



UNITED STATES DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

NATIONAL MARINE FISHERIES SERVICE

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Chief, Fort Myers Section  
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Department of the Army  
1520 Royal Palm Square Boulevard, Suite 310  
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JAN 27 2017

Ref.: SAJ-2016-00030 (NW-MMB), SER-2016-17661, James Inglis, Maintenance Dredge, Goodland,  
Collier 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 within a channel providing recreational vessel service to a residential canal and dredging underneath 2 associated vessel slips 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, Kemp's ridley, green (North and South Atlantic distinct population segments), leatherback, and hawksbill sea turtles; smalltooth sawfish; and smalltooth sawfish critical habitat. NMFS concludes that the proposed action will have no effect on hawksbill and leatherback sea turtles and is not likely to adversely affect the remaining 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](mailto:Joseph.Cavanaugh@noaa.gov).

Sincerely,

Roy E. Crabtree, Ph.D.  
For 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:** Mr. James Inglis Maintenance Dredge (shallow-water essential feature removal within smalltooth sawfish critical habitat)  
Goodland, Collier 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-2016-17661

**Approved by:**

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

**Date Issued:**

JANUARY 27, 2017

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## Acronyms and Abbreviations

CFR	Code of Federal Regulations
CO <sub>2</sub>	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	Intergovernmental Panel on Climate Change
MHWL	Mean High Water Line
MIT	Massachusetts Institute of Technology
MLW	Mean Low Water
MLLW	Mean Lower Low Water
NMFS	National Marine Fisheries Service
NOAA	National Ocean and Atmospheric Association
Opinion	Biological Opinion
RPMs	Reasonable and Prudent Measures
TTIU	Ten Thousand Islands and 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 <sup>2</sup>	square feet
in	inches
km	kilometer(s)
lin ft	linear feet
m	meter(s)
mi	miles
mi <sup>2</sup>	square miles
yd <sup>3</sup>	cubic yards

## **1 INTRODUCTION**

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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 Collier 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**

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NMFS received a request for a formal consultation under Section 7 of the ESA from the USACE dated January 11, 2016. The USACE determined that the proposed project may affect, but is not likely to adversely affect, 5 species of swimming sea turtles (Kemp’s ridley, green, hawksbill, leatherback, and loggerhead) and smalltooth sawfish, may affect smalltooth sawfish critical habitat, and requested NMFS’s concurrence. NMFS requested additional information via email on January 25, 2016, March 24, 2016, and again on July 1, 2016. We received a final response on August 24, 2016, and initiated formal consultation that same day after determining all necessary information was received.

## **3 DESCRIPTION OF THE PROPOSED ACTION AND ACTION AREA**

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### **Proposed Action**

The project site is an access recreational vessel channel within Goodland Key serving a residential canal community as shown in Figure 1. The project is located at 25.923261°N, 81.643619°W, North American Datum 1983, within a previously dredged canal/channel outlet and underneath 2 existing recreational vessel slips. The canal outlet into the channel has

unconsolidated shoreline (wetlands) on the opposite side across from the James Inglis home and vessel slips. The canal entrance where the project site is located opens out into the adjacent mangrove keys and waterway (Figures 1-3). The site is adjacent to Coon Key Pass and is located approximately 7 miles (mi) south/southwest to the Gulf of Mexico through a labyrinth of shallow bay keys (Figure 2). The applicant intends to dredge approximately 750 cubic yards (yd<sup>3</sup>) of water bottom within an area of approximately 9,340 square feet(ft<sup>2</sup>) to a depth of -5 feet (ft) at mean low water (MLW) using a mechanical (e.g., clamshell) dredge operated from a barge. The proposed dredge area is shown in Figure 3. Approximately 450 yd<sup>3</sup> of the 750 yd<sup>3</sup> total anticipated dredge volume or 2,430 ft<sup>2</sup> of the proposed 9,340 ft<sup>2</sup> will occur in water depth that is approximately -3 ft deep or less at MLW. Dredge spoil will be placed on an adjacent undeveloped lot used as a staging area for disposal. The staging area will be surrounded on all sides by hay bales and silt fences to contain any runoff of dredge slurry back into the adjacent project site waters. Dredge spoil will subsequently be removed to a permitted land disposal site. Currently, water depths in the project area range from -1 to -4 ft deep within the intended dredge footprint. The sediment is dominated by fine sand and silt. There are no seagrasses or corals within the project area.

In-water construction is expected to take approximately 2 weeks 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).

