Smalltooth Sawfish and Smalltooth Sawfish Critical Habitat Consultation Framework NOAA Fisheries Southeast Region

February 2023

Purpose and Scope

To inform the Southeast Region's Endangered Species Act (ESA) Section 7 consultation activities regarding the smalltooth sawfish (*Pristis pectinata*) and its critical habitat, this document consolidates and interprets information obtained through the listing process, subsequent research by state, federal, and university partners, and recovery plan development. This collection of information provides ESA Section 7 assistance, and identifies early conservation/recovery concepts to be considered during consultation. The contents are intended to summarize best available information as well as facilitate integration of conservation/recovery considerations into our routine consultation practices. A large quantity of information was synthesized in the production of this document and as such, it should be considered a job aid and used as general guidance only. Additional detailed information can be found in Brame et al. (2019), Norton et al. (2012), the most recent status review document, and the Recovery Plan.

Table 1. Smalltooth sawfish ESA listing documents

Species/DPS	ESA Status	Listing Rule, Date	Critical Habitat Rule, Date	Recovery Plan
U.S. Distinct population segment	Endangered	68 FR 15674, April 1, 2003	74 FR 45353, September 2, 2009	January 1, 2009
Non-U.S. Distinct population segment	Endangered	79 FR 73978, December 12, 2014	Not applicable	Not available

Species Life History

Species Description

The smalltooth sawfish (Figure 1) is one of five species of sawfishes. Although shark-like in appearance, sawfish are actually rays, as their gills and mouths are found on the underside of their bodies (ventral side) while spiracles are located on their top (dorsal) side, directly behind their eyes. They are named after the distinct long, flat snouts (rostra) edged with teeth that look much like actual saws (Figure 2). Smalltooth sawfish are olive gray to brown on top and have a white underside. The smalltooth sawfish is differentiated from the other species of sawfishes by the 22-29 rostral teeth on each side of the rostrum, the lack of a lower caudal (tail

fin) lobe, and the alignment of the first dorsal fin with the pelvic fins. Smalltooth sawfish are born at approximately 2.5 feet and may reach a maximum size of 16 feet.

Figure 1. Juvenile smalltooth sawfish; notice the lack of a caudal lobe and the alignment of the second dorsal and pelvic fins. Photo credit: Olivier Born

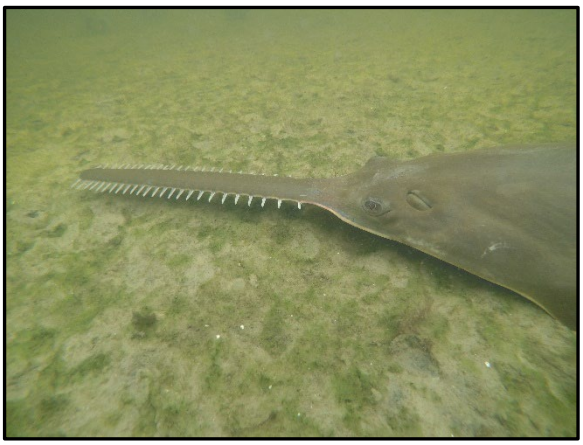

Figure 2. Sawfish rostrum (saw); notice the 25 rostral teeth on the left and 24 rostral teeth on the right. Photo credit: Nick Farmer

Distribution

In the western Atlantic, the smalltooth sawfish has been reported historically from Brazil through the greater Caribbean and Central America, the Gulf of Mexico, and the Atlantic coast of the United States (Carlson et al. 2013). However, the smalltooth sawfish has been wholly or nearly extirpated from large areas of its historical range and is now found in <20% of its former range worldwide (Dulvy et al. 2016). The species is now only known to occur in the southeastern United States, the Bahamas, Cuba, Honduras, and Belize (Carlson et al. 2013; Figure 3). Yet, the Bahamas is the only country, besides the U.S., where smalltooth sawfish are reliably encountered in the western Atlantic Ocean (Guttridge et al. 2015).

Figure 3. Current worldwide range of smalltooth sawfish (NOAA Fisheries).

The historical distribution of smalltooth sawfish in the U.S. spanned from Texas to North Carolina; however, the majority of records were from peninsular Florida. Water temperatures lower than 16–18°C and the lack of appropriate coastal habitat (i.e., mangrove-fringed shallow water) serve as major environmental constraints limiting the northern movements of smalltooth sawfish in the western North Atlantic and Gulf of Mexico (Poulakis et al. 2011). As a result, most records of this species from areas north of Florida occur during spring and summer periods (May to August) when inshore waters reach appropriately high temperatures. Most specimens captured along the Atlantic coast north of Florida have been large juveniles or adults (>10 ft or 3 m) and likely represent seasonal migrants, wanderers, or colonizers from the historical Florida core population to the south rather than members of a continuous, even-density population (Bigelow and Schroeder 1953).

