UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
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-2016-01654 (NW-BEM), Malter Shoreline Stabilization, Cape Coral, Lee 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 installation of a concrete seawall and mangrove removal under the authorities of Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act on the following listed species and/or critical habitat: loggerhead (Northwest Atlantic distinct population segment), Kemp's ridley, and green (North and South Atlantic distinct population segments) sea turtles; smalltooth sawfish; and smalltooth sawfish critical habitat. NMFS concludes that the proposed action is not likely to adversely affect sea turtle species (green, Kemp's ridley, and loggerhead) and smalltooth sawfish. NMFS also concludes the project is likely to adversely affect, but is not likely to destroy or adversely modify, smalltooth sawfish critical habitat.

Please direct questions regarding this Opinion to Joseph Cavanaugh, Consultation Biologist, by phone at (727) 551-5097, or by email at Joseph.Cavanaugh@noaa.gov.

Sincerely,

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

Applicant: Richard Malter

Activity: New seawall installation with red mangrove removal within smalltooth sawfish critical habitat, Cape Coral, Lee 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-2016-18160

Approved by: _____
for Roy E. Crabtree, Ph.D., Regional Administrator
NMFS, Southeast Regional Office
St. Petersburg, Florida

Date Issued: _____

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Acronyms and Abbreviations

CFR	Code of Federal Regulations
CHEU	Charlotte Harbor Estuary Program
CHPSP	Charlotte Harbor Preserve State Park
CO_2	Carbon Dioxide
DPS	Distinct Population Segment
EFH	Essential Fish Habitat

ESA	Endangered Species Act
FDEP	Florida Department of Environmental Protection
FWRI	Fish and Wildlife Research Institute
GMFMC	Gulf of Mexico Fishery Management Council
IPCC	The Intergovernmental Panel on Climate Change
LAA	Likely to Adversely Affect
MHWL	Mean High Water Line
MIT	Massachusetts Institute of Technology
MLLW	Mean Low Lower Water
NMFS	National Marine Fisheries Service
NOAA	National Ocean and Atmospheric Association
Opinion	Biological Opinion
RPMs	Reasonable and Prudent Measures
TTIU	Ten Thousand Islands/Everglades Unit
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
YOY	Young-of-the-year

Units of Measurement

Temperature

°F	degrees Fahrenheit
°C	degrees Celsius

Length and Area

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

1 INTRODUCTION

Section 7(a)(2) of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. § 1531 et seq.), requires that each federal agency ensure that any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of critical habitat of such species; Section 7(a)(2) requires federal agencies to consult with the appropriate Secretary on any such action. NMFS and the U.S. Fish and Wildlife Service (USFWS) share responsibilities for administering the ESA.

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

This document represents NMFS's Opinion based on our review of impacts associated with the proposed action to issue a permit within Lee County, Florida. This Opinion analyzes the project's effects on threatened and endangered species and designated critical habitat, in accordance with Section 7 of the ESA. We based the Opinion on project information provided by USACE and other sources of information, including the published literature cited herein.

2 CONSULTATION HISTORY

NMFS received a request for a formal consultation under Section 7 of the ESA from the USACE dated August 26, 2016. The USACE determined that the proposed project may affect, but is not likely to adversely affect, several 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 email on October 21, 2016, and we received a final response on October 23, 2016. We initiated formal consultation on October 23, 2016, once all necessary information was received.

3 DESCRIPTION OF THE PROPOSED ACTION AND ACTION AREA

Proposed Action

The project site is a single-family lot (2 adjacent 40-ft-wide platted lots) in a residential canal, located approximately 3.5 miles (mi) from the open waters of Charlotte Harbor navigating by vessel through the North Spreader Waterway within a very large residential canal community out into Matlacha Pass. The applicant intends to install a concrete seawall along 80 linear feet (lin ft) of unconsolidated shoreline necessitating the removal of approximately 50 lin ft (and

approximately 350 square feet [ft^2]) of red mangroves. The seawall will be installed using shore-based mechanical equipment and concrete slabs will be jetted into place. The seawall will be placed 4 ft waterward of the mean high water line (MHWL) in order to align it with the adjacent seawall on the south side of the property. The seawall installation will result in backfilling approximately 12.44 cubic yards, and affecting approximately 120 ft^2 of shallow-water habitat less than 3 ft deep a mean low water that will be displaced by the seawall, in addition to approximately 50 ft^2 of white mangroves (Figure 3).

In-water construction is expected to take approximately 3 weeks and will be done during daylight hours only. The applicant has agreed to use turbidity controls and comply with NMFS's *Sea Turtle and Smalltooth Sawfish Construction Conditions*, dated March 23, 2006 (enclosed).

Action Area

The project is located at 26.708495°N, 82.069484°W, North American Datum 1983, within a dredged residential canal that is shoreline-armored (seawalls) along the east bank of the canal within the North Spreader Waterway (see Figure 2) with unconsolidated mangrove-fringed wetlands along the west bank. Red and white mangroves are present along the shoreline of the project site and adjacent properties. The property address is 2848 NW 47th Avenue, Cape Coral, Lee County, Florida (Figures 1 and 2). The bottom habitat is a mixture of sand, silt, and peat with no seagrasses in the project 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 (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 outside the residential canal along the western adjacent portion of the North Spreader Waterway.