#### **Action Area**

The action area is defined by regulation as “all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action” (50 Code of Federal Regulations (CFR) 402.02). The action area includes the areas in which construction will take place, as well as the immediately surrounding water areas that may be impacted by direct (immediate) and indirect (later in time) effects of the actions (e.g., noise, sedimentation). The action area for this project includes the waters and submerged lands within the residential canal where the project is located. In addition, it includes the immediate vicinity of the project site within the intended dredge footprint (9,340 ft<sup>2</sup>) and 150 feet east of the dredge area where the residential canal connects with Coon Key Pass (see Figure 1).



Figure 1. Image showing James Inglis project location (©2016 Google); approximate action area circumscribed within patterned rectangle.



Figure 2. Image showing project site within Goodland Key in relation to surrounding keys and Gulf of Mexico (©2016 Google)



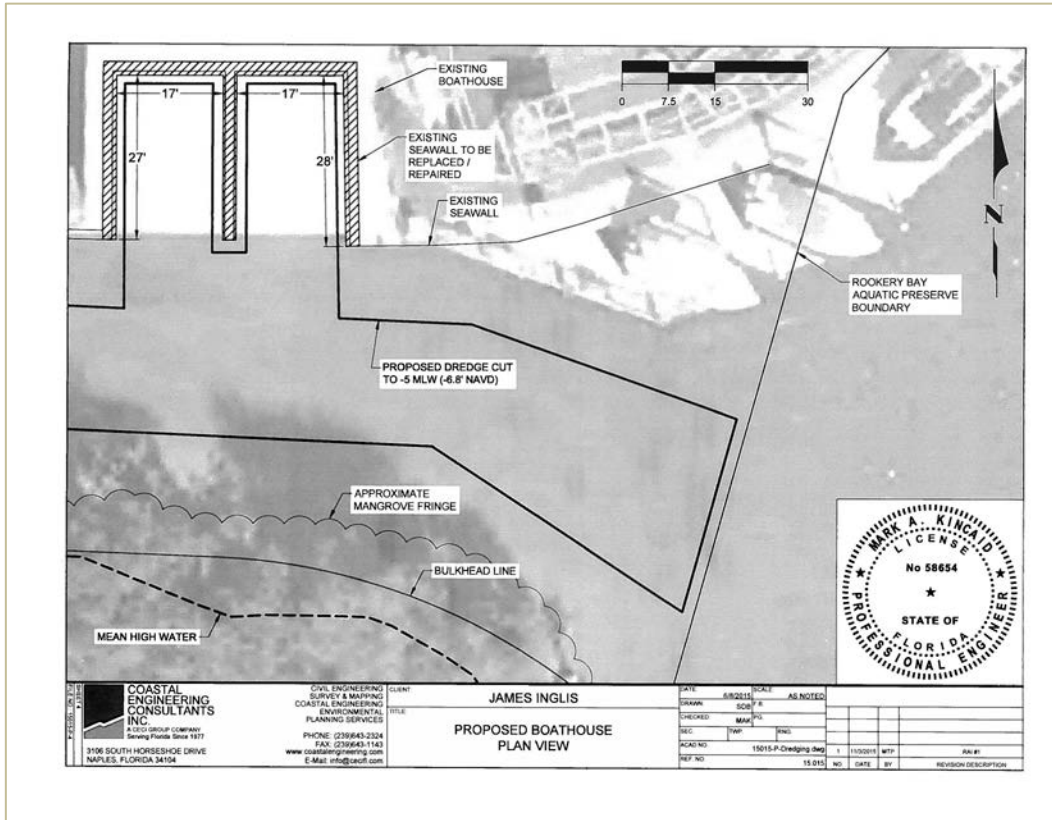


Figure 3. Proposed Project Design to -5 ft MLW (© 2016 Coastal Engineering Consultants, Inc.)

#### 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 Project**

Species	ESA Listing Status	Action Agency Effect Determination	NMFS Effect Determination
<b>Sea Turtles</b>			
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
Leatherback	E	NLAA	NE



Species	ESA Listing Status	Action Agency Effect Determination	NMFS Effect Determination
Hawksbill	E	NLAA	NE
<b>Fish</b>			
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	Ten Thousand Islands/Everglades Unit (TTIU) for protection and restoration of nursery habitat	LAA	LAA, Will not 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 which are not supported at or near the project site. Leatherback sea turtles have pelagic, deep water life history, where they forage primarily on jellyfish. Hawksbill sea turtles typically inhabit inshore creek and hard bottom areas where they forage primarily on encrusting sponges. Thus, these 2 species will not be affected.

