UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southeast Regional Office
263 13th Avenue South
St. Petersburg, Florida 33701-5505
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F/SER31:NB
SER-2014-14671

MAR 12 2015

Pedro Ramos
Superintendent
Everglades and Dry Tortugas National Parks
40001 SR 9336
Homestead, Florida 33034

Ref.: Everglades National Park Draft General Management Plan, Miami-Dade, Monroe, and Collier Counties, Florida

Dear Mr. Ramos:

Enclosed is the National Marine Fisheries Service's (NMFS's) Programmatic Biological Opinion based on our review of the impacts associated with the issuance of the National Park Service's (NPS) General Management Plan (GMP) for Everglades National Park (ENP).

The Opinion analyzes the project's effects on sea turtles (loggerhead, *Caretta caretta*; leatherback, *Dermochelys coriacea*; Kemp's ridley, *Lepidochelys kempii*; hawksbill, *Eretmochelys imbricata*; and green, *Chelonia mydas*), smalltooth sawfish (*Pristis pectinata*), smalltooth sawfish critical habitat, and loggerhead sea turtle critical habitat, and is based on project-specific information provided by ENP and NMFS's review of published literature. We conclude that the issuance of the ENP GMP is likely to adversely affect, but is not likely to jeopardize, the continued existence of sea turtles (loggerhead, Kemp's ridley, and green) and smalltooth sawfish and is not likely to adversely affect any other species or critical habitats.

We look forward to further cooperation with you on other NPS projects to ensure the conservation and recovery of our threatened and endangered marine species. If you have any questions regarding this consultation, please contact Nicole Bonine, Consultation Biologist, at (727) 824-5336, or by email at Nicole.Bonine@noaa.gov.

Sincerely,

Roy E. Crabtree, Ph.D.
Regional Administrator

Enclosure

File: 1514-22.P

Endangered Species Act - Section 7 Consultation
Biological Opinion

Agency: National Park Service

Applicant: Everglades National Park

Activity: Draft General Management Plan

Consulting Agency: National Marine Fisheries Service
Southeast Regional Office
Protected Resources Division
Consultation No. SER-2014-14671

Date Issued: 3/12/15

Approved By:
Roy E. Crabtree, Ph.D.
Regional Administrator

ACRONYMS AND ABBREVIATIONS

ATON	Aid-to-Navigation
CPUE	Catch per Unit Effort
cSEL	Cumulative Sound Exposure Level
DNA	Deoxyribonucleic acid
DPS	Distinct Population Segment
DWH	Deep Water Horizon
ENP	Everglades National Park
ESA	Endangered Species Act
FP	Fibropapillomatosis
FWRI	Florida Fish and Wildlife Research Institute
GMP	General Management Plan
GPS	Global Positioning System
ITS	Incidental Take Statement
NMFS	National Marine Fisheries Service
NOAA	National Ocean and Atmospheric Association
NPS	National Park Service
NWA DPS	Northwest Atlantic Distinct Population Segment
PRM	Post-release mortality
RMS	Root Mean Square
SCL	Straight Carapace Length
sSEL	Single-Strike Sound Exposure Level
STSSN	Sea Turtle Stranding and Salvage Network
TED	Turtle Excluder Device
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service

Background

Section 7(a)(2) of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. §1531 et seq.), requires that each federal agency ensure that any action authorized, funded, or carried out by the agency is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of critical habitat of those species. When the action of a federal agency may affect a protected species or its critical habitat, that agency is required to consult with either the National Marine Fisheries Service (NMFS) or the U.S. Fish and Wildlife Service (USFWS), depending upon the protected species that may be affected.

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

This document represents NMFS's Opinion based on our review of impacts associated with the National Park Service's (NPS) issuance of the General Management Plan (GMP) for Everglades National Park (ENP) in Collier, Monroe, and Miami-Dade Counties, Florida, and management of the Park under the GMP for the next 20-30 years. The main activities covered under the GMP that involve potential routes of adverse effects to listed species or designated critical habitat include boating, which will be managed under the new GMP by designating zones for certain types of boating and increasing the amount of in-water speed restricted zones; construction, repair, and replacement to aids-to-navigation (ATONs), chickees (raised camping platforms), and existing structures; and developing and maintaining a mandatory education and permit program for all boaters and fishers in the Park. A complete list of activities covered under the GMP that may affect NMFS's ESA-managed resources is provided in Section 2.2.

This Opinion analyzes project effects on sea turtles (loggerhead, leatherback, Kemp's ridley, hawksbill, and green), smalltooth sawfish, and designated critical habitat for smalltooth sawfish and loggerhead sea turtles in accordance with Section 7 of the ESA. The analysis begins with a description of the types of the actions (i.e., activities) covered under the GMP, how in-water projects will be reviewed, and the requirements they must meet to be permitted. This discussion is followed by the status of listed species and critical habitat within the action area, the environmental baseline conditions of the action area, and an analysis of the effects of the proposed action on species and critical habitat likely to be affected. A discussion of cumulative effects precedes the jeopardy/destruction, adverse modification analyses, which are based on the status of the affected species and on the information presented in the environmental baseline, effects of the action, and cumulative effects sections of this Opinion. Finally, we present our conclusions and conservation recommendations. This Opinion is based on project information provided by ENP. NMFS also utilized published literature.

Programmatic Consultations

NMFS and the USFWS have developed a range of techniques to streamline the procedures and time involved in consultations for broad agency programs or numerous similar activities with well-understood predictable effects on listed species and critical habitat. Some of the more common of these techniques and the requirements for ensuring that streamlined consultation procedures comply with Section 7 of the ESA and its implementing regulations are discussed in the October 2002 joint Services memorandum, *Alternative Approaches for Streamlining Section 7 Consultation on Hazardous Fuels Treatment Projects* (http://www.fws.gov/endangered/pdfs/MemosLetters/streamlining.pdf; see also, 68 FR 1628 [January 13, 2003]). Provided below is a generalized discussion about programmatic consultations. We have provided the specific requirements set forth for this programmatic consultation in Section 2.

Programmatic consultations can be used to evaluate the expected effects of groups of related agency actions expected to be implemented in the future, where specifics of individual projects such as project location are not definitively known. Programmatic consultation generally must identify project design criteria (PDCs) or standards that will be applicable to all future projects implemented under the consultation document. PDCs serve to prevent adverse effects to listed species or designated critical habitat, or to limit adverse effects to predictable levels that will not jeopardize the continued existence of listed species or destroy or adversely modify critical habitat, at the individual project level or in the aggregate from all projects implemented under the Programmatic Opinion. Programmatic consultations allow for streamlined project-specific consultations because much of the effects analysis is completed up front in the programmatic consultation document. At the project-specific consultation stage, a proposed project is reviewed to determine if it can be implemented according to the PDCs, and to evaluate or tally the aggregate effects that will have resulted by implementing projects under the programmatic consultation to date, including the proposed project. The following elements should be included in a programmatic consultation to ensure its consistency with ESA Section 7 and its implementing regulations:

1. PDCs to prevent or limit future adverse effects on listed species and critical habitat

2. Description of the manner in which projects to be implemented under the programmatic consultation may affect listed species and critical habitat, an evaluation of expected level of effects from covered projects, and a programmatic incidental take statement if applicable

3. Process for evaluating expected, and tracking actual aggregate or net additive effects of all projects expected to be implemented under the programmatic consultation, including project-specific incidental take if applicable. The programmatic consultation document must demonstrate that when the PDCs are applied to each project, the aggregate effect of all projects will not adversely affect listed species or their critical habitat, or will not jeopardize species or destroy or adversely modify their critical habitat, as applicable

4. Procedures for streamlined project-specific consultation. As discussed above, if an approved programmatic consultation document is sufficiently detailed, project-specific consultations ideally will consist of certifications and concurrences between action agency biologists and consulting agency biologists, respectively. An action agency biologist or team will provide a description of a proposed project, or batched projects, and a certification that the project(s) will be implemented in accordance with the applicable PDCs. The action agency also provides a description of anticipated project-specific effects and a tallying of net effects to date resulting from projects implemented under the program, and certification that these effects are consistent with those anticipated in the programmatic consultation document. If a project is likely to result in prohibited take of a listed species, a project-specific incidental take statement may be developed and appended to the programmatic consultation. The consulting agency biologist reviews the submission and provides concurrence, or adjustments to the project(s) necessary to bring it (them) into compliance with the programmatic consultation document. The project-specific consultation process must also identify any effects that were not considered in the programmatic consultation. Finally, the project-specific consultation procedures must provide contingencies for proposed projects that cannot be implemented in accordance with the PDCs; full stand-alone consultations may be performed on these projects if they are too dissimilar in nature or in expected effects from those projected in the programmatic consultation document.

5. Procedures for monitoring projects and validating effects predictions

6. Comprehensive review of the program, generally conducted annually

1 Consultation History

The NPS requested consultation and provided a draft GMP to NMFS on March 5, 2013. The ENP determined that adopting and implementing the GMP may affect, but is not likely to adversely affect, smalltooth sawfish and sea turtles (green, leatherback, loggerhead, Kemp's ridley, and hawksbill). NMFS did not submit written comments on the draft GMP. NMFS and the ENP had a conference call on January 17, 2014, to provide an update on the GMP process to NMFS and request consultation or NMFS feedback on the GMP. Through successive emails and phone conversations, information was exchanged, the scope of the GMP was clarified, and the NPS indicated that it was preparing a final GMP. A preliminary final GMP was provided to NMFS on May 30, 2014, at which time we initiated consultation. The ENP requested NMFS complete consultation or provide a technical assistance letter describing NMFS recommendations for the GMP on July 10, 2014. The issue to be determined was whether the GMP was the type of plan that required consultation at the time of plan adoption, or whether consultations were appropriate at only the project-specific stage. NMFS determined that programmatic consultation on the plan was appropriate, and that the consultation would be formal, due to the ENP's requirement for Park boaters and fishers to complete educational requirements regarding listed species and to get a permit. Take of sea turtles by recreational boating and fishing is an effect of the GMP, given the permitting of boaters and fishers with the educational component, and ENP's authority to oversee and manage hook-and-line captures of listed marine species within the Park. The final request for additional information request was fulfilled on September 8, 2014.

2 Description of the Proposed Action

Authorities under Which the Action Will Be Conducted

The GMP is an NPS-required planning document that provides long-term guidance for Park decision making and management direction consistent with its mission, and applicable laws, regulations, and policies. The ENP was dedicated as a national park in 1947 with 460,000 acres (ac) and in 1989 the East Everglades Addition (109,600 ac) was added. The ENP is currently 1,509,000 ac (2,358 square miles [mi^2]), making it the largest legislated wilderness area east of the Rocky Mountains. Approximately 1 million people visit the ENP annually through their 2 main entrances (Homestead and Shark Valley). Of these visitors, approximately 100,000-125,000 vessels traverse ENP waters per year, with about 20% being non-motorized vessels like canoes. The last GMP was completed in 1979, before the addition of the East Everglades Addition. Since GMPs typically have a planning horizon of 20-30 years and the Park has expanded, the ENP GMP is due to be updated. A Wilderness Study is also included to evaluate the East Everglades Addition for possible recommendation to Congress for inclusion in the National Wilderness Preservation System. None of the East Everglades Addition occurs in marine waters.

Description of the ENP GMP

The GMP analyzes 4 alternative ways to manage the ENP over the next 20-30 years. The GMP identified a preferred alternative, which is the alternative that is addressed in this consultation. The preferred alternative addresses the following items that are located in marine waters under NMFS jurisdiction. We have described activities covered under the proposed ENP GMP including changes from the previous management of the Park that ENP will implement below and have summarized them in Table 1.

- Increase the amount of vessel speed restriction zones throughout the Park. This includes establishing pole-and-troll areas (i.e., combustion engines turned off and only poles, paddles, or electric trolling motors are allowed) and idle wake zones. The Park has approximately 529,300 ac of marine waters of which 29,000 ac are protected by an existing speed-restriction zone. Under the preferred alternative, the ENP proposes increasing this to 149,642 ac of speed-restriction zones, as detailed in Table 2 and shown in Figures 4 and 5 in Section 2.6. This will result in 5 times as much marine waters protected by speed-restriction zones.
- Develop a mandatory boater education/permit process throughout the Park's marine areas, and a subsequent boating safety and resource protection plan to address boating, visitor safety, and resource protection in marine waters of Florida Bay, the Gulf Coast, and Ten Thousand Islands, as part of the plan's adaptive management framework. According to the ENP, all boaters will have to take a course after which they will be issued a permit that will last for 1 year to allow boat operators in Park waters after the course/test completion. Courses will be updated as needed based on GMP

implementation efforts and other rules/regulations changes that could occur over time. It is expected that the fee to take the course could cover administrative as well as resource protection activities in the Park. The course would be available online, through computer applications (apps), could be taken at the Park's visitor centers, and would be adaptable as new technologies are developed. Main themes of the course include (1) resource protection including threatened and endangered species impact avoidance, (2) GMP zones and rules, and (3) boating safety and on-the-water etiquette and procedures.

- Expand the types of boat tours provided by NPS including fishing and paddling tours and expand canoe and kayak rentals. For example, the ENP proposes new fishing opportunities such as guided kayak fishing, which is becoming more popular. The goal is to make the public more aware of these services and be able to visit the Park and have a unique experience. The ENP anticipates that these activities will not increase the overall visitor, boating usage, and/or fishing activity in the Park and if it did increase any of these activities, the increase would be minimal. They believe that expanding these activities would more be a shift from people that are already coming to the Park that decide to take part in fishing/boating in this manner, versus going out with a friend or using a more traditional type of fishing guide. The goal is to provide visitors with a way to see and learn about the Park (e.g., view wildlife, photography) rather than increasing the number of new users.
- Establish a cultural heritage interpretive water trail in Ten Thousand Islands. The goal is to provide paddlers a canoe route/trail that provides historical or traditional-use stories about important areas in the Park. This is done in many areas across the country to create more meaningful recreation experiences. For example, the ENP might provide 1 or more loop trails in the Ten Thousand Islands area to talk about Native American and early pioneer sites/historical events. The trail and sites would be minimally marked using virtual indicators via Global Positioning System (GPS) and software apps to the greatest extent possible.
- Maintain the approximately 99-mi Wilderness Waterway that runs through the western portion of the Park.
- Construct new campsites and camping platforms (chickees) in Florida Bay and along the Gulf Coast. A sample image of a chickee is shown in Figure 1 below. There are 17 existing chickees and 30 backcountry beach or ground camping sites. ENP anticipate installation of up to 12 additional chickees in marine waters (4 in Florida Bay and 8 along the Gulf Coast). Single group chickees are typically 200 ft^2 in size and are constructed of 8-10 wood piles that have 4-in diameters. Chickees designed for 2 groups are approximately 400 ft^2 in size and are constructed of 16 wood piles that have 4-inch diameters. NMFS consulted on the installation of a group of 2 chickees in 2009 that was designed with 2 camping platforms supported by 32 wood piles with a walkway, chemical toilet, roof, and ladder. Installation was completed from a barge with piles driven (NMFS tracking number SER-2008-07458). Chickee designs may be refined over time to minimize impacts and make them enjoyable for visitors, but the general footprint size and pile type will remain the same. All chickees will be placed so as to minimize impacts to seagrasses and will not impact mangroves.

Figure 1. Example of an ENP chickee

- Maintain and improve the Flamingo Visitors Center (Flamingo) area including overnight accommodations (e.g., cabins, campgrounds, house boats, eco-tents), food service, visitor center, marina, and boat rentals. The ENP has stated that it anticipates no repairs to the marinas or boat ramps during the next 20 years. The Flamingo Marina is divided into a northern and a southern section, with the southern section accessible to Florida Bay and the northern section only accessible to the canal which leads to Whitewater Bay and other backcountry areas (Figure 2). The marina has approximately 56 slips for public use. In addition, there are approximately 20 slips for Park operations/ research divided among Key Largo, Flamingo, and Everglades City. Most vessels are trailered in for day use by Park visitors. The ENP estimates that approximately 40%-50% of all boat use in the Park occurs from Flamingo. With the estimate of 100,000-125,000 boat trips/year, the average estimated daily use from Flamingo is 110-170 trips depending on the day of the week, weather, season, water quality, health of economy, etc. NMFS consulted on repairs to the 3 northern marina boat ramps in 2014 (NMFS tracking number SER-2014-13357). The existing ramps were replaced with new pre-fabricated concrete slabs. If future repairs are necessary for the southern boat ramps, repairs will be completed using the same construction methodology. Pre-fabricated concrete slabs would be placed from the land. The concrete piles supporting the concrete floating docks in the marina are rated with withstand a Category 2 hurricane and have an estimated lifespan of 50 years. Therefore, ENP does not anticipate any additional repairs will be required during the life of the plan.

Figure 2. Image of ENP Flamingo marinas, visitor center, and campground (©2014 Google)

- Maintain the numerous existing monofilament recycling bins at the marinas and throughout the Park. ENP intends to maintain these bins. In addition, educational signs shall be posted in these areas to inform fishers how to handle potential fishing interactions with listed species. A sample sign is provided at the end of this document. These signs must be posted in prominent locations with high foot traffic where visitors may fish. At a minimum, these signs shall include all of the information provided in the sample.
- Maintain and improve the 20-ac ranger station and Florida Bay Interagency Science Center in Key Largo, Florida.
- Maintain and improve the Everglades City visitor and administrative facilities including boat tours and canoe and kayak rentals. This includes the construction of a new canoe/kayak launch site.
- Per NPS's proposal, increase law enforcement on the water.
- Maintain and install aids-to-navigation (ATONs) as necessary to maintain vessel traffic throughout the Park. There are currently about 900 ATONs throughout the 529,300 acres of Park marine waters, with most found in Florida Bay to mark "channels." At this time, the ENP anticipates that an additional 50 ATONs may be required to address the proposed changes in vessel speed primarily in Florida Bay. They stated that most channels and in-water signs identifying important information are already in place and that they are moving to increased reliance on GPS, apps, and other technologies to communicate important information to boaters. This approach is intended to (1) minimize impacts to natural resource, and (2) reduce visual and safety impacts. The mandatory boater education program/permit will increase awareness for resource protection and stewardship by Park visitors to reduce the need for in-water signs and markers. The ENP also stated that they may remove approximately 100 ATONs as navigation guidance becomes increasingly more dependent on GPS and apps.

