UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southeast Regional Office
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St. Petersburg, Florida 33701-5505
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OCT 26 2017

F/SER31: JC
SER-2016-17948

Chief, Tampa Permits Section
Jacksonville District Corps of Engineers
Department of the Army
10117 Princess Palm Avenue, Suite 120
Tampa, Florida 33610

Ref.: SAJ-1997-08228 (IP-CSH), City of Clearwater, Modifications to 3 Fishing Piers, Clearwater, Pinellas County, Florida

Dear Sir or Madam:

The enclosed Biological Opinion ("Opinion") was prepared by the National Marine Fisheries Service (NMFS) pursuant to Section 7(a)(2) of the Endangered Species Act (ESA). The Opinion considers the effects of a proposal by the Jacksonville District of the U.S. Army Corps of Engineers (USACE) to authorize the modification of 3 existing fishing piers in Sand Key Park on the following listed species: loggerhead sea turtle (Northwest Atlantic [NWA] distinct population segment [DPS]), Kemp's ridley sea turtle, green sea turtle (North Atlantic [NA] and South Atlantic [SA] DPSs), hawksbill, and leatherback sea turtles; and smalltooth sawfish. We base this Opinion on project-specific information provided in the consultation package as well as NMFS's review of published literature. NMFS concludes that the proposed action may affect, and is likely to adversely affect loggerhead (Northwest Atlantic distinct population segment [DPS]), Kemp's ridley, and green (North and South Atlantic DPSs) sea turtles.

We look forward to further cooperation with you on other USACE projects to ensure the conservation and recovery of our threatened and endangered marine species. If you have any questions regarding this consultation, please contact Joseph Cavanaugh, Consultation Biologist, by phone at 727-551-5097, or by email at Joseph.Cavanaugh@noaa.gov.

Sincerely,

Roy E. Crabtree, Ph.D.
Regional Administrator

Enclosures:
Biological Opinion
Sea Turtle and Smalltooth Sawfish Construction Conditions, dated March 23, 2006

File: 1514-22 F.4

Endangered Species Act - Section 7 Consultation
Biological Opinion

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

Activity: Modification of 3 Existing Fishing Piers, Pinellas County, Florida

Consulting Agency: National Oceanic and Atmospheric Administration (NOAA),
National Marine Fisheries Service (NMFS), Southeast Regional
Office, Protected Resources Division, St. Petersburg, Florida

Consultation Number SER-2016-17948

Approved by:

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

Date Issued: Oct 26, 2017

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Acronyms and Abbreviations

CFR	Code of Federal Regulations
CPUE	Catch Per Unit Effort
cSEL	Cumulative Sound Exposure
DPS	Distinct Population Segment
DWH	*Deepwater Horizon*
DTRU	Dry Tortugas Recovery Unit
ESA	Endangered Species Act
FAD	Fish Attractor Device
FP	Fibropapillomatosis disease

FWRI	Fish and Wildlife Research Institute
GADNR	Georgia Department of Natural Resources
GCRU	Greater Caribbean Recovery Unit
ISED	International Sawfish Encounter Database
ITS	Incidental Take Statement
MHW	Mean High Water
NMFS	National Marine Fisheries Service
NCWRC	North Carolina Wildlife Resources Commission
NGMRU	Northern Gulf of Mexico Recovery Unit
NOAA	National Oceanic and Atmospheric Association
NRU	Northern Recovery Unit
NWA	Northwest Atlantic
PRM	Post-release mortality
RPMs	Reasonable and Prudent Measures
SAFMC	South Atlantic Fishery Management Council
SCDNR	South Carolina Department of Natural Resources
SCL	Straight carapace length
SEFSC	Southeast Fisheries Science Center
STSSN	Sea Turtle and Stranding Network
TEDs	Turtle Exclusion Devices
TEWG	Turtle Expert Working Group
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service

Units of Measurement

°C	Degrees Celsius
°F	Degrees Fahrenheit
cm	Centimeter(s)
ft	Feet
ft^2	Feet squared
in	Inch(es)
kg	Kilograms
lb	Pound(s)
mi	Mile(s)

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 such agency is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of critical habitat of such species; Section 7(a)(2) requires federal agencies to consult with the appropriate Secretary on any such action. NMFS and the U.S. Fish and Wildlife Service (USFWS) share responsibilities for administering the ESA.

Consultation is required when a federal action agency determines that a proposed action “may affect” listed species or designated critical habitat. Consultation is concluded after NMFS determines that the action is not likely to adversely affect listed species or critical habitat or issues a Biological Opinion (“Opinion”) that identifies whether a proposed action is likely to jeopardize the continued existence of a listed species, or destroy or adversely modify critical habitat. The Opinion states the amount or extent of incidental take of the listed species that may occur, develops measures (i.e., reasonable and prudent measures - RPMs) to reduce the effect of take, and recommends conservation measures to further the recovery of the species. Notably, no incidental destruction or adverse modification of designated critical habitat can be authorized, and thus there are no RPMs—only reasonable and prudent alternatives that must avoid destruction or adverse modification.

This document represents NMFS’s Opinion based on our review of impacts associated with the proposed action to issue a permit within Pinellas County, Florida. This Opinion analyzes project effects on sea turtles (loggerhead [NWA DPS], green[North Atlantic [NA and SA DPSs], Kemp’s ridley, hawksbill and leatherback); and smalltooth sawfish. Our determinations are based on project information provided by USACE and other sources of information including the published literature cited herein.

1 CONSULTATION HISTORY

NMFS received a request for an informal consultation from USACE in your letter, dated May 15, 2016. NMFS requested additional information on June 13, 2016, via telephone and on July 16, 2016, via email. We received a final response on July 13, 2016. Upon review of new fishing pier sea turtle hook-and-line capture data nearby to the action area, NMFS changed our initial effects determination and initiated formal consultation on November 22, 2016.

2 DESCRIPTIONS OF THE PROPOSED ACTION AND ACTION AREA

2.1 Proposed Action

The City of Clearwater proposes to construct 3 new 10-feet (ft)-long by 30-ft-wide “T-Head” extensions (each T-head = 300 square feet [ft^2]) on 3 existing fishing piers located in Sand Key Park (Figures 1 and 2). Construction will also consist of installation of 3 fish-attractor devices (FADs) (concrete culverts atop filter fabric) under the new T-head extensions. The work will be completed via a shallow-draft barge that has a 2-ft-deep draft when fully loaded. Wood timber pilings (8-in-diameter) will be jetted or impact-hammered into place and then stringers and decking will be installed on top of these piles. Construction materials will be trucked to the site and stored on land in the fenced supply area already adjacent to each of the piers. A total of 3 FADs will be installed under the pier T-head extensions. These structures will be placed directly underneath the T-head extensions, areas void of any submerged aquatic resources (seagrasses or corals) (C. Hoch, USACE, pers. comm. to J. Cavanaugh, NMFS Protected Resources Division [PRD], July 13, 2016) (Figure 3). Each FAD is an 8-ft-long by 8-ft-wide structure consisting of 4 connected concrete culvert pipes with elliptical openings. Each individual pipe is 8 ft long, 2 ft wide, and 15 inches (in) tall. Filter fabric cloth will be placed on the marine bottom and the pipes will be placed on top. The total in-water footprint for each FAD is 192 ft^2. FADs will be installed by barge as well.

The applicant will post educational signage (there are currently none), which can be found at http://sero.nmfs.noaa.gov/protected_resources/section_7/protected_species_educational_signs/documents/protect_dolphin_sign_feeding.pdf. The applicant estimates that a maximum of 20 people per day will use the 3 piers to fish (C. Hoch, USACE, pers. comm. to J. Cavanaugh, NMFS PRD, July 12, 2016). “No mooring” signs will be posted and handrails will be installed to prohibit mooring of vessels along the side of the pier where the T-heads are installed. The applicant states that the NMFS’s *Sea Turtle and Smalltooth Sawfish Construction Conditions*, dated March 23, 2006 (enclosed), will be complied with throughout the project, which includes using turbidity barriers and stopping the operation of any moving equipment or mechanical construction equipment if a sea turtle or smalltooth sawfish is spotted within 50 ft of the construction. Construction is expected to take 1-3 weeks and will be conducted during daylight hours only as a condition of the construction permit (C. Hoch, USACE, pers. comm. to J. Cavanaugh, NMFS PRD, July 12, 2016). Monofilament and fishing hook disposal bins are already located on the existing piers as well as 1 fish cleaning station per pier. The applicant has agreed to host annual underwater pier clean ups to retrieve lost fishing gear (monofilament lines, hooks, etc.), using a local non-government organization.

Figure 1. Image of the project location and surrounding area with the 3 piers indicated by arrows (©2016 Google)

Figure 2. Image showing project site in relation to surrounding area including Clearwater Harbor and Gulf of Mexico (©2016 Google)

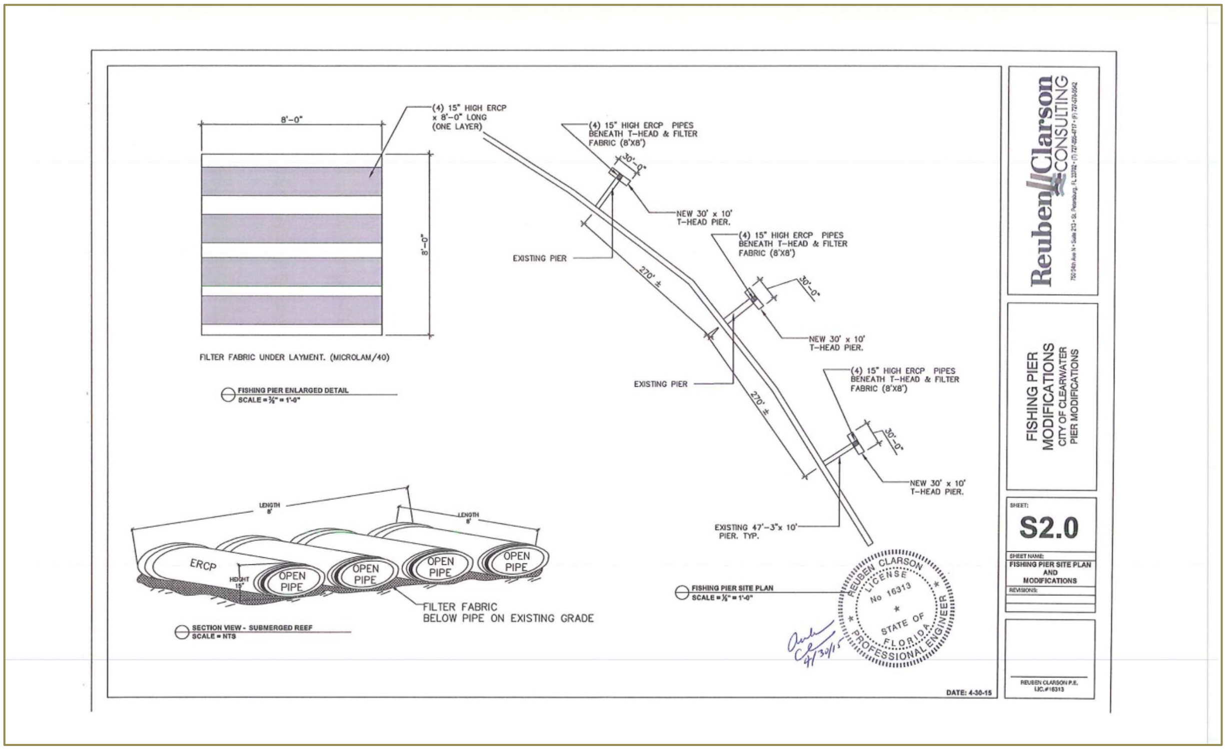

Figure 3. Project drawing showing the 3 piers where T-head extensions will be added and the FAD design which will be added underneath each pier extension (©2016 Reuben Clarson Consulting)

2.2 Action Area

The action area is defined by regulation as “all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action” (50 Code of Federal Regulations [CFR] 402.02). The action area includes the areas in which construction will take place, as well as the immediately surrounding water areas that may be impacted by direct (immediate such as construction noise) and indirect (later in time by increased fishing pressure) effects of the actions. The project site is located at latitude 27.9602ºN, longitude 82.82453ºW (North American Datum 1983), at 1060 Gulf Boulevard, Clearwater, Pinellas County, Florida. For purposes of this consultation, the action area extends to a radius of 705 feet from the pier footprint, which, based on our noise calculations discussed below, is the maximum distance that any potential effects to ESA-listed species may occur (i.e., the distance to which ESA-listed fish have the potential to experience behavioral effects) (Figure 4).

The action area is located in Little Pass between the Gulf of Mexico and Clearwater Harbor. There are 3 existing fishing piers in the action area. The shorefront of the adjacent public park is consolidated with existing riprap revetment. Bottom habitat in the action area is described as sand with some silt and shell detritus on top. There are no mangroves present but there are some seagrasses according to a benthic survey completed by Woods Consulting, Inc. (April 24, 2015). Water depths are between 3 to 7-ft-deep in the action area and there is a strong current in Little Pass.

Figure 4. Image showing the action area for the Clearwater pier extensions – with an approximate noise impact radius of 705 ft extended outward from the site where behavioral effects to ESA-listed species may occur during pile driving during pier T-head construction (©2016 Google); white circles indicate the 3 existing piers.

3 STATUS OF LISTED SPECIES

The following endangered (E) and threatened (T) species under the jurisdiction of NMFS may occur in or near the action area (Table 1). The project is not located in designated critical habitat, and there are no potential routes of effect to any designated critical habitat.

Table 1. Effects Determinations for Species the Action Agency or NMFS Believes May Be Affected by the Proposed Action

Species	ESA Listing Status	Action Agency Effect Determination	NMFS Effect Determination
Sea Turtles			
North Atlantic DPS of green sea turtle	T	LAA	LAA
South Atlantic DPS of green sea turtle	T	LAA	LAA
Kemp's ridley	E	LAA	LAA
Northwest Atlantic Ocean DPS of loggerhead sea turtle	T	LAA	LAA

Species	ESA Listing Status	Action Agency Effect Determination	NMFS Effect Determination
Leatherback	E	LAA	NE
Hawksbill	E	LAA	NE
Fish			
Smalltooth sawfish (U.S. DPS)	E	LAA	LAA
E = endangered; T = threatened; LAA = may affect, likely to adversely affect; NE = no effect			

We believe the project will have no effect on hawksbill and leatherback sea turtles, due to these species' very specific life history strategies, which are not supported at the project site. Leatherback sea turtles have a pelagic, deepwater life history, where they forage primarily on jellyfish. Hawksbill sea turtles typically inhabit inshore reef and hard bottom areas (not present at this site) where they forage primarily on encrusting sponges. Furthermore, the absence of reported Hawskbill and low numbers of leatherback strandings in the area reported in the most recent 10 years of data support our determination that the species are unlikely to be encountered in the action area and will not be affected by the action (stranding data discussed in detail in Section 3.2).

We believe that loggerhead, green, and Kemp's ridley sea turtles and smalltooth sawfish may be present within the action area and may be affected by the proposed action.

Critical Habitat

The project is not located in designated critical habitat, and there are no potential routes of effect to any designated critical habitat.

3.1 Species Not likely to be Adversely Affected

Sea turtles (green, Kemp's ridley, and loggerhead) and smalltooth sawfish may be affected by construction activities (i.e., dock pile installation [T-heads] and barge movement). Sea turtles and smalltooth sawfish may be injured or killed if struck by equipment or materials. Still, we believe this effect is discountable because these species are likely to move away and are expected to exhibit avoidance behavior. The applicant's implementation of NMFS's *Sea Turtle and Smalltooth Sawfish Construction Conditions* will further reduce the risk by requiring that all construction workers watch for smalltooth sawfish and sea turtles. Operation of any mechanical construction equipment will cease immediately if a sea turtle or smalltooth sawfish is seen within a 50-ft radius of the equipment. Activities will not resume until the protected species has departed the project area of its own volition.

During construction, sea turtles and smalltooth sawfish may be affected by being temporarily unable to use the site for foraging or refuge due to avoidance of construction activities and related noise. We believe these effects will be insignificant as this is an open-water area with similar surrounding habitat. There are no mangroves in the action area, however, there are some sporadic seagrasses that will be avoided by the construction but which will be inaccessible to listed species during construction due to turbidity devices. Any temporary effects to sea turtles and smalltooth sawfish will be so small as to be unmeasurable because the action area is located in a pass with a strong current and ample seagrasses exist just outside of the pass in Clearwater Harbor. We do not anticipate any permanent habitat effects other than the FADs (discussed below in Section 5) that would affect sea turtles or smalltooth sawfish.

Effects to listed species as a result of noise created by construction activities can physically injure animals in the affected areas or change animal behavior in the affected areas. Injurious effects can occur in 2 ways. First, immediate adverse effects can occur to listed species if a single noise event exceeds the threshold for direct physical injury. Second, effects can result from prolonged exposure to noise levels that exceed the daily cumulative exposure threshold for the animals, and these can constitute adverse effects if animals are exposed to the noise levels for sufficient periods. Behavioral effects can be adverse if such effects interfere with animals' migrating, feeding, resting, or reproducing, for example. Our evaluation of effects to listed species as a result of noise created by construction activities is based on the analysis prepared in support of the Opinion for SAJ-82.[1] The noise analysis in this consultation evaluates effects to ESA-listed fish and sea turtles identified by NMFS as potentially affected in Table 1, above.

The applicant will use a combination of impact hammer and jetting for pile installation. Based on our noise calculations, the installation of 8-in-diameter wood piles by impact hammer will not cause single-strike or peak-pressure injury to sea turtles or ESA-listed fish. The cumulative sound exposure level (cSEL) of multiple pile strikes over the course of a day may cause injury to ESA-listed fishes and sea turtles at a radius of up to 30 ft (9 m). Due to the mobility of sea turtles and ESA-listed fish species, we expect them to move away from noise disturbances. Because we anticipate the animal will move away, we believe that an animal's suffering physical injury from noise is extremely unlikely to occur. Even in the unlikely event an animal does not vacate the daily cumulative injurious impact zone, the radius of that area is smaller than the 50-ft radius that will be visually monitored for listed species. Construction personnel will cease construction activities if an animal is sighted per NMFS's *Sea Turtle and Smalltooth Sawfish Construction Conditions.* Thus, we believe the likelihood of any injurious cSEL effects is discountable. An animal's movement away from the injurious impact zone is a behavioral response, with the same effects discussed below.

Based on our noise calculations, impact hammer pile installation could also cause behavioral effects at radii of 151 ft (46 m) for sea turtles and 705 ft (215 m) for ESA-listed fishes. Due to the mobility of sea turtles and ESA-listed fish species, we expect them to move away from noise disturbances. Because there is similar habitat nearby along adjacent properties on Sand Key and on both sides of the approximately ¼-mile-wide Sand Key Pass, we believe behavioral effects will be insignificant. If an individual chooses to remain within the behavioral response zone, it could be exposed to behavioral noise impacts during pile installation. Since installation will occur only during the day, these species will be able to resume normal activities during quiet periods between pile installations and at night. Therefore, we anticipate any behavioral effects will be insignificant.

Based on our noise calculations, the use of a water jet to create pilot holes or install piles will not result in injurious noise effects or behavioral noise effects.

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[1] NMFS. Biological Opinion on Regional General Permit SAJ-82 (SAJ-2007-01590), Florida Keys, Monroe County, Florida. June 10, 2014.

The 3 fishing pier renovations will require installation of new piles to support the pier that will cause increased turbidity that may adversely affect listed species. However, the applicant will use floating turbidity curtains installed prior to and throughout all in-water construction. Turbidity curtains will remain in place post-construction until all turbidity and siltation subsides from pile installation, and siltation fences will also be installed on the uplands to mitigate any land-based work causing sedimentation in the action area. Elevated turbidity during construction will be temporary (i.e., 1-3 weeks) and will be contained by turbidity controls, and then turbidity will subside to normal background levels post construction. Therefore, NMFS believes turbidity effects to sea turtles and smalltooth sawfish are insignificant.

