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National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southeast Regional Office
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SER-2016-17950

JUN 13 2017

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

Ref.: SAJ-2010-01766 (LOP-SJF), SER-2016-17950, Gary Gorski, Seawall Installation, Port Charlotte, Charlotte County, Florida

Dear Sir or Madam,

The enclosed Biological Opinion ("Opinion") was prepared by the National Marine Fisheries Service (NMFS) pursuant to Section 7(a)(2) of the Endangered Species Act (ESA). The Opinion considers the effects of a proposal by the Jacksonville District of the U.S. Army Corps of Engineers (USACE) to authorize installation of a concrete seawall under the authorities of Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act on the following listed species and/or critical habitat: loggerhead (Northwest Atlantic Ocean distinct population segment [DPS]), Kemp's ridley, and green (North and South Atlantic DPSs) 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:	Gary Gorski
Activity:	Single-family home seawall installation within smalltooth sawfish critical habitat, Port Charlotte, Charlotte County, Florida
Consulting Agency:	National Oceanic and Atmospheric Administration (NOAA), National Marine Fisheries Service (NMFS), Southeast Regional Office, Protected Resources Division, St. Petersburg, Florida Consultation Number SER-2016-17950
Approved by:	FOR Roy E. Crabtree, Ph.D., Regional Administrator NMFS, Southeast Regional Office St. Petersburg, Florida
Date Issued:	JUNE 13, 2017

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Acronyms and Abbreviations

CFR	Code of Federal Regulations
CHEU	Charlotte Harbor Estuary System
CO_2	Carbon Dioxide
DPS	Distinct Population Segment
EFH	Essential Fish Habitat
ESA	Endangered Species Act
FDEP	Florida Department of Environmental Protection
FWRI	Fish and Wildlife Research Institute
GMFMC	Gulf of Mexico Fishery Management Council
IPCC	The Intergovernmental Panel on Climate Change
LAA	Likely to Adversely Affect
MHW	Mean High Water
MHWL	Mean High Water Line
MIT	Massachusetts Institute of Technology
MLW	Mean Low Water
MLLW	Mean Lower Low Water
NLAA	Not Likely to Adversely Affect
NMFS	National Marine Fisheries Service
NOAA	National Ocean and Atmospheric Association
Opinion	Biological Opinion
RPMs	Reasonable and Prudent Measures
TTIU	Ten Thousand Islands/Everglades Unit
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
YOY	Young-of-the-year

Units of Measurement

Temperature

°F	degrees Fahrenheit
°C	degrees Celsius

Length and Area

ac	acre(s)
cm	centimeter(s)
ft	foot/feet
ft^2	square feet
in	inch(es)
km	kilometer(s)
lin ft	linear feet
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 marine construction permit within Charlotte County, Florida. This Opinion analyzes the project's effects on threatened and endangered species and designated critical habitat, in accordance with Section 7 of the ESA. We based 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 revised request for a formal consultation under Section 7 of the ESA from the USACE dated May 11, 2016. The USACE determined that the proposed project may affect, but is not likely to adversely affect, several species of sea turtles (Kemp's ridley, green, hawksbill, leatherback, and loggerhead) and smalltooth sawfish, and may affect smalltooth sawfish critical habitat, and requested NMFS's concurrence. NMFS requested additional information via phone on June 23, 2016. We received a final response at that time and initiated formal consultation on that day, after having determined that the proposed action had components that would likely adversely affect smalltooth sawfish critical habitat. NMFS made a subsequent request for additional information on January 3, 2017, and received a final response January 12, 2017.

3 DESCRIPTION OF THE PROPOSED ACTION AND ACTION AREA

Proposed Action

The site consists of a single-family home and existing dock (441 square feet [ft^2]) with a boatlift and remnants of riprap revetment (Figures 1 and 2). Nearshore water depths are less than 3 feet

(ft) measured at mean low water (MLW) and is estimated at between 6 inches (in) and 12 in deep at mean high water (MHW) where the seawall is proposed. The applicant describes the benthic conditions as a mixture of sand and mud with approximately 322 ft^2 of red mangroves (46 lin ft) interspersed along portions of where the 82 linear feet (lin ft) seawall is proposed within the project area. The applicant states that no corals or submerged aquatic vegetation is located within the project area.

The applicant proposes to install 82 lin ft of concrete seawall, which will require the removal of 322 ft^2 (46 lin ft by 7 ft deep) of red mangroves. Where mangroves are not present along the project footprint, there is shallow-water habitat because depths are less than 3 ft deep. The proposed seawall will be installed 7 ft waterward of the mean high water line (MHWL) and result in the loss of 288 ft^2 of shallow-water habitat from the resulting backfill placed behind the new seawall and the width of the seawall itself (82 lin ft of seawall – 46 lin ft of red mangroves = 36 lin ft remaining shallow-water habitat x 7 ft backfill from the back side of the new seawall = 252 ft^2 + 1 ft [width of seawall] x 36 ft length of seawall = 252 ft^2 +[36 ft x 1 ft] = 288 ft^2 total). The seawall will be jetted into place and mangroves will be removed using mechanical equipment (e.g., backhoe) from the uplands.

In-water construction is expected to take 1-2 weeks to complete and work will be done 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).

Figure 1. Proposed seawall location outlined by white line and proposed mangrove removal in 2 locations outlined by white rectangles (©2016 Google)

Figure 2. Image showing the project location in relation to the overall residential canal system and surrounding mangrove islands/wetlands (©2016 Google)

Action Area

The project is located at 26.95360°N, 82.14543°W, North American Datum 1983, within a shoreline armored residential canal. The project site is a single-family lot, home, and dock located in the Manchester Waterway in Port Charlotte, approximately 2.7 miles (mi) west from the nearest outlet into Alligator Bay, at 18574 Arapahoe Circle, Port Charlotte, Charlotte County, Florida. The majority of the neighboring lots within the project residential canal are seawall-armored. Directly across the residential canal south of the project is an extensive mangrove-fringed wetland (as shown in Figure 2).

