File Number: 21043

Applicant Information

Affiliation:	Florida Fish and Wildlife Conservation Commission, Fish and Wildlife Research Institute
Address:	585 Prineville Street
City,State,Zip:	Port Charlotte, FL 33954
Phone Number:	(941)613-0946

Project Information

File Number:	21043
Application Status:	**Application Complete**
Project Title:	Smalltooth sawfish research and monitoring in Florida: an interdisciplinary collaborative program
Project Status:	New
Previous Federal or State Permit/Authorization:	
Permit/Authorization Requested:	• ESA Section 10(a)(1)(A) permit (other) - Issued
Where will activities occur?	US Locations including offshore waters
Research Timeframe:	**Start:** 11/10/2016 **End:** 05/31/2022

Sampling Season/Project Duration: Our sampling began in 2004, occurs year-round, and the research is currently funded by NMFS through 2019. Given the 100 year recovery estimate for this species, our plan is to continue the research and monitoring beyond 2019. Our sampling is concentrated between March and September and occurs 8–10 days per month during this period. Sampling occurs 2–3 days per month between October and January.

Abstract: We are requesting renewal of ESA permit #15802 which expires on May 31, 2017. Our project began in November 2004 and its purpose is to conduct research and monitoring on smalltooth sawfish (Pristis pectinata) in the State of Florida, especially the Charlotte Harbor system--an estuary designated as 'Critical Habitat' by NMFS. A summary of knowledge gained through 2013 is available (Poulakis et al., 2014; http://myfwc.com/research/saltwater/fish/sawfish/references/). This project was recently expanded and funded by NMFS through 2019 and we are requesting another 5-year permit which will be required to complete this research. Sawfish were once common in the coastal and estuarine waters of the southeastern US, but during the last century they became rare throughout their range. Today, the species is primarily found only in waters off south Florida. Despite the concern for this fish, there is little scientific information available, making the establishment of conservation and recovery plans for this species difficult. Our goal is to characterize as much biological, ecological, and health information on this species as possible. Examples of this information include data on movements and habitat use (juveniles and adults), relative abundance of juveniles, temporal and spatial distributions, and baseline assessments of health. We anticipate capturing, tagging, biopsying, genetic sampling, and releasing less than 200 sawfish (includes recaptures, juveniles, and adults) per year and all will be kept in the water unless brief removal is necessary for data collection. Based on previous research, we anticipate catching and releasing about 100 rays, 20 sharks, 40 crabs, and 300 teleosts per year during the sawfish research. These data will improve the scientific understanding of this endangered fish and directly address many Action Items outlined in the Recovery Plan. Numbers and effects on non-target species are minimized by using large mesh gill nets and one hour soak times.

Project Description

Purpose: Objectives:

Despite the endangered status of the smalltooth sawfish and the associated conservation concern for the future of the species, there was little scientific research historically conducted, making the implementation of the recovery plan for this species challenging. To help address these research gaps, our project began in November 2004 and its ongoing purpose is to conduct research and monitoring on smalltooth sawfish, especially within the Charlotte Harbor estuarine system, Florida because sawfish are known to frequent this area and this estuarine system is one of only two NMFS-designated juvenile critical habitat units (Seitz and Poulakis, 2002; Norton et al. 2012). It is important to note that data collected under our previous permits #1475 and #15802 were used to designate the juvenile critical habitat. A summary of knowledge gained specifically by our research through 2013 is available (Poulakis et al., 2014; http://myfwc.com/research/saltwater/fish/sawfish/references/). We are continually in the process of publishing portions of our work. As of November 2016 as this renewal application was being prepared, seven manuscripts were in various stages of the peer review process (e.g., inter-nursery habitat use comparisons, population genetics, parasites, stress physiology, diet) and some of our research has already been published (e.g., juvenile growth: Simpfendorfer et al., 2008; genetics methods: Feldheim et al., 2010; abiotic affinities: Poulakis et al. 2011; movements: Simpfendorfer et al. 2011; Poulakis et al. 2013, 2016). The information contained in these papers is/has been used by the NMFS (e.g., Section 7 consultations) and other regulatory agencies such as the South Florida Water Management District (e.g., dry-season flow modeling in the Caloosahatchee River) in a variety of ongoing ways and the work we will accomplish with this research permit will build upon the work completed so far. For example, the genetics methods used in the Feldheim et al. (2010) research are being used to complete genetic assessments of kinship, philopatry, and paternity in multiple nurseries. Further, long-term trends in relative abundance are needed to gauge the state of the population--which is confined to the state waters of Florida. Statistical approaches will be explored (e.g., generalized linear models, mixed models) to aid recovery assessments range-wide. In addition, we will continue to monitor juvenile sawfish in acoustic arrays targeting known nursery "hotspots" within the Charlotte Harbor Estuary Unit of critical habitat. The goal is to define the boundaries of hotspots and to determine fine-scale habitat use within and associated with these hotspots (e.g., diel movement patterns, use of habitats such as mangroves and oyster reefs). These findings will be incorporated into management plans that promote environmental conditions in the nurseries that benefit this critically endangered species.

We are asking for this permit because there are no surrogates for collecting information on smalltooth sawfish.

Justification:

We work for the State of Florida's Fish and Wildlife Conservation Commission (FWC), Fish and Wildlife Research Institute in cooperation with the National Marine Fisheries Service and other partners (e.g., university researchers). We also coordinate our research with other collaborators to maximize consistency and avoid duplication of effort. The specifics of our project are outlined in detail as part of our recently funded ESA Section 6 proposal (i.e., Species Recovery Grants to States, sometimes referred to as the Section 6 Program). Because the smalltooth sawfish and protected sea turtles occur in south Florida, the potential for interaction with turtles exists. Based on data collected under our previous permits #1475 and #15802, the techniques we are using and plan on continuing to use, minimize these interactions and have resulted in the safe release of marine turtles. Staying on station and using one hour soak times are useful procedures that help minimize effects on these animals and other non-target species (e.g., manatees, dolphins).

Our take requests are based on past sampling and are calculated according to projected sampling effort outlined in our NMFS/NOAA Fisheries funded ESA Section 6 proposal. Effort will be directed mostly at juveniles and previous research has shown that they occur in groups of up to 17 individuals in the estuarine nursery areas. Recaptures are sometimes included in these catches because previous research has shown that juveniles have small home ranges, associate with each other, and are found in hotspots within the broader nursery (Poulakis et al., 2011). As mentioned above, our previous research was used in part to justify and officially designated juvenile smalltooth sawfish Critical Habitat. Collection of large juvenile and adult samples have become a focus in recent years because of the need for data on their movements and habitat use. Critical Habitat for adults has not been designated and this is a priority in the Recovery Plan. We will tag large juveniles and adults opportunistically and as supplemental funding allows. Our research has several 'Programmatic Connections', some as described in Poulakis et al. (2014), which broaden the significance of the core sampling. These studies have been developed as new technologies emerge and include stable isotope, accelerometer, and reproductive analyses that will help us learn more about feeding ecology, behavior, and reproductive biology. These projects all contribute to satisfying specific Action Items in the Recovery Plan outlined below.

The primary level Action Items (briefly summarized in parentheses) from the Smalltooth Sawfish Recovery Plan that will be specifically addressed by our research and were listed in our recently funded proposal include 1.3 (minimize interactions through outreach), 1.4 (reduce threats from research), 2.1 (ensure nursery habitat size and quality), 2.2 (freshwater flow/water quality), 2.3 (adult habitats), 3.1 (investigate movements between the US and other countries), 3.2 (determine numbers of adults to ensure recovery), 3.3 (develop a PVA), 3.4 (determine numbers of juveniles to ensure recovery).

1.3 (minimize interactions through outreach): The FWC has been and will continue to disseminate information on the status of the smalltooth sawfish to minimize interactions between the public and the species. Permanent signs that outline guidelines for minimizing harm to sawfish and fishers have been broadly distributed. Once a year, staff checks on the status of all these signs and distribute smaller posters and information pamphlets throughout the current range of sawfish (south and southwest Florida) to be sure that new boaters and residents are exposed to the conservation information. Signs and posters are replaced during the year if we see that they are missing or if others inform us that they are missing (e.g., a sign was moved due to a construction project). In addition to signage, presentations are given throughout the year to all age groups. In the print media, articles are run in newspapers and in the widely distributed Florida Fishing Regulations publication. On television, a program shown on the National Geographic Wild channel highlighted the plight of the smalltooth sawfish and featured a segment on FWC's research and a PBS special on smalltooth sawfish also featured FWC's research ("Changing Seas", Season 6). Most recently, public service announcements have been produced for radio, television, and even a highway billboard. Collectively, these activities have been successful in making the public aware of the status of the smalltooth sawfish because we rarely encounter anglers or boaters that are unaware.

