UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southeast Regional Office
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F/SER31:JC
SER-2016-18138

MAR 01 2017

Chief, Fort Myers Section
Jacksonville District Corps of Engineers
Department of the Army
1520 Royal Palm Square Boulevard, Suite 310
Fort Myers, Florida 33919

Ref.: SAJ-2006-01964 (SP-BEM), SER-2016-18138, Charlotte County Board of County Commissioners (BOCC), Maintenance Dredge, Port Charlotte, Charlotte 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 mechanical dredging of an access channel under the authorities of Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act on the following listed species and/or critical habitat: loggerhead (Northwest Atlantic Ocean distinct population segment), Kemp's ridley, and green (North and South Atlantic distinct population segments) sea turtles; smalltooth sawfish; and smalltooth sawfish critical habitat. NMFS concludes that the proposed action is not likely to adversely affect sea turtle species (green, Kemp's ridley, and loggerhead) and smalltooth sawfish. NMFS also concludes the project is likely to adversely affect, but is not likely to destroy or adversely modify, smalltooth sawfish critical habitat.

Please direct questions regarding this Opinion to 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

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: Charlotte County Board of County Commissioners (BOCC) Maintenance Dredge— shallow-water essential feature removal within smalltooth sawfish critical habitat, Port Charlotte, Charlotte 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-2016-18138

Approved by:

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

Date Issued: March 1, 2017

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Acronyms and Abbreviations

BOCC	Board of County Commissioners
CFR	Code of Federal Regulations
CHEU	Charlotte Harbor Estuary System
CO_2	Carbon Dioxide
DPS	Distinct Population Segment

EFH	Essential Fish Habitat
ESA	Endangered Species Act
FDEP	Florida Department of Environmental Protection
FWRI	Fish and Wildlife Research Institute
GMFMC	Gulf of Mexico Fishery Management Council
IPCC	The Intergovernmental Panel on Climate Change
LAA	Likely to Adversely Affect
MHWL	Mean High Water Line
MIT	Massachusetts Institute of Technology
MLW	Mean Low Water
MLLW	Mean Low Lower Water
NLAA	Not Likely to Adversely Affect
NMFS	National Marine Fisheries Service
NOAA	National Ocean and Atmospheric Association
Opinion	Biological Opinion
RPMs	Reasonable and Prudent Measures
TTIU	Ten Thousand Islands/Everglades Unit
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
YOY	Young-of-the-year

Units of Measurement

Temperature

°F	degrees Fahrenheit
°C	degrees Celsius

Length and Area

ac	acre(s)
cm	centimeter(s)
ft	foot/feet
ft^2	square feet
in	inches
km	kilometer(s)
lin ft	linear feet
m	meter(s)
mi	miles
mi^2	square miles

1 INTRODUCTION

Section 7(a)(2) of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. § 1531 et seq.), requires that each federal agency 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 Lee County, Florida. This Opinion analyzes the project's effects on threatened and endangered species and designated critical habitat, in accordance with Section 7 of the ESA. We based it on project information provided by USACE and other sources of information, including the published literature cited herein.

2 CONSULTATION HISTORY

NMFS received a request for a formal consultation under Section 7 of the ESA from the USACE dated August 10, 2016. The USACE determined that the proposed project may affect, but is not likely to adversely affect, swimming sea turtles (Kemp's ridley, green, hawksbill, leatherback, and loggerhead) and smalltooth sawfish, may affect and is likely to adversely affect smalltooth sawfish critical habitat, and requested NMFS's concurrence. NMFS requested additional information via email on August 25, 2016, and we received a final response and initiated consultation that day.

3 DESCRIPTION OF THE PROPOSED ACTION AND ACTION AREA

3.1 Proposed Action

The project site is a navigation channel to provide vessel access within Gasparilla Sound serving a residential canal community, located approximately 1 mile (mi) from Charlotte Harbor. The channel serves the residential community adjacent to Pirate Cove (east side) and lead into Charlotte Harbor (west side) Charlotte County, Florida (Figure 1). The applicant intends to

dredge approximately 5,500 cubic yards (yd^3) of water bottom within an area approximately 5.58 acres (ac) (243,070 square feet[ft^2]) to a depth of -4 to -5 ft[1] at mean low water (MLW) using a mechanical (e.g., clamshell) dredge operated from a barge. Dredging will extend out from the vessel channel into the Charlotte Harbor entrance/exit in order to bring those portions of the waterway to their intended navigable depths. Approximately 5,400 linear feet (lin ft) will be dredged along a 45-foot (ft)-wide channel (Figure 1). Currently, water depths range from -1 to -9 ft deep. Seagrass surveys were conducted in 2005, 2014, and 2016. Based on the 2016 survey, the proposed project will impact 0.19 ac of seagrass. There are no corals within the project area. Approximately 2,300 feet of the channel has not been previously dredged, so the depths are variable; there is a portion of the channel that is shallower than -3 ft MLW (Figures 2 and 3). A geotechnic sediments analysis determined the substrate is dominated by fine sand with smaller percentages of medium and coarse sand.

Figure 1. Image showing Charlotte County BOCC project location (red line indicates approximate total dredge path, the white brackets indicate approximate area of proposed dredge that has not been previously dredged) (©2016 Google)

[1] Dredging is intended at -5 ft in the maintenance section (outside channel) and – 4 ft within the channel, all dredging will be below a depth below -3 ft MLW for a conservative analysis of lost shallow-water feature (B. McGuffie, USACE. Pers. comm. to J. Cavanaugh, NMFS, August 25, 2016).

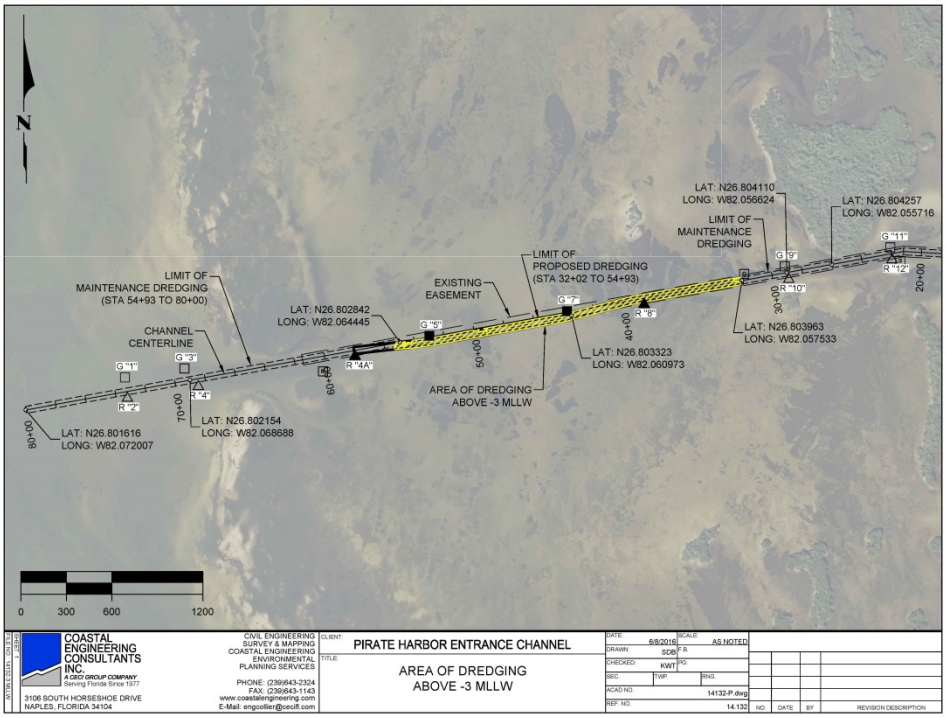


Figure 2. Image showing dredging footprint, area in yellow is where existing depth is shallower than -3 ft at mean lower low water and has not been previously dredged (©2016 Coastal Engineering Consultants, Inc.)

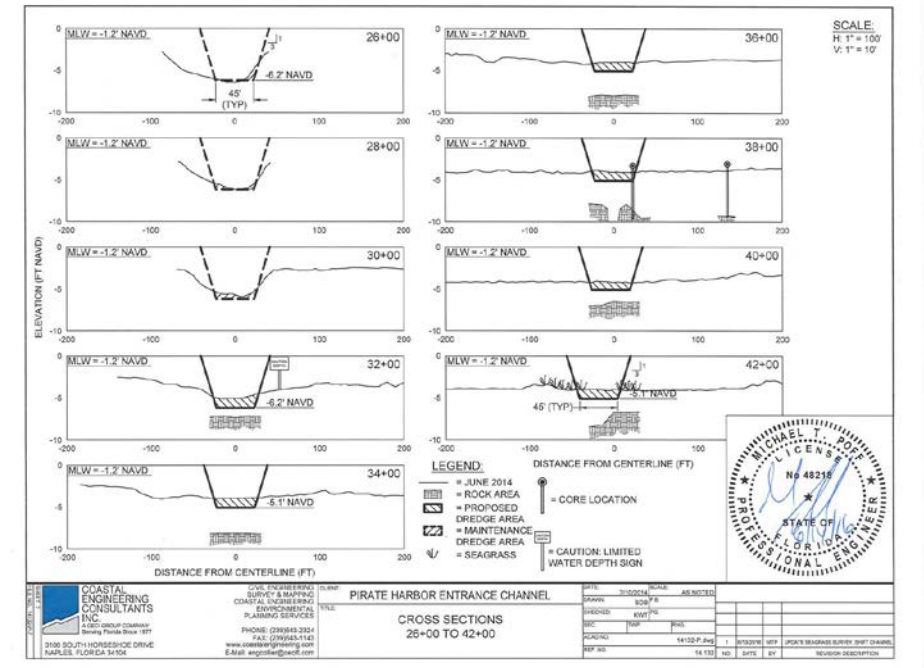


Figure 3. Some of the proposed dredge cut cross sections (© 2016 Coastal Engineering Consultants, Inc.)

