalltooth sawfish will be captured each year, amounting to 700 juvenile and 325 adult smalltooth sawfish. During years when anticipated capture is not achieved, the authorized but uncaptured portion of each year's take is not added to the following years. Capture activities will utilize long lines, drum lines, rod and reel, gill nets, and beach seines.

The gillnets, drum lines and long lines proposed for use in this research can result in mortality to smalltooth sawfish (Musick et al. 2001, Simpfendorfer 2006) as seen through years of incidental captures in commercial fisheries. Rod and reel has the potential for post-release mortality, as is seen when other species of fish are caught on rod and reel, though no monitoring has been conducted to estimate post-release mortality and there is no compelling evidence that it has any effect. Capture by seine nets is not expected to have any chance of mortality. Much of the smalltooth sawfish mortality during commercial fisheries was due to the difficulty of removing smalltooth sawfish from fishing gear without damaging the gear. Most of the time, this meant lethal removal of the saw before returning the fish to the water to starve to death or killing the sawfish in the net and dropping the carcass overboard.

Research on smalltooth sawfish has been conducted under seven permits since 2003 (Table 3). Table 3 shows the number of sawfish that have been captured, the number of sawfish that have been killed, and the number of listed sea turtle species that have been incidentally captured. To date, there have been no lethal takes of sawfish or sea turtles resulting from these research practices. This success in primarily due to the use of established mitigation measures such as short sets and monitoring nets and longlines at all times while they are set to reduce the chances of killing a listed species.

Table 3: number of sawfish and sea turtles captured, injured, or killed over the previous 10 years of permits.

Permit Number (years valid)	Sawfish captured	Sawfish injured or killed	Sea turtles captured (no recorded deaths)
#13330 (2008-2013)	100	0	0
#1352 (2003-2008)	112	0	0
# 1475 (2006-2012)	99	0	2
#1538 (2006-2008)	2	0	0
#17316 (2014-present)	8	0	0

#17787 (2013-present)	149	0	0
#15802 (2013-present)	260	0	6

In the past 14 years, there are eight documented cases of bycatch of marine turtles while attempting to capture smalltooth sawfish. Despite this low levels of bycatch observed previously, the primary risk of bycatch comes from long-lines, which are used to capture adult or large juvenile smalltooth sawfish. In the past, most effort was made to capture juvenile sawfish after reports from the public. In this permit, an increased effort will be made to capture and tag large smalltooth sawfish. As such, it is likely that interactions with sea turtles will increase as well. The species of sea turtle to be bycaught is unpredictable because they are not the intended species of capture. As such, it is anticipated that as many as 15 sea turtles could be captured over the 5 years of the permit and no more than 10 in a single year. Because of the mitigation measures included in the application, meant to protect both smalltooth sawfish and sea turtles, no mortalities are expected.

6.3.2 Handling

Each year, as many as 140 juvenile smalltooth sawfish and 65 adult smalltooth sawfish will be handled following capature. Over the life of the permit, as many as 700 juvenile smalltooth sawfih and 325 adult smalltooth sawfish will be handled. Additionally, 15 sea turtles could be handled following their capture. The handling of sea turtles will be minimal to non-existent depending on the method of capture and ease of release. The sea turtles will be released in water with no handling if possible, but may need to be removed from the water if necessary. Once freed from the capture gear, they will be immediately released alive.

Handling and restraining smalltooth sawfish may cause short term stress responses, but those responses are not likely to result in pathologies because of the short duration of the handling. The proposed methods of handling smalltooth sawfish are the same as have been carried out in previous permits and consistent with the handling of other elasmobranchs. Mitigation measures built into the handling requirements in the permit such as holding large fish in the water or small fish in on-board tanks with recirculating water, should negate the chance of mortality during handling and restraint. NMFS expects that individual smalltooth sawfish would normally experience no more than short-term stresses as a result of these activities. No injury would be expected from these activities.

6.3.3 Tagging

Rototags, internal acoustic tags, PIT tags, and CTD or ADL tags will be attached to 700 juvenile and 325 adult smalltooth sawfish during the next five years. Satellite tags on the other hand will be applied to 15 adults and 15 juveniles each year. All of these tags have been used in this and previous smalltooth sawfish permits.

Rototags will be attached with nylon bolts through the dorsal fin. Manire and Gruber (1991) documented the effects of punching holes in the dorsal fins of elasmobranchs by taking 5mm hole punches from the fin of lemon shark. They found the holes were readily apparent for two to four weeks and became scars within a year of removing the punch from the dorsal fin. Heupel et al. (1998) monitored the effects of attaching tags through the dorsal fins of carcharhinids. No infection was observed in tissues surrounding the wound. Disruption of the fin surface was observed due to abrasion by the tag, but did not appear to cause a severe tissue reaction. Even though the tags caused continued tissue disruption (until they fall off) no signs of infection were found in the tissue samples. They summarized that the use of rototags and Jumbo rototags appears to be an efficient way of marking elasmobranchs with minimal damage to the shark. They added that the mucous layer on the skin may be a primary response to injury that helps reduce ionic exchange and prevent infection of wounds. Therefore no swabbing of the area would be used to prevent any disruption to this natural mucous layer.