Peninsular Florida has been the U.S. region with the greatest number of smalltooth sawfish capture records (Seitz and Poulakis 2002, Poulakis and Seitz 2004, Wiley and Simpfendorfer 2010, Waters et al. 2014) and is the main area that historically hosted the species year round. The region's subtropical to tropical climate and availability of desirable habitat, including large expanses of shallow lagoons, bays, mangroves, and nearshore reefs are suitable for the species. Although no longer common, smalltooth sawfish were once characteristic and prominent members of the inshore Florida ichthyofauna (regional fish community), especially in coastal areas ranging from Indian River Lagoon on the east coast to Tampa Bay on the west coast.

South and southwest Florida from Charlotte Harbor through Everglades National Park and south through the Florida Keys reef tract to the Dry Tortugas represents the core area of smalltooth sawfish historical and current abundance. Goode (1884) stated that in the

Everglades these fish were “exceedingly abundant.” There has been a continuous and frequent record of sawfish occurrences in the Everglades since the first report in 1834, making this region (including Charlotte Harbor) the last U.S. stronghold for the species (Seitz and Poulakis 2002; Poulakis and Seitz 2004; Simpfendorfer and Wiley 2005; Wiley and Simpfendorfer 2010).

Habitat Use

Smalltooth sawfish inhabit shallow coastal waters, estuaries, and rivers of the tropical and subtropical Atlantic Ocean and Gulf of Mexico, down to a maximum depth rarely exceeding 100 m (Dulvy et al. 2014). While the species can be found in a range of salinity, juveniles have an affinity for salinity between 18 and 30 (Simpfendorfer et al. 2011, Poulakis et al. 2011). Smalltooth sawfish have a pattern of habitat use that is relatively consistent among individuals of similar sizes and display ontogenetic changes (changes based on life stage; Simpfendorfer et al. 2010, 2011; Poulakis et al. 2013, Graham et al. 2021). Juvenile smalltooth sawfish ≤220 cm have the most specific habitat associations in nearshore areas where they show strong affinity for very shallow (<3 ft) estuarine waters that are bordered with red mangroves. The smallest juveniles (birth to 150 cm) exhibit site fidelity (the tendency to stay or return to the same place) for specific areas (nursery sites) for several months to a year after birth and increase their home range (the area in which an animal lives and moves on a periodic basis) with growth (Simpfendorfer et al. 2010, 2011, Hollensead et al. 2016, Scharer et al. 2017). Larger size classes (>220 cm) exhibit more varied habitat use and can be found from offshore reefs to shallow estuarine flats (Wiley and Simpfendorfer 2010). More research is necessary to identify important habitats for adult aggregation, mating, and feeding.

Diet and Feeding

Smalltooth sawfish primarily feed on fish (Poulakis et al. 2017) and use the rostrum for both prey detection and immobilization (Wueringer et al. 2012). Direct prey observations include clupeids, carangids, mugilids, dasyatids, pinfish (*Lagodon rhomboides*), and shrimp (*Farfantepenaeus* spp.; Poulakis et al. 2013). Given the importance of the rostrum as a tool in obtaining food, if removed or substantially broken, sawfish likely die by starvation (Morgan et al. 2016).

Growth and Reproduction

Smalltooth sawfish have a biennial reproductive cycle (give birth every other year) and are yolk-sac viviparous—eggs are internally fertilized and embryos develop over a period of approximately 12 months before the young are born (pupped) at 64-81 cm in length (Poulakis et al. 2011, Bethea et al. 2012). Litter size ranges from 7-14 young (Feldheim et al. 2017, Gelsleichter unpubl. data, Smith et al. 2021). Sawfish pups are born with a clear, jellylike sheath over their rostrum so as not to harm the mother during birth; this sheath dissolves in a few hours to a few days. Adult females exhibit parturition site fidelity (Feldheim et al. 2017), returning to the same nursery site(s) to deliver young. Neonate (newborn) sawfish will stay

within close proximity of the parturition site (pupping or birth site) for weeks to months but expand their activity areas and home ranges with increased size.

Early growth is relatively quick compared to other sharks and rays with individuals doubling in size to lengths of ~150 cm by the end of their first year and to lengths of ~220 cm by the end of their second year (Simpfendorfer et al. 2008, D. Bethea & J. Carlson, NMFS unpubl. data). Like other sharks and rays however, sawfish mature slowly, reaching sexual maturity in 7-11 years. Males reach maturity at a size of approximately 340 cm L_{ST}, while females reach maturity at a size of 360 cm L_{ST}. Maximum age is not well described but expected to be several decades.