Installation of FADs could adversely affect listed species by potentially entrapping/entangling sea turtles and smalltooth sawfish. Artificial reef materials that include FADs of various types (e.g., reef modules) have been documented in some instances to cause mortality to sea turtles in particular by entrapping them, thereby causing forced submergence and eventual drowning. NMFS believes the risk of entrapment in the FADs is so unlikely as to make this potential adverse effect discountable. Each FAD is an 8-ft-long by 8-ft-wide structure consisting of 4 connected concrete culvert pipes with elliptical openings. Each individual pipe is 8 ft long, 2 ft wide, and 15 inches tall. It is highly unlikely that a sea turtle or smalltooth sawfish would become entrapped in individual 2-ft-wide culvert pipes or the overall array that makes up each FAD. The reason being that such a small opening (2-ft-wide) would be very unlikely to tempt a sea turtle or sawfish to wedge itself into while foraging. The sparse data there is on entrapment indicate that the highest risk for sea turtle entrapment are reef modules with open bottoms and closed tops that allow access for sea turtles in particular[2]. The proposed FADs for the Clearwater fishing piers will have narrow culvert openings that would not be expected to entrap a foraging sea turtles or smalltooth sawfish.

The accumulation of discarded fishing line on the FADs in this instance also may pose an entanglement risk for sea turtles and smalltooth sawfish, increasing the opportunity for entanglement of listed species over time. The applicant has agreed to annual fishing line cleanup events using a local non-government organization to host such events using both wading volunteers and the use of SCUBA. NMFS believes the annual cleanup events and the low expected user pressure on the modified fishing piers (maximum of 20 people per day) make the risk of entanglement highly unlikely and therefore discountable.

The addition of FADS below the T-heads as proposed is somewhat unusual for coastal fishing piers. We considered the potential for increased sea turtle/fisher encounter probabilities following installation of the FADs whereby increases in bait fish lead to larger fish preying on the bait fish that in turn might lead to increased interest from passing sea turtles in foraging at any of the 3 fishing piers. We believe any such effects to sea turtles are discountable. We believe the shallow depths under the docks where the FADs will be located will not appreciably increase prey (baitfish) densities to a degree that would impact sea turtle foraging in and around

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[2] Patterson, W. 2010. The effect of unpublished artificial reefs deployed on the Northwest Florida Shelf. Final Report. Florida Fish and Wildlife Conservation Commission Grant Number FWC-08267. 38 pp.

the docks. Therefore, it is our opinion that the potential for sea turtles to increase in densities around the FADS is very unlikely because we do not believe increases in prey fish species will be appreciable enough to increase sea turtle foraging underneath and around the T-heads. .

3.2 Species Likely to be Adversely Affected

Sea Turtles

A fishing pier can facilitate recreational fishing that could injure or kill sea turtles and smalltooth sawfish via accidental hooking and entanglement either by actively fished lines, discarded, remnant, or broken-off fishing lines, and/or other debris. We evaluated the threats posed by the proposed project to sea turtles based on their abundance in the area and their habitat/feeding preferences.

The National Oceanic and Atmospheric Association’s (NOAA) Southeast Fisheries Science Center’s (SEFSC) Sea Turtle and Stranding Network (STSSN) was formally established in 1980 to collect information on and document strandings of marine turtles along the U.S. Gulf of Mexico and Atlantic coasts. Stranding data is parsed into regions so that subsets of the overall database may be reviewed to discern smaller, regional patterns in strandings such as species distributions, for instance. For the STSSN, a stranding is defined as 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; it may or may not be the location at the time of injury or death.

The North and South Atlantic DPSs of green, Kemp’s ridley, and the Northwest Atlantic DPS of loggerhead sea turtles may occur within the action area. Data from the STSSN (2006-2015 [10 years]) indicate that for inshore stranding locations in the Gulf of Mexico (Zone 4[3]) loggerhead sea turtles are most commonly stranded (57.1%), followed by green sea turtles (21.1%), with Kemp’s ridleys making up the third most likely stranded species (18.3%) (Table 2). Over the past 10-year period, there is a slightly increasing trend of both green and Kemp’s ridley strandings (Figure 5) and a more significant decreasing trend in STSSN reported strandings of loggerhead sea turtles. The remaining sea turtle composition over the 10-year period is as follows: 0.9% hawksbills, 0.3% leatherback, and 2.4% unknown species. However, these data are for inshore coastal areas primarily on the Gulf of Mexico (GOM) portion of Zone 4 and there are few stranding data for Clearwater Harbor and the immediate vicinity of the Gulf of Mexico where the action area is located between the two in Little Pass. In other words, Zone 4 is much more expansive than the action area, extending north and south within Clearwater Harbor and out into the GOM where most stranding reports occur with the zone. As we might anticipate, the inshore bays and estuaries such as Clearwater Harbor have few stranding reports due to a combination of less frequent use of these bays by sea turtles and also less fishing pressure that might lead to stranding reports. If we refine our search of the stranding data further, teased out of the above stranding metrics, there were 7 reported sea turtle strandings for fishing piers near to the action area, but all outside of the action area either in the Gulf of Mexico or Clearwater

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[3] STSSN strandings are grouped by region into zones, for this project Zone 4 includes the action area but extends many miles up- and down-coast from the action area and 9 miles out into the Gulf of Mexico.

Harbor, and 1 along Indian Rocks Beach (Figure 6, Table 3). These 7 reported sea turtle landings by recreational anglers included 6 Kemp’s ridley and 1 green sea turtle.

Table 2. Inshore Sea Turtle Strandings from Zone 4 of (2006-2015) *

Year	**Sea Turtle Species**					**Total**
	Loggerhead	**Green**	**Kemp’s**	**Hawksbill**	**Leatherback**	
2015	67	32	20	0	2	125
2014	50	34	17	0	1	106
2013	63	30	51	0	0	145
2012	47	28	42	0	0	118
2011	50	31	23	0	0	105
2010	49	54	13	2	5	130
2009	79	9	19	0	0	111
2008	82	14	14	1	1	114
2007	103	10	7	0	0	123
2006	162	20	28	1	3	217
Total by Species	752	262	234	4	12	1,294**
Percent of Total by Species	**57.1%**	**21.1%**	**18.3%**	**0.3%**	**0.9%**	**97.7%**

* STSSN Zone 4 data (2016 partial year) data not shown above and species distribution is 41.3% loggerhead, 40.4% green, and 18.3% Kemp’s ridleys (http://www.sefsc.noaa.gov/species/turtles/strandings.html)

** Totals will not cross-foot because unknowns are not shown here in a separate column but account for a small percentage of strandings (2.4%) discussed in the Opinion text.

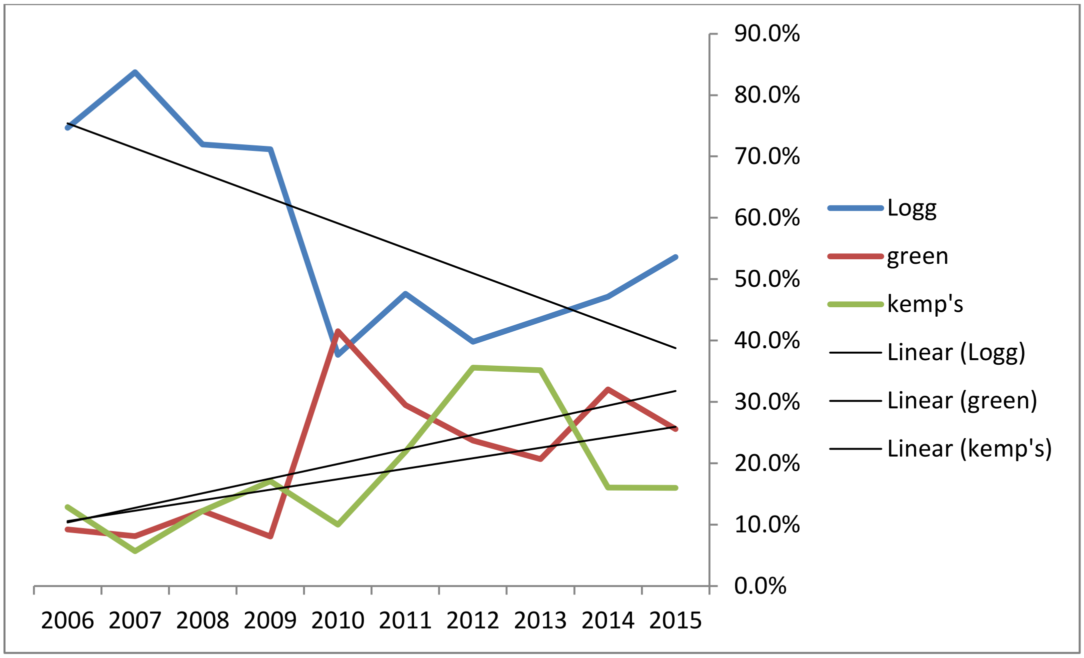

Figure 5. 10-year STSSN Data for Zone 4 for Loggerhead, Green, and Kemp's ridleys. Hawksbills (0.9%) and Leatherbacks (0.3%) not shown here.

Figure 6. Sea turtle captures at Pier 60 represent the closest fishing pier incidental captures to the action area, n=5 (~1.3 miles) (©2016 Google) (Source for stranding data – Sea Turtle Strandings in Zone 4 [2008-2016]).

Table 3. Incidental Captures of Sea Turtles Nearest to the Action Area (Source for stranding data – Sea Turtle Strandings in Zone 4 [2008-2016]).

Pier 60					
Species	Date	Capture Method	Action	Capture Notes	Distance from Action Area
Kemp's ridley	Sept 14	Hook/Line	Released Alive	Hook in Throat	1.3 miles
Kemp's ridley	Jan 13	Hook/Line	Released Alive	Hook in Mouth	1.3 miles
Kemp's ridley	May 15	Hook/Line	Released Alive	Hook in Esophagous	1.3miles
Kemp's ridley	May 16	Hook/Line	Released Alive	Hook Ingested	1.3 miles
Kemp's ridley	May 13	Hook/Line	Released Alive	Old Healed Wounds	1.3 miles
Indian Rocks					
Kemp's ridley	July 14	Hook/Line	Released Alive	Swallowed Circle Hook	6 miles

Magnolia St. Pier					
Green	June 8	Hook/Line	Rehab	Hook in Tongue	4.5 miles

The nearest of the 7 STSSN reported captures to the action area are of 5 separate Kemp's ridley sea turtles, all caught by hook-and-line from Pier 60 (public fishing pier), approximately 1.3 mile from the action area just north from Little Pass in the Gulf of Mexico (previous Figure 6). All 5 captures were by hook-and-line and 3 of the 5 had to be sent to rehabilitation facilities. Three of the 5 were captured in May, 1 in January, and the remaining 1 in September. The next closest reported capture was another hook-and-line capture from the Magnolia Street Pier (public fishing pier) and occurred in June 2008 and was sent to a rehabilitation facility. The remaining reported sea turtle capture occurred 6 miles from the action area along the bayside of Indian Rocks Beach from a marina dock.

Smalltooth Sawfish

NMFS found no record of reported sawfish sightings and/or incidental captures from recreational fishing in Clearwater Harbor or in the immediate vicinity out into the Gulf of Mexico from Little Pass. No sawfish sightings were reported at any of the 3 existing fishing piers to be renovated over the past 18 years of operation. Public sawfish sightings/encounter data are housed in a public database at the International Sawfish Encounter Database (ISED). These reports are indicative of sawfish presence in localized regions; conversely however, the lack of reported sightings does not mean that sawfish are not present in the area. The nearest reported sightings of smalltooth sawfish in the ISED occurred in the next closest pass northward from the action area, approximately 7 miles, adjacent to the northeast side of Caldesi Island in Dunedin. The sawfish (small juvenile) was reported by a recreational fisher in 2013 (Figure 7). Just north of this sighting (~ 3.4 mi) in Palm Harbor, another small juvenile was reported as a sighting by another recreational fisher (2007) over a shallow seagrass bed. Moving 4.6 mi northwest of the previous sighting, another small juvenile was captured by a recreational fisher (2002) and released alive. These 3 sawfish sightings represent the known sightings/capture somewhat near to the action area biogeographically. Overall, sawfish encounters (sightings and captures combined) in the region are somewhat rare.

While the ISED includes all types of encounters with sawfish (captures, sightings, stranded specimens, etc.), most of the encounters fall in the first 2 categories (ISED 2014). Considering only the U.S. records from the last thirteen years provided by interviews (no directed research data included), 48.8% of the encounters were captures, both recreational and commercial, while 39.3% were sightings with no physical contact with the sawfish. In Clearwater Harbor, recreational fishing pressure appears moderate considering the moderate number of fishing piers inside Clearwater Harbor and just outside Little Pass in the Gulf of Mexico (e.g., Pier 60). Based on the above data from the ISED, sightings are often biased towards fisher reports. On the one hand, there have been no sawfish captures reported at the 3 existing fishing piers for this project since they were installed 18 years ago (confirmed by pers. comm., C. Hoch, USACE, to J. Cavanaugh, NMFS, July 13, 2016). There were also no existing conservation reporting signs that existing data shows increases reporting of captured sawfish at fishing piers. Pier modifications and possibly increases in sawfish populations in the region of the action area my increase the opportunity for incidental capture at any of the 3 existing piers. In other words, given the presence of these 3 fishing piers in the area over the decades long expected lifespan of the structures, we may conservatively expect the fishing piers presence to lead to incidental captures and/or sighting reports in the future, perhaps even more so given their location in a pass. This will be discussed further in Section 5 when we estimate sawfish incidental captures anticipated from the 3 piers.

Additionally, NMFS anticipates increases in population size and distribution given recovery efforts for this species discussed in Section 7 and it is reasonable to assume that given their presence in Clearwater Harbor and the Gulf of Mexico where there are ample foraging and refuge resources, this will likely lead to increased sightings and possibly increased incidental captures in the action area.

Figure 7. Closest sawfish sighting from the ISED to the action area, project area circled in yellow and sawfish sighting circled in white (©2016 Google)

Based on the above discussion, we believe that green, loggerheads, and Kemp's ridley sea turtles and smalltooth sawfish may occur in the area and may be affected by hook-and-line capture at this fishing pier. These effects will be discussed further in Section 5. Section 3.3 will address the general threats that confront all sea turtle species followed by specific species information on the distribution, life history, population structure, abundance, population trends, and unique threats to each species of sea turtle in sections 3.4 through 3.6, and on smalltooth sawfish in section 3.7.

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

In addition to domestic fisheries, sea turtles are subject to direct as well as incidental capture in numerous foreign fisheries, further impeding the ability of sea turtles to survive and recover on a global scale. For example, pelagic stage sea turtles, especially loggerheads and leatherbacks, circumnavigating the Atlantic are susceptible to international longline fisheries including the Azorean, Spanish, and various other fleets (Aguilar et al. 1994; Bolten et al. 1994; Crouse 1999). Bottom longlines and gillnet fishing are 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 activities 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, confusing them on their approach to their native nesting beaches, and also subsequently drawing sea turtle hatchlings away from the water toward artificial lighting on shorefront properties (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 wave patterns.

Environmental Contamination

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

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

A thorough assessment of the long-term effects of the spill on sea turtles has not yet been completed; 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 2007a). 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 2007a).

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

Other Threats

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

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.

3.4 Loggerhead Sea Turtle – Northwest Atlantic (NWA) DPS

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

Species Description and Distribution

Loggerheads are large sea turtles. Adults in the southeast United States average about 3 ft (92 centimeters [cm]) long, measured as a straight carapace length (SCL), and weigh approximately 255 pounds (lb) (116 kilograms [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 1998b).

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 2008b). 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[4]), (4) juvenile stage (oceanic zone), (5) juvenile stage (neritic zone), (6) adult

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

stage (oceanic zone), (7) adult stage (neritic zone), and (8) nesting female (terrestrial zone) (NMFS and USFWS 2008). Loggerheads are long-lived animals. They reach sexual maturity between 20-38 years of age, although age of maturity varies widely among populations (Frazer and Ehrhart 1985; NMFS 2001). The annual mating season occurs from late March to early June, and female turtles lay eggs throughout the summer months. Females deposit an average of 4.1 nests within a nesting season (Murphy and Hopkins 1984), but an individual female only nests every 3.7 years on average (Tucker 2010). Each nest contains an average of 100-126 eggs (Dodd 1988) which incubate for 42-75 days before hatching (NMFS and USFWS 2008b). Loggerhead hatchlings are 1.5-2 in long and weigh about 0.7 ounces (20 grams).

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

After departing the oceanic zone, neritic juvenile loggerheads in the Northwest Atlantic inhabit continental shelf waters from Cape Cod Bay, Massachusetts, south through Florida, The Bahamas, Cuba, and the Gulf of Mexico. Estuarine waters of the United States, including areas such as Long Island Sound, Chesapeake Bay, Pamlico and Core Sounds, Mosquito and Indian River Lagoons, Biscayne Bay, Florida Bay, 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. 2009).

Like juveniles, non-nesting adult loggerheads also use the neritic zone. However, these adult loggerheads do not use the relatively enclosed shallow-water estuarine habitats with limited ocean access as frequently as juveniles. Areas such as Pamlico Sound, North Carolina, and 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. 2009).

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

Status and Population Dynamics

A number of stock assessments and similar reviews (Conant et al. 2009; Heppell et al. 2003; NMFS-SEFSC 2001; NMFS-SEFSC 2009; NMFS and USFWS 2008b; TEWG 1998b; 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 2008b). NMFS and USFWS (2008b) 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 2008b). 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 8). FWRI performed a detailed analysis of the long-term loggerhead index nesting data (1989-2015) (http://myfwc.com/research/wildlife/sea-turtles/nesting/loggerhead-trends/). Over that time period, 3 distinct trends were identified. From 1989-1998 there was a 24% increase that was then followed by a sharp decline over the subsequent 9 years. A large increase in loggerhead nesting has occurred since, as indicated by the 74% increase in nesting between 2008 and 2015. FWRI examined the trend from the 1998 nesting high through 2015 and found that the decade-long post-1998 decline was replaced with a slight but nonsignificant increasing trend. Looking at the data from 1989 through 2015 (an increase of over 38%), FWRI concluded that there was an overall positive change in the nest counts (http://myfwc.com/research/wildlife/sea-turtles/nesting/loggerhead-trends/).