The action area is defined by regulation as "all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action" (50 Code of Federal Regulations (CFR) 402.02). The action area includes the areas in which construction will take place, as well as the immediately surrounding water areas that may be impacted by direct (immediate such as noise from the construction equipment, sedimentation) effects of the actions.

4 STATUS OF LISTED SPECIES AND CRITICAL HABITAT

Tables 1 and 2 provide a list of species and critical habitat under the jurisdiction of NMFS that may occur in or near the action area:

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

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

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

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

We believe the project will have no effect on hawksbill and leatherback sea turtles, due to the species' very specific life history strategies, which are not supported at the project site. Leatherback sea turtles are the most pelagic[1] of the sea turtles, only entering coastal waters on a seasonal basis to feed in areas where jellyfish are concentrated or to nest. Leatherback sea turtles' very specific life history requirements are not supported at or near the project site. Similarly, we would not expect hawksbill sea turtles to be present at the project site due to their very specific life-history requirements, also not supported at or near the project site; hawksbills are associated with corals reefs, which are not found in or near the project area. Thus, these 2 species will not be affected by the proposed action and will not be discussed further.

[1] Pelagic: relating to or living in the open sea far from shore

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

Species Not Likely to be Adversely Affected

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

1. Sea turtles and smalltooth sawfish may be adversely affected by being temporarily unable to use the site due to avoidance of construction activities, related noise (e.g., seawall installation and mechanical removal of mangroves), 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 (1-2 weeks for all in-water work). Additionally, there are alternative sites in the area that sea turtles and sawfish can use for foraging or refuge such as the extensive mangrove-fringed islands directly across from the project area on the other side of the residential canal. Moreover, with respect to sea turtles, the project site is located approximately 2.7 miles inland through residential canals away from the nearest outlet into Alligator Bay. Therefore, we believe it is unlikely that the project site is providing preferred foraging or refuge habitat to sea turtles, which further supports our view that both temporary habitat impacts (exclusion from mangroves during construction) and the permanent removal of red mangroves will have insignificant effects on sea turtles.

2. Sea turtles and smalltooth sawfish may be adversely affected by construction activities involving permanent removal of red mangroves and shallow-water habitat (e.g., backfill to align new seawall with adjacent existing seawalls). Juvenile sawfish, in particular, use the shallow water and red mangroves for foraging and refuge. When there are foraging resources available (e.g., sea grasses, sponges and other invertebrate prey), some sea turtle species are known to forage in very shallow water (e.g., loggerheads, greens, kemp's ridleys) sometimes in and around mangroves. However, this shallow-water foraging is more typical of shallow patch reefs and seagrass beds adjacent to open water areas. The project area is located in an inland, extensive residential canal system with mangrove-fringed wetlands that we believe sea turtles are unlikely to be using for foraging or refuge. Sea turtles may be present in the action area having traversed the residential canals, but in this case the foraging area provided by the project site would be a less desirable foraging site than the extensive surrounding fringing red mangroves and shallow-water habitat. Thus, we believe the loss of red mangroves and shallow-water habitat will have an insignificant effect on sea turtles.

With respect to smalltooth sawfish:

a. Seawall installation and associated backfill will permanently remove approximately 288 ft^2 (0.007 ac) of shallow water habitat less than 3 ft MLW; however, given the much greater acreage of shallow water habitat outside of the residential canal in the surrounding mangrove islands and the available shallow water habitat that will remain along the edges of the spreader canal, which separates the extensive Port Charlotte residential canal system from the surrounding protected mangrove-fringed wetlands, NMFS believes the impact of the permanent loss of this shallow water area to smalltooth sawfish within the project footprint is insignificant.
b. The onsite red mangroves (46 lin ft [322 ft^2]) will also be removed and permanently lost from the project area. Given the much greater areas of red mangrove habitat outside of the residential canal in the surrounding mangrove islands and in the spreader canal, NMFS believes the impact of the permanent loss of these red mangroves to smalltooth sawfish within the project footprint is insignificant. Additionally, sawfish will continue to be able to transit within the canal post-construction where there are many unconsolidated shoreline areas with mangroves. Thus, foraging and refuge resources will remain available and accessible to the species post-construction, and the effect of the action is insignificant.
c. Both red mangroves and shallow-water habitat are essential features of smalltooth sawfish critical habitat. Impacts to both essential features of critical habitat may affect the species and will be discussed further in Section 6 and 8.

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 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 (1-2 weeks during daylight hours). Therefore, NMFS believes that physical impacts directly related to in-water construction equipment are discountable.

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^2]) of coastal habitat, and the Ten Thousand

Islands/Everglades Unit (TTIU), which is comprised of approximately 619,013 ac (967 mi^2) of coastal habitat.

Critical Habitat Unit Impacted by this Action

This consultation focuses on an activity occurring in the CHEU, which encompasses portions of Charlotte and Lee Counties (Figure 3). 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).