Figure 1. Image showing Richard Malter project location (white rectangle) (©2016 Google)

Figure 2. Image showing project location (white circle) and location within the surrounding mangrove islands on the opposite side of the North Spreader Waterway that is indicated by the blue arrow and blue line showing a portion of the spreader waterway (Image Landsat, ©2016 Google)

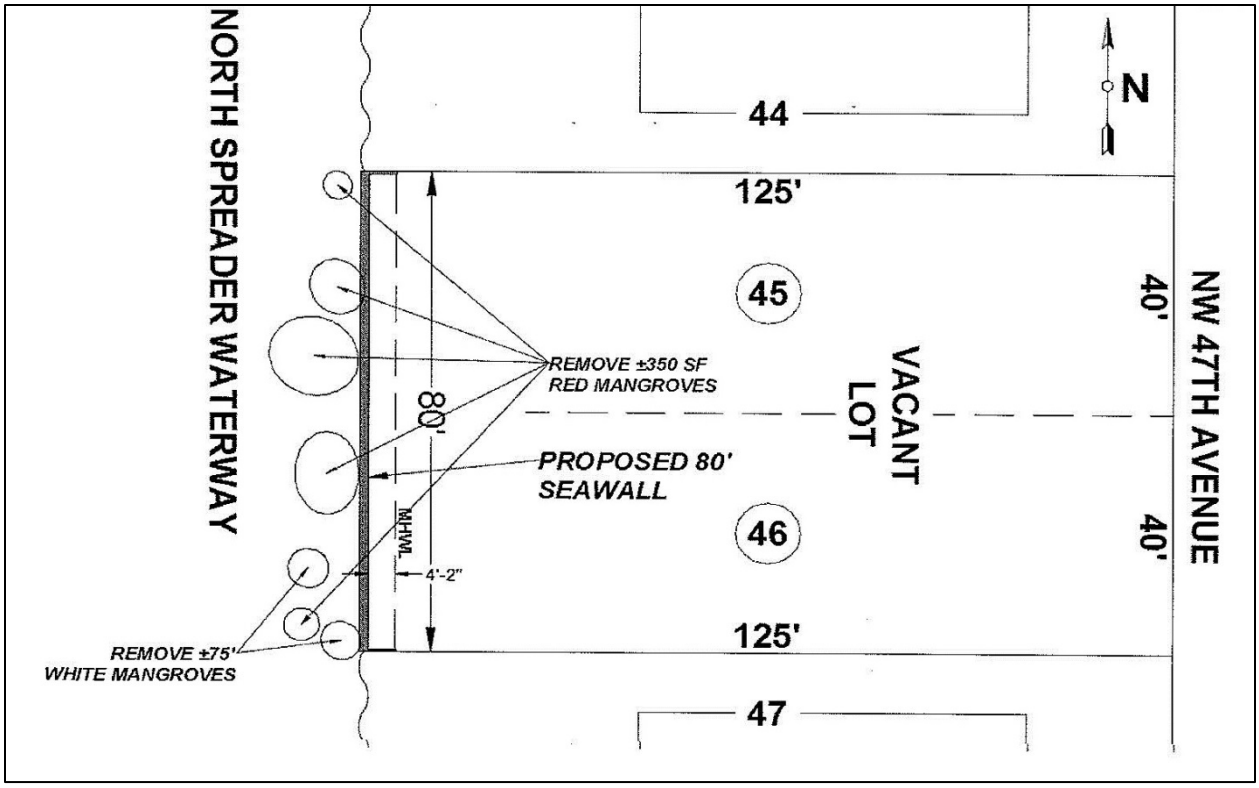


Figure 3. Proposed plans for seawall and red mangrove removal (© 2016 JChilson)

4 STATUS OF LISTED SPECIES AND CRITICAL HABITAT

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

Table 1. ESA-listed Species and Critical Habitat in or Near to Action Area

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
E = endangered; T = threatened; NLAA = may affect, not likely to adversely affect			

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

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

In the following sections, we describe why we believe smalltooth sawfish and 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, but not destroyed or adversely modified.

Species Not Likely to be Adversely Affected

Sea Turtles and Smalltooth Sawfish

1. Sea turtles and smalltooth sawfish may be adversely affected by avoiding or being temporarily unable to use the action area 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. Still, we believe these impacts will have an insignificant effect on sea turtles and sawfish due to the small project footprint and the project's limited duration (approximately 3 weeks [daylight hours only] for all in-water work), and the availability of alternative sites in the area that sea turtles and sawfish can use for foraging or refuge, such as the extensive mangrove-fringed areas along the opposite side of the spreader canal from the project location.

2. Sea turtles and smalltooth sawfish may be adversely affected by the loss of forage and refuge habitats a result of construction activities involving permanent removal of red mangroves and shallow-water habitat (e.g., backfill associated with seawall). The onsite red mangroves (50 lin ft [and 350 ft^2]) will be removed and permanently lost from the project area. Juvenile sawfish, in particular, use the shallow water and red mangroves for foraging and refuge. Given the much greater areas of red mangrove habitat outside of the canal in the spreader canal and surrounding mangrove islands, NMFS believes the permanent loss of these red mangroves within the project footprint is insignificant. Additionally, sawfish will continue to be able to transit within the extensive mangrove-fringed spreader canal post-construction – these foraging and refuge resources will remain available to these species post-construction. Seawall installation and associated backfill will permanently remove 120 ft^2 (0.0027 ac) of shallow water habitat less than 3 ft MLLW and approximately 350 ft^2 along 50 lin ft of shoreline of the red

mangrove habitat; however, given the much greater acreage of shallow-water habitat on the opposite side of the spreader canal and in and around the residential canals, NMFS believes the permanent loss of this shallow-water area within the project footprint is insignificant. Sea turtles and sawfish will still have extensive shallow-water habitat remaining post-construction. Therefore, NMFS believes that impacts related to loss of forage and refuge habitat are insignificant. Impacts to both essential features of critical habitat (i.e., red mangroves and shallow-water habitat) will be discussed further in Section 6.