In-water construction is expected to take approximately 90 days to complete during daylight hours only. The applicant will be required by permit condition to use turbidity controls and

comply with NMFS's *Sea Turtle and Smalltooth Sawfish Construction Conditions*, dated March 23, 2006 (enclosed).

3.2 Action Area

The project is located at 26.803131°N, -82.062653°W, North American Datum 1983, within a previously dredged channel outlet and within a channel that has not been previously dredged. The channel has unconsolidated shoreline (wetlands) on either side and leads to a residential canal community.

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 noise, sedimentation) and indirect (later in time by diminished foraging resources from shallow-water habitat) effects of the actions. The action area for this project includes the waters and submerged lands within the navigation channel where the project is located. In addition, it includes the immediate vicinity of the project site, approximately 500 ft outside the vessel channel out into the western adjacent portion of Charlotte Harbor and 500 ft into the eastern outlet of the channel letting out into Pirate Harbor, where dredges may access the channel and the outward limits of turbidity control devices installed during dredging.

4 STATUS OF LISTED SPECIES AND CRITICAL HABITAT

The following endangered (E) and threatened (T) species under the jurisdiction of NMFS may occur in or near the action area (Tables 1 and 2):

Table 1. ESA-listed Species that May Occur in or Near to the Action Area

Species	ESA Listing Status	Action Agency Effect Determination	NMFS Effect Determination
Sea Turtles			
Green (North and South Atlantic distinct population segment [DPS])	T	NLAA	NLAA
Kemp's ridley	E	NLAA	NLAA
Loggerhead (Northwest Atlantic Ocean DPSs)	T	NLAA	NLAA
Leatherback	E	NLAA	NE
Hawksbill	E	NLAA	NE
Fish			
Smalltooth sawfish (U.S. DPS)	E	NLAA	NLAA
E = endangered; T = threatened; NLAA = may affect, not likely to adversely affect; NE = no effect			

Table 2. Effects Determinations for Designated Critical Habitat Occurring In or Near the Action Area

Species	Unit	USACE Effect Determination	NMFS Effect Determination
Smalltooth sawfish	Charlotte Harbor Estuary Unit (CHEU) for protection and restoration of nursery habitat	LAA	LAA, Will not destroy or adversely modify
LAA = likely to adversely affect			

We would not expect leatherback or hawksbill sea turtles to be present at the project site due to their very specific life history requirements that are not supported at or near the project site; hawksbills are associated with corals reefs, while leatherbacks are associated with deepwater, pelagic habitats, neither of which are found in or near the project area. Thus, these 2 species will not be affected.

In the following sections, we describe why we believe that smalltooth sawfish and sea turtles (Kemp's ridley, green, and loggerhead) may be affected, but are not likely to be adversely affected, by the project, and why we believe that smalltooth sawfish critical habitat is likely to be adversely affected, but not destroyed or adversely modified.

4.1 Species Not Likely to be Adversely Affected

Sea Turtles and Smalltooth Sawfish
We have identified the following potential effects to sea turtles and smalltooth sawfish and believe that the species are not likely to be adversely affected by the proposed in-water construction activities for the following reasons:

1. Sea turtles and smalltooth sawfish may be adversely affected by being temporarily unable to use the site due to avoidance of construction activities, related noise (e.g., mechanical dredging), and physical exclusion from the area where blocked by turbidity curtains. These impacts will be insignificant due to the small project footprint on any given workday and the project's limited duration (approximately 90 days for all in-water work). Additionally, there are alternative sites in the area containing equivalent habitat that sea turtles and sawfish can easily use for foraging or refuge during construction, such as the extensive mangrove-fringed islands on either side of the channel where the project area is located.

2. Construction activities involve mechanical dredging that will remove shallow-water habitat in the proposed dredge footprint. Juvenile sawfish, in particular, use the shallow water and red mangroves for foraging and refuge. Dredging will remove approximately 2.8 ac of shallow water habitat less than 3 ft MLLW; however, given the much greater acreage of shallow water habitat outside of the channel and some available shallow water habitat that will remain along the edges of the channel, NMFS believes the loss of this shallow water area within the

project footprint is insignificant. Sawfish will still have extensive shallow water habitat remaining post-dredging outside of the vessel channel. Additionally, sawfish will continue to be able to transit within the channel post-construction and there are extensive shallow water areas on either side of the channel throughout the extensive wetlands.

3. Effects to sea turtles and smalltooth sawfish include the risk of injury from dredging, which we expect to be discountable due to the species' ability to move away from the project site if disturbed. NMFS has previously determined in dredging Biological Opinions (NMFS 2007) that, while oceangoing hopper-type dredges may lethally entrain protected species including sea turtles and sturgeon, non-hopper type dredging methods (e.g., mechanical such as clamshell, and bucket dredging; hydraulic [suction] cutterhead, and pipeline) are slower and extremely unlikely to overtake or adversely affect them. The applicant's implementation of NMFS's *Sea Turtle and Smalltooth Sawfish Construction Conditions* will further reduce the risk by requiring 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.

4. Mechanical dredging will cause increased turbidity that may adversely affect listed species; however, the applicant will use 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 mechanical dredging. Generally, NMFS believes elevated turbidity during construction will be temporary and for a short duration (i.e., 90 days total, but a few days only for each dredge section) and will be effectively contained by turbidity controls. Turbidity will subside to normal background levels post construction Therefore, NMFS believes turbidity effects to sea turtles and smalltooth sawfish will be insignificant. However, due to the open water nature of the project, and that it requires dredging over an extended area spanning approximately 3 months, unforeseen weather events may lessen the effectiveness of those turbidity barriers. If there are any severe weather events during construction that cause turbidity to spill over turbidity barriers, turbidity would be localized to the section of dredging at that time and quickly subside after the weather event. While NMFS believes turbidity should be adequately contained by the project's turbidity devices, in the event that it is not, NMFS believes that any potential spillover in turbidity from local severe weather would also be small in area, temporary (storm event), and also insignificant.

4.2 Status of Critical Habitat Likely to be Adversely Affected

Smalltooth Sawfish Critical Habitat

NMFS issued a Final Rule (74 Federal Register [FR] 45353; see also, 50 CFR § 226.218) to designate critical habitat for the U.S. DPS of smalltooth sawfish on September 2, 2009. The critical habitat consists of 2 units located along the southwestern coast of Florida: the Charlotte Harbor Estuary Unit (CHEU), which is comprised of approximately 221,459 acres (ac) (346 square miles [mi²]) of coastal habitat, and the Ten Thousand Islands/Everglades Unit (TTIU), which is comprised of approximately 619,013 ac (967 mi^2) of coastal habitat.

Critical Habitat Unit Impacted by this Action

This consultation focuses on an activity occurring in the CHEU, which encompasses portions of Charlotte and Lee Counties (Figure 4). The CHEU is comprised of Charlotte Harbor, Gasparilla Sound, Matlacha Pass, Pine Island Sound, San Carlos Bay, and Estero Bay. The unit is fed by the Myakka and Peace Rivers to the north and the Caloosahatchee River to the east. A series of passes between barrier islands connect the CHEU with the Gulf of Mexico. The CHEU is a relatively shallow estuary with large areas of submerged aquatic vegetation, oyster bars, saltwater marsh, freshwater wetlands, and mangroves. Freshwater flows from the Caloosahatchee River are controlled by the Franklin Lock and Dam, which periodically releases water. This water thereby affects downstream salinity regimes. The CHEU boundaries are defined in detail in the Final Rule (74 FR 45353; see also 50 CFR § 226.218).

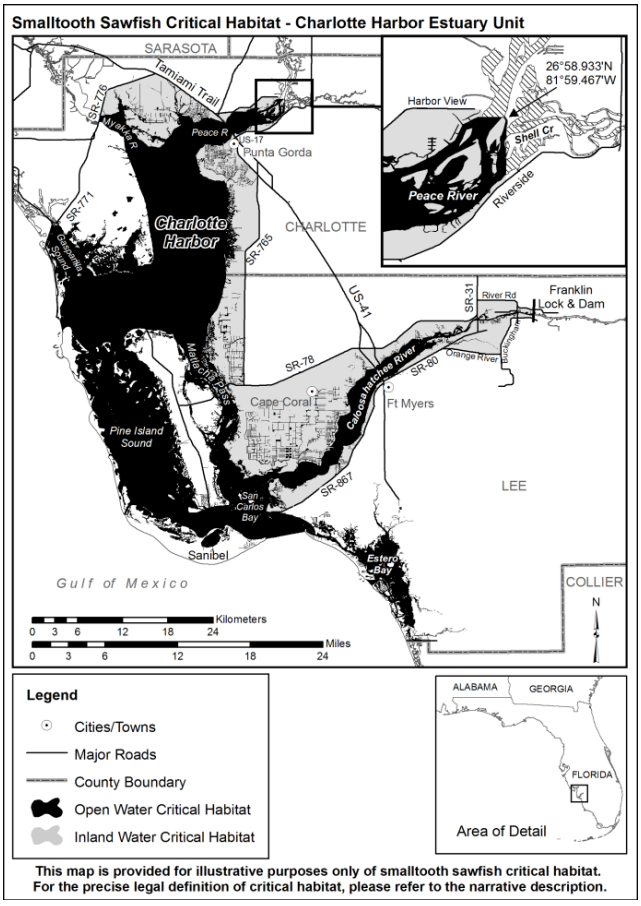


Figure 4. Map of smalltooth sawfish critical habitat - CHEU

Essential Features of Critical Habitat

The recovery plan developed for the smalltooth sawfish, which represents NMFS's best judgment about the objectives and actions necessary for the species' recovery, identified a need to increase the number of juvenile smalltooth sawfish developing into adulthood by protecting or restoring nursery habitat. NMFS determined that without sufficient habitat, the population was unlikely to increase to a level associated with low extinction risk and de-listing. Therefore, NMFS identified 2 habitat features essential for the conservation of this species: (1) red mangroves, and (2) shallow, euryhaline habitats (shallow, euryhaline habitats) characterized by water depths between the mean high water line (MHWL) and -3 ft (-0.9 meters [m]) measured at mean lower low water (MLLW). These essential features of critical habitat provide juveniles refuge from predation and forage opportunities within their nursery habitat. One or both of these essential features must be present in an action area for it to function as critical habitat for smalltooth sawfish.