Critical Habitat

NMFS designated critical habitat for the U.S. DPS of smalltooth sawfish on September 2, 2009 (effective October 2, 2009; 74 FR 45353). In the final rule, NMFS identified 2 critical habitat units—Charlotte Harbor Estuary Unit and the Ten Thousand Islands/Everglades Unit—for the conservation of the species as these areas contained nursery habitat necessary for facilitating recruitment into the adult sawfish population (Figure 4). NMFS identified two features of the critical habitat that are essential for smalltooth sawfish conservation: red mangroves and shallow euryhaline waters characterized by depths between the mean high water (MHW) line and 3 ft at mean lower low water (MLLW). These essential features provide forage and refuge habitat for juvenile sawfish. Only one of the features needs to be present for the area to function as critical habitat. NMFS has yet to designate critical habitat for larger size classes of smalltooth sawfish because researchers have not yet identified the specific locations or habitat features that would define critical habitat for larger individuals.

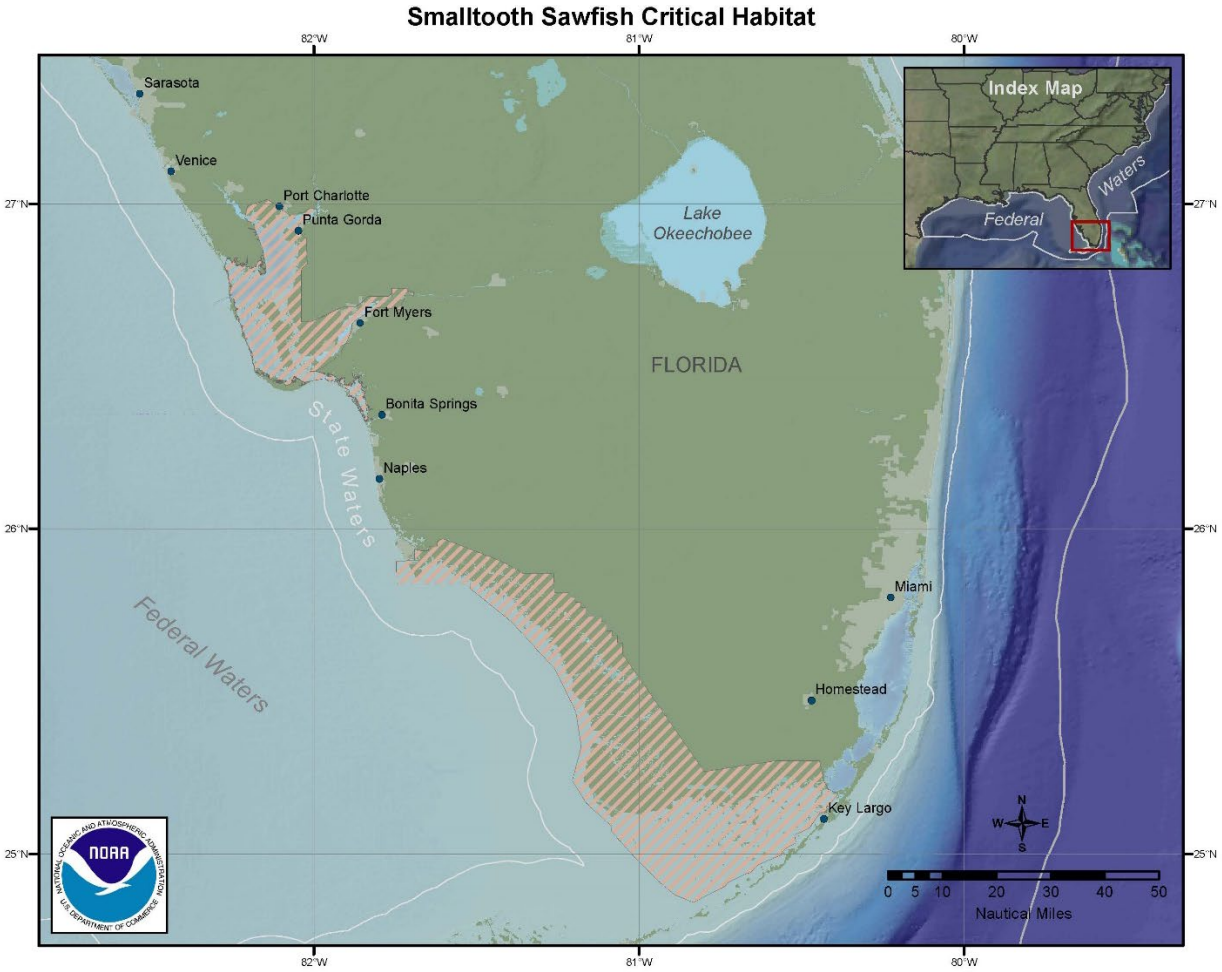

Figure 4. Smalltooth sawfish critical habitat in southwest Florida. The northern area is the Charlotte Harbor Estuary Unit and the southern area is the Ten Thousand Islands/Everglades Unit.