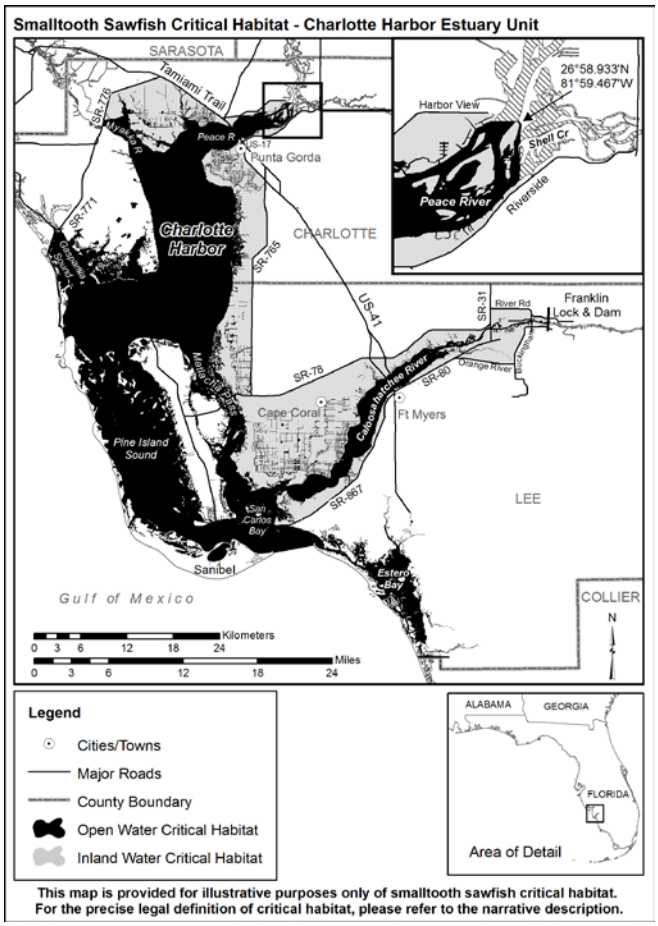


Figure 3. Map of smalltooth sawfish critical habitat – Charlotte Harbor Estuary Unit (CHEU)

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 2009). NMFS determined that without sufficient habitat, the population was unlikely to increase to a level associated with low extinction risk and de-listing. Therefore, NMFS identified 2 habitat features essential for the conservation of this species: (1) red mangroves, and (2) shallow, euryhaline habitats characterized by water depths between the MHWL and -3 ft (-0.9 meter [m]) measured at mean lower low water (MLLW) (Final Rule, 74 FR 45353). These essential features of critical habitat provide juveniles refuge from predation and forage opportunities within their nursery habitat. One or both of these essential features must be present in an action area for it to function as critical habitat for smalltooth sawfish.

Habitat Use

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

Tracking data from the Caloosahatchee River in Florida indicate very shallow depths and specific salinity ranges are important abiotic factors influencing juvenile smalltooth sawfish movement patterns, habitat use, and distribution (Simpfendorfer et al. 2011). An acoustic tagging study in a developed region of Charlotte Harbor, Florida, identified the importance of mangroves in close proximity to shallow-water habitat for juvenile smalltooth sawfish, stating that juveniles generally occur in shallow water within 328 ft (100 m) of mangrove shorelines (Simpfendorfer et al. 2010). Juvenile smalltooth sawfish spend the majority of their time in waters shallower than -13 ft (-4 m) deep (Simpfendorfer et al. 2010) and are seldom found deeper than -32 ft (-10 m) (Poulakis and Seitz 2004). Simpfendorfer et al. (2010) also indicated the following developmental differences in habitat use: the smallest YOY juveniles generally used water shallower than -1.6 ft (-0.5 m), had small home ranges, and exhibited high levels of site fidelity. Although small juveniles exhibit high levels of site fidelity for specific nursery habitats for periods of time lasting up to 3 months (Wiley and Simpfendorfer 2007), they undergo small movements coinciding with changing tidal stages. These movements often involve moving from shallow sandbars at low tide and among red mangrove prop roots at higher tides (Simpfendorfer et al. 2010), behavior likely to reduce the risk of predation (Simpfendorfer 2006). As juveniles increase in size, they begin to expand their home ranges (Simpfendorfer et al. 2010; Simpfendorfer et al. 2011), eventually moving to more offshore habitats where they likely feed on larger prey and eventually reach sexual maturity.

Researchers have identified several areas within the Charlotte Harbor Estuary that are disproportionately more important to juvenile smalltooth sawfish, based on intra- or inter-annual capture rates during random sampling events within the estuary (Poulakis 2012; Poulakis et al. 2011). The areas, 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 (see Figure 4, 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 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 requiring federal authorization 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 applicants construct docks in accordance with the NMFS-USACE publication, *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. Many seawalls built along unconsolidated shorelines require the removal of red mangroves to accommodate the seawalls.

Cable, Pipeline, and Transmission Line Construction

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

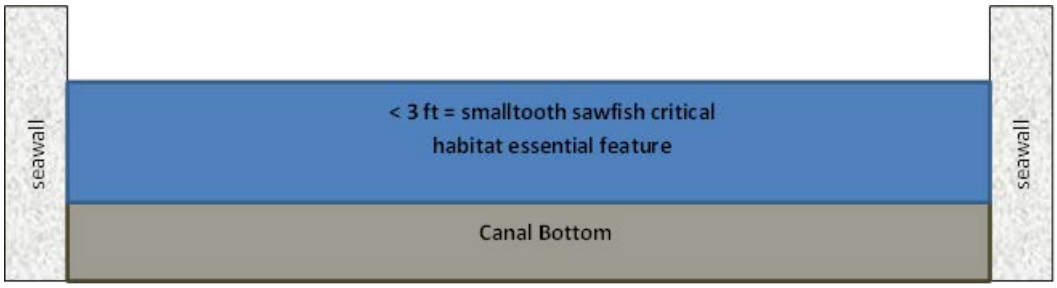
Transportation Infrastructure Construction

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

Dredging

Riverine, nearshore, and offshore areas are dredged for navigation, construction of infrastructure, and marine mining. An analysis of 18 major southeastern estuaries conducted in 1993-94 demonstrated that over 7,000 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 4, Diagrams A and B).

A.