Habitat Use

Juvenile smalltooth sawfish, identified as those up to 3 years of age or approximately 8 ft (2.4 meters [m]) 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 (Simpfendorfer 2001; 2003). The structural complexity of red mangrove prop roots creates a unique habitat used by a variety of fish, invertebrates, and birds. Juvenile smalltooth sawfish, particularly young-of-the-year (YOY) (measuring less than 39.4 inches (in) [100 centimeters (cm)] in length), use these areas as both refuge from predators and forage grounds; taking advantage of the large number of fish and invertebrates found there.

Tracking data from the Caloosahatchee River in Florida indicate very shallow depths and specific salinity ranges are important abiotic factors influencing juvenile smalltooth sawfish movement patterns, habitat use, and distribution (Simpfendorfer et al. 2011). An 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 (Simpfendorfer et al. 2010). Juvenile smalltooth sawfish spend the majority of their time in waters shallower than 13 ft (4 m) deep (Simpfendorfer et al. 2010) and are seldom found deeper than 32 ft (10 m) (Poulakis and Seitz 2004). Simpfendorfer et al. (2010) also indicated the following developmental differences in habitat use: the smallest YOY juveniles generally used water shallower than 1.6 ft (0.5 m), had small home ranges, 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 undergo small movements coinciding with changing tidal stages. These movements often involve moving from shallow sandbars at low tide and among 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 capture rates during random sampling events within the estuary (Poulakis 2012; Poulakis et al. 2011). The areas that were termed "hotspots" correspond with areas where public encounters are most frequently reported. Use of these hotspots can be variable within and among years based on the amount and timing of freshwater inflow. Smalltooth sawfish use hotspots further upriver during drought (i.e., high salinity) conditions 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 (e.g., presence or absence of predators and prey) or abiotic factors (e.g., salinity) influence this habitat selection. Still, they believe a variety of conditions in addition to salinity, such as temperature, dissolved oxygen, water depth, shoreline vegetation, and food availability, may influence smalltooth sawfish habitat selection (Poulakis et al. 2011).

Status and Threats to Critical Habitat

Modification and loss of smalltooth sawfish critical habitat is an ongoing threat contributing to the current status of the species. Activities such as agricultural and urban development, commercial activities, dredge-and-fill operations, boating, erosion, and diversions of freshwater runoff contribute to these losses (SAFMC 1998). Large areas of coastal habitat were modified or lost between the mid-1970s and mid-1980s within the United States (Dahl and Johnson 1991; USFWS 1999). Since then, rates of loss have decreased even though habitat loss continues. Between 1998 and 2004, approximately 2,450 ac (3.8 mi^2) of intertidal wetlands consisting of mangroves or other estuarine shrubs were lost along the Atlantic and Gulf coasts of the United States (Stedman and Dahl 2008). In another study, Orlando et al. (1994) analyzed 18 major southeastern estuaries and recorded over 703 mi (1,131 kilometers [km]) of navigation channels and 9,844 mi (15,842 km) of shoreline with modifications. Additionally, changes to the natural freshwater flows into estuarine and marine waters through construction of canals and other water-control devices have altered the temperature, salinity, and nutrient regimes, reduced both wetlands and submerged aquatic vegetation coverage, and degraded vast areas of coastal habitat utilized by smalltooth sawfish (Gilmore 1995; Quigley and Flannery 2002; Reddering 1988; Whitfield and Bruton 1989). Juvenile sawfish and their critical habitat are particularly vulnerable to these kinds of habitat losses or alterations due to the juveniles' affinity for (and developmental need of) 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 in the future.

In Florida, coastal development often involves the removal of mangroves, the armoring of shorelines through seawall construction, and the dredging of canals. This is especially apparent in master plan communities such as Cape Coral and Punta Gorda which are located within the Charlotte Harbor Estuary. These communities were created through dredge-and-fill projects to increase the amount of waterfront property available for development, but in doing so, developers removed the majority of red mangrove habitat from the area. The canals created by these communities require periodic dredging for boat access, further affecting the shallow,

euryhaline essential feature of critical habitat. Development continues along the shorelines of Charlotte Harbor in the form of docks, boat ramps, shoreline armoring, utility projects, and navigation channel dredging.

To protect critical habitat, federal agencies must ensure that their activities are not likely to result in the destruction or adverse modification of the physical and biological features that are essential to the conservation of sawfish, or the species' ability to access and use these features (ESA Section 7(a)(2); see also 50 CFR 424.12(b) (discussing essential features). Therefore, proposed actions that may impact critical habitat require an analysis of potential impacts to each essential feature. As mentioned previously, there are 2 essential features of smalltooth sawfish critical habitat: (1) red mangroves; and (2) shallow, euryhaline habitats characterized by water depths between the MHWL and -3 ft (-0.9 m) measured at MLLW. The USACE oversee the permitting process for residential and commercial marine development in the CHEU. The Florida Department of Environmental Protection (FDEP) and their designated authorities also regulate mangrove removal in Florida. All red mangrove removal permit requests within smalltooth sawfish critical habitat necessitate ESA Section 7 consultation. NMFS Protected Resources Division tracks the loss of these essential features of smalltooth sawfish critical habitat.

Threats to Critical Habitat

Dock and Boat Ramp Construction

The USACE attempts to persuade applicants to construct docks in accordance with the NMFS-USACE *Dock Construction Guidelines in Florida for Docks or Other Minor Structures Constructed in or over Submerged Aquatic Vegetation (SAV), Marsh, or Mangrove Habitat* ("Dock Construction Guidelines") when possible. The current dock construction guidelines allow for some amount of mangrove removal; however, it is typically restricted to either (1) trimming to facilitate a dock, or (2) complete removal up to the width of the dock extending toward open water, which the guidelines define as a width of 4 ft.

Installation or replacement of boat ramps is often part of larger projects such as marinas, bridge approaches, and causeways where natural and previously created deep-water habitat access channels already exist. Boat ramps can result in the permanent loss of both the red mangrove and the shallow, euryhaline habitat features of critical habitat for smalltooth sawfish.

Marina Construction

Marinas have the potential to adversely affect aquatic habitats. Marinas are typically designed to be deeper than -3 ft MLLW to accommodate vessel traffic; therefore, most existing marinas lacking essential features are unlikely to function as critical habitat for smalltooth sawfish. The expansion of existing marinas and creation of new marinas can result in the permanent loss of large areas of this nursery habitat.

Bulkhead and Seawall Construction

Bulkheads and other shoreline stabilization structures are used to protect adjacent shorelines from wave and current action and to enhance water access. These projects may adversely impact critical habitat for smalltooth sawfish by removal of the essential features through direct filling

and dredging to construct vertical or riprap seawalls. Generally, vegetation plantings, sloping riprap, or gabions are environmentally-preferred shoreline stabilization methods instead of vertical seawalls because they provide better quality fish and wildlife habitat. Nevertheless, placement of riprap material removes more of the shallow euryhaline essential feature than a vertical seawall. Many seawalls built along unconsolidated shorelines require the removal of red mangroves to accommodate the seawalls.

Cable, Pipeline, and Transmission Line Construction

While not as common as other activities, excavation of submerged lands is sometimes required for installing cables, pipelines, and transmission lines. Construction may also require temporary or permanent filling of submerged habitats. Open-cut trenching and installation of aerial transmission line footers are activities that have the ability to temporarily or permanently impact critical habitat for smalltooth sawfish.

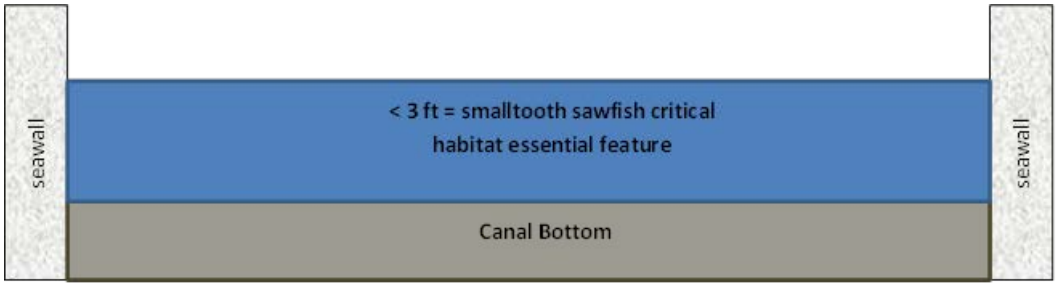
Transportation Infrastructure Construction

Potential adverse effects from federal transportation projects in smalltooth sawfish critical habitat (CHEU) include operations of the Federal Highway Administration, USACE, and the Federal Emergency Management Agency. Construction of road improvement projects typically follow the existing alignments and expand to compensate for the increase in public use. Transportation projects may impact critical habitat for smalltooth sawfish through installation of bridge footers, fenders, piles, and abutment armoring, or through removal of existing bridge materials by blasting or mechanical efforts.