3. Sea turtles and smalltooth sawfish may be adversely affected by being struck by mechanical equipment used for seawall installation and mangrove removal (e.g., back-hoe). Sea turtles and smalltooth sawfish are highly mobile species and expected to avoid the project area during seawall installation and mechanically dredging mangroves, which will occur over a small area and short duration (3 weeks during daylight hours). Therefore, NMFS believes that direct physical impacts from in-water construction equipment are extremely unlikely to occur and are, therefore, discountable. Additionally, the applicant's implementation of NMFS's *Sea Turtle and Smalltooth Sawfish Construction Conditions* will further reduce the risk by requiring all construction workers watch for smalltooth sawfish and sea turtles. Operation of any mechanical construction equipment will cease immediately if a sea turtle or smalltooth sawfish is seen within a 50-ft radius of the equipment. Activities will not resume until the protected species has departed the project area of its own volition.

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 [mi²]) of coastal habitat, and the Ten Thousand Islands/Everglades Unit (TTIU), which is comprised of approximately 619,013 ac (967 square miles [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).

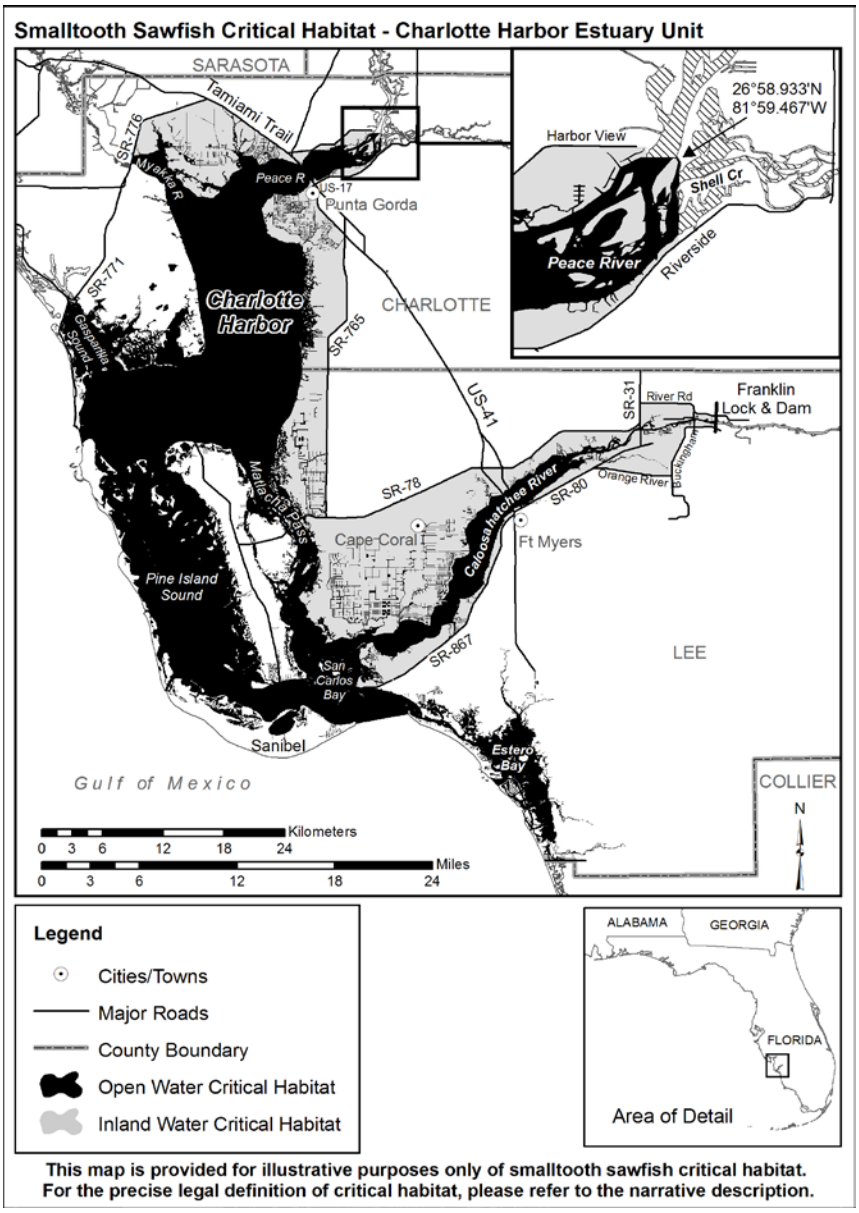


Figure 4. Map of smalltooth sawfish critical habitat – Charlotte Harbor Estuary Unit (CHEU)

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 determined that without sufficient habitat, the population was

unlikely to increase to a level associated with low extinction risk and de-listing. Therefore, NMFS identified 2 habitat features essential for the conservation of this species: (1) red mangroves, and (2) shallow, euryhaline habitats (shallow, euryhaline habitats) characterized by water depths between the mean high water line and -3 ft (-0.9 meters [m]) measured at mean lower low water (MLLW). These essential features of critical habitat provide juveniles refuge from predation and forage opportunities within their nursery habitat. One or both of these essential features must be present in an action area for it to function as critical habitat for smalltooth sawfish.