Table 1. Current and Anticipated Marine In-water Construction Impacts

Structures	Current Structures	Proposed Structures or Anticipated Repairs
ATON	Approximately 900 (would be maintained are repaired/replaced in-kind as needed)	50 additional planned to mark new in-water speed restriction zones
Chickees and backcountry campsites	17	Maintenance and replacement of existing structures and up to 12 new structures (over multiple-year period)
Marina	1 marina at Flamingo with approximately 56 slips for public use	No new structures proposed and no repairs anticipated; however, repairs that may be needed are covered under this Opinion
Boat ramp	2 public boat ramps at Flamingo There are non-public ramps for Park operations/ research at Key Largo, Flamingo, and Everglades City	No new ramps proposed (maintain with repair/replace in-kind)
Moorings	None	3 (approximate) for several flats boats/skiffs for day use in the Trout Cove area of Florida Bay (4 x 4 wood piles)
Miscellaneous	Park has about 5 small observation boardwalks or small boat tie-up docks in its vast marine areas (e.g., wildlife viewing area at end of Snake Bight Trail, dock at North Nest Key campsite)	Repair and replacement of existing structures plus up to 12 new structures over a multiple year period

Key ENP GMP activities occurring with no routes of effects to ESA-resources under NMFS jurisdiction:

- ENP will continue to allow commercial airboat tours and private airboat use in non-marine waters in the East Everglades Addition. Under the GMP, all airboats will now be required to follow designated routes and commercial airboat operators will be licensed under concession contracts.
- ENP will change the designation of waters within the East Everglades Addition (non-marine waters). Approximately 26,900 ac in the northwest portion would be managed as "frontcountry" zone (i.e., motorized vessels allowed) and the remaining approximately 80,000 ac would be "backcounty" (i.e., no motorized vessels). Approximately 41,600 ac would be proposed for wilderness designation and 42,500 ac would be proposed for potential wilderness. Frontcountry zones cannot be areas designated as wilderness.

Projects occurring in ENP that are not included in the current GMP. The GMP lists a number of activities that are not included in the current plan, but which appear to meet the ESA definition of interdependent and interrelated activities that should be evaluated as part of the broader GMP. When such new management plans or activities are in draft form, NMFS and ENP will review the proposed activities/plans to determine whether reinitiation on the GMP is required based on any of the reinitiation triggers defined in 50 CFR § 402.16 and in Section 11 of this Opinion. For example, while a fishing management plan may change or add to the activities described in this consultation, it may not change the effects to listed species in a manner that would trigger reinitiation of this GMP Opinion. The anticipated future management plans include:

- The ENP proposes to develop a fisheries management plan to address fishing concerns within the Park's boundaries.
- Restoration of land and in-water resources within the Park including removal of non-native plants and restoration of seagrass beds. The ENP is working to develop a Florida Bay Seagrass Habitat Restoration and Management Plan but it is uncertain when the draft will be completed and available. The intent of the plan is to clarify the restoration methods and situations under which restoration projects may occur.

Table 2. ENP Speed Restriction Zones (August 2014)

Acreage/ Protection Measure	**Florida Bay**	**Other Marine Areas (Gulf Coast, 10,000 Islands, etc.)**	**Total Acres**
Acres	392,580 ac	136,720 ac	529,300 ac
Existing conditions – see attached Alternative 1 Map and other documents			
Crocodile Sanctuary, Wildlife Protection areas – closed to public entry	~16,000 ac		~16,000 ac
Hell's Bay Canoe Trail – paddle only		~500 ac	~500 ac
Snake Bight Pole/Troll Zone – push pole, electric trolling motor, paddle	~9,400 ac		~9,400 ac
Miscellaneous idle speed areas	~50 ac	~50 ac	~100 ac
West Lake – 6 horsepower limit		~2,000 ac	~2,000 ac
Chokoloskee Manatee Protection Area – speed limits		~1,000 ac	~1,000 ac
Totals (areas with some type of protective measures related to boating)	~25,450 ac	~3,550 ac	~29,000 ac
Preferred Alternative – see attached Preferred Alternative Map and other documents			
Crocodile Sanctuary, Wildlife Protection areas – closed to public entry	~12,566 ac		~12,566 ac
Hell's Bay Canoe Trail – paddle only		~500 ac	~500 ac
Backcountry Zone (Joe Bay/Snag Bay area) – paddle only	~3,450 ac		
Pole/Troll Zones – push pole, electric trolling motor, paddle	~102,838 ac		~102,838 ac
Pole/Troll/Idle Zones – push pole, electric trolling motor, paddle (idle speed with adequate water depth)	~24,588 ac		~24,588 ac
Miscellaneous idle speed areas	~1,500 ac	~50 ac	~1,550 ac
Slow speed areas	~50 ac		~50 ac
West Lake – 6-horsepower limit		~2,000 ac	~2,000 ac
Chokoloskee Manatee Protection Area – speed limits		~1,000 ac	~1,000 ac
Seasonal backcountry areas – paddle only		~100 ac	~100 ac
Seasonal idle speed areas		~1,000 ac	~1,000 ac
Totals (areas with some type of protective measures related to boating)	~144,992 ac	~4,650 ac	~149,642 ac

Project-Specific Review

This section describes the required project review for the ENP GMP. The ENP does not anticipate the need for many in-water construction projects in the next 20 years. In-water work is limited to the activities described in this document and must meet the PDCs described in Section 2.5. For in-water projects, the ENP will provide NMFS with the following information before starting in-water construction:

1. **PDC-Compliant Activities**
    a. **Submission to NMFS:** The ENP must email NMFS the following information to nmfs.ser.enp@noaa.gov:
    b. A completed Excel spreadsheet attachment in the format shown below in Table 3. Table 3 provides the necessary headings along with an example. This is followed by descriptions and formatting requirements for each of the columns.
    c. A written explanation briefly describing the project and how the PDCs will be met.
    d. Any other relevant supporting documentation such as a site survey, photos, etc.

   NMFS will acknowledge receipt of the ENP's email submission through an auto reply email. NMFS will review each e-mail submission sent to us by the NPS. If the ENP receives acknowledgement of NMFS's receipt of the application package, and receives no subsequent notification within the 10-day review period that the project does not comply with the programmatic consultation, then the ENP may proceed with processing the project application.

2. **Activities that Do Not Comply with PDCs – Additional Section 7 Consultation**: If a project does not meet the PDCs defined in this Programmatic Opinion, additional project-specific consultation procedures must be implemented for that project. NPS and NMFS points of contact will determine whether the project can be modified (e.g., with different PDCs) so that it avoids adverse effects to NMFS' listed species and designated critical habitat, or modified so that the effects are not of a type and extent other than those considered in this programmatic opinion.

Table 3. ENP project-specific review provided to NMFS (shown below with examples)

Date Sent to NMFS	Latitude	Longitude	Project Type	Impact Types	Total New In-Water Impact (ft^2)	Over-water Area (ft^2)	New, Repair, or Replacement	Type and Extent of Effects Consistent with BiOp	All PDCs Met
11/12/14	25.56789	-81.23456	5 ATONs	pile driving	X	Y	replacement	Y or N	Y or N

Formatting requirements:
1. Date Sent to NMFS: This is the date the email was provided to NMFS.
2. Latitude: This shall be formatted in decimal degrees to 5 places as shown in the examples.
3. Longitude: This shall be formatted in decimal degrees to 5 places as shown in the examples. Please provide a negative symbol before the longitude to denote the western hemisphere.
4. Impact type: Specify the type of impact to the environment.
5. Total In-Water Impact: Defined as the total area of in-water substrate that is permanently changed below the mean high water line. This loss is calculated in square footage.
6. Overwater Area: Includes the total square footage of all overwater structures including docks, boardwalks, chickees.

7. New Construction, Repair, or Replacement: Please note which type of activity is being authorized. Repair and replacement are defined as occurring within the same footprint as the existing structure. New construction is defined as a partial or completely new project footprint.
8. Type and Extent of Effects: Certify whether the type and extent of effects from this type of project is within the range of effects predicted in this opinion for this project type.
9. All PDCs Met: Are all of the applicable PDCs defined in this document being met by the proposed project? Answer "yes" or "no."

Program Review

NMFS and the ENP will conduct annual program reviews to evaluate, among other things, whether the nature and scale of the effects predicted continue to be valid, whether the PDCs continue to be appropriate, and whether the project-specific consultation procedures are being complied with and are effective. The purpose is to verify conclusions regarding the potential effects to ESA-listed species and critical habitat, review data on the cumulative impacts of the combined projects from the previous year, and evaluate and suggest any procedural changes prompted by the review of data. If the results of the annual program review show that the anticipated impacts to listed species or critical habitat defined in this document are being exceeded, reinitiation of consultation may be required. The program review also provides an opportunity for NMFS and ENP to discuss any changes that may be required to the educational program to the ENP visitor permit.

The ENP shall provide the following information every 6 months for the annual program review:

1. An excel spreadsheet of all sea turtle and smalltooth sawfish hook-and-line captures in the ENP during the previous 6 months. Also, any encounter data provided by Park visitors or researchers, if available. ENP staff captures this existing data in their "creel survey and guide logbook reporting." The location of captures is currently reported by the Park's 11 marine fishing areas shown below in Figure 3. As educational materials are developed, this reporting process is likely to improve. Please provide NMFS with the most current searchable version of the database for review.

The ENP shall provide the following information annually for the program review:

2. An excel spreadsheet of the construction projects completed the previous year in the format provided in Table 3 above.

The annual program review will cover all construction projects and hook-and-line captures that occur within a given calendar year. The review will occur at the end of that year but no later than March 31st of the following year. This review will be conducted as an in-person meeting or conference call between NMFS and the ENP. The meeting will discuss the results of the in-depth project reviews, administrative issues, concerns, any necessary changes in the PDCs, effects of this consultation, and any other procedural changes required. NMFS will document the results of the annual review in a formal letter to the ENP.

Project Design Criteria

Based on past ESA Section 7 consultations on similar in-water activities, PDCs have been identified that typically have been applied to in-water activities that limit environmental effects. PDCs must limit effects to listed species and designated critical habitat to those that are temporary or otherwise insignificant and do not result in take of listed species or adverse effects to the essential features of designated critical habitat, or if they do result in take or adverse effects, the effects from individual projects or from the entire program will not be of an extent that they jeopardize the continued existence of listed species or destroy or adversely modify critical habitat . The nature of the in-water activities involved in a proposed project will dictate which of the PDCs will be applicable to future projects covered by this consultation. Below is a list of each of the activities that are covered and the required PDCs necessary to complete the action (see Table 4).

Table 4. Project Design Criteria Required for Projects Authorized under the GMP

<table>
<tr><td colspan="2">All projects and activities shall meet the following conditions:
□ No work shall be authorized which may have direct or indirect adverse effects on the essential features of loggerhead sea turtle critical habitat (e.g., block the migratory pathway of sea turtles).
□ For projects in waters accessible to sea turtles and smalltooth sawfish, follow the NMFS’s Sea Turtle and Smalltooth Sawfish Construction Conditions, dated March 23, 2006. Under these guidelines, all construction personnel shall be on the look-out for the presence of ESA-listed species and construction activities will cease if sea turtles or smalltooth sawfish are observed in the area.
□ Turbidity barriers shall be used to minimize the effects of turbidity during in-water construction.
□ To the extent possible, new or rehabilitated facilities would be sited to avoid sensitive wildlife habitats, including feeding and resting areas, major travel corridors, nesting areas, and other sensitive habitats. Specifically, projects must be designed to minimize impacts to seagrasses (i.e., no more than 10 acres of impact per structure).
□ Construction activities will be timed to avoid sensitive periods such as nesting or spawning seasons. Ongoing visitor use and NPS operational activities could be restricted if their potential level of damage or disturbance warranted doing so.
□ Breeding or nesting areas for threatened and endangered species will be protected from human disturbance.
□ All vessels associated with construction projects shall operate at idle speeds, no-wake speeds at all times while in the construction area and while in water depths where the draft of the vessel provides less than a 4-ft clearance to the bottom.
□ Any collision with and/or injury to a sea turtle or smalltooth sawfish shall be reported immediately to NMFS at 727-824-5312 and the local sea turtle stranding / rescue organization.</td></tr>
<tr><td>ATONS, chickees, and other minor pile-supported structures</td><td>Installation, maintenance, and removal of ATONs, chickees, mooring pilings, boardwalks, and tie-up docks:
□ Piles are limited to 14-in-diameter wood piles
□ New overwater structures are limited to 500 ft^2 in size
□ No impacts to red mangroves are authorized</td></tr>
</table>

Boat ramps	Repair and replacement of existing boat ramps within the Park are limited to the same size and location as the existing boat ramp. No impacts to red mangroves are authorized.
Boating and fishing permits required by the ENP for visitors	The ENP shall coordinate with NMFS to develop and maintain educational materials provided to Park visitors as part of their Park pass. These materials shall, at a minimum, include the following information to boaters and fishers regarding how to handle incidental captures of listed species by hook-and-line: □ Handling procedures for listed marine species incidentally captured □ Reporting requirements and contact information for the sea turtle and smalltooth sawfish hotlines □ Requirements for fishers to have line cutting equipment and a de-hooking instrument available during fishing □ Instructions for hook-and-line captures which must be reported to the ENP Creel Survey and the Sea Turtle Stranding and Salvage Network (STSSN) or National Sawfish Encounter Database (NSED), as defined in Section 2.4 above
Educational and Outreach	□ Educational signs must be posted providing procedures to address potential hook-and-line captures of sea turtles and smalltooth sawfish. These signs must be posted in high traffic areas wherever Park visitors enter the water to fish (e.g., marinas, boat ramps, popular shore fishing locations). Any signs posted must have NMFS approval for content. □ We request that Park visitors photograph hook-and-line captures if photos can be taken safely without further harming the animal.

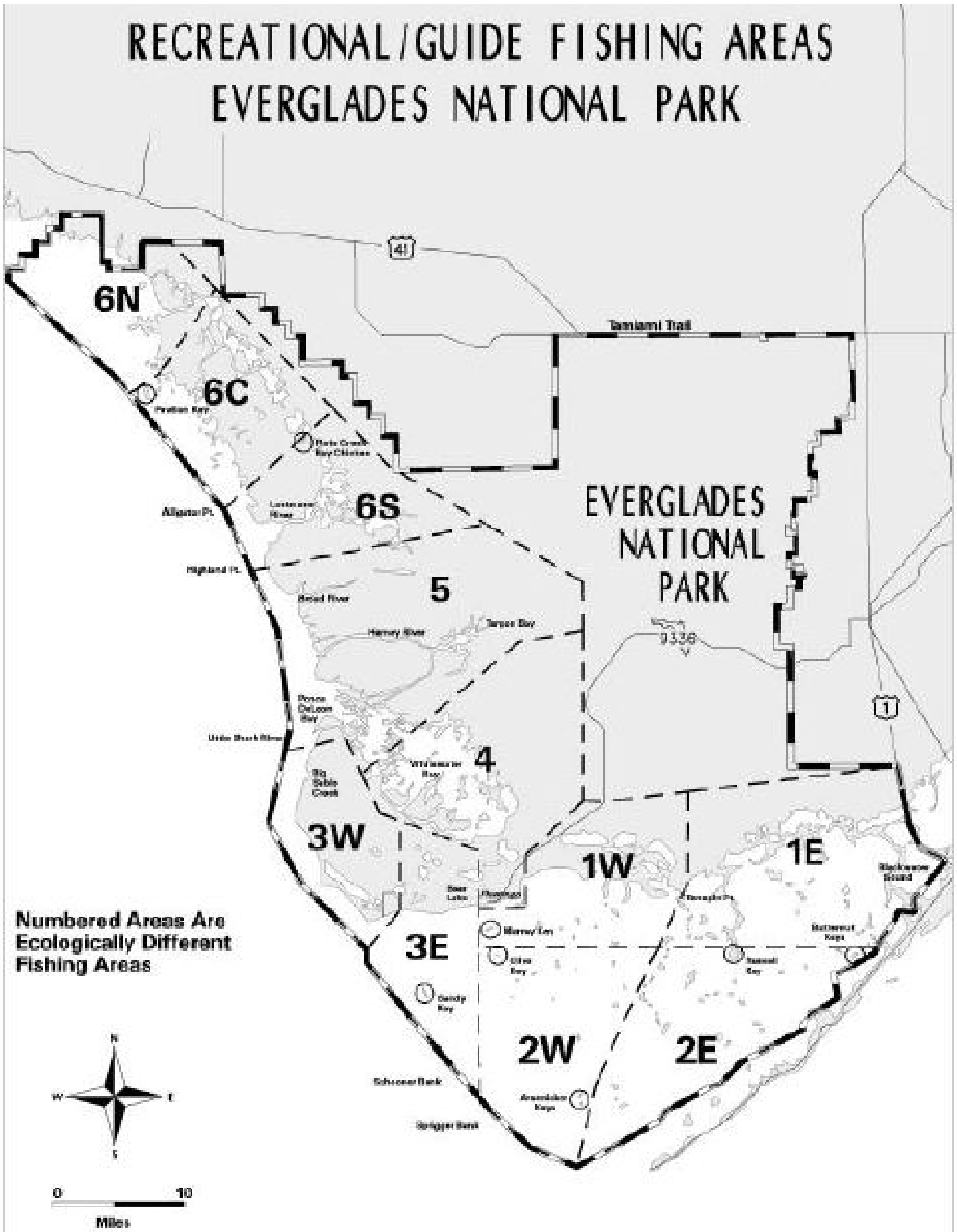

Figure 3. ENP Marine Fishing Areas (11)

Action Area

The action area is defined by regulation as "all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action" (50 CFR 402.02). The action area for the ENP GMP is the limits of the National Park. Figures 4 and 5 below show the current and proposed speed restriction zones, chickees, and waterways that are marked with ATONS.

