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NATIONAL MARINE FISHERIES SERVICE
Southeast Regional Office
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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-2015-1582 (RGP-RWR), Terrence and Juanita Keehn, Shoreline Stabilization, 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 construction of a concrete seawall 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: Kemp's ridley, loggerhead (Northwest Atlantic distinct population segment), 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 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,

For 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: Terrence and Juanita Keehn seawall installation with red mangrove removal within smalltooth sawfish critical habitat, Port Charlotte, Charlotte County, Florida

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

Consultation Number: SER-2015-17457

Approved by:

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

Date Issued: January 12, 2017

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Acronyms and Abbreviations

CFR	Code of Federal Regulations
CHEU	Charlotte Harbor Estuary System
CO_2	Carbon Dioxide
cSEL	Cumulative Sound Exposure

DPS	Distinct Population Segment
EFH	Essential Fish Habitat
ESA	Endangered Species Act
FDEP	Florida Department of Environmental Protection
FWRI	Fish and Wildlife Research Institute
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)
m^2	square 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 Charlotte 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 October 9, 2015. The USACE determined that the proposed project may affect, but is not likely to adversely affect, 3 species of swimming sea turtles (Kemp's ridley, green, and loggerhead) and smalltooth sawfish, may affect smalltooth sawfish critical habitat, and requested NMFS's concurrence. NMFS requested additional information via phone on December 14, 2015. Formal consultation was initiated on December 14, 2015, when all necessary information was received.

3 DESCRIPTION OF THE PROPOSED ACTION AND ACTION AREA

Proposed Action

The project is located at 26.95702°N, -82.15552°W, North American Datum 1983, within a dredged residential canal which is partially shoreline-armored but also has mangrove-fringed portions of unconsolidated shoreline on both sides where there are undeveloped residential lots such as the project site itself. The project site is a single-family lot at the terminus of a canal, located approximately 3.8 miles from Alligator Bay, through canals and fringing mangrove islands. The property address is 5084 Collingswood Boulevard, Port Charlotte, Charlotte County, Florida (Figure 1 and 2), approximately 25.3 miles from the Gulf of Mexico. The 100 linear feet (lin ft) of shoreline fronting at the project site is natural, unarmored (i.e., no seawall) and vegetated with red mangroves. Nearshore water depths are less than 3 feet (ft) measured at mean low water (MLW) and the water bottom is a mixture of mud and sand.

The applicant intends to remove approximately 400 square feet (ft^2) of red mangroves along the 100 lin ft property line and install a concrete slab seawall (Figure 3). Concrete slabs will be jetted into place and mangroves removed using mechanical equipment with all work being done from shore (R. Rouan, USACE, pers. comm. to J. Cavanaugh, NMFS, December 14, 2015, confirming water jetting for seawall installation).

In-water construction is expected to take 7-10 days 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). The applicant will purchase 0.01 mitigation credits from Little Pine Island Mitigation Bank to offset the mangrove removal for purposes of the USACE's permitting authorities.

Action Area

The action area is defined by regulation as "all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action" (50 CFR 402.02). The action area includes the areas in which construction will take place, as well as the immediately surrounding water areas that may be impacted by direct (immediately through noise and sedimentation) and indirect (later in time, by diminished foraging resources from lost mangroves) effects of the actions. The action area for this project also includes the waters and submerged lands within the residential canal where the project is located.