1.4 (reduce threats from research): Our research has always been conducted in a cautious manner to be sure that we don't inadvertently affect the species in a negative way. To date, our procedures have resulted in over 300 successful multiple tagging events, including acoustic tagging. The acoustic data indicate long-term sawfish survival. Sawfish have been observed engaging in the same behaviors before tagging and after tagging. This Action Item was geared toward curtailing research interactions as the population recovers (decades in the future), but the procedures and experience present day researchers acquire will be valuable then, and can be used to develop a training course as indicated.

2.1 (ensure nursery habitat size and quality): Sampling and acoustic tracking studies we have conducted have shown that the current NMFS-designated critical habitat is of the size and quality to allow protection and recovery of the species. For example, to date, we have not tracked any juvenile sawfish that have left the nursery and returned. These observations indicate that the critical habitat designated by NMFS in 2009 is adequate and fulfills important nursery requirements (healthy habitat, proper environmental conditions for survival, adequate food resources). We will continue to make observations throughout the designated habitat areas and over a broad range of environmental conditions to determine whether new results are obtained. New observations and

analyses could lead to area-specific management protocols and/or expansion of the critical habitat areas. Monitoring toxin levels and feeding ecology will allow long-term comparisons within and among nurseries to determine possible reasons for recruitment variability and population fluctuation.

2.2 (freshwater flow/water quality): Public encounter databases and scientific research have shown that juvenile sawfish occur in estuarine areas. By definition, these areas are affected by freshwater flow regimes. Our research has shown that juveniles have affinities for specific ranges of environmental variables, including salinity, and that these affinities change as the sawfish grow. This ongoing research will be useful as inevitable changes occur in the watersheds that feed sawfish nursery areas, including long-term (25+ years) Comprehensive Everglades Restoration Project planning. Communication of new results to relevant agencies is a priority and occurs through regular communication, including attendance at meetings.

2.3 (identification and protection of adult habitats): Adults appear to have broader, less specific, habitat use patterns than juveniles, and move over large distances between shallow coastal areas and the deeper outer continental shelf. Our ongoing efforts to satellite tag adult (and large juvenile) sawfish will determine the details of these movements and may identify specific areas or corridors that are important for adults (e.g., mating areas). Seasonal migrations have been suggested for this species based on historical data and satellite tags will determine if this occurs. Preliminary data suggest connectivity between the northernmost portion of the current range (Charlotte Harbor estuary) and the southernmost portion of the range (Florida Bay and the Florida Keys).

3.1 (investigate movements between the U.S. and other countries): Tagging efforts (especially acoustic and satellite tagging) and genetic analyses are needed to determine the relationship between the U.S. distinct population segment and populations elsewhere in the Atlantic and Caribbean. Our past and future research will help determine these relationships. Genetic techniques have been developed to assess the population and local relationships of sawfish in Florida and will be combined with tagging results and future DNA sampling to answer these broad questions.

3.2 (determine numbers of adults to ensure recovery): What we know about adult sawfish shows that they are wide-ranging and historically existed on both coasts of Florida. Tagging these large sawfish with acoustic and satellite tags and continuing to record public encounter data will be useful in determining where to focus formal monitoring efforts in the future. At present, developing methods to successfully tag adults and learn about their movements are important precursors to establishing an adult monitoring program. Genetic analyses that are underway will be helpful for estimation of aspects of the adult population also (e.g., genetic effective population size). Baseline data on toxin levels and feeding ecology are needed to ensure individual fitness and may help determine the cues for adult sawfish movements.

3.3 (develop a PVA): Population viability analysis (PVA) is a common method used to determine the extinction risk of a species. These models require a large amount of data on biological, habitat, and fishery aspects of the species. None of these data were available in sufficient detail to contribute to a PVA when the species was listed in 2003. Some of the data required for the PVA has been collected by our research (e.g., juvenile growth rates) and much more has not (e.g., adult growth rates, reproduction, natural mortality). The research that we are conducting will help develop the existing PVA.

3.4 (determine numbers of juveniles to ensure recovery): Consistent, long-term sampling of juvenile sawfish in their nursery areas is needed to document annual recruitment and the extent of natural mortality from a variety of sources (e.g., red tide, cold temperatures, predation by sharks). Recent documentation of philopatry by adult females underscores the importance of consistent sampling in all known nursery areas. Monitoring toxin levels and feeding ecology will allow long-term comparisons across nurseries to determine possible reasons for recruitment variability. The research that we are conducting provides these data.

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Description: Action area, duration, and sampling sites:

It is requested that the permit cover all smalltooth sawfish research activities necessary in Florida primarily from Sarasota County to Monroe County on the Gulf Coast and from Volusia County to Monroe County on the east coast (referred to as 'primary sampling area'). However, we would also like to have the ability to work in all Florida state waters if it becomes necessary because we represent Florida's Fish and Wildlife Research Institute and might be called upon to opportunistically tag sawfish outside of our primary sampling area. For example, if researchers at our Apalachicola Field Lab (northern Florida) learn about sawfish in their estuary, it would be important to tag those individuals to find out if they remain there or if they move toward south Florida where we normally focus our research efforts. It is also requested that the permit will authorize us to receive parts and/or salvage any carcass from wherever they are found. Sampling will occur year-round with up to five times weekly. Most sampling will occur between March and September, but sampling periods will be adjusted based on new data if necessary (e.g., encounter reports from the public, acoustic data). Our goal is to characterize as much biological, ecological, and health information on the smalltooth sawfish as possible. Examples of this information include data on movements and habitat use (juveniles and adults), relative abundance of juveniles, juvenile recruitment, temporal and spatial distributions, and baseline assessments of health (e.g., parasitology). These data will improve the scientific understanding of this endangered fish and directly and indirectly address at least nine primary level Action Items outlined in the Smalltooth Sawfish Recovery Plan. A summary of knowledge gained through 2013 is available (Poulakis et al., 2014;http://myfwc.com/research/saltwater/fish/sawfish/references). Peer-reviewed analyses are cited throughout this application and are available also. This project was recently funded by the NMFS through 2019 through the Species Recovery Grants to States Program, sometimes referred to as the Section 6 Program.

This is a study of the biology and ecology of the endangered smalltooth sawfish that is needed to develop management strategies for the protection and recovery of its population. Activities are intended to directly and indirectly address Action Items in the Smalltooth Sawfish Recovery Plan. For catching this species, we propose the use of techniques that have been developed through decades of fishing experience by both scientists and commercial fishers (see details below). We have successfully collected and released hundreds of smalltooth sawfish alive and in good health using these techniques for over a decade (see Poulakis et al., 2010, 2014). There are no alternative species or methods that would provide the needed data. Interactions with other protected species in Florida such as manatees, sea turtles, and sturgeon are not expected to result in mortalities because we remain with the fishing gears while attempting to catch sawfish. Many of the procedures from sawfish collaborator permit #13330 (John Carlson) will be followed for consistency. It is important to note that collaborator permit #13330 is most active in the Ten Thousand Islands/Everglades Unit of juvenile sawfish critical habitat and our research is most active in the Charlotte Harbor Estuary Unit of critical habitat (see Norton et al. 2012). Sampling is necessary in both regions because of logistics, funding sources, and sawfish life history (e.g., data have shown that adult females exhibit parturition site fidelity to nursery areas; Chapman et al. 2015). John Carlson will be a Co-Investigator on our new permit (#21043) and Gregg Poulakis will be a Co-Investigator on permit #13330.

Research Methods

Description of Smalltooth Sawfish Take:

We estimate capturing a maximum of 205 sawfish annually (140 "juveniles" [<3 m stretch total length, TL both sexes combined] (Take table rows 1 and 2) and 65 "adults" [>=3 m TL both sexes combined] (Take table rows 3 and 4)), including three recaptures per animal. Recaptured sawfish will only be captured, measured, and released if previous tags are present. Tags will be reapplied if lost. This size at maturity estimate has been used in the Smalltooth Sawfish Recovery Plan and at least three scientific publications (Seitz and Poulakis, 2002; Schwartz, 2003; Poulakis and Seitz, 2004). Take action category (capture/handle/release) definition: We will capture, measure, ultrasound, fin clip, muscle biopsy, CTD tag, PIT tag, rototag, acoustic tag, acceleration data logger (ADL) tag, blood draw, and release each sawfish (Take table rows 1 through 4). In addition, satellite tags will be attached to 30 sawfish 2 m or larger (15 for large juveniles 2<= x < 3 m TL, 15 for adults >=3 m), Take table rows 2 and 4). A maximum of 50 dead whole sawfish will be salvaged for scientific purposes (e.g., through calls from the public, other institutions, or law enforcement; Take table row 5). Observe/collect method definition: Sampling for sawfish will be conducted using seines, hook and line, longlines, drum lines, or gill nets. Gillnets will be the primary gear for juveniles and longlines will be the primary gear for adults, but all gear can be used for both life stages.