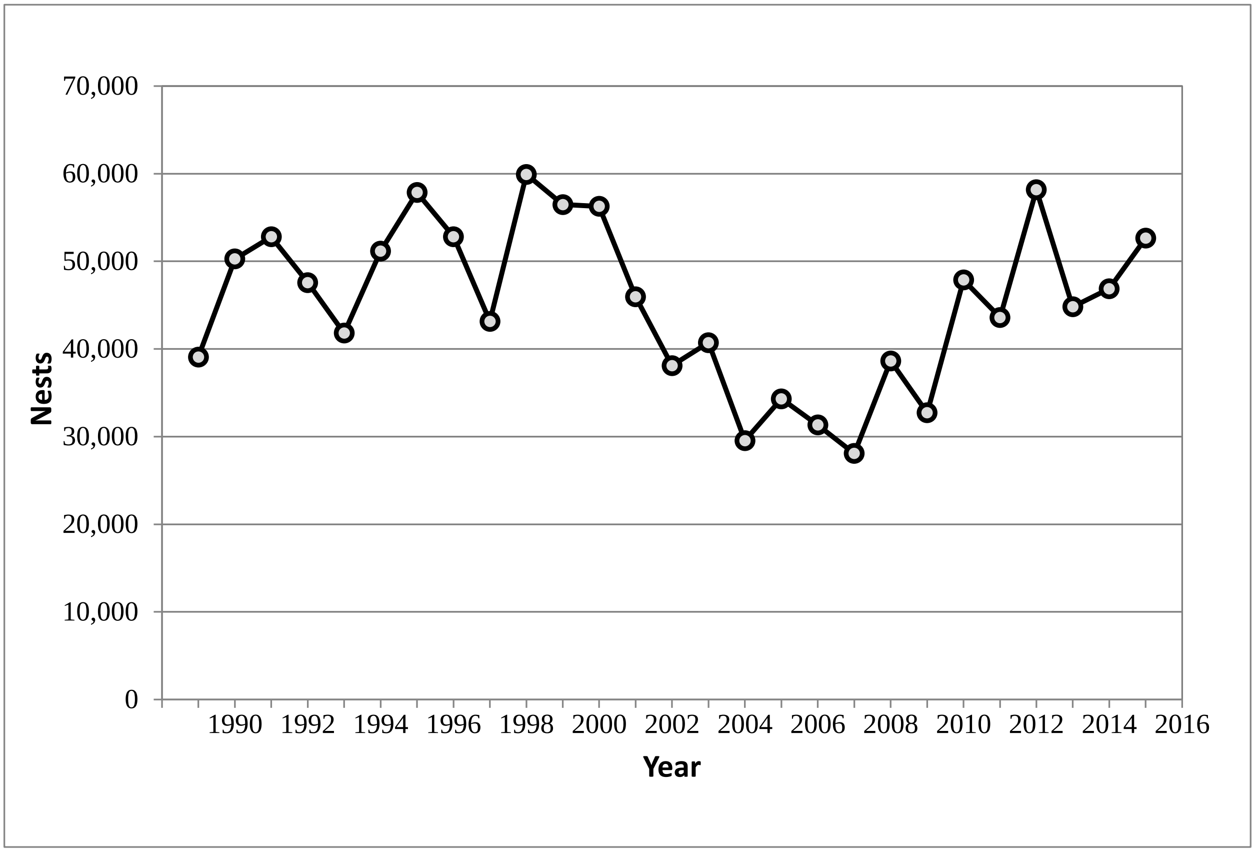

Figure 8. Loggerhead sea turtle nesting at Florida index beaches since 1989

Northern Recovery Unit

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

Data since that analysis (Table 4) are showing improved nesting numbers and a departure from the declining trend. Georgia nesting has rebounded to show the first statistically significant increasing trend since comprehensive nesting surveys began in 1989 (Mark Dodd, GADNR press release, http://www.georgiawildlife.com/node/3139). South Carolina and North Carolina nesting have also begun to show a shift away from the declining trend of the past.

Table 4. Total Number of NRU Loggerhead Nests (GADNR, SCDNR, and NCWRC nesting datasets)

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

South Carolina also conducts an index beach nesting survey similar to the one described for Florida. Although the survey only includes a subset of nesting, the standardized effort and locations allow for a better representation of the nesting trend over time. Increases in nesting were seen for the period from 2009-2012, with 2012 showing the highest index nesting total since the start of the program (Figure 9).

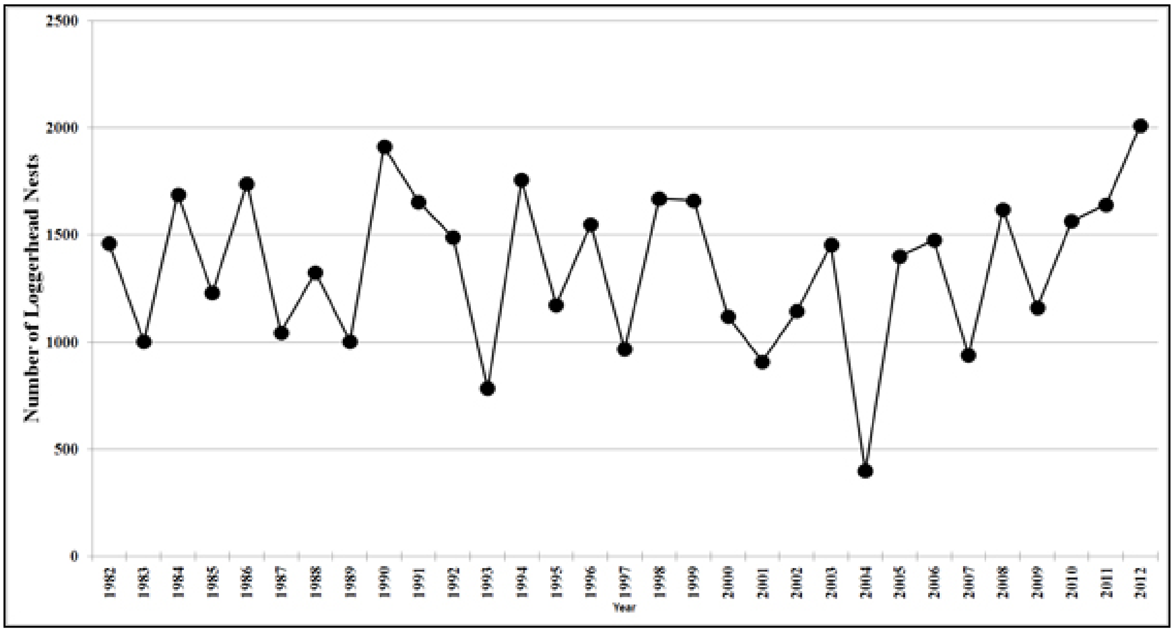

Figure 9. South Carolina index nesting beach counts for loggerhead sea turtles (from the SCDNR website, http://www.dnr.sc.gov/seaturtle/nest.htm)

<u>Other Northwest Atlantic DPS Recovery Units</u>

The remaining 3 recovery units—Dry Tortugas (DTRU), Northern Gulf of Mexico (NGMRU), and Greater Caribbean (GCRU)—are much smaller nesting assemblages, but they are still considered essential to the continued existence of the species. Nesting surveys for the DTRU are conducted as part of Florida's statewide survey program. Survey effort was relatively stable during the 9-year period from 1995-2004, although the 2002 year was missed. Nest counts ranged from 168-270, with a mean of 246, but there was no detectable trend during this period (NMFS and USFWS 2008b). Nest counts for the NGMRU are focused on index beaches rather than all beaches where nesting occurs. Analysis of the 12-year dataset (1997-2008) of index nesting beaches in the area shows a statistically significant declining trend of 4.7% annually. Nesting on the Florida Panhandle index beaches, which represents the majority of NGMRU nesting, had shown a large increase in 2008, but then declined again in 2009 and 2010 before rising back to a level similar to the 2003-2007 average in 2011. Nesting survey effort has been inconsistent among the GCRU nesting beaches, and no trend can be determined for this subpopulation (NMFS and USFWS 2008b). 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 2008b).

In-water Trends

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

Population Estimate

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

Threats (Specific to Loggerhead Sea Turtles)
The threats faced by loggerhead sea turtles are well summarized in the general discussion of threats in Section 3.3. 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. 2009).

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

3.5 Green Sea Turtle

Information Relevant to All DPSs

The green sea turtle was originally listed as threatened under the ESA on July 28, 1978, except for the Florida and Pacific coast of Mexico breeding populations, which were listed as endangered (NMFS). On April 6, 2016, the original listing was replaced with the listing of 11 distinct population segments (DPSs) (81 FR 20057 2016) (Figure 10). The Mediterranean, Central West Pacific, and Central South Pacific DPSs were listed as endangered. The North Atlantic, South Atlantic, Southwest Indian, North Indian, East Indian-West Pacific, Southwest Pacific, Central North Pacific, and East Pacific were listed as threatened. For the purposes of this consultation, only the South Atlantic DPS (SA DPS) and North Atlantic DPS (NA DPS) will be considered, as they are the only two DPSs with individuals occurring in the Atlantic and Gulf of Mexico waters of the United States.

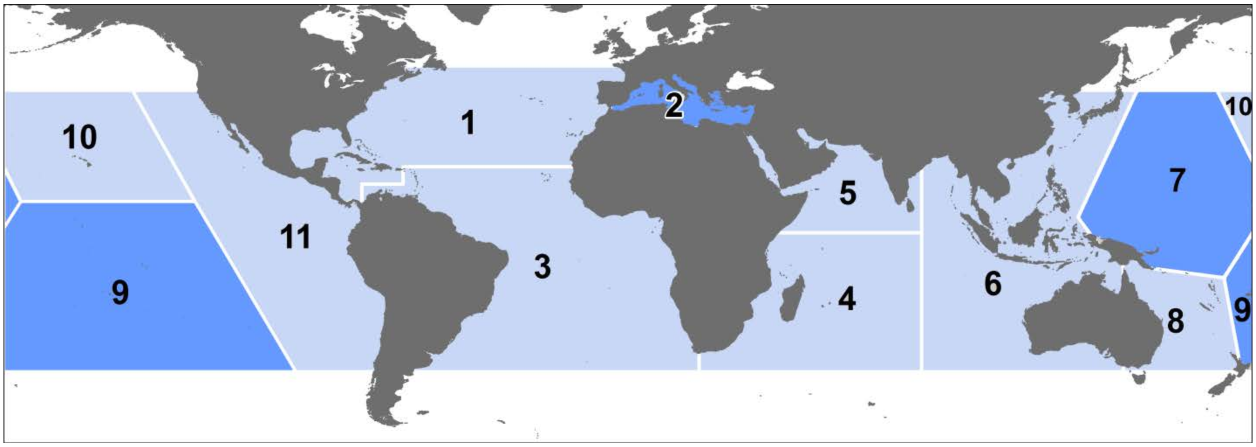

Figure 10. Threatened (light) and endangered (dark) green turtle DPSs: 1. North Atlantic, 2. Mediterranean, 3. South Atlantic, 4. Southwest Indian, 5. North Indian, 6. East Indian-West Pacific, 7. Central West Pacific, 8. Southwest Pacific, 9. Central South Pacific, 10. Central North Pacific, and 11.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

Life History Information

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

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

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

Species Description and Distribution

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

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

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

North Atlantic DPS Distribution

The NA DPS boundary is illustrated in Figure 5. Four regions support nesting concentrations of particular interest in the NA DPS: Costa Rica (Tortuguero), Mexico (Campeche, Yucatan, and Quintana Roo), U.S. (Florida), and Cuba. By far the most important nesting concentration for green turtles in this DPS is Tortuguero, Costa Rica. Nesting also occurs in The Bahamas, Belize, Cayman Islands, Dominican Republic, Haiti, Honduras, Jamaica, Nicaragua, Panama, Puerto Rico, Turks and Caicos Islands, and North Carolina, South Carolina, Georgia, and Texas, U.S.A. In the eastern North Atlantic, nesting has been reported in Mauritania (Fretey 2001).

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

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

South Atlantic DPS Distribution

The SA DPS boundary is shown in Figure 5, and includes the U.S. Virgin Islands in the Caribbean. The SA DPS nesting sites can be roughly divided into four regions: western Africa, Ascension Island, Brazil, and the South Atlantic Caribbean (including Colombia, the Guianas, and Aves Island in addition to the numerous small, island nesting sites).

The in-water range of the SA DPS is widespread. In the eastern South Atlantic, significant sea turtle habitats have been identified, including green turtle feeding grounds in Corisco Bay, Equatorial Guinea/Gabon (Formia 1999); Congo; Mussulo Bay, Angola (Carr and Carr 1991); as well as Principe Island. Juvenile and adult green turtles utilize foraging areas throughout the

Caribbean areas of the South Atlantic, often resulting in interactions with fisheries occurring in those same waters (Dow et al. 2007). Juvenile green turtles from multiple rookeries also frequently utilize the nearshore waters off Brazil as foraging grounds as evidenced from the frequent captures by fisheries (Lima et al. 2010; López-Barrera et al. 2012; Marcovaldi et al. 2009). Genetic analysis of green turtles on the foraging grounds off Ubatuba and Almofala, Brazil show mixed stocks coming primarily from Ascension, Suriname and Trindade as a secondary source, but also Aves, and even sometimes Costa Rica (North Atlantic DPS)(Naro-Maciel et al. 2007; Naro-Maciel et al. 2012). While no nesting occurs as far south as Uruguay and Argentina, both have important foraging grounds for South Atlantic green turtles (Gonzalez Carman et al. 2011; Lezama 2009; López-Mendilaharsu et al. 2006; Prosdocimi et al. 2012; Rivas-Zinno 2012).

Status and Population Dynamics

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

North Atlantic DPS

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

Tortuguero, Costa Rica is by far the predominant nesting site, accounting for an estimated 79% of nesting for the DPS (Seminoff et al. 2015). Nesting at Tortuguero appears to have been increasing since the 1970's, when monitoring began. For instance, from 1971-1975 there were approximately 41,250 average annual emergences documented and this number increased to an average of 72,200 emergences from 1992-1996 (Bjorndal et al. 1999). Troëng and Rankin (2005) collected nest counts from 1999-2003 and also reported increasing trends in the population consistent with the earlier studies, with nest count data suggesting 17,402-37,290 nesting females per year (NMFS and USFWS 2007a). Modeling by Chaloupka et al. (2008) using data sets of 25 years or more resulted in an estimate of the Tortuguero, Costa Rica population's growing at 4.9% annually.

In the continental United States, green sea turtle nesting occurs along the Atlantic coast, primarily along the central and southeast coast of Florida where an estimated 200-1,100 females nest each year (Meylan et al. 1994; Weishampel et al. 2003). Occasional nesting has also been documented along the Gulf Coast of Florida (Meylan et al. 1995). Green sea turtle nesting is documented annually on beaches of North Carolina, South Carolina, and Georgia, though nesting is found in low quantities (nesting databases maintained on www.seaturtle.org).

In Florida, index beaches were established to standardize data collection methods and effort on key nesting beaches. Since establishment of the index beaches in 1989, the pattern of green sea turtle nesting has generally shown biennial peaks in abundance with a positive trend during the 10 years of regular monitoring (Figure 10). According to data collected from Florida's index nesting beach survey from 1989-2015, green sea turtle nest counts across Florida have increased approximately ten-fold from a low of 267 in the early 1990s to a high of 27,975 in 2015. Two consecutive years of nesting declines in 2008 and 2009 caused some concern, but this was followed by increases in 2010 and 2011, and a return to the trend of biennial peaks in abundance thereafter (Figure 11). 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%.

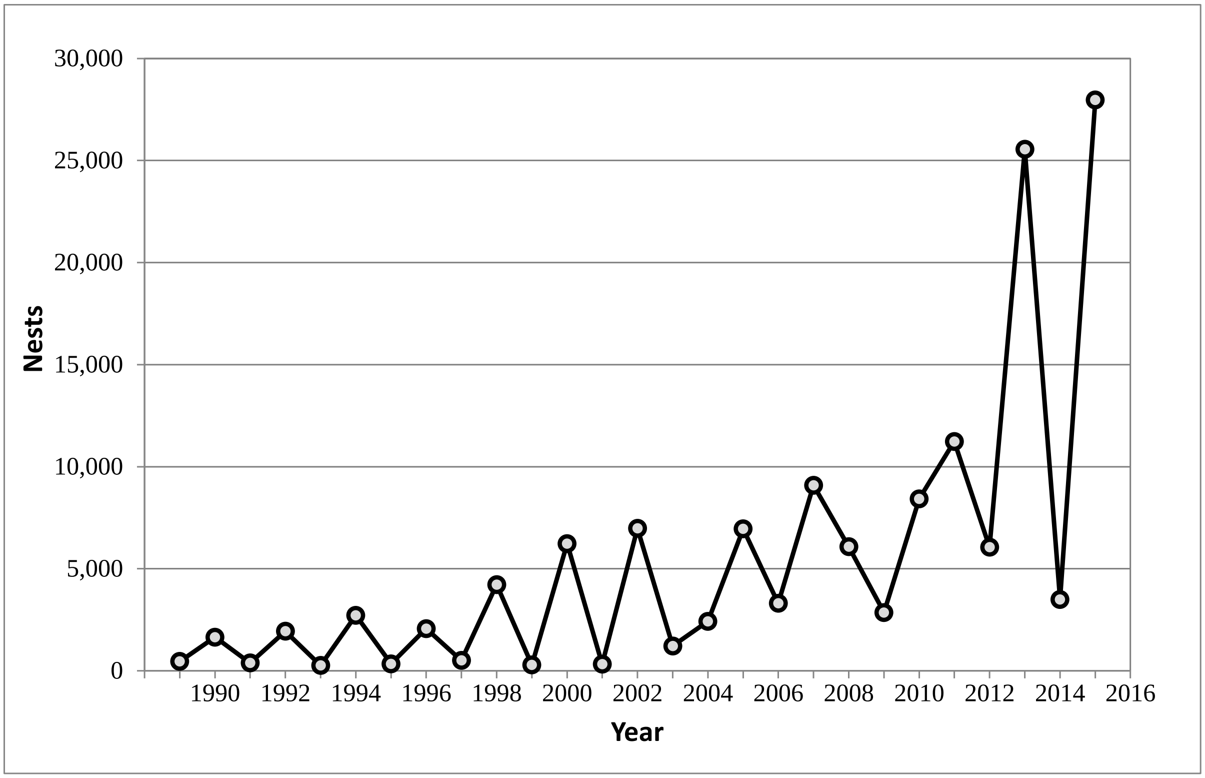

Figure 11. Green sea turtle nesting at Florida index beaches since 1989

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

South Atlantic DPS

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

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

Threats

The principal cause of past declines and extirpations of green sea turtle assemblages has been the overexploitation of the species for food and other products. Although intentional take of green sea turtles and their eggs is not extensive within the southeastern United States, green sea turtles that nest and forage in the region may spend large portions of their life history outside the region and outside U.S. jurisdiction, where exploitation is still a threat. Green sea turtles also face many of the same threats as other sea turtle species, including destruction of nesting habitat from storm events, oceanic events such as cold-stunning, pollution (e.g., plastics, petroleum products, petrochemicals), ecosystem alterations (e.g., nesting beach development, beach nourishment and shoreline stabilization, vegetation changes), poaching, global climate change, fisheries interactions, natural predation, and disease. A discussion on general sea turtle threats can be found in Section 3.3.

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

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

Whereas oil spill impacts are discussed generally for all species in Section 3.3, specific impacts of the DWH spill on green sea turtles are considered here. Impacts to green sea turtles occurred to offshore small juveniles only. A total of 154,000 small juvenile greens (36.6% of the total small juvenile sea turtle exposures to oil from the spill) were estimated to have been exposed to oil. A large number of small juveniles were removed from the population, as 57,300 small juveniles greens are estimated to have died as a result of the exposure. A total of 4 nests (580 eggs) were also translocated during response efforts, with 455 hatchlings released (the fate of which is unknown) (DWH Trustees 2015). Additional unquantified effects may have included inhalation of volatile compounds, disruption of foraging or migratory movements due to surface or subsurface oil, ingestion of prey species contaminated with oil and/or dispersants, and loss of foraging resources which could lead to compromised growth and/or reproductive potential. There is no information currently available to determine the extent of those impacts, if they occurred.

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

3.6 Kemp's Ridley Sea Turtle

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

Species Description and Distribution
The Kemp's ridley sea turtle is the smallest of all sea turtles. Adults generally weigh less than 100 lb (45 kg) and have a carapace length of around 2.1 ft (65 cm). Adult Kemp's ridley shells are almost as wide as they are long. Coloration changes significantly during development from

the grey-black dorsum and plastron of hatchlings, a grey-black dorsum with a yellowish-white plastron as post-pelagic juveniles, and then to the lighter grey-olive carapace and cream-white or yellowish plastron of adults. There are 2 pairs of prefrontal scales on the head, 5 vertebral scutes, usually 5 pairs of costal scutes, and generally 12 pairs of marginal scutes on the carapace. In each bridge adjoining the plastron to the carapace, there are 4 scutes, each of which is perforated by a pore.