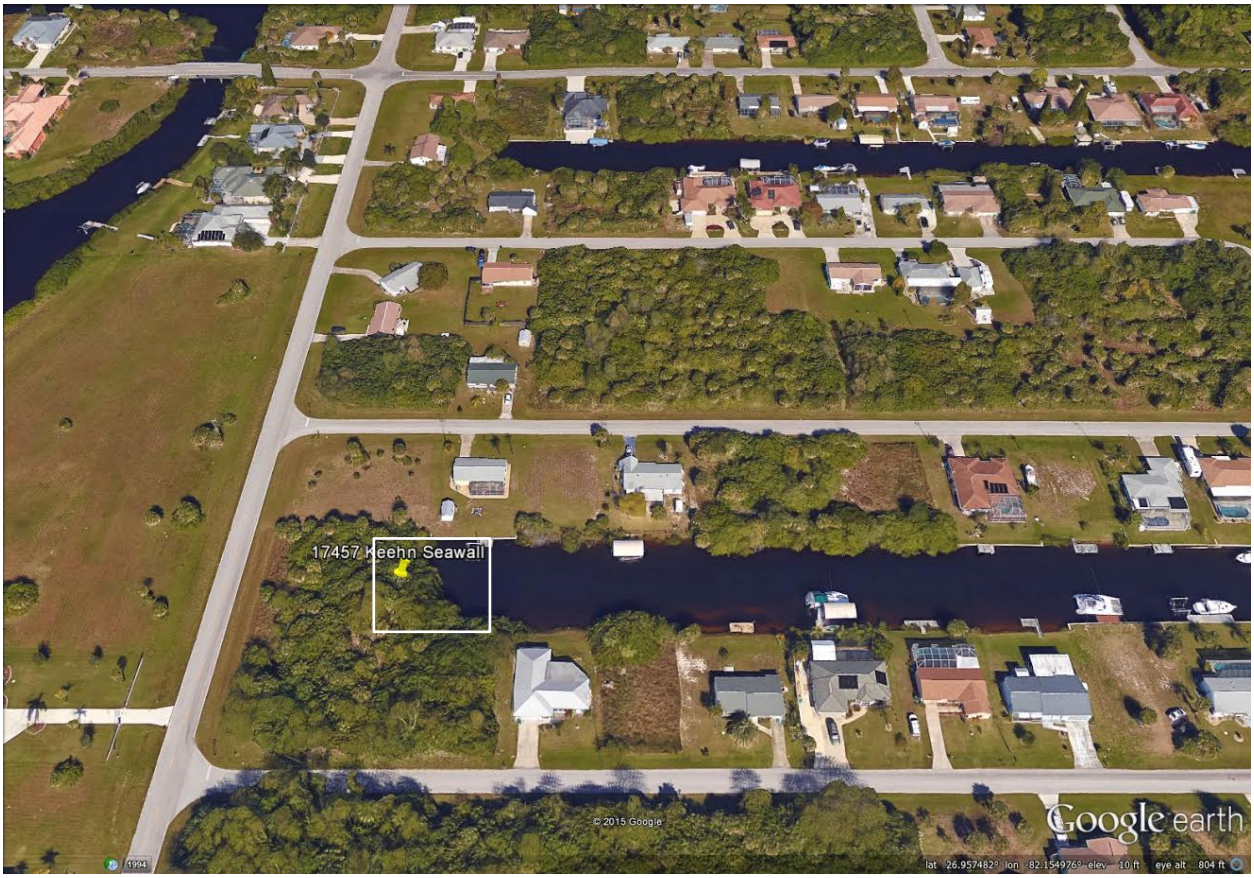


Figure 1. Image showing Keehn seawall project location (white square) (©2015 Google)

Figure 2. Image showing project location (white circle) and location within the residential canals and fringing mangrove islands leading into Charlotte Harbor (©2015 Google)

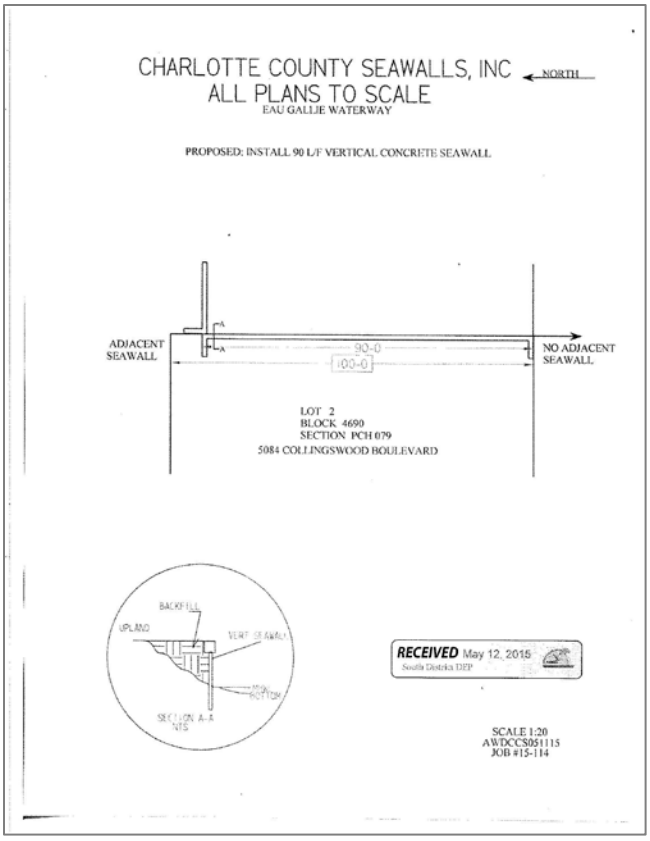


Figure 3. Proposed plans for 100-lin-ft seawall installation (© 2015 L&T Engineering, Inc.)