Habitat Use

Juvenile smalltooth sawfish, identified as those up to 3 years of age or approximately 8 ft (2.4 meters [m]) in length (Simpfendorfer et al. 2008), inhabit the shallow waters of estuaries and can be found in sheltered bays, dredged canals, along banks and sandbars, and in rivers (NMFS 2000). Juvenile smalltooth sawfish occur in euryhaline waters (i.e., waters with a wide range of salinities) and are often closely associated with muddy or sandy substrates, and shorelines containing red mangroves (Simpfendorfer 2001; 2003). The structural complexity of red mangrove prop roots creates a unique habitat used by a variety of fish, invertebrates, and birds. Juvenile smalltooth sawfish, particularly young-of-the-year (YOY) (measuring less than 39.4 inches (in) [100 centimeters (cm)] in length), use these areas as both refuge from predators and forage grounds; taking advantage of the large number of fish and invertebrates found there.

Tracking data from the Caloosahatchee River in Florida indicate very shallow depths and specific salinity ranges are important abiotic factors influencing juvenile smalltooth sawfish movement patterns, habitat use, and distribution (Simpfendorfer et al. 2011). An acoustic tagging study in a developed region of Charlotte Harbor, Florida, identified the importance of mangroves in close proximity to shallow-water habitat for juvenile smalltooth sawfish, stating that juveniles generally occur in shallow water within 328 ft (100 m) of mangrove shorelines (Simpfendorfer et al. 2010). Juvenile smalltooth sawfish spend the majority of their time in waters 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, which were termed “hotspots,” correspond with areas where public encounters are most frequently reported. Use of these hotspots can be variable within and among years

based on the amount and timing of freshwater inflow. Smalltooth sawfish use hotspots further upriver during drought (i.e., high salinity) conditions and areas closer to the mouth of the Caloosahatchee River during times of high freshwater inflow (Poulakis et al. 2011). At this time, researchers are unsure what specific biotic (e.g., presence or absence of predators and prey) or abiotic factors (e.g., salinity) influence this habitat selection. Still, they believe a variety of conditions in addition to salinity, such as temperature, dissolved oxygen, water depth, shoreline vegetation, and food availability, may influence smalltooth sawfish habitat selection (Poulakis et al. 2011).

Status and Threats to Critical Habitat

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

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

To protect critical habitat, federal agencies must ensure that their activities are not likely to result in the destruction or adverse modification of the physical and biological features that are essential to the conservation of sawfish, or the species' ability to access and use these features (ESA Section 7(a)(2); see also 50 CFR 424.12(b) (discussing essential features). Therefore,

proposed actions that may impact critical habitat require an analysis of potential impacts to each essential feature. As mentioned previously, there are 2 essential features of smalltooth sawfish critical habitat: (1) red mangroves; and (2) shallow, euryhaline habitats characterized by water depths between the MHWL and -3 ft (-0.9 m) measured at MLLW. The USACE oversee the permitting process for residential and commercial marine development in the CHEU. The Florida Department of Environmental Protection (FDEP) and their designated authorities also regulate mangrove removal in Florida. All red mangrove removal permit requests within smalltooth sawfish critical habitat necessitate ESA Section 7 consultation. NMFS Protected Resources Division tracks the loss of these essential features of smalltooth sawfish critical habitat.

Threats to Critical Habitat

Dock and Boat Ramp Construction

The USACE 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 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. 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.

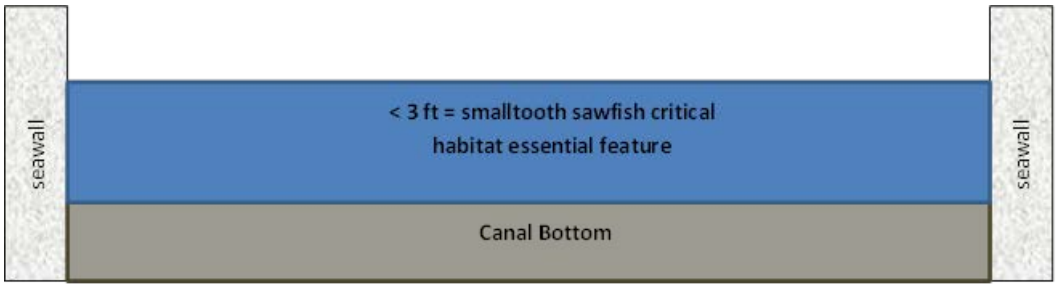
Transportation Infrastructure Construction

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

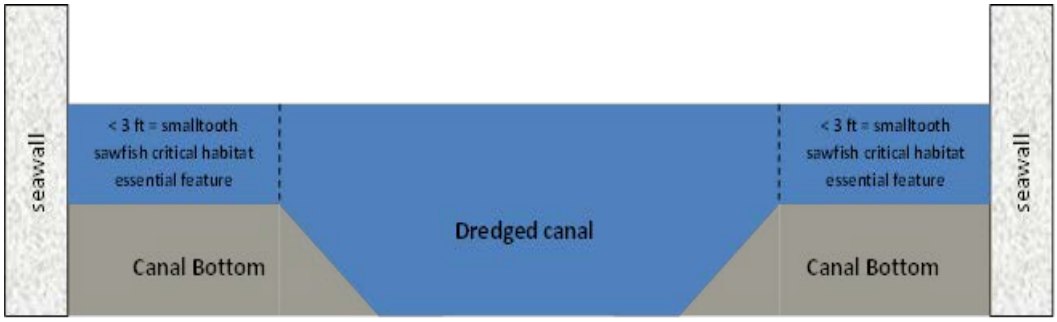
Dredging

Riverine, nearshore, and offshore areas are dredged for navigation, construction of infrastructure, and marine mining. An analysis of 18 major southeastern estuaries conducted in 1993-1994 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.