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

The primary range of Kemp's ridley sea turtles is within the Gulf of Mexico basin, though they also occur in coastal and offshore waters of the U.S. Atlantic Ocean. Juvenile Kemp's ridley sea turtles, possibly carried by oceanic currents, have been recorded as far north as Nova Scotia. Historic records indicate a nesting range from Mustang Island, Texas, in the north to Veracruz, Mexico, in the south. Kemp's ridley sea turtles have recently been nesting along the Atlantic Coast of the United States, with nests recorded from beaches in Florida, Georgia, and the Carolinas. In 2012, the first Kemp's ridley sea turtle nest was recorded in Virginia. The Kemp's ridley nesting population had been exponentially increasing prior to the recent low nesting years, which may indicate that the population had been experiencing a similar increase. Additional nesting data in the coming years will be required to determine what the recent nesting decline means for the population trajectory.

Life History Information

Kemp's ridley sea turtles share a general life history pattern similar to other sea turtles. Females lay their eggs on coastal beaches where the eggs incubate in sandy nests. After 45-58 days of embryonic development, the hatchlings emerge and swim offshore into deeper, ocean water where they feed and grow until returning at a larger size. Hatchlings generally range from 1.65-1.89 in (42-48 mm) SCL, 1.26-1.73 in (32-44 mm) in width, and 0.3-0.4 lb (15-20 g) in weight. Their return to nearshore coastal habitats typically occurs around 2 years of age (Ogren 1989), although the time spent in the oceanic zone may vary from 1-4 years or perhaps more (TEWG 2000). Juvenile Kemp's ridley sea turtles use these nearshore coastal habitats from April through November, but 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 12), which indicates the species is recovering. It is worth noting that when the Bi-National Kemp's Ridley Sea Turtle Population Restoration Project was initiated in 1978, only Rancho Nuevo nests were recorded. In 1988, nesting data from southern beaches at Playa Dos and Barra del Tordo were added. In 1989, data from the northern beaches of Barra Ostionales and Tepehuajes were added, and most recently in 1996, data from La Pesca and Altamira beaches were recorded. Currently, nesting at Rancho Nuevo accounts for just over 81% of all recorded Kemp's ridley nests in Mexico. Following a significant, unexplained 1-year decline in 2010, Kemp's ridley nests in Mexico reached a record high of 21,797 in 2012 (Gladys Porter Zoo 2013). In 2013 through 2014, there was a second significant decline, with only 16,385 and 11,279 nests recorded, respectively. In 2015, nesting in Mexico improved to 14,006 recorded nests (J. Pena, Gladys Porter Zoo, pers. comm. to M. Barnette, NMFS, October 19, 2015). At this time, it is unclear if nesting will now steadily increase uninterrupted, similar to what occurred from 1990-2009, or if nesting will continue to exhibit sporadic declines and increases as recorded in the past 5 years. 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). It is worth noting that nesting in Texas has paralleled the trends observed in Mexico, with a significant decline in 2010 followed by a second decline in 2013-2014. Nesting rebounded in 2015, with 159 nests documented along the Texas coast (D. Shaver, National Park Service, pers. comm. to M. Barnette, NMFS, October 28, 2015).

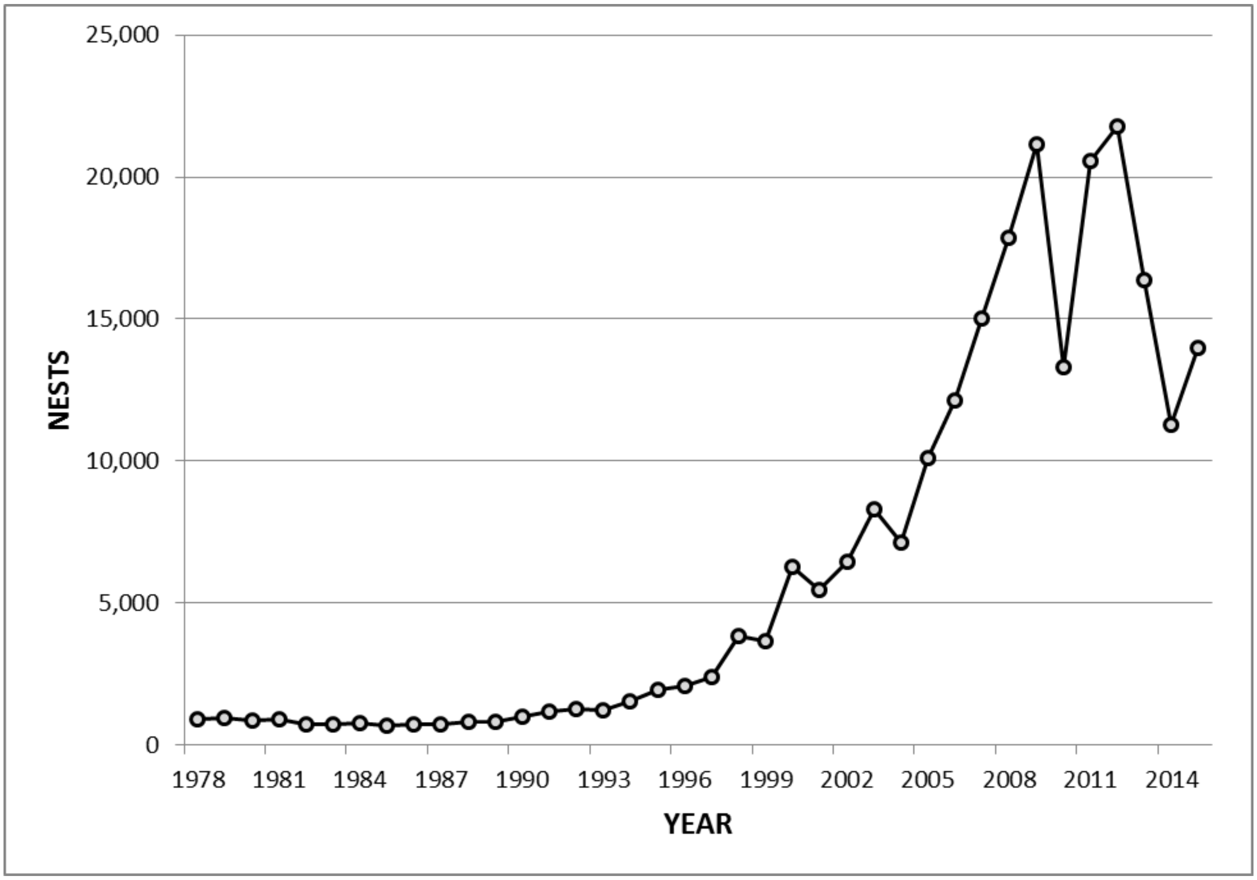

Figure 12. Kemp's ridley nest totals from Mexican beaches (Gladys Porter Zoo nesting database 2015)

Heppell et al. (2005) predicted in a population model that the population is expected to increase at least 12-16% per year and that the population could attain at least 10,000 females nesting on Mexico beaches by 2015. NMFS et al. (2011a) produced an updated model that predicted the population to increase 19% per year and attain at least 10,000 females nesting on Mexico beaches by 2011. Approximately 25,000 nests would be needed for an estimate of 10,000 nesters on the beach, based on an average 2.5 nests/nesting female. While counts did not reach 25,000 nests by 2015, it is clear that the population has increased over the long term. The increases in Kemp's ridley sea turtle nesting over the last 2 decades is likely due to a combination of management measures including elimination of direct harvest, nest protection, the use of turtle exclusion devices (TEDs), reduced trawling effort in Mexico and the United States, and possibly other changes in vital rates (TEWG 1998a; TEWG 2000a). 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 3.3; 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[5] 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 6 years, NMFS has documented (via the Sea Turtle Stranding and Salvage Network data, http://www.sefsc.noaa.gov/species/turtles/strandings.htm) elevated sea turtle strandings in the Northern Gulf of Mexico, particularly throughout the Mississippi Sound area. In the first 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 Horizon* (DWH) oil spill event. A total of 644 sea turtle strandings were reported in 2010 from Louisiana, Mississippi, and Alabama waters, 561 (87%) of which were Kemp's ridley sea turtles. During March through May of 2011, 267 sea turtle strandings were reported from Mississippi and Alabama waters alone. A total of 525 sea turtle strandings were reported in 2011 from Louisiana, Mississippi, and Alabama waters, with the majority (455) occurring from March through July, 390 (86%) of which were Kemp's ridley sea turtles. During 2012, a total of 384 sea turtles were reported from Louisiana, Mississippi, and Alabama waters. Of these reported strandings, 343 (89%) were Kemp's ridley sea turtles. During 2014, a total of 285 sea turtles were reported from Louisiana, Mississippi, and Alabama waters, though the data is incomplete. Of these reported strandings, 229 (80%) were Kemp's ridley sea turtles. These stranding numbers are significantly greater than reported in past years; Louisiana, Mississippi, and Alabama waters reported 42 and 73 sea turtle strandings for 2008 and 2009, respectively. It should be noted that stranding coverage has increased considerably due to the DWH oil spill event.

Nonetheless, considering that strandings typically represent only a small fraction of actual mortality, these stranding events potentially represent a serious impact to the recovery and survival of the local sea turtle populations. While a definitive cause for these strandings has not been identified, necropsy results indicate a significant number of stranded turtles from these events likely perished due to forced submergence, which is commonly associated with fishery interactions (B. Stacy, NMFS, pers. comm. to M. Barnette, NMFS, March 2012). Yet, available

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

information indicates fishery effort was extremely limited during the stranding events. The fact that 80% or more of all Louisiana, Mississippi, and Alabama stranded sea turtles in the past 5 years were Kemp's ridleys is notable; however, this could simply be a function of the species' preference for shallow, inshore waters coupled with increased population abundance as reflected in recent Kemp's ridley nesting increases.

In response to these strandings, and due to speculation that fishery interactions may be the cause, fishery observer effort was shifted to evaluate the inshore skimmer trawl 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-in 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.

While oil spill impacts are discussed generally for all species in Section 3.3, specific impacts of the DWH spill on Kemp's ridley sea turtles are considered here. Kemp's ridleys experienced the greatest negative impact from the DWH spill of any sea turtle species. Impacts to Kemp's ridley sea turtles occurred to offshore small juveniles as well as large juveniles and adults. Loss of hatchling production resulting from injury to adult turtles was also able to be estimated for this species. Injuries to adult turtles of other species, such as loggerheads, certainly would have resulted in unrealized nests and hatchlings to those species as well. However, the calculation of unrealized nests and hatchlings was limited to Kemp's ridleys for several reasons. All Kemp's ridleys in the Gulf belong to the same population (NMFS et al. 2011a), so total population abundance could be calculated based on numbers of hatchlings because all individuals that enter the population could reasonably be expected to inhabit the northern Gulf of Mexico throughout their lives (DWH Trustees 2015).

A total of 217,000 small juvenile Kemp's ridleys (51.5% of the total small juvenile sea turtle exposures to oil from the spill) were estimated to have been exposed to oil. That means approximately half of all small juvenile Kemp's ridleys from the total population estimate of 430,000 oceanic small juveniles were exposed to oil. Furthermore, a large number of small juveniles were removed from the population, as up to 90,300 small juveniles Kemp's ridleys are estimated to have died as a direct result of the exposure. Therefore, as much as 20% of the small oceanic juveniles of this species were killed during that year. Impacts to large juveniles (3+ years old) and adults were also high. An estimated 21,990 such individuals were exposed to oil (about 22% of the total estimated population for those age classes), with an estimated 3,110 mortalities (or 3% of the population for those age classes). The loss of near-reproductive and reproductive-stage females would have contributed to some extent to the decline in total nesting abundance observed between 2011 and 2014. The estimated number of unrealized Kemp's ridley nests is between 1,300 and 2,000, which translates to approximately 65,000 and 95,000 unrealized hatchlings (DWH Trustees 2015). However, this is a minimum estimate because of the overall potential DWH effect because the sublethal effects of DWH oil on turtles, their prey, and their habitats might have delayed or reduced reproduction in subsequent years may have contributed substantially to additional nesting deficits observed following DWH. These sublethal effects could have slowed growth and maturation rates, increased remigration intervals, and decreased clutch frequency (number of nests per female per nesting season). The nature of the DWH effect on reduced Kemp's ridley nesting abundance and associated hatchling production after 2010 requires further evaluation. Additionally, 483 eggs from 5 nests were translocated, with 125 ultimately released as hatchlings (the fate of which is unknown) (DWH Trustees 2015).

Additional unquantified effects may have included inhalation of volatile compounds, disruption of foraging or migratory movements due to surface or subsurface oil, ingestion of prey species contaminated with oil and/or dispersants, and loss of foraging resources which could lead to compromised growth and/or reproductive potential. There is no information currently available to determine the extent of those impacts, if they occurred. It is clear that the DWH spill event resulted in large losses to the Kemp's ridley population across various age classes, and likely had an important population-level effect on the species. Yet, we do not have a clear understanding of those impacts on the population trajectory for the species into the future.

3.7 Smalltooth Sawfish

The U.S. DPS of smalltooth sawfish 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) (ISED 2014). 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%, and south and southwest Florida the only areas which are 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 International Sawfish Encounter Database (ISED) that was 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 ISED, over 3,000 smalltooth sawfish encounters have been reported and compiled in the encounter database (ISED 2014).

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[6] 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 (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).

Bycatch Mortality

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 (gill nets, 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, 1 fisherman 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"[7] (FLA. CONST. art. X,

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

[7] "nearshore and inshore Florida waters" means all Florida waters inside a line 3 mi seaward of the coastline along the Gulf of Mexico and inside a line 1 mi seaward of the coastline along the Atlantic Ocean.

§ 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 (ISED 2014) 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 according to the South Atlantic Fishery Management Council (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 mi of navigation channels and 9,844 mi 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 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 make it 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 describes the effects of past and ongoing human and natural factors contributing to the current status of the species, its habitat (including designated critical habitat), and ecosystem within the action area, without the additional effects of the proposed action. In the case of ongoing actions, this section includes the effects that may contribute to the projected future status of the species, its habitat, and ecosystem. The environmental baseline describes a species' and habitat's health based on information available at the time of this consultation.

By regulation (50 CFR 402.02), environmental baselines for Biological Opinions include the past and present impacts of all state, federal, or private actions and other human activities or natural phenomena in, or having effects in, the action area. We identify the anticipated impacts of all proposed federal projects in the specific action area of the consultation at issue that have already undergone formal or early Section 7 consultation (as defined in 50 CFR 402.11), as well as the impact of state or private actions, or the impacts of natural phenomena, which are concurrent with the consultation in process (50 CFR 402.02).

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

4.1 Status of Sea Turtles and Smalltooth Sawfish within the Action Area

Sea Turtles
Based on the information discussed above, and their habitat and eating preferences, loggerhead, green, and Kemp's ridley sea turtles may be located in the action area and be affected by the proposed recreational fishing activities. All of these species are migratory, traveling for foraging or reproduction purposes. Clearwater Harbor and Little Pass itself may be used by these sea turtles as foraging habitat, and there are a number of direct connections into the Gulf of Mexico such as Little Pass, 3 major passes to the north of the action area, and 1 to the south. There are some seagrass beds that may be used as foraging habitat within the action area and throughout the areas immediately adjacent to the action area. NMFS believes that no individual sea turtles are likely to be permanent residents of the nearshore waters of Clearwater Harbor, although some individuals may be present at any given time for foraging or refuge. These same individuals will migrate into offshore waters, as well as other areas 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 sea turtles in the action area are considered to be the same as those discussed in Section 3.3. Sea turtle nesting occurs throughout Pinellas County with low loggerhead and green sea turtle nesting densities along the Gulf of Mexico beaches just north and south of the action area. It is expected these species are present in the action area primarily for transitory foraging or refuge activities (Florida Fish and Wildlife Conservation Commission http://geodata.myfwc.com/datasets/fb5d8030596b4af1b2d63b5782b55a77_0?geometry=-83.038%2C27.66%2C-82.385%2C27.751). There are 7 confirmed sea turtle hook-and-line capture reports (6 Kemp's ridley, and 1 green) that occurred within a reasonable proximity to the action area (i.e., within the natural biogeographic area of Clearwater Bay and the immediate shoreline of the Gulf of Mexico and several passes leading in or out of the harbor); all of these captures occurred outside of the action area where the 3 fishing piers have been operational for 18 years. The transitory presence of sea turtles in the bay for long durations may account for the low number of reported sightings near to the action area in Clearwater Harbor (Florida Sea Turtle Stranding and Salvage Network STSSN - http://www.sefsc.noaa.gov/species/turtles/strandings.htm http://ocean.floridamarine.org/mrgis/, Florida Fish and Wildlife Conservation Commission http://geodata.myfwc.com/datasets/fb5d8030596b4af1b2d63b5782b55a77_0?geometry=-

83.038%2C27.66%2C-82.385%2C27.751, Marine Resources GIS - http://ocean.floridamarine.org/mrgis/). On the other hand, as mentioned previously the lack of conservation reporting signs at the 3 fishing piers in the action area may also be why there have been no reported sea turtle captures. The nearest reported captures to the action area are from Pier 60, which has conservation reporting signs that increase the likelihood that a sea turtle or sawfish capture will be reported.

Smalltooth Sawfish
As discussed in Section 3.2, smalltooth sawfish have been documented throughout the state of Florida with the majority of sightings occurring in Lee, Charlotte, and Monroe Counties. Critical habitat was designated in these counties as a means of protecting sawfish nursery habitats. The project is not located in critical habitat but the ISED has documented several encounters throughout the greater Clearwater Harbor area extending both north and south of the action area. This suggests that juvenile or adult sawfish are using the nearshore waters in the vicinity of the proposed action and could reasonably be expected to occur in the action area. It is important to note that the ISED data may indicate presence of sawfish in the area but most sawfish sightings and captures go unreported (this is discussed later in Section 5). It is likely that smalltooth sawfish use of Clearwater Harbor is limited at present since the ISED only had 1 reported capture in Clearwater Harbor. The smalltooth sawfish recovery plan (NMFS 2009), if successfully implemented, would be expected to increase sawfish abundance not only within designated critical habitat (i.e., in the Charlotte Harbor Estuary Unit [CHEU] south of the project area) but also in adjacent areas with suitable habitat in southwest Florida such as Clearwater Harbor, Tampa Bay, and other embayments along southwest Florida. Therefore, we might reasonably expect that over the course of the proposed action as the species recovers this population may expand and add more sawfish into other regional bays such as Clearwater Harbor.

4.2 Factors Affecting the Species and Environment within the Action Area

Federal Actions
A search of NMFS records found no projects in the action area that have undergone Section 7 consultation. Since this is a public community park located within a major pass from the Gulf of Mexico into Clearwater Harbor, the typical dock, seawall, and dredging projects in the action area are not expected.

State or Private Actions
Recreational fishing as regulated by the state of Florida can affect protected species or their habitats within the action area. Pressure from recreational fishing in and adjacent to the action area is likely to continue and will increase with the construction and operation of the proposed fishing pier. Recreational fishing pressure via small vessels and from shore is difficult to quantify given the lack of reporting in Clearwater Harbor.

Recreational fishing from private vessels may occur in the action area. Observations of state recreational fisheries have shown that loggerhead, Kemp’s ridley, and green sea turtles are known to bite baited hooks and frequently ingest the hooks. Hooked turtles have been reported by the public fishing from boats, piers, and beach, banks, and jetties and from commercial anglers fishing for reef fish and for sharks with both single rigs and bottom longlines. Additionally, lost fishing gear such as line cut after snagging on rocks, or discarded hooks and line, can also pose an entanglement threat to sea turtles in the area. A detailed summary of the known impacts of hook-and-line incidental captures to loggerhead sea turtles can be found in the SEFSC Turtle Expert Working Group (TEWG) reports (TEWG 1998a; TEWG 2000a).

Other Potential Sources of Impacts in 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 along the GOM side of Florida where the project is located, can kill smalltooth sawfish (Poulakis et al. 2011) and sea turtles (Foley et al. 2007).