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:

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

Species	ESA Listing Status	Action Agency Effect Determination	NMFS Effect Determination
Sea Turtles			
Green (North and South Atlantic distinct population segments [DPSs])	T	NLAA	NLAA
Kemp's ridley	E	NLAA	NLAA
Loggerhead (Northwest Atlantic Ocean DPSs)	T	NLAA	NLAA
Fish			
Smalltooth sawfish (U.S. DPS)	E	NLAA	NLAA

Species	ESA Listing Status	Action Agency Effect Determination	NMFS Effect Determination
E = endangered; T = threatened; NLAA = may affect, not likely to adversely affect			

Table 2. Effects Determinations for Designated Critical Habitat the Action Agency or NMFS Believes May Be Affected by the Proposed Action

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 adversely modify
LAA = likely to adversely affect			

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 removal of mangroves and seawall installation), and physical exclusion from the area blocked by turbidity curtains. However, we believe these effects will be insignificant due to the small project footprint (approximately 400 ft^2) and the project's limited duration (7-10 days for all in-water work). Additionally, there are alternative sites in the area that sea turtles and sawfish can use for foraging or refuge such as the extensive mangrove-fringed islands adjacent and nearby to the residential canal where the project area is located.

2. Sea turtles and smalltooth sawfish may be adversely affected by construction activities involving mechanical removal of red mangroves and seawall installation. Juvenile sawfish, in particular, use the shallow water and red mangroves for foraging and refuge. The use of mechanical equipment in-water may physically injure sea turtles and smalltooth sawfish. However, sea turtles and sawfish are mobile species and expected to avoid the mechanical equipment during seawall installation and mangrove removal, which will occur in a very small area over a short duration (7-10 days). Therefore, NMFS believes that physical impacts directly related to in-water construction equipment are discountable.

3. Construction activities resulting in the removal of approximately 400 ft^2 of red mangrove habitat may adversely affect juvenile smalltooth sawfish. Juvenile sawfish use the shallow water edges and red mangroves for foraging and refuge. The removal of red mangroves in the proposed project area (about 400 ft^2) is relatively small compared to the much greater area of mangrove habitat just outside of the residential canal. We believe the effects of a relatively small loss of red mangrove habitat to smalltooth sawfish are insignificant. Sawfish will still have extensive mangroves remaining post-construction outside of the residential canal and also within the canal where shorelines have not yet been consolidated. Impacts to the essential features of critical habitat (i.e., shallow, euryhaline habitat) may affect reproduction of this species and will be discussed further in Section 5.

4. Mechanical removal of red mangroves and seawall installation will cause increased turbidity that may adversely affect sea turtles and sawfish. 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 mangrove removal and seawall installation. Elevated turbidity during construction will be temporary and for a short duration (i.e., 7-10 days) 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.

Status of Critical Habitat Likely to be Adversely Affected

Smalltooth Sawfish Critical Habitat

The U.S. Distinct Population Segment (DPS) of smalltooth sawfish was listed as endangered on April 1, 2003; however, at that time, NMFS was unable to determine critical habitat. After funding additional studies necessary for the identification of specific habitats and environmental features important for the conservation of the species, establishing a smalltooth sawfish recovery team, and reviewing the best scientific data available, NMFS issued a Final Rule (74 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 [mi^2]) 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).