In the following sections, we describe why we believe smalltooth sawfish and 3 ESA-listed sea turtles (Kemp’s ridley, green, and loggerhead) may be present in the action area, and why they may be affected, but are not likely to be adversely affected, by the project. We also explain our belief that smalltooth sawfish critical habitat may be adversely affected.

**Species Not Likely to be Adversely Affected**

*Sea Turtles and Smalltooth Sawfish*

We have identified the following potential effects to 3 ESA-listed sea turtles (Kemp’s ridley, green, and loggerhead) 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 2 weeks for all in-water work [daylight hours only]).

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 on the periphery of the canal where the project area is located.

2. Sea turtles and smalltooth sawfish may be adversely affected by habitat impacts resulting from the mechanical dredging. Juvenile sawfish, in particular, use the shallow water and red mangroves for foraging and refuge. Dredging will permanently remove approximately 2,430 ft<sup>2</sup> of shallow water habitat less than 3 ft MLLW; however, given the much greater acreage of shallow water habitat outside of the canal/channel and the available shallow water habitat that will remain along the edges of the channel, NMFS believes the temporary loss of this shallow water area within the project footprint will be insignificant. Sawfish will still have extensive shallow water habitat remaining post-dredging outside of the residential canal and vessel channel. The onsite red mangroves will not be removed and the dredging will only slightly alter the shallow-water habitat in the action area and will not prevent juvenile sawfish from using the nearshore shallow-water habitat, especially around the mangrove-fringed shoreline. Additionally, sawfish will continue to be able to transit within the canal/channel post-construction, and there are extensive shallow water areas throughout the mangrove-fringed islands/keys in the immediate area surrounding the residential canal system. Therefore, NMFS believes that physical impacts to habitat directly related to in-water construction equipment will be insignificant. Impacts to 1 of 2 essential features of critical habitat (i.e., shallow-water habitat) may affect reproduction of this species and will be discussed further in Section 5.
3. Sea turtles and smalltooth sawfish may be adversely affected by being struck by the clamshell dredge and/or the barge used to carry the dredge. Sea turtles and smalltooth sawfish are mobile species and expected to avoid the project area during dredging which will occur over a small area and short duration (2 weeks during daylight hours). Therefore, NMFS believes that physical impacts directly related to in-water construction equipment are extremely unlikely to occur and are, therefore, discountable.
4. Mechanical dredging will cause increased turbidity that may adversely affect listed species. But 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. Silt fences and hay bales will be placed on the land-based dredge staging area and these turbidity controls are expected to contain any dredge slurry from draining into the surrounding water while the dredge spoil remains on site before being removed for disposal. Elevated turbidity during construction will be temporary and for a short duration (i.e., 2 weeks total but a few days only for each dredge section) 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 will be insignificant.

## **Status of Critical Habitat Likely to be Adversely Affected**

### *Smalltooth Sawfish Critical Habitat*

The U.S. 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 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 [mi<sup>2</sup>]) of coastal habitat, and the TTIU, which is comprised of approximately 619,013 ac (967 mi<sup>2</sup>) of coastal habitat.

### *Critical Habitat Unit Impacted by this Action*

This consultation focuses on an activity occurring in the TTIU, which encompasses portions of Collier, Monroe, and Miami-Dade Counties (Figure 4). The unit includes the waters of Everglades National Park, Florida Bay, Everglades City, Cape Romano-Ten Thousand Islands Aquatic Preserve, and the portion of Rookery Bay Aquatic Preserve south of state road 92. The few developed regions of the unit include the areas of Goodland, Everglades City, Plantation, Chokoloskee, and Flamingo. The unit receives freshwater from a number of creeks and rivers found along the coast, including those associated with the Shark River Slough which originates in and drains central Florida. The TTIU is a relatively shallow nearshore environment with a diversity of habitats including submerged aquatic vegetation, oyster bars, mud banks, beaches, and mangrove communities.