Within the Charlotte Harbor Estuary Unit of smalltooth sawfish critical habitat, researchers have identified several areas that have higher densities of juvenile sawfish year after year (Poulakis et al. 2011, Simpfendorfer et al. 2003). These biologically important areas (BIA, deemed hotspots by researchers; Figure 5) likely serve as core nursery habitat and thus all efforts should be made to minimize and mitigate any project effects in these locations. To date, BIAs are located in the Caloosahatchee and Peace Rivers of Charlotte Harbor and can be found in the SERO Section 7 Mapper. Researchers are still working to identify BIAs in the Ten Thousand Islands/Everglades Unit of smalltooth sawfish critical habitat; however, the majority of this unit is under certain protections offered by the National Park and National Wildlife Refuge systems.

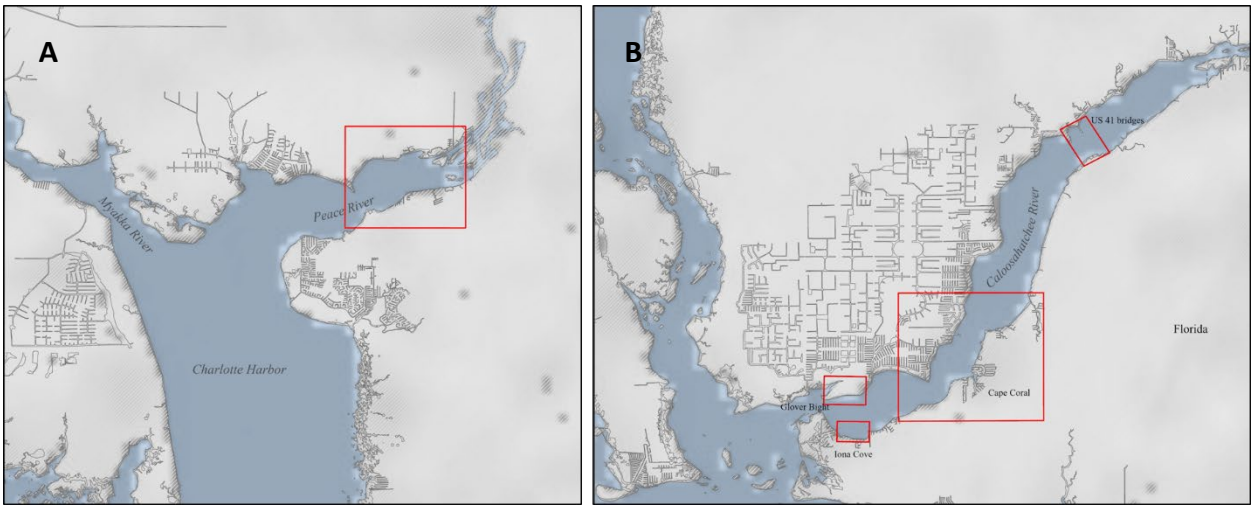

Figure 5. Current juvenile BIAs (hotspots) in the (A) Peace and (B) Caloosahatchee rivers as modified from Poulakis et al. 2011.

Section 7 Considerations for Smalltooth Sawfish

This section provides guidance to assist biologists with ESA Section 7 consultations. This examination considered published scientific literature, as well as unpublished data provided by non-governmental, state, and federal agencies. The best available information indicates that smalltooth sawfish are distributed throughout Florida, though concentrated in southwest Florida from Charlotte Harbor through the Florida Keys. Within these areas, juveniles are found in nearshore coastal areas, including bays, river mouths, and mud and sand flats within estuarine waters, especially areas with red mangrove-lined shores. Larger smalltooth sawfish may be found along beaches, in passes, and along offshore reefs, in addition to the inshore areas where juveniles reside. Please refer to the SERO Section 7 Mapper for more detailed information regarding where to consult on smalltooth sawfish in the Southeast Region.

No Effect Determination for the Species

When making a *no effect* determination, it is not necessary to mention the species in the consultation. Below are common activities that could conclude *no effect* for project effects to smalltooth sawfish. When making an effect determination consider whether the species is likely to be present. Smalltooth sawfish are rare outside of Florida. Further, the species is rare in upstream portions of rivers outside of southwest Florida. To date, SERO ESA Section 7 consultations do not consider smalltooth sawfish when the project is located outside of the state of Florida or far upstream in rivers outside of southwest Florida from Charlotte Harbor to the Florida Keys. The following are examples of routes of effect that typically have no effect on smalltooth sawfish.

Turbidity: Short term, discrete projects (e.g., shoreline stabilization, pile-supported structures, and boat ramps) can result in a temporary increase in turbidity. Turbidity curtains are used

during most projects to control and reduce turbidity and, even when turbidity curtains are not used, the applicant must adhere to state water quality standards. Smalltooth sawfish are able to swim through or avoid a temporary increase in turbidity, as they are commonly found in high turbidity environments. Therefore, we believe any potential exposure to a short-term increase in turbidity (with or without the use of turbidity curtains) due to the construction will have no effect to smalltooth sawfish.

Injury from hand placement of materials: placement of riprap or anchors by hand will have no effect on smalltooth sawfish.