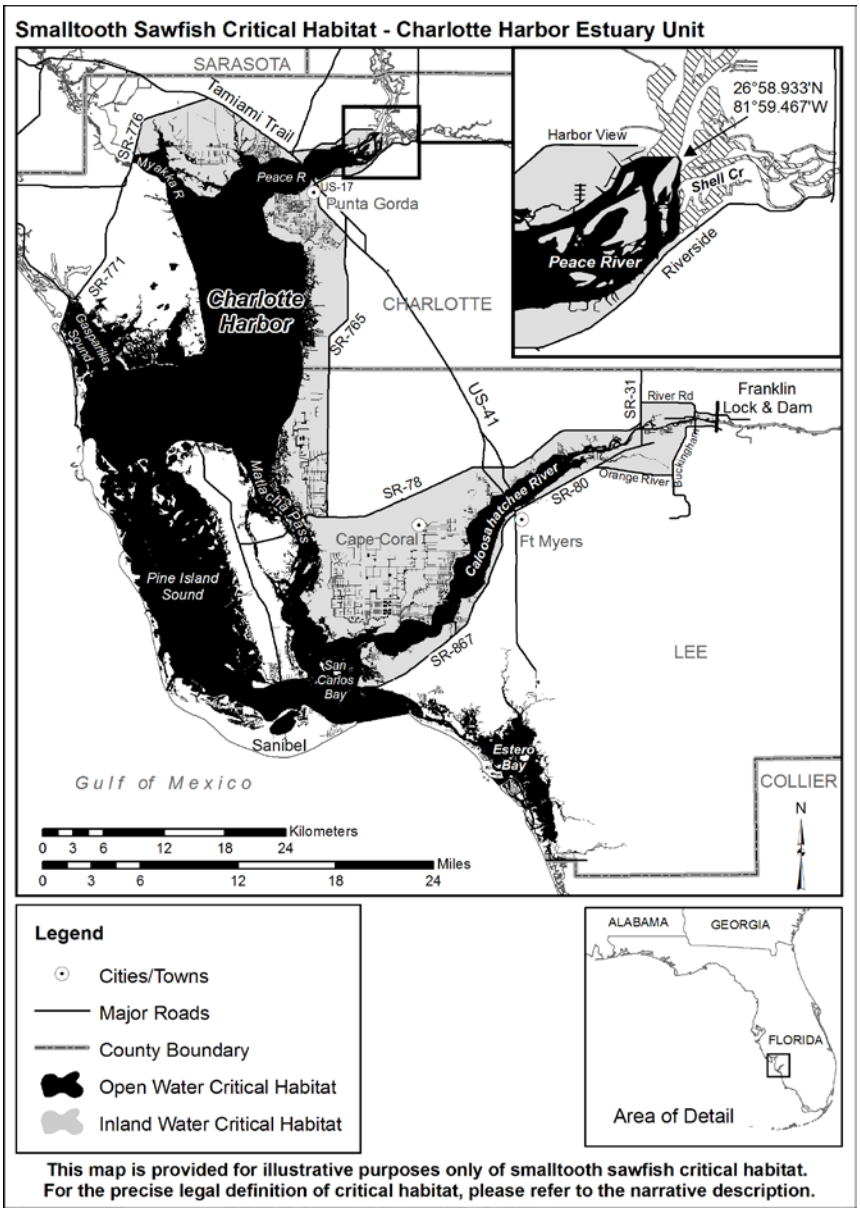


Figure 4. Map of smalltooth sawfish critical habitat – Charlotte Harbor Estuary Unit (CHEU)

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 2009b) . 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 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) (Final Rule, 74 FR 45353). 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 less 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 (See Figure 3, Diagrams A and B). 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 critical habitat. Destruction or adverse modification means a direct or indirect alteration that appreciably diminishes the value of critical habitat for the conservation of a listed species. 50 CFR § 402.02. Therefore, proposed actions that may

affect critical habitat require an analysis of potential impacts to each essential feature, and how such impacts would diminish the conservation value of the designated critical habitat. 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 oversees 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 to the USACE 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 deepwater 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. Additionally, 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.

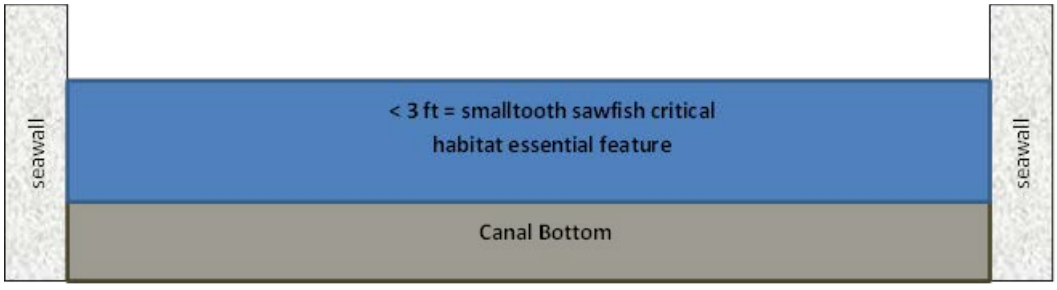
Transportation Infrastructure Construction