Marine Pollution and 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) and smalltooth sawfish and 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 are unknown in the action area, the species of sea turtles and smalltooth sawfish analyzed in this Biological Opinion travel within near shore and offshore habitats and may be exposed to and accumulate these contaminants during their life cycles.

Conservation and Recovery Actions Shaping the Environmental Baseline

As discussed in Section 3.2, 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.

In response to the growing awareness of recreational fishery impacts on sea turtles, in 2008 the Marine Recreational Fishery Statistics Survey added a survey question regarding sea turtle interactions within recreational fisheries (https://www.sefsc.noaa.gov/about/mrfss.htm) (http://www.st.nmfs.noaa.gov/recreational-fisheries/index). NMFS is exploring potential revisions to Marine Recreational Information Program to quantify recreational encounters with sea turtles on a permanent basis.

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 (40 CFR 402.02).

5.1 General Discussion of Hook-and-Line Captures of Sea Turtles

Loggerheads, green, and Kemp's ridley sea turtles are known to bite baited fishing hooks or become entangled in fishing lines and these interactions have been reported by the public fishing from boats, piers, beaches, banks, and jetties. Most sea turtle captures on rod-and-reel, as reported to the STSSN, have occurred during pier fishing. Fishing piers are suspected to attract sea turtles that learn to forage there for discarded bait and fish carcasses.

Hook-and-line gear commonly used by recreational anglers fishing from fishing piers—like the 3 existing Clearwater fishing piers at issue here—can adversely affect sea turtles via entanglement, hooking, and trailing line. Sea turtles released alive may later succumb to injuries sustained at the time of capture or from exacerbated trauma from fishing hooks or lines that were ingested, entangled, or otherwise still attached when they were released. Of the sea turtles hooked or entangled that do not die from their wounds, some may suffer impaired swimming or foraging abilities, altered migratory behavior, and altered breeding or reproductive patterns.

The current understanding of the effects of hook-and-line gear on sea turtles is related primarily to the effects observed in association with commercial fisheries (particularly longline fisheries); few data exist on the effects of recreational fishing on sea turtles. Dead sea turtles found stranded with hooks in their digestive tract have been reported, though it is assumed that most sea turtles hooked by recreational fishers are released alive (Thompson 1991). Little information exists on the frequency of recreational fishing captures and the status of the sea turtles after they are caught. Regardless, effects sea turtles are likely to experience as a result of interactions with recreational hook-and-line gear (i.e., entanglement, hooking, and trailing line) are anticipated to be the same as those that might occur in commercial fisheries. The following discussion summarizes in greater detail the available information on how individual sea turtles may be affected by interactions with hook-and-line gear.

Entanglement

Sea turtles are particularly prone to entanglement as a result of their body configuration and behavior. Records of stranded or entangled sea turtles reveal that hook-and-line gear can wrap around the neck, flipper, or body of a sea turtle and severely restrict swimming or feeding. If the sea turtle is entangled when young, the fishing line becomes tighter and more constricting as the sea turtle grows, cutting off blood flow and causing deep gashes, some severe enough to remove an appendage. Sea turtles have been found entangled in many different types of hook-and-line gear. Entangling gear can interfere with a sea turtle's ability to swim or impair its feeding, breeding, or migration. Entanglement may even prevent surfacing and cause drowning.

Hooking

In addition to being entangled in hook-and-line gear, sea turtles are also injured and killed by being hooked. Hooking can occur as a result of a variety of scenarios, some depend on the foraging strategies and diving and swimming behavior of the various species of sea turtles. Sea turtles are either hooked externally in the flippers, head, shoulders, armpits, or beak, or internally inside the mouth or when the animal has swallowed the bait (Balazs et al. 1995). Observer data (not specific to recreational fishing) indicate entanglement and foul-hooking are the primary forms of gear interactions with leatherback sea turtles, whereas internal hooking is much more prevalent in hardshell sea turtles, especially loggerheads (NMFS unpublished data). Internal hooking of leatherback sea turtles is much rarer. Almost all interactions with loggerheads result from the turtle taking the bait and hook; only a very small percentage of loggerheads are foul-hooked externally or entangled.

Swallowed hooks are of the greatest concern. A sea turtle's esophagus (throat) is lined with strong conical papillae directed towards the stomach (White 1994). The presence of these papillae in combination with an S-shaped bend in the esophagus make it difficult to see hooks when looking through a sea turtle's mouth, especially if the hooks have been deeply ingested. Because of a sea turtle's digestive structure, deeply ingested hooks are also very difficult to remove without seriously injuring the turtle. A sea turtle's esophagus is also firmly attached to underlying tissue; thus, if a sea turtle swallows a hook and tries to free itself or is hauled on board a vessel, the hook can pierce the sea turtle's esophagus or stomach and can pull organs from its connective tissue. These injuries can cause the sea turtle to bleed internally or can result in infections, both of which can kill the sea turtle.

If a hook does not lodge into, or pierce, a sea turtle's digestive organs, it can pass through the sea turtle entirely (Aguilar et al. 1995; Balazs et al. 1995) with little damage (Work 2000). For example, a study of loggerheads deeply hooked by the Spanish Mediterranean pelagic longline fleet found ingested hooks could be expelled after 53-285 days (average 118 days) (Aguilar et al. 1995). If a hook passes through a sea turtle's digestive tract without getting lodged, the hook probably has not harmed the turtle.

Trailing Line

Trailing line (i.e., line left on a sea turtle after it has been captured and released), particularly line trailing from a swallowed hook, poses a serious risk to sea turtles. Line trailing from a swallowed hook is also likely to be swallowed, which may irritate the lining of the digestive system. The line may cause the intestine to twist upon itself until it twists closed, creating a blockage ("torsion"), or may cause a part of the intestine to slide into another part of intestine like a telescopic rod ("intussusception") which also leads to blockage. In both cases, death is a likely outcome (Watson et al. 2005). The line may also prevent or hamper foraging, eventually leading to death. Trailing line may also become snagged on a floating or fixed object, further entangling a turtle and potentially slicing its appendages and affecting its ability to swim, feed, avoid predators, or reproduce. Sea turtles have been found trailing gear that has been snagged on the sea floor, or has the potential to snag, thus anchoring them in place (Balazs 1985). Long lengths of trailing gear are likely to entangle the sea turtle, eventually leading to impaired movement, constriction wounds, and potentially death.

5.2 Methods and Data for Estimating Future Capture, Injury and Post-Release Mortality Rates for Sea Turtles

To determine the number of turtles anticipated to be captured at a fishing pier and the expected mortality rate from these encounters, we break our analysis into the following categories, discussed in the sections below:

1. Sea turtles captured and reported

    a. Sea turtle captured, reported, and released at the pier
        i. Non-lethal captured and released turtles
        ii. Estimated post release mortality (PRM) of those released from pier
    b. Sea turtles captured at the pier and sent to rehabilitation
        i. Die in rehabilitation center
        ii. Not released (still recovering or cannot be released due to injuries)
        iii. Rehabilitated and later released alive
        iv. Rehabilitated, released alive, and later found stranded dead
2. Sea turtles captured and not reported
    a. Sea turtles captured at the pier, but not reported
        i. Non-lethal captured and released turtles
        ii. Estimated PRM of unreported turtles

The injury to sea turtles from hook-and-line captures and ultimately the PRM will depend on numerous factors including how deeply the hook is embedded, whether it was swallowed or was an external hooking, whether the sea turtle was released with trailing line, how soon and how effectively the hooked sea turtle was de-hooked or otherwise cut loose and released, and other factors which are discussed in more detail below (Table 5).

The preferred method to release a hooked sea turtle safely is to bring it ashore and de-hook/disentangle it there and release it immediately. If that cannot be accomplished, the next preferred technique is to cut the line as close as possible to the sea turtle’s mouth or hooking site rather than attempt to pull the sea turtle up to the pier. Some incidentally captured sea turtles are likely to break free on their own and escape with embedded/ingested hooks and/or trailing line. Because of considerations such as the tide, weather, and the weight and size of the captured sea turtle, some will not be able to be de-hooked (when applicable), and will be cut free by fishers and intentionally released. These sea turtles will escape with embedded or swallowed hooks, or trailing varying amounts of monofilament fishing line which may cause post-release injury or death.

5.2.1 Estimating Post-Release Mortality in Sea Turtles

In January 2004, NMFS convened a workshop of experts to develop criteria for estimating PRM of sea turtles caught in the pelagic longline fishery. In 2006, those criteria were revised and finalized (Ryder et al. 2006). In February 2012, the Southeast Fisheries Science Center (SEFSC) updated the 2006 criteria by adding 3 additional hooking scenarios. Overall mortality ratios are dependent upon the type of interaction (i.e., hooking, entanglement), the location of hooking if applicable (i.e., hooked externally, hooked in the mouth), and the amount/type of gear remaining on the animal at the time of release (i.e., hook remaining, amount of line remaining, entangled or not). Therefore, the experience, ability, and willingness of anglers to remove the gear, and the availability of gear-removal equipment, are very important factors that influence PRM. The new criteria also take into account differences in PRM between hardshell sea turtles and leatherback sea turtles, with slightly higher rates of PRM assigned to leatherbacks.

Table 5. Criteria for Assessing PRM, With Mortality Rates Shown as Percentages for Hardshell Sea Turtles and Leatherbacks (in Parentheses) (NMFS and SEFSC 2012)

Injury Category		**Release Condition**			
		(A) Released entangled (line is trailing or not trailing, turtle is entangled[8])	**(B) Released with hook and with trailing line greater than or equal to half the length of the carapace (line is trailing, turtle is not entangled)**	**(C) Released with hook and with trailing line less than half the length of the carapace (line is trailing, turtle is not entangled)**	**(D) Released with all gear removed**
		Hardshell (Leatherback)	Hardshell (Leatherback)	Hardshell (Leatherback)	Hardshell (Leatherback)
I	Hooked externally with or without entanglement	55% (65%)	20% (30%)	10% (15%)	5% (10%)
II	Hooked in upper or lower jaw with or without entanglement—includes ramphotheca (i.e., beak), but not any other jaw/mouth tissue parts (see Category III)	65% (75%)	30% (40%)	20% (30%)	10% (15%)
III	Hooked in cervical esophagus, glottis, jaw joint, soft palate, tongue, and/or other jaw/mouth tissue parts not categorized elsewhere, with or without entanglement—includes all events where the insertion point of the hook is visible when viewed through the mouth.	75% (85%)	45% (55%)	35% (45%)	25% (35%)
IV	Hooked in esophagus at or below level of the heart with or without entanglement—includes all events where the insertion point of the hook is not visible when viewed through the mouth	85% (95%)	60% (70%)	50% (60%)	75% (85%)[9]
V	Entangled only, no hook involved	Released Entangled 50% (60%)	n/a		Fully Disentangled 1% (2%)
VI	Comatose/resuscitated	n/a[10]		70% (80%)	60% (70%)

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[8] Length of line, as well as the presence or absence of the hook, is not relevant as turtle remains entangled at release.

[9] Although per veterinary recommendations, hooks would not be removed if the insertion point of the hook is not visible when viewed through the open mouth, this has occurred and must be accounted for. We have interpolated the table's value to insert a value for this cell base on veterinary and expert opinion. Also, there are times when the hook location is unknown, but the hook and line are retrieved. Because these are coded in this row, we must also allow for the removal of all gear.

[10] Assumes that the resuscitated turtle will always have the line cut to a length less than half the length of the carapace, even if the hook remains and that the turtle is not released entangled in the remaining line.

No specific criteria for recreational hook-and-line gear at the 3 existing piers are currently available (Table 5). To estimate future PRM, we used the estimates in NMFS and SEFSC (2012). This study assessed hook-and-line captures from pelagic long-lining where there are a lot of sea turtle hooking and entanglement criteria data and these data are analogous to infer how sea turtles are captured during recreational hook-and-line fishing. Post-release mortality varies based on the initial injury the animal sustained and the amount of gear left on the animal at the time of release. At this time, the best available information we have regarding these 2 factors for recreational fishing captures in the NMFS Southeast Region is reported by the Mississippi STSSN. According to the STSSN, Mississippi has approximately 44 miles of tidal shoreline with nearly 200 public fishing access points including fishing piers, fishing bridges, boat launches, and marinas. In cooperation with the Institute of Marine Mammal Studies (IMMS), the STSSN have compiled extensive data on the hook-and-line captures of 924 sea turtles at fishing piers in Mississippi from 2010 to mid-2015. These data include the location of where the sea turtle was hooked (e.g., flipper, shell, internal). We evaluated these data to determine the types of hooking injuries and potential post-release mortality for sea turtles captured at fishing piers. Since data are available for fishing piers across the state of Mississippi, we applied the trends observed for the entire state as a more accurate representation of turtle interactions than a smaller subset of data from a specific pier. The data provided includes 24.24% of turtle interactions that did not report the specific sea turtle hooking location. We believe that it is more accurate to estimate the future injury and post-release mortality by only analyzing the reported hook-and-line captures that reported the hooking location since the hooking location is an important factor in determining potential PRM (Table 6). Using these data, we estimate that 7% (7.43 % rounded down to 7%) of turtles hooked at fishing piers will suffer a Category I injury defined in Table 5 above, followed by 4% (3.71% rounded up to 4%) of turtles that will suffer a Category II injury, 85% (85.14% rounded down to 85%) of turtles that will suffer a Category III injury, and 4% (3.71% rounded up to 4%) of turtles that will suffer a Category IV injury (Table 6).

Table 6. Category of Injury from Hook-and-Line Captures at Fishing Piers in Mississippi (January 1, 2010-June 10, 2013)

All Reporting Hook-and-Line Captures	I	II	III	IV	Unknown Hooking Location	Total – All Captures
Records	52	26	596	26	224	924
Percent of Total	5.63%	2.81%	64.50%	2.81%	24.24%	100.00%

Hook-and-Line Captures with Hooking Location Reported	I	II	III	IV	Total – Known Hooking Location
Records	52	26	596	26	700
Percent of Total	7.43%	3.71%	85.14%	3.71%	100.00%

5.2.2 Estimating Hook-and-Line Sea Turtle and Smalltooth Sawfish Captures at Fishing Piers

While we believe the best available information for estimating future interactions at fishing piers are the documented incidental captures at a specific pier and/or in the surrounding area, we also recognize the need to account for underreporting, especially in areas where education signs are not present. In the following sections, we describe how we derived our estimates for potential future takes.

In 2013, a fishing pier survey was completed at 26 fishing piers in Charlotte Harbor on the west coast of Florida in smalltooth sawfish critical habitat (Hill 2013). During the survey, 93 fishers were asked a series of questions regarding captures of sea turtles, smalltooth sawfish, and dolphins, including whether or not they knew these encounters were required to be reported and if they did themselves report any encounters. The interviewer also noted conditions about the pier including if educational signs regarding reporting of hook-and-line captures were present at the pier. Interviewed fishers were asked open-ended questions about what they would do if they were to accidently capture a sea turtle or sawfish. Of those interviewed, 46% responded they would cut the line, while 28% would either cut the line or remove the hook depending on the situation, and 22% would try to remove the hook. It was reported that 88% did not know of requirements to report incidental captures of either sea turtles or sawfish, only 12% stated that they would report an accidently hooked *sawfish*, and only 8% would have reported an accidently hooked *sea turtle*. We interpret this as 88% of sawfish captures are unreported and 92% of sea turtle captures are unreported collectively at the Charlotte Harbor fishing piers. This demonstrates the high level of underreporting likely occurring in that survey area, which includes the action area for this Opinion. The survey indicates a lack of awareness regarding reporting, and the lack of educational signs regarding reporting at piers in smalltooth sawfish critical habitat.[11] In 2013, NMFS conducted a fishing pier survey in Mississippi that interviewed 382 fishers. This survey indicated that approximately 60% of anglers that had captured a sea turtle actually reported it. Many anglers indicated they were unaware of the requirements to report a captured sea turtle (Cook et al. 2014).

We believe that the Charlotte Harbor (Hill 2013) study is the most applicable study to determine underreporting at the subject Clearwater fishing piers, because proposed modifications to the existing piers and the 26 piers assessed in (Hill 2013) are located in southwest Florida and like the Clearwater fishing piers, none of these piers had or will have a pier attendant. In the Charlotte Harbor study, 88% of fishers interviewed stated that they did not know to report either sea turtle or smalltooth sawfish captures and only 8% would have reported an accidently hooked sea turtle. Therefore, we will assume 88% underreporting of smalltooth sawfish captures and 92% underreporting of sea turtle captures at the Clearwater fishing piers.

The number of captures in any given year may fluctuate based on our knowledge of captures from reporting (as discussed above) and can also be influenced by sea temperatures, species abundances in a given year, fluctuating salinity levels in estuarine habitats where piers may be

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[11] NMFS is working in conjunction with FWRI to increase the presence of conservation and reporting signage on existing piers in addition to engaging applicants for newly proposed piers to install signs at the time of construction of new structures in an overall effort to improve smalltooth sawfish reporting for sightings and incidental captures.

located, and other factors that cannot be predicted. For these reasons, we believe basing our future incidental take estimate on a 1-year estimated take level is largely impractical. For these reasons, and based on our experience monitoring other fishing, we believe a 3-year time period is appropriate for meaningful monitoring. The triennial takes are set as 3-year running sums (total for any consecutive 3-year period) and not for static 3-year periods (i.e., 2017-2019, 2018-2020, 2020-2022 and so on). This approach accounts for the inherent variability in take levels, while still allowing for an accurate assessment of how the proposed actions are performing as compared to our expectations.

5.3 Estimating Non-lethal Sea Turtle Take at the 3 Clearwater Fishing Piers

We believe that estimating sea turtle takes in the action area according to takes in overall STSSN Zone 4 which includes Pinellas County may skew the expected species composition and over-represent the potential for sea turtle take, because of the project location within Little Pass between Clearwater Harbor and the Gulf of Mexico, and due to the limited recorded sea turtle presence for this area in part because of lack of conservation and reporting signs on existing piers such as those in the action area. On the other hand, the absence of sea turtle capture data within and near to the action area may reflect that there is reduced fishing pressure (e.g., piers) in Clearwater Harbor, for instance, compared to nearby areas just outside of Clearwater Harbor in the Gulf of Mexico. Below we discuss the available information regarding hook-and-line captures at fishing piers near to the action area and how we can use this information to estimate the number of sea turtles likely to be captured at the Clearwater fishing piers post-modifications that include the addition of educational reporting signs at the 3 existint piers.

As stated in Section 3.2, we discussed just 7 reports (STSSN) of sea turtles captured near to the action area; none of these were in the action area as all 7 reported captures occurred outside of Clearwater Harbor either in the Gulf of Mexico or in neighboring bays north and south of the action area. These reported sea turtle landings by recreational anglers consisted of 6 Kemp’s ridley and 1 green sea turtle. With scant data from the action area and adjacent bay and Gulf of Mexico areas, we rely on incidental fishing captures reported to estimate what sea turtle species we may encounter in the future at the Clearwater fishing piers. These STSSN reports also can help us forecast the likely frequency of captures if we view these sighting data over a fixed period of time.

If we look at all of the previously discussed sea turtle captures at nearby fishing piers and include a major fishing pier (Pier 60, Clearwater, Florida - Figure 13), there are 6 reported captures in the last 4 years (2013 – 2016) – all Kemp’s ridleys, and 1 reported green sea turtle in 2008 (Table 7). All of the sea turtle captures reported from these fishing piers are for hook-and-line captures only. From these data we see over the previous 4 years (2013 to 2016), there were 6 captures or a reported capture rate of 1.5 sea turtle captures per year. All of these reported captures were Kemp’s ridley sea turtles. We tease out the green sea turtle in terms of the short timeline because there is a 4 year break in sea turtle reporting near to the action area. However, the 2008 sea turtle report was for a green sea turtle and this sighting is important in establishing the likelihood of a green sea turtle capture in the ensuing years post-construction[12].