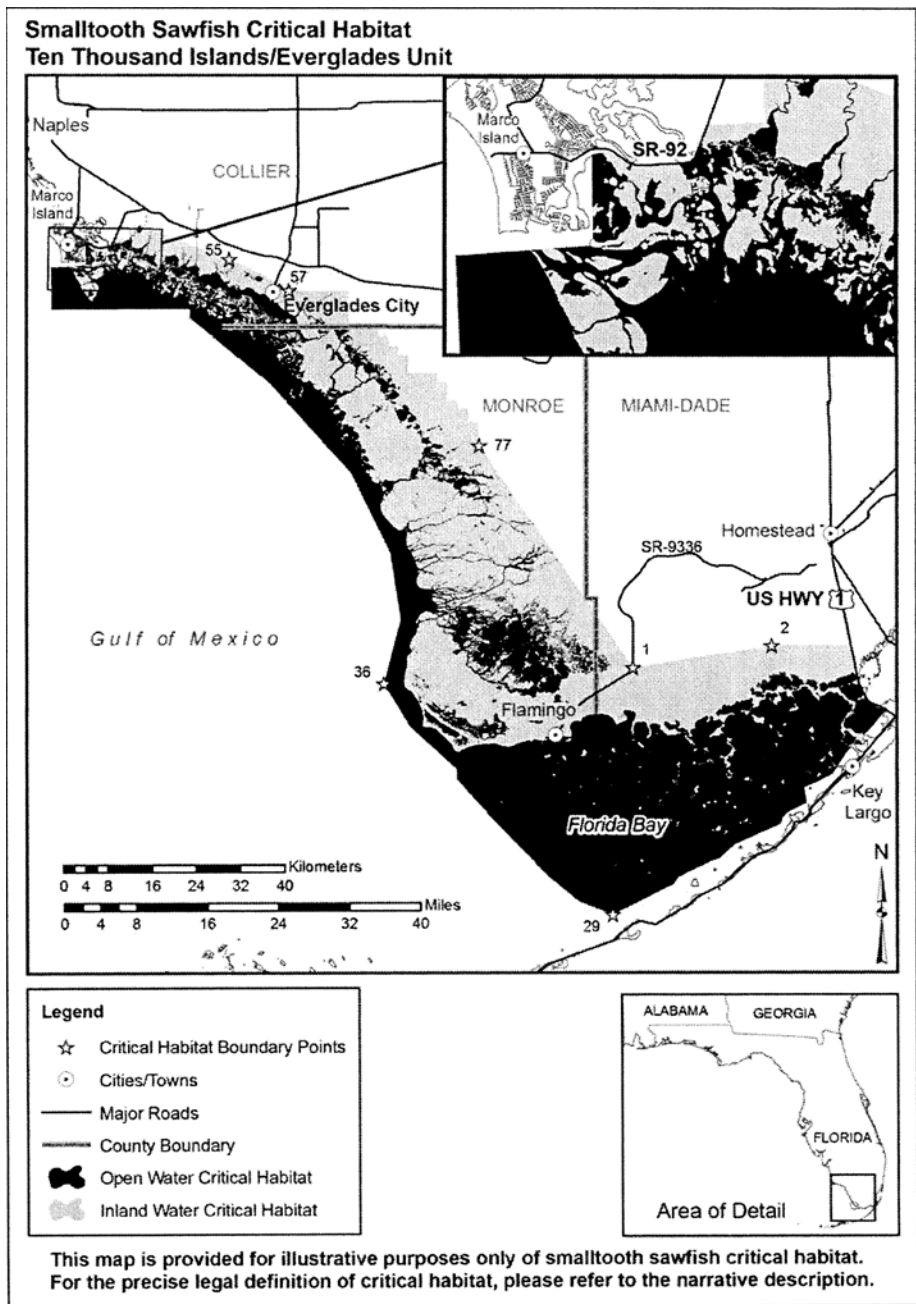


Figure 4 Map of smalltooth sawfish critical habitat – Ten Thousand Islands/Everglades Unit (TTIU)

*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 2009)). NMFS determined that without sufficient habitat, the population was unlikely to increase to a level associated with low extinction risk and de-listing. Shortly after issuing the recovery plan, NMFS designated critical habitat for the species. In the critical habitat rule, 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 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 and the Ten Thousand Islands/Everglades 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 of the Ten Thousand Islands/Everglades Unit*

The TTIU is located in a more remote part of Florida that is largely protected from development by Everglades National Park and the Ten Thousand Islands National Wildlife Refuge. As a result the status of this unit has changed little since critical habitat designation. NMFS has completed consultation on 10 projects located within this unit and only 2 have resulted in the loss of essential features. The first project involved the replacement of 2 existing dam structures which resulted in the temporary loss of 4,359 linear feet (lin ft) of red mangroves. The second project involved the restoration of a marina destroyed by Hurricane Wilma which resulted in the loss of 10,767 ft<sup>2</sup> of shallow, euryhaline waters and 1,900 lin ft of red mangroves. There are several other projects underway, well inland of the critical habitat unit, these are focused on restoring the natural hydrology of the Everglades. Though NMFS has not specifically consulted on these projects, there is a chance that these restoration projects benefit the critical habitat unit and the species in the future.