B.



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

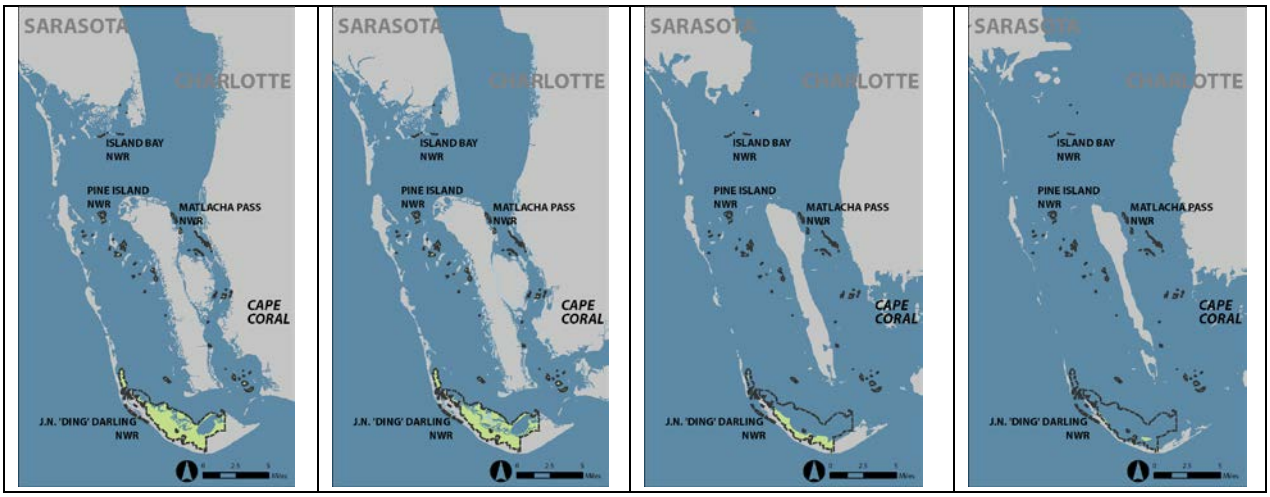


Figure 6. From left to right: current shoreline, + 3.5 in (+ 9 cm); + 18.5 in (+ 47 cm); and + 38.97 in (+ 99 cm) sea level rise by 2060[1].

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, carbon dioxide (CO_2) levels, and damage to mangroves from

[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.

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

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

As atmospheric CO_2 levels increase, mostly resulting from 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 3.5 miles from open water in the Charlotte Harbor estuary through the spreader canal leading out into Matlacha Pass. The benthos (water bottom) at the site is described as a mixture of sand, silt, and peat. There are approximately 350 ft^2 of red mangroves along 50 lin ft of the 80 lin ft property located directly within the project footprint that are slated for removal in the proposed action. Additionally 120 ft^2 of shallow-water euryhaline habitat less than 3 ft depth will be displaced by the backfill and placement of the new seawall. The extensive residential, manmade canal system in Lee County is adjacent to the Charlotte Harbor Preserve State Park (CHPSP). CHPSP is comprised of 43,000 acres and protects 80 miles of shoreline habitat along the Charlotte Harbor estuaries in Charlotte and Lee Counties, providing a buffer between the aquatic preserves and urban development and agriculture (Charlotte Harbor Aquatic Preserves Management Plan, 2016).

Factors Affecting Critical Habitat within the Action Area

Federal Actions

Since the designation of smalltooth sawfish critical habitat on September 2, 2009, we have consulted on several shoreline stabilization projects (seawall installation necessitating red mangrove and shallow-water habitat removal) in the greater residential canal system where the project is located. No other federal permitted projects are known to have occurred within the

action area (which we defined in Section 3), as per a review of the NMFS PRD's completed consultation database (as reviewed by consulting biologist on March 14, 2017). The largest project that NMFS consulted on in this residential, man-made canal network was for a large development in the northern portion. We issued an Opinion (SER-2012-3777) evaluating the removal of 1,568 lin ft of red mangroves.

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, including in the action area. 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. Additionally, limited options in terms of shoreline armoring are presented to applicants such as alternatives to vertical seawalls such as living shorelines.

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, docks). The direct and indirect impacts from some of these activities are difficult to quantify. Where possible, conservation actions in ESA Section 10 permits, ESA Section 6 cooperative agreements, and state permitting programs are being implemented or investigated to monitor or study impacts from these sources.

Other Potential Sources of Impacts to the Environmental Baseline
Stochastic events, such as hurricanes, are common 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 critical habitat in and around the action area.

Conservation and Recovery Actions Shaping the Environmental Baseline
Federal Essential Fish Habitat (EFH) consultation requirements pursuant to the Magnuson-Stevens Fishery Conservation and Management Act minimize and mitigate for losses of wetland and preserve valuable foraging and developmental habitat that is used by juvenile smalltooth sawfish. NMFS has designated mangrove and estuarine habitats as EFH as recommended by the Gulf of Mexico Fishery Management Council (GMFMC). 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