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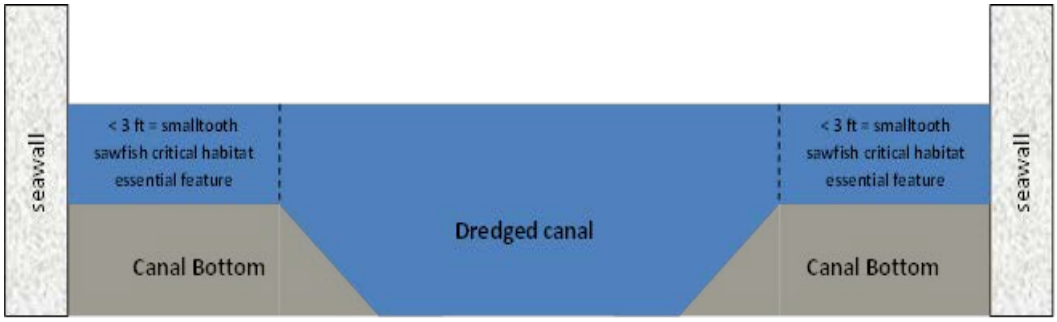

C.

Figure 4. Diagram A depicts a cross section of a historically-dredged channel/canal within the boundaries of the critical habitat units that has not been maintained. Diagram B depicts the typical cross section of a maintenance dredged channel/canal. Diagram C depicts a cross section of a maintained dredged channel/canal after sea level rise of > 1 ft.

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

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

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

As stated above, smalltooth sawfish show an affinity for a particular salinity range, moving downriver during wetter months and upriver during drier months to remain within that range (Simpfendorfer et al. 2011). Therefore, water management decisions that affect salinity regimes may impact the functionality of critical habitat. This may result in smalltooth sawfish following specific salinity gradients into less advantageous habitats (e.g., areas with less shallow water or red mangrove habitat). Furthermore, large changes in water flow over short durations would likely escalate movement patterns for smalltooth sawfish, thereby increasing predation risk and energy output. Researchers are currently looking into the effects of large-scale freshwater discharges on smalltooth sawfish and their designated critical habitat. The most vulnerable portion of the juvenile sawfish population to water management 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 sea level modeling data (IPCC 2007) to forecast a range of sea level rise trajectories from low, to moderate, to high predictions (Figure 5). 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 4, Diagram C).

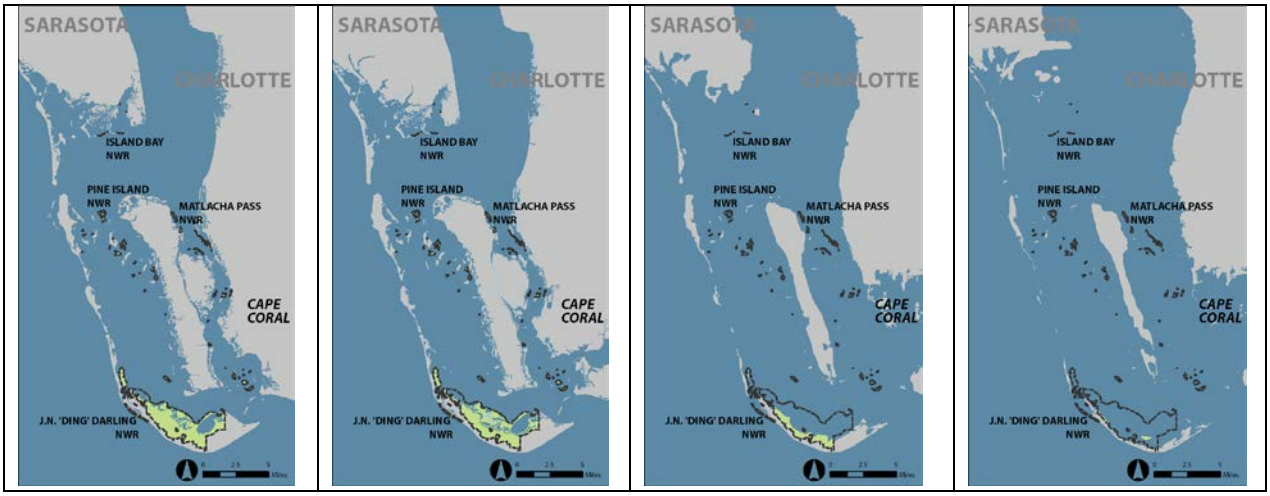

Figure 5. From left to right: current shoreline, + 3.5 in (+ 9 cm); + 18.5 in (+ 47 cm); and + 38.97 in (+ 99 cm) sea level rise by 2060[2].

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

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

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

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

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

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

mangrove community composition, mortality, and recruitment (Gilman et al. 2006). Increased storms surges and flooding events could also affect mangroves' ability to photosynthesize (Gilman et al. 2006) and the oxygen concentrations in the mangrove lenticels (Ellison 2010).

5 ENVIRONMENTAL BASELINE

This section describes the effects of past and ongoing human and natural factors contributing to the current status of the affected smalltooth sawfish critical habitat in the action area. The environmental baseline describes the critical 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 current state of critical habitat, 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, or may have been exposed to unique or disproportionate stresses. These localized stress responses or stressed baseline conditions may increase the severity of the adverse effects expected from the proposed action.

Status of Designated Critical Habitat in or Near the Action Area

The subject property is a single-family lot, home, and associated dock located in a residential canal approximately 2.7 mi via the canal system out into Alligator Bay and Charlotte Harbor. The benthos at the site is described as a mixture of sand and mud with no submerged aquatic vegetation present within the project area. There are red mangroves on the property, all within the project footprint. There is also considerable mangrove fringe located on the opposite side of the peripheral spreader canal that separates the extensive Port Charlotte residential canal system from the surrounding protected mangrove-fringed wetlands. The undeveloped areas along the southern portion of the spreader canal in Figure 6 below are part of the Gasparilla Sound – Charlotte Harbor Aquatic Preserve. This is the largest aquatic preserve in the Charlotte Harbor system and is comprised of approximately 84,500 ac. These mangrove islands provide a buffer between the aquatic preserves and urban development and agriculture in addition to providing smalltooth sawfish critical habitat and essential fish habitat under the ESA (Charlotte Harbor Aquatic Preserves Management Plan, 2016).