Potential adverse effects from federal transportation projects in the action area 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 1993-1994 demonstrated that over 7,000 kilometers 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 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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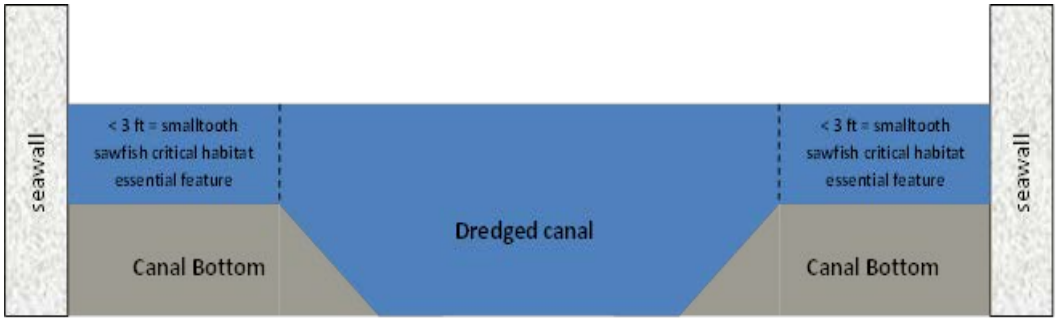

C.

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 human-induced 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 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 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 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).

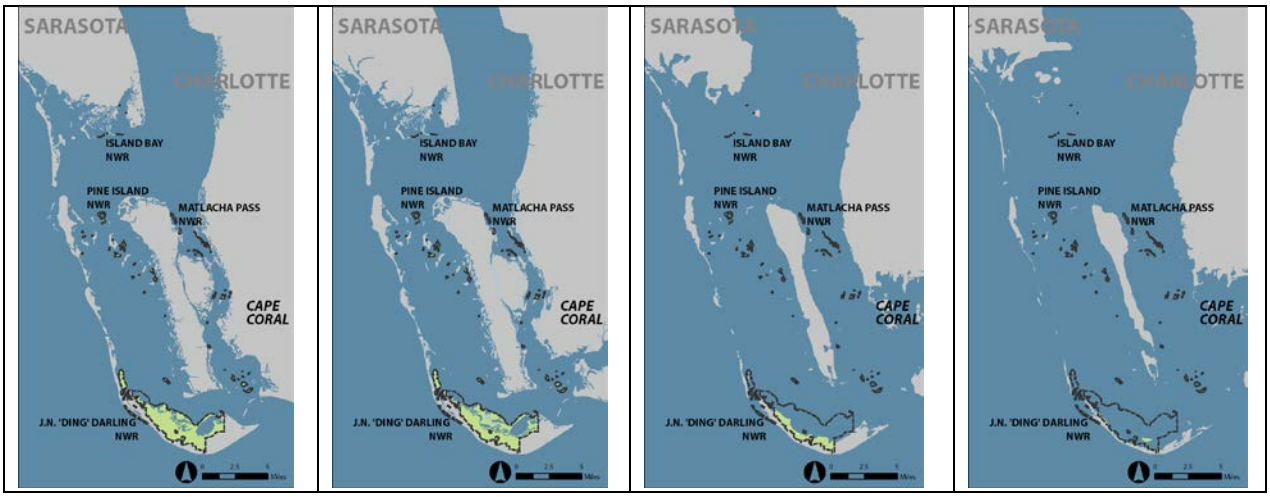

Figure 6. From left to right: current shoreline, + 3.5 in (+ 9 cm); + 18.5 in (+ 47 cm); and + 38.97 in (+ 99 cm) sea level rise by 2060[1].

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.

Other threats to mangroves result from climate change: fluctuations in precipitation amounts and distribution, seawater temperature, 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

[1] 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.

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 human-induced 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 reduce 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.

Status of Critical Habitat within the Action Area

The subject property is a single-family lot, located approximately 3.8 miles from Alligator Bay, through residential canal arteries and fringing mangrove islands (Figure 7). The benthos (bottom habitat) at the site is described as a mixture of mud and sand. There are approximately 400 ft^2 of red mangroves on the property located directly within the project footprint that are slated for removal by the proposed action. We expect continued shoreline armoring within the residential canal(s) because owners need shoreline armoring in order to obtain permits to build homes on the lots purchased. Therefore, we expect the loss of most canal mangroves in and near the action area unless alternative shoreline armoring strategies are adopted in the future. For example, living shoreline approaches that preserve mangrove frontage for residential canal properties would be an alternative shoreline armoring strategy.