Restriction of movement and access to foraging habitat: Seawalls, piles associated with single family docks, and piles for ATONs generally will have no effect on smalltooth sawfish movement or ability to access foraging habitat. Sawfish are mobile and can effectively swim around or by these types of structures to access foraging habitat with no added stress that could affect their well-being.

Note: A *no effect* determinations refers to the presence of the structures; the effects of installation may adversely affect the species and should be considered separately.

May Affect Determination (Not Likely to Adversely Affect [NLAA] or Likely to Adversely Affect [LAA]) for the Species

For proposed actions that may affect smalltooth sawfish (Table 2), the biologist must carefully analyze the effects of the proposed action to confirm whether a *NLAA* or *LAA* determination is most applicable. An activity that is typically *NLAA* could be *LAA* for a different consultation if circumstances are significantly different (duration or magnitude of potential exposure) or if certain conditions and best practices are not incorporated. The biologist may use this guidance, but must carefully analyze the effects of the proposed action to confirm whether *NLAA* or *LAA* is most applicable.

NLAA Determinations for the Species

Project effects that are considered insignificant (minor in scale and/or duration), extremely unlikely to occur, or wholly beneficial may result in a *NLAA* determination. Common project effects that generally result in a *NLAA* determination for smalltooth sawfish include: injury from vessel strikes (extremely unlikely to occur), injury from installation of materials (extremely unlikely to occur or insignificant depending on situation), disturbance from dredging or construction (insignificant–due to scale or duration), and disturbance from temporary changes in water quality (insignificant).

LAA Determination for the Species

Stressors that lead to adverse effects to the species result in a LAA determination. Effects can include any form of "take," including both injury and mortality. The action that most commonly results in a *LAA* determination is fishing, both commercial and recreational, as this results in the temporary possession and possible injury and/or death of sawfish. Other project activities that could rise to the level of a *LAA* determination include: pile installation (depending on the type, size, number, installation technique, and mitigation efforts), operation of power plants, and relocation trawling associated with dredging. See Table 2 for a more thorough evaluation of activities, routes of effects, and best practices.

Section 7 Considerations for Smalltooth Sawfish Critical Habitat

This section considers whether smalltooth sawfish critical habitat may be affected by a proposed action. In making a determination, the biologist should determine: (1) if the action area is located within the boundary of either critical habitat unit, (2) whether either of the essential features are present within the action area, and (3) whether the proposed action may affect an essential feature, if present. Biologists should also determine whether or not the proposed action is occurring within a juvenile hotspot (Figure 5). If the proposed action is occurring within a hotspot, extra precautions should be made to avoid and minimize any effects to the critical habitat features. Biologists should also consider working with the action agency to mitigate for any critical habitat effects within hotspots.

Note: Both features do not need to be present in the action area for the action area to function as critical habitat.

Note: SERO PRD calculates and tracks losses to the essential features of smalltooth sawfish critical habitat independently. That is, the ESA Section 7 consultation will account for losses to both features when they overlap within an action area.

No Effect Determination for the Critical Habitat

If the action area occurs outside the boundary of smalltooth critical habitat, then the proposed action will have no effect to smalltooth sawfish critical habitat.

If the action area occurs inside the inside the boundary of smalltooth sawfish critical habitat and neither of the essential features are present, then the proposed action will have no effect to smalltooth sawfish critical habitat.

If the action area occurs inside the boundary of smalltooth sawfish critical habitat and neither of the essential features will be permanently affected by the proposed action (i.e., the proposed action will not remove or restrict long-term access to red mangroves, the proposed action will occur at or above the MHW line or deeper than 3 ft measured at MLLW, or the depth

between MHW and 3 ft measured at MLLW will not be changed outside the depth range defined in the rule), then the proposed action will have no effect to smalltooth sawfish critical habitat.

May Affect Determination (NLAA or LAA) for the Critical Habitat

As discussed for the species above, proposed actions that may affect smalltooth sawfish critical habitat (Table 3) must be carefully assessed to determine the routes of effects and whether a *NLAA* or *LAA* determination is most applicable. Duration and magnitude of potential effects must be considered in addition to whether best practices are proposed. The biologist may use this guidance, but must carefully analyze the effects of the proposed action to confirm whether *NLAA* or *LAA* is most applicable.

NLAA Determinations for the Critical Habitat

There are a few instances of specific effects from proposed projects resulting in *NLAA* effect determinations for smalltooth sawfish critical habitat. These may include effects that alter the essential features but do not necessarily remove them, such as red mangrove trimming or dredging to depths that keep the depth within the essential feature range (between MHW line and -3 ft at MLLW). For a more thorough evaluation of project activities that may affect critical habitat, see Table 3.