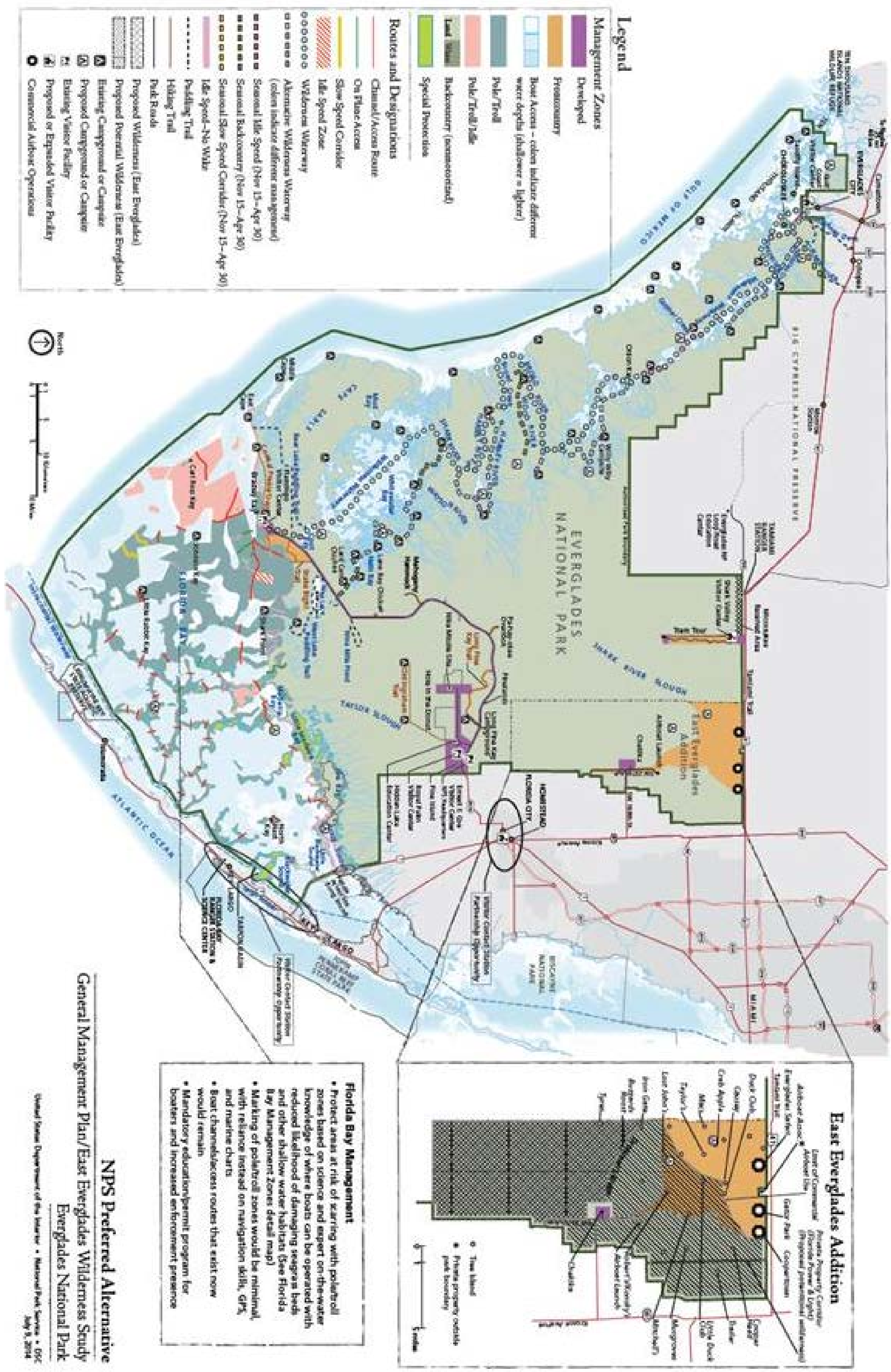

Figure 4. ENP showing speed-restriction zones and proposed chickees

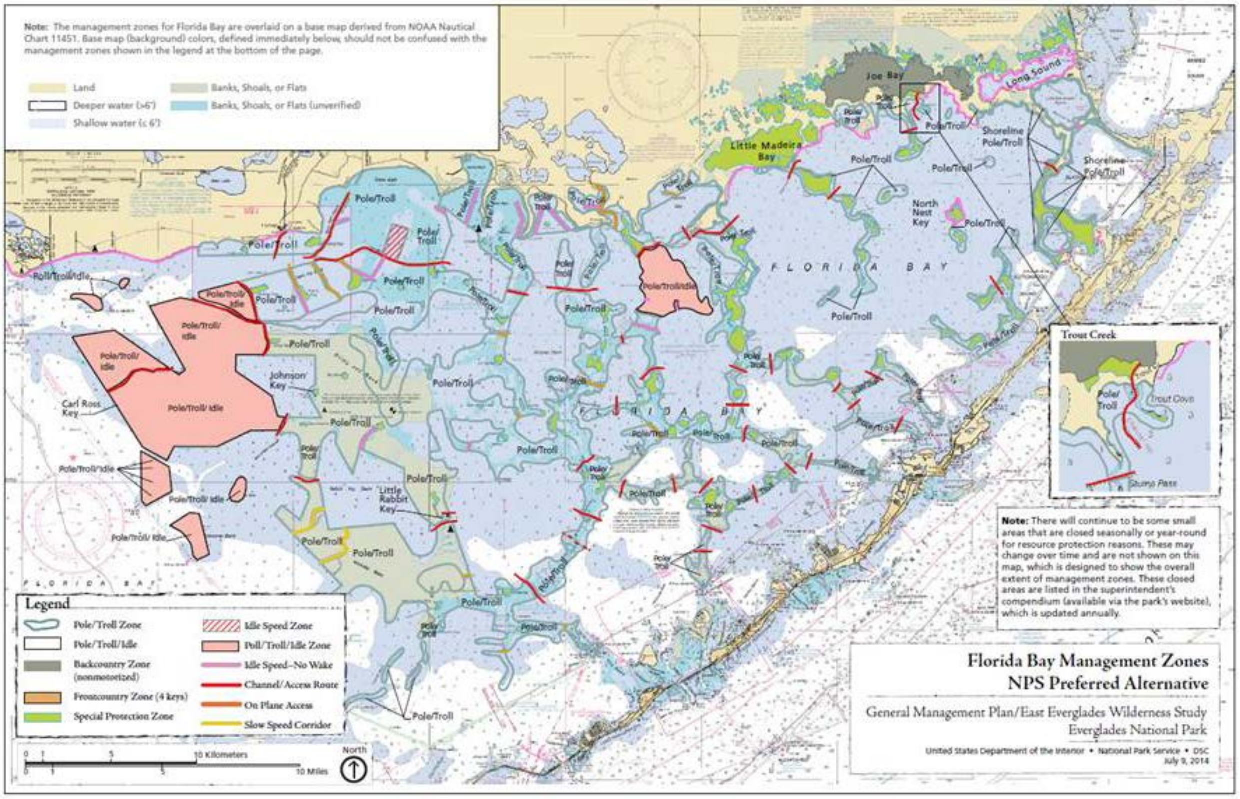

Figure 5. Map of the speed-restrictions zones proposed in Florida Bay under the preferred alternative

3 Status of Listed Species and Critical Habitat

Three ESA-listed species of sea turtles (the endangered Kemp's ridley; the threatened loggerhead[1] and the threatened/endangered green[2]) and the endangered smalltooth sawfish[3] can be found in or near the action area and may be affected by the project. We do not believe hawksbill or leatherback sea turtles will be present at the project sites or affected because of their very specific life history, sheltering, and foraging requirements, which are not met in or near the action area. Hawksbills are associated with coral reefs, while leatherbacks are a deepwater, pelagic species. In addition, no hawksbill sea turtle and only 1 leatherback sea turtle were reported as captured in the area to the sea turtle and stranding network (Gulf of Mexico Zone 3, Everglades offshore Waters) between 1986 to 2014 (NSED 2012).

The ENP includes critical habitat for smalltooth sawfish (Ten Thousand Islands/Everglades Unit) and loggerhead sea turtle (Unit 19 for nearshore reproductive habitat). Neither of these critical habitat units will be affected by the projects proposed in the preferred alternative. For smalltooth sawfish critical habitat, none of the proposed projects will change the shallow, euryhaline essential feature, or sawfish's ability to use the feature normally after construction, or remove the

[1] Northwest Atlantic Ocean distinct population segment (DPS)
[2] Green turtles are listed as threatened except for the Florida and Pacific coast of Mexico breeding populations, which are listed as endangered.
[3] U.S. DPS

red mangrove essential feature. For loggerhead critical habitat, none of the proposed activities will impact nearshore reproductive habitat by blocking access to adult turtles entering or leaving nesting beaches, or hatchlings leaving the beaches. Specifically, impacts to loggerhead critical habitat primary constituent elements and the smalltooth sawfish critical habitat's red mangrove essential feature are prohibited by the PDCs. The installation of pile-supported structures will not impact the shallow, euryhaline essential feature habitat.

Potential Effects to Species in the Action Area

We have identified the following potential adverse effects to sea turtles and smalltooth for the reasons described below.

1. The species may be temporarily unable to use the project sites described above for forage and shelter habitat due to avoidance of construction activities, related noise, and physical exclusion from areas blocked by turbidity curtains, but these effects will be insignificant, given the proposed projects' small footprints; short construction times; and turbidity controls that will only enclose a small portion of the project sites at any time. Curtains will be removed immediately after construction, and will only block potential use of the area by sea turtles or smalltooth sawfish during construction. Construction is limited to pile placement (ATON repair or installation, chickee repair or installation, etc.) or marina/boat ramp repairs. Piles placed will be positioned to avoid seagrasses to the maximum extent possible to minimize impacts to seagrasses used by some sea turtles for foraging and will not impact red mangroves used by smalltooth sawfish for refuge. Potential seagrass impacts would be likely limited to ATON placement to alert boaters of potential resource protection or vessel safety concerns. These small pile-supported structures are either located in areas that would not restrict foraging or refuge because they are located in open water (ATONs and chickees) where species can easily move around them, or are nearshore by existing structures (piles for mooring or small dock repairs),. Though repairs are not anticipated, if marina and boat ramp repairs would be required, they would occur in the same footprint as existing structures and would not impact foraging or refuge habitat. In addition, these marinas are located in marina basins not likely used by these species because of the regular vessel traffic in that area. Therefore, any short-term displacement or exclusion from the project area is insignificant.

2. Sea turtles and sawfish may be affected by pile-driving noise, but we believe this effect will be insignificant. All piles that will be installed for ATONS or chickees are typically 4-in wood piles. The PDCs limit pile installation to 14-in wood piles. Since the exact installation is unknown, we assume a worst case scenario (loudest installation method) of impact driving of piles.

   ***Single-strike injury effects*:** Injurious decibel (dB) levels are expressed in units of sound exposure level (SEL or sSEL for a single pile-driving strike). The sSEL source level caused by a single strike to a wooden pile using an impact hammer is 175 dB (sSEL).[4] This source level (175 dB) does not exceed the noise threshold for causing injury (187 dB [sSEL]) in sea turtles and smalltooth sawfish. Therefore, there is no single-strike injury noise impact associated with the installation of wood piles by impact hammer.

[4] NMFS 2014. Regional General Permit SAJ-82 (SAJ-2007-1590), Florida Keys, Monroe County, Florida

Daily cumulative noise exposure**:** Daily cumulative noise exposure (cSEL) is the exposure to pile-driving noise over time. The cSEL source level increases with each pile strike, while the cSEL threshold remains the same at 187 dB (cSEL). Based on calculations in SAJ-82 for the installation of wood piles by impact hammer, the daily cSEL source level does not exceed the threshold. Therefore, there is no cumulative noise impact associated with the installation of wood piles by impact hammer.

Behavioral response**:** Animal hearing is characterized by the root mean square (RMS) dB level and is the measure used to assess behavioral or non-injury responses of organisms to sound (e.g., changes in feeding or sheltering). The RMS source level generated by driving wooden piles with an impact hammer is 185 dB (RMS). The RMS threshold level at which a behavioral response is elicited from this activity is 150 dB for sawfish, and 160 dB for sea turtles. The source level exceeds the thresholds for both sea turtles and smalltooth sawfish; therefore, we believe that both species would modify their behaviors if within a distance of 215 m and 46 m, respectively. Due to the species' mobility and short-term disturbance from noise in the project locations while piles are being driven, animals are unlikely to remain in the area during construction. The installation of ATONs or chickees are likely to occur in open water and will be installed quickly. As these structures are being placed in a protected national park, there will be similar, undisturbed foraging and sheltering habitat around them for sea turtles or sawfish, including juveniles, to use during construction and they can return when construction is complete. We believe that temporary noise produced by pile driving with an impact will have insignificant effects on sea turtles and smalltooth sawfish.

3. Sea turtles could be adversely affected by motorized vessel traffic, as vessels may pose risk of collisions with these species. The ENP estimates that visitors will take 100,000-125,000 boat trips/year with an estimated average daily use from Flamingo of 110-170 trips depending on the day of the week, weather, season, water quality, and health of economy. As will be discussed in more detail in Section 5.1.1, sea turtle stranding data indicates that 5 sea turtles were reported dead as a result of vessel interactions. It is unknown if the turtle was struck by a vessel before or after death or inside or outside of the park boundaries and then washed into the park. As discussed in Section 2.2, the Park has approximately 529,300 ac of marine waters of which 29,000 ac are protected by an existing speed-restriction zone. Under the preferred alternative, the ENP proposes increasing this to 149,642 ac of speed-restriction zones. We believe that vessel traffic within the park may continue to present a risk of vessel strike injury to sea turtles, though at a reduced rate due to the increase in speed restriction zones in the park. These effects are discussed further in Section 3.2 and Section 5.

4. Sea turtles and smalltooth sawfish may be adversely affected by hook-and-line captures by Park visitors fishing within the ENP. The ENP has proposed to provide educational materials to fishers in the Park as part of their visitor permit program. This educational material will be developed and maintained with NMFS as part of the PDCs of this Opinion. This will include providing Park visitors with the most current guidance on how to handle these species when captured and current contact information for reporting captures. The ENP has stated that an average of 39 smalltooth sawfish are captured each year by recreational fishers in the ENP (Table 5), with the highest year resulting in the capture of 64 sawfish. Sea turtles are captured in much lower numbers in ENP, with only 5 known

captures in the last 25 years (2 loggerhead and 3 unknown species). None of the sea turtle or smalltooth sawfish captures were reported to be injured and all were released alive. The potential effect to sea turtles and smalltooth sawfish from hook-and-line capture is considered further below.

Table 5. Number of smalltooth sawfish captured in ENP by hook-and-line

Year	Number of Smalltooth Sawfish
2004	43
2005	28
2006	48
2007	33
2008	39
2009	31
2010	35
2011	27
2012	64
2013	40
Average per year	39

Status of Species and Critical Habitat Likely to be Adversely Affected

3.1.1 Sea Turtles

There are 3 species of sea turtles that may be affected by the proposed action (green, Kemp's ridley, and loggerhead), that all travel widely throughout the South Atlantic, Gulf of Mexico and the Caribbean. These species are highly migratory and therefore could occur within the action area. Section 3.2.1.1 will address the general threats that confront all sea turtle species. The remainder of Section 3.2.1.2 – 3.2.1.4 will address information on the distribution, life history, population structure, abundance, population trends, and unique threats to each species of sea turtle.

3.1.1.1 **General Threats Faced by All Sea Turtle Species**

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

Fisheries
Incidental bycatch in commercial fisheries is identified as a major contributor to past declines, and threat to future recovery, for all of the sea turtle species (NMFS and USFWS 1991a; NMFS and USFWS 1992; NMFS and USFWS 1993; NMFS et al. 2011a; NMFS and USFWS 2008b). Domestic fisheries often capture, injure, and kill sea turtles at various life stages. Sea turtles in the pelagic environment are exposed to U.S. Atlantic pelagic longline fisheries. Sea turtles in the benthic environment in waters off the coastal United States are exposed to a suite of other

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

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

Non-Fishery In-Water Activities

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

Coastal Development and Erosion Control

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

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

The April 20, 2010, explosion of the Deepwater Horizon oil rig affected sea turtles in the Gulf of Mexico. There is an on-going assessment of the long-term effects of the spill on Gulf of Mexico marine life, including sea turtle populations. Following the spill, juvenile Kemp's ridley, green, and loggerhead sea turtles were found in *Sargassum* algae mats in the convergence zones, where currents meet and oil collected. Sea turtles found in these areas were often coated in oil and/or had ingested oil. Approximately 536 live adult and juvenile sea turtles were recovered from the Gulf and brought into rehabilitation centers; of these, 456 were visibly oiled (these and the following numbers were obtained from http://www.nmfs.noaa.gov/pr/health/oilspill/). To date, 469 of the live recovered sea turtles have been successfully returned to the wild, 25 died during rehabilitation, and 42 are still in care but will hopefully be returned to the wild eventually.

During the clean-up period, 613 dead sea turtles were recovered in coastal waters or on beaches in Mississippi, Alabama, Louisiana, and the Florida Panhandle. As of February 2011, 478 of these dead turtles had been examined. Many of the examined sea turtles showed indications that they had died as a result of interactions with trawl gear, most likely used in the shrimp fishery, and not as a result of exposure to or the ingestion of oil.

During the spring and summer of 2010, nearly 300 sea turtle nests were relocated from the northern Gulf to the east coast of Florida with the goal of preventing hatchlings from entering the oiled waters of the northern Gulf. From these relocated nests, 14,676 sea turtles, including 14,235 loggerheads, 125 Kemp's ridleys, and 316 greens, were ultimately released from Florida beaches.

A thorough assessment of the long-term effects of the spill on sea turtles is underway. However, the spill resulted in the direct mortality of many sea turtles and may have had sublethal effects or caused environmental damage that will impact other sea turtles into the future. The population level effects of the spill and associated response activity are likely to remain unknown for some period into the future.

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

Climate Change

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

Climate change impacts on sea turtles currently cannot be predicted with any degree of certainty; however, significant impacts to the hatchling sex ratios of sea turtles may result (NMFS and USFWS 2007c). In sea turtles, sex is determined by the ambient sand temperature (during the middle third of incubation) with female offspring produced at higher temperatures and males at lower temperatures within a thermal tolerance range of 25°-35°C (Ackerman 1997). Increases in global temperature could potentially skew future sex ratios toward higher numbers of females (NMFS and USFWS 2007c).

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

Other changes in the marine ecosystem caused by global climate change (e.g., ocean acidification, salinity, oceanic currents, dissolved oxygen levels, nutrient distribution, etc.) could influence the distribution and abundance of lower trophic levels (e.g., phytoplankton, zooplankton, submerged aquatic vegetation, crustaceans, mollusks, forage fish, etc.) which could ultimately affect the primary foraging areas of sea turtles.

Other Threats

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

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

3.1.1.2 **Loggerhead Sea Turtle**

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

Species Description and Distribution

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

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

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

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

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

The recovery plan for the Northwest Atlantic population of loggerhead sea turtles concluded that there is no genetic distinction between loggerheads nesting on adjacent beaches along the Florida Peninsula. It also concluded that specific boundaries for subpopulations could not be designated based on genetic differences alone. Thus, the recovery plan uses a combination of geographic distribution of nesting densities, geographic separation, and geopolitical boundaries, in addition to genetic differences, to identify recovery units. The recovery units are as follows: (1) the Northern Recovery Unit (Florida/Georgia border north through southern Virginia), (2) the Peninsular Florida Recovery Unit (Florida/Georgia border through Pinellas County, Florida), (3) the Dry Tortugas Recovery Unit (islands located west of Key West, Florida), (4) the Northern Gulf of Mexico Recovery Unit (Franklin County, Florida, through Texas), and (5) the Greater Caribbean Recovery Unit (Mexico through French Guiana, the Bahamas, Lesser Antilles, and Greater Antilles) (NMFS and USFWS 2008a). The recovery plan concluded that all recovery units are essential to the recovery of the species. Although the recovery plan was written prior to the listing of the NWA DPS, the recovery units for what was then termed the Northwest Atlantic population apply to the NWA DPS.