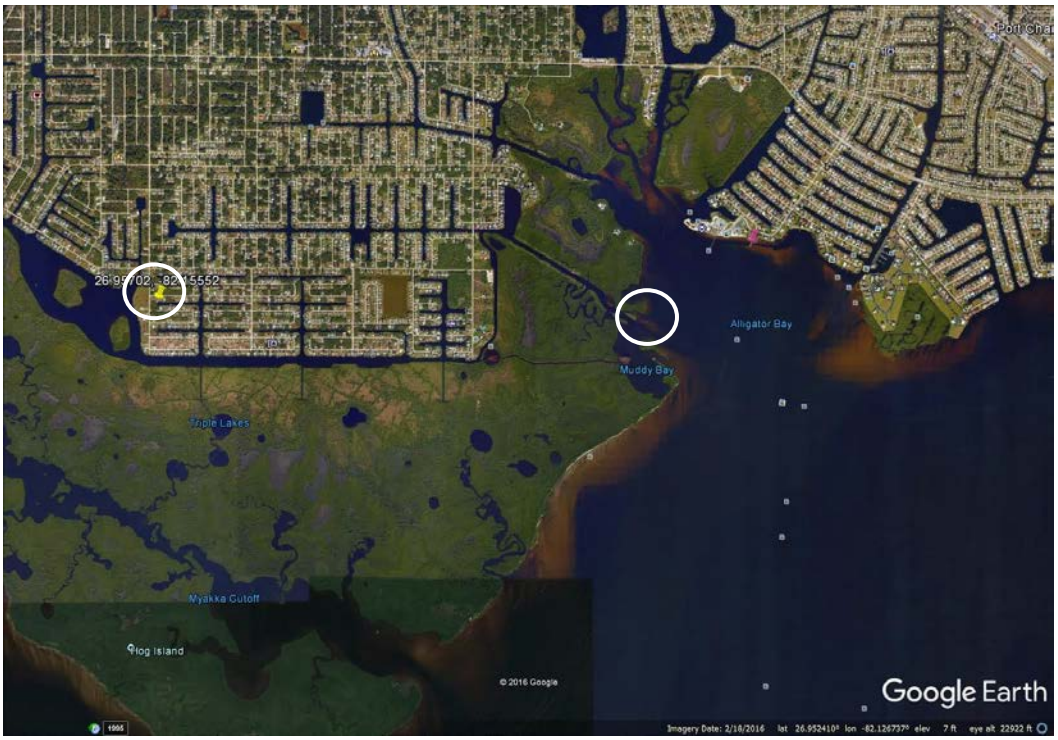

Figure 7. Image showing project location in relation to the nearest outlet into Alligator Bay (white circles) (©2016 Google)

Factors Affecting Critical Habitat within the Action Area

Federal Actions
In 2013, The USACE previously permitted shoreline armoring (riprap revetment placed to stabilize a failing seawall) on a neighboring residential property several canals northeast of the project site discussed in this Opinion (SER-2013-13778). That project resulted in a letter of concurrence because there were no red mangroves and no shallow-water essential feature present that would be adversely affected by the proposed riprap revetment installation. No other federal permitted projects are known to have occurred within the action area, as per a review of the NMFS PRD's completed consultation database (December 20, 2016).

State or Private Actions
A number of nonfederal activities that may adversely affect designated critical habitat for smalltooth sawfish in the CHEU include impacts from residential shoreline stabilization activities that do not obtain federal permits (i.e., seawall, riprap). The direct and indirect impacts from some of these activities are difficult to quantify, and we are aware of none in the action area considered here.

Other Potential Sources of Impacts to the Environmental Baseline
Stochastic events, such as hurricanes, are common throughout the range of smalltooth sawfish, especially in the current core of its range (i.e., south and southwest Florida). These events are by nature unpredictable and their effect on the recovery of the species is unknown; however, they have the potential to impede recovery directly if animals die as a result of them, or indirectly if important habitats are damaged as a result of these disturbances. In 2005, Hurricane Charley

likely damaged habitat in and around the action area. Other stochastic events, such as cold snaps, like the one that occurred in January 2010, can have fatal impacts on smalltooth sawfish (Poulakis et al. 2011).

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). 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 minimization of impacts to EFH resources.