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[12] There are an additional 2 green captures by hook and line approximately 9-10 miles north of what we consider the boundary of our sea turtle sighting data. However, those sightings are also important in establishing the presence of

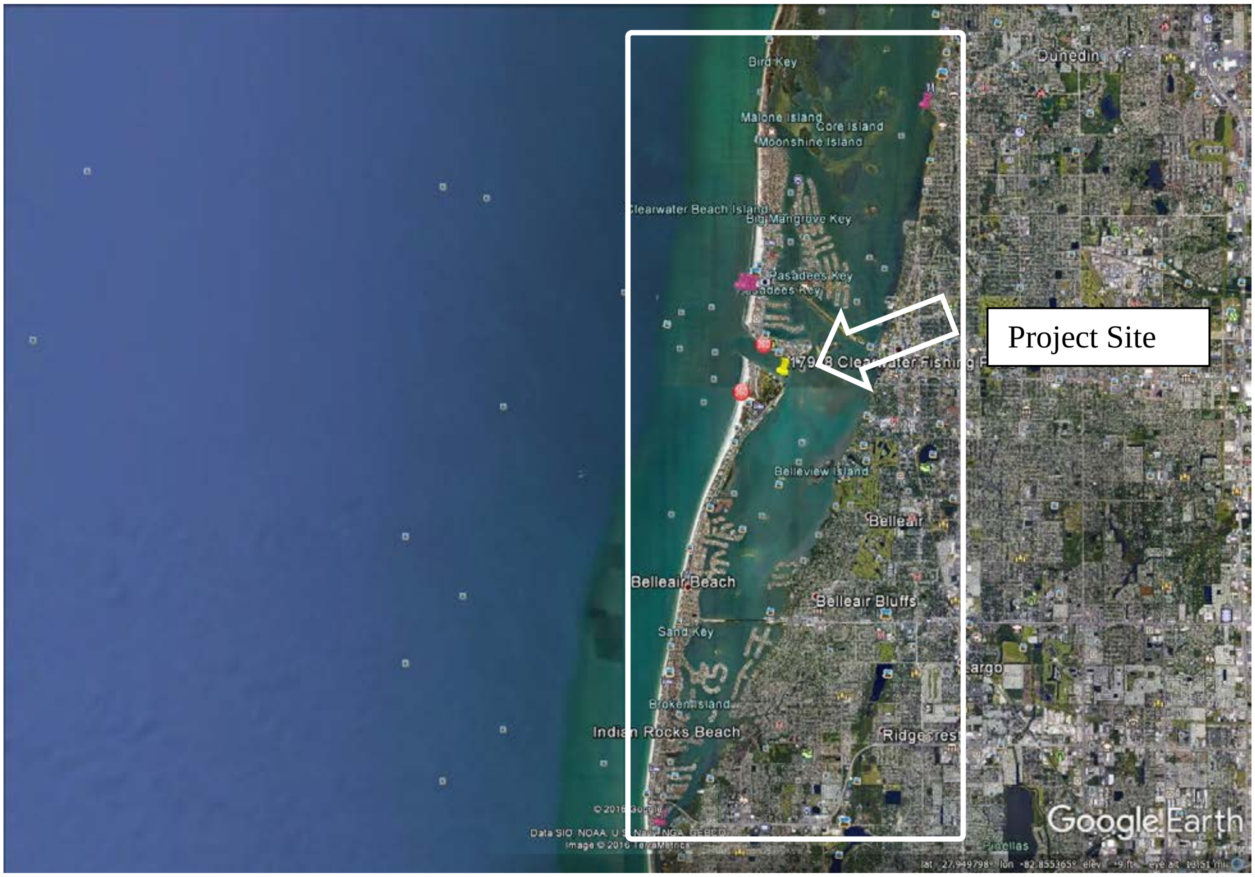

Figure 13. White rectangle circumscribes the sea turtle captures by hook-and-line used to forecast estimated take in the future at the 3 Clearwater fishing piers (Source STSSN for fishing captures [purple pushpins]) (©Google 2016)

Table 7. Incidental Hook-and-line Captures from Greater Regional Areas Surrounding the Action Area (Source STSSN)

Year	Number of Captures (All Kemp's Ridleys)
2016	1
2015	1
2014	2
2013	2
Total	6*
Not included in above ## is a reported green in 2008. Capture rate of 6 in 4 years reporting time = capture rate of 1.5/year (6 reported Kemp's ridley captures/4 years = 1.5)	

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green sea turtles in the greater area. Similary there are 2 loggerhead captures 10 miles south of the action area in the Gulf of Mexico along Fort DeSoto Beach, St. Petersburg. These sightings further outside of the action area are not counted directly in our sea turtle take estimate, but do confirm the presence of loggerheads and likelihood of an incidental capture by hook and line fishers in the action area.

To determine the level of take expected at the 3 Clearwater fishing piers, we first treat the take estimated as 1 take for any of the 3 small fishing piers. In other words, we estimate the future take for all 3 of the fishing piers as though it was a single pier so that a take at any of the 3 piers counts as a take for all 3 piers combined. To be precautionary, we also assume 92% underreporting for sea turtles, as discussed in Section 5.4. To determine the number of unreported sea turtle captures over the 3-year period (X) we use the equation:

Reported captures ÷8% = unreported captures ÷ 92%
$4.5 \div 8 = X \div 92$
$414 = 8X$
$X = 51.8$

If we estimate an average of 1.5 sea turtles will be captured and reported every year at the pier (all 3 piers combined), based on the information discussed in Section 3.2 and in the preceding paragraph, then 4.5 sea turtles will be reported captured every 3 years. Because reported takes will represent 8% of total takes (92% underreported), 56.3 unreported sea turtle captures will occur every 3-year period.

- Future 3-year reported captures: 4.5
- Future 3-year unreported captures: 51.8
- Future 3-year total: 56.3

Because 86% (6/7) of the past reported hook-and-line captures discussed above were Kemp's ridleys when counting the 2008 green sea turtle sighting (and 100% over the past 4 years if we do not include the green in 2008), we assume the greatest likelihood for incidental captures at the Clearwater fishing piers are Kemp's ridleys. This is further reinforced by Kemp's ridley's proclivity for incidental capture at fishing piers over other sea turtle species because much of the bait used by anglers is part of the Kemp's regular diet. However, the presence of foraging resources inside of Clearwater Harbor for both greens and loggerheads (especially seagrass beds for greens) makes their presence likely even if their presence is more intermittent. Therefore, we need to account for the possibility of either or both a loggerhead and green sea turtle take periodically. Over the decades of continued operation of a public fishing pier, the likelihood of rarer sea turtle species to be encounteredbecomes greater. In other words, the longer the operation of the Clearwater fishing piers, the greater the likelihood that less frequently encountered sea turtle species will be captured at those piers especially if those species continue to recover and their populations expand.

5.4 Estimating Lethal Sea Turtle Takes at the Clearwater Fishing Piers

In the previous section we estimated the number of sea turtles that will be captured by hook-and-line at this location, including accounting for anticipated underreporting. We believe using the data from this 3-year timeframe will help us determine future takes more accurately. However, this reasoning does not apply to considering the type/severity of the interactions reported across years. We have no reason to believe that the type/severity of the captures that occurred across all years will be different going forward. Therefore, we will consider all the injuries previously documented as we go through our analysis evaluating the type of future interactions and possible mortalities.

Now we must evaluate how many of these future interactions may result in mortality. Each of the 3 Clearwater fishing piers will have educational signs posted informing recreational anglers to report hooked turtles and smalltooth sawfish. Since we lack data on the outcome of sea turtles captured at fishing piers in Florida, we will rely on data provided in Mississippi as a proxy, since Mississippi has more data available. Sea turtles that are captured and reported as accidentally captured in fishing gear in Mississippi's waters are evaluated by IMMS to determine if they can immediately be released or require rehabilitation. According to IMMS data provided by the STSSN, 939 turtles were accidentally captured at Mississippi fishing piers between 2010 and mid-2015 (Table 8). Table 8 provides IMMS' breakdown of the number and percent of reported captures that were released alive at the pier (12%) verses those sent to rehabilitation (88%). This is further divided into the fate of those sent to rehabilitation as shown in Table 8.

Table 8. Disposition of Sea Turtles Captured at Mississippi Fishing Piers (January 1, 2010-June 10, 2015)

Final Disposition	Released immediately alive	At IMMS	Died in rehabilitation facility	Non-releasable from rehabiliation	Rehabilitated and released alive	Released and later stranded dead*
Total Number	113	77	20	6	682	37
Percent	12%	8%	2%	1%	73%	4%
Perecentage estimates above are based on the STSSN total of 939 sea turtles captured at Mississippi piers, for example, for "released immediately alive" (113 or 12%) (113/939 x 100 [%] = 12.03% rounded down to 12%.						

Estimated Future Captures Released at the Clearwater fishing piers (not sent to rehabilitation)
We now use the data provided by IMMS in Mississippi to estimate the number of sea turtles that will be released directly from the pier compared to those that will be sent to a rehabilitation center. Sea turtles released immediately from the piers (i.e., not sent to a rehabilitation facility) may be because the animals break the line of their own volition or the angler cut the line. According to IMMS (Table 8), 12% of the reported captures are released alive at the piers and 88% are sent to a rehabilitation center. In Section 5.6, we estimate 4.5 turtles would be reported captured per 3-year period to account for annual variability.

Using this information we estimate:

- Turtles released immediately from the pier = 0.54 turtles
  (4.5 reported turtle captures x 0.12 = 0.54)

- Turtles sent to a sea turtle rehabilitation center = 3.96 turtles
  (4.5 reported turtle captures x 0.88 = 3.96)

Estimating Post-Release Mortality Rates for Sea Turtles Released Immediately from a Pier
Calculating PRM requires 2 steps: (1) determining where the animal was hooked or entangled ("Injury Category"; Table 5), and (2) how much gear remains on the animal at the time of release ("Release Condition"; Table 5). Based on the information in Table 5, we estimate that approximately 7% of turtles hooked at fishing piers will suffer a Category I injury defined in the

previous Table 6, 4% will suffer a Category II injury, 85% will suffer a Category III injury, and 4% will suffer a Category IV injury.

Since piers are elevated structures, we believe it is reasonable (and conservative) to conclude that fishers will choose not to or not be able to cut the line at the hook and turtles will be released with trailing line likely longer than half the length of it carapace. This assumption would put the turtle in Release Condition B (Table 5). Assuming Release Condition B allows us to identify the likely PRM rate for each Injury Category. For example, the information in Table 5 indicates an animal with a Category I injury that is returned to the water in Release Condition B is likely to suffer 20% PRM (hardshell sea turtles). Likewise, hardshell sea turtles with a Category II injury that are returned to the water in Release Condition B are likely to suffer 30% PRM, and so on. To estimate PRM for turtles released immediately from a pier, we took our estimates of the number of captures that fall into each Injury Category (see previous paragraph) and multiplied them by the corresponding PRM rates associated with Release Condition B.

Since the hooking location of the injury affects the likelihood of survival and the hooking location varies greatly it is difficult to determine which PRM rate we should use regarding anticipated future takes released immediately from a pier. We address this issue by calculating weighted mortality rates and an overall mortality rate (Table 9). For example, we anticipate 7% of our future captures are likely to have Category I injuries, and only 20% of those animals are likely to suffer PRM as a result of that injury. Therefore, of *all* future anticipated captures, we expect 1.4% of them (7% x 20%) would suffer PRM as a result of a Category I injury. By following this same approach for each injury category and its corresponding mortality rate, we establish the weighted mortality rates. By summing the weighted mortality rates we can estimate the overall mortality rate that we can apply to all future turtles captured and released immediately from a pier. This overall rate helps us account for the varying severity of future injuries and varying PRM rates associated with them.

Table 9. Estimated Weighted and Overall PRM Rates for Turtles Released Immediately from the Clearwater Piers (combined), Potentially with Trailing Line

Injury Category	Percent of Total Captures in Each Injury Category from Table 6	PRM Rate per Category from Table 5	Weighted Mortality Rate*
I	7%	20%	1.4%
II	4%	30%	1.2%
III	85%	45%	38.3%
IV	4%	60%	2.4%
Overall Post-Release Mortality Rate**			**43.3%**

Weighted Mortality Rate* = Percent of Total Captures in Each Injury Category x PRM Rate per Category

Overall Post-Release Mortality Rate**= Weighted Mortality Rate for Injury Category I + Weighted Mortality Rate for Injury Category II + Weighted Mortality Rate for Injury Category III + Weighted Mortality Rate for Injury Category IV

Based on the assumptions we have made about the likely location on sea turtles of future hookings and the amount of fishing gear likely to remain on animals released immediately at a pier, we estimate an overall PRM rate of 43.3% for sea turtles released at the pier (not sent to rehabilitation).

As discussed above, we divided the sea turtles released immediately at the pier (all 3 Clearwater piers combined) into the 2 categories of reported and non-reported captures. Here we apply the PRM rate of 43.3% to those estimated pier releases:

- Reported Turtles Released at the Clearwater fishing piers: We estimated that 0.54 sea turtles would be captured, reported, and released at the pier every 3 years. This is multiplied by 43.3% PRM to estimate that 0.234 released turtles are expected to die as a result of their injuries (0.54 turtles x 0.433 = 0.234).

- Unreported Turtles Released at the Clearwater fishing piers: We estimated that 51.8 sea turtles would be captured, not reported, and released at the piers every 3 years. This is multiplied by 43.3% to estimate that 22.4 released turtles are expected to die as a result of their injuries (51.8 turtles x 0.433 = 22.4).

Estimating Future Mortalities of Turtles Captured, Reported, and Sent to Rehabilitation
Above, we determined that 87.5% of the known captures are sent to rehabilitation. This means that 87.5% of the estimated 4.5 reported captures will be sent to rehabilitation resulting in a total of 3.94 turtles being sent to rehabilitation (4.5 turtles x 0.875 = 3.94). The total number of sea turtles sent to rehabilitation is further divided to estimate their fate. To calculate the estimated outcomes from the total number of turtles reported, we look to the estimated percentages from Table 8 and compare them to the total estimated reported turtles.

- Die in Rehabilitation: According to the information provided by IMMS in Table 8 approximately 2% of the total reported captures will die at the rehabilitation facility. Therefore, we estimate 0.09 turtle will die in rehabilitation (3.94 total reported turtles x 0.02 mortality = 0.079).

- Not Released: According to the information provided by IMMS in Table 8, 3% of the turtles captured that they assisted with either died after capture or were unable to be returned to the wild. Although IMMS also immediately released turtles reported, we are considering all turtle captures handled by rehabilitation staff in the same category as those sent to a rehabilitation center. Therefore, we assume that the other 97% are released back to the wild with no injuries or attached hooks or line and we do not need to estimate a PRM for these turtles attended to by rehabilitation staff. We will count turtles unable to be released as lethal takes, because they are removed from the wild population.

- Successfully returned to the wild = 3.82 turtles
  (3.94 turtles x 0.97 = 3.82)

- Died or were unable to be released = 0.12 turtles
  (3.94 turtles x 0.03 = 0.12)

Summary of Total Estimated Captures and Mortalities

As discussed at the beginning of Section 5.2, we divided the estimated captures and mortalities into different categories. These were then described in detail and PRM was calculated. The result of this analysis discussed in Sections 5.2-5.7 is summarized in Table 10.

Table 10. Summary of Estimated Non-lethal and Lethal Take over 3-year Reporting Periods

	Total Calculated	**Non-lethal Take**	**Lethal Take**
1. Turtles Captured and Reported = 4.5			
a. Sea turtles captured and released at the pier	0.54		
i. Estimated post release mortality (PRM) of those released from pier			0.234
ii. Non-lethal released at pier		0.306	
b. Sea turtles captured at the pier and rehabilitation contacted	3.94		
i. Die in rehabilitation center or unable to be released			0.12
ii. Rehabilitated and later released alive		3.82	
2. Sea turtles captured and not reported = 51.8			
a. Sea turtles captured at the pier, but not reported	51.8		
i. Estimated PRM of unreported turtles			22.4
ii. Non-lethal released		29.4	
3. Total Captures = 56.3 (rounded to 57)	**56.28***	**33.53**	**22.75**
**This number will be rounded up from 56.3 to 57 total below for actual whole number take estimate*			

Expected Non-lethal and Lethal Sea Turtle Takes by Species

Now that we have determined the numbers of estimated non-lethal and lethal takes for 3-year periods, we need to determine the number of each sea turtle species that will be affected. According to the stranding data provided in Table 2 in Section 3.2, inshore strandings in the Gulf of Mexico consisted of loggerhead (57%), green (21%), and Kemp's ridley (18%) sea turtles. However, we determined that the stranding data were not directly relevant to estimating species composition for incidental take anticipated to occur at the 3 Clearwater fishing piers because:

1) STSSN data includes all stranding types of which hook-and-line captures are only a portion.
2) The project site is located in a pass adjacent to an inshore bay whereas most of the stranding data for Zone 4 is from inshore but in the Gulf of Mexico
3) As described in Section 5.4, there are hook-and-line capture data from the vicinity of the action area that indicate Kemp's ridley are the predominant species for fishing pier captures in the area (6/7, 85.7% rounded up to 86%).

We therefore assume the greatest likelihood for incidental captures at the Clearwater fishing piers is for Kemp's ridleys. Because Kemp's ridleys made up 86% of the captures over the past 4-year period (see Table 7, Section 5.4), we attribute 86% of future incidental captures at the

Clearwater fishing piers as Kemp's ridleys. That leaves the remaining 14% that that we could divide equally to attribute 7% to loggerhead and 7% to green sea turtles, respectively (Kemp's ridleys 86% over last 4 years + 7% loggerhead + 7% green = 100%). In other words, we believe there is an 86% probability of capturing a Kemp's ridley sea turtle for the combined 3 Clearwater fishing piers, a 7% probability of capturing a loggerhead, and a 7% probability of capturing a green turtle (from either the North Atlantic or South Atlantic DPSs). Because there are not enough data to attribute a proportion of the remaining 14% take between greens (North and South Atlantic DPSs) and loggerheads we instead attribute the remaining 14% to both species in any combination of proportional takes of the 14%.

In other words, we anticipate 86% of the non-lethal take will be Kemp's ridley and the remaining 14% could be any combination of percentages of greens and loggerheads not to exceed 14%. For instance, in a single 3-year period you might have 10% greens and 4% loggerheads and in another 3-year period, 7% green and 7% loggerhead. Our rationale is discussed further below.

In the absence of data for strandings for loggerheads in the action area and immediate vicinity of surrounding bays, we believe there is still a significant likelihood of future captures of loggerheads at the Clearwater piers. Loggerheads make up 57% of the stranding network (STSSN) data for the greater region that includes the action area. Plus there have been 4 loggerhead hook-and-line captures reported approximately 22 miles south of the action area near Egemont Key leading into Tampa Bay. Loggerheads are most likely present in the action area and use Little Pass leading from the Gulf of Mexico into Clearwater Harbor. We believe loggerheads may be captured at the Clearwater fishing piers in the future and a conservative estimate in the absence of precise data for the action area is to cautiously divide the remaining 14% of non-lethal takes between loggerheads and greens, dividing these takes in any combination of percentages not to exceed 14%. We know there is also a likelihood of hook-and-line captures of greens at the Clearwater fishing piers based on several captures north of the action area, 1 that was included in our take estimates previously (Table 7, Section 5.4) and 2 more greens not included in our take estimates because of the distance from the action area. However, those green captures plus the 1 green we did consider establish the presence of greens near to the action area and that in addition to the foraging resources (seagrass beds) throughout Clearwater Harbor tell us there is some likelihood of capturing greens as well at the Clearwater fishing piers. We predict future captures of green sea turtles just as we did with loggerheads, to be shared in any combination of percentages with loggerhead takes not to exceed 14%. We believe sharing the anticipated takes between greens and loggerheads provides a conservative estimate for this species in the forseeable future.

We applied these species composition percentages below in Table 11 to determine non-lethal take estimates per species based on a total estimated 23.73 non-lethal takes from Table 10 above.