The red mangrove essential feature is present at the project site in the immediate shoreline area. In areas where red mangroves are not present, the shallow-water essential feature is present.

Figure 6. Project location indicated by white circle, the mangrove areas bordering the entire residential canal community are part of the Gasparilla Sound-Charlotte Harbor Aquatic Preserve (©2016 Google).

Factors Affecting Critical Habitat within the Action Area

Federal Actions

The USACE previously permitted activities on this property in 2008 (SER-2013-12382); however, construction never commenced. The property has since been sold to the current owner, who has chosen not to rely on the previous authorization and instead to seek authorization for the proposed project discussed in this Opinion. No other federal permitted projects are known to have occurred within the action area as defined in Section 3, as per a review of the NMFS Protected Resource Division's completed consultation database (June 5, 2017).

USACE Authorized Marine Construction Permitting

The USACE issues Clean Water Act and Rivers and Harbors Act permits for coastal in-water marine construction, including for consolidation of shoreline abutting 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). In the action area, state and county ordinances often require shoreline armoring before building on vacant lots is allowed. Although individual shoreline armoring projects may be small in scale, cumulatively, these required armoring projects could have a potentially large effect on smalltooth sawfish critical habitat. This is particularly true given the limited options available under the ordinances for

shoreline armoring. For example, alternatives to vertical seawalls such as living shorelines are not currently an option for the required pre-construction shoreline armoring.

State or Private Actions
Nonfederal activities that may adversely affect designated critical habitat for smalltooth sawfish in the action area include impacts from residential shoreline stabilization activities that do not require federal permits or otherwise have a federal nexus. The direct and indirect impacts from some of these activities are difficult to quantify. NMFS does not have any knowledge of state or private actions occurring in or near to the action area that also would not require a federal permit. The likelihood of a shoreline armoring project occurring in or near to the action area that does not require a federal permit for in-water construction work, for instance, is very small.

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 and on critical habitat is unknown; however, they have the potential to impede recovery directly if animals die as a result of them, or indirectly if important critical habitat is damaged as a result of these disturbances. In 2005, Hurricane Charley likely damaged habitat, including red mangroves, 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, including areas that have been designated as smalltooth sawfish critical habitat. 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

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 288 ft^2 (0.007 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 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 288 ft^2 (shallow, euryhaline habitat), the project is not severing or preventing access to alternate habitat with this essential feature in the surrounding area for juvenile smalltooth sawfish. Still,

some ecological function provided to juvenile smalltooth sawfish in terms of the shallow, euryhaline essential feature will be lost. The project is located within a residential canal system far away from any known hotspot reproductive areas such as those areas identified within the Caloosahatchee River (Poulakis 2012; Poulakis et al. 2011). There has been 1 reported juvenile smalltooth sawfish approximately 1.4 miles northwest from the action area (very small juvenile in 2014) (ISED, unpublished data). Juvenile smalltooth sawfish use the shallow, euryhaline essential feature to forage and take refuge from potential predators. The installation of the seawall will result in the permanent loss of 288 ft^2 of nearshore shallow-water area along the project site that is likely to adversely affect this essential feature in reducing the available shallow, euryhaline essential feature.

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. Before installing the seawall, the applicant proposes to remove existing mangroves, result in a permanent loss of approximately 322 ft^2 along 46 lin ft of shoreline of the red mangrove habitat, potential forage and shelter area for juvenile smalltooth sawfish. Using remote sensing data acquired from the Fish and Wildlife Research Institute (FWRI), we were able to compile information relating to the total area of this essential feature within smalltooth sawfish critical habitat. 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 46 lin ft, 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 322 ft^2 of a red mangrove along 46 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 402.02).

Many threats to smalltooth sawfish critical habitat are expected to be exacerbated by the effects of global climate change (see Threats to Critical Habitat section). Potential increases in sea level may impact the availability of nursery habitat, particularly shallow euryhaline and red mangrove lined, low-lying coastal habitats (IPCC 2014; Wanless et al. 2005). Red mangroves could be negatively affected by increased temperatures, salinities, and acidification of coastal waters (Snedaker 1995), Wanless et al. 2005 (Scavia et al. 2002), as well as increased runoff and erosion due to the expected increase in extreme storm events (IPCC 2014; Wanless et al. 2005). These alterations of the marine environment due to global climate change could ultimately affect the distribution, physiology, and growth rates of red mangroves, potentially eliminating them from particular areas. The magnitude of these effects on smalltooth sawfish

critical habitat are difficult to predict, yet the cyclical loss of habitat from extreme storm events combined with sea level rise may result in a decrease in the areal coverage of the 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 contribute to, or be affected cumulatively by climate change.

Smalltooth sawfish habitat, including areas designated as critical habitat, has been degraded or modified throughout the southeastern United States from agriculture, urban development, commercial activities, channel dredging, boating activities, and the diversion of freshwater runoff. No future actions with effects beyond those already described are reasonably certain to occur in the action area. The man-made canals within the CHEU will likely continue to experience the same types of actions described in the status of critical habitat in Section 4 (Status of the Critical Habitat within the Action Area). These threats include shoreline armoring (e.g., seawall installation and associated red mangrove removal), canal dredging, and dock construction.

8 INTEGRATION AND SYNTHESIS

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 "significantly 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 population by protecting juvenile areas. We determined that the habitat features essential to achieving that conservation objective are (1) shallow, euryhaline habitats characterized by water depths between the MHWL and 3 ft (0.9 m) measured at MLLW and (2) red mangrove shorelines. 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. The critical habitat designation for smalltooth sawfish is divided into 2 units in southwest Florida where the physical features essential to the species' conservation can be protected from destruction or adverse modification: the Charlotte Harbor Estuary Unit (CHEU) and the Ten Thousand Islands/Everglades Unit (TTIU). The proposed action is located within CHEU.