Dredging

Riverine, nearshore, and offshore areas are dredged for navigation, construction of infrastructure, and marine mining. An analysis of 18 major southeastern estuaries conducted in 1993-94 demonstrated that over 7,000 km of navigation channels have already been dredged (Orlando et al. 1994). Habitat effects of dredging include the loss of submerged habitats by disposal of excavated materials, turbidity and siltation effects, contaminant release, alteration of hydrodynamic regimes, and fragmentation of physical habitats (GMFMC 1998; GMFMC 2005; SAFMC 1998). In the CHEU, dredging to maintain canals and channels constructed prior to the critical habitat designation, limits the amount of available shallow, euryhaline habitat essential feature to the edges of waterways and these dredging activities can disturb juveniles that are using these areas. At the time of critical habitat designation, many previously dredged channels and canals existed within the boundaries of the critical habitat units; however, we are unsure which of those contained the shallow-water essential feature at that time. It is likely that many of these channels and canals were originally dredged deeper than 3 ft MLLW, but they have since shoaled in and now contain the essential feature of shallow, euryhaline habitat. Therefore, maintenance dredging impacts are counted as a loss to this essential feature, even though the areas may or may not have contained the essential feature at time of designation (see Figure 5, Diagrams A and B)

A.



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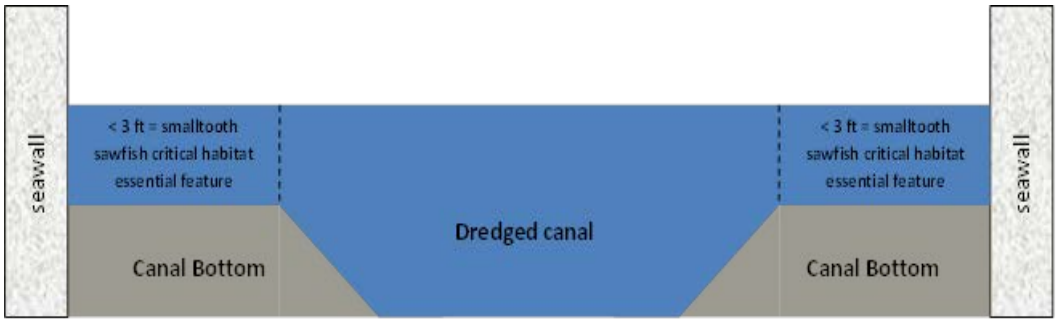

C.

Figure 5. Diagram A depicts a cross section of a historically-dredged channel/canal within the boundaries of the critical habitat units that has not been maintained. Diagram B depicts the typical cross section of a maintenance dredged channel/canal. Diagram C depicts a cross section of a maintained dredged channel/canal after sea level rise of > 1 ft.

Construction, Operations and Maintenance of Impoundments and Other Water Level Controls

Federal agencies such as the USACE have historically been involved in large water control projects in Florida. Agencies sometimes propose impounding rivers and tributaries for such purposes as flood control, salt water intrusion prevention, or creation of industrial, municipal, and agricultural water supplies. Projects to repair or replace water control structures may affect smalltooth sawfish critical habitat by limiting sufficient freshwater discharge which could alter the salinity of estuaries. The ability of an estuary to function as a nursery depends upon the quantity, timing, and input location of freshwater inflows (Garmestani and Percival 2005; Norton et al. 2012; USEPA 1994). Estuarine ecosystems are vulnerable to the following man-made disturbances: (1) decreases in seasonal inflow caused by the removal of freshwater upstream for agricultural, industrial, and domestic purposes; (2) contamination by industrial and sewage

discharges; (3) agricultural runoff carrying pesticides, herbicides, and other toxic pollutants; and (4) eutrophication (e.g., influx of nutrients such as nitrates and phosphates most often from fertilizer runoff and sewage) caused by excessive nutrient inputs from a variety of nonpoint and point sources. Additionally, rivers and their tributaries are susceptible to natural disturbances, such as floods and droughts, whose effects can be exacerbated by these man-made disturbances.

As stated above, smalltooth sawfish show an affinity for a particular salinity range, moving downriver during wetter months and upriver during drier months to remain within that range (Simpfendorfer et al. 2011). Therefore, water management decisions that affect salinity regimes may impact the functionality of critical habitat. This may result in smalltooth sawfish following specific salinity gradients into less advantageous habitats (e.g., areas with less shallow-water or red mangrove habitat). Furthermore, large changes in water flow over short durations would likely escalate movement patterns for smalltooth sawfish, thereby increasing predation risk and energy output. Researchers are currently looking into the effects of large-scale freshwater discharges on smalltooth sawfish and their designated critical habitat. The most vulnerable portion of the juvenile sawfish population to water-management outfall projects appears to be smalltooth sawfish in their first year of life. Newborn smalltooth sawfish remain in smaller areas irrespective of salinity, which potentially exposes them to greater osmotic stress (a sudden change in the solute concentration around a cell, causing a rapid change in the movement of water across its cell membrane), and impacts the nursery functions of sawfish critical habitat (Poulakis et al. 2013; Simpfendorfer et al. 2011).

Climate Change Threats

The Intergovernmental Panel on Climate Change (IPCC) has stated that global climate change is unequivocal and its impacts to coastal resources may be significant (IPCC 2007). There is a large and growing body of literature on past, present, and future impacts of global climate change induced by human activities (i.e., global warming mostly driven by the burning of fossil fuels). The latest report by the IPCC (2013) is more explicit, stating that, "science now shows with 95% certainty that human activity is the dominant cause of observed warming since the mid-twentieth century." Some of the anticipated outcomes are sea level rise, increased frequency of severe weather events, and changes in air and water temperatures. NOAA's climate change web portal provides information on the climate-related variability and changes that are exacerbated by human activities (http://www.climate.gov/#understandingClimate). The EPA's climate change webpage also provides basic background information on these and other measured or anticipated effects (http://www.epa.gov/climatechange/index.html).

Though the impacts on smalltooth sawfish cannot, for the most part, be predicted with any degree of certainty, we can project some effects to sawfish critical habitat. We know that both essential features (red mangroves and shallow, euryhaline waters less than 3 ft deep at MLLW) will be impacted by climate change. Sea level rise is expected to exceed 3.3 ft (1 m) globally by 2100, according to the most recent publications, exceeding the estimates of the Fourth Assessment of the IPCC (Meehl et al. 2007; Pfeffer et al. 2008; Rahmstorf et al. 2009). Mean sea level rise projections have increased since the Fourth Assessment because of the improved physical understanding of the components of sea level, the improved agreement of process-based models with observations, and the inclusion of ice-sheet dynamical changes (IPCC 2013). A 1-

m sea level rise in the state of Florida is within the range of recent estimates by 2080 (Pfeffer et al. 2008; Rahmstorf et al. 2009).

Sea level increases would affect the shallow-water essential feature of smalltooth sawfish critical habitat within the CHEU. A 2010 climate change study by the Massachusetts Institute of Technology (MIT) forecasted sea level rise in a study area with significant overlap with the CHEU (Vargas-Moreno and Flaxman 2010). The study investigated possible trajectories of future transformation in Florida's Greater Everglades landscape relative to 4 main drivers: climate change, shifts in planning approaches and regulations, population change, and variations in financial resources. MIT used (IPCC 2007) sea level modeling data to forecast a range of sea level rise trajectories from low, to moderate, to high predictions (Figure 6). The effects of sea level rise on available shallow-water habitat for smalltooth sawfish would be exacerbated in areas where there is shoreline armoring (e.g., seawalls). This is especially true in canals where the centerlines are maintenance-dredged deeper than -3 ft (0.9 m) for boat accessibility. In these areas, the areas that currently contain the essential feature depth (less than -3 ft at MLLW) will be reduced along the edges of the canals as sea level rises (see previous Figure 5, Diagram C).

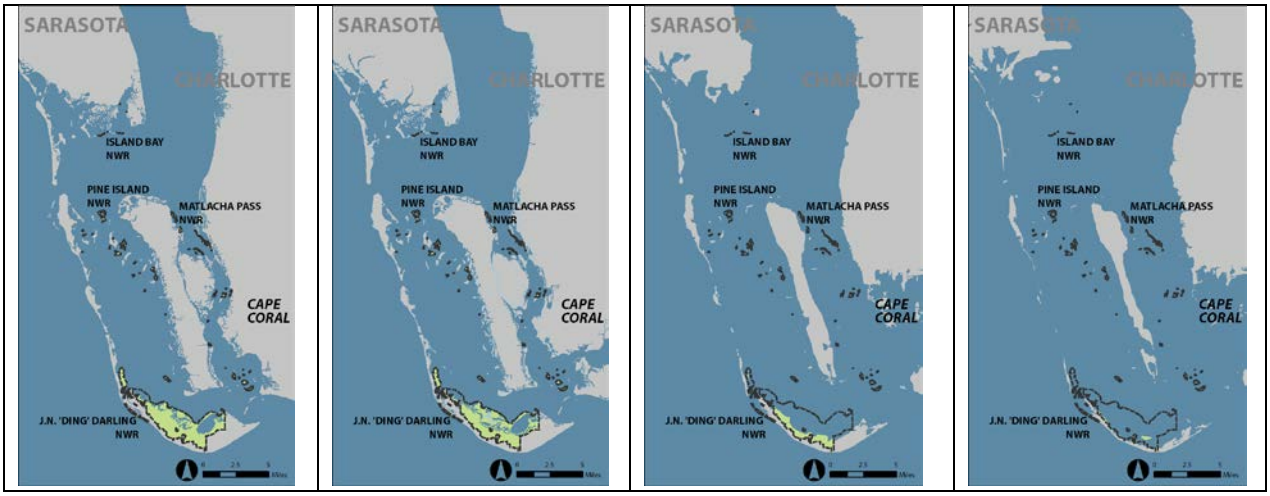

Figure 6. From left to right: current shoreline, + 3.5 in (+ 9 cm); + 18.5 in (+ 47 cm); and + 38.97 in (+ 99 cm) sea level rise by 2060[2].