6 EFFECTS OF THE ACTION ON CRITICAL HABITAT

Red Mangrove 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 in the action area but will be unaffected by the proposed action. The red mangrove essential feature found within the action area will be adversely affected by their removal to accommodate the new seawall. This will result in a permanent loss of approximately 400 ft^2 along 100 lin ft of shoreline of the red mangrove habitat, potential forage and shelter area for juvenile smalltooth sawfish. Using remote sensing data acquired from the Fish and Wildlife Research Institute (FWRI), we were able to compile information relating to the total area of this essential feature within smalltooth sawfish critical habitat. The total amount of red mangrove shoreline for the CHEU is approximately 5,512,320 lin ft (1,044 mi). While the available red mangrove essential feature will be diminished by approximately 100 lin ft (400 ft^2), 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 red mangrove 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 402.14).

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).

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. While the degradation and modification of habitat is not likely the primary reason for the decline of smalltooth sawfish abundance and their contracted distribution, it has likely been a significant factor.

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.

8 INTEGRATION AND 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, and 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 conservation role the action area serves with regard to the function of the overall 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 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. We conduct this analysis by evaluating whether the impacts to critical habitat would interfere with relevant 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 2009b). 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 listed 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 maintain 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.

Red Mangrove Essential Feature Impacts

The proposed project will result in the permanent loss of approximately 400 ft^2 of the red mangrove essential feature of critical habitat along 100 lin ft of shoreline. We must assess the impact of this loss in combination with all losses of red mangroves since the time the sawfish was listed, to determine whether and how relevant recovery objectives will be impacted by the project.

At the time of listing in 2003, remote sensing data from FWRI indicated that approximately 5,512,320 linear feet of red mangrove shoreline was available in the CHEU. From the time of critical habitat designation in September 2009 until September 1, 2016, NMFS completed 107 Section 7 consultations on federally permitted projects within the CHEU that resulted in the total loss of approximately 12,302 lin ft of red mangrove shoreline.[2] This equates to an average annual loss rate of 1,758 lin ft of red mangrove shoreline (12,302 lin ft/84 months [since sawfish critical habitat designation in Sept 2009 – Sept 2016[3]] = 146.5 lin ft lost per month x 12 = 1,758 lin ft per year). Assuming similar rates of red mangrove loss between May 2003 and the time of critical habitat designation in 2009, we estimate that 11,280.5 lin ft of red mangrove were lost prior to designation (77 months x 146.5 lin ft/month = 11,280.5 lin ft). Taking into consideration the estimated total of red mangrove shoreline at time of listing (5,512,320 lin ft), the estimated loss of red mangroves prior to critical habitat designation (11,280.5 lin ft), and the estimated loss of red mangroves since critical habitat designation (12,320 lin ft), we calculated that approximately 5,488,737.5 lin ft of red mangroves currently remain available for juvenile smalltooth sawfish (5,512,320 – 23,582.5[11,280.5 + 12,302] = 5,488,737.5). While this number only takes federally permitted projects into account, there are very few non-federally permitted projects that could impact red mangrove shoreline in Charlotte County where the project is located due to the federal nexus for most in-water construction work.

According to the recovery plan objectives, 95% of red mangrove habitat available at the time of the species listing (i.e., approximately 5,488,737.5 lin ft of red mangrove habitat in the CHEU) must be maintained and effectively protected to facilitate recovery of the sawfish. This requirement is based on the fact that although the CHEU is part of the larger Recovery Region G, 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 100 lin ft of red mangroves (100 lin ft/5,488,737.5 lin ft remaining in CHEU = 0.000018 x 100 = 0.0018%). While this is a reduction in the total area available, it represents a tiny fraction of the overall red mangrove habitat available in the CHEU, and will neither appreciably reduce the amount of available habitat nor appreciably diminish the functionality of the habitat in serving juvenile sawfish. The losses from this project will not provide any impediment to achieving the recovery objective of effectively protecting 95% of the mangrove habitat.

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, FWRI has conducted an ongoing study in the CHEU

[2] NMFS calculates loss of this essential feature on a quarterly basis.