As defined in the Contacts section, all "Co-Investigators" on our permit will be able to perform all activities including internal acoustic tagging, a "Research Assistant" will be able to perform all activities except internal acoustic tagging, and "Tissue Sample Disposition" personnel will be able to possess or transport tissues including carcass recovery. We anticipate CIs using internal implantation of acoustic tags most of the time (see below for more details), but under certain circumstances sawfish may be tagged externally. For example, if multiple sawfish are caught in a net

set by a CI, we may quickly apply acoustic tags externally. RAs will always apply acoustic tags externally. Following methods in our previous permits #1475 and #15802, external acoustic tags have been attached to the rototags with a cable tie and covered in marine epoxy.

Capture, Handling, and Tagging

Discussion of the procedures and techniques:

a. Methods of capture and release: Sampling for sawfish will be conducted using seines, hook and line, longlines, drum lines, and gill nets. Often, the gear type will be selected based on the location of encounter reports by the public. This technique has been very helpful for our research, including information used by the NMFS to designate juvenile critical habitat in 2009. For example, if someone reports a sawfish in a shallow muddy area, we will use a gill net, etc. These public encounter reports not only translate into data collection for us, but provide unique opportunities to communicate the status of the smalltooth sawfish to the public and answer any specific questions they may have.

Fishing Gear: All gear except hook and line will be marked by visible buoys. Actively fished nets (e.g., seines) will be monitored constantly from the beginning of the set until the sample is completed. Passively fished gill nets will be constantly monitored while being set and checked a minimum of every 30 min, with the crew remaining on station. Longlines and drum lines will be fished for 1 hr. Hook and line will be continuously monitored for hooked fish and the presence of bait. These gear types are being used because they are known to have minimal effects on sawfish (i.e., we continuously monitor the gear and employ short soak times) and their habitats (i.e., the gear rests on the bottom or gently glides over it so submerged aquatic vegetation is undisturbed).

Anchored Gill nets: Monofilament gill nets will be used to primarily sample juveniles x<3m in open water riverine and estuarine areas. The nets are deployed by boat, with an anchor at each end and a float line that contains a foam core and a lead line that contains a lead core. Surface buoys will also be used to mark the location of the net every 10 yards to maximize net visibility. Net size will vary depending on habitat and type of sampling. During random sampling, nets will be either 30.5-m (100 ft) or 61-m (200 ft) long with 102-mm (4 in) stretch monofilament mesh and during directed sampling nets will be 45-m (150 ft) gill nets or 183-m (600 ft) gill net, both with 152-mm (6 in) stretch monofilament mesh. All nets will be 10 ft deep and will be set in depths from 0-10 ft. In most cases, two smaller nets (<183-m) will be used in non-open-water areas (i.e., canals or creeks). If the 183-m gill net is used, only one will be deployed. Nets will be fished near shore in shallow waters over sand and mud bottoms for one hour. Nets will be constantly being monitored and are checked at the half-hour, when the float line is down, or when an animal has hit the net (e.g., splash observed), whichever comes first. Sampling will occur primarily between March and September when surface water temperatures are between 14.5 and 34 degrees Celsius and when surface dissolved oxygen concentrations are between 3 and 13mg/L (Florida Fish and Wildlife Research Institute, unpublished data).

Seines: Seines will be used rarely, however there may be occasions when the seine net will be used to encircle a juvenile sawfish x<3m in open water riverine and estuarine areas. The seine is a 183- × 3-m center-bag haul seine (38-mm stretched nylon mesh). The seine is deployed by boat in a rectangular shape along shorelines with relatively firm substrates and retrieved by hand. Sampling will occur primarily between March and September. Seines will be monitored constantly from the beginning of the set until the sample is completed.

Longlines: Bottom longlines consist of 400-800 m of 4.0 mm monofilament mainline or 8 mm braided nylon rope, anchored at both ends. Gangions will be up to two meters long, constructed of braided nylon rope and heavy monofilament (e.g., 227 kg/500 pound) and terminated with corrodible, non-offset >14/0 circle hooks. Gangions will be spaced approximately 10 m apart along the mainline. Large hooks are required for adult sawfish to prevent breaking or straightening of the hook given their large size. Hooks will be baited with fishes such as striped mullet (Mugil cephalus), ladyfish (Elops saurus), bonita (Euthynnus allettaratus), or northern mackerel (Scomber scombrus). Squid will not be used for bait. Bait will be single hooked (i.e., not threaded). Longlines are anchored and marked with a buoy at each end. These longlines will be set in open water coastal areas and passes, in areas such as Charlotte Harbor, Florida Bay, and the Florida Keys. Longlines will primarily be used to target adults. Sampling will occur primarily between March and September. Longlines will be fished for 1 hr.

Drumlines: Drumlines will consist of a cement block anchor with a monofilament leader (or baitline), a 14/0-18/0 circle hook and a surface float. The bait line will be at least 1 ½ times the water depth in length to allow for any captured air-breathing animals to surface. This will allow for these animals to be removed from the gear soon after capture. This gear will be set in open water coastal areas and passes, in areas such as Charlotte Harbor, Florida Bay, and the Florida Keys. Drum lines will only be used primarily when targeting adult sawfish. Sampling will occur

primarily between March and September. Drum lines will be fished for 1 hr.

Hook and line (rod and reel): Sawfish of all sizes will be caught using rod and reel in any habitat type where gill nets, seines, or longlines cannot be used (e.g., high current area). A variety of bait will be used including striped mullet (Mugil cephalus), ladyfish (Elops saurus), bonita (Euthynnus allettaratus). Sampling will occur primarily between March and September. Hook and line will be continuously monitored for hooked fish and the presence of bait.

Handling Techniques: To minimize stress, all sawfish caught will be immediately untangled (if necessary), processed (e.g., measured, tagged, tissue samples taken) as quickly as possible, and released. Small juvenile sawfish (<2 m) will be kept in a water-filled net well in the stern of the boat to minimize out-of-water-time. We will use an aerator(s) to maintain dissolved oxygen levels in the net well. This technique has been used since the beginning of our project and has been very effective, resulting in no mortalities or injuries to captured sawfish. To prevent injury to specimens (e.g., chipping of rostral teeth) and to protect researchers, a designated crew member will immobilize the rostrum of any captured sawfish by grasping the rostrum while wearing padded welding gloves. This technique has been used successfully since we began sampling for juvenile sawfish and has facilitated sawfish and researcher safety. Larger sawfish will be held similarly in the ambient water if they are too big for the net well. If necessary, a temporary holding pen is created using a portion of the seines mentioned above. Captured sawfish swim freely within the pen in ambient water. These techniques have allowed us to capture and study up to 11 sawfish from a single sample, moving them in assembly line fashion from ambient water, into the net well for work-up, and release. In shallow water, sawfish are released by gently placing them in the water and leading them away from the boat. In water too deep to stand, sawfish are released by gently placing them in the water and allowing them to descend. Sawfish captured will be measured, sexed, tagged and released. Measurements taken include precaudal length (PCL), fork length (FL), stretch total length (STL), disc width (DW) and rostrum length (RL). Rostral tooth counts will be taken, any parasites will be removed and a fin clip will be taken. Occasional recaptures will be measured and re-tagged if necessary and released. These capture methods have been used on all sawfish captured under previous ESA permits, with no deleterious effects observed.

Bycatch: Because this study will be conducted as a portion of, and in conjunction with, ongoing fisheries monitoring, all samples from randomly selected sites will be processed according to standard protocol, with some additional sample processing specifically for sawfish. This approach has the advantages of allowing us to characterize both the biological and physical settings in which sawfish are found and, at the same time, contribute to monitoring efforts for populations of various economically important fish and invertebrate species that may be used by sawfish for food. Accordingly, all fish and select invertebrate species (e.g., blue crabs) will be identified to the lowest practical taxon, sexed (if applicable), counted, and released alive in the field. All sawfish and a sub-set of all other fish and select invertebrate species will be measured (precaudal length for sawfish and sharks, disc width for rays, standard length for teleost fishes, carapace width for blue crabs) to the nearest millimeter for each sample. Additional morphometric measurements will be taken for all sawfish (i.e., rostrum length, rostral tooth count per side, rostral tooth length, disc width, maximum total length, and clasper length). Sawfish will also be assessed for overall external health (e.g., parasite examination, broken rostral teeth) and tissue samples will be taken for analyses such as DNA, stable isotopes, and toxicology. All sawfish will be tagged (see "Description of tags" below) for tracking movements of individuals within the estuary and adjacent waters for assessments of habitat use. Tags will be imprinted with contact information and a unique identification number. Based on research conducted during 2009 (added and doubled to account for current sampling effort), we anticipate catching and releasing about 100 rays, 20 sharks, 40 crabs, and 300 teleosts per year. If marine mammals are observed in the area, gillnets will be removed from the water. If sea turtles are observed in the sampling area, longlines, drum lines, and gillnets will be removed from the water.