Life History Information

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

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

(Dodd 1988) which incubate for 42-75 days before hatching (NMFS and USFWS 2008a). Loggerhead hatchlings are 1.5-2 in long and weigh about 0.7 ounces [20 grams (g)]. As post-hatchlings, loggerheads hatched on U.S. beaches enter the "oceanic juvenile" life stage, migrating offshore and becoming associated with *Sargassum* habitats, driftlines, and other convergence zones (Carr 1986; Conant et al. 2009a; Witherington 2002). Oceanic juveniles grow at rates of 1-2 in (2.9-5.4 cm) per year (Bjorndal et al. 2003; Snover 2002) over a period as long as 7-12 years (Bolten et al. 1998) before moving to more coastal habitats. Studies have suggested that not all loggerhead sea turtles follow the model of circumnavigating the North Atlantic Gyre as pelagic juveniles, followed by permanent settlement into benthic environments (Bolten and Witherington 2003; Laurent et al. 1998). These studies suggest some turtles may either remain in the oceanic habitat in the North Atlantic longer than hypothesized, or they move back and forth between oceanic and coastal habitats interchangeably (Witzell 2002). Stranding records indicate that when immature loggerheads reach 15-24 in (40-60 cm) straight carapace length, they begin to reside in coastal inshore waters of the continental shelf throughout the U.S. Atlantic and Gulf of Mexico (Witzell 2002).

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

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

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

Cuban waters of 5 adult female loggerheads originally flipper-tagged in Quintana Roo, Mexico, indicating that Cuban shelf waters likely also provide foraging habitat for adult females that nest in Mexico.

Status and Population Dynamics

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

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

Peninsular Florida Recovery Unit

The Peninsular Florida Recovery Unit is the largest loggerhead nesting assemblage in the Northwest Atlantic. A near-complete nest census (all beaches including index nesting beaches) undertaken from 1989-2007 showed an average of 64,513 loggerhead nests per year, representing approximately 15,735 nesting females per year (NMFS and USFWS 2008a). The statewide estimated total for 2013 was 77,975 nests (FWRI nesting database).

In addition to the total nest count estimates, the Florida Fish and Wildlife Research Institute (FWRI) uses an index nesting beach survey method. The index survey uses standardized data-collection criteria to measure seasonal nesting and allow accurate comparisons between beaches and between years. This provides a better tool for understanding the nesting trends (Figure 25). FWRI performed a detailed analysis of the long-term loggerhead index nesting data (1989-2013) (http://myfwc.com/research/wildlife/sea-turtles/nesting/loggerhead-trends/). Over that time period, 3 distinct trends were identified. From 1989-1998 there was a 30% increase that was then followed by a sharp decline over the subsequent decade. Large increases in loggerhead nesting occurred since then. FWRI examined the trend from the 1998 nesting high through 2013 and found the decade-long post-1998 decline had reversed and there was no longer a demonstrable trend. Looking at the data from 1989 through 2014 (an increase of over 32%), FWRI concluded that there was an overall positive change in the nest counts (http://myfwc.com/research/wildlife/sea-turtles/nesting/loggerhead-trends/).

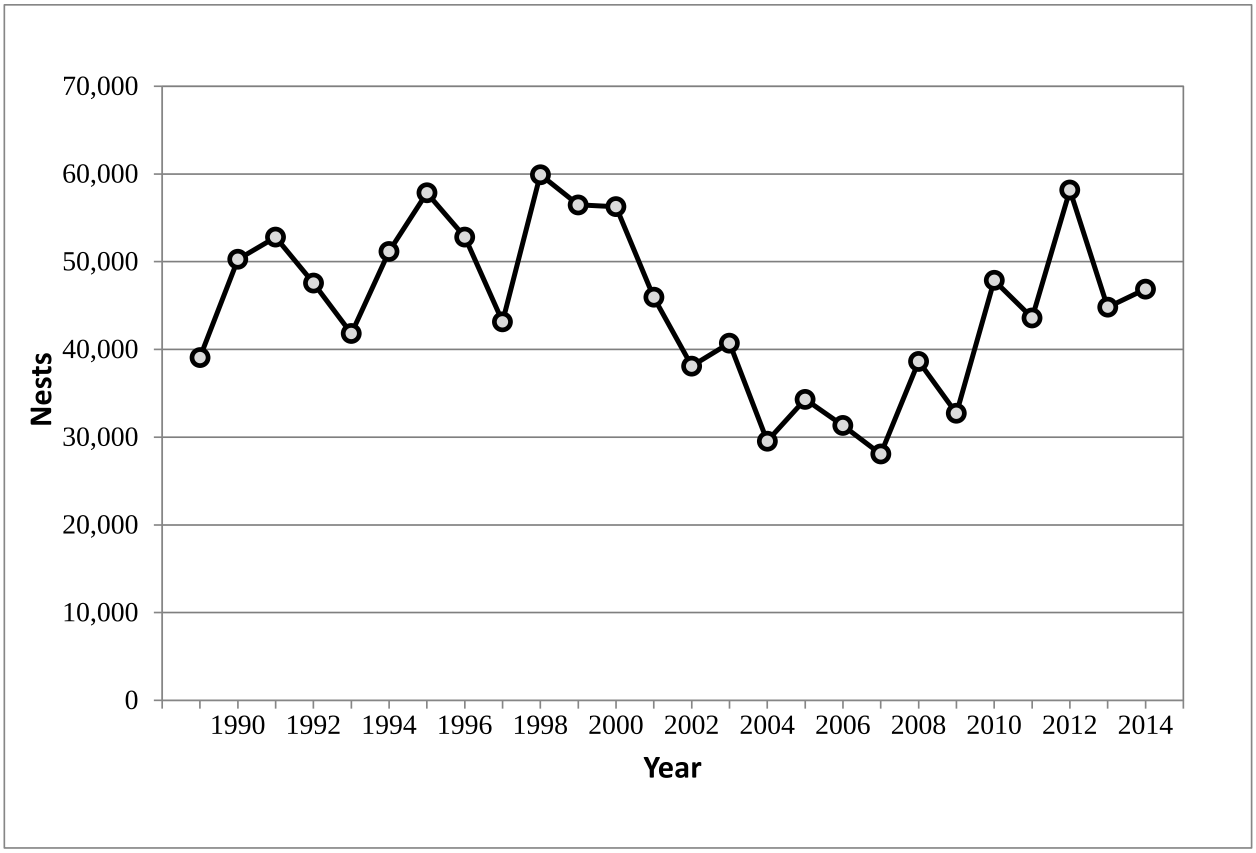

Figure 25. Loggerhead sea turtle nesting at Florida index beaches since 1989

Northern Recovery Unit

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

Data since that analysis (Table 18) are showing improved nesting numbers and a departure from the declining trend. Georgia nesting has rebounded to show the first statistically significant increasing trend since comprehensive nesting surveys began in 1989 (Mark Dodd, Georgia Department of Natural Resources press release, http://www.georgiawildlife.com/node/3139). South Carolina and North Carolina nesting have also begun to show a shift away from the declining trend of the past.

Table18. Total Number of NRU Loggerhead Nests (Georgia Department of Natural Resources, South Carolina Department of Natural Resources, and North Carolina Wildlife Resources Commission nesting datasets)

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

South Carolina also conducts an index beach nesting survey similar to the one described for Florida. Although the survey only includes a subset of nesting, the standardized effort and locations allow for a better representation of the nesting trend over time. Increases in nesting were seen for the period from 2009-2012, with 2012 showing the highest index nesting total since the start of the program (Figure 26).

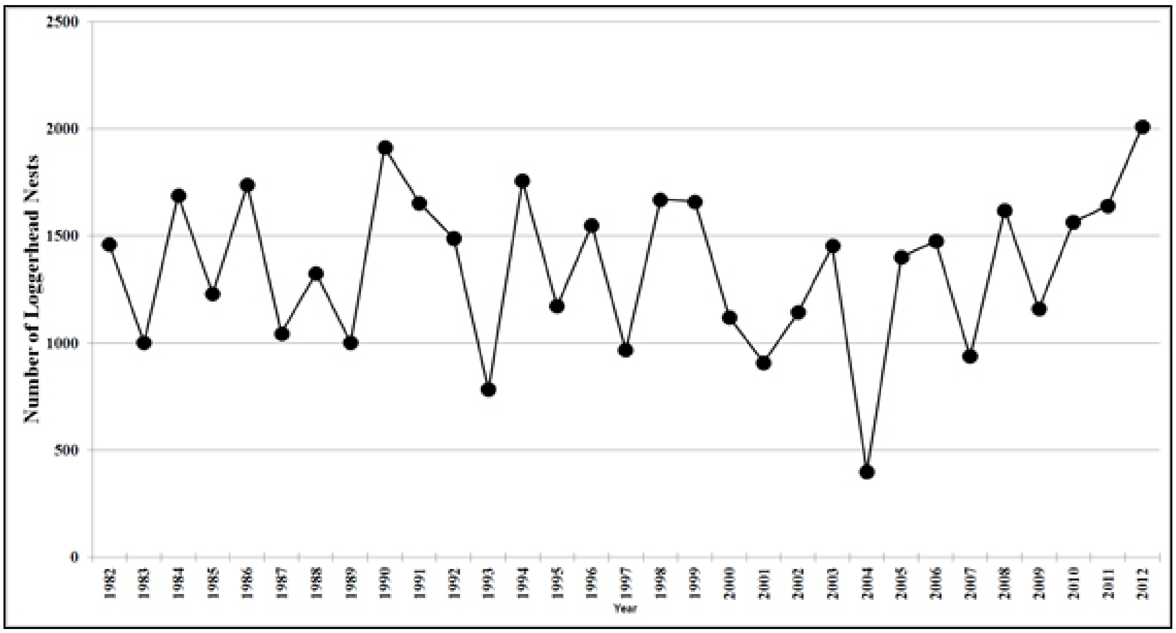

Figure 26. South Carolina index nesting beach counts for loggerhead sea turtles (from the South Carolina Department of Natural Resources website, http://www.dnr.sc.gov/seaturtle/nest.htm)

<u>Other NWA DPS Recovery Units</u>

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

In-water Trends

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

Population Estimate

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

Threats (Specific to Loggerhead Sea Turtles)
The threats faced by loggerhead sea turtles are well-summarized in the general discussion of threats in Section 4.2.2.1. Yet the impact of fishery interactions is a point of further emphasis for this species. The joint NMFS and USFWS Loggerhead Biological Review Team determined that the greatest threats to the NWA DPS of loggerheads result from cumulative fishery bycatch in neritic and oceanic habitats (Conant et al. 2009a).

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

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

3.1.1.3 **Green Sea Turtle**

The green sea turtle, *Chelonia mydas*, was listed as threatened under the ESA on July 28, 1978, except for the Florida and Pacific coast of Mexico breeding populations, which were listed as endangered.

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

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

Differences in mitochondrial deoxyribonucleic acid (mtDNA) properties of green sea turtles from different nesting regions indicate there are genetic subpopulations (Bowen et al. 1992; Fitzsimmons et al. 2006). Despite the genetic differences, sea turtles from separate nesting origins are commonly found mixed together on foraging grounds throughout the species' range. Such mixing occurs at extremely low levels in Hawaiian foraging areas, perhaps making this central Pacific population the most isolated of all green sea turtle populations occurring worldwide (Dutton et al. 2008).

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

The complete nesting range of green sea turtles within the southeastern United States includes sandy beaches between Texas and North Carolina, as well as the U.S. Virgin Islands and Puerto Rico (Dow et al. 2007; NMFS and USFWS 1991a). Still, the vast majority of green sea turtle nesting within the southeastern United States occurs in Florida (Johnson and Ehrhart 1994; Meylan et al. 1995). Principal U.S. nesting areas for green sea turtles are in eastern Florida, predominantly Brevard south through Broward counties. For more information on green sea turtle nesting in other ocean basins, refer to the 1991 publication, *Recovery Plan for the Atlantic Green Turtle* (NMFS and USFWS 1991a) or the 2007 publication, *Green Sea Turtle 5-Year Status Review* (NMFS and USFWS 2007a).

*Life History Informati*on

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

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

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

Status and Population Dynamics
Population estimates for marine turtles do not exist because of the difficulty in sampling turtles over their geographic ranges and within their marine environments. Nonetheless, researchers have used nesting data to study trends in reproducing sea turtles over time. A summary of nesting trends is provided in the most recent 5-year status review for the species (NMFS and USFWS 2007b) organized by ocean region (i.e., Western Atlantic Ocean, Central Atlantic Ocean, Eastern Atlantic Ocean, Mediterranean Sea, Western Indian Ocean, Northern Indian Ocean, Eastern Indian Ocean, Southeast Asia, Western Pacific Ocean, Central Pacific Ocean, and Eastern Pacific Ocean). It shows trends at 23 of the 46 nesting sites: 10 appeared to be increasing, 9 appeared to be stable, and 4 appeared to be decreasing. With respect to regional trends, the Pacific, the Western Atlantic, and the Central Atlantic regions appeared to show more positive trends (i.e., more nesting sites increasing than decreasing) while the Southeast Asia, the Eastern Indian Ocean, and possibly the Mediterranean Sea regions appeared to show more

negative trends (i.e., more nesting sites decreasing than increasing). These regional determinations should be viewed with caution, because trend data was only available for about half of the total nesting concentration sites examined in the review and site specific data availability appeared to vary across all regions.

The Western Atlantic region (i.e., the focus of this Opinion) was one of the best performing in terms of abundance in the entire review, as there were no sites that appeared to decrease. The 5-year status review for the species reviewed the trend in nest count data for each identified 8 geographic areas considered to be primary sites for green sea turtle nesting in the Atlantic/Caribbean (NMFS and USFWS 2007a): (1) Yucatán Peninsula, Mexico; (2) Tortuguero, Costa Rica; (3) Aves Island, Venezuela; (4) Galibi Reserve, Suriname; (5) Isla Trindade, Brazil; (6) Ascension Island, United Kingdom; (7) Bioko Island, Equatorial Guinea; and (8) Bijagos Achipelago, Guinea-Bissau. Nesting at all of these sites was considered to be stable or increasing with the exception of Bioko Island and the Bijagos Archipelago where the lack of sufficient data precluded a meaningful trend assessment for either (NMFS and USFWS 2007a). Seminoff (2004) likewise reviewed green sea turtle nesting data for 8 sites in the western, eastern, and central Atlantic, including all of the above with the exception that nesting in Florida was reviewed in place of Isla Trindade, Brazil. Seminoff (2004) concluded that all sites in the central and western Atlantic showed increased nesting, with the exception of nesting at Aves Island, Venezuela, while both sites in the eastern Atlantic demonstrated decreased nesting. These sites are not inclusive of all green sea turtle nesting in the Atlantic; however, other sites are not believed to support nesting levels high enough that would change the overall status of the species in the Atlantic (NMFS and USFWS 2007a). More information about site-specific trends for the other major ocean regions can be found in the most recent 5-year status review for the species (see NMFS and USFWS (2007a).

By far, the largest known nesting assemblage in the western Atlantic region occurs at Tortuguero, Costa Rica. According to monitoring data on nest counts, as well as documented emergences (both nesting and non-nesting events), there appears to be an increasing trend in this nesting assemblage since monitoring began in the early 1970s. For instance, from 1971-1975 there were approximately 41,250 average annual emergences documented and this number increased to an average of 72,200 emergences from 1992-1996 (Bjorndal et al. 1999). Troëng and Rankin (2005) collected nest counts from 1999-2003 and also reported increasing trends in the population consistent with the earlier studies, with nest count data suggesting 17,402-37,290 nesting females per year (NMFS and USFWS 2007a). Modeling by Chaloupka et al. (2008) using data sets of 25 years or more resulted in an estimate of the Tortuguero, Costa Rica, population's growing at 4.9% annually.

In the continental United States, green sea turtle nesting occurs along the Atlantic coast, primarily along the central and southeast coast of Florida where an estimated 200-1,100 females nest each year (Meylan et al. 1994; Weishampel et al. 2003). Occasional nesting has also been documented along the Gulf Coast of Florida (Meylan et al. 1995). More recently, green sea turtle nesting has occurred in North Carolina on Bald Head Island, just east of the mouth of the Cape Fear River, on Onslow Island, and on Cape Hatteras National Seashore. In 2010, a total of 18 nests were found in North Carolina, 6 nests in South Carolina, and 6 nests in Georgia (nesting databases maintained on www.seaturtle.org).

In Florida, index beaches were established to standardize data collection methods and effort on key nesting beaches. Since establishment of the index beaches in 1989, the pattern of green sea turtle nesting has generally shown biennial peaks in abundance with a positive trend during the 10 years of regular monitoring (Figure 27). According to data collected from Florida's index nesting beach survey from 1989-2012, green sea turtle nest counts across Florida have increased approximately ten-fold from a low of 267 in the early 1990s to a high of 25,553 in 2013. Two consecutive years of nesting declines in 2008 and 2009 caused some concern, but this was followed by increases in both 2010 and 2011, a decrease in 2012, and another increase in 2013 (Figure 27). Modeling by Chaloupka et al. (2008) using data sets of 25 years or more has resulted in an estimate of the Florida nesting stock at the Archie Carr National Wildlife Refuge growing at an annual rate of 13.9%.