Table 11. Anticipated Non-lethal Take by Species During Any 3-Year Period

Sea Turtles	**Non-lethal Take**
Kemp's ridley	0.86 x 33.53 = 28.84 (29)
Green and/or loggerhead	0.14 x 33.53 = 4.69 (5)

Based on the calculations in Table 11 above, we estimate that 28.84 rounded up to 29 Kemp's ridleys, and 4.69 rounded up to 5 of either loggerhead or green (either NA or SA DPSs) divided in any combination (e.g., 3 green and 2 loggerhead or 2 green and 3 loggerhead, etc.) will be non-lethally captured during any 3-year period.

We now take the same species composition to estimate lethal take from the Clearwater fishing piers during any 3-year period.

Table 12. Anticipated Lethal Take by Species During Any 3-Year Period

Kemp's ridley	0.86 x 22.75 = 19.57 (20)
Green and/or loggerhead	0.14 x 22.75 = 3.19 (3)

Based on the calculations in Table 12 above, we estimate that 19.57 rounded up to 20 Kemp's ridleys, 3.19 rounded down to 3 of any combination of green and loggerhead sea turtles will be lethally captured during any 3-year period.

After rounding numbers in the above tables (11, 12), our final estimated take is 57 total: 49 Kemp's ridleys + 8 (any combination of green or loggerhead). We anticipate up to 29 non-lethal Kemp's ridleys + 20 lethal Kemp's takes for a total of 49 Kemp's ridleys. We also anticipate up to 5 non-lethal takes and 3 lethal takes for 8 total of any combination of green and loggerhead sea turtles not to exceed the 8 total takes (5 non-lethal + 3 lethal).

5.5 General Discussion of Hook-and-Line Captures of Smalltooth Sawfish

Smalltooth sawfish may be adversely affected by recreational fishing activity through incidental hooking or entanglement in actively fished or discarded fishing line. Smalltooth sawfish have historically been captured in both recreational and commercial fisheries and are known to become entangled in fishing debris. Most documented/reported recreational fishing captures for smalltooth sawfish involve recreational fishing from piers and small recreational vessels in shallow water within juvenile sawfish nursery habitat. Smalltooth sawfish are particularly prone to entanglement as a result of their body morphologies and behaviors. The configuration of the smalltooth sawfish rostrum is particularly prone to entanglement, likely affecting the ability of the fish to function if the rostrum is damaged during incidental capture. If an individual 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.

5.6 Estimating Smalltooth Sawfish Captures at the 3 Clearwater Fishing Piers

The ISED 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 information. The database includes both recent and historical information. As discussed above, it is expected that this database represents only a portion of actual encounters and that a large number go unreported. Recreational fishing captures or sightings while fishing represent the majority of ISED reported sightings (G. Burgess, University of Florida [ISED Database], pers. comm. to J. Cavanaugh, NMFS PRD, April 5, 2016). According to the (ISED 2014), 96% of all fishing captures are from recreational fishing and 4% are from commercial fishing.

NMFS believes the ISED capture data reported in Pinellas County, and more specifically data reported within and near to the action area, are the best data available for estimating the incidental capture of smalltooth sawfish at the existing 3 Clearwater fishing piers, for the reasons discussed below. As discussed in Section 3.2, we believe it is unlikely that at the present time smalltooth sawfish occur in significant numbers in Clearwater Harbor. Based on the 3 sawfish sightings nearest the action area discussed previously in Section 3.7, and projecting ahead to anticipated increases in sawfish population size and distribution given recovery efforts under the ESA, NMFS believes sawfish may be captured at any of the 3 Clearwater fishing piers. NMFS also anticipates that Tampa Bay and Old Tampa bay south of the action area will be utilized much more heavily in the future during the expected lifetime of the project fishing piers. It is reasonable to also anticipate more sawfish may inhabit Clearwater Harbor as the population expands.

In order to estimate the potential incidental capture of sawfish from the 3 Clearwater fishing piers, we could use sighting and/or capture data from within Clearwater Harbor but there are no reports from the ISED of either incidental captures or sightings. The nearest reported sightings of smalltooth sawfish in the ISED occurred in the next closest pass northward from the action area, approximately 7 miles, adjacent to the northeast side of Caldesi Island in Dunedin. The sawfish (small juvenile) was reported by a recreational fisher in 2013. Just north of this sighting (~ 3.4 mi) in Palm Harbor, another small juvenile was reported as a sighting by another recreational fisher (2007) over a shallow seagrass bed. Moving 4.6 mi northwest of the previous sighting, another small juvenile was captured by a recreational fisher (2002) and released alive. These 3 sawfish sightings represent the known sightings/captures somewhat near to the action area biogeographically. The 3 reports are from 2002, 2007, and 2013. This yields an approximate sighting frequency of 1 sawfish every 3 years[13] or 0.33 annually (3 sightings/12 years = 0.25/year rounded x 3 years = 0.75 rounded to 1 every 3 years = 0.33 per annum). We will apply this sighting frequency to the 3 fishing piers in Clearwater. It is reasonable to round from 0.25 per annum to 0.33 because the population of sawfish regionally is expected to make moderate population gains in the long term, given 5% population growth over the 100-year recovery plan for the species.

We therefore estimate up to 1 smalltooth sawfish may be reported as captured at any of the Clearwater fishing piers every 3 years (0.33 per year x 3 years = 1/3-year period). In addition, based on the underreporting discussed above, we believe that approximately 88% of captures will not be reported. If we anticipate that 1 sawfish capture may be reported every 3 years, and factor in 88% underreporting, this would result in 8.33 sawfish captures every 3 years (1 reported every 3 years x 100/12 [12% reported] = 7.33 sawfish unreported every 3 years + 1 sawfish (reported) = 9.33 total per 3-year period rounded down to 9) (Table 13).

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[13] We estimate sea turtles takes over 3-year periods due to high interannual variability in reported takes from existing piers where NMFS receives reports. Similarly we expect high interannual variation in sawfish reporting, and we are also estimating sawfish capture periodicity over 3-year intervals.

Reported captures ÷12% = unreported captures ÷ 88%
1 ÷ 12 = X ÷88
88 = 12X
X = 7.33
1 (reported) + 7.33 (unreported) = 8.33 total sawfish captured every 3-yr period

NMFS's preferred method of releasing hooked smalltooth sawfish is to cut the line as close as possible to the sawfish's mouth or hooking site, without damaging the rostrum. 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 the escape of sawfish 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 very low based on the few stranding reports of sawfish. According to a study, only 0.6% of reported sightings to the ISED between 1998 and 2008 were reported stranded dead, demonstrating a very low rate of mortality from captures (Wiley and Simpfendorfer 2010). In addition, the applicant proposes to install educational signs to inform fishers of how to handle an accidentally captured smalltooth sawfish. Current data on smalltooth sawfish juveniles and adults indicate that sawfish show little stress from incidental capture by hook-and-line and gillnets for fishery-independent research, demonstrating that this species may be less likely than sea turtles, for instance, to suffer post-release mortality from the type of fishing that would occur at the Clearwater fishing piers (D. Grubbs, Florida State University, pers. comm. to J. Cavanaugh, NMFS PRD, April 5, 2016, during the Smalltooth Sawfish Recovery Team Meeting). Research is underway to further study the physiological effects on sawfish from recreational fishing capture but these studies are just now being funded. Based on the above information, we believe that the 8.33 smalltooth sawfish (rounded to 9) estimated to be captured every 3 years at the proposed pier will not suffer mortality at the time of capture or subsequently as post-release mortality; therefore, no lethal take of smalltooth sawfish is anticipated.

Table 13. Anticipated Non-lethal Take of Smalltooth Sawfish in Any Given 3-Year Period

Smalltooth Sawfish Reported + Unreported	Non-lethal Take
1 (reported) + 7.33 (rounded to 8 unreported)	9

6 CUMULATIVE EFFECTS

Cumulative effects are effects from unrelated, non-federal actions that are reasonably certain to occur in the action area in the future. At this time, we are not aware of any other non-federal actions being planned or under development in the action area. While we do not know of any specific actions, there may be other projects under consideration, planned, or developed within or in the vicinity of the action area (e.g., marinas, piers, property development) that may add or compound existing issues for smalltooth sawfish and sea turtles within the action area.

Similarly, we also do not expect any types of activities beyond those discussed in Section 4 to have effects in the action area. Within the action area, major future changes are not anticipated in addition to the ongoing human activities described in the environmental baseline. The present human uses of the action area, such as recreational fishing, are expected to continue into the foreseeable future.

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 the Northwest Atlantic DPS of loggerhead, North and South Atlantic DPSs of green, or Kemp's ridley sea turtles, or smalltooth sawfish, by identifying the nature and extent of adverse effects (take) expected to impact each species. Next, we consider how these 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 analyses first consider the effects of the action to determine if we would reasonably expect the action to result in reductions in reproduction, numbers, or distribution of these species. The analyses next consider whether any such reduction would in turn result in an appreciable reduction in both 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. By contrast, the death of mature, breeding females can have an immediate effect on the reproductive potential 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 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 any aspect of proposed action. Nonetheless, later stage juveniles and adults of these species are more likely to be subject to incidental take as a result of foraging in the area of increased fishing activity which would occur as a result of the proposed project.

7.1 NWA DPS of Loggerhead Sea Turtles

We anticipate up to 8 loggerhead sea turtles may be taken at the Clearwater fishing piers (combined for all 3 piers) (Tables 9-10, above) during any consecutive 3-year period, 3 lethal and 5 non-lethal. A maximum of four loggerhead sea turtles may be captured and released immediately alive from the pier with no anticipated PRM, or taken to a rehabilitation center and released later in time after the turtle has recovered from the hook-and-line capture. Animals not released within a short period of time after capture could possibly miss some reproductive output (egg laying) if the captured sea turtle was a female and the capture occurred during nesting season, for instance. The potential loss of reproductive activity from up to 5 loggerheads removed from a single nesting season would at worst remove several hundred eggs combined from 5 nesting females that would have an insignificant effect on the species and not cause an appreciable adverse impact on the numbers, reproduction or distribution of the species.

The estimated lethal sea turtle captures may be turtles captured at the pier that are expected to suffer PRM, or turtles captured and transported to a rehabilitation center that either die in captivity or are unable to be successfully released back into the wild population. This lethal take of up to 3 loggerhead sea turtles per 3-year period will result in a reduction in both numbers (the individual lethally taken) and reproduction as a result of lost reproductive potential, as the individuals could be females who could have survived other threats and reproduced in the future, thus eliminating the females' contributions 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 NWA DPS of loggerhead sea turtles have large ranges in which they disperse, including along the coast of the United States, from southern Virginia to Alabama, where nesting may occur, and because the anticipated lethal takes are expected to occur in a small, discrete action area, the distribution of loggerhead sea turtles is expected to be unaffected by the lethal take of 3 sea turtles every 3 years in the action area surrounding these piers.

Whether the loss of 3 loggerhead sea turtles per 3-year period would appreciably reduce the likelihood of survival for the DPS 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 current status of the species, cumulative effects, and the environmental baseline, is of such magnitude that adverse effects on population dynamics are appreciable. In Section 3.4, 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 and cumulative effects in the action area.

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

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

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

We believe that the incidental take and resulting mortality of up to 3 loggerhead sea turtles every 3 years associated with the proposed action is not reasonably expected to cause an appreciable reduction in the likelihood of survival of the NWA DPS of loggerhead sea turtles, for the following reasons. We believe the current population is large (i.e., several hundred thousand individuals) and is showing encouraging signs of stabilizing and possibly increasing. We also expect that the mortality of 3 loggerhead sea turtles every 3 years will not cause the population to lose genetic heterogeneity, broad demographic distribution, or successful reproduction. As stated above, small increases in mortality rates in adults and subadults could substantially impact population numbers and viability. However, the loss of 3 loggerheads over iterative 3-year periods would not be expected to impact population viability for this species given the population size estimates at present and a projected increasing population trend. This is the case even if every individually lethally captured loggerhead is female and of reproductive age. However, it is extremely unlikely that all projected loggerhead captures at the 3 piers will be female and end up in a rehabilitation center during nestings seasons causing all 3 individuals(3-yr period) to miss their reproductive output during those nesting periods.

With respect to whether the proposed action would appreciably reduce the likelihood of the species' recovery, we evaluated 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. The recovery plan anticipates that, with implementation of the plan, the western

North Atlantic population will recover within 50-150 years, but notes that reaching recovery in only 50 years would require a rapid reversal of the then declining trends of the Northern, Peninsular Florida, and Northern Gulf of Mexico Recovery Units.

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

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

Recovery Objective No. 1, "Ensure that the number of nests in each recovery unit is increasing…," is the plan's overarching objective and has associated demographic criteria. Currently, none of the plan's criteria are being met, but the plan acknowledges that it will take 50-150 years to do so. Further reduction of multiple threats throughout the North Atlantic, Gulf of Mexico, and Greater Caribbean will be needed for strong, positive population growth, following implementation of more of the plan's actions. Although any continuing mortality can affect the potential for population growth, we believe the loss of 3 loggerhead sea turtles every 3 years predicted to result from the proposed action will not impede or prevent achieving this recovery objective. The NWA DPS of loggerhead sea turtles is thought to be recovering with a modest increasing population trend and the loss of 3 loggerheads every 3 years will not impede this recovery. The loss of 3 loggerheads over 3-year periods would not have an appreciable adverse effect on population dynamics of the NWA DPS because the potential reproductive loss would be so small in comparison to the overall DPS reproductive capacity. The population recovery would not be impacted by the loss of just 3 loggerheads every 3 years considering this project and potential population impacts discussed in the environmental baseline for this species. Further, as discussed in Section 3.4, there has been a 74% increase in nesting between 2008 and 2015 in Florida that suggests an overall increase in the number of nesting females during that time. The potential loss of 3 nesting females every 3 years would not cause an appreciable effect on the number of nesting females for the NWA DPS of loggerheads. The small loss of nesting females would not be expected to impact the most recent upward trend in nesting females with greater than 50,000 nesting females in Florida alone for 2015, for example.

Recovery Objective No. 2 states, "Ensure the in-water abundance of juveniles in both neritic and oceanic habitats is increasing and is increasing at a greater rate than strandings of similar age classes." Currently, there are not enough data on the population trends of juvenile loggerhead sea turtles to determine if this objective is being met. Because of scant and spatially deficient data from populations trends of loggerheads at sea, the most reliable information on population trends is derived from loggerhead sea turtle nesting since nests are easier to accurately identify, count, and track annually. The NWA DPS nesting trend has modestly increased since 1998 (see Section 3.4). From this modest increasing trend in nesting we can infer a commensurate increase in in-water abundance of juveniles. In other words, we assume a modest increase in juvenile abundance given the increasing trend in nesting and nesting females over the past several years, discussed above. We expect that the loss of up to 3 loggerhead sea turtles over consecutive 3-year periods would not cause an appreciable reduction in either nesting female or in-water juvenile abundance.

The potential lethal interaction of up to 2 loggerhead sea turtles during consecutive 3-year periods 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 effects of the proposed action would not appreciably impede progress on achieving the identified relevant recovery objectives or achieving the overall recovery strategy. Specifically, the potential loss of up to 3 loggerheads every 3 years will not appreciably adversely affect the increasing trend in either the number of loggerhead nests or the number of juveniles in either neritic or oceanic habitats. It is expected The non-lethal takes of loggerhead sea turtles as discussed in this opinion would not affect population numbers or long-term reproductive success. Thus, the proposed action is not expected to impede the recovery objectives above and will not result in an appreciable reduction in the likelihood of the NWA DPS of loggerhead sea turtles' recovery in the wild.

Conclusion

The lethal take of 2 NWA DPS of loggerhead sea turtles every 3 years associated with the proposed action is not expected to cause an appreciable reduction in the likelihood of either the survival or recovery of the species in the wild.

7.2 Kemp's Ridley Sea Turtles

We anticipate up to 49 Kemp's ridley sea turtles may be taken at the 3 Clearwater fishing piers (combined) over consecutive 3-year periods, 20 lethal and 29 non-lethal. A total of 29 Kemp's ridley sea turtles may be captured at the pier and released immediately alive with no anticipated PRM or taken to a rehabilitation center and released later in time after the turtle has recovered from the hook-and-line capture. Animals not released within a short period of time after capture could possibly miss some reproductive output (egg laying) if the captured sea turtle was a female and the capture occurred during nesting season, for instance. The potential loss of reproductive activity from up to 3 (3.82 total sea turtles sent to rehabilitation centers from Table 10 above x 86% [Kemp's ridleys] = 3.3 of total sea turtles/3-yr periods would be Kemp's) non-lethal Kemp's removals from a single nesting season would at worst remove several hundred eggs combined from at most 3 nesting females that would when combined potentially have an effect on the species. We believe that this small loss of reproductive effort (up to 3 Kemp's ridleys per 3-year period) would not have an appreciable adverse effect on the population dynamics of the species because the potential reproductive loss would be so small in comparison to its overall reproductive capacity.

The potential lethal take of 20 Kemp's ridley sea turtles during consecutive 3 years periods may be turtles captured at the pier that are expected to suffer PRM, or turtles captured and transported to a rehabilitation center that either die in captivity or are unable to be successfully released back into the wild population. These lethal take 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. 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 Turtle Expert Working Group (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. The loss of 20 adult female Kemp's ridley sea turtles could preclude the production of thousands of eggs and hatchlings, of which a fractional percentage would be 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 lethal takes are expected to occur in a small, discrete action area and Kemp's ridleys generally have large ranges; thus, no reduction in the distribution of Kemp's ridley sea turtles is expected from the take of these individuals.

Whether the reduction in numbers and reproduction of this species would appreciably reduce its likelihood of survival depends on the probable effect the changes in numbers and reproduction would have relative to current population sizes and trends. In the absence of any total population estimates for Kemp's ridley sea turtles, nesting trends are the best proxy for estimating population changes (Figure 12). Heppell et al. (2005a) predicted in a population model that the Kemp's ridley sea turtle population was 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. Research by NMFS et al. (2011b) included 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 Mexican 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, the population appears to be 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 in nesting in Mexico, with only 16,385 and 11,279 nests recorded, respectively followed by 14,006 nest in 2015. 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).

The number of nests in Texas decreased in 2013 to 153 (Gladys Porter Zoo nesting database 2013). It is important to remember that with sea turtle species that exhibit normal inter-annual variation in nesting levels, sea turtle population trends necessarily are measured over decades and the long-term trend line better reflects the population increase in Kemp's ridleys. With the recent boom in nesting data (2015) and recent declining numbers of nesting females (2013-2014), it is too early to tell whether the long-term trend line is impacted. The trend line may change from an asymptotic upward curve to a more leveled increase. Either way, long-term data from 1990 to present support that Kemp's ridleys are increasing in population size.

We believe this long-term increasing trend in nesting is evidence of an increasing population, as well as a population that is maintaining (and potentially increasing) its genetic diversity; in general we expect that as sea turtle populations increase, there will be more genetic mixing leading to greater genetic diversity. We also believe these nesting trends at the arribadas are indicative of a species with a large number of sexually mature individuals. 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. That said, we do not believe the number of anticipated takes of Kemp's ridley associated with the proposed action will have a measurable effect on the increasing nesting trends seen over the last several years because these projected losses are very small in comparison to the estimated adult breeding population of thousands of adults based on nesting data discussed in Section 3. 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 that could appreciably affect the species' likelihood of survival. Although there has been some large inter-annual variation in the numbers of nesting females at the arribadas in recent years, the overall longterm trend in nesting numbers is once again increasing. We believe there is sufficient resiliency to allow the species to continue to recover given the small number of lethal takes (up to 20 Kemp's over 3-yr periods), given the large number of nesting females.