LAA Determinations for the Critical Habitat

If the proposed action occurs within the boundary of smalltooth sawfish critical habitat and one or both of the essential features will be affected (long-term or permanently) by the proposed action, then the biologist must make a LAA determination. Whether or not the adverse effects to smalltooth sawfish critical habitat will lead to a Destruction or Adverse Modification (DAM) determination depends not only on the magnitude of the impact and how much critical habitat as a whole will remain after the completion of the proposed action but also the way in which the critical habitat will function after the completion of the proposed action. Further, a DAM determination will also consider the location of the project within the critical habitat unit, notably whether it is in or directly adjacent to an identified hotspot. An example of an activity that may result in a LAA determination is dredging shallow waters of critical habitat to depths deeper than -3 ft MLLW. For a more thorough evaluation of project activities that may affect critical habitat, see Table 3.

Conservation Considerations and Recovery Integration

Minimization of Effects and Conservation Measures
Biologists can work to minimize or avoid the effects of an Action Agency's proposed action during the consultation process, seeking ways to incorporate mitigation measures and best practices, recommending different equipment, materials, or methods, or requiring monitoring

and construction moratoriums to ensure that the proposed action is carried out in the most careful and least impactful manner possible for smalltooth sawfish and its designated critical habitat. Regardless of informal or formal consultation (i.e, a NLAA or LAA determination), this back and forth with the action agency can result in a proposed action that will help SERO PRD and the Action Agency ensure that the proposed action has a minimal negative effect on conservation and recovery of the species. When conducting a formal consultation (i.e., a LAA determination) which results in an Incidental Take Statement, biologists should also develop "Terms and Conditions" designed to minimize the impact of any such take on the species.

Best Practices for Reducing and Avoiding Effects to Smalltooth Sawfish

Consider the following when including smalltooth sawfish in the consultation:

- Report sightings to the Smalltooth Sawfish Recovery Implementation Team (SSRIT) via E-mail: Sawfish@MyFWC.com, website, or by telephone: 844-472-9347 (1-844-4SAWFISH). The applicant's agent will report during construction; the applicant will report post-construction
- Daylight-only operations
- Limit vessel operation speeds and/or the quantity of vessels operating in a given area
- Material(s) used, such as stiff, rigid lines versus soft, flexible lines.
- Require the use of the SERO Protected Species Construction Conditions
- Ensuring projects prevent debris from entering the environment

Additional considerations/requirements when the Proposed Action is located inside a hotspot (Figure 5):

- Construction moratorium window March 1–July 31 per Florida Fish and Wildlife Conservation Commission researchers
- Turbidity curtains must have a minimum clearance of 1-foot from bottom to allow for passage of juveniles
- Required minimum clearance for barges is 12–18 inches
- Barges secured by spudding only
- Pile installation will occur via jetting only—no impact hammering

The following additional measures may be required when incidental take of smalltooth sawfish is anticipated:

- NMFS educational signs
- Safe handling guidance
- Fishing line recycling bins
- Promotion of circle hook usage instead of standard J-hooks

Best Practices for Reducing and Avoiding Effects to the Critical Habitat

Consider the following when including smalltooth sawfish critical habitat in the consultation:

- Limit mangrove trimming

- If existing single-family dock/pier/boatlift is to replaced, it should be replaced in same footprint to the greatest extent possible

Additional measures that may be required when the Proposed Action is located inside a hotspot (Figure 5):

- Seawall projects (new or existing) will not be allowed to place new or additional riprap in front of the seawall
- If new, single-family dock/pier/boatlift, MUST follow all conservation measures listed above under "BMPs for Reducing and Avoiding Effects to Smalltooth Sawfish."
- No new marginal docks. Existing marginal docks should be removed and replaced in same footprint as much as possible.
- No new marinas. Work inside an existing marina will be considered on a case by case basis

Conservation Activities and Recommendations

It is also important to work with action agencies to promote proactive, forward thinking efforts to help conserve and recover the species. This will help the agency comply with its Section 7(a)(1) obligations, fill data gaps, improve the environmental baseline of species, and recover species so they no longer need the protections of the ESA. Regardless of informal or formal consultation (i.e, a NLAA or LAA determination), conservation activities discussed early in the consultation process may be included as part of the proposed action. During formal consultation (i.e., a LAA determination), these may also be implemented through "Conservation Recommendations." These efforts provide an opportunity to stimulate partnerships. They also allow federal agencies to proactively do positive things for ESA species and critical habitat. Biologists should give thought to possible conservation recommendations based on the project type, location, and action agency or applicant performing the activity. Where applicable and practicable, staff should seek the cooperation and assistance of action agencies and applicants in helping with public outreach concerning the plight of the species. This may include, but is not limited to, helping communicate the importance of minimizing human impacts to habitats used by smalltooth sawfish (and other protected species) (e.g., educational signage) and promoting responsible fishing practices (e.g., the use of circle hooks when fishing in areas where this species may be captured and safe handling and release guidelines).