Along the Gulf Coast of Florida, and south Florida in particular, rises in sea level will impact mangrove resources. As sea levels rise, mangroves will be forced landward in order to remain at a preferred water inundation level and sediment surface elevation, which is necessary for successful growth. This retreat landward will not keep pace with conservative projected rates of elevation in sea level (Gilman et al. 2008). This forced landward progression poses the greatest threat to mangroves in areas where there is limited or no room for landward or lateral migration (Semeniuk 1994). Such is the case in areas of the CHEU where landward mangrove growth is restricted by shoreline armoring and coastal development. This man-made barrier will prohibit mangroves from moving landward and will result in the loss of the mangrove essential feature.

[2] Adapted from (Vargas-Moreno and Flaxman), M. Addressing the Challenges of Climate Change in the Greater Everglades Landscape. Project Sheet. November, 2010. Department of Urban Planning, MIT.)

Other threats to mangroves result from climate change: fluctuations in precipitation amounts and distribution, seawater temperature, carbon dioxide (CO_2) levels, and damage to mangroves from increasingly severe storms and hurricanes (McLeod and Salm 2006). A 25% increase in precipitation globally is predicted by 2050 (McLeod and Salm 2006), but the specific geographic distribution will vary, leading to increases and decreases in precipitation at the regional level. Changes in precipitation patterns caused by climate change may adversely affect the growth of mangroves and their distribution (Field 1995; Snedaker 1995). Decreases in precipitation will increase salinity and inhibit mangrove productivity, growth, seedling survival, and spatial coverage (Burchett et al. 1984). Decreases in precipitation may also change mangrove species composition, favoring more salt-tolerant types (Ellison 2010). Increases in precipitation may benefit some species of mangroves, increasing spatial coverage and allowing them to out-compete other salt marsh vegetation (Harty 2004). Even so, potential mangrove expansion requires suitable habitat for mangroves to increase their range, which depends to a great extent on patterns and intensity of coastal development (i.e., bulkhead and seawall construction).

Seawater temperature changes will have potential adverse effects on mangroves as well. Many species of mangroves show an optimal shoot density in sediment temperatures between 59°-77°F (15°-25°C) (Hutchings and Saenger 1987). Yet, at temperatures between 77°-95°F (25°-35°C), many species begin to show a decline in leaf structure and root and leaf formation rates (Saenger and Moverley 1985). Temperatures above 95°F lead to adverse effects on root structure and survivability of seedlings (UNESCO 1992) and temperatures above 100.4°F (38°C) lead to a cessation of photosynthesis and mangrove mortality (Andrews et al. 1984). Although impossible to forecast precisely, sea surface ocean temperatures are predicted to increase 1.8°-3.6°F (1°-2°C) by 2060 (Chapter 11 IPCC 2013), which will in turn impact underlying sediment temperatures along the coast. If mangroves shift pole-ward in response to temperature increases, they will at some point be limited by temperatures at the lower end of their optimal range and available recruitment area. This is especially true when considering already armored shorelines in residential communities such as those within and surrounding the CHEU of critical habitat for smalltooth sawfish.

As atmospheric CO_2 levels increase, mostly resulting from man-made causes (e.g., burning of fossil fuels), the world's oceans will absorb much of this CO_2, causing potential increases in photosynthesis and mangrove growth rates. This increase in growth rate, however, would be limited by lower salinities expected from CO_2 absorption in the oceans (Ball et al. 1997), and by the availability of undeveloped coastline for mangroves to expand their range. A secondary effect of increased CO_2 concentrations in the oceans is the deleterious effect on coral reefs' ability to absorb calcium carbonate (Hoegh-Guldberg et al. 2007), and subsequent reef erosion. Eroded reefs may not be able to buffer mangrove habitats from waves, especially during storm/hurricane events, causing additional physical effects.

Finally, the anticipated increase in the severity of storms and hurricanes may also impact mangroves. Tropical storms are expected to increase in intensity and/or frequency, which will directly impact existing mangroves that are already adversely impacted by increased seawater temperatures, CO_2, and changes in precipitation (Cahoon et al. 2003; Trenberth 2005). The combination of all of these factors may lead to reduced mangrove height (Ning et al. 2003).

Further, intense storms could result in more severe storm surges and lead to potential changes in mangrove community composition, mortality, and recruitment (Gilman et al. 2006). Increased storms surges and flooding events could also affect mangroves' ability to photosynthesize (Gilman et al. 2006) and the oxygen concentrations in the mangrove lenticels (Ellison 2010).

5 ENVIRONMENTAL BASELINE

This section describes the effects of past and ongoing human and natural factors contributing to the current status of the affected smalltooth sawfish critical habitat in the action area. The environmental baseline describes the 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 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 critical habitat. 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 areas, critical habitat features will commonly exhibit, or be more susceptible to, adverse responses to stressors than they would be in other areas. These localized stress responses or stressed baseline conditions may increase the severity of the adverse effects expected from the proposed action.

5.1 Status of Critical Habitat within the Action Area

The action area is a navigational channel located 1 mile from Charlotte Harbor at the west end of the channel. This channel serves a residential canal community at the entrance to Pirate Harbor (east end of the channel). The benthos at the site is described as fine sand with smaller percentages of medium and coarse sand. Currently, water depths range from -1 to -9 ft deep. A significant portion of the channel itself has not been previously dredged, so the depths are variable; there is a portion of the channel that is shallower than -3 ft MLW. The area adjacent to and outside of the channel is comprised a series of shallow-water bays and mangrove-fringed keys. The keys are not habitable, and we don't expect additional development in the action area. These keys are also is part of the Gasparilla Sound-Charlotte Harbor Aquatic Preserve which is the largest aquatic preserve in the Charlotte Harbor system, and is located in Charlotte and Lee counties. The aquatic preserve includes Gasparilla Sound, Charlotte Harbor (where the action area is located), and the mouths of the Peace and Myakka rivers. The boundary encompasses approximately 84,500 acres, which includes some islands that are not part of the aquatic preserve.

5.2 Factors Affecting Critical Habitat within the Action Area

Federal Actions
No other federal permitted projects are known to have occurred within the action area as defined in Section 3, as per a review of the NMFS Protected Resource Division's completed consultation database (February 27, 2017.

State or Private Actions
A number of nonfederal activities that may adversely affect designated critical habitat for smalltooth sawfish in the action area include impacts from residential shoreline stabilization activities that do not obtain federal permits (i.e., seawall, riprap, docks). The direct and indirect impacts from some of these activities are difficult to quantify. Where possible, conservation actions in ESA Section 10 permits, ESA Section 6 cooperative agreements, and state permitting programs are being implemented or investigated to monitor or study impacts from these sources.

Other Potential Sources of Impacts to the Environmental Baseline
Stochastic events, such as hurricanes, are common in smalltooth sawfish, critical habitat. These events are by nature unpredictable and their effect on the habitat and recovery of the species are unknown; however, they have the potential to impede recovery directly if critical habitat areas are damaged as a result of these disturbances. In 2005, Hurricane Charley likely damaged critical habitat in and around the action area.

Conservation and Recovery Actions Shaping the Environmental Baseline
Federal Essential Fish Habitat (EFH) consultation requirements pursuant to the Magnuson-Stevens Fishery Conservation and Management Act minimize and mitigate for losses of wetland and preserve valuable foraging and developmental habitat that is used by juvenile smalltooth sawfish. NMFS has designated mangrove and estuarine habitats as EFH as recommended by the Gulf of Mexico Fishery Management Council (GMFMC), including the areas designated as smalltooth sawfish critical habitat. Both essential features (shallow, euryhaline water less than 3 ft MLLW and red mangroves) are critical components of areas designated as EFH and receive a basic level of protection under the Magnuson-Stevens Act to the extent that the Act requires consideration of impacts to EFH resources.

6 EFFECTS OF THE ACTION ON CRITICAL HABITAT

6.1 Shallow-Water Essential Feature Impacts

The shallow euryhaline essential feature found within the CHEU of designated critical habitat for the U.S. DPS of smalltooth sawfish is present and will be adversely affected by the proposed dredging. This will result in a loss of approximately 121,968 ft^2 (2.8 ac) of the shallow, euryhaline habitat potential forage and shelter area for juvenile smalltooth sawfish.

Using remote sensing data acquired from the Fish and Wildlife Research Institute, we were able to compile information relating to the total area of these essential features within smalltooth sawfish critical habitat. The total amount of shallow, euryhaline habitat for CHEU is approximately 132 mi^2 (84,480 ac). While the available essential feature will be diminished by approximately 121,968 ft^2 (2.8 ac) (shallow, euryhaline habitat), the project is not severing or

preventing access to alternate refuge or forage areas at the site or in the surrounding area for juvenile smalltooth sawfish. Still, some ecological function provided to juvenile smalltooth sawfish in terms of the shallow-water essential feature will be lost.