Acoustic transmitters will be attached to sawfish via the rototag or internally through a small incision. Internally tagged smalltooth sawfish will have the largest (longest lasting) tag implanted with the requirement that total tag weight not exceed 2 percent of the sawfish's weight. The surgery is done by rolling the sawfish into a supine position to induce tonic immobility. When the sawfish has stopped moving and its eyes roll back indicating a state of narcosis, a small incision is made ventrally and the tag inserted. The wound is then sutured and the sawfish released. The primary risk to the sawfish occurs during the period of healing as the wound could become infected and swimming over hard substrates could cut the stitches, reopening the wound. There are no good estimates of healing rates or probability of adverse incidents during the healing process. There are however many tags implanted or attached to sawfish allowing researchers to monitor their long-term movement and survival. This information will be gathered for all tagged fish in annual reports.

PIT tags have been used with a wide variety of animal species that include fish (Clugston 1996, Skalski et al. 1998, Dare 2003), amphibians (Thompson 2004), reptiles (Cheatwood et al. 2003, Germano and Williams 2005), birds (Boisvert and Sherry 2000, Green et al. 2004), and mammals (Wright et al. 1998). When PIT tags are inserted into animals that have large body sizes relative to the size of the tag, empirical studies have generally demonstrated that the tags have no adverse effect on the growth, survival, reproductive success, or behavior of individual animals (Brännäs et al. 1994, Elbin and Burger 1994, Keck 1994, Jemison et al. 1995, Clugston 1996, Skalski et al. 1998, Hockersmith et al. 2003). The smallest smalltooth sawfish researchers expect to capture is approximately 62 cm and therefore is well within the bounds of tag to animal weight ratio.

Satellite tags will be attached to the first or second dorsal fin by first making a small hole with a leather punch at the base of the fin. The tag will be secured with a harness consisting of steel cables and crimps that will be programmed to release after five to six months. When the tag surfaces, data will be transmitted to satellites. Satellite tags will only be placed on sawfish at least two meters in total length.

Conductivity Temperature Depth tags and ADL tags are attached directly to the dorsal fin or below the ventral surface. Tag retention is generally less than six months. These tags are meant to fall of after short time periods, after which they are collected. The effects of these tags are similar to rototags, though these tags are smaller in size.

In many cases, multiple tags will be applied to the same smalltooth sawfish. All of the above mentioned tags are small (12 mm x 1.5 mm diameter for PIT tags, 27 mm x 9 mm diameter for acoustic tags [weight in air = 4.7 g; weight in water = 2.9 g], 175 mm long x 21 mm diameter for satellite tags [weight in air = 75 g], 40 mm x 28 mm 16.3 mm for ADL tags [weight in air = 18.0 g]) compared with the size of a sawfish and involve making small holes (e.g., with a leather punch) in or below dorsal fins to affix rototags and external acoustic or satellite tags or small holes (i.e., with a syringe needle) at the left side base of the first dorsal fin to inject internal PIT tags. In all situations, the researchers have established length standards of the fish being tagged to ensure that the weight of the tags will not be detrimental to the fish being tagged.

6.3.4 Fin Clips and Muscle Biopsies

Each year, 140 juvenile and 65 adult smalltooth sawfish are likely to be captured and will then receive a fin clip for genetic analysis and a punch biopsy for stable isotope analysis. Over the life of the project, this will mean the fin clip and muscle biopsy of 700 juveniles and 325 adults. As with other fish species, small (1 cm^2) fin clips will be taken for genetic and stable isotope analysis. These clips will be taken from the rear tip of the dorsal fin of each sawfish. Samples will be stored in ethanol. There are no adverse effects anticipated as a result of fin clips.

One standard, individually packaged, disposable, hand-held biopsy punch (6 mm diameter; 8 mm deep; with safety flange to prevent insertion beyond 8 mm) will be taken from the dorsal flank of each sawfish to determine baseline levels of skin and muscle histology, environmental toxins such as mercury (total mercury) and organochlorines, as well as validation of stable isotope results derived from fin clips. In cases where a sawfish is observed to have gross external lesions, a biopsy punch will also be taken in this area for histopathological evaluation. A new sterile punch will be used for each sample. This standard biopsy technique is currently used to take samples from other large fishes (e.g., sharks, billfish), smaller endangered freshwater fishes, and endangered mammals such as right whales and manatees (EPA 2003, Peterson et al. 2005). Biopsy sites (with diameters up to 5 cm) are known to heal quickly and completely when used on a variety of vertebrates such as sharks, teleosts, and marine mammals (Weller et al. 1997, Krutzen et al. 2002). Muscle biopsies are not expected to result in any long-term effects, such as reduced growth or swimming ability.