As to whether the proposed action will appreciably reduce the species' likelihood of recovery, the recovery plan for the Kemp's ridley sea turtle (NMFS et al. 2011b) 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; it 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, followed by 14,006 nests in 2016. If 14,006 nests were observed in 2016, that would equate to approximately 5,602 nesting females (14,006 nests / 2.5 females per nest = 5,602.4 females)

The lethal take of up to 20 Kemp's ridley sea turtles in consecutive 3-year periods will result in a reduction in numbers but the take is unlikely to have any detectable influence on the trends noted above because thousands of adult Kemp's ridley sea turtles are nesting each year. The loss of possibly 10 females (50% of the 20 lethal takes) in consecutive 3-year periods would result in the loss of possibly 25 nests per year (10 females laying 2.5 nests per season [2016 nesting period estimate above]). Using the 2016 estimate of 14,006 nests, the loss of 25 nests would represent 0.18 percent of that year's reproductive effort. This small impact is not likely to impede achieving the recovery objective of 10,000 nesting females in a season. Thus, we believe the proposed action will not result in an appreciable reduction in the likelihood of Kemp's ridley sea turtles' recovery in the wild.

Conclusion

The lethal and non-lethal takes of Kemp's ridley sea turtles associated with the proposed action are not expected to cause an appreciable reduction in the likelihood of either the survival or recovery of the species in the wild.

7.3 Green Sea Turtles (North Atlantic and South Atlantic DPSs)

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

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

As discussed in section 3.2.3, within U.S. waters individuals from both the NA and SA DPSs can be found on foraging grounds. While there are currently no in-depth studies available to determine the percent of NA and SA DPS individuals in any given location, an analysis of cold-stunned green turtles in St. Joseph Bay, Florida (northern Gulf of Mexico) found approximately 4% of individuals came from nesting stocks in the SA DPS and that the remainder were from the NA DPS (Foley et al. 2007). On the Atlantic coast of Florida, a study on the foraging grounds off Hutchinson Island found that approximately 5% of the turtles sampled came from the SA DPS (Bass and Witzell 2000). All of the individuals in both studies were benthic juveniles.

Taken together, this information suggests that the vast majority of the anticipated captures in the action area are likely to come from the NA DPS. However, it is possible that animals from the SA DPS could be captured during the proposed action. Since the cold-stun study of the northern Gulf of Mexico (above) represents the best available data teasing out the NA and SA DPS distribution for greens in the action area, we will assume that 96% of animals captured during the proposed action will be from the NA DPS, and the remaining 4% will be from the SA DPS, per the breakdown in the study. For these reasons, we will act conservatively and conduct jeopardy analyses on the assumption that both the NA DPS and the SA DPS will be captured by the proposed action but that the vast majority (96%) will be from the NA DPS.

We anticipate up to 8 green sea turtles may be taken at the proposed pier during any consecutive 3-year period, 3 lethal and 5 non-lethal (Tables 11-12). Because of such a small lethal take anticipated and given the low likelihood of captures of SA DPS green sea turtles, we will assign all 3 lethal takes to the NA DPS. For the remaining non-lethal takes (5 total) we assign 4 of the 5 takes (80%) to the NA DPS and the remaining 1 green (20%) to the SA DPS. If we assume 96% of non-lethal takes are from the NA DPS then we would have 0.16 sea turtle captures attributed to the NA DPS (5 turtles x 96% = 4.8 subtracted from5 yields 0.2turtle). In order to attribute a whole turtle to the SA DPS, we conservatively estimate that 1 of the 5 greens captured every 3-year period will be from the SA DPS. The other 4 (80%) non-lethal captures will be attributed to the NA DPS.

NA DPS

As discussed above, we anticipate 3 lethal captures and 4 non-lethal takes every 3 years would be from the NA DPS. So 7 of the 8 total green sea turtle takes anticipated would be from the NA DPS for consecutive 3-year periods.

An estimated 4 green sea turtles from the NA DPS may be captured from the pier over a 3-year period and released immediately alive with no anticipated PRM, or be taken to a rehabilitation center and released later in time after the turtle has recovered from the hook-and-line capture. Animals not released within a short period of time after capture could possibly miss some reproductive output (egg laying) if the captured sea turtle was a female and the capture occurred during nesting season, for instance. The potential loss of reproductive activity from up to 4 non-lethal greens removed from a single nesting season would at worst remove several hundred eggs combined from 4 nesting females that would when combined potentially have a significant effect on the species. We believe that this small loss of reproductive effort would not have an appreciable adverse effect on the population dynamics of the NA DPS because the potential reproductive loss would be so small in comparison to the overall NA DPS reproductive capacity.

An estimated 4 green sea turtles from the NA DPS over consecutive 3-year periods may suffer PRM, or the turtles will be captured and transported to a rehabilitation center that either die in captivity or are unable to be successfully released back into the wild population. The potential lethal take would reduce the number of green sea turtles, compared to their numbers in the absence of the proposed action, assuming all other variables remained the same. A lethal interaction would also result in a potential reduction in future reproduction, assuming the 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. The anticipated lethal interaction is expected to occur in a small, discrete action area which is a tiny portion of the large range of the NA DPS of green sea turtles in which they disperse; thus, no reduction in the distribution of the NA DPS of green sea turtles is expected from this take.

Whether the reduction in numbers and reproduction of this species would appreciably reduce its likelihood of survival depends on the probable effect the changes in numbers and reproduction would have relative to current population sizes and trends. Seminoff et al. (2015) estimate there are greater than 167,000 nesting females in the NA DPS. The nesting at Tortuguero, Costa Rica, accounts for approximately 79% of that estimate (approximately 131,000 nesters), with Quintana Roo, Mexico (approximately 18,250 nesters; 11%), and Florida, USA (approximately 8,400 nesters; 5%) also accounting for a large portion of the overall nesting (Seminoff et al. 2015).

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

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

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

Seminoff et al. (2015) also conducted a population viability analysis for the Tortuguero, Costa Rica, and Florida, USA nesting sites (as well as 2 others: Isla Aguada, Mexico and Guanahacabibes, Cuba).[14] The population viability analysis evaluated the probabilities of nesting populations declining to 2 separate biological thresholds after 100 years: (1) a trend-based reference point where nesting populations decline by 50% and (2) the number of total adult females falls to 300 or fewer at these sites which is modeled as the minimum number of adult females needed to keep the population fom dropping below their carrying capacity (Seminoff et al. 2015).[15] Seminoff et al. (2015) point out that population viability analyses do not fully incorporate spatial structure or threats. They also assume all environmental and man-

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

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

made pressures will remain constant in the forecast period, while also relying solely on nesting data.

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

Nesting at the primary nesting beaches has been increasing over the course of the decades. Additionally, the population viability analysis for the Florida and Tortuguero, Costa Rica, nesting beaches indicate no more than a 0.7% probability those populations will reach the 50% decline threshold at the end of 100 years, and a 0% probability these populations will fall below the absolute abundance threshold of 100 nesting females per year at the end of 100 years (Seminoff et al. 2015). We believe these nesting trends are indicative of a species with a high number of sexually mature individuals. Since the abundance trend information for green sea turtles is clearly increasing, we believe the potential lethal take of 2 green sea turtles from the NA DPS over consecutive 3 year periods attributed to the proposed action will not have any measurable effect on that trend. Therefore, we believe the proposed action is not reasonably expected to cause an appreciable reduction in the likelihood of survival of the NA DPS of green sea turtle in the wild.

The NA DPS of green sea turtles did not have a recovery plan in place at the time of listing. However, an Atlantic Recovery Plan for the population of Atlantic green sea turtles (NMFS and USFWS 1991) does exist. Since the animals within the NA DPS all occur in the Atlantic Ocean and would have been subject to the recovery actions described in that plan, we believe it is appropriate to continue using that Recovery Plan as a guide until a new plan specific to the NA DPS is developed. The Atlantic Recovery Plan lists the following relevant recovery objectives over a period of 25 continuous years:

> *Objective: The level of nesting in Florida has increased to an average of 5,000 nests per year for at least 6 years.*
>
> *Objective: A reduction in stage class mortality is reflected in higher counts of individuals on foraging grounds.*

Green sea turtle nesting in Florida between 2001-2006 was documented as follows: 2001 – 581 nests, 2002 – 9,201 nests, 2003 – 2,622, 2004 – 3,577 nests, 2005 – 9,644 nests, 2006 – 4,970 nests. This averages 5,039 nests annually over those 6 years (2001-2006) (NMFS and USFWS 2007a). Subsequent nesting has shown even higher numbers (i.e., 2007 – 12,751 nests, 2008 – 9,228, 2009 – 4,462, 2010 – 13,225 nests, 2011 – 15,352, 2012 – 9,617, 2013 – 25, 553, 2014 – 3,502; 2015 – 27,975 (http://myfwc.com/research/wildlife/sea-turtles/nesting/2015-nesting-trends/); this averages 13,518 nests annually over those 9 years, which indicates the species is meeting the first recovery objective above. There are currently no estimates available specifically addressing changes in abundance of individuals on foraging grounds. Given the clear increases in nesting, however, it is likely that numbers on foraging grounds will also have increased.

The potential lethal take of up to 3green sea turtles from the NA DPS over consecutive 3 year periods will result in a reduction in numbers when takes occur, but it is unlikely to have any detectable influence on the recovery objectives and trends noted above. Thus, the proposed action will not impede achieving the recovery objectives above and will not result in an appreciable reduction in the likelihood of the NA DPS of green sea turtles' recovery in the wild.

Conclusion

The lethal take of 3 green sea turtles associated with the proposed action is not expected to cause an appreciable reduction in the likelihood of either the survival or recovery of the NA DPS of green sea turtle in the wild.

SA DPS

One green sea turtle may be captured over consecutive 3-year from the pier and released immediately alive with no anticipated PRM, or taken to a rehabilitation center and released later in time after the turtle has recovered from the hook-and-line capture. No impacts on the distribution of the species are expected. Animals not released within a short period of time after capture could possibly miss some reproductive output (egg laying) if the captured sea turtle was a female and the capture occurred during nesting season, for instance. The potential loss of reproductive activity from up to 1 non-lethal green turtle removal from a single nesting season would at worst remove several hundred eggs from a single nesting female that could potentially have an effect on the species. We believe that this small loss of reproductive effort would not have an adverse effect on the population dynamics of the SA DPS because the potential reproductive loss would be so small in comparison to the overall SA DPS reproductive capacity. Therefore, we do not expect the proposed action will impede the SA DPSs likelihood of survival or recovery.

7.4 Smalltooth Sawfish

The proposed action is anticipated to result in up to 9 captures and live release of smalltooth sawfish every 3-year period. Injuries resulting from non-lethal take that could impact the reproductive potential, fitness, or growth of the captured smalltooth sawfish are unlikely to occur because based on available information, captured sawfish are typically 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, or 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.

8 CONCLUSION

Using the best available data, we analyzed the effects of the proposed action in the context of the status of the species, the environmental baseline, and cumulative effects, and determined that the proposed action is not likely to jeopardize the continued existence of the loggerhead (NWA DPS), green (NA and SA DPSs), and Kemp's ridley sea turtles, or smalltooth sawfish.

9 INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and federal regulations issued pursuant to Section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, 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 green, Kemp's ridley, and loggerhead sea turtles and smalltooth sawfish. These effects will result from capture on hook-and-line and entanglement in fishing line or debris. NMFS anticipates the following incidental takes may occur in the future as a result of the modifications to and continued operation of the 3 Clearwater fishing piers. We anticipate these takes will occur over consecutive 3-calendar-year periods (i.e., 2017-2019; 2018-2020, etc.) for sea turtles and 3-year periods for smalltooth sawfish (Table 14).

Table 14. Estimated Total Captures and Mortality by Species/DPS over a 3-Year Period for Sea Turtles and Smalltooth Sawfish at the 3 Clearwater Fishing Piers

Species/DPS	**Lethal Take**	**Non-lethal Take**	**Total**
Kemp's ridley	20	29	49
Green NA DPS	3	4	7
Green SA DPS	0	1	1
Loggerhead	3	5	8
	23	34	**57***
*Takes of Green and/or loggerhead sea turtles are estimated at 8 (3 lethal, 5 non-lethal) for every 3-year period and since it may be any combination of either green or loggerhead sea turtles but not to exceed 8 total (3 lethal, 5 non-lethal) ; the total is 57 sea turtles for any 3-year reporting period with 49 Kemp's ridleys and 8 of some combination of greens (both DPSs) and loggerheads as ascribed above. But the total number of sea turtles must not exceed 57 given those parameters for DPSs and combinations of loggerheads and greens.			
Smalltooth Sawfish	9 takes every 3-year period (all non-lethal)		

The take estimates above are our best estimates of total lethal and non-lethal take and are the basis of our jeopardy analyses.

However, as described in this Opinion, most takes and mortalities are not expected to be observed. Therefore, the following observed take levels are to be used by USACE to determine if take estimates have been exceeded and reinitiation of ESA Section 7 consultation is necessary.

Table 15. Anticipated Observed Takes and Reinitiation Triggers for 3-year Periods at the Clearwater Fishing Piers

Species/DPS	**Lethal Take**	**Non-lethal Take**	**Total**
Kemp's ridley	1	3	4
Green NA DPS	1	1	1
Green SA DPS	0	0	0
Loggerhead	1	1	1
Total	2	3	**5***
*Total reported take is 5 and 4 are anticipated to be Kemp's and either 1 loggerhead or 1 green every 3-year period.			
Smalltooth Sawfish	1 takes every 3-year period (all non-lethal)		

9.2 Effect of the Take

NMFS has determined the anticipated incidental take specified in this Section is not likely to jeopardize the continued existence of sea turtles (Kemp's ridley, NA and SA DPS of green, and the NWA DPS of loggerhead) 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 NMFS shall identify the RPMs necessary to minimize the impacts of take and the terms and conditions to implement those measures must be provided and must be implement the RPMs. 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 USACE or the applicant in order for the protection of Section 7(o)(2) to apply. USACE has a continuing duty to regulate the activity covered by this Incidental Take Statement (ITS). If USACE or the applicant fail to adhere to the terms and conditions of the ITS through enforceable terms, and/or fail to retain oversight to ensure compliance with these terms and conditions, the protective coverage of Section 7(o)(2) may lapse. To monitor the impact of the incidental take, USACE or the applicant must report the progress of the action and its impact on the species to NMFS as specified in the ITS [50 CFR 402.14(i)(3)].

NMFS has determined that the following RPMs and associated terms and conditions are necessary and appropriate to minimize impacts of the incidental take of sea turtles and smalltooth sawfish related to the proposed action.

1. The USACE shall include a special permit condition that requires the applicant to monitor and report the impacts of its activities on sea turtles and smalltooth sawfish. Reports shall be forwarded to the USACE and NMFS.

2. The USACE shall include a special permit condition that requires the applicant to reduce the likelihood of injury or mortality resulting from hook-and-line capture or entanglement from fishing line of sea turtles and smalltooth sawfish by installing educational signage at the pier and by installing monofilament recycling bins. These signs shall contain information on the possibility of sea turtle captures by hook-and-line and what to do in the event of a capture.

3. The USACE shall include a special permit condition that requires the applicant to reduce the impacts to incidentally captured sea turtles and smalltooth sawfish by ensuring that incidentally captured sea turtles and smalltooth sawfish are appropriately handled and released or injured sea turtles are sent to rehabilitation facilities.

9.4 Terms and Conditions

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

1. To implement RPM No. 1, USACE must make it a condition of their permit that the applicant reports all hook-and-line captures of sea turtles and smalltooth sawfish at the proposed pier to the NMFS's Southeast Regional Office.
    a. Within 24 hours, the applicant must notify NMFS by email (takereport.nmfsser@noaa.gov) that the capture has occurred. Emails must reference this Opinion by the respective identifier number SER-2016-17948 (Clearwater Fishing Piers) and date of issuance. The email shall also state the type of species captured, date and time of capture, location and activity resulting in capture (i.e., fishing from the pier by hook-and-line), condition of the sea turtle or sawfish (i.e., alive, dead, sent to rehabilitation [if a sea turtle]), size of the individual, behavior, identifying features (i.e., presence of tags, scars, or distinguishing marks), and any photos that may have been taken.
    b. Reports must also be provided on an annual basis. These reports shall be emailed to NMFS's Southeast Regional Office (takereport.nmfsser@noaa.gov) with the following information: the total number of sea turtle and/or smalltooth sawfish captures, entanglements, and strandings that occurred at or adjacent to the pier included in this Opinion. The report must include the same details listed in T&C No. 1, above.

2. To implement RPM No. 2, USACE must make it a condition of their permit that the applicant installs NMFS Protected Species Educational Signs including “Save the Sea Turtles, Sawfish, and Dolphins” sign at the entrance and/or terminal end of each of the 3 fishing piers. The applicant stated that informational signs will be displayed on each of the 3 piers educating the public on safe fishing practices that will reduce or prevent sea turtle and smalltooth sawfish injuries and who to notify in the event a dead, injured, or entangled sea turtle and/or smalltooth sawfish is located (see Section 2.1). Sign designs and installation methods are provided on our website at: http://sero.nmfs.noaa.gov/protected_resources/section_7/protected_species_educational_signs/index.html. The applicant shall email photographs of installed signs to USACE and NMFS. Signs shall be installed during or post-construction but prior to opening the piers for operation to the public.
3. To implement RPM No. 2, USACE shall make it a condition of their permit that the applicant perform the annual/biennial underwater fishing debris cleanup around this fishing pier. The applicant shall conduct annual underwater fishing debris cleanups around the fishing piers and if needed around the platforms where fishing is permitted (see Section 2.1). Reports of the each cleaning event should be submitted to the USACE and to NMFS with the NMFS PRD number for this biological opinion (SER-2016-17948).
4. To implement RPM No. 3, USACE must make it a condition of their permit that the applicant report incidentally captured sea turtles and that are taken to a rehabilitation facility holding an appropriate U.S. Fish and Wildlif**e** Native Endangered and Threatened Species Recovery permit. The conservation signs when installed will inform the fishers who to report sea turtle captures to for rehabilitation and the appropriate safe handling instructions for sea turtles and sawfish (T&C #2). The applicant shall send take report to the USACE and to NMFS’s Southeast Regional Office (takereport.nmfsser@noaa.gov) documenting captures and results of capture (e.g., released alive, sent to rehabilitation, died) every 3 years.

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 the listed species that will be impacted by the USACE’s proposed action. NMFS strongly recommends that these measures be considered and implemented by USACE:

1. USACE encourages the Florida sea turtle rehabilitation centers to work with other state sea turtle rehabilitation facilities on the best handling techniques, data collection and reporting, and public outreach.

1. USACE encourages research to develop deterrents to discourage turtles from using fishing piers as a habitualized food source.
2. Perform pier surveys to determine the percent of captured sea turtles and smalltooth sawfish that are captured and/or reported.

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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13 APPENDIX 1. EXAMPLE OF PROTECTED SPECIES/FISHING PIER SIGNAGE

Save Sea Turtles and Dolphins

While Fishing, Following These Tips:

- Report injured, entangled, hooked, or stranded dolphins and sea turtles to the 24-hour hotline:

1-877-942-5343

Download the
Dolphin & Whale 911 app
on your iPhone or Android
for reporting
marine mammals.

- Never cast towards dolphins or sea turtles.
- Change location or reel in your line if a dolphin or sea turtle shows interest in your bait or catch.
- Release catch away from dolphins when and where possible without violating any state or federal fishing regulations.
- Do not feed or attempt to feed wild dolphins or sea turtles - it's harmful and illegal.
- Do not dispose of leftover bait or cleaned fish remains in water.
- Use circle or corrodible (non-stainless steel) hooks to reduce injury.
- Use recycling bins for fishing line and do not throw trash or unwanted line in the water.
- If you hook a **SEA TURTLE**, immediately call the 24-hour hotline at **1-877-942-5343** and follow response team instructions.

If you cannot reach a response team, follow these guidelines to reduce injuries:

1) If possible, use a net or lift by the shell to bring the turtle on pier or land. Do NOT lift by hook or line.
2) Cut the line close to the hook, removing as much line as possible.
3) Release turtle.