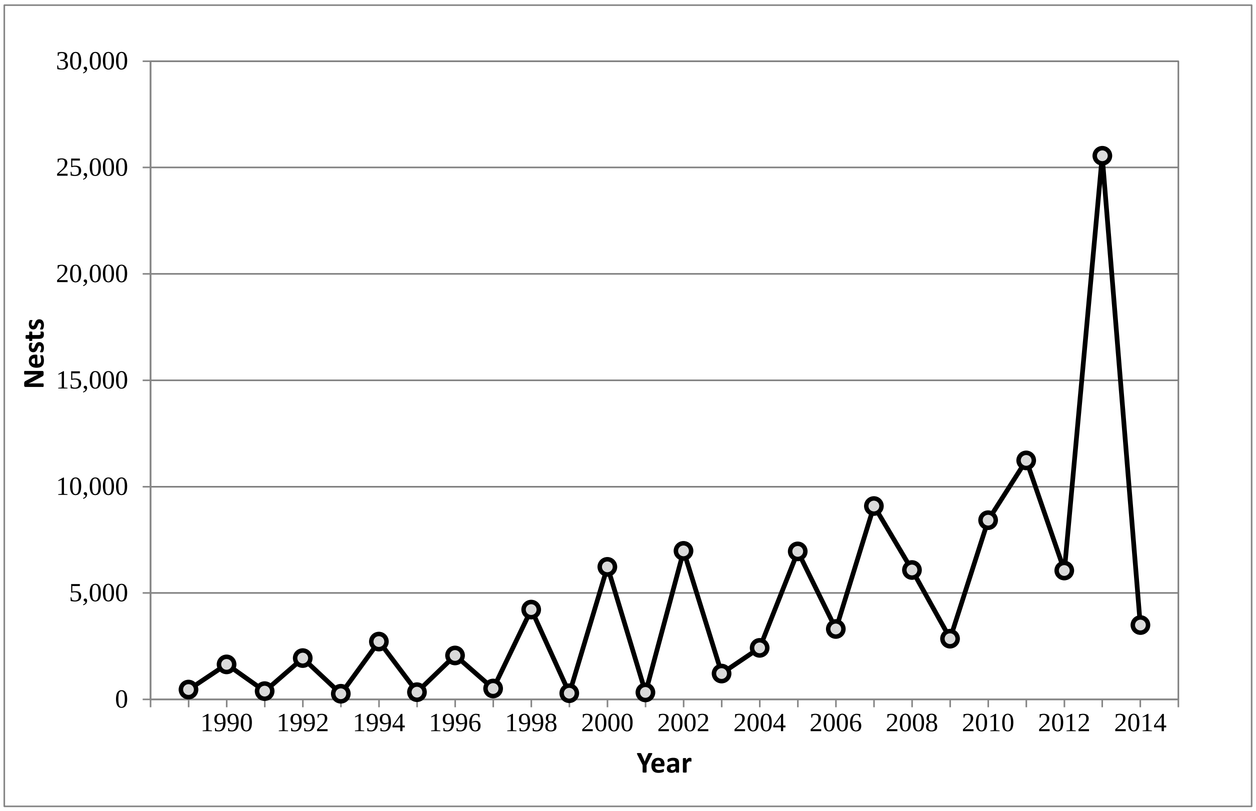

Figure 27. Green sea turtle nesting at Florida index beaches since 1989

Threats

The principal cause of past declines and extirpations of green sea turtle assemblages has been the overexploitation of the species for food and other products. Although intentional take of green sea turtles and their eggs is not extensive within the southeastern United States, green sea turtles that nest and forage in the region may spend large portions of their life history outside the region and outside U.S. jurisdiction, where exploitation is still a threat. Green sea turtles also face many of the same threats as other sea turtle species, including destruction of nesting habitat from storm events, oceanic events such as cold-stunning, pollution (e.g., plastics, petroleum products, petrochemicals), ecosystem alterations (e.g., nesting beach development, beach nourishment and shoreline stabilization, vegetation changes), poaching, global climate change, fisheries interactions, natural predation, and disease. A discussion on general sea turtle threats can be found in Section 4.2.2.1

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

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

3.1.1.4 **Kemp's Ridley Sea Turtle**

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

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

In each bridge adjoining the plastron to the carapace, there are 4 scutes, each of which is perforated by a pore.

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

The primary range of Kemp's ridley sea turtles is within the Gulf of Mexico basin, though they also occur in coastal and offshore waters of the U.S. Atlantic Ocean. Juvenile Kemp's ridley sea turtles, possibly carried by oceanic currents, have been recorded as far north as Nova Scotia. Historic records indicate a nesting range from Mustang Island, Texas, in the north to Veracruz, Mexico, in the south. Kemp's ridley sea turtles have recently been nesting along the Atlantic Coast of the United States, with nests recorded from beaches in Florida, Georgia, and the Carolinas. In 2012, the first Kemp's ridley sea turtle nest was recorded in Virginia. The Kemp's ridley nesting population is exponentially increasing, which may indicate a similar increase in the population as a whole (NMFS et al. 2011a).

Life History Information

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

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

Population Dynamics

Of the 7 species of sea turtles in the world, the Kemp's ridley has declined to the lowest population level. Most of the population of adult females nest on the beaches of Rancho Nuevo, Mexico (Pritchard 1969). When nesting aggregations at Rancho Nuevo were discovered in 1947, adult female populations were estimated to be in excess of 40,000 individuals (Hildebrand 1963). By the mid-1980s, however, nesting numbers from Rancho Nuevo and adjacent Mexican beaches were below 1,000, with a low of 702 nests in 1985. Yet, nesting steadily increased through the 1990s, and then accelerated during the first decade of the twenty-first century (Figure 29), which indicates the species is recovering. It is worth noting that when the Bi-National Kemp's Ridley Sea Turtle Population Restoration Project was initiated in 1978, only Rancho Nuevo nests were recorded. In 1988, nesting data from southern beaches at Playa Dos and Barra del Tordo were added. In 1989, data from the northern beaches of Barra Ostionales and Tepehuajes were added, and most recently in 1996, data from La Pesca and Altamira beaches were recorded. Currently, nesting at Rancho Nuevo accounts for just over 81% of all recorded Kemp's ridley nests in Mexico. Following the significant, unexplained decline in 2010, Kemp's ridley nests in Mexico reached a record high of 21,797 in 2012 (Gladys Porter Zoo nesting database 2013). In 2013 through 2014, there was a second significant decline, with only 16,385 and 11,279 nests recorded, respectively. A small nesting population is also emerging in the United States, primarily in Texas, rising from 6 nests in 1996 to 42 in 2004, to a record high of 209 nests in 2012 (National Park Service data, http://www.nps.gov/pais/naturescience/strp.htm, http://www.nps.gov/pais/naturescience/current-season.htm).

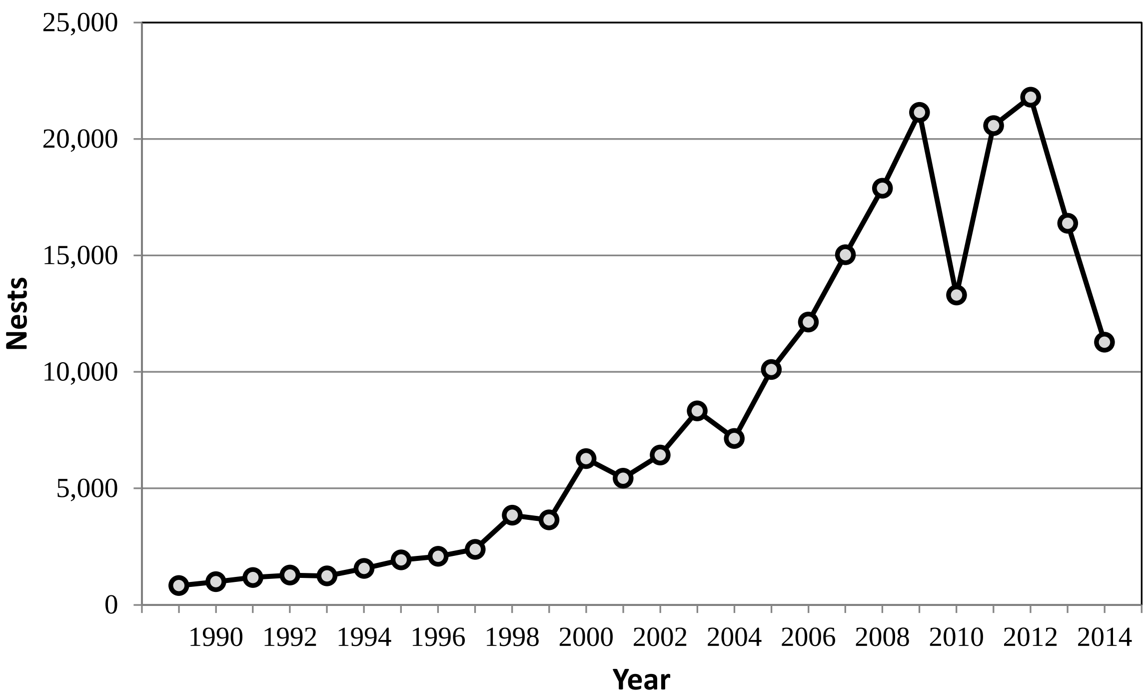

Figure 29. Kemp's ridley nest totals from Mexican beaches (Gladys Porter Zoo nesting database 2014)

Before the declines in 2010 and 2013/2014, Heppell et al. (2005a) predicted in a population model that the population is expected to increase at least 12-16% per year and that the population could attain at least 10,000 females nesting on Mexico beaches by 2015. NMFS et al. (2011a) produced an updated model that predicted the population to increase 19% per year and attain at least 10,000 females nesting on Mexico beaches by 2011. Approximately 25,000 nests would be needed for an estimate of 10,000 nesters on the beach, based on an average 2.5 nests/nesting female. While counts did not reach 25,000 nests by 2012, it is clear that the population has been steadily increasing over the long term. The increases in Kemp's ridley sea turtle nesting seen in the last 2 decades is likely due to a combination of management measures including elimination of direct harvest, nest protection, the use of Turtle Excluder Devices (TEDs), reduced trawling effort in Mexico and the United States, and possibly other changes in vital rates (TEWG 1998; TEWG 2000b). While these results are encouraging, the species limited range as well as low global abundance makes it particularly vulnerable to new sources of mortality as well as demographic and environmental randomness, all of which are often difficult to predict with any certainty. Additionally, the significant nesting declines observed in 2010 and 2013-2014 potentially indicate a serious population-level impact, and there is cause for concern regarding the ongoing recovery trajectory.

Threats

Kemp's ridley sea turtles face many of the same threats as other sea turtle species, including destruction of nesting habitat from storm events, oceanic events such as cold-stunning, pollution (plastics, petroleum products, petrochemicals, etc.), ecosystem alterations (nesting beach development, beach nourishment and shoreline stabilization, vegetation changes, etc.), poaching, global climate change, fisheries interactions, natural predation, and disease. A discussion on general sea turtle threats can be found in Section 3.2.1.1; the remainder of this section will expand on a few of the aforementioned threats and how they may specifically impact Kemp's ridley sea turtles.

As Kemp's ridley sea turtles continue to recover and nesting arribadas[6] are increasingly established, bacterial and fungal pathogens in nests are also likely to increase. Bacterial and fungal pathogen impacts have been well documented in the large arribadas of the olive ridley at Nancite in Costa Rica (Mo 1988). In some years, and on some sections of the beach, the hatching success can be as low as 5% (Mo 1988). As the Kemp's ridley nest density at Rancho Nuevo and adjacent beaches continues to increase, appropriate monitoring of emergence success will be necessary to determine if there are any density-dependent effects.

Over the past 3 years, NMFS has documented [via the Sea Turtle Stranding and Salvage Network data (STSSN), http://www.sefsc.noaa.gov/species/turtles/strandings.htm] elevated sea turtle strandings in the Northern Gulf of Mexico, particularly throughout the Mississippi Sound area. In the first 3 weeks of June 2010, over 120 sea turtle strandings were reported from Mississippi and Alabama waters, none of which exhibited any signs of external oiling to indicate effects associated with the Deepwater Hoizon oil spill event. A total of 644 sea turtle strandings were reported in 2010 from Louisiana, Mississippi, and Alabama waters, 561 (87%) of which were Kemp's ridley sea turtles. During March through May of 2011, 267 sea turtle strandings were reported from Mississippi and Alabama waters alone. A total of 525 sea turtle strandings were reported in 2011 from Louisiana, Mississippi, and Alabama waters, with the majority (455) occurring from March through July, 390 (86%) of which were Kemp's ridley sea turtles. During 2012, a total of 428 sea turtles were reported from Louisiana, Mississippi, and Alabama waters, though the data is incomplete. Of these reported strandings, 301 (70%) were Kemp's ridley sea

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

turtles. These stranding numbers are significantly greater than reported in past years; Louisiana, Mississippi, and Alabama waters reported 42 and 73 sea turtle strandings for 2008 and 2009, respectively. It should be noted that stranding coverage has increased considerably due to the Deepwater Horizon oil spill event.

Nonetheless, considering that strandings typically represent only a small fraction of actual mortality, these stranding events potentially represent a serious impact to the recovery and survival of the local sea turtle populations. While a definitive cause for these strandings has not been identified, necropsy results indicate a significant number of stranded turtles from these events likely perished due to forced submergence, which is commonly associated with fishery interactions (B. Stacy, NMFS, pers. comm. to M. Barnette, NMFS, March 2012). Yet, available information indicates fishery effort was extremely limited during the stranding events. The fact that in both 2010 and 2011 approximately 85% of all Louisiana, Mississippi, and Alabama stranded sea turtles were Kemp's ridleys is notable; however, this could simply be a function of the species' preference for shallow, inshore waters coupled with increased population abundance as reflected in recent Kemp's ridley nesting increases.

In response to these strandings, and due to speculation that fishery interactions may be the cause, fishery observer effort was shifted to evaluate the inshore skimmer trawl fishery during the summer of 2012. During May-July of that year, observers reported 24 sea turtle interactions in the skimmer trawl fishery, all but one of which were identified as Kemp's ridleys (1 sea turtle was an unidentified hardshell turtle). Encountered sea turtles were all very small, juvenile specimens ranging from 7.6-19.0 in (19.4-48.3 cm) curved carapace length, and all sea turtles were released alive. The small average size of encountered Kemp's ridleys introduces a potential conservation issue, as over 50% of these reported sea turtles could potentially pass through the maximum 4-inch bar spacing of TEDs currently required in the shrimp fishery. Due to this issue, a proposed 2012 rule to require TEDs in the skimmer trawl fishery (77 FR 27411) was not implemented. Based on anecdotal information, these interactions were a relatively new issue for the inshore skimmer trawl fishery. Given the nesting trends and habitat utilization of Kemp's ridley sea turtles, it is likely that fishery interactions in the Northern Gulf of Mexico may continue to be an issue of concern for the species, and one that may potentially slow the rate of recovery for Kemp's ridley sea turtles.

3.1.2 Smalltooth Sawfish

The U.S. DPS of smalltooth sawfish, *Pristis pectinata*, was listed as endangered under the ESA effective May 1, 2003 (68 FR 15674, April 1, 2003).

Species Description and Distribution
The smalltooth sawfish is a tropical marine and estuarine elasmobranch. It has an extended snout with a long, narrow, flattened, rostral blade (rostrum) with a series of transverse teeth along either edge. In general, smalltooth sawfish inhabit shallow coastal waters of warm seas throughout the world and feed on a variety of small fish (e.g., mullet, jacks, and ladyfish) (Simpfendorfer 2001), and crustaceans (e.g., shrimp and crabs) (Bigelow and Schroeder 1953; Norman and Fraser 1937).

Although this species is reported to have a circumtropical distribution, NMFS identified smalltooth sawfish from the Southeast United States as a DPS, due to the physical isolation of this population from others, the differences in international management of the species, and the significance of the U.S. population in relation to the global range of the species (see 68 FR15674). 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 2000). 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 2005). 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 northern movements of smalltooth sawfish in the western North Atlantic. Most specimens captured along the Atlantic coast north of Florida are large adults (over 10 ft) that likely represent seasonal migrants, wanderers, or colonizers from a historic Florida core population(s) to the south, rather than being members of a continuous, even-density population (Bigelow and Schroeder 1953).

Life History Information

Smalltooth sawfish fertilization is internal and females give birth to live young. The brood size, gestation period, and frequency of reproduction are unknown for smalltooth sawfish. Therefore, data from the closely related (in terms of size and body morphology) largetooth sawfish represent our best estimates of these parameters. The largetooth sawfish likely reproduces every other year, has a gestation period of approximately 5 months, and produces a mean of 7.3 offspring per brood, with a range of 1-13 offspring (Thorson 1976). Smalltooth sawfish are approximately 31 in (80 cm) at birth and may grow to a length of 18 ft (548 cm) or greater during their lifetime (Bigelow and Schroeder 1953; Simpfendorfer 2002). Simpfendorfer et al. (2008) report rapid juvenile growth for smalltooth sawfish for the first 2 years after birth, with stretched total length increasing by an average of 25-33 in (65-85 cm) in the first year and an average of 19-27 in (48-68 cm) in the second year. By contrast, very little information exists on size classes other than juveniles, which make up the majority of sawfish encounters; therefore, much uncertainty remains in estimating life history parameters for smalltooth sawfish, especially as it relates to age at maturity and post-juvenile growth rates. Based on age and growth studies of the largetooth sawfish (Thorson 1982) and research by Simpfendorfer (2000), the smalltooth sawfish is likely a slow-growing (with the exception of early juveniles), late-maturing (10-20 years) species with a long lifespan (30-60 years). Juvenile growth rates presented by Simpfendorfer et al. (2008) suggest smalltooth sawfish are growing faster than previously thought and therefore may reach sexual maturity at an earlier age.

There are distinct differences in habitat use based on life history stage. Juvenile smalltooth sawfish, those up to 3 years of age or approximately 8 ft in length (Simpfendorfer et al. 2008)), inhabit the shallow waters of estuaries and can be found in sheltered bays, dredged canals, along banks and sandbars, and in rivers (NMFS 2000). Juvenile smalltooth sawfish occur in euryhaline waters (i.e., waters with a wide range of salinities) and are often closely associated with muddy or sandy substrates, and shorelines containing red mangroves, *Rhizophora mangle* (Simpfendorfer 2001; Simpfendorfer 2003). Tracking data from the Caloosahatchee River in

Florida indicate very shallow depths and salinity are important abiotic factors influencing juvenile smalltooth sawfish movement patterns, habitat use, and distribution (Simpfendorfer et al. 2011). Another recent acoustic tagging study in a developed region of Charlotte Harbor, Florida, identified the importance of mangroves in close proximity to shallow water habitat for juvenile smalltooth sawfish, stating that juveniles generally occur in shallow water within 328 ft (100 m) of mangrove shorelines, generally red mangroves (Simpfendorfer et al. 2010). Juvenile smalltooth sawfish spend the majority of their time in waters less than 13 ft (4 m) in depth (Simpfendorfer et al. 2010) and are seldom found in depths greater than 32 ft (10 m) (Poulakis and Seitz 2004). Simpfendorfer et al. (2010) also indicated developmental differences in habitat use: the smallest juveniles (young-of-the-year juveniles measuring < 100 cm in length) generally used water depths less than 0.5 m (1.64 ft), had small home ranges (4,264-4,557 m^2), and exhibited high levels of site fidelity. Although small juveniles exhibit high levels of site fidelity for specific nursery habitats for periods of time lasting up to 3 months (Wiley and Simpfendorfer 2007), they do undergo small movements coinciding with changing tidal stages. These movements often involve moving from shallow sandbars at low tide to within red mangrove prop roots at higher tides (Simpfendorfer et al. 2010), behavior likely to reduce the risk of predation (Simpfendorfer 2006). As juveniles increase in size, they begin to expand their home ranges (Simpfendorfer et al. 2010; Simpfendorfer et al. 2011), eventually moving to more offshore habitats where they likely feed on larger prey and eventually reach sexual maturity.