Filling Data Needs

Due to the rarity of most listed species and limited resources available for their study, data gaps often exist in both individual and population level effects from Federal actions. Closing these data gaps is a major recovery priority and can also result in more timely and accurate consultations in the future. Our understanding of the probability and magnitude of stressors in a Federal action can influence the project implementation timeline in several ways: prompt determination of informal vs. formal consultation requirements; identification of environmental windows to avoid/minimize adverse effects; and development of effective best management practices. Through integrating recovery actions into their proposed action, action agencies can contribute to closing these data gaps and to the recovery of listed species, while minimizing

their adverse effects and improving consultation quality and efficiency for their current proposed action and future actions.

Anthropogenic impacts to an individual ("take") can be estimated as the product of the following: probability of an activity occurring in an area; probability of individual protected species being in an activity area; duration of exposure of individuals to the activity; magnitude of the exposure; and probability of the activity impacting the individual. When all of this information is available, effects can be quickly assessed. However, often there are data gaps which can delay consultation response as distribution models or assumptions must be used to make our best determination of whether protected species could be affected by a particular project. This lack of information could lead to formal consultation as we must err on the side of species conservation, but formal consultation may be an unnecessary time commitment if take does not occur. Alternatively, if there is an informal consultation and take occurs, the project could be delayed as construction is halted while a formal consultation is completed.

Monitoring and research studies (e.g., incorporating acoustic telemetry into proposed actions) that are implemented in advance of or during larger projects can accomplish multiple consultation and recovery objectives—species avoidance, refinement of work windows, reduced planning time, implementation of recovery actions, etc. Demographic information (e.g., abundance, mortality rate) may also be necessary to evaluate population consequences of larger projects in the context of population status and recovery. In this regard, resolving gaps in species demographic information can improve the accuracy of jeopardy analyses and our overall understanding of recovery. The same principles described above apply to improve consultation efficiency and recovery in multiple project types (e.g., commercial fisheries, barrier removal, aquaculture leases, shoreline protection).

Table 2. Potential Threats that May Affect Smalltooth Sawfish.

Activity	Route of Effects	Potential Impact to Species	Considerations
Fisheries	• Potential hooking, entanglement, and capture in fishing gear, (rod and real gear, longlines, trawls, gillnets, seines • Vessel strikes	• Injury or mortality resulting from capture • Post release mortality • Injury or mortality from vessel strikes – typically NLAA unless operation in very shallow water	• Safe handling and release procedures – Available for recreational and commercial gears • Fishery Observers – Collect data and report on size, sex (presence of claspers), catch location, release condition, etc. Observers are also trained to collect fin clips and deploy external tags. • Timing and location of operations – avoid areas of high smalltooth sawfish abundance (e.g. Poulakis et al. 2011, Graham et al. 2021) • Gear type, deployment duration, deployment frequency
Public fishing piers	• Interaction with recreational fishing gears (hooking and/or entanglement in line) • Potential disturbance during construction.	• Injury from hooking and/or entanglement • Mortality associated with poor handling or illegal harvest • Interactions with construction equipment – unlikely due to species' mobility • Noise associated with construction activities – typically NLAA if it is below the injury threshold level of > 2g fish	• Location - Is the pier located in an area of high sawfish abundance (SW Florida between Charlotte Harbor and the Florida Keys) • Expected usage – number of anglers • Require posting of educational signage, anglers outreach, and fishing line disposal receptacles • Construction conditions and noise abatement measures
Energy (e.g., oil and gas, wind farm, power plant).	• Exploration activities (e.g., sonar, exploratory drilling, noise, entanglement in lines) • Construction Activities, including pipelines, cable transmission routes, and port improvements • Direct fouling by oil/contaminants, including accidental discharges.	• Injury or mortality from entrainment - incidental take associated with intake (e.g., FPL St. Lucie Plant or FPL Fort Myers Plant) • Habitat modification and degradation, avoidance, and displacement from an action area	• Location – Does the action area include areas of high sawfish abundance (SW Florida between Charlotte Harbor and the Florida Keys) • Visual surveys or monitoring prior to and/or during activities • Shutdown procedures if a listed species observed