6.1 Shallow-Water Essential Feature Impacts

The shallow, euryhaline essential feature found within the CHEU of designated critical habitat for the U.S. DPS of smalltooth sawfish is present adjacent to the unconsolidated shoreline to be armored in the project at issue and is likely to be adversely affected. The proposed seawall installation will result in a permanent loss of approximately 120 ft^2 (0.003 ac) of the shallow, euryhaline habitat as 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 shallow, euryhaline habitat for CHEU at the time of smalltooth sawfish were listed under the ESA was approximately 132 mi^2 (84,480 ac) (NMFS unpublished data). While the available essential feature will be diminished by approximately 120 ft^2 (shallow, euryhaline habitat), the project is not severing or preventing juvenile smalltooth sawfish access to alternate habitat with this essential feature in the surrounding area. The project is located deep within a residential canal system far away (>17 mi) from any known hotspot reproductive areas such as those areas identified within the Caloosahatchee River (Poulakis 2012; Poulakis et al. 2011). Still, some ecological function provided to juvenile smalltooth sawfish in terms of the shallow, euryhaline essential feature will be lost. Thus, we believe that the permanent loss of 120 ft^2 of nearshore shallow-water area along the project site is likely to adversely affect the shallow, euryhaline essential feature essential feature .

6.2 Red Mangrove Essential Feature Impacts

The red mangrove essential feature found within the CHEU of designated critical habitat for the U.S. DPS of smalltooth sawfish is present and is likely to be adversely affected by the seawall installation. This project will result in a permanent loss of approximately 350 ft^2 along 50 lin ft of shoreline of the red mangrove habitat, which is potential forage and shelter area for juvenile smalltooth sawfish. Using remote sensing data acquired from the FWRI, we were able to compile information relating to the total area of this essential feature within smalltooth sawfish critical habitat. Based on that information, we estimated that the total amount of red mangrove shoreline for the CHEU was approximately 5,512,320 lin ft (1,044 mi) at the time that smalltooth sawfish were listed under the ESA in 2003. While the available red mangrove essential feature in the CHEU will be diminished by approximately 350 ft^2, along 50 lin ft of shoreline, 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. Thus we believe the proposed removal of 350 ft^2 of a red mangrove along 50 lin ft of shoreline is likely to adversely affect the red mangrove essential feature of smalltooth sawfish critical habitat.

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 areal coverage of red mangrove essential feature of smalltooth sawfish critical habitat (Norton et al. 2012; Scavia et al. 2002). However, this proposed action is of such a small scale, scope, and limited time frame that is not very likely to be affected cumulatively by climate change.

Smalltooth sawfish habitat has been degraded or modified throughout the southeastern United States, including areas designated as critical habitat, from agriculture, urban development, commercial activities, channel dredging, boating activities, and the diversion of freshwater runoff.

No future actions with effects beyond those already described are reasonably certain to occur in the action area. The man-made canals within the CHEU will likely continue to experience the same types of actions described in the status of critical habitat in Section 3. These threats include shoreline armoring (e.g., seawall installation and associated red mangrove removal), canal dredging, and dock construction.

8 INTEGRATION AND SYNTHESIS

8.1 **Critical Habitat Destruction/Adverse Modification Analysis**

NMFS's regulations define *Destruction or adverse modification* to mean a direct or indirect alteration that appreciably diminishes the value of critical habitat for the conservation of a listed species. Such alterations may include, but are not limited to, those that alter the physical or biological features essential to the conservation of a species or that preclude or significantly delay development of such features (50 CFR § 402.02). Other alterations that may destroy or adversely modify critical habitat may include impacts to the area itself, such as those that would impede access to or use of the essential features. We intend the phrase "significant delay" in development of essential features to encompass a delay that interrupts the likely natural

trajectory of the development of physical and biological features in the designated critical habitat to support the species' recovery. NMFS will generally conclude that a federal action is likely to "destroy or adversely modify" designated critical habitat if the action results in an alteration of the quantity or quality of the essential physical or biological features of designated critical habitat, or that precludes or significantly delays the capacity of that habitat to develop those features over time, 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 role the action area and the affected critical habitat serves with regard to the function of the overall critical habitat designation, and how that role is affected by the action.

In designating critical habitat for the smalltooth sawfish, we explained that the key conservation objective for the species is to facilitate recruitment of juveniles into the adult sawfish population by protecting juvenile areas. We determined that the habitat features essential to the achieving that conservation objective are (1) red mangroves and (2) shallow, euryhaline habitats characterized by water depths between the 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 designated as essential to conservation of the species. Much of the historic juvenile sawfish habitat in

southwest Florida, which encompasses Recovery Regions G, H, and I, remains high quality and must be strongly protected at near existing levels to allow for the species' recovery. The CHEU is in Recovery Region G. For these 3 recovery regions with remaining high-quality juvenile habitat, the recovery plan states juvenile habitats must be maintained and effectively protected over the long term at or above 95% of the acreage available at the time of listing, which occurred in April 2003.

To meet the third recovery objective, we explained that it was important that sufficient numbers of juvenile sawfish inhabit several nursery areas across a diverse geography area to ensure survivorship and growth and to protect against the negative effects of stochastic events within parts of their range. To meet this objective, Recovery Region G must support sufficiently large numbers of juvenile sawfish to ensure that the species is viable in the long-term and can 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.