#### *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<sup>2</sup>) 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 miles (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 (Figure 5, 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 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 oversees the permitting process for residential and commercial marine development in both the TTIU and CHEU critical habitat units. 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.

#### Construction of Infrastructure - Dock and Boat Ramp Construction

The USACE recommends that applicants 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 affect 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 over vertical seawalls because they provide better quality fish and wildlife habitat. Nevertheless, placement of riprap material removes more of the shallow euryhaline habitat essential feature than a vertical seawall. Also, 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 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. 1994b). 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 1998a). In the TTIU, dredging to maintain canals and channels constructed prior to the critical habitat designation limits the amount of available shallow, euryhaline habitat to the edges of waterways, and these dredging activities can disturb juveniles. 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. Many of these channels and canals were likely 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).

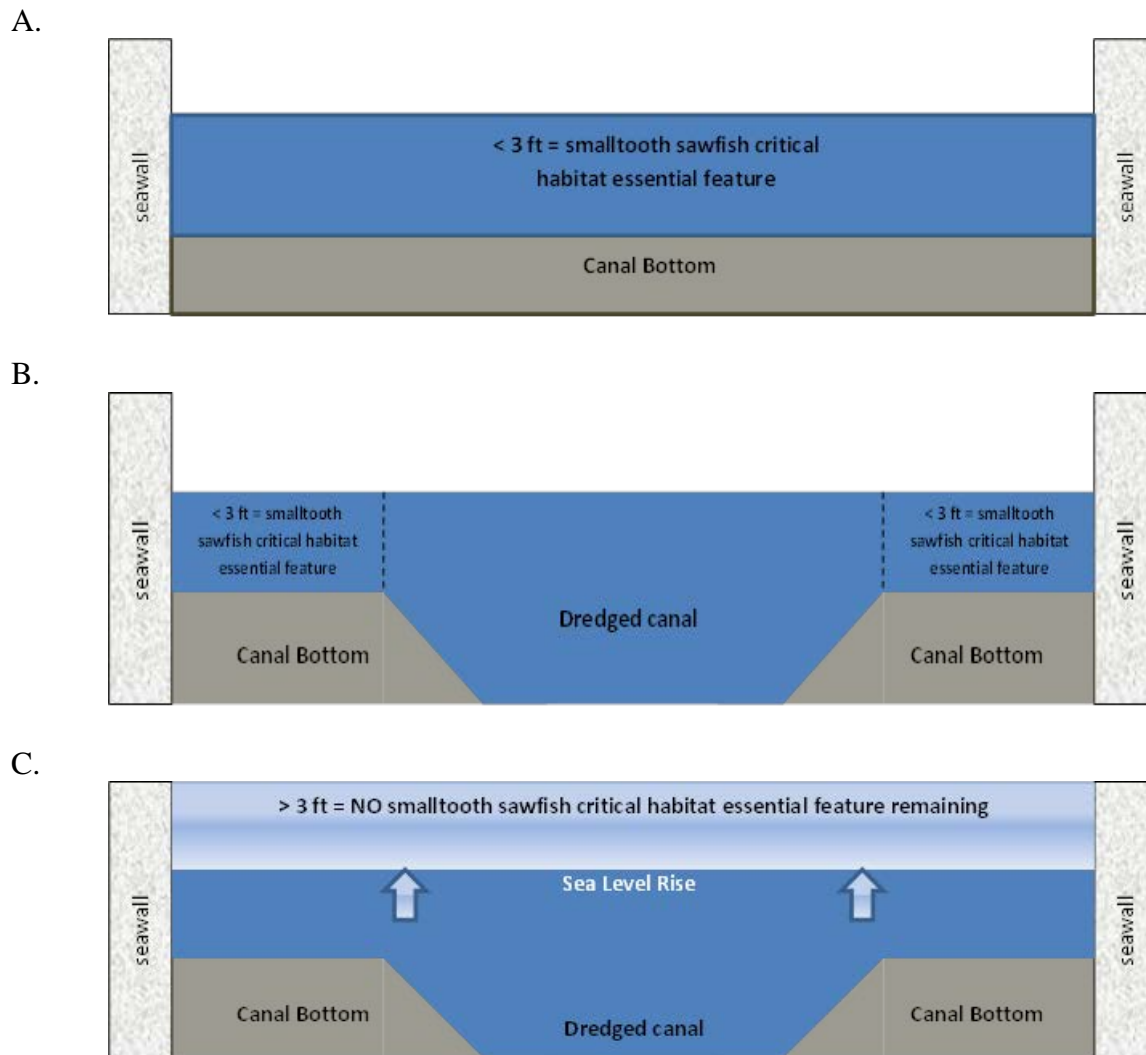


Figure 5. Diagram A depicts a cross section of a historically-dredged channel/canal within the boundaries of the critical habitat units that has not been maintained. Diagram B depicts the typical cross section of a maintenance dredged channel/canal. Diagram C depicts a cross section of a maintained dredged 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 (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 Figure 5 Diagram C).