7 CUMULATIVE EFFECTS

Cumulative effects include the effects of future state, tribal, or local private actions that are reasonably certain to occur in the action area considered in this Opinion. Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to Section 7 of the ESA (50 CFR 402.02).

Many threats to smalltooth sawfish critical habitat are expected to be exacerbated by the effects of global climate change (see Threats to Critical Habitat section). Potential increases in sea level may impact the availability of nursery habitat, particularly shallow euryhaline and red mangrove lined, low-lying coastal habitats (IPCC 2014; Wanless et al. 2005). Red mangroves could be negatively affected by increased temperatures, salinities, and acidification of coastal waters (Snedaker 1995), Wanless et al. 2005 (Scavia et al. 2002), as well as increased runoff and erosion due to the expected increase in extreme storm events (IPCC 2014; Wanless et al. 2005). These alterations of the marine environment due to global climate change could ultimately affect the distribution, physiology, and growth rates of red mangroves, potentially eliminating them from particular areas. The magnitude of these effects on smalltooth sawfish critical habitat are difficult to predict, yet the cyclical loss of habitat from extreme storm events combined with sea level rise may result in a decrease in juvenile survival (Norton et al. 2012; Scavia et al. 2002). However, this proposed action is of such a small scale, scope, and limited time frame that is not very likely to contribute to, or be affected cumulatively by climate change. Smalltooth sawfish habitat has been degraded or modified throughout the southeastern United States from agriculture, urban development, commercial activities, channel dredging, boating activities, and the diversion of freshwater runoff.

No future actions with effects beyond those already described are reasonably certain to occur in the action area. The man-made canals within the CHEU will likely continue to experience the same types of actions described in the status of critical habitat in Section 3. These threats include shoreline armoring (e.g., seawall installation and associated red mangrove removal), canal dredging, and dock construction. Channel dredging to provide vessel access to residential communities is also expected to continue within the CHEU as these channels need periodic dredging to maintain safe vessel navigation depths.

8 INTEGRATION AND SYNTHESIS

8.1 Critical Habitat Destruction/Adverse Modification Analysis

NMFS's regulations define *Destruction or adverse modification* to mean a direct or indirect alteration that appreciably diminishes the value of critical habitat for the conservation of a listed species. Such alterations may include, but are not limited to, those that alter the physical or biological features essential to the conservation of a species or that preclude or significantly delay development of such features (50 CFR § 402.02). Other alterations that may destroy or

adversely modify critical habitat may include impacts to the area itself, such as those that would impede access to or use of the essential features. We intend the phrase "significant delay" in development of essential features to encompass a delay that interrupts the likely natural trajectory of the development of physical and biological features in the designated critical habitat to support the species' recovery. NMFS will generally conclude that a Federal action is likely to "destroy or adversely modify" designated critical habitat if the action results in an alteration of the quantity or quality of the essential physical or biological features of designated critical habitat, or that precludes or significantly delays the capacity of that habitat to develop those features over time, if the effect of the alteration is to appreciably diminish the value of critical habitat for the conservation of the species.

This analysis takes into account the geographic and temporal scope of the proposed action, recognizing that "functionality" of critical habitat necessarily means that it must now and must continue in the future to support the conservation of the species and progress toward recovery. The analysis must take into account any changes in amount, distribution, or characteristics of the critical habitat that will be required over time to support the successful recovery of a/the species. Destruction or adverse modification does not depend strictly on the size or proportion of the area adversely affected, but rather on the role the action area and the affected critical habitat serves with regard to the function of the overall critical habitat designation, and how that role is affected by the action.

In designating critical habitat for the smalltooth sawfish, we explained that the key conservation objective for the species is to facilitate recruitment of juveniles into the adult sawfish population by protecting juvenile areas. We determined that the habitat features essential to the achieving that conservation objective are (1) red mangroves and (2) shallow, euryhaline habitats characterized by water depths between the Mean High Water line and -3 ft (0.9 m) measured at MLLW. These essential features are necessary to facilitate recruitment of juveniles into the adult population because they provide for predator avoidance and habitat for prey in the areas currently being used as juvenile nursery areas. Impacts to designated critical habitat, thus, have the potential to destabilize recovery efforts and impede chances for recovery.

Our analysis evaluates whether the anticipated impacts to critical habitat associated with the proposed action would interfere with the conservation objective behind the designated critical habitat– that is, facilitation of juvenile recruitment into a recovering adult population. In addition, we evaluate whether the impacts to critical habitat would interfere with the recovery objectives for the species.

The smalltooth sawfish recovery plan identified 3 recovery objectives: (1) minimizing human interactions and associated injury and mortality; (2) protecting and/or restoring smalltooth sawfish habitats; and (3) ensuring smalltooth sawfish abundance increases substantially and the species reoccupies areas from which it had previously been extirpated (NMFS 2009). Protecting critical habitat is important to achieving the second and third recovery objectives.

For example, in establishing the second recovery objective, we recognized that recovery of the smalltooth sawfish depends on the availability and quality of nursery habitats. Historically, juvenile sawfish were documented in mangrove and non-mangrove habitat in the southeastern

United States, with reports at the time of the recovery plan showing a strong association with red mangrove and shallow, euryhaline waters in southwest Florida, features we designated as essential to conservation of the species. Much of the historic juvenile sawfish habitat in southwest Florida, which encompasses Recovery Regions G, H, and I, remains high quality and must be strongly protected at near existing levels to allow for the species' recovery. The CHEU is in Recovery Region G. For these 3 recovery regions with remaining high-quality juvenile habitat, the recovery plan states juvenile habitats must be maintained and effectively protected over the long term at or above 95% of the acreage available at the time of listing, which occurred in April 2003.

To meet the third recovery objective, we explained that it was important that sufficient numbers of juvenile sawfish inhabit several nursery areas across a diverse geography area to ensure survivorship and growth and to protect against the negative effects of stochastic events within parts of their range. To meet this objective, Recovery Region G must support sufficiently large numbers of juvenile sawfish to ensure that the species is viable in the long-term and can maintained genetic diversity. Thus, for this region, the recovery objectives also require that the relative abundance of small juvenile sawfish (< 200 cm) either increase at an average annual rate of at least 5% over a 27-year period, or juvenile abundance is at greater than 80% of the carrying capacity of the recovery region.

8.2 Shallow-Water Essential Feature Impacts

Approximately 121,968 ft^2 (2.8 ac) of shallow, euryhaline critical habitat will be lost and cease to function as critical habitat because of the proposed action. When smalltooth sawfish were first listed under the ESA in 2003, the amount of shallow, euryhaline habitat in the CHEU alone was estimated to be 84,480 ac (132 mi^2) of the 221,459 total ac within the CHEU. At the time of smalltooth sawafish critical habitat designation in September 2009 until September 2016, NMFS has completed 107 Section 7 consultations on projects within the CHEU that have resulted in the total loss of approximately 16.18 ac of shallow, euryhaline critical habitat. Over that 7-year period since critical habitat designation (September 2009 – September 2016[3]), these total losses translate into average annual loss rates of approximately 2.31 ac (16.18 ac/7 years) of shallow, euryhaline critical habitat, or 0.193 ac per month (2.31 ac per year/12 mo = 0.1925 rounded to 0.193 ac per month). Assuming similar rates of shallow, euryhaline habitat loss in the CHEU between May 2003 and the time of critical habitat designation in September 2009, we estimate that 14.9 ac of shallow euryhaline habitat were lost prior to designation (77 months [May 2003 until September 2009] x 0.193 ac/month = 14.9 ac). Taking into consideration the estimated total available shallow, euryhaline habitat in the CHEU at time of listing (84,480 ac), the estimated loss of shallow, euryhaline habitat prior to critical habitat designation in the CHEU (14.9 ac), and the estimated loss of shallow euryhaline critical habitat since its designation (16.18 ac), we calculated that approximately 84,449 ac of shallow, euryhaline critical habitat currently remains available for juvenile smalltooth sawfish in the CHEU (84,480 – 31.1 [14.9 ac + 16.18 ac] = 84,448.9 rounded to 84,449). While this number only takes into account projects with a

[3] Due to the small number of monthly projects impacting smalltooth sawfish critical habitat and the limited adverse impact from typical seawall/dock projects to critical habitat, NMFS updates annual loss rates quarterly. For example, the next quarterly update will occur in December 2016.

federal nexus requiring ESA Section 7 consultations, there are very few projects without a federal nexus that could impact shallow, euryhaline habitat in the CHEU and Charlotte County as most in-water construction projects require federal authorization. .

Based on the recovery plan objectives (protect 95 % of the shallow, euryhaline habitat in the CHEU available at the time of listing), approximately 80,256 ac (84,480 ac x .95 = 80,256) of shallow, euryhaline critical habitat must be maintained and effectively protected to facilitate recovery of the sawfish. This requirement is premised on the fact that, although the CHEU is part of the larger Recovery Region G, and the 95% protection requirement applies to this larger region, designated critical habitat is currently the only area in which nursery areas have been established and are being protected specifically for that purpose. The proposed project would result in the loss of 121,968 ft^2 (2.8 ac) of the originally estimated 84,480 ac of shallow, euryhaline habitat at the time of species listing in 2003, which equates to 0.0033% (2.8 ac x 100/84,480 ac) of what was initially available. While this loss is a reduction in the total area available, it represents a miniscule fraction of the shallow euryhaline habitat available in the CHEU at the time of listing. Further, this loss of 121,968 ft^2 (2.8 ac) of shallow, euryhaline critical habitat, when added to 31.1 ac of shallow, euryhaline critical habitat already lost, results in a total loss of only 0.04% (2.8 ac [this project] + 31.1 ac [lost shallow-water feature since designation] = 33.9 ac x 100/84480 ac = 0.04%) of the estimated available shallow-water feature at time of listing. This is neither an appreciable reduction in the amount of critical habitat available nor an appreciable diminishment in the functionality of the critical habitat in serving juvenile sawfish. Additionally, this loss, in combination with the losses since we designated critical habitat, does not provide any impediment to achieving the recovery objective of effectively protecting 95% of the habitat.