Listed Sea Turtle Species: Sea turtles are sometimes present in our primary sampling areas, however we do not anticipate harming any sea turtles during our research. We expect interaction with sea turtles to be a rare occurrence. If sea turtles are observed in the sampling area, we will not set gear or all gear will be removed immediately if sets have already been made. In the event that a sea turtle is captured, we anticipate a safe release (i.e., no mortality) because we remain on site while the gear is fishing.

Marine Mammals: Manatees and dolphins are sometimes present in our primary sampling areas, however we do not anticipate harming any marine mammals in our research and the likelihood of catching one is low because we remain on site while the gear is fishing. If manatees or dolphins move into the sampling area, we will not set gear or all gear will be removed immediately if sets have already been made. In the event that a marine mammal is captured, we anticipate a safe release (i.e., no mortality).

Sturgeon: Sturgeon are not present in our primary sampling areas, and we do not expect to interact with them during our normal sampling. In the event that we are sampling outside our primary sampling area where sturgeon do occur (e.g., Florida panhandle), and we were to inadvertently catch one, we anticipate a safe release (i.e., no mortality) because we remain on site while the gear is fishing.

Biological Data: Physical and biological environmental data will be recorded with each sample. Location, date, time, salinity (‰), water temperature (°C), pH, dissolved oxygen (mg/l), and water depth along the shoreline and at the bag of the net (if applicable) will be recorded at each sampling site. Observations of shoreline inundation, tidal level, and shoreline and bottom vegetation descriptions (type, % coverage, and presence/absence) will also be recorded.

b. Description of tags, including attachment method, location, and expected duration of tag attachment: Rototags, passive integrated transponder tags (PIT tags), acoustic tags, 3-dimensional acceleration data logger (ADL; also on permit #17316) tags, conductivity temperature and depth tags (CTD) or satellite tags will be applied directly to a dorsal fin, the base of the dorsal fin, or inserted below the ventral surface of captured sawfish. Duration of attachment depends on tag placement and sawfish habitat use, but in general external tag attachment will not exceed 6 months. Tag types have been chosen based on success with other elasmobranch species including sawfish (e.g., rototags) as well as new/developing technology (e.g., satellite tags). For example, the NMFS shark tagging program uses rototags for sharks. All of the above mentioned tags are small (12 mm x 1.5 mm diameter for PIT tags, 27 mm x 9 mm diameter for acoustic tags [weight in air = 4.7 g; weight in water = 2.9 g], 175 mm long x 21 mm diameter for satellite tags [weight in air = 75 g], 40 mm x 28 mm 16.3 mm for ADL tags [weight in air = 18.0 g]) compared with the size of a sawfish and involve making small holes (e.g., with a leather punch) in or below dorsal fins to affix rototags and external acoustic or satellite tags or small holes (i.e., with a syringe needle) at the left side base of the first dorsal fin to inject internal PIT tags. Neoprene clasp tags may also be used to secure acoustic transmitters and CTD tags externally. Satellite tag harnesses will only be placed on sawfish at least 2 m in total length; they have been programmed to release after 5–6 months. Collectively, these tags have been used successfully since we began our sampling program in November 2004 under permits #1475 and #15802. These tags have been used on over 300 sawfish, and the application sites heal quickly and completely within a few days based on recaptures.

Small juvenile sawfish (<2 m) will have up to 4 tags (PIT tag, rototag, acoustic tag, CTD tag or ADL); large juvenile (2<= x < 3 m TL) and adult sawfish (>=3 m) will have up to 5 tags (PIT tag, rototag, acoustic tag, CTD tag or ADL, satellite tag). The CTD tags record environmental data, much like the satellite tags do, but they are smaller, need to be recovered, and usually more appropriate for small juveniles. The ADL's are slightly larger than the rototags, but stay on for a short period of time (~5 days) and also need to be recovered. Data from these tags will contribute to primary level Action Items 1.4, 2.1, 3.2, and 3.4 in the Smalltooth Sawfish Recovery Plan.

Recaptures: Regarding recaptures, any tag type will be re-applied if fallen off. Re-application of PIT tags and internal acoustic tags is unlikely because research has indicated that these tags are long-term and not shed. If we know that a sawfish has been caught before, we will not take another tissue or fin clip sample unless it has a lesion that needs to be biopsied.

Rototags: Rototags are bright yellow plastic sheep tags that display a fish identification number and the sawfish hotline reporting phone number. These tags help researchers and anglers easily identify the fish as a recapture. These tags will be attached to the first dorsal fin by first punching a hole through the fin with a leather hole-punch, and then clipping the two halves of the tag together through the fin. All individuals captured in this project will be fitted with this type of tag. We have been using these rototags for over a decade (under permits #1475 and #15802) on the first dorsal fin and on the second dorsal fin for external acoustic tag attachment (i.e., the acoustic tag is glued to the flat half of the rototag). There have been only minor effects with the use of these tags (e.g., well-healed scarring) on sawfish that have shed the tags and recaptures have shown well-healed tagging sites and little bio-fouling when the tags are still present (see pictures). We are requesting internal acoustic tagging following the procedures of collaborator permit #13330 (John Carlson), so the previously used external acoustic tag attachment method used for permits #1475 and #15802 will only be used by Research Assistants that have not been trained to conduct internal acoustic tagging or by Co-Investigators in rare circumstances. For example, if a sampling trip led by a Co-Investigator catches six juvenile sawfish and after internally implanting three of the acoustic tags a thunderstorm threatens the safety of the crew, we will attach acoustic tags externally to the other three juveniles and end the sampling day.

PIT tag: Passive Integrated Transponder (PIT) tags are very small electronic tags that contain a unique code number that is transmitted to a reader. These tags will be implanted into the musculature at the base of the first dorsal using a sterilized hypodermic needle. The tags measure about 12 mm in length and 1.5 mm in diameter. These tags remain in the animal throughout their

life and are used extensively in endangered species research. This is in contrast to external tags that are normally shed by the animal after short periods of time (e.g., months). All sawfish caught will receive this tag.

Satellite tags: Satellite tags can record a variety of information including depth, light, temperature, and location. Following the procedures of collaborator permit #13330 (John Carlson), tags will be attached to the first or second dorsal fin by first making a small hole with a leather punch at the base of the fin. The tag will be secured with a harness consisting of steel cables and crimps that will be programmed to release after 5-6 months. When the tag surfaces, data will be transmitted to satellites. Satellite tags will only be placed on sawfish at least 2 m in total length.

ADL Tags: Following methods in collaborator permit #17316, the ADL tags will be attached by making two holes in the dorsal fin with a leather punch or drill (depending on size of the animal), stainless steel wire coated plastic tubing (to prevent chafing) will be passed through the holes and attached to a galvanic release package. The galvanic release package is designed to corrode within 3–7 days depending on salinity and will be coupled to a continuous acoustic pinger and/or VHF radio transmitter that will allow us to track the ADL after it has fallen off. The ADL tag and VHF transmitter or continuous pinger will be embedded into a recovery package made of silastic rubber mold consisting of resin and microsphere mixture, as tested in Whitmore et al. (2015). The size of the recovery package will depend on the size of the animal. ADL tags have been used successfully on several species of elasmobranchs including largetooth sawfish in Australia (Gleiss et al. 2016) and smalltooth sawfish under permit #17316. One smalltooth sawfish was recaptured five months later and the fin holes had healed completely.

Acoustic Tags: Following methods in collaborator permit #13330 (George Burgess), acoustic tags will be inserted into the body cavity by making a 2–4 cm incision on the animal's ventral surface just anterior to the pelvic fins using a sterile, disposable scalpel. We anticipate using internal implantation of acoustic tags most of the time (see below for more details), but under certain circumstances sawfish may be tagged externally (see rototag section above). For example, if multiple sawfish are caught, we may quickly apply acoustic tags externally. Following methods in our previous permits #1475 and #15802, external acoustic tags have been attached to the rototags with a cable tie and covered in marine epoxy.