[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.

supported primarily by funding from NMFS's Section 6 Species Recovery Grants Program. The study's objective 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 the study, there are not enough data to discern the trend in juvenile abundance within the recovery region. However, early indications are that juvenile sawfish are likely recovering in the CHEU, due in large part to ESA-listing of the species and designation of critical habitat, and the increased conservation awareness on the part of the public resulting from these actions. Still, a significant amount of data needs to be analyzed in the near future to better determine the extent to which juveniles are recovering. The action area is not documented as a hotspot for juveniles. Though species abundance is generally linked to habitat availability, the permanent loss of an additional 100 lin ft (400 ft^2) of red mangrove habitat, in addition to 12,302 lin ft of red mangrove habitat already lost in critical habitat, is not likely to impede the 5% annual growth recovery objective 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' recruitment into the adult population in southwest Florida.

Based on the foregoing, we conclude that the proposed action's adverse effects on smalltooth sawfish critical habitat will not diminish the critical habitat's conservation value—supporting recruitment of juveniles into the adult population—or otherwise impede the recovery objectives for the species.

9 CONCLUSION

After reviewing the current status of smalltooth sawfish critical habitat, the environmental baseline, and the cumulative effects, it is our Opinion that the proposed seawall installation resulting in the loss of 400 ft^2 (100 lin ft) of red mangrove essential feature will not impede the critical habitat's ability to support the smalltooth sawfish's conservation, despite permanent 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 and will require reinitiation of consultation. Refer to the present Biological Opinion by title, issuance date, NMFS PCTS identifier number (SER-2015-17457), and USACE permit number (SAJ-2015-1582). At that time, consultation must be reinitiated.

11 CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA directs federal agencies to utilize their authority to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. We believe that USACE should implement the following conservation recommendations:

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).

To stay abreast of actions minimizing or avoiding adverse effects or benefitting listed species or their habitats, we request notification of the implementation of any conservation recommendations.

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 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 actions that may affect listed species and/or critical habitat in a manner or to an extent not previously considered, (3) the identified actions are subsequently modified in a manner that cause an effect to listed species or critical habitat that was not considered in the Opinion, or (4) a new species is listed or critical habitat designated that may be affected by the identified actions.

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., and coauthors. 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., and coauthors. 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, FL.

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., and coauthors. 2007. Coral reefs under rapid climate change and ocean acidification. Science 318(5857):1737-42.

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.

McLeod, E., and R. V. Salm. 2006. Managing mangroves for resilience to climate change. IUCN, Gland, Switzerland.

Meehl, G. A., and coauthors. 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.

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., and coauthors. 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. , and coauthors. 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., and coauthors. 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.

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., and coauthors. 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, MA.

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.

SEA TURTLE AND SMALLTOOTH SAWFISH CONSTRUCTION CONDITIONS

The permittee shall comply with the following protected species construction conditions:

a. The permittee shall instruct all personnel associated with the project of the potential presence of these species and the need to avoid collisions with sea turtles and smalltooth sawfish. All construction personnel are responsible for observing water-related activities for the presence of these species.

b. The permittee shall advise all construction personnel that there are civil and criminal penalties for harming, harassing, or killing sea turtles or smalltooth sawfish, which are protected under the Endangered Species Act of 1973.

c. Siltation barriers shall be made of material in which a sea turtle or smalltooth sawfish cannot become entangled, be properly secured, and be regularly monitored to avoid protected species entrapment. Barriers may not block sea turtle or smalltooth sawfish entry to or exit from designated critical habitat without prior agreement from the National Marine Fisheries Service's Protected Resources Division, St. Petersburg, Florida.

d. All vessels associated with the construction project shall operate at "no wake/idle" speeds at all times while in the construction area and while in water depths where the draft of the vessel provides less than a four-foot clearance from the bottom. All vessels will preferentially follow deep-water routes (e.g., marked channels) whenever possible.

e. If a sea turtle or smalltooth sawfish is seen within 100 yards of the active daily construction/dredging operation or vessel movement, all appropriate precautions shall be implemented to ensure its protection. These precautions shall include cessation of operation of any moving equipment closer than 50 feet of a sea turtle or smalltooth sawfish. Operation of any mechanical construction equipment shall cease immediately if a sea turtle or smalltooth sawfish is seen within a 50-ft radius of the equipment. Activities may not resume until the protected species has departed the project area of its own volition.

f. Any collision with and/or injury to a sea turtle or smalltooth sawfish shall be reported immediately to the National Marine Fisheries Service's Protected Resources Division (727-824-5312) and the local authorized sea turtle stranding/rescue organization.

g. Any special construction conditions, required of your specific project, outside these general conditions, if applicable, will be addressed in the primary consultation.

Revised: March 23, 2006