6.3.5 Blood Sample

As with other research procedures, the researchers propose to take blood samples from all 140 juvenile and 65 adult smalltootch sawfish captured each year. This will amount to blood samples from 700 juveniles and 325 adults between 2017 and 2022.

Caudal venipuncture has been performed for years on sharks, skates, and rays and the researchers are experienced in the process. There are no reports of problems from the procedure or any post-handling observations of stress (Manire et al. 2001). No swabbing of the area prior to penetration will be used, as the effects of alcohol or betadine on the skin of sawfish is unknown. Dermatitis has been reported in some other elasmobranchs from the swabbing of the skin (Permit No. 17787). Therefore, swabbing is not generally used unless the animal is going to be sampled numerous times and the effects of the agent applied to the skin can be observed in a controlled setting. No harmful side effects have been observed from the blood draws, and no known mortalities have resulted from the process. During a recent field collection of blood from over 50 bull sharks in the Caloosahatchee River all sharks were quickly sampled and successfully released (Gelsleichter 2009). In order to ensure the samples are taken with minimal impact to the smalltooth sawfish, all staff listed on the permit to blood sample would be trained on blood draw procedures from experienced scientists and/or veterinarians. Given the success of blood draws on many other elasmobranch species NMFS does not foresee any side effects from this process.

6.4 Risk Analysis

This project proposes to capture 65 adult and 140 juvenile smalltooth sawfish each year until 2022. Adults and juveniles will be targeted using long lines, the same as are used in commercial fisheries. As demonstrated in the commercial fisheries portion of the environmental baseline, there is a chance that smalltooth sawfish could die during capture, but mitigation measures included in the project have been proven to prevent mortality. Adults and juveniles over 150 cm are captured using long lines and this method of capture has caused mortalities in the commercial fishery. Because of this, NMFS requires the researchers to tend the nets so they can release the smalltooth sawfish as soon as it is caught and worked up. Based on the results of smalltooth sawfish captures in the past 14 years, the previous research conducted by the applicant, and the thorough mitigation measures included with this project, NMFS does not expect any smalltooth sawfish mortalities.

All of the smalltooth sawfish that are captured will be handled, tagged, receive biopsies, and have blood drawn. These procedures are all generally less risky than the capture activity. The only procedure with the potential to effect smalltooth sawfish through delayed mortality or injury is surgical tagging. When surgical procedures are employed to surgically implant a tag, there is a risk of the wound not healing correctly after release. Because of the large number of tags attached to each smalltooth sawfish, post-release survival can be verified by the detection of acoustic tags and the other tags.

Sea turtles incidentally captured during this research are expected to be stressed by the capture process; however, mitigation included in the project, as well as mitigation prescribed in the permit, will minimize the response of sea turtles to being captured. Frequent checks of nets and long-lines as well as constantly monitoring sampling gear will ensure no sea turtles are captured without the researcher being aware and therefore being quickly released. Because of this, it is expected that sea turtles will experience a stress response to the incidental capture, but experience no long-term damage or changes such as reduced growth or fecundity. Furthermore, no sea turtles that are captured will be killed by this research.

6.5 Cumulative Effects

"Cumulative effects" are those effects of future state or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation (50 CFR 402.02). 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.

Direct threats to sawfish from anthropogenic activities have been identified in the baseline for the most part. However, there is also the risk that some members of the public may kill sawfish to keep the saw as a sort of curio.

Smalltooth sawfish habitat has been degraded or modified throughout the southeastern United States from activities like coastal development, channel dredging, boating activities. These threats were discussed in the baseline. While the degradation and modification of habitat is not likely the primary reason for the decline of smalltooth sawfish 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 CONCLUSION

After reviewing the current status of the ESA-listed species, the environmental baseline within the action area, the effects of the proposed action, any effects of interrelated and interdependent actions, and cumulative effects, it is NMFS' opinion that the proposed action is not likely to jeopardize the continued existence of smalltooth sawfish, northwest Atlantic DPS loggerhead sea turtles, leatherback sea turtles, north Atlantic DPS green sea turtles, hawksbill sea turtles, or Kemp's ridley sea turtles. As was identified in sections 4.1 and 4.2, all critical habitat that is designated or proposed will either be outside of the action area or is not likely to be adversely affected by this action.