Determining impacts of the project on the other relevant recovery objective, juvenile abundance, is made difficult by the state of available data. Since both the designation of critical habitat and the release of the recovery plan in 2009, an ongoing study has been occurring in the CHEU. FWRI is conducting this study which is supported primarily under funding provided by NMFS through the Section 6 Species Recovery Grants Program. Its intent is to determine the distribution, habitat use, and movement of juvenile sawfish in the CHEU. Given the limited duration (approximately 7 years [Sept 2009 – Sept 2016]) of this study, there is not enough data to discern the trend in juvenile abundance within the CHEU or Recovery Region G. Early indications, however, are that juvenile sawfish are likely recovering in the CHEU, due in large part to ESA-listing of the species and critical habitat. Still, a significant amount of data needs to be analyzed in the near future to better determine to what extent juveniles are recovering. The project area is not documented as a hotspot for juveniles. Though species abundance is generally linked to habitat availability, the permanent loss of an additional 121,968 ft^2 (2.8 ac) of shallow, euryhaline habitat, when added to 31.1 ac of shallow, euryhaline critical habitat already lost in critical habitat since the species was listed results in a total loss of only 0.04% (calculations noted above) of the estimated available shallow-water feature at time of listing. This is not expected to impede the 5% annual growth mandate for the juvenile population within Recovery Region G. Available data indicate the adult population in southwest Florida is reproducing and that the adult population trend was slightly increasing over the past decade. In a study conducted between 1989 and 2004 (Carlson et al. 2007), smalltooth sawfish relative abundance increased by about 5% per year (NMFS 2010). Yet, it is too early to determine whether we can interpret

this slight increasing trend as evidence of increasing juvenile populations' being recruited into the adult population in southwest Florida.

The 2.8 ac of projected lost shallow-water essential feature from the proposed action is greater than the annual cumulative loss from all other projects within the CHEU (2.31 ac/year); however, the area dredged has ample shallow-water feature on either side of the channel. The channel runs through wetlands that are mangrove fringed with shallow water throughout. Consequently, NMFS does not believe the size of the area dredged will significantly alter sawfish foraging or refuge habitat or preclude sawfish from transiting through the channel or otherwise impede smalltooth sawfish recovery.

9 CONCLUSION

After reviewing the current status of smalltooth sawfish critical habitat, the environmental baseline, and the cumulative effects, it is our Opinion that dredging the access channel will result in the loss of 121,968 ft^2 (2.8 ac) of shallow-water essential feature, and this loss will not impede the critical habitat's ability to support the smalltooth sawfish's conservation, despite the adverse effects. Given the nature of the project and the information provided above, we conclude that the action, as proposed, is likely to adversely affect, but is not likely to destroy or adversely modify, smalltooth sawfish critical habitat.

10 INCIDENTAL TAKE STATEMENT

NMFS does not anticipate that the proposed action will incidentally take any species and no take is authorized. Nonetheless, any takes of smalltooth sawfish or sea turtles shall be immediately reported to takereport.nmfsser@noaa.gov. Refer to the present Biological Opinion by title, issuance date, NMFS PCTS identifier number (SER-2016-18138), and USACE permit number (SAJ-2006-01964). At that time, consultation must be reinitiated.

11 CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA directs federal agencies to, in consultation with the Services, use their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of the threatened and endangered species. Conservation recommendations identified in Biological Opinions can assist action agencies in implementing their responsibilities under Section 7(a)(1). Conservation recommendations are discretionary activities 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. The following conservation recommendations are discretionary measures that NMFS believes are consistent with this obligation and therefore should be carried out by the federal action agency:

1. Continue public outreach and education on smalltooth sawfish and smalltooth sawfish critical habitat, in an effort to minimize interactions, injury, and mortality.

2. Provide funding to conduct directed research on smalltooth sawfish that will help further our understanding about the species (e.g., implement a relative abundance monitoring

program which will help define how spatial and temporal variability in the physical and biological environment influence smalltooth sawfish) in an effort to predict long-term changes in smalltooth sawfish distribution, abundance, extent, and timing of movements.

3. Fund surveys of detailed bathymetry and mangrove coverage within smalltooth sawfish critical habitat. Lee County and the USACE recently funded such surveys within the Cape Coral municipality. Data is needed from other municipalities within the CHEU to establish a more accurate baseline assessment of both critical habitat features (red mangroves and shallow-water areas).

4. Fund and support restoration efforts that rehabilitate and create shallow euryhaline and mangrove fringe habitats within the range of smalltooth sawfish.

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

12 REINITIATION OF CONSULTATION

This concludes NMFS's formal consultation on the proposed actions. As provided in 50 CFR 402.16, reinitiation of formal consultation is required where discretionary federal action agency involvement or control over the action has been retained, or is authorized by law, and if (1) any take occurs for ESA-listed species since there is no take authorized in this Opinion, (2) new information reveals effects of the agency action on listed species or designated critical habitat in a manner or to an extent not considered in this Opinion, (3) the agency action is subsequently modified in a manner that causes an effect on the listed species or critical habitat not considered in this Opinion, or (4) a new species is listed or critical habitat designated that may be affected by the action.

13 LITERATURE CITED

Andrews, T. J., B. F. Clough, and G. J. Muller. 1984. Photosynthetic gas exchange properties and carbon isotope ratios of some mangroves in North Queensland. Pages 15-23 *in* H. J. Teas, editor. Physiology and Management of Mangroves volume 9. Dr. W. Junk Publishers.

Ball, M. C., M. J. Cochrane, and H. M. Rawson. 1997. Growth and water use of the mangroves *Rhizophora apiculata* and *R. stylosa* in response to salinity and humidity under ambient and elevated concentrations of atmospheric CO_2. Plant, Cell & Environment 20(9):1158-1166.

Burchett, M. D., S. Meredith, A. Pulkownik, and S. Pulkownik. 1984. Short term influences affecting growth and distribution of mangrove communities in the Sydney region. Wetlands (Australia) 4(2):10.

Cahoon, D. R., P. Hensel, J. Rybczyk, K. L. McKee, C. E. Proffitt, and B. C. Perez. 2003. Mass tree mortality leads to mangrove peat collapse at Bay Islands, Honduras after Hurricane Mitch. Journal of Ecology 91(6):1093-1105.

Carlson, J. K., J. Osborne, and T. W. Schmidt. 2007. Monitoring the recovery of smalltooth sawfish, *Pristis pectinata*, using standardized relative indices of abundance. Biological Conservation 136(2):195-202.

Dahl, T. E., and C. E. Johnson. 1991. Status and trends of wetlands in the conterminous United States, mid-1970s to mid-1980s. U.S. Fish and Wildlife Service, Washington, D.C.

Ellison, J. 2010. Vulnerability of Fiji's mangroves and associated coral reefs to climate change. A review., Suva, Fiji, WWF South Pacific Office.

Field, C. D. 1995. Impact of expected climate change on mangroves. Hydrobiologia 295(1-3):75-81.

Garmestani, A. S., and H. F. Percival. 2005. Raccoon removal reduces sea turtle nest depredation in the ten thousand islands of Florida. Southeastern Naturalist 4(3):469-472.

Gilman, E. L., J. Ellison, N. C. Duke, and C. Field. 2008. Threats to mangroves from climate change and adaptation options: A review. Aquatic Botany 89(2):237-250.

Gilman, E. L., J. Ellison, V. Jungblut, H. Van Lavieren, L. Wilson, F. Areki, G. Brighouse, J. Bungitak, E. Dus, and M. Henry. 2006. Adapting to Pacific Island mangrove responses to sea level rise and climate change. Climate Research 32:161-176.

Gilmore, G. R. 1995. Environmental and Biogeographic Factors Influencing Ichthyofaunal Diversity: Indian River Lagoon. Bulletin of Marine Science 57(1):153-170.

GMFMC. 1998. Generic amendment for addressing essential fish habitat requirements in the following Fishery Management plans of the Gulf of Mexico: Shrimp Fishery of the Gulf of Mexico, United States waters; Red Drum Fishery of the Gulf of Mexico, Reef Fish Fishery of the Gulf of Mexico, Coastal Migratory Pelagic Resources (Mackerel) in the Gulf of Mexico and South Atlantic; Stone Crab Fishery of the Gulf of Mexico; Spiny Lobster Fishery of the Gulf of Mexico; Coral and Coral Reefs of the Gulf of Mexico. Gulf of Mexico Fishery Management Council, Tampa, Florida.

GMFMC. 2005. Generic Amendment 3 for addressing EFH requirements, HAPCs , and adverse effects of fishing in the following FMPs of the Gulf of Mexico: Shrimp, Red Drum, Reef Fish, Stone Crab, Coral and Coral Reefs in the GOM and Spiny Lobster and the Coastal Migratory Pelagic resources of the GOM and South Atlantic. Gulf of Mexico Fishery Management Council, Tampa, FL.

Harty, C. 2004. Planning strategies for mangrove and saltmarsh changes in southeast Australia. Coastal Management 32(4):405-415.