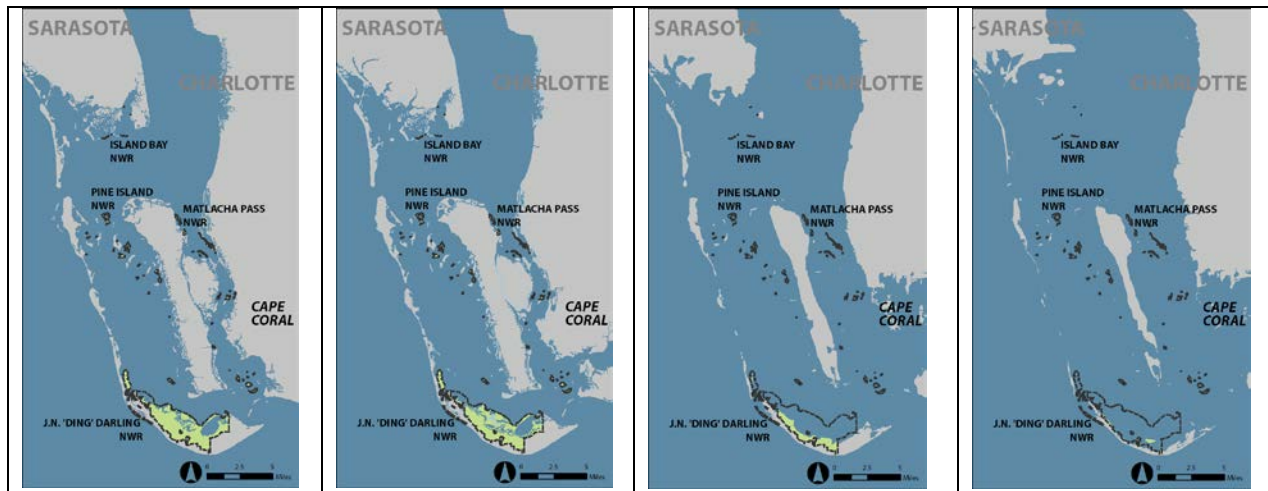


Figure 6. From left to right: current shoreline, + 3.5 in (+ 9 cm); + 18.5 in (+ 47 cm); and + 38.97 in (+ 99 cm) sea level rise by 2060<sup>1</sup>.

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 maintain the appropriate tidal duration where their prop roots are underwater and can also extend to the bottom sediments for nutrient uptake, 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 (Semenuk 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. The threat of sea level rise to mangroves is less severe in the TTIU than the CHEU because most of the

<sup>1</sup> 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.

mangroves in the TTIU are protected under federal, state and county regulations against development. Therefore, there is a smaller interface where mangroves might be migrating into shoreline armoring due to climate change as is the case in the heavily developed CHEU.

Other threats to mangroves result from climate change: fluctuations in precipitation amounts and distribution, seawater temperature, carbon dioxide (CO<sub>2</sub>) 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<sub>2</sub> levels increase, mostly resulting from human-induced causes (e.g., burning of fossil fuels), the world's oceans will absorb much of this CO<sub>2</sub>, causing potential increases in photosynthesis and mangrove growth rates. This increase in growth rate, however, would be limited by lower salinities expected from CO<sub>2</sub> 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<sub>2</sub> 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<sub>2</sub>, 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 storm 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**

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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 proposed project will occur within a residential channel at Goodland Key as shown in Figure 3, adjacent to a navigational channel (Coon Key Pass) approximately 7 miles northeast of the nearest outlet through a series of mangrove islands out into the Gulf of Mexico. The benthos (sea bottom habitat) at the site is dominated by fine sand and silt, absent of submerged aquatic vegetation and corals. Coon Key Pass has the only significant vessel traffic in the area since Goodland is the only developed mangrove island. Significant erosion has occurred on many properties on Goodland Key, including in the action area. The existing red mangrove fringe on the property directly across from the project site has receded significantly due to this sediment erosion over the past 20 years. There is currently a Section 7 consultation for that property to place riprap on top of filter cloth in front of existing mangroves to reduce the shoreline erosion and protect the mangroves (SER-2016-17660), and both properties are owned by the same applicant (James Inglis). The keys surrounding the action area are not inhabited and we don't expect additional development in that portion of the action area because those mangrove islands

are protected by state regulations prohibiting their development. We do, however, expect periodic maintenance dredging to service existing residential canal communities such as the one in the action area into the future.