The smalltooth sawfish recovery plan identifies 3 recovery objectives (NMFS 2009). Recovery Objective #1 is to minimize human interactions and associated injury and mortality; this objective is not relevant to critical habitat. Recovery Objective #2 is to protect and/or restore smalltooth sawfish habitats. Recovery Objective #3 is to ensure smalltooth sawfish abundance increases substantially and the species reoccupies areas from which it had previously been extirpated. 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.

Protect and Restore Smalltooth Sawfish Habitat (Recovery Objective #2)
In establishing Recovery Objective #2, we recognized that recovery and conservation of 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. Due to the protections provided by the Ten Thousand Islands National Wildlife Refuge, Everglades National Park, and the Florida Keys National Marine Sanctuary, much of the historic juvenile smalltooth sawfish habitat in southwest Florida has remained high-quality juvenile habitat. Recovery Regions G, H, and I in southwest Florida extend from the Manatee River on the west coast of Florida south through Everglades National Park and the Florida Keys to Caesar Creek on the southeast coast of Florida. While much of the CHEU is protected by the Charlotte Harbor Preserve State Park (CHPSP) system, it is also highly anthropomorphically influenced (See Section 5 "Environmental Baseline").

The recovery plan states that for the three recovery regions with remaining high-quality habitats (i.e., Recovery Regions G, H, and I), juvenile habitats "must be maintained over the long term at or above 95% of the acreage available at the time of listing" (NMFS, 2009). To ensure that a proposed action will not impede Recovery Objective #2, we determine whether the critical habitat unit will be able to maintain 95% of its designated critical habitat after taking into account project impacts in the context of the status of the critical habitat, the environmental baseline, and cumulative effects. The analysis of impacts on Recovery Objective #2 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 is currently the only area in which nursery areas have been established and are being protected specifically for that purpose. Below we estimate the percent impact the proposed action will have shallow, euryhaline habitat and red mangrove shoreline essential features of critical habitat within the CHEU.

Shallow, Euryhaline Essential Feature Impacts
NMFS estimated that 84,480 ac of shallow, euryhaline habitat (abbreviated SEH throughout this section) was available within the 221,459 acres of the CHEU at the time of species listing in April 2003 (NMFS, 2009; Table 3, Line 1). The recovery plan is specific that juvenile habitat in Recovery Regions G, H, and I must be maintained at or above 95% of the acreage available at the time of listing; however, loss of habitat was not formally monitored until critical habitat was designated in September 2009. Therefore, we must estimate habitat loss that occurred during the period between species listing and the designation of critical habitat.

To do this, first we need to estimate an annual loss rate of SEH in CHEU. We used a 7-year dataset of completed Section 7 consultations (September 2009 – September 2016) 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. We are relying on this dataset because using 7 complete years of information helps avoid over- or under-estimating the rate of habitat loss due to any potential interannual variability associated with economic growth and contraction that may have occurred in that time. From September 2009 to September 2016 (i.e., 84 months), NMFS completed 107 Section 7 consultations on projects within the CHEU that resulted in the total loss of 16.18 ac of shallow, euryhaline habitat. Based on these losses, we estimated a monthly loss rate of SEH using the following equation:

$$Monthly\ loss\ rate\ of\ SEH = SEH\ lost\ through\ federal\ agency\ actions \div 84\ months$$
$$Monthly\ loss\ rate\ of\ SEH = 16.18\ ac \div 84\ months$$
$$Monthly\ loss\ rate\ of\ SEH = 0.19\ ac\ per\ month$$

Assuming the same monthly loss rate, we back-calculated the loss of SEH in the 77 months between when the species was listed and the time of critical habitat designation (April 2003 – August 2009) using the following equation:

$$SEH\ lost\ prior\ to\ critical\ habitat\ designation = 77\ months \times Monthly\ loss\ rate\ of\ SEH$$
$$SEH\ lost\ prior\ to\ critical\ habitat\ designation = 77\ months \times 0.19\ ac\ per\ month$$
$$SEH\ lost\ prior\ to\ critical\ habitat\ designation = 14.63\ ac$$ (Table 3 Line 2)

Next, we need to determine the loss of SEH since the designation of critical habitat. From critical habitat designation through March 31, 2017[3], NMFS has completed 122 Section 7 consultations on projects within the CHEU that have resulted in the additional loss of 19.58 ac of

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

SEH (Table 3 Line 3). Using this information, we calculated the SEH currently available in CHEU using the following equation:

$$SEH\ currently\ available\ in\ CHEU$$
$$= SEH\ in\ CHEU\ at\ time\ of\ species\ listing$$
$$- (SEH\ lost\ prior\ to\ critical\ habitat\ designation$$
$$+ SEH\ lost\ since\ critical\ habitat\ designation)$$
$$SEH\ currently\ available\ in\ CHEU = 84,480\ ac\ - (14.63\ ac + 19.58\ ac)$$
$$SEH\ currently\ available\ in\ CHEU = 84,480\ ac\ - 34.21\ ac$$
$$SEH\ currently\ available\ in\ CHEU = 84{,}445.79\ ac$$ (Table 3 Line 4)

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 shallow, euryhaline habitat in the CHEU as most in-water construction projects require federal authorization.