Internal tagging methodology and justification (following collaborator permit #13330):

After capture, smalltooth sawfish will be inverted with the ventral side up to initiate tonic immobility. Tonic immobility (also known as animal hypnosis, death feigning, or catalepsy) is an unlearned response characterized by a state of immobility and torpor, which may last from under a minute to several hours. Research by Snow et al. (1993) reported that elasmobranch fishes lack complete myelination of neural tissues. The conclusion of that study was that "sharks and rays lack the neural apparatus essential for the sensation of pain". This finding has been supported by more recent publications on fish welfare (Rose 2002, 2007). Sharks and rays have also been reported to enter into a state of tonic immobility when inverted dorso-ventrally (Henningsen, 1994). This procedure will be used as a tool to immobilize sawfish for handling during surgical procedures and thus they will not require restraint.

To allow acoustic transmitter insertion, a 2–4 cm incision will be made on the animal's ventral surface just anterior to the pelvic fins using a sterile, disposable scalpel. The transmitter will be inserted and pushed cranially until it is completely within the peritoneal cavity. If necessary, transmitters will be coated with a combination of paraffin and bees wax to eliminate any potentially sharp edges on the transmitter and alleviate internal damage. This technique has been shown to be effective in decreasing transmitter rejection in several species (Holland, 1999; Bridger and Booth, 2003; Meyer et al., 2010). The incision will be closed with two layers of silk surgical sutures, one at the muscle layer and one in the skin layer. Sutures fitted with cutting needles will be used with a new, sterile suture used for each individual. Suturing in both the muscle and skin layers ensures the incision to the body cavity is completely closed even if exterior skin sutures are abraded prior to complete healing. Versions of the same acoustic transmitter (e.g., VEMCO© Ltd. V9, V13, or V16 acoustic transmitter, depending on the size of the animal and representing no more than 0.5% of total body weight) used for external attachment will be used for internal implantation. After surgery is complete, the animal will be recovered in the water and be observed for any abnormal behavior. The entire surgical procedure will take less than 5 minutes and individuals will be released as quickly as possible after completion to reduce handling time and stress.

Several of our collaborators (Co-Investigators) have experience performing surgeries on fishes, including elasmobranchs, to implant acoustic tags: R. Dean Grubbs (also on NOAA smalltooth sawfish research permit #13330), Beau Yeiser, Matt Ajemian, Mike McCallister, and Tonya Wiley. Their experience is detailed in their CVs. Training for personnel that will be responsible for all activities under the permit that have no previous internal-tagging experience will be conducted by at least one of these experienced Co-Investigators. Training will involve practice surgeries in the laboratory and/or in the field. All "Co-Investigators" on our permit will be able to perform all activities including internal acoustic tagging, a "Research Assistant" will be able to perform all activities except internal acoustic tagging, and "Tissue Sample Disposition" personnel will be able to possess or transport tissues including carcass recovery.

Based on collaborator permit #13330, we feel the internal tagging procedure should be performed without anesthesia. As anesthetics commonly used for fish are no longer allowed by the U.S. Food and Drug Administration (since these drugs weren't approved for humans and people may catch and consume animals exposed to treatment) some researchers began conducting surgeries on other elasmobranchs without anaesthesia. For example, Dr. Michelle Heupel conducted surgeries on blacktip sharks and found that the procedure went faster and individuals were released in better condition. Individuals did not react to any of the surgical procedure (i.e., no response to incision, tag insertion, or suturing) and tonic immobility was effective in all cases. In surgeries where anesthetic was used, the process took longer (10+ minutes to dose and revive the individual) than surgery without anesthetic (5 minutes). Individuals exposed to anaesthetic were often in a "groggy" condition requiring several minutes of revival and still swam away slowly upon release (M. Heupel, James Cook University, personal communication). At least two previously anaesthetised individuals were predated upon within an hour of release during a study of blacktip sharks (Heupel and Simpfendorfer, 2002). Animals not exposed to anesthetic started to swim immediately upon righting and swam away more vigorously when released, suggesting they were in better condition than anaesthetised individuals. Similarly, bonnethead sharks that were exposed to anesthetic were also often in a "groggy" condition requiring more time and effort in their revival than those not exposed to anesthetic (Carlson and Parsons, 2003).

In general, the internal tagging technique has been applied to several species of elasmobranchs with little harm to the animals (e.g., bat ray – Matern et al., 2000; blacktip shark – Heupel et al., 2004; blacktip reef shark – Meyer et al., 2007; bonnethead shark – Heupel et al., 2006; Galapagos shark – Meyer et al., 2010; lemon shark – Morrissey and Gruber, 1993, Wetherbee et al., 2007; school shark – West and Stevens, 2001; and tiger shark – Holland et al., 1999). In the case of 38 juvenile lemon sharks (47–100 cm PCL) surgically implanted with acoustic tags in the Bahamas, all had normal color and muscle tone and appeared healthy when recaptured 20 days post-surgery, presenting only a thin black line at the site of the incision (Morrissey and Gruber, 1993). In another study using lemon sharks, three weeks post-surgery, the sutures were absent and only a faint scar remained where the incision was made (Wetherbee et al., 2007). Holland et al. (1999) noted that the incision used to implant the transmitters in tiger sharks did not appear to be qualitatively as severe as some of the naturally occurring wounds they observed. By using this simple surgical procedure to implant an acoustic transmitter in the body cavity of smalltooth sawfish, we aim to eliminate damage and/or scarring of the dorsal fin. We also feel that natural behaviors (e.g., swimming, feeding, and seeking refuge) will be less inhibited by an internal tag.

External tags generally have a higher shedding rate, defeating the purpose of a long-term movement study. Internal tags have been recovered from healthy animals after many years. For example, Morrissey and Gruber (1993) recaptured 17 internally tagged juvenile lemon sharks after 1055 days; these animals exhibited growth from 0.3 to 28.2 cm PCL (6.4–9.9 cm/year). Holland et al. (1999) recaptured two tiger sharks 377 days after the 12 month internal tag had terminated. Meyer et al. (2010) found that some internally tagged tiger sharks at French Frigate Shoals, Hawaii, were detected on acoustic receiver stations year round, whereas others visited the atoll in summer to forage on fledging albatross, then swam thousands of kilometers along the Hawaiian chain, or out into the open ocean, before returning in subsequent years (518–980 days). To date, our research has focused on movement patterns of sawfish over a few months, internal tagging will allow us to learn about long-term movement patterns of smalltooth sawfish and further investigate larger size classes which we know little about.

Tags and attachment methods are outlined below as a summary:

Rototags: Leather punch to make hole, secure both halves of tag through hole
PIT tags: Injected using a needle at base of first dorsal fin
External acoustic tags: Leather punch to make hole and attached to rototag
Internal acoustic tag: 2–4 cm incision with sutures
CTD tag: Leather punch to make hole and attached to rototag
Satellite tags: Harness assembly with timed release system
ADL tag: Leather punch to make two holes with timed galvanic release system

c. Description of drugs to be used, including purpose and method of application: We do not intend to drug sawfish during our sampling.

d. Temporary holding prior to release and manner in which they will be detained: We will fill the net well in the stern of the mullet skiff (boat with engine mounted in the bow) with water as a temporary environment for small sawfish (<2 m) during sample processing and data recording. Larger sawfish (>2 m) will be held in shallow water with welding gloves or will be tethered to the

side of the boat using ropes wrapped around the rostrum and the caudal peduncle (base of tail). They will be secured in a manner such that their spiracles and gills will be submerged and aerator(s) will be used to maintain dissolved oxygen levels in the net well. The net well is a large open area at the stern of the vessel. It is important to note that the engine is in front of the console on our research skiffs. This setup allows us to have plenty of space to safely study the sawfish when they are in the net well.

e. Collection of Samples

Number and types of samples to be taken from each individual, including sampling protocol:

Fin clip: As has been done since 2004 under permits #1475 and #15802, using sterile techniques (e.g., iodine or alcohol swabbing the scissors), a small fin clip (~1 cm2) will be taken for genetic and stable isotope (feeding ecology) analysis from the free rear tip of a dorsal fin of each sawfish. The sample will be placed in ethanol.

Biopsy: One standard, individually packaged, disposable, hand-held biopsy punch (6 mm diameter; 8 mm deep; with safety flange to prevent insertion beyond 8 mm) will be taken from the dorsal flank of each sawfish to determine baseline levels of skin and muscle histology, environmental toxins such as mercury (total mercury) and organochlorines, as well as validation of stable isotope results derived from fin clips. In cases where a sawfish is observed to have gross external lesions, a biopsy punch will also be taken in this area for histopathological evaluation. This will allow for identification of pathogens (e.g., fungi, bacteria, viruses) or characterization of tumors. A new sterile punch will be used for each sample. This standard biopsy technique is currently used to take samples from other large fishes (e.g., sharks, billfish), smaller endangered freshwater fishes, and endangered mammals such as right whales and manatees (EPA Standard Operating Procedure, 2003; Peterson et al., 2005). Biopsy sites (with diameters up to 5 cm) are known to heal quickly and completely when used on a variety of vertebrates such as sharks, teleosts, and marine mammals (Weller et al., 1997; Krutzen et al., 2002).