## **Factors Affecting Critical Habitat within the Action Area**

### *Federal Actions*

NMFS is currently consulting on another proposed action for riprap installation to mitigate against shoreline erosion (SER-2016-17660), this project is directly across from and overlapping with the action area. This proposed action will result in 11,790 ft<sup>2</sup> (0.27 ac) of shallow, euryhaline habitat being adversely effected. We are not aware of any other federal actions occurring on Goodland or surrounding keys, and 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 PRD's completed consultation database (December 6, 2016).

### *USACE Authorized Marine Construction Permitting*

The USACE issues Clean Water Act and Rivers and Harbors Act permits for coastal in-water marine construction most notably for consolidation of shoreline residential properties for new home construction. Consolidation of shoreline usually involves shoreline armoring such as seawall and riprap revetment and often necessitates the removal of mangroves and disturbance of submerged aquatic vegetation (e.g., seagrasses covered by riprap). The effects to sea turtles and smalltooth sawfish are usually habitat related in terms of lost mangroves and seagrass beds, for instance. Shoreline armoring permits issued by USACE are frequently reinforced by state and county ordinances that require shoreline armoring in order to build on vacant lots. Because of this state and county nexus with the USACE, the cumulative impacts from shoreline armoring and associated construction present a more significant potential impact to listed species than do individual projects. Almost all of the marine construction projects permitted for shoreline residential properties occurring in smalltooth sawfish critical habitat occur in the CHEU. Most of the remaining mangroves in the TTIU are protected by county/state/federal protections and will not be subject to removal for new home construction.

### *State or Private Actions*

NMFS is not aware of any nonfederal activities that may adversely affect designated critical habitat for smalltooth sawfish in the action area. The action area is located adjacent to the only developed mangrove key in the greater mangrove island basin. The action area and surrounding keys are part of a Florida state aquatic preserve and a National Estuarine Research Reserve (Rookery Bay National Research Reserve) and as such there are numerous permitting restrictions on future commercial and residential developments.

### *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, Hurricanes Dennis, Katrina, Rita, and Wilma likely damaged habitat in and around the action area, negatively affecting both the red mangrove and shallow-water essential features of critical habitat.



### *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**

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### **Shallow-water Essential Feature Impacts**

The red mangrove essential feature found within the TTIU of designated critical habitat for the U.S. DPS of smalltooth sawfish is present and will not be adversely affected by the proposed dredging. The shallow euryhaline essential feature found within the TTIU 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 the loss of approximately 2,430 ft<sup>2</sup> (0.06 ac) of the shallow, euryhaline habitat as potential forage and shelter areas 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 shallow, euryhaline habitat for TTIU is approximately 967 mi<sup>2</sup> (619,013 ac) at the time that smalltooth sawfish were listed under the ESA in 2003. While the available shallow-water essential feature will be diminished by approximately 2,430 ft<sup>2</sup> (0.06 ac), the project will not sever or prevent access to alternate refuge or forage areas at the site or in the surrounding areas for juvenile smalltooth sawfish. Still, some ecological function provided to juvenile smalltooth sawfish in terms of the shallow-water essential feature will be lost. Although this loss of shallow-water habitat will be over a currently patchy area where there is significant overlap between areas that are shallower and deeper than - 3 ft MLLW, NMFS believes the dredged areas will not sever any connectivity between shallow water areas for juvenile sawfish use post-construction.

## **7 CUMULATIVE EFFECTS**

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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 Florida State Aquatic Preserve and National Estuarine Research Reserve designations both impose restrictions from most types of development in and around the action area and what is not restricted within those designations would necessarily be consulted on by NMFS under Section 7.

## **8 INTEGRATION AND SYNTHESIS**

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### **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, 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 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 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 the achieving that conservation objective are (1) red mangroves and (2) shallow, euryhaline habitats characterized by water depths between the MHWL 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 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 TTIU is in Recovery Region H and I (Region H is where the action area is located for the proposed action). 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.