8.2 **Shallow-Water Essential Feature Impacts**

At the time of species listing in May 2003 NMFS estimated that 84,480 ac (132 mi^2) of shallow, euryhaline habitat was available within the 221,459 acres of the CHEU. The recovery plan is specific that critical habitat must be maintained at or above 95% of the habitat available at the time of listing. However, loss of habitat was not formally monitored until critical habitat was designated in September 2009. Therefore to meet the recovery sub-objective, we must estimate habitat loss that occurred between 2003 and 2009. We used our 7-year dataset of completed Section 7 consultations (September 2009 – September 2016[2]) to generate an annual rate of loss that can then be used as a proxy to back-calculate the loss of shallow, euryhaline habitat between species listing and the time of critical habitat designation. These total losses translate into an average loss rate of approximately 2.31 ac (16.18 ac/7 years) of shallow, euryhaline habitat per year, and 0.193 ac per month (2.31 ac per year/12 month = 0.1925 rounded to 0.193 ac per month). Assuming similar rates of shallow, euryhaline habitat loss in the 77 months between when the species was listed and the time of critical habitat designation, we estimate that 14.9 ac of shallow, euryhaline habitat was lost prior to critical habitat designation (77 months x 0.193 ac/month = 14.9). Since the designation of critical habitat until December 31, 2016[3], NMFS has completed 116 Section 7 consultations on projects within the CHEU that have resulted in the additional total loss of approximately 16.77 ac of shallow, euryhaline habitat.

Taking into consideration the estimated total of shallow, euryhaline habitat in the CHEU at time of listing (84,480 ac), the estimated loss of shallow, euryhaline habitat prior to critical habitat designation(14.9 ac), and the estimated loss of shallow habitat since critical habitat designation(16.77 ac), we calculated that approximately 84,448 ac of shallow, euryhaline habitat currently remains available for juvenile smalltooth sawfish in the CHEU (84,480 – 31.67 [14.9 + 16.77] = 84,448.33 rounded to 84,448). While this number only takes into account projects with

[2] From September 2009 to September 2016, NMFS completed 107 Section 7 consultations for a total loss of 16.18 ac of shallow, euryhaline habitat.

[3] Due to the small number of monthly projects affecting smalltooth sawfish critical habitat and the limited adverse impact from typical seawall/dock projects to critical habitat, NMFS updates annual loss rates quarterly.

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

Based on the recovery plan objectives, 95% of the shallow, euryhaline habitat available at the time the species was listed, or approximately 80,256 ac of shallow, euryhaline habitat in the CHEU, must be maintained and effectively protected to facilitate recovery of the smalltooth sawfish (0.95 x 84,480 = 80,256). This requirement is premised on the fact that although the CHEU is part of the larger Recovery Region G, and the 95% protection requirement applies across the areas within Recovery Regions G, H, and I, designated critical habitat in the CHEU 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 120 ft² (0.003 ac) of the estimated remaining 84,448 ac of shallow, euryhaline habitat in the CHEU at the time of this consultation, which equates to 0.0000035% (0.003 ac x 100/84,448 ac). The permanent loss of 120 ft^2 (0.003 ac) of shallow, euryhaline habitat, in addition to 31.67 ac of shallow, euryhaline habitat already lost in critical habitat since the species was listed results in a combined loss of 0.037% of the estimated available shallow-water feature at time of listing (0.003 ac + 31.67 = 31.67 ac x 100 = 3,167/84,480 ac = 0.037%). Thus, this loss, in combination with the losses since we listed the species, does not provide any impediment to achieving the recovery objective of effectively protecting 95% of the habitat available at the time the species was listed. In addition, while the 120 ft^2 (0.003 ac) loss is a reduction in the total area with those features currently available in the CHEU (84,448.33 ac), it represents a fraction of the overall habitat available, and is neither an appreciable reduction in the amount of habitat available nor an appreciable diminishment in the functionality of the habitat in serving juvenile sawfish.

Table 3. Summary of Impacts to the Shallow, Euryhaline Habitat Essential Feature

Shallow, Euryhaline Habitat in the CHEU	**Acres**
Available habitat in May 2003	84,480
Estimated habitat lost May 2003 to September 2009	14.90
Habitat lost September 2009 to December 31, 2016 (Section 7)*	16.77
Habitat remaining as of December 31, 2016*	84,448.33
Habitat affected by this project	0.003 (0.0000035% of 84,480)
Approximate habitat remaining after completion of this project	84,448.327
Available habitat that must be maintained (per Recovery Plan)	80,256 (95% of 84,480)
*Due to the small number of monthly projects affecting smalltooth sawfish critical habitat and the limited adverse impact from typical seawall/dock projects to critical habitat, NMFS update	

Shallow, Euryhaline Habitat in the CHEU	Acres
losses quarterly.	

8.3 **Red Mangrove Essential Feature Impacts**

At the time of species listing in May 2003, remote sensing data from FWRI indicated that approximately 5,512,320 lin feet of red mangrove shoreline was available in the CHEU. The recovery plan is specific that critical habitat must be maintained at or above 95% of the habitat available at the time of listing. However, loss of habitat was not formally monitored until critical habitat was designated in September 2009. Therefore to meet the recovery sub-objective, we must estimate habitat loss that occurred between 2003 and 2009. We used our 7-year dataset of completed Section 7 consultations (September 2009 – September 2016[4]) to generate an annual rate of loss that can then be used as a proxy to back-calculate the loss of red mangrove shoreline between species listing and the time of critical habitat designation. These total losses translate into an average loss rate of approximately 1,757 lin ft (12,302/7 years) of red mangrove shoreline per year, and 146.5 lin ft per month (1,757/12 month = 146.45 rounded to 146.5). Assuming similar rates of red mangrove loss between when the species was listed and the time of critical habitat designation, we estimate that 11,280.5 lin ft of red mangrove were lost prior to critical habitat designation (77 months x 146.5 lin ft/month = 11,280.5 lin ft). From the time of critical habitat designation until December 31, 2016[5], NMFS completed 116 Section 7 consultations on projects within the CHEU that have resulted in the total loss of approximately 13,010 lin ft of red mangrove shoreline.