We are requesting authorization to take a biopsy punch from a standardized area of every sawfish (the side of the sawfish just in front of the first dorsal fin, sometimes referred to as the "shoulder"). If any sawfish exhibit gross external lesions elsewhere on the body, depending on the severity, we may forego the shoulder biopsy and take it at healthy tissue near the location of the lesion for comparative purposes. It is necessary to take biopsies from healthy and unhealthy sawfish so comparisons can be made between healthy and necrotic tissue to assess abnormalities across the population. Further, some of the samples from healthy individuals will be used to determine/monitor levels of environmental toxins (e.g., the State of Florida has a mercury monitoring program) and validate stable isotope results from analysis of fin clips. Toxins are known to have negative effects on neurological and behavioral function as well as reproductive consequences in other species. Stable isotope results will be used with other data (ultrasound, necropsy, fin clips, observations) to learn about the feeding ecology of the species. The analyses derived from the biopsies will contribute to primary level Action Items 1.4, 2.1, 3.2, and 3.4 in the Smalltooth Sawfish Recovery Plan

PIT tag applicators are similar in size compared with the biopsies, have been used on over 300 sawfish, and these injection sites heal quickly and completely within a few days based on recaptures. In addition, it is important to characterize results of biopsy samples using fresh tissue as opposed to tissue derived from necropsies because in many cases, decomposition complicates interpretation. Another example of healing comes when leeches are removed from the body of sawfish. The skin can be irritated and obviously swollen upon capture, but well-healed and back to normal when recaptured. Collectively, these observations, combined with those made by other researchers on other species, have convinced us that the sawfish will recover quickly and completely from all tagging techniques, including the biopsy technique. These data contribute to primary level Action Item 1.4 in the Smalltooth Sawfish Recovery Plan.

Blood Collection: Blood sampling will be conducted using the same methodologies authorized under collaborator permit #13300 (SEFSC; John Carlson). Small blood samples (1–5 ml) will be obtained via caudal venipuncture and less than 6% of total blood volume from any individual sawfish will be collected (see details below).

Sawfish body weight Amount of blood draw
<1 kg 1 ml
1-2 kg 3 ml
>2 kg 5 ml

Blood will be drawn using a sterile, disposable 1–1.5 inch 20–24 gauge needle and syringe. All sawfish will be restrained with the ventral side up by securing the saw and caudal tail. Small sawfish (<2 m) will be handled on the boat and secured by personnel holding the saw and caudal tail. Larger sawfish (>2 m) will be secured with ropes wrapped around the rostrum, mid-section and caudal tail which are secured to the boat or held by personnel. The needle will enter the tail at the ventral midline and remain as close to the midline position as possible during penetration of the muscle until the vertebral column is reached. Slight penetration of the caudal vertebrae allows access to the caudal vein. Further details and photographs of caudal venipuncture are included on pages 316–317 of the following paper (Walsh and Luer, 2004-Chapter 23 of the Elasmobranch Husbandry Manual: Captive Care of Sharks, Rays and their Relatives). No harmful side effects have been observed from the blood draws, and no known mortalities have resulted from the process.
Further, we will analyze toxin concentrations in blood samples already collected from sawfish during permitted activities of an ongoing collaborator project (permit #13330; samples taken to obtain plasma for hormone analysis) for comparison to what is being assimilated into the muscle.

f. Discussion of potential injury or mortality, including the steps that will be taken to minimize adverse effects: Our goal is to capture and release all sawfish without harming them. The most likely potential injury is for individual rostral teeth to break from contact with the boat during capture and release because of the species' tendency to engage in side-to-side slashing movements of the rostrum as a natural defense mechanism. To minimize the potential for damage, we will use padded welding gloves to hold the rostra of captured sawfish as soon as possible after capture. It is important to note that if any teeth break, they eventually grow back out provided the base is not damaged. Sawfish will be kept in the water as much as possible and only smaller specimens will be brought onboard for processing in the water-filled net well.

g. Ultrasound procedures: The ultrasound examination will occur as part of the normal health assessment workup procedure when we catch a sawfish. For juveniles, we will determine stomach contents and gonad size if possible. For adults, we will determine stomach contents, gonad size, and brood size (females). The time required for the ultrasound examination will be shorter for juveniles (~5 min) than for adults (~5–10 min) mainly because of quantity differences (adults will probably have more in their stomachs). The spiracles and gills of all sawfish will be kept in the water during the exam. The analyses derived from the ultrasounds will contribute to primary level Action Items 1.4, 2.1, 3.3, and 3.4 in the Smalltooth Sawfish Recovery Plan.

Minimizing risk during sampling and capture: To reduce risks during capture, all gear except hook and line will be marked by visible buoys. Actively fished nets (e.g., seines) will be monitored constantly from the beginning of the set until the sample is completed. Passively fished gill nets will be constantly monitored while being set and checked a minimum of every 30 min, with the crew remaining on station. Longlines and drum lines will be fished for 1 hr. Captured sawfish will be removed as soon as possible by trained CIs and RAs. All sawfish caught will be immediately untangled (if necessary), processed (e.g., measured, tagged, tissue samples taken) as quickly as possible, and released.

Minimizing risk during handling: To reduce risks during handling, sawfish will only be removed from the water when absolutely necessary (e.g., while measurements are being taken and parasites are removed). Juvenile sawfish (<2 m) will be held at the base of the rostrum and if necessary also at the base of the tail depending on size. When handling sawfish, staff will wear padded welding gloves to safely hold the rostra as soon as possible after capture. Smaller specimens will be brought onboard for processing in the water-filled net well. The net well is a large open area at the stern of the vessel. It is important to note that the engine is in front of the console on our research skiffs. This setup allows us to have plenty of space to safely study the sawfish when they are in the net well. Spiracles will be monitored while the sawfish is under our care; we have yet to observe any respiratory abnormalities during a capture. We will continuously monitor the dissolved oxygen level while the sawfish is onboard and continuously change the water with buckets or a custom pump system to mimic ambient conditions. Larger sawfish (>2 m) will be held in shallow water with welding gloves if possible or will be tethered to the side of the boat using ropes wrapped around the rostrum and the base of the tail. They will be secured in a manner such that their spiracles and gills will be submerged.

Minimizing risk during tagging or sample collection: To reduce risks during tagging or tissue sampling, only CIs and RAs will apply tags or collect samples. All tools used for tagging or tissue sampling will be used with sterile techniques (i.e., swabbed with iodine or alcohol before recurring use or using sterile disposable supplies). If necessary, internal transmitters will be coated with a combination of paraffin and bees wax to eliminate any potentially sharp edges on the transmitter.

Supplemental Information

Status of Species: The smalltooth sawfish is listed as 'Endangered' under the Endangered Species Act and on Appendix I of CITES. The following documents contain pertinent information on the status of the species:

1) Smalltooth Sawfish Listing-Final Rule :
https://www.federalregister.gov/documents/2003/04/01/03-7786/endangered-and-threatened-species-final-endangered-status-for-a-distinct-population-segment-of

2) Smalltooth Sawfish Recovery Plan: http://www.fisheries.noaa.gov/pr/pdfs/recovery/smalltoothsawfish.pdf

3) Smalltooth Sawfish Critical Habitat:
https://www.federalregister.gov/documents/2009/09/02/E9-21186/endangered-and-threatened-species-critical-habitat-for-the-endangered-distinct-population-segment-of

4) Map of Critical Habitat: http://www.fisheries.noaa.gov/pr/pdfs/criticalhabitat/smalltoothsawfish.pdf

5) 5-yr Status Review: http://www.fisheries.noaa.gov/pr/pdfs/species/smalltoothsawfish_5yearreview.pdf
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Intentional Lethal Take: Not Applicable

Anticipated Effects on Animals: Anticipated negative effects on animals are minimal based on the previous research we have conducted associated under permits #1475 and #15802. Sawfish are kept in the water even after they have been captured and are removed from the water only if necessary. For example, it becomes necessary to remove sawfish from the water to assess natural injuries or parasitic infestations. In these cases, the sawfish will be held out of the water for 30–60 seconds, put back in the water for several minutes, and then moved out of the water again if necessary to complete the examination. In cases where sawfish were observed prior to capture and work-up (examination, tagging), these individuals have resumed their pre-capture activities (identical swim speeds and direction of movement) in their original locations after they were released. We have interpreted this agreement between pre- and post-capture behavior as a low-stress response to our procedures. Further, all sawfish that have been tagged with acoustic tags have been passively monitored for an average of three months after release (Poulakis et al., 2013). No mortalities have resulted and long-term movement patterns have been comparable. In general, we have interpreted these data to also indicate favorable responses by the sawfish to our interactions with them. It is also important to note that juvenile growth rates have been extremely fast--a doubling of length by the end of their first year (Simpfendorfer et al., 2008). These data likely also indicate favorable responses to our research interactions. In addition, tag locations have been well-healed during recaptures.