#### Shallow-water Essential Feature Impacts

Approximately 2,430 ft<sup>2</sup> (0.06 ac) of shallow, euryhaline habitat will be lost and cease to function as critical habitat because of the proposed action. Since smalltooth sawfish were first listed under the ESA in 2003, the amount of shallow, euryhaline habitat in the TTIU alone was estimated to be 398 mi<sup>2</sup> (254,720 ac). At the time of smalltooth sawfish critical habitat designation in 2009, our estimate of the average loss of essential features (red mangroves and shallow, euryhaline habitat) was approximately 0.40 ac per year, based on USACE project applications between 2007 and 2009. Since the designation of critical habitat in September 2009 until September 2016, NMFS has completed 10 Section 7 consultations on projects within the TTIU that have resulted in the total loss of approximately of 10,767 ft<sup>2</sup> (0.25 ac) shallow euryhaline habitat. This loss resulted from a single project consulted on by NMFS PRD informally in 2010 (SER-2009-6537). Over the approximately 7-year period since critical habitat designation (Sept 2009 – Sept 2016), this total loss translates into average annual loss rates of approximately 1,538 ft<sup>2</sup> of shallow-water feature (10,767 ft<sup>2</sup>/7 years [since sawfish critical habitat designation in September 2009] = 1,538 ft<sup>2</sup> annually, or 128 ft<sup>2</sup> per month [1,538 ft<sup>2</sup> per year/12 months = 128.2 rounded down to 128 ft<sup>2</sup> per month]). Assuming similar rates of shallow, euryhaline habitat loss between May 2003 and the time of critical habitat designation in 2009, we estimate that 9,856 ft<sup>2</sup> (0.23 ac) of shallow habitat were lost prior to designation (77 months x 128 ft<sup>2</sup>/month = 9,856 ft<sup>2</sup> [0.226 ac rounded to 0.23 ac]). Taking into consideration the estimated total of shallow, euryhaline habitat at time of listing (254,720 ac), the estimated loss of shallow, euryhaline habitat prior to critical habitat designation (0.23 ac), and the estimated loss of shallow habitat since critical habitat designation (0.25 ac), we calculated that approximately 254,719.5 ac of shallow, euryhaline habitat currently remain available for juvenile smalltooth sawfish (254,720 – 0.48 [0.25ac + 0.23 ac] = 254,719.5, essentially a ½-ac loss since smalltooth sawfish listing in 2003). While this number only takes federally permitted projects into account, there are very few, if any, expected non-federally permitted projects that could impact shallow, euryhaline habitat in Collier County due to the federal nexus for most in-water construction work.

According to the recovery plan objectives, 95% of this habitat (approximately 241,984 ac [254,720 ac x .95 = 241.984 ac]) must be maintained and effectively protected to facilitate recovery of the sawfish. This requirement is based on the fact that although the TTIU 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 2,430 ft<sup>2</sup> (0.06 ac) of shallow-water essential feature. While this is a reduction in the total area available, it represents a tiny fraction of the overall shallow-water habitat available in the TTIU, and is neither an appreciable reduction in the amount of habitat nor an appreciable diminishment in the functionality of the habitat in serving juvenile sawfish, nor does this loss provide any impediment to achieving the recovery objective of effectively protecting 95% of the 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, an ongoing study has been occurring in the TTIU. 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 TTIU. Given the limited duration (7 years [Sept 2009 - Sept 2016]) of a current study to assess annual rates of increase within Recovery Regions G, H, I, and J, there are not enough data to discern the trend in juvenile abundance within the recovery region. Early indications are that juvenile sawfish are likely recovering in the TTIU, 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 2,430 ft<sup>2</sup> (0.06 ac) of shallow-water habitat, in addition to 10,667 ft<sup>2</sup> of shallow-water habitat already lost in critical habitat (TTIU), is not likely 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.

## **9 CONCLUSION**

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After reviewing the current status of smalltooth sawfish critical habitat, the environmental baseline, and the cumulative effects, it is our Opinion that dredging will result in the loss of 2,430 ft<sup>2</sup> (0.06 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 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**

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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](mailto:takereport.nmfsser@noaa.gov). Refer to the present Biological Opinion by title, issuance date, NMFS PCTS identifier number (SER-2016-17661), and USACE permit number (SAJ-2016-00030). At that time, consultation must be reinitiated.

## **11 CONSERVATION RECOMMENDATIONS**

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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).

## **12 REINITIATION OF CONSULTATION**

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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 action.

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## **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