Researchers have identified several areas within the Charlotte Harbor Estuary that are disproportionately more important to juvenile smalltooth sawfish, based on intra- or inter-annual (within- or between-year) capture rates during random sampling events within the estuary (Poulakis 2012; Poulakis et al. 2011). These areas were termed "hotspots" and also correspond with areas where public encounters are most frequently reported. Use of these "hotspots" can vary within and among years based on the amount and timing of freshwater inflow. Smalltooth sawfish use hotspots further upriver during high salinity conditions (drought) and areas closer to the mouth of the Caloosahatchee River during times of high freshwater inflow (Poulakis et al. 2011). At this time, researchers are unsure what specific biotic or abiotic factors influence this habitat use, but they believe a variety of conditions in addition to salinity, such as temperature, dissolved oxygen, water depth, shoreline vegetation, and food availability, may influence habitat selection (Poulakis et al. 2011).

While adult smalltooth sawfish may also use the estuarine habitats used by juveniles, they are commonly observed in deeper waters along the coasts. Poulakis and Seitz (2004) noted that nearly half of the encounters with adult-sized smalltooth sawfish in Florida Bay and the Florida Keys occurred in depths from 200-400 ft (70-122 m) of water. Similarly, Simpfendorfer and Wiley (2005) reported encounters in deeper waters off the Florida Keys, and observations from both commercial longline fishing vessels and fishery-independent sampling in the Florida Straits report large smalltooth sawfish in depths up to 130 ft (~40 m) (NSED 2012). Even so, NMFS believes adult smalltooth sawfish use shallow estuarine habitats during parturition (when adult females return to shallow estuaries to pup) because very young juveniles still containing rostral sheaths are captured in these areas. Since very young juveniles have high site fidelities, we hypothesize that they are birthed nearby or in their nursery habitats.

Status and Population Dynamics
Few long-term abundance data exist for the smalltooth sawfish, making it very difficult to estimate the current population size. Simpfendorfer (2001) estimated that the U.S. population may number less than 5% of historic levels, based on anecdotal data and the fact that the species' range has contracted by nearly 90%, with south and southwest Florida the only areas known to support a reproducing population. Since actual abundance data are limited, researchers have begun to compile capture and sightings data (collectively referred to as encounter data) in the NSED developed in 2000. Although this data cannot be used to assess the population because of the opportunistic nature in which they are collected (i.e., encounter data are a series of random occurrences rather than an evenly distributed search over a defined period of time), researchers can use this database to assess the spatial and temporal distribution of smalltooth sawfish. We expect that as the population grows, the geographic range of encounters will also increase. Since the conception of the NSED, over 3,000 smalltooth sawfish encounters have been reported and compiled in the encounter database (NSED 2012).

Despite the lack of scientific data on abundance, recent encounters with young-of-the-year, older juveniles, and sexually mature smalltooth sawfish indicate that the U.S. population is currently reproducing (Seitz and Poulakis 2002; Simpfendorfer 2003). The abundance of juveniles encountered, including very small individuals, suggests that the population remains viable (Simpfendorfer and Wiley 2004), and data analyzed from Everglades National Park as part of an established fisheries-dependent monitoring program (angler interviews) indicate a slightly increasing trend in abundance within the Park over the past decade (Carlson and Osborne 2012; Carlson et al. 2007). Using a demographic approach and life history data for smalltooth sawfish and similar species from the literature, Simpfendorfer (2000) estimated intrinsic rates of natural population increase for the species at 0.08-0.13 per year and population doubling times from 5.4-8.5 years. These low intrinsic rates[7] of population increase, suggest that the species is particularly vulnerable to excessive mortality and rapid population declines, after which recovery may take decades.

Threats
Past literature indicates smalltooth sawfish were once abundant along both coasts of Florida and quite common along the shores of Texas and the northern Gulf coast (NMFS 2010) and citations therein). Based on recent comparisons with these historical reports, the U.S. DPS of smalltooth sawfish has declined over the past century (e.g., (Simpfendorfer 2001; Simpfendorfer 2002). The decline in smalltooth sawfish abundance has been attributed to several factors including bycatch mortality in fisheries, habitat loss, and life history limitations of the species (NMFS 2010).

<u>Bycatch Mortality</u>
Bycatch mortality is cited as the primary cause for the decline in smalltooth sawfish in the United States (NMFS 2010). While there has never been a large-scale directed fishery, smalltooth sawfish easily become entangled in fishing gears (gillnets, otter trawls, trammel nets, and seines) directed at other commercial species, often resulting in serious injury or death (NMFS 2009). This has historically been reported in Florida (Snelson and Williams 1981), Louisiana (Simpfendorfer 2002), and Texas (Baughman 1943). For instance, one fisherman

[7] The rate at which a population increases in size if there are no density-dependent forces regulating the population

interviewed by Evermann and Bean (1897) reported taking an estimated 300 smalltooth sawfish in just one netting season in the Indian River Lagoon, Florida. 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 lb in 1949 to less than 1,500 lb 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"[8] (FLA. CONST. art. X, § 16). However, the threat of bycatch currently remains in commercial fisheries (e.g., South Atlantic shrimp fishery, Gulf of Mexico shrimp fishery, federal shark fisheries of the South Atlantic, and the Gulf of Mexico reef fish fishery), though anecdotal information collected by NMFS port agents suggest smalltooth sawfish captures are now rare.

In addition to incidental bycatch in commercial fisheries, smalltooth sawfish have historically been and continue to be captured by recreational fishers. Encounter data (NSED 2012) and past research (Caldwell 1990) document that rostrums are sometimes removed from smalltooth sawfish caught by recreational fishers, thereby reducing their chances of survival. While the current threat of mortality associated with recreational fisheries is expected to be low given that possession of the species in Florida has been prohibited since 1992, bycatch in recreational fisheries remains a potential threat to the species.

Habitat Loss

Modification and loss of smalltooth sawfish habitat, especially nursery habitat, is another 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). Large areas of coastal habitat were modified or lost between the mid-1970s and mid-1980s within the United States (Dahl and Johnson 1991). Since then, rates of loss have decreased, 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. In Florida, coastal development often involves the removal of mangroves and the armoring of shorelines through seawall construction. Changes to the natural freshwater flows into estuarine and marine waters through construction of canals and other water control devices have had other impacts: 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

[8] "Nearshore and inshore Florida waters" means all Florida waters inside a line 3 miles seaward of the coastline along the Gulf of Mexico and inside a line 1 mile seaward of the coastline along the Atlantic Ocean.

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.

Life History Limitations

The smalltooth sawfish is also limited by its life history characteristics as a slow-growing, relatively late-maturing, and long-lived species. Animals using this life history strategy are usually successful in maintaining small, persistent population sizes in constant environments, but are particularly vulnerable to increases in mortality or rapid environmental change (NMFS 2000). The combined characteristics of this life history strategy result in a very low intrinsic rate of population increase (Musick 1999) that makes the species slow to recover from any significant population decline (Simpfendorfer 2000). More recent data suggest smalltooth sawfish may mature earlier than previously thought, meaning rates of population increase could be higher and recovery times shorter than those currently reported (Simpfendorfer et al. 2008).

Current Threats

The 3 major factors that led to the current status of the U.S. DPS of smalltooth sawfish—bycatch mortality, habitat loss, and life history limitations—continue to be the greatest threats today. All the same, other threats such as the illegal commercial trade of smalltooth sawfish or their body parts, predation, and marine pollution and debris may also affect the population and recovery of smalltooth sawfish on smaller scales (NMFS 2010). We anticipate that all of these threats will continue to affect the rate of recovery for the U.S. DPS of smalltooth sawfish.

In addition to the anthropogenic effects mentioned previously, changes to the global climate are likely to be a threat to smalltooth sawfish and the habitats they use. The Intergovernmental Panel on Climate Change has stated that global climate change is unequivocal (IPCC 2007) and its impacts to coastal resources may be significant. Some of the likely effects commonly mentioned are sea level rise, increased frequency of severe weather events, changes in the amount and timing of precipitation, and changes in air and water temperatures (EPA 2012; NOAA 2012). The impacts to smalltooth sawfish cannot, for the most part, currently be predicted with any degree of certainty, but we can project some effects to the coastal habitats where they reside. We know that the coastal habitats that contain red mangroves and shallow, euryhaline waters will be directly impacted by climate change through sea level rise, which is expected to exceed 1 meter globally by 2100 according to Meehl et al. (2007), Pfeffer et al. (2008), and Vermeer and Rahmstorf (2009). Sea level rise will impact mangrove resources, as sediment surface elevations for mangroves will not keep pace with conservative projected rates of elevation in sea level (Gilman et al. 2008). Sea level increases will also affect the amount of shallow water available for juvenile smalltooth sawfish nursery habitat, especially in areas where there is shoreline armoring (e.g., seawalls). Further, the changes in precipitation coupled with sea level rise may also alter salinities of coastal habitats, reducing the amount of available smalltooth sawfish nursery habitat.

4 Environmental Baseline

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

Status of Sea Turtles and Smalltooth Sawfish within the Action Area

Sea Turtles

Loggerhead, Kemp's ridley, and green sea turtles may be located in ENP and affected by the proposed action. These species are migratory, traveling to forage grounds or for reproductive purposes. In addition, sea turtles are known to nest within the Park. According to the ENP, they have identified 1,119 sea turtle nests within the Park between 2009 and 2014. Prior to 2012, nest surveys were aerial and now they are field surveyed. Of these nests, all of the nests were loggerhead sea turtles except 1 reported green sea turtle nest and 6 unconfirmed hawksbill nests identified prior to field verification. NMFS believes that no individual sea turtles are likely to be permanent residents of these inshore waters, although some individuals may be present at any given time. These same individuals will migrate into offshore waters, as well as other area of the Gulf of Mexico, Caribbean Sea, and North Atlantic Ocean at certain times of the year, and thus may be impacted by activities occurring there; therefore, threats to turtles in the action area are considered to be the same as those discussed in Section 3.2.

Smalltooth Sawfish

Smalltooth sawfish in the action area (see Section 2.2) may be affected by the proposed action. Since the 1990s, the distribution of this species has been limited to Florida. Lee, Charlotte, and Monroe Counties are of particular significance for this species, and critical habitat was designated in these counties as a means of protecting their nursery habitats. In fact, the ENP makes up a majority of the smalltooth sawfish critical habitat for the Ten Thousand Islands/Everglades Unit, which was designated to protect sawfish nursery habitat. According to a sawfish population study done in the Everglades (Carlson and Osborne 2012), the population of smalltooth sawfish is approximately 5% of its original size and is restricted primarily to the waters of southern Florida, especially Everglades National Park and adjacent areas. Carlson et al. (2007) indicated that the population was stable with some evidence of increasing abundance by approximately 5% per year from 1989-2004. They updated this research and reported that this potential trend continues, although variability is high (Carlson and Osborne 2012). As with sea turtles, it is unlikely that any sawfish are permanent residents of the action area, but they are known to use this area for nursery habitat and individuals may be in the area at any given time. According to the ENP, approximately 39 smalltooth sawfish are captured on hook-and-line in the Park each year by recreational fishers (see Table 5, page 20). We discuss further the effects of these captures below.

Factors Affecting the Species and Environment within the Action Area

4.1.1 Federal Actions

Because the action area is a protected national park, not many actions requiring consultation by NMFS have occurred in the action area. Projects have included repairs to chickees, the marina at Flamingo, and 3 projects in Everglades City to construct or repair docks.

One federal action occurring outside of the ENP that may beneficially affect smalltooth sawfish and smalltooth sawfish critical habitat within the park is the Comprehensive Everglades Restoration Plan (CERP). NMFS completed programmatic consultation with the USACE on the CERP in 2014 (NMFS tracking number SER-2013-11848). This plan includes managing freshwater discharges in southern Florida that will beneficially affect salinity regimes (smalltooth sawfish critical habitat's shallow, euryhaline essential feature).

4.1.2 State or Private Actions

Recreational fishing as regulated by the state of Florida can affect protected species and their habitats within the action area. Pressure from recreational fishing around the action area is likely to continue and hard to quantify; however, the ENP does not regulate fishing licenses and still relies on the state of Florida fishing regulations. The ENP has plans to develop a fisheries management plan in the future that may further restrict fishing activities with the Park boundaries.

4.1.3 Other Potential Sources of Impacts to the Environmental Baseline

Stochastic events
Stochastic (i.e., random) events, such as hurricanes, occur in Florida and can affect the action area. These events are by nature unpredictable, and their effect on the recovery of the species is unknown; yet, they have the potential to directly impede recovery if animals die as a result, or indirectly if important habitats are damaged. Other stochastic events, such as cold snaps like the one that occurred in January 2010, can kill smalltooth sawfish (Poulakis et al. 2011) and also sea turtles.

Environmental Contamination
Coastal runoff, marina and dock construction, dredging, aquaculture, oil and gas exploration and extraction, increased under water noise and boat traffic can degrade marine habitats used by sea turtles (Colburn et al. 1996). The development of marinas and docks in inshore waters can negatively impact nearshore habitats. Fueling facilities at marinas can sometimes discharge oil, gas, and sewage into sensitive estuarine and coastal habitats. Although these contaminant concentrations do not likely affect the more pelagic waters, the species of sea turtles analyzed in this Biological Opinion travel between near shore and offshore habitats and may be exposed to and accumulate these contaminants during their life cycles.

The Gulf of Mexico is an area of high-density offshore oil extraction with chronic, low-level spills and occasional massive spills (such as the DWH oil spill, Ixtoc I oil well blowout and fire in the Bay of Campeche in 1979, and the explosion and destruction of a loaded supertanker, the Mega Borg, near Galveston in 1990). When large quantities of oil enter a body of water, chronic effects such as cancer, and direct mortality of wildlife, become more likely (Lutcavage et al. 1997). Oil spills in the vicinity of nesting beaches just prior to or during the nesting season could place nesting females, incubating egg clutches, and hatchlings at significant risk (Fritts et al. 1982; Lutcavage et al. 1997; Witherington 1999).

The accumulation of organic contaminants and trace metals has been studied in loggerhead, green, and leatherback sea turtles (Aguirre et al. 1994; Caurant et al. 1999; Corsolini et al. 2000) (McKenzie et al. 1999). Omnivorous loggerhead sea turtles had the highest organochlorine contaminant concentrations in all the tissues sampled, including those from green and leatherback turtles (Storelli et al. 2008). It is thought that dietary preferences were likely to be the main differentiating factor among species. Sakai et al. (1995) found the presence of metal residues occurring in loggerhead sea turtle organs and eggs. Storelli et al. (1998) analyzed tissues from 12 loggerhead sea turtles stranded along the Adriatic Sea (Italy) and found that characteristically, mercury accumulates in sea turtle livers while cadmium accumulates in their kidneys, as has been reported for other marine organisms like dolphins, seals, and porpoises (Law et al. 1991b). No information on detrimental threshold concentrations is available, and little is known about the consequences of exposure of organochlorine compounds to sea turtles. Research is needed on the short- and long-term health and fecundity effects of chlorobiphenyl, organochlorine, and heavy metal accumulation in sea turtles.

Conservation and Recovery Actions Shaping the Environmental Baseline

As mentioned above, the Comprehensive Everglades Restoration Plan may beneficially affect smalltooth sawfish and smalltooth sawfish critical habitat within the park. This plan includes managing freshwater discharges in southern Florida that will beneficially affect salinity regimes (smalltooth sawfish critical habitat's shallow, euryhaline essential feature). NMFS and cooperating states have established an extensive network of STSSN participants along the Atlantic and Gulf of Mexico coasts that not only collect data on dead sea turtles, but also rescue and rehabilitate any live stranded sea turtles. Similarly, the Florida Program for Shark Research at the Florida Museum of Natural History operates and maintains a sawfish encounter database that monitors the population of smalltooth sawfish in the southeastern United States. Finally, NMFS completed a recovery plan for smalltooth sawfish in 2009, and NMFS and FWS have issued recovery plans for loggerhead, green, and Kemp's ridley sea turtles. Current recovery plans can be found here: http://www.nmfs.noaa.gov/pr/recovery/plans.htm.

5 Effects of the Action

Effects of the action include direct and indirect effects of the action under consultation. Indirect effects are those that result from the proposed action, occur later in time (i.e., after the proposed action is complete), but are still reasonably certain to occur. We believe that hook-and-line captures of sea turtles and smalltooth sawfish are an effect of the ENP's adoption and implementation of the GMP, given the education, permitting and enforcement of boating and fishing within the Park boundaries. In addition, vessel strikes of sea turtles by park visitors are an effect of continued use of the Park.

Hook-and-Line Capture

Sea turtles and smalltooth sawfish are known to bite baited fishing hooks and captures have been reported within the ENP. According to the Park, there are 5 reports of sea turtles (2 loggerhead and 3 unknown species), captured by Park visitors in the last 25 years. All were released, presumably unharmed. According to the ENP creel surveys, an average of 39 smalltooth sawfish are captured and released by hook-and-line in the Park each year, with the highest annual total being 64 captures (Table 5). None have been reported to be injured. Fishing piers are suspected to attract sea turtles that learn to forage there for discarded bait and fish carcasses, or on growths and encrusting organisms on underwater parts of the pier structure itself (e.g., piles). The captures of sea turtles from fishing piers and boat fishing is typically a result of accidental capture.

5.1.1 Sea Turtles

Direct effects on sea turtles include capture by recreational fishers using hook-and-line methods that could lead to injury and, in some instances, their eventual death. While there is much research on the effects of commercial fisheries and longline fisheries on the capture of sea turtles, little data exist on the capture of sea turtles as a part of recreational fishing. Commercial fishing is prohibited in ENP. Dead turtles found stranded with hooks in their digestive tract have been reported, though it is assumed that most turtles hooked by recreational fishers are released alive (Thompson 1991). Little information exists on the frequency of these captures and the status of the turtles after they are caught (Weber 1989).

NMFS leads an 18-state stranding network for sea turtles known as the STSSN. Data collected include the date of the stranding, species type, location of stranding, carapace length and width, turtle condition, turtle outcome (e.g., dead, died, transported to rehabilitation, released immediately) and information on anomalies (e.g., entanglement, propeller damage, and fibropapillomas). A stranding is any dead sea turtle that is found floating or washed ashore or any live sea turtles that are found with life-threatening problems (e.g., sick, injured, or entangled). The location of the stranding when first reported is the point location that appears in this database and may or may not be the location at the time of injury or death. STSSN data indicates that 355 turtles were stranded in the Everglades area (Gulf of Mexico, STSSN Zone 3) between 1986 and August 2014. These strandings were comprised of 230 loggerhead (65%), 83 Kemp's ridley (23%), and 42 green sea turtles (12%). Records for the last 5 years (2009-2014), indicate that the majority of stranded turtles were already dead with the cause of death believed to be the result of a red tide, cold stunning, shark bites, or other natural causes. Of the 75 reported strandings between 2009 and 2014, 8 were reported to have been struck by a vessel (before or after death is unknown), 5 with fishing line attached, and 3 with crab trap lines attached. As stated above, it is unknown how many of these fishing and vessel interactions occurred within the ENP boundaries versus the turtle death occurring outside of the park boundaries and the carcass being recovered within the park. We assume that the crab trap line entanglement likely occurred outside of the Park, as fishing with unattended gear such as crab traps is prohibited in ENP. Also, as discussed in Section 3.1, we believe the risk of vessel strikes will continue; however, it will drastically decrease as a result the proposed increase in speed-restriction zones to 5 times the current amount of speed-restriction zones.