* Interactions with other Listed Animals--
--Sea turtles: Although there is potential for taking listed Sea Turtles in our work (up to 6 captures over 5 years), we do not anticipate any lethal takes to turtles. Takes of sea turtles could result in short-term stress to the animals, but because of our training involving careful handling of turtles potentially captured, animals would recover within a few minutes to hours after release with little

--Florida Manatee: Manatee have been cited in our past studies of smalltooth sawfish over 15 years. Additionally critical habitat is listed in our action area. We do not anticipate taking any manatee during our studies due to the operations of our research vessels and our close monitoring of our deployed gear.

--Crocodiles and (similar appearing) American Alligators: Crocodiles are listed federal and state of Florida species and have critical habitat overlapping that of juvenile smalltooth sawfish within our action area in south and southwest Florida. However, we do not anticipate any adverse effect from our research to crocodiles or alligators during our studies.

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Measures to Minimize Effects:

Our overarching intent is to contribute to the recovery of the smalltooth sawfish population. With this goal in mind, all activities that we conduct and samples that we take are related to the Recovery Plan. We make a conscious and thorough effort to use the most up-to-date scientific methods of capturing and handling sawfish and obtaining samples from them. Study methods and procedures come from many years of development of fishery-independent techniques (since 1988 in Florida) as well as consultations with peers conducting relevant research. Because of the interdisciplinary nature of data needs for this species, tagging and sampling techniques are learned, taught, and updated to ensure continuity of data collection and use of gear, as well as to ensure the safety of researchers, sawfish, and other species.

The most likely potential injury to sawfish is for individual rostral teeth to break from contact with the boat during capture and release because of the species' tendency to engage in side-to-side slashing movements of the rostrum as a natural defense mechanism. To minimize the potential for damage, we will use padded welding gloves to hold the rostra of captured sawfish as soon as possible after capture. It is important to note that if any teeth break, they eventually grow back out provided the base is not damaged. Sawfish will be kept in the water as much as possible and only smaller specimens will be brought onboard for processing (<6 feet).

Our research is designed to collect data on the smalltooth sawfish to promote its recovery, but we recognize the fact that non-target species will be encountered during this effort. Based on research conducted during 2009 (scaled for effort), we anticipate catching and releasing about 100 rays, 20 sharks, 40 crabs, and 300 teleosts per year. The vast majority of these animals are released alive due in large part to the fact that we use one hour soak times, stay on site while the gear is fished, and completely check gill nets every 30 minutes. In addition, if we see a splash or observe an animal near the gill nets, we investigate and determine whether it needs to be freed or not. If marine mammals or sea turtles are observed in the area where gill nets are being soaked, nets will be removed from the water for precautionary purposes. If sea turtles are observed in the area where longlines or drum lines are being fished, gear will also be removed from the water for precautionary purposes. These actions are meant to minimize interactions with these species. In general, if marine mammals or sea turtles are seen within 200 yds of our sampling gear, it will be removed from the water as a precautionary measure.

As mentioned, we will avoid sea turtles if we know they are in the area by removing the gear from the water. For example, sometimes they extend their head above the water to breathe or swim by the boat in clear water. Because we often work in turbid water, we may not see them and could encounter sea turtles from time to time. The take numbers in the application are the same granted in the previous permit #15802. It is important to note that these takes are over the life of the permit. The methods related to sea turtle sampling will follow the Sea Turtle Life History Form (e.g., length, gear description, condition of turtle) given to us during the sea turtle training received at the NMFS Southeast Fisheries Science Center. When turtles are encountered, these data will be recorded and sent to sea turtle researchers there. While in the field, we carry a variety of dehookers and related equipment as suggested while we were at the training.

The Gulf sturgeon (Acipenser oxyrinchus desotoi) are found north of Tampa Bay along the Gulf coast of Florida, and and Atlantic sturgeon (Acipenser oxyrinchus oxyrinchus) are occasionally found south of Jacksonville, Florida, in coastal marine areas; however, these areas do not coincide with the current concentration range of the smalltooth sawfish's. Thus, our typical sampling will not likely be conducted where these species range. Regardless, if our rare, extended research activities in theses areas, designed to opportunistically take advantage of straying sawfish, overlap with that of these sturgeon species, we follow all NMFS protocols that minimize impacts to these species. Because we would be monitoring our deployed gear and remain on site, using extremely short soak times, we would be able to free a sturgeon from our gear quickly if we encounter one. Interactions with sturgeon may become a concern in the future, however, if sawfish were to expand their range to the north, but given the extended period required for sawfish recovery, this is not likely to soon occur (~100 year recovery estimate in the Recovery Plan).

We will also follow all state and federal regulations designed to minimize impacts to both Florida manatee and crocodiles/alligators occuring within our action area.

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Resources Needed to Accomplish Objectives: We work at the State of Florida's Fish and Wildlife Research Institute--a state-of-the-art research facility with satellite labs across the state where a wide variety of marine and estuarine research is conducted. The research described in this application has been and will be coordinated out of the Charlotte Harbor Field Laboratory in Port Charlotte, Florida.

This ongoing project has been conducted under ESA permits #1475 and #15802 and is currently funded primarily by federal funds provided by Endangered Species Act Section 6 grants (i.e., Species Recovery Grants to States, sometimes referred to as the Section 6 Program). The current grant began in July 2016 and will continue through June 2019. In addition to the core federal funding referred to above, we have been supported by supplemental funds from the Nature Conservancy in 2014 and 2016. The current Nature Conservancy grant began in February 2016 and will continue through March 2016.
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Disposition of Tissues: All tissue samples will be stored at the Charlotte Harbor Field Laboratory or transferred to co-investigators or authorized recipients listed in our permit. In general, if samples are not consumed in analysis, they will be archived at the Charlotte Harbor Field Laboratory for future study.
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Public Availability of Product/Publications: Real-time research results will be discussed during outreach events, scientific meetings, and implementation team meetings. Final reports produced at the end of the grant period(s) are made available to the public on the sawfish portion of the Fish and Wildlife Research Institute's web site (http://myfwc.com/research/saltwater/fish/sawfish/references/) or in hard copy form if requested. Peer-reviewed publications that result from the permitted activities will also be available on our web site and upon individual request.==========

Location/Take Information

Location

Research Area: Atlantic Ocean **State:** FL
Location Description: Smalltooth sawfish research will be conducted primarily in State and Federal waters off Florida

Take Information

Line	Ver	Species	Listing Unit/Stock	Production /Origin	Life Stage	Sex	Expected Take	Takes Per Animal	Take Action	Observe /Collect Method	Procedure	Transport Record	Begin Date	End Date
1		Sawfish, smalltooth	U.S. DPS (NMFS Endangered)	Wild	Juvenile	Male and Female	125	3	Capture/Handle/Release	Net, Gill	Instrument, internal/external ; Mark, PIT tag; Mark, roto tag; Measure; Other; Photograph/Video; Sample, blood; Sample, fin clip (genetic); Sample, other tissue ; Weigh	N/A	11/10/2016	5/31/2022
		Details: (Juveniles x <3.0 m TL): (1)Gear=longline, drum line, hook & line, seine, gillnet; (2) Other tags=ADL or CTD; (3) Other activities=Ultrasound & Muscle biopsy) (4) Recaptured fish: measured & released; (5) Lost tags reapplied.												
2		Sawfish, smalltooth	U.S. DPS (NMFS Endangered)	Wild	Juvenile	Male and Female	15	3	Capture/Handle/Release	Net, Gill	Instrument, internal/external ; Mark, PIT tag; Mark, roto tag; Measure; Other; Photograph/Video; Sample, blood; Sample, fin clip (genetic); Sample, other tissue ; Weigh	N/A	11/10/2016	5/31/2022
		Details: (Large Juveniles: 2.0m>x<3.0 m TL): (1)Gear=longline, drum line, hook & line, seine, gillnet. (2)Other tags=ADL or CTD & Satellite; (3)Other activities=Ultrasound & Muscle biopsy; (4)Recaptures: measured/released;(5)Lost tags reapplied												