Hoegh-Guldberg, O., P. J. Mumby, A. J. Hooten, R. S. Steneck, P. Greenfield, E. Gomez, C. D. Harvell, P. F. Sale, A. J. Edwards, K. Caldeira, N. Knowlton, C. M. Eakin, R. Iglesias-Prieto, N. Muthiga, R. H. Bradbury, A. Dubi, and M. E. Hatziolos. 2007. Coral reefs under rapid climate change and ocean acidification. Science 318(5857):1737-1742.

Hutchings, P. A., and P. Saenger. 1987. Ecology of Mangroves. St. Lucia, Queensland, Australia; New York: University of Queensland Press.

IPCC. 2007. Climate Change 2007: Climate Change Impacts, Adaptation and Vulnerability. Summary for Policymakers. S. Solomon, and coeditors, editors. Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the IPPC (Intergovernmental Panel on Climate Change). Cambridge University Press, Cambridge, UK and New York, NY.

IPCC. 2013. Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change.

Pages 1535 *in* T. F. Stocker, and coeditors, editors. Cambridge University Press, Cambridge, United Kingdom; New York, NY.
IPCC. 2014. Climate change 2014: Impacts, adaptation, and vulnerability. IPCC Working Group II contribution to AR5. Intergovernmental Panel on Climate Change.
McLeod, E., and R. V. Salm. 2006. Managing mangroves for resilience to climate change. IUCN, Gland, Switzerland.
Meehl, G. A., T. F. Stocker, W. D. Collins, P. Friedlingstein, A. T. Gaye, J. M. Gregory, A. Kitoh, R. Knutti, J. M. Murphy, A. Noda, S. C. B. Raper, I. G. Watterson, A. J. Weaver, and Z. C. Zhao. 2007. Global climate projections. Pages 747-846 *in* S. Solomon, and coeditors, editors. Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth assessment Report of the Intergovernmental Panel on Climate Change. Cambridge University Press, Cambridge, United Kingdom and New York, NY.
Ning, Z. H., R. E. Turner, T. Doyle, and K. K. Abdollahi. 2003. Integrated assessment of the climate change impacts on the Gulf Coast Region: findings of the Gulf Coast Regional Assessment. LSU Graphic Services, Baton Rouge, Louisiana.
NMFS. 2000. Smalltooth Sawfish Status Review. National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Southeast Regional Office, Saint Petrsburg, FL.
NMFS. 2009. Smalltooth Sawfish Recovery Plan, Silver Spring, MD.
NMFS. 2010. Smalltooth Sawfish 5-Year Review: Summary and Evaluation. National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Protected Resources Division, St. Petersburg, FL.
Norton, S. L., T. R. Wiley, J. K. Carlson, A. L. Frick, G. R. Poulakis, and C. A. Simpfendorfer. 2012. Designating critical habitat for juvenile endangered smalltooth sawfish in the United States. Marine and Coastal Fisheries 4(1):473-480.
Orlando, S. P., Jr. , P. H. Wendt, C. J. Klein, M. E. Patillo, K. C. Dennis, and H. G. Ward. 1994. Salinity Characteristics of South Atlantic Estuaries. NOAA, Office of Ocean Resources Conservation and Assessment, Silver Spring, MD.
Pfeffer, W. T., J. T. Harper, and S. O'Neel. 2008. Kinematic Constraints on Glacier Contributions to 21st-Century Sea-Level Rise. Science 321(5894):1340-1343.
Poulakis, G. R. 2012. Distribution, Habitat Use, and Movements of Juvenile Smalltooth Sawfish, *Pristis pectinata*, in the Charlotte Harbor Estuarine System, Florida. Florida Institute of Technology, Melbourne, FL.
Poulakis, G. R., and J. C. Seitz. 2004. Recent occurrence of the smalltooth sawfish, *Pristis pectinata* (Elasmobranchiomorphi: Pristidae), in Florida Bay and the Florida Keys, with comments on sawfish ecology. Florida Scientist 67(27):27-35.
Poulakis, G. R., P. W. Stevens, A. A. Timmers, C. J. Stafford, and C. A. Simpfendorfer. 2013. Movements of juvenile endangered smalltooth sawfish, *Pristis pectinata*, in an estuarine river system: use of non-main-stem river habitats and lagged responses to freshwater inflow-related changes. Environmental Biology of Fishes 96(6):763-778.
Poulakis, G. R., P. W. Stevens, A. A. Timmers, T. R. Wiley, and C. A. Simpfendorfer. 2011. Abiotic affinities and spatiotemporal distribution of the endangered smalltooth sawfish, *Pristis pectinata*, in a south-western Florida nursery. Marine and Freshwater Research 62(10):1165-1177.

Quigley, D. T. G., and K. Flannery. 2002. Leucoptic harbour porpoise *Phocoena phocoena* (L.). Irish Naturalists' Journal 27(4):170.
Rahmstorf, S., A. Cazenave, J. A. Church, J. E. Hansen, R. F. Keeling, D. E. Parker, and R. C. J. Somerville. 2009. Recent climate observations compared to projections. Science 316(5825):709.
Reddering, J. S. V. 1988. Prediction of the effects of reduced river discharge on estuaries of the south-eastern Cape Province, South Africa. South African Journal of Science 84:726-730.
Saenger, P., and J. Moverley. 1985. Vegetative phenology of mangroves along the Queensland coastline. Pages 9 *in* M. G. Ridpath, and L. K. Corbett, editors. Ecology of the wet-dry tropics: Proceedings of a joint symposium with the Australian Mammal Society in association with the Darwin Institute of Technology. Blackwell Scientific Book Distributors, Melbourne.
SAFMC. 1998. Final Plan for the South Atlantic Region: Essential Fish Habitat Requirements for the Fishery Management Plan of the South Atlantic Fishery Management Council. South Atlantic Fishery Management Council, Charleston, SC.
Scavia, D., J. C. Field, D. F. Boesch, R. W. Buddemeier, V. Burkett, D. R. Cayan, M. Fogarty, M. A. Harwell, R. W. Howarth, C. Mason, D. J. Reed, T. C. Royer, A. H. Sallenger, and J. G. Titus. 2002. Climate change impacts on US coastal and marine ecosystems. Estuaries 25(2):149-164.
Semeniuk, V. 1994. Predicting the effect of sea-level rise on mangroves in northwestern Australia. Journal of Coastal Research 10(4):1050-1076.
Simpfendorfer, C. A. 2001. Essential habitat of the smalltooth sawfish (*Pristis pectinata*). Report to the National Fisheries Service's Protected Resources Division. Mote Marine Laboratory Technical Report.
Simpfendorfer, C. A. 2003. Abundance, movement and habitat use of the smalltooth sawfish. Final Report. Mote Marine Laboratory Mote Technical Report No. 929, Sarasota, FL.
Simpfendorfer, C. A. 2006. Movement and habitat use of smalltooth sawfish. Final Report. Mote Marine Laboratory, Mote Marine Laboratory Technical Report 1070, Sarasota, FL.
Simpfendorfer, C. A., G. R. Poulakis, P. M. O'Donnell, and T. R. Wiley. 2008. Growth rates of juvenile smalltooth sawfish, *Pristis pectinata* (Latham), in the western Atlantic. Journal of Fish Biology 72(3):711-723.
Simpfendorfer, C. A., T. R. Wiley, and B. G. Yeiser. 2010. Improving conservation planning for an endangered sawfish using data from acoustic telemetry. Biological Conservation 143:1460-1469.
Simpfendorfer, C. A., B. G. Yeiser, T. R. Wiley, G. R. Poulakis, P. W. Stevens, and M. R. Heupel. 2011. Environmental Influences on the Spatial Ecology of Juvenile Smalltooth Sawfish (*Pristis pectinata*): Results from Acoustic Monitoring. PLoS ONE 6(2):e16918.
Snedaker, S. 1995. Mangroves and climate change in the Florida and Caribbean region: scenarios and hypotheses. Hydrobiologia 295(1-3):43-49.
Stedman, S., and T. E. Dahl. 2008. Status and trends of wetlands in the coastal watersheds of the Eastern United States 1998-2004. National Oceanic and Atmospheric Administration, National Marine Fisheries Service, and U.S. Department of the Interior, U.S. Fish and Wildlife Service.
Trenberth, K. 2005. Uncertainty in Hurricanes and Global Warming. Science 308(5729):1753-1754.

UNESCO. 1992. Coastal systems studies and sustainable development. . Pages 276 *in* COMAR Interregional Scientific Conference. UNESCO, Paris, 21-25 May, 1991.
USEPA. 1994. Freshwater Inflow Action Agenda For The Gulf of Mexico; First Generation-Management Committee Report. U.S. Environmental Protection Agency.
USFWS. 1999. South Florida Multi-Species Recovery Plan Atlanta, Georgia. 2172p.
Vargas-Moreno, J. C., and M. Flaxman. 2010. Addressing the challenges of climate change in the greater everglades landscape. Massachusetts Institute of Technology, Cambridge, Massachusetts.
Wanless, H. R., B. M. Vlaswinkel, and K. L. Jackson. 2005. Coastal Landscape and Channel Evolution Affecting Critical Habitats at Cape Sable, Everglades National Park, Florida. University of Miami.
Whitfield, A. K., and M. N. Bruton. 1989. Some biological implications of reduced freshwater inflow into eastern Cape estuaries: a preliminary assessment. South African Journal of Science 85:691-694.
Wiley, T. R., and C. A. Simpfendorfer. 2007. The ecology of elasmobranchs occurring in the Everglades National Park, Florida: implications for conservation and management. Bulletin of Marine Science 80(1):171-189.