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 (13,010 lin ft), we calculated that approximately 5,488,029.5 lin ft of red mangroves currently remain available for juvenile smalltooth sawfish in the CHEU (5,512,320 – 24,290.5 [11,280.5 + 13,010] = 5,488, 029.5). While this number only takes into account projects with a federal nexus requiring ESA section 7 consultation, there are very few projects without a federal nexus that could impact red mangrove shoreline in the CHEU as most in-water construction projects require federal authorization.

Based on the recovery plan objectives, 95% of red mangrove habitat available at the time of the species listing, or approximately 5,236,704 lin ft of red mangrove habitat in the CHEU must be maintained and effectively protected to facilitate recovery of the smalltooth sawfish (0.95 x 5,512,320 = 5,236,704). This requirement is based on the fact that although the CHEU is part of the larger Recovery Region G, and the 95% protection requirement applies across the areas within Recovery Regions G, H, and I, designated critical habitat in the CHEU 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 50 lin ft of red mangroves, which

[4] From September 2009 to September 2016, NMFS completed 107 completed Section 7 consultations for a total loss of 12.302 lin ft of red mangrove shoreline.

[5] Due to the small number of monthly projects affecting smalltooth sawfish critical habitat and the limited adverse impact from typical seawall/dock projects to critical habitat, NMFS updates losses quarterly.

equates to 0.0009% loss of the estimated amount of red mangrove habitat remaining (50 lin ft/5,488,029.5lin ft in CHEU = 0.000009 x 100 = 0.0009%). The permanent loss of 50 lin ft of red mangrove habitat in addition to the loss of 24,290.5 lin ft since the species was listed results in a combined loss of 0.44% of the estimated red mangrove habitat available at the time the species was listed (50 lin ft + 24,290.5 lin ft = 24,340.5 lin ft/5,512,320 = 0.0044 x 100 = 0.44%). Thus, this loss, in combination with the estimated losses since we listed the species, does not provide any impediment to achieving the recovery objective of effectively protecting 95% of the habitat available at the time the species was listed. In addition, while the 50 lin ft loss is a reduction in the total area with those features currently available in the CHEU (5,488,029.5 lin ft), it represents a tiny fraction of the overall habitat available, and will neither appreciably reduce the amount of available habitat nor appreciably diminish the functionality of the habitat in serving juvenile sawfish.

Table 4. Summary of Impacts to the Red Mangrove Essential Feature

Red Mangrove Shoreline in the CHEU	**Linear Feet**
Available habitat in May 2003	5,512,320
Habitat lost May 2003 to September 2009	11,280.5
Habitat lost September 2009 to December 31, 2016 (Section 7)*	13,010
Habitat remaining as of December 31, 2016*	5,488,029.5
Habitat affected by this project	50 (0.0009% of 5,512,320)
Habitat remaining after com pletion of this project	
Available habitat that must be maintained (Recovery Plan)	5,236,704 (95% of 5,512,320)
*Due to the small number of monthly projects affecting smalltooth sawfish critical habitat and the limited adverse impact from typical seawall/dock projects to critical habitat, NMFS updates losses quarterly.	

8.4 Juvenile Abundance Recovery Objective

Impacts of the project on the other relevant recovery objective identified above, juvenile abundance, is made difficult by the state of available data. Since both the designation of critical habitat and the release of the recovery plan in 2009, an ongoing study has been occurring in the CHEU. FWRI is conducting this study which is supported primarily under funding provided by NMFS through the Section 6 Species Recovery Grants Program. Its intent is to determine the distribution, habitat use, and movement of juvenile sawfish in the CHEU. Given the limited duration (approximately 7 years [September 2009-September 2016]) of this study, there is not enough data to discern the trend in juvenile abundance within the CHEU or Recovery Region G. Early indications, however, are that juvenile sawfish are likely recovering in the CHEU, due in large part to ESA-listing of the species and critical habitat. Still, a significant amount of data needs to be analyzed in the near future to better determine to what extent juveniles are recovering. The action area is not documented as a hotspot for juveniles. Though species abundance is generally linked to habitat availability, we do not believe the loss of habitat associated with this project, in combination with the losses to date, will impede the 5% annual

growth objective for the juvenile population within Recovery Region G. Available data indicate the adult population in southwest Florida is reproducing and that the juvenile population trend is at least stable within the core range and possibly increasing—though variability is high (Carlson et al. 2007)(Carlson and Osborne 2012). Yet, it is too early to definitively state that juveniles are surviving to adulthood or that the population is recovering as a whole.

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 reaching 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 loss of 120 ft² (0.003 ac) of shallow, euryhaline essential feature and the loss of 50 lin ft (and 350 ft^2) of red mangrove essential feature from the seawall installation will not appreciably diminish the value of the critical habitat for the conservation of smalltooth sawfish , 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. Refer to the present Biological Opinion by title, issuance date, NMFS PCTS identifier number (SER-2016-18160), and USACE permit number (SAJ-2016-01654). 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. Conservation recommendations identified in Biological Opinions can assist action agencies in implementing their responsibilities under Section 7(a)(1). Conservation recommendations are discretionary activities designed to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. The following conservation recommendations are discretionary measures that NMFS believes are consistent with this obligation and therefore should be carried out by the federal action agency:

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

2. Provide funding to conduct directed research on smalltooth sawfish that will help further our understanding about the species (e.g., implement a relative abundance monitoring program which will help define how spatial and temporal variability in the physical and biological environment influence smalltooth sawfish) in an effort to predict long-term changes in smalltooth sawfish distribution, abundance, extent, and timing of movements.

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

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

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

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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