8 INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and Federal regulations pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without a special exemption. "Take" is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by regulation to include significant habitat modification or degradation that results in death or injury to ESA-listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Section 7(b)(4) and section 7(o)(2) provide that taking that is incidental to an otherwise lawful agency action is not considered to be prohibited taking under the ESA if that action is performed in compliance with the terms and conditions of this incidental take statement.

8.1 Amount or Extent of Take

Section 7 regulations require NMFS to specify the impact of any incidental take of endangered or threatened species; that is, the amount or extent, of such incidental taking on the species (50 CFR § 402.14(i)(1)(i)). The amount of take represents the number of individuals that are expected to be taken by actions while the extent of take or "the extent of land or marine area that may be affected by an action" may be used if we cannot assign numerical limits for animals that could be incidentally taken during the course of an action (51 FR 19953).

While the action proposes to capture smalltooth sawfish, there is a chance of sea turtle bycatch associated with those efforts. This project anticipates the capture of loggerhead, leatherback, hawksbill, Kemp's ridley, and green sea turtles (Table 4), but does not anticipate any sea turtles will be killed by being captured. Because the bycatch of sea turtles is unintentional and the researchers cannot anticipate which species may be captured, take is allocated as a maximum number of sea turtles that can be captured in 5 years, but the species composition is unrestricted as long as no more than 15 sea turtles are captured during the life of the project. As explained in section 6.3, mitigation is in place to ensure mortality is not likely to occur. Furthermore, while only eight sea turtles have been captured during previous smalltooth sawfish research, we anticipate a greater emphasis on the sampling methods that have resulted in sea turtle take, and therefore are proposing 15 sea turtles to by captured over the life of this permit. No sea turtle mortalities are authorized for this research.

Table 4. Annual and total numbers of capture take for each species of sea turtle likely to be affected.

Species	Annual Maximum Capture	Five Year Maximum Capture	Five Year Maximum Mortality
Northwest DPS Loggerhead, Leatherback, Hawksbill, Kemp's Ridley, or North Atlantic DPS Green Sea Turtle	10	15	0

8.2 Effects of the Take

In this opinion, NMFS determined that the amount of anticipated take, coupled with other effects of the proposed action, is not likely to result in jeopardy to the species or destruction or adverse modification of designated critical habitat. For greater detail on the analysis of the risk faced by smalltooth sawfish, as well as species that may be incidentally taken during this research, see section 6.4.

8.3 Reasonable and Prudent Measures

The measures described below are nondiscretionary, and must be undertaken by the Permit Division so that they become binding conditions for the exemption in section 7(o)(2) to apply. Section 7(b)(4) of the 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 ESA-listed species, NMFS will issue a statement that specifies the impact of any incidental taking of endangered or threatened species. To minimize such impacts, reasonable and prudent measures, and term and conditions to implement the measures, must be provided. Only incidental take resulting from the agency actions and any specified reasonable and prudent measures and terms and conditions identified in the incidental take statement are exempt from the taking prohibition of section 9(a), pursuant to section 7(o) of the ESA.

"Reasonable and Prudent Measures" are nondiscretionary measures to minimize the amount or extent of incidental take (50 CFR 402.02). NMFS believes the reasonable and prudent measure described below is necessary and appropriate to minimize the impacts of incidental take on threatened and endangered species:

The only Reasonable and Prudent Measure identified for this action is monitoring the activities authorized under this permit. The purpose of this Reasonable and Prudent Measure is to ensure the anticipated effects supporting this opinion's conclusions are the effects observed during the research.

8.4 Terms and Conditions

To be exempt from the prohibitions of section 9 of the ESA, the Permit Division must comply with the following terms and conditions, which implement the Reasonable and Prudent Measures described above and outlines the mitigation, monitoring and reporting measures required by the section 7 regulations (50 CFR 402.14(i)). These terms and conditions are non-discretionary. If the Permit Division fails to ensure compliance with these Reasonable and Prudent Measures and their implementing terms and conditions, the protective coverage of section 7(o)(2) may lapse.

1. The following terms and conditions implement the Reasonable and Prudent Measure: provide a summary of the annual reports to the ESA Interagency Cooperation Division.

9 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 the threatened and endangered species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on ESA-listed species or critical habitat, to help implement recovery plans or develop information (50 CFR 402.02).

There are no Conservation Recommendations associated with this project.

10 REINITIATION OF CONSULTATION

This concludes formal consultation on the Permit Division's proposal to issue Permit No. 21043. As 50 CFR 402.16 states, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded, (2) new information reveals effects of the agency action that may affect ESA-listed species or 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 to the ESA-listed species or critical habitat that was not considered in this opinion, or (4) a new species is ESA-listed or critical habitat designated that may be affected by the action.

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