By comparison, there were only 5 records of sea turtle captures within ENP in the last 25 years and none were reported as lethal. This includes the creel surveys done that interview Park fishers at the 2 public saltwater boat ramps. Each boat ramp is surveyed 100 days per year and the Park estimates that 40%-50% of boaters use the Flamingo ramp that is surveyed. This survey and other reported captures have resulted in a high number of reported captures of smalltooth sawfish, but has only resulted in 5 reports of captured sea turtles. We believe that the 5 reported captures in the ENP in 25 years are a result of underreporting and that the number of reported fishing encounters is likely to increase as the Park requires visitors to report encounters through its educational visitor permit program. Since this educational program will also inform fishers how to avoid, handle, and release potential hook-and-line captures of these animals, lethal hook-and-line interactions with turtles would likely be less than without the educational program.

Using the more-conservative turtle reporting data for the STSSN of 5 fishing-related turtle stranding in the Park in the last 5 years equates to future estimates of 1 fishing-related sea turtle stranding per year on average.

5.1.2 Smalltooth Sawfish

Smalltooth sawfish may be adversely affected by recreational fishing activity within the ENP, through incidental hooking or entanglement in actively fished or discarded fishing line. This species has historically been captured in both recreational and commercial fisheries. Although nets associated with former commercial fisheries were largely responsible for the precipitous decline in smalltooth sawfish abundance within the United States, loss associated with recreational fishers also contributed to their decline, as fishers often removed the rostrum (saw) of these fish to retain as trophies (Caldwell 1990).

The NSED was created during the smalltooth sawfish listing process and is now maintained by the Florida Program for Shark Research at the Florida Museum of Natural History. This database tracks sawfish encounters reported by fishers, boaters, and researchers. Collected data includes the date of the encounter, type of encounter (sighting or capture), species of sawfish, location and habitat of encounter, estimated total length, condition of the sawfish, and a variety of other additional information. The database includes both recent and historical information. It is expected that this database represents only a portion of actual encounters and that a large number go unreported.

Data from the NSED indicate approximately 609 sawfish were captured in ENP by hook-and-line between 1999-2014. This data represents all fishing related encounters including shore-based fishing, offshore fishing, hook-and-line captures, and net fishing. It does not include encounters described as research (research captures are addressed separately under a Section 10 permit). This is an average of 41 fishing related captures in the Park per year over that 15-year period. The ENP stated that 226 captures were reported within the Park in the last 5 years. This is an average of 39 captures per year, with up to 64 sawfish captured in a single year. We assume that the number of captures may increase as the Park requires visitors to report encounters through its educational visitor permit program. Therefore, we will assume that the highest reported year total of 64 sawfish is possible in any given year during the next 20-year period.

Effects of Hooking, Entanglement, and Hook-and-line Ingestion on Sea Turtles and Smalltooth Sawfish

In addition to direct ingestion of baited hooks, monofilament fishing line and other debris discarded into Park waters can directly affect sea turtles and smalltooth sawfish. These species can become entangled in monofilament and debris, or can directly ingest these discarded materials. Other debris that could be discarded from the pier, and ingested, would include but is not limited to fishing tackle, bags, trash, Styrofoam®, and food wastes. Sea turtles of all kinds are particularly prone to eat plastic scraps and other buoyant debris, which may result in physiological sublethal effects and even death (Bursic et al. 2007; Carr 1987).

Sea turtles and smalltooth sawfish are also prone to entanglement as a result of their body morphologies and behaviors. Records of stranded or entangled sea turtles reveal that fishing gear can wrap around the neck, flipper, or body of a sea turtle and severely restrict swimming or feeding. The configuration of the smalltooth sawfish rostrum is particularly prone to entanglement, possibly affecting the ability of the fish to function. If an individual sea turtle or sawfish is entangled when young, the fishing line can become tighter and more constricting as the individual grows, cutting off blood flow and causing deep gashes, some severe enough to remove an appendage in sea turtles (NMFS 2004).

Sea turtle stranding data is not an absolute record of injuries to sea turtles from fishing activities because injured sea turtles may travel seaward to die later, thus reducing the chances of their stranding being reported. NMFS has previously estimated that as many as 80% of turtles that die offshore due to shrimp trawling-related drowning do not wash up on beaches to be counted as stranded animals. Dead, marked sea turtles were released at offshore, shrimp trawling grounds in a stranding study conducted off the U.S. Atlantic coast to estimate the quantity of sea turtles affected by the shrimp trawl fishery. Only 6 of 22 tagged loggerhead carcasses released at sea turned up as beach strandings (Murphy and Hopkins-Murphy 1989). Another study showed that marked turtles that ultimately stranded made up just 7%-13% of the total marked turtles released (Epperly et al. 1996). The prevailing ocean currents and winds carried most of the bodies seaward, rather than shoreward where they could be observed and counted.

Estimates of Take by Recreational Fishing and Vessel Interaction within the ENP

5.1.3 Estimates of Sea Turtle Take and Post-Capture Mortality from Recreational Fishing

The 1 fishing gear-related stranding per year estimated in Section 5.1.1 above, is likely a significant underreporting of hook-and-line captures within the Park. As discussed in this section, NMFS expects that most sea turtles will be released alive after being incidentally captured; although we are unsure whether all released sea turtles will ultimately survive. Post-capture mortality will depend on numerous factors including how deeply the hook is embedded, whether it was swallowed or was an external hooking, whether the turtle was released with trailing line, how soon and how effectively the hooked turtle was de-hooked or otherwise cut loose and released, and other factors which are discussed in more detail below. The preferred method of hooked sea turtle release is to remove the hook or cut the line as close as possible to the turtle's mouth or hooking site with no trailing line. Some accidental captures are likely unavoidable and, of these, some will break free on their own and escape with embedded/ingested hooks and/or trailing line.

NMFS has no way of estimating how many will break free with trailing line and/or ingested or embedded hooks. Because of considerations such as the tide, weather, and the weight and size of the captured turtle, some turtles will not be able to be raised to a boat for treatment, and will be cut free by fishers, and intentionally released. These turtles will escape with embedded or swallowed hooks, or trailing varying amounts of monofilament fishing line which may cause post-release injury or death. If untreated, the ingested hook and/or the trailing, monofilament fishing line may ultimately be swallowed and ingested by the animal, potentially leading to constriction and strangulation of the turtles' internal digestive organs. Trailing line may also become entangled around the animals' limbs (leading to limb amputations) or around sea floor obstructions, structure pilings, etc., preventing the animals from surfacing and leading to drowning. Thus, some of these hooking/entanglement interactions may eventually prove lethal.

NMFS (2005) estimated a 30% post-release mortality of sea turtles caught and released by the commercial vertical-line fishery in the Gulf of Mexico. That fishery uses larger hooks, heavier lines, and lines go untended for much longer periods of time than during recreational fishing. Those turtles that survive are more likely to be stressed and oxygen-deprived when released than turtles hooked during recreational fishing.

We believe that, in comparison to commercial vertical line fishing, significantly less post-release mortality from hooking/entanglement effects will occur by ENP visitors fishing in the Park. NMFS believes that most larger turtles caught by anglers will result in the line breaking off while still attached to the turtle. Thus the turtle will escape with an ingested hook (jaw hooked or internally hooked) with varying amounts of trailing line, from 0 to about 30 ft. Turtles that are able to be captured by recreational angler will likely be able to cut and remove the hook or call for assistance as directed by the ENP visitor-required educational program. As previously noted, NMFS estimated a 30% post-release mortality of sea turtles caught and released by the commercial vertical-line fishery in the Gulf of Mexico, which uses larger hooks, heavier lines, and lines go untended for much longer time periods than during recreational fishing.

Given the large differences in gear and methods used between commercial fishing and recreational fishing, NMFS estimates that post-release mortality associated with the recreational fishing in the Park will be less than that reported in the commercial fishery. We therefore estimate that post-release mortality of sea turtles from recreational fishing activities will be no greater than half of the 30% reported in the commercial fishery, or 15%. This may still be an overestimate since fishers are required to take the ENP educational program including how to handle hook-and-line captures, but we will use the 15% mortality to be conservative. As stated in Section 5.1.1, we estimate that 1 turtle stranding (mortality) may occur per year. If we estimate a 15% mortality rate, that would equate to an average of 7 non-lethal sea turtle hook-and-line captures in the Park per year. Of these 7 non-lethal captures, we believe they are likely to be a combination of 4 loggerhead (65% likihood = 4.5 turtles rounded down to 4), 2 Kemp's ridley (23% = 1.6 turtles rounded up to 2), and 1 green (12% = 0.84 turtles rounded up to 1) sea turtle. . One of these captures may result in post-release mortality each year and may be of any of these 3 species (loggerhead, Kemp's ridley, or green sea turtle).

5.1.4 Estimates of Smalltooth Sawfish Take from Recreational Fishing

NMFS believes the data provided by the ENP is the best data available concerning the incidental capture of smalltooth sawfish in the Park, though this number likely represents only a portion of the number of incidental captures in the Park due to underreporting. Therefore, we estimate that up to 64 sawfish may be captured in any given year during the life of the ENP (the highest number reported in a single year). The educational program being developed by the ENP as a way to permit boaters and fishers in the Park will help with reporting and handling of smalltooth sawfish captured. The ENP will work with NMFS to develop and maintain educational materials provided to Park visitors including instructions on how to handle and release sawfish captured and how to report captures and sighting in the Park.

NMFS's preferred method of hooked smalltooth sawfish release is to cut the line as close as possible to the sawfish's mouth or hooking site. Based on observations of stranded sawfish and anecdotal reports, this is the preferred approach of fishers to deal with hooked smalltooth sawfish. This form of release will result in sawfish escaping with embedded hooks and varying amounts of monofilament fishing line which may cause post-release injury or death. Post-release mortality is unknown at this time, but is believed to be low (NMFS 2010). Therefore, no lethal takes are anticipated or authorized.

Effects from Vessel Strikes

Since sea turtles are known to be susceptible to vessel strikes, park visitor vessel traffic can result in an increased risk of vessel strikes in the ENP. Due to their demersal lifestyle, we do not anticipate that sawfish will be impacted by vessel strikes. As previously discussed, (1) sea turtle stranding data indicates that 5 sea turtles were reported dead as a result of vessel interactions in a 5-year period from 2009-2014; and (2) the Park has approximately 529,300 ac of marine waters of which 29,000 ac are currently protected; and (3) the GMP will increase this protection to 5 times the size (149,642 ac) of speed-restriction zones. To determine the potential level of impact to sea turtles, we look at the above data regarding the number of strandings reported in the park related to vessel strikes, and the size of the boating area within the park including areas with speed restrictions. NMFS analyzed the probability of vessel strikes on sea turtles in Florida in 2009 (Barnette 2009) and again in 2013 (Barnette 2013). This analysis was based on studies in Florida that evaluated recreational boater usage for Sarasota County (Sidman et al. 2006), Charlotte Harbor (Sidman et al. 2005), Brevard County (Sidman et al. 2007), and Palm Beach County (Gorzelany 2013). This was compared to the vessel registration data from the Florida Department of Motor Vehicles, turtle stranding data from the STSSN, and the likelihood of turtles struck by vessels being undetected or unreported. The NMFS analysis provides 2 estimates of the number of new vessels needed in an area to result in a vessel striking a sea turtle in a single year. The conservative calculations concluded that it would take an addition of 500 vessels in an area to potentially result in a vessel strike in any single year. The ultra-conservative calculations concluded that it would take an addition of 300 vessels in an area to potentially result in a vessel strike of a sea turtle in any single year.

Since risk and severity of vessel strikes of sea turtles is affected by the speed of the vessel, the amount of areas that have reduced speed (i.e., poll-and-troll) or restricted access will have an effect on the number of sea turtles that will potentially be struck by boaters. If the ENP GMP will increase the amount of area protected by speed restriction zones by 5 times the current amount, we believe it will also likely reduce the amount of sea turtle strikes by 5 times the current amount. Therefore, if 8 turtles were struck in the last 5 year period, only 2 turtles (8 turtles divided by 5 = 1.6, which is rounded up to 2) are likely to be struck in a future 5-year period. These strikes may consist of any combination of loggerhead, green or Kemp's ridley sea turtles. To be conservative, we will assume the strikes will be lethal.

6 Cumulative Effects

Cumulative effects include the effects of future state, tribal, or local private actions that are reasonably certain to occur in the action area considered in this Opinion. Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to Section 7 of the ESA (50 CFR 402.14).

Smalltooth sawfish and sea turtle habitat have been degraded or modified throughout the southeastern United States from activities like coastal development, channel dredging, commercial fishing, and boating activities. These threats were discussed in Section 3.2 for each species. While the degradation and modification of habitat are not likely the primary reasons for the decline of smalltooth sawfish or sea turtle abundance or distribution, they have likely been contributing factors. Recreational fishing related effects were discussed in Section 5 above. Though these activities are likely to continue, no future actions with effects beyond those already described are reasonably certain to occur in the action area.

7 Jeopardy Analysis

The analyses conducted in the previous sections of this Opinion provide a basis to determine whether the proposed action is likely to jeopardize the continued existence of sea turtles (loggerhead, Kemp's ridley, and green) and smalltooth sawfish, by identifying the nature and extent of adverse effects (take) expected to impact each species. Next, we consider how these 4 species will be impacted by the proposed action in terms of overall population effects and whether those effects of the proposed action will jeopardize the continued existence of the species when considered in the context of the status of the species and their habitat (Section 3), the environmental baseline (Section 4), and cumulative effects (Section 6).

To 'jeopardize the continued existence of' is defined as "to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species" (50 CFR 402.02). The following jeopardy analysis first considers the effects of the actions to determine if we would expect the action to result in reductions in reproduction, numbers, or distribution of these species. The analysis next considers whether any such reduction would in turn result in an appreciable reduction in the likelihood of survival of these species in the wild, and the likelihood of recovery of these species in the wild.

All life stages are important to the survival and recovery of a species; however, it is important to note that individuals of one life stage are not equivalent to those of other life stages. For example, the take of male juveniles may affect survivorship and recruitment rates into the reproductive population in any given year, and yet not significantly reduce the reproductive potential of the population. Yet, the death of mature, breeding females can have an immediate effect on the reproductive rate of a species. Sublethal effects on adult females may also reduce reproduction by hindering foraging success, as sufficient energy reserves are probably necessary for producing multiple clutches of eggs in a breeding year. Different age classes may be subject to relative rates of mortality, resilience, and overall effects of population dynamics. Ontogenetic shifts, or changes in location and habitat, have a major impact on where sea turtles and smalltooth sawfish occur and what human hazards they may encounter. Young juvenile sea turtles are generally not subject to hook-and-line capture because of their pelagic oceanic stage of life. Still, a shift in diet for all sea turtles occurs when juvenile sea turtles shift to a neritic habitat and benthic feeding, at which time they would become more susceptible to fishing impacts. For the proposed action, we would not expect early juvenile stage sea turtles of any of these species to be subject to take from hook-and-line capture within the Park. Later stage juveniles and adults of these 3 species, however, are more likely to be subject to incidental take as a result of foraging in the area of recreational fishing in ENP. In contrast, smalltooth sawfish of various life stages use nearshore estuarine waters and are often subjected to hook-and-line capture; therefore, this project could lead to the capture of juvenile or adult smalltooth sawfish. Small juvenile smalltooth sawfish are closely associated with nursery habitat in southwest Florida, specifically within smalltooth sawfish critical habitat designated in ENP, and are therefore likely to have interactions with fishers in ENP.

Loggerhead NWA DPS

The potential nonlethal take of up to 4 loggerhead sea turtles per year and 1 lethal take per year by recreational fishing plus the lethal take of 2 sea turtles every 5 years from recreational boating traffic is a reduction in numbers. This lethal take would also result in a reduction in reproduction as a result of lost reproductive potential, as this individual could be a female who could have survived other threats and reproduced in the future, thus eliminating a female individual's contribution to future generations. For example, an adult female loggerhead sea turtle can lay 3 or 4 clutches of eggs every 2-4 years, with 100-130 eggs per clutch. The loss of an adult female sea turtle could preclude the production of thousands of eggs and hatchlings of which a small percentage would be expected to survive to sexual maturity. Because the potential fishing captures could occur anywhere through the Park, and sea turtles generally have large ranges in which they disperse, the distribution of loggerhead sea turtles in the action area is expected to be unaffected.

Whether the reduction of 1 loggerhead sea turtle per year from recreational fishing plus the lethal take of 2 sea turtles every 5 years from recreational boating traffic and reproduction attributed to the proposed action would appreciably reduce the likelihood of survival for loggerheads depends on what effect this reduction in numbers and reproduction would have on overall population sizes and trends, i.e., whether the estimated reduction, when viewed within the context of the environmental baseline and status of the species, is of such magnitude that adverse effects on population dynamics is appreciable. In Section 3.2, we reviewed the status of the species in terms of nesting and female population trends and several recent assessments based on population modeling (e.g., (Conant et al. 2009b; NMFS-SEFSC 2009). Below we synthesize what that information means in general terms and also in the more specific context of the proposed action and the environmental baseline.

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

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

A detailed analysis of Florida's long-term loggerhead nesting data (1989-2014) revealed 3 distinct annual trends (Figure 25). From 1989-1998 there was a 30% increase that was then followed by a sharp decline over the subsequent decade. Large increases in loggerhead nesting have occurred since then. FWRI examined the trend from the 1998 nesting high through 2013 and found the decade-long post-1998 decline had reversed and there was no longer a demonstrable trend. Looking at the data from 1989 through 2014 (an increase of over 32%), FWRI concluded that there was an overall positive change in the nest counts (http://myfwc.com/research/wildlife/sea-turtles/nesting/loggerhead-trends/).