Activity	Route of Effects	Potential Impact to Species	Considerations
	• Habitat modification and degradation, contaminants, including oil spills. • Wind farms – possible magnetic displacement (Keller et al. 2021). • Power plant entrainment or entrapment at intake structures/canals. • Vessel strikes	• Injury or mortality from contaminant exposure • Noise associated with construction activities – typically NLAA if it is below the injury threshold level of > 2g fish	• Construction conditions and noise abatement measures • Pollution and spill safeguards • Pollution and spill reporting requirements
Aquaculture	• Potential interactions with equipment - entanglement • Migration/movement restriction – physical barriers • Water quality and/or habitat • Vessel strikes	• Interactions with construction equipment – unlikely due to species' mobility • Disruption of normal migration/movements • Entanglement could result in injury or mortality • Water quality/habitat degradation could reduce foraging habitat • Injury or mortality from vessel strikes	• Type and size of equipment • Duration of in-water construction • Duration of the permit (i.e., how long will structures remain in the water) • Configuration and design of the aquaculture equipment • Maintenance plans for the facility (e.g., how often will nets/lines be inspected) • Frequency and abundance of vessel use
Dredging (e.g., hopper, clamshell, or cutter head)	• Potential disturbance during construction • Short and/or long-term habitat alteration • Capture in relocation trawls (if there is relocation trawling)	• Interactions with dredge equipment – unlikely due to species' mobility • Injury and possible mortality from relocation trawling	• Type of equipment to be used and the duration of dredging • Shutdown procedures if listed species are observed • Tow time limits for relocation trawls • Trained observers – on relocation trawls and/or dredge vessels
Marina, dock, boat house, boat ramp, and additional slips	• Potential impacts during construction • Capture/Entanglement • Foraging energetics • Water quality and/or habitat • Vessel strikes	• Interactions with construction equipment – unlikely due to species' mobility • Noise associated with construction activities is typically NLAA if it is below the injury threshold level of > 2g fish.	• Type of equipment and duration of in-water construction • Construction conditions and noise abatement measures • Educational signs or other boater outreach • Alternative device for securing boat house canopies

Activity	Route of Effects	Potential Impact to Species	Considerations
		• Increased vessels may result in increased fishing effort – potential for capture/entanglement • Entanglement in associated materials - flexible in water lines (e.g., mooring lines) and bungee cords (used for securing boat house canopies) – may lead to injury • Water quality/habitat degradation could reduce foraging habitat • Disruption of resting or feeding due to increased vessel traffic associated with large marina projects • Vessel strikes associated with increased vessel traffic	• Reduction in habitat and prey availability • Scale of marina projects • Number and speed of vessels operating out of new facilities
Beach nourishment	• Potential interaction with construction equipment • Entanglement • Short and/or long-term habitat alteration	• Interactions with construction equipment – unlikely due to species' mobility • Flexible in water lines (e.g., mooring lines) pose an entanglement risk. • Habitat avoidance or displacement from the action area	• Type of equipment and duration of in-water construction • Project duration (temporary or long-term) • Project location and habitat type
Habitat restoration	• Potential interactions with construction equipment or vessels • Habitat alteration	• Interactions with construction equipment and vessels – unlikely due to species' mobility • Habitat avoidance or displacement from the action area – likely to be temporary	• Type of habitat affected. Are there any beneficial effects? Creation or restoration reef habitat or other positive water quality / habitat enhancements. • Type of equipment and duration of in-water construction. • What is the average speed of support vessels and deployment frequency?

Activity	Route of Effects	Potential Impact to Species	Considerations
Outfalls, water releases, and effluent discharge	• Long term habitat alteration • Foraging energetics	• Inability to use habitat or reduction in prey because water quality parameters are not suitable • Habitat degradation and avoidance or displacement from the action area	• Project location and habitat type • Project duration (temporary or long-term) • Reduction in habitat and prey availability
Artificial Reef	• Potential for entanglement in fishing line that gets wrapped around the structure • Blasting impacts, if explosives are used to sink vessels • Physical injury from placed material.	• These projects are typically NLAA, but need to consider potential for entanglement • Use of explosives typically LAA • Noise associated with construction activities is typically NLAA if it is below the injury threshold level of > 2 g fish. • Interaction with construction equipment and placement of material – unlikely due to species' mobility	• Project location and habitat type • Noise abatement measures • Type of equipment to be used and duration of in-water construction • Duration of the permit (consider how often USACE may request reauthorization since most artificial reef permits are ongoing leading to an increase in structures placed in the marine environment over time)

Table 3. Potential threats that may affect smalltooth sawfish critical habitat

Activity	Essential Feature Affected	Potential Impact to Essential Feature	Considerations
Dredging	• Shallow, euryhaline water between MHW line and 3 ft MLLW	• Loss of shallow water component if dredged deeper that 3 ft MLLW.	• High-use area (hotspot) • Will dredging affect the amount of continuous habitat • Depth of dredging • Disposal of dredge material
Habitat restoration or creation	• Shallow, euryhaline water between MHW line and 3 ft MLLW	• Loss of shallow water component if dredging or filling is involved • Modification of euryhaline component if freshwater delivery is modified • Potential loss of shallow water component by oyster reef material or artificial reefs	• High-use area (hotspot) • Will proposed dredging affect the shallow water feature • Will materials be placed in critical habitat • Will upstream restoration affect salinity levels within critical habitat boundary
Shoreline development (docks, seawalls, boat ramps, groins)	• Red mangroves • Shallow, euryhaline water between MHW line and 3 ft MLLW	• Red mangrove removal • Restricted access to red mangroves • Loss of shallow water component • Installation of piles is typically a NE determination if red mangroves are not removed	• High-use area (hotspot) • Will red mangroves or shallow, euryhaline water be affected • Can impacts to the features be avoided or mitigated for

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