Recovery Objective #2 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 is currently the only area in which nursery areas have been established and are being protected specifically for that purpose. Therefore, calculated the amount of SEH that must be maintained in the CHEU according to the recovery plan using the following equation:

$$SEH\ that\ must\ be\ maintained\ in\ CHEU = SEH\ in\ CHEU\ at\ time\ of\ species\ listing \times 95\%$$
$$SEH\ that\ must\ be\ maintained\ in\ CHEU = 84{,}480\ ac \times 0.95$$
$$SEH\ that\ must\ be\ maintained\ in\ CHEU = 80{,}256\ ac$$ (Table 3 Line 5)

The proposed project would result in the permanent loss of 288 ft^2 (0.006611 ac) of the estimated 84,480 ac of SEH in the CHEU at the time of species listing (Table 3 Line 6). Using the above results, we can estimate the impact of the proposed project in addition to the SEH lost in CHEU since the species was listed using the following equation:

$$\%\ SEH\ lost\ in\ CHEU\ since\ species\ listing$$
$$= [(SEH\ loss\ due\ to\ this\ project$$
$$+\ SEH\ lost\ prior\ to\ critical\ habitat\ desingation$$
$$+ SEH\ lost\ since\ critical\ habitat\ designation)$$
$$\div Total\ SEH\ in\ CHEU\ at\ time\ of\ species\ listing] \times 100$$
$$\%\ SEH\ lost\ in\ CHEU\ since\ species\ listing$$
$$= [(0.006611\ ac + 14.63\ ac\ + 19.58\ ac) \div 84,480\ ac] \times 100$$
$$\%\ SEH\ lost\ in\ CHEU\ since\ species\ listing = (34.216611\ ac\ \div 84,480\ ac) \times 100$$
$$\%\ SEH\ lost\ in\ CHEU\ since\ species\ listing = 0.040503\ \%$$ (Table 3 Line 7)

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

Shallow, Euryhaline Habitat in the CHEU		**Acres**
1.	Available at the time of species listing	84,480
2.	Losses prior to critical habitat designation	14.63
3.	Losses since critical habitat designation (through federal agency actions)	19.58
4.	Available as of March 31, 2017	84,445.79
5.	Acreage that must be maintained per Recovery Plan	80,256 (95% of 84,480)
6.	Affected by this project	0.006611
7.	Affected since species listing	34.216611 (0.040503% of 84,480)

Red Mangrove Essential Feature Impacts
Remote sensing data from FWRI indicated that approximately 5,512,320 lin feet of red mangrove shoreline (abbreviated RMS throughout this section) was available in the CHEU at the time of species listing in April 2003 (Table 4 Line 1). The recovery plan is specific that juvenile habitat in Recovery Regions G, H, and I must be maintained at or above 95% available at the time of listing; however, loss of habitat was not formally monitored until critical habitat was designated in September 2009. Therefore, we must estimate habitat loss that occurred during the period between species listing and the designation of critical habitat.

To do this, first we need to calculate an annual loss rate of RMS in CHEU. We used a 7-year dataset of completed Section 7 consultations (September 2009 – September 2016) 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. We are relying on this dataset because using 7 complete years of information helps avoid over- or under-estimating the rate of habitat loss due to any potential inter-annual variability associated with economic growth and contraction that may have occurred in that time. From September 2009 to September 2016 (i.e., 84 months), NMFS completed 107 Section 7 consultations on projects within the CHEU that resulted in the total loss of 12,302 lin ft of red mangrove shoreline. Based on these losses, we estimated a monthly loss rate of RMS using the following equation:

$$Monthly\ loss\ rate\ of\ RMS = RMS\ loss\ lost\ through\ federal\ agency\ actions \div 84\ months$$
$$Monthly\ loss\ rate\ of\ RMS = 12{,}302\ lin\ ft \div 84\ months$$
$$Monthly\ loss\ rate\ of\ RMS = 146.45\ lin\ ft\ per\ month$$

Assuming the same monthly loss rate, we back-calculated the loss of RMS in the 77 months between when the species was listed and the time of critical habitat designation (April 2003 – August 2009) using the following equation:

$$RMS\ loss\ prior\ to\ critical\ habitat\ designation = September\ 2003\ to\ September\ 2009 \times Annual\ loss\ rate\ of\ RMS$$

$$RMS\ loss\ prior\ to\ critical\ habitat\ designation = 77\ months \times 146.45\ lin\ ft\ per\ month$$
$$RMS\ loss\ prior\ to\ critical\ habitat\ designation = 11{,}276.65\ lin\ ft \text{ (Table 4 Line 2)}$$

Next, we need to determine the loss of RMS since the designation of critical habitat. From the critical habitat designation through March 31, 2017[4], NMFS completed 123 Section 7 consultations on projects within the CHEU that have resulted in the additional loss of approximately 13,282 lin ft of red mangrove shoreline (Table 4 Line 3). Using this information, we calculated the RMS currently available for juvenile smalltooth sawfish in CHEU using the following equation:

$$RMS\ currently\ available\ in\ CHEU$$
$$= RMS\ in\ CHEU\ at\ time\ of\ species\ listing$$
$$- (RMS\ loss\ prior\ to\ critical\ habitat\ designation$$
$$+ RMS\ loss\ since\ critical\ habitat\ designation)$$
$$RMS\ currently\ available\ in\ CHEU$$
$$= 5{,}512{,}320\ lin\ ft - (11{,}276.65\ lin\ ft + 13{,}282\ lin\ ft)$$
$$RMS\ currently\ available\ in\ CHEU = 5{,}512{,}320\ lin\ ft - 24{,}558.65\ lin\ ft$$
$$RMS\ currently\ available\ in\ CHEU = 5{,}487{,}761.35\ lin\ ft \text{ (Table 4 Line 4)}$$

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.