We believe that the incidental take and resulting mortality of loggerhead sea turtles associated with the proposed actions are not reasonably expected to cause an appreciable reduction in the likelihood of survival of the NWA DPS of loggerhead sea turtles. We believe the current population is large (i.e., several hundred thousand individuals) and is showing encouraging signs of stabilizing and possibly increasing. Over at least the next several decades, we expect the western North Atlantic population to remain large (i.e., hundreds of thousands of individuals) and to retain the potential for recovery. We also expect that the proposed actions will not cause the population to lose genetic heterogeneity, broad demographic representation, or successful reproduction, nor affect loggerheads' ability to meet their lifecycle requirements, including reproduction, sustenance, and shelter.

The recovery plan anticipates that, with implementation of the plan, the western North Atlantic population will recover within 50 to 150 years, but notes that reaching recovery in only 50 years would require a rapid reversal of the then declining trends of the Northern, Peninsular Florida, and Northern Gulf of Mexico Recovery Units. The recovery plan includes 8 different recovery actions directly related to the proposed actions of this Opinion.

The Services' recovery plan for the NWA population of the loggerhead sea turtle (NMFS and USFWS 2008a) which is the same population of sea turtles as the NWA DPS, provides additional explanation of the goals and vision for recovery for this population. The objectives of the recovery plan most pertinent to the threats posed by the proposed actions are numbers 1 and 2 (listed below):

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

Recovery objective 1, "Ensure that the number of nests in each recovery unit is increasing…," is the plan's overarching objective and has associated demographic criteria. Currently, none of the plan's criteria are being met, but the plan acknowledges that it will take 50-150 years to do so. Further reduction of multiple threats throughout the North Atlantic, Gulf of Mexico, and Greater Caribbean will be needed for strong, positive population growth, following implementation of more of the plan's actions. Although any continuing mortality in what might be an already declining population can affect the potential for population growth, we believe the effects of the proposed actions would not impede or prevent achieving this recovery objective over the anticipated 50-150 year time frame.

Recovery objective 2, "Ensure the in-water abundance of juveniles in both neritic and oceanic habitats is increasing and is increasing at a greater rate than strandings of similar age classes." Currently, there are not enough data to determine if this objective is being met. The NWA DPS nesting trend for loggerhead sea turtles remains slightly negative, although as mentioned above the trend has likely stabilized. Overall, loggerhead populations have a long way to go before the population decline is reversed and numerical increases in population meet the goals of the recovery plan. As with recovery objective 1 above, continuing mortality in what might still be a declining population resulting from the proposed actions would not impede or prevent achieving this recovery objective over the anticipated 50-150 year time frame.

We believe that the proposed action is not reasonably expected to cause an appreciable reduction in the likelihood of recovery of the NWA DPS of loggerheads. Recovery is the process of removing threats so self-sustaining populations persist in the wild. The proposed actions would not impede progress on achieving the identified relevant recovery objectives or achieving the overall recovery strategy.

Green Sea Turtles

The potential nonlethal take of 1 green sea turtle per year and 1 lethal take per year by recreational fishing plus the lethal take of 2 sea turtles every 5 years from recreational boating traffic is a reduction in numbers. This take would also result in a potential reduction in future reproduction, assuming the individual would be a female and would have survived otherwise to reproduce. For example, an adult green sea turtle can lay 1-7 clutches (usually 2-3) of eggs every 2-4 years, with 110-115 eggs/nest of which a small percentage is expected to survive to sexual maturity. Green sea turtles are highly migratory, and individuals from all Atlantic nesting populations may range throughout the Gulf of Mexico, Atlantic Ocean, and Caribbean Sea. While the potential lethal take would result in a displacement of an individual from the action area, the loss is not significant in terms of local, regional, or global distribution and abundance as a whole. The majority of reproductive effort for green sea turtles comes from Florida and the Florida population distribution would be expected to remain the same. Therefore, we believe the anticipated impact will not affect the species' distribution.

Whether the reduction in numbers and reproduction of green sea turtles species would appreciably reduce the species' likelihood of survival depends on the probable effect the changes in numbers and reproduction would have on current population sizes and trends.

The 5-year status review for green sea turtles states that of the 7 green sea turtle nesting concentrations in the Atlantic Basin for which abundance trend information is available, all were determined to be either stable or increasing (NMFS and USFWS 2007a). That review also states that the annual nesting female population in the Atlantic basin ranges from 29,243-50,539 individuals. Additionally, the pattern of green sea turtle nesting shows biennial peaks in abundance, with a generally positive trend during the 10 years of regular monitoring since establishment of index beaches in Florida in 1989. An average of 5,039 green turtle nests were laid annually in Florida between 2001 and 2006 with a low of 581 in 2001 and a high of 9,644 in 2005 (NMFS and USFWS 2007a). Data from the index nesting beaches program in Florida substantiate the dramatic increase in nesting. In 2007, there were 9,455 green turtle nests found just on index nesting beaches, the highest since index beach monitoring began in 1989. The number fell back to 6,385 in 2008, further dropping under 3,000 in 2009, but that consecutive drop was a temporary deviation from the normal biennial nesting cycle for green turtles, as 2010 saw an increase back to 8,426 nests on the index nesting beaches (FWRI Index Nesting Beach Survey Database). Modeling by Chaloupka et al. (2008) using data sets of 25 years or more resulted in an estimate of the Tortuguero, Costa Rica, population growing at 4.9% annually.

For a population to remain stable, sea turtles must replace themselves through successful reproduction at least once over the course of their reproductive lives, and at least one offspring must survive to reproduce itself. If the hatchling survival rate to maturity is greater than the mortality rate of the population, the loss of breeding individuals would be exceeded through recruitment of new breeding individuals from successful reproduction of non-taken sea turtles.

Since the abundance trend information for green sea turtles is clearly increasing, we believe the lethal interactions attributed to the proposed action will not have any measurable effect on that trend. Therefore, we conclude the proposed action is not likely to appreciably reduce the likelihood of survival of green sea turtles in the wild.

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

- The level of nesting in Florida has increased to an average of 5,000 nests per year for at least 6 years;
    - Status: Green sea turtle nesting in Florida between 2001-2006 was documented as follows: 2001 – 581 nests; 2002 – 9,201 nests; 2003 – 2,622 nests; 2004 – 3,577 nests; 2005 – 9,644 nests; 2006 – 4,970 nests. This averages 5,039 nests annually over those 6 years (2001-2006) (NMFS and USFWS 2007a). Subsequent nesting has shown even higher average numbers (i.e., 2007 – 9,455 nests; 2008 – 6,385 nests; 2009 – 3, 000 nests; 2010 – 8,426 nests, 2011 – 10,701 nests). In 2013, the number reached 25,553; thus, this recovery criterion continues to be met.
- A reduction in stage class mortality is reflected in higher counts of individuals on foraging grounds.
    - Status: Several actions are being taken to address this objective; however, there are currently no estimates available specifically addressing changes in abundance of individuals on foraging grounds. Given the clear increases in nesting, however, it is likely that numbers on foraging grounds have increased by at least the same amount. This Opinion’s effects analysis assumes that in-water abundance has increased at the same rate as the Tortuguero population (4.9%).

The lethal interactions of a green sea turtle attributed to the proposed action are not likely to reduce population numbers over time due to current population trends, nesting increases and expected recruitment. Thus, the proposed action is not likely to impede the recovery objectives above and will not result in an appreciable reduction in the likelihood of green sea turtles’ recovery in the wild.

Kemp’s Ridley Sea Turtles

The potential nonlethal take of up to1 Kemp’s ridley sea turtle per year and 1 lethal take per year by recreational fishing plus the lethal take of 2 sea turtles every 5 years from recreational boating traffic would reduce the species’ population compared to the number that would have been present in the absence of the proposed action, assuming all other variables remained the same. The TEWG (1998) estimates age at maturity from 7-15 years. Females return to their nesting beach about every 2 years (TEWG 1998). The mean clutch size for Kemp’s ridleys is 100 eggs/nest, with an average of 2.5 nests/female/season. Lethal takes could also result in a potential reduction in future reproduction, assuming at least one of these individuals would be female and would have survived to reproduce in the future. The loss of 1 Kemp’s ridley sea turtles per year could preclude the production of thousands of eggs and hatchlings, of which a fractional percentage is expected to survive to sexual maturity. Thus the death of any females would eliminate their contribution to future generations, and result in a reduction in sea turtle reproduction. The anticipated takes are limited to ENP and sea turtles generally have large ranges; thus no reduction in the distribution of Kemp's ridley sea turtles is expected from the take of these individuals.

In the absence of any total population estimates for Kemp's ridley sea turtles, nesting trends are the best proxy we have for estimating population changes (Figure 29). Heppell et al. (2005) predicted in a population model that the Kemp's ridley sea turtle population is expected to increase at least 12%-16% per year and that the population could attain at least 10,000 females nesting on Mexico beaches by 2015. NMFS et al. (2011) contained an updated model, which predicted that the population was expected to increase 19% per year and that the population could attain at least 10,000 females nesting on Mexico beaches by 2011. Approximately 25,000 nests would be needed for an estimate of 10,000 nesting females on the beach, based on an average 2.5 nests/nesting female. While counts did not reach 25,000 nests by 2012, it is clear that the population has been steadily increasing over the long term. Following a significant, unexplained 1-year decline in 2010, Kemp's ridley nests in Mexico reached a record high of 21,797 in 2012 (Gladys Porter Zoo nesting database 2013). In 2013 through 2014, there was a second significant decline, with only 16,385 and 11,279 nests recorded, respectively. A small nesting population is also emerging in the United States, primarily in Texas, rising from 6 nests in 1996 to 42 in 2004, to a record high of 209 nests in 2012 (National Park Service data, http://www.nps.gov/pais/naturescience/strp.htm, http://www.nps.gov/pais/naturescience/current-season.htm). Nesting numbers from 2013 indicate they decreased in 2013 to 153 nests in Texas (Gladys Porter Zoo nesting database 2013).

We believe the overall increasing trend in nesting is evidence of an increasing population, as well as a population that is maintaining (and potentially increasing) its genetic diversity. We also believe these nesting trends are indicative of a species with a number of sexually mature individuals. Assuming a 50:50 sex ratio, there is only a 50% chance that any given take would actually involve a female. However, the significant nesting declines observed in 2010 and 2013-2014 potentially indicate a serious population-level impact, and there is cause for concern regarding the ongoing recovery trajectory. We do not believe the anticipated takes of Kemp's ridley associated with the proposed actions will have a measurable effect on the increasing nesting trends seen over the last several years. Because the 2 lethal takes could be individuals from any nesting beach, we do not believe the proposed actions will have a measurable effect on the species' overall genetic diversity, particularly in light of the increasing population trends. Nor do we believe the anticipated takes will cause a change in the number of sexually mature individuals producing viable offspring to an extent that changes in nesting trends will occur.

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

The recovery plan for the Kemp's ridley sea turtle (NMFS et al. 2011) lists the following relevant recovery objectives:

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

  The recovery plan states the average number of nests per female is 2.5 and sets a recovery goal of 10,000 nesting females associated with 25,000 nests. The 2012 nesting season recorded approximately 22,000 nests. However, in 2013 through 2014, there was a second significant decline, with only 16,385 and 11,279 nests recorded, respectively.

  The lethal take of up to 1 Kemp's ridley per year by the proposed actions will result in reduction in numbers, but it is unlikely to have any detectable influence on the trends noted above. Nonlethal takes of sea turtles would not affect the adult female nesting population or number of nests per nesting season. Additionally, our estimate of future take is based on our belief that the same level of take from the action and from actions in the baseline occurred in the past. Yet, we have still seen a generally positive trends in the status of these species. Thus we believe the proposed actions will not interfere with or delay achieving the recovery objective above and will not result in an appreciable reduction in the likelihood of Kemp's ridley sea turtles' recovery in the wild.

Smalltooth Sawfish

The proposed action may result in up to 64 live captures or entanglements of a smalltooth sawfish per year in ENP. Injuries resulting from nonlethal smalltooth sawfish takes are not expected to have any measurable impact on the numbers, reproduction, or distribution of this species. Injuries resulting from nonlethal take are unlikely to affect the reproductive potential, fitness, or growth of the captured smalltooth sawfish because they will be released unharmed shortly after capture or released with only minor injuries from which they are expected to recover. Since there is no expected lethal take of smalltooth sawfish, there will be no reduction in smalltooth sawfish numbers, reproduction, and distribution; therefore, the proposed action will not jeopardize the continued existence of the species because it will have no effect on the survival and recovery of smalltooth sawfish. In addition, the ENP educational requirements for boaters and fishers in the Park will educate visitors about safe handling and release of smalltooth sawfish accidentally captured, further reducing the potential for permanent injury to the sawfish.

8 Conclusion

We have analyzed the best available data, the current status of the species, environmental baseline, and effects of the proposed action, and determined that the issuance of the National Park Service's (NPS) General Management Plan (GMP) for Everglades National Park (ENP) in Collier, Monroe, and Miami-Dade Counties, Florida is not likely to jeopardize the continued existence of NWA DPS of loggerhead sea turtles, green sea turtles, Kemp's ridley sea turtles, and smalltooth sawfish.

Our analyses for green sea turtles focused on the impacts and population response of greens in the action area. Nevertheless, the impact of the effects of the proposed action on the populations in the Atlantic basin must be directly linked to the global populations of the species, and the final jeopardy analysis is for the global populations as listed in the ESA. Because the proposed action will not reduce the likelihood of survival and recovery of the Atlantic population of green sea turtle, it is our opinion that fishing activities authorized under the ENP GMP also are not likely to jeopardize the continued existence of green sea turtles worldwide.

9 Incidental Take Statement

Section 9 of the ESA and federal regulation 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. 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.

9.1 Anticipated Amount or Extent of Incidental Take

Based on the above information and analyses, NMFS believes that the proposed action will adversely affect loggerhead, Kemp's ridley, and green sea turtles, and smalltooth sawfish. These effects will result from capture on hook-and-line by recreational fishers or from vessel strikes to sea turtles in ENP. NMFS anticipates that the proposed action will result in up to 7 nonlethal sea turtle takes per year from recreational fishing and 1 lethal take per year. Based on the species composition of sea turtles in the area, we expect that 7 non-lethal turtle captures per year to be a combination of 4 loggerheads, 2 Kemp's ridley, and 1 green sea turtle. . NMFS believes that the majority of these turtles incidentally hooked will be released alive (uninjured or with minor, non-life-threatening injuries) and survive. Ingested hooks and/or trailing line or stranded turtles may require rescue and rehabilitation, and eventual release as viable members of their respective sea turtle populations. Based on the species composition of sea turtles in the area, we expect that 1 of either loggerhead, green, or Kemp's ridley sea turtles will suffer post-release mortality from fishing or be struck by vessels per year. We also believe that there will be a lethal take of 2 sea turtles every 5 years from recreational boating traffic, which also is expected to be a combination of either loggerhead, green, or Kemp's ridley sea turtles.

In addition, we anticipate that 64 smalltooth sawfish may be nonlethally captured per year, and zero lethal takes will occur per year. We expect any captured smalltooth sawfish will released alive (uninjured or with minor, non-life-threatening injuries) and survive, ingested hooks and/or trailing line notwithstanding.

9.2 Effect of the Take

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

9.3 Reasonable and Prudent Measures (RPMs)

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

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

NMFS has determined that the following RPMs are necessary and appropriate to minimize impacts of the incidental take of sea turtles and smalltooth sawfish during the proposed action. The following RPMs and associated terms and conditions are established to implement these measures, and to document incidental takes. Only incidental takes that occur while these measures are in full implementation are authorized. These restrictions remain valid until reinitiation and conclusion of any subsequent Section 7 consultation.

1. The ENP must provide NMFS with take reports regarding all Park visitors' recreational fishing interactions with protected species, including an annual summary report.

2. The ENP must reduce the likelihood of injury or mortality resulting from hook-and-line capture or entanglement in the Park.

9.4 Terms and Conditions

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

The following terms and conditions implement the above RPMs:

1. To implement RPM No. 1, the ENP must report all hook-and-line captures of sea turtles and smalltooth sawfish within the Park to the NMFS's Southeast Regional Office.
    a. The ENP agrees to report hook-and-line captures annually to NMFS, as part of the programmatic annual review. If a take of a sea turtle or sawfish results in injury

or death to the animal, ENP will notify NMFS within 24 hours by email (takereport.nmfsser@noaa.gov) and the programmatic email address nmfs.ser.enp@noaa.gov (RPM No. 1). Emails must reference this Opinion by the consultation identifier number SER-2014-14671. The emails shall also state the type of species captured, date and time of capture, location and activity resulting in capture (i.e., fishing by hook-and-line), condition and disposition of the turtle or sawfish caught (i.e., alive, dead, sent to rehabilitation), size of the individual, behavior, identifying features (i.e., presence of tags, scars, or distinguishing marks), and any photos that may have been taken. If a dead smalltooth sawfish is observed or reported, if feasible, the ENP shall retrieve the sawfish and call John Carlson for further instructions. Mr. Carlson can be reached by phone at 850-234-6541 ext. 221 or email at john.carlson@noaa.gov. If a turtle is caught, the ENP is responsible for reporting captures to the Florida Sea Turtle Stranding Network.

2. The ENP agrees to prominently display educational signs providing information about hook-and-line captures of sea turtles and smalltooth sawfish (see Section 2.1). To implement RPM No. 2, ENP must coordinate with NMFS SERO Protected Resources Division on the content of the educational materials. These signs must be posted in high traffic areas wherever Park visitors enter the water to fish (e.g., marinas, boat ramps, popular shore fishing locations). At a minimum, we recommend that signs be placed within 6 months of receipt of this Opinion and display the following information:
    a. Warn anglers to cease fishing when a sea turtle or smalltooth sawfish is sighted within 200 ft to avoid the possibility of catching it.
    b. State whom to contact for assistance if a turtle or smalltooth sawfish is caught.
    c. Clearly display the 24-hour marine mammal and sea turtle stranding hotline number (1-877-942-5343). If a turtle is caught, the ENP is responsible for reporting captures to the Florida Sea Turtle Stranding Network.
    d. Clearly display the phone number for the National Sawfish Encounter Database (1-941-255-7403) so that any captured or sighted sawfish can be reported.

3. The ENP agrees to place monofilament recycling bins at public boat ramps, mooring sites like the Flamingo marina, and other locations frequently used by Park fishers (see Section 2.1). To implement RPM number 2, the ENP must install and maintain both monofilament recycling bins and trash receptacles in these locations to reduce the probability of trash and debris entering the water.

10 Conservation Recommendations

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

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

1. The ENP continues to include NMFS in the development and maintenance of any educational materials provided to Park visitors regarding listed marine species.
2. The ENP develops a better hook-and-line capture reporting system that identifies the capture locations with GIS coordinates instead of the current reporting by fishing zone.

In order for NMFS to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats, NMFS requests notification of the implementation of any conservation recommendations.

11 Reinitiation of Consultation

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

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