Recovery Objective #2 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 is currently the only area in which nursery areas have been established and are being protected specifically for that purpose. Therefore, we calculated the amount of RMS that must be maintained in the CHEU according to the recovery plan using the following equation:

$$RMS\ that\ must\ be\ maintained\ in\ CHEU =$$
$$Total\ RMS\ in\ CHEU\ at\ time\ of\ critical\ habitat\ designation \times 95\%$$
$$RMS\ that\ must\ be\ maintained\ in\ CHEU = 5{,}512{,}320\ lin\ ft \times 0.95$$
$$RMS\ that\ must\ be\ maintained\ in\ CHEU = 5{,}236{,}704\ lin\ ft \text{ (Table 4 Line 5)}$$

The proposed project would result in the loss of 46 lin ft of the estimated 5,512,320 lin ft of RMS in the CHEU at the time of species listing (Table 4 Line 6). Using the above results, we estimated the impact of the proposed project in addition to the RMS lost in CHEU since the species was listed using the following equation:

[4] Due to the small number of monthly projects affecting smalltooth sawfish critical habitat and the limited adverse effect from typical seawall/dock projects to critical habitat, NMFS updates red mangrove shoreline loss quarterly.

$$\%\ RMS\ lost\ in\ CHEU\ since\ species\ listing$$
$$= [(RMS\ loss\ due\ to\ this\ project + RMS\ lost\ prior\ to\ critical\ habitat\ designation + RMS\ lost\ since\ critical\ habitat\ designation) \div Total\ RMS\ in\ CHEU\ at\ time\ of\ species\ listing] \times 100$$
$$\%\ RMS\ lost\ in\ CHEU\ since\ species\ listing = [(46\ lin\ ft + 11{,}276.65\ lin\ ft + 13{,}282\ lin\ ft) \div 5{,}512{,}320\ lin\ ft] \times 100$$
$$\%\ RMS\ lost\ in\ CHEU\ since\ species\ listing = (24{,}604.65\ lin\ ft \div 5{,}512{,}320\ lin\ ft) \times 100$$
$$\%\ RMS\ lost\ in\ CHEU\ since\ species\ listing = 0.446357\ \%$$ (Table 4 Line 7)

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

Red Mangrove Shoreline in the CHEU		**Linear Feet**
1.	Available at the time of species listing	5,512,320
2.	Losses prior to critical habitat designation	11,276.65
3.	Losses since critical habitat designation (through federal agency actions)	13,282
4.	Available as of March 31, 2017	5,487,761.35
5.	Acreage that must be maintained per Recovery Plan	5,236,704 (95% of 5,512,320)
6.	Affected by this project	46.0
7.	Affected since species listing	24,604.65 (0.446357% of 5,512,320)

Summary of Impacts to the Essential Features
Including this project, 0.040503% of the SEH essential feature (Table 3) and 0.446357% of the RMS essential feature (Table 4) in CHEU has been affected by in-water construction projects requiring a federal authorization since smalltooth sawfish was listed in 2003. Together, these losses total 0.48686% (0.040503% [SEH] + 0.446357% [RMS]). Thus, the loss of essential features associated with the proposed project, in combination with losses since we listed the species, does not provide any impediment to effectively protecting 95% of the habitat available in Recovery Regions G, H, and I at the time the species was listed.

Ensure Smalltooth Sawfish Abundance Increases (Recovery Objective #3)
In establishing Recovery Objective #3, we recognized that it was important that sufficient numbers of juvenile sawfish inhabit several nursery areas across a diverse geographic 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 (i.e., CHEU) must support sufficiently large numbers of juvenile sawfish to ensure that the species is viable in the long-term and can maintain genetic diversity. For this region, the recovery objective requires that the relative abundance of small juvenile sawfish (< 200 cm) either increases 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.

Assessing the effect of the proposed action on small juvenile abundance is made difficult by the state of available data. Since the designation of critical habitat and the release of the recovery plan in 2009, ongoing studies have been in place to monitor the US DPS of smalltooth sawfish. FWRI is conducting a study in the CHEU that is supported primarily under funding provided by NMFS through the Section 6 Species Recovery Grants Program, while NOAA Fisheries SEFSC Panama City Laboratory and Florida State University have focused studies in the TTIU. The intent of these studies is to determine the abundance, distribution, habitat use, and movement of juvenile sawfish. Given the limited duration of the study in CHEU (September 2009-current]), there is not yet enough data to discern the trend in juvenile abundance within that Unit. Early indications are that juvenile sawfish are at least stable and likely increasing in the CHEU, due in large part to ESA-listing of the species and designation of critical habitat. While it may be too early to state definitively that juveniles within CHEU are surviving to adulthood, researchers consistently capture newborn smalltooth sawfish, particularly within "hot spots," indicating adult smalltooth sawfish are pupping within Recovery Region G. Available data from the adjacent Recovery Region H (i.e., TTIU) indicate that adult smalltooth sawfish are also reproducing within this recovery region and that the juvenile population trend is at least stable and possibly increasing—though variability is high (Carlson et al. 2007)(Carlson and Osborne 2012). With no other data to consider, the abundance trend in TTIU represents the best data available for assessing the population trends in the CHEU. Therefore, 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.

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 permanent loss of 288 ft^2 (0.006611 ac) of the shallow, euryhaline essential feature and the permanent loss of 46 lin ft (322 ft^2) of the red mangrove essential feature from the proposed seawall installation will not impede the critical habitat's ability to support the smalltooth sawfish's conservation, despite permanent adverse effects. Given the nature of the project and the information provided above, we conclude that the action, as proposed, is likely to adversely affect, but is not likely to destroy or adversely modify, smalltooth sawfish critical habitat.

10 INCIDENTAL TAKE STATEMENT

NMFS does not anticipate that the proposed action will incidentally take any species and no take is authorized. Nonetheless, any takes of smalltooth sawfish or sea turtles shall be immediately reported to takereport.nmfsser@noaa.gov. Refer to the present Biological Opinion by title (Gorski Shoreline Stabilization), issuance date, NMFS PCTS identifier number (SER-2016-17950), and USACE permit number (SAJ-2010-01766). 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 euryhaline 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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