3		Sawfish, smalltooth	U.S. DPS (NMFS Endangered)	Wild	Adult	Male and Female	50	3	Capture/Handle/Release	Longline	Instrument, internal/external ; Mark, PIT tag; Mark, roto tag; Measure; Other; Photograph/Video; Sample, blood; Sample, fin clip (genetic); Sample, other tissue ; Weigh	N/A	11/10/2016	5/31/2022
		Details: (Adults: x >3.0 m TL): (1)Gear=longline, drum line, hook & line, seine, gillnet; (2) Other tags=ADL or CTD; (3) Other activities=Ultrasound & Muscle biopsy) (4) Recaptured fish: measured & released; (5) Lost tags reapplied.												
4		Sawfish, smalltooth	U.S. DPS (NMFS Endangered)	Wild	Adult	Male and Female	15	3	Capture/Handle/Release	Longline	Instrument, internal/external ; Mark, PIT tag; Mark, roto tag; Measure; Other; Photograph/Video; Sample, blood; Sample, fin clip (genetic); Sample, other tissue ; Weigh	N/A	11/10/2016	5/31/2022
		Details: (Adults: x >3.0 m TL): (1)Gear=longline, drum line, hook & line, seine, gillnet. (2)Other tags=ADL or CTD & Satellite; (3)Other activities = Ultrasound & Muscle biopsy; (4) Recaptures: measured & released; (5)Lost tags reapplied.												
5		Sawfish, smalltooth	U.S. DPS (NMFS Endangered)	All	All	Male and Female	50	1	Import/export/receive only	Other	Import/export/receive, parts; Necropsy; Other; Salvage (carcass, tissue, parts)	N/A	11/10/2016	5/31/2022
		Details: Salvage (carcass, tissue, parts), necropsy. From strandings or law enforcement.												
6		Sawfish, smalltooth	U.S. DPS (NMFS Endangered)	All	All	Male and Female	50	1	Import/export/receive only	Other	Import/export/receive, parts	N/A	11/10/2016	5/31/2022
		Details: Receipt and analysis of samples taken by other permitted researchers.												
7		Turtle, loggerhead sea	Northwest Atlantic Ocean DPS (NMFS Threatened)	Wild	All except hatchling	Male and Female	6	1	Incidental take	Net, Tangle	Other	N/A	11/10/2016	5/31/2022
		Details: Non-lethal capture & release (Total of 6 over Permit): Incidental to sawfish sampling.												
8		Turtle, green sea	North Atlantic DPS (NMFS Threatened)	Wild	All except hatchling	Male and Female	6	1	Incidental take	Net, Tangle	Other	N/A	11/10/2016	5/31/2022
		Details: Non-lethal capture & release (Total of 6 over Permit): Incidental to sawfish sampling.												
9		Turtle, Kemp's ridley sea	Range-wide (NMFS Endangered)	Wild	All except hatchling	Male and Female	6	1	Incidental take	Net, Tangle	Other	N/A	11/10/2016	5/31/2022
		Details: Non-lethal capture & release (Total of 6 over Permit): Incidental to sawfish sampling.												
10		Turtle, hawksbill sea	Range-wide (NMFS Endangered)	Wild	All except hatchling	Male and Female	6	1	Incidental take	Net, Tangle	Other	N/A	11/10/2016	5/31/2022

		Details: Non-lethal capture & release (Total of 6 over Permit): Incidental to sawfish sampling.												
11		Turtle, leatherback sea	Range-wide (NMFS Endangered)	Wild	All except hatchling	Male and Female	6	1	Incidental take	Net, Tangle	Other	N/A	11/10/2016	5/31/2022
		Details: Non-lethal capture & release (Total of 6 over Permit): Incidental to sawfish sampling.												

NEPA Checklist

1) If your activities will involve equipment (e.g., scientific instruments) or techniques that are new, untested,or otherwise have unknown or uncertain impacts on the biological or physical environment , please discuss the degree to which they are likely to be adopted by others for similar activities or applied more broadly.

Our activities are based on established techniques for fisheries research and don't involve any techniques that are unknown.

2) If your activities involve collecting, handling, or transporting potentially infectious agents or pathogens (e.g., biological specimens such as live animals or blood), or using or transporting hazardous substances (e.g., toxic chemicals), provide a description of the protocols you will use to ensure public health and human safety are not adversely affected, such as by spread of zoonotic diseases or contamination of food or water supplies.

Blood samples will be collected, placed in sealable tubes, and transported in a cooler on ice to the lab for processing. There are no known pathogens that can be transferred from sawfish to humans.

3) Describe the physical characteristics of your project location, including whether you will be working in or near unique geographic areas such as state or National Marine Sanctuaries, Marine Protected Areas, Parks or Wilderness Areas, Wildlife Refuges, Wild and Scenic Rivers, designated Critical Habitat for endangered or threatened species, Essential Fish Habitat, etc. Discuss how your activities could impact the physical environment, such as by direct alteration of substrate during use of bottom trawls, setting nets, anchoring vessels or buoys, erecting blinds or other structures, or ingress and egress of researchers, and measures you will take to minimize these impacts.

We will be working in juvenile smalltooth sawfish Critical Habitat. The gear we use has minimum impact on the environment. Seines and gill nets slide over the bottom with minimal disruption. Hooked gear rests on the bottom. The areas where we work are largely devoid of submerged aquatic vegetation, but we still take care with our anchor placement to avoid vegetated bottom.

4) Briefly describe important scientific, cultural, or historic resources (e.g., archeological resources, animals used for subsistence, sites listed in or eligible for listing in the National Register of Historic Places) in your project area and discuss measures you will take to ensure your work does not cause loss or destruction of such resources. If your activity will target marine mammals in Alaska or Washington, discuss measures you will take to ensure your project does not adversely affect the availability (e.g., distribution, abundance) or suitability (e.g., food safety) of these animals for subsistence uses.

We know of no scientific, cultural, or historic resources in the project area that would be affected by our research.

5) Discuss whether your project involves activities known or suspected of introducing or spreading invasive species, intentionally or not, (e.g., transporting animals or tissues, discharging ballast water, use of equipment at multiple sites). Describe measures you would take to prevent the possible introduction or spread of non-indigenous or invasive species, including plants, animals, microbes, or other biological agents.

Our project does not involve any activities known or suspected of introducing or spreading invasive species of any kind, intentionally or not.

Project Contacts

Responsible Party: Gregg Richard Poulakis

Primary Contact: Gregg Richard Poulakis

Principal Investigator: Gregg Richard Poulakis

Other Personnel

Name	Role(s)
Doug Adams	Tissue Sample Disposition
Matt Ajemian	Co-Investigator
Micah Bakenhaster	Tissue Sample Disposition
Christine Bedore	Tissue Sample Disposition
Rebecca Blaxton	Research Assistant
David Blewett	Research Assistant
Matt Bunting	Co-Investigator
John Carlson	Co-Investigator
Demian Chapman	Tissue Sample Disposition
Kevin Feldheim	Tissue Sample Disposition
R. Dean Grubbs	Co-Investigator
Chris Hessell	Research Assistant
Janelle Johnson	Co-Investigator
Michael McCallister	Co-Investigator
Eric Milbrandt	Research Assistant
Nate Miller	Research Assistant
Gavin Naylor	Tissue Sample Disposition
Pat O'Donnell	Co-Investigator
Jill Olin	Tissue Sample Disposition
Yannis Papastamatiou	Research Assistant
Nicole M Phillips	Tissue Sample Disposition
Eric A. Reyier	Research Assistant
Courtney Saari	Research Assistant
Rachel Scharer	Co-Investigator
Philip Stevens	Research Assistant
Hidetoshi Urakawa	Tissue Sample Disposition
Tonya Wiley-Lescher	Tissue Sample Disposition
Andrew Wooley	Co-Investigator
Beau Yeiser	Co-Investigator

Attachments

Application Archive - (Added Jun 5, 2017)
Certification of Identity - (Added Nov 10, 2016)
Contact - Andrew Wooley (Added Feb 15, 2018)
Contact - Beau Yeiser (Added May 25, 2016)
Contact - Beau Yeiser (Added Jul 25, 2016)
Contact - Beau Yeiser (Added Jan 22, 2018)
Contact - Beau Yeiser (Added Jan 13, 2017)
Contact - Chris Hessell (Added May 5, 2016)
Contact - Christine Bedore (Added Feb 15, 2018)
Contact - Courtney Saari (Added May 5, 2016)
Contact - Courtney Saari (Added Jan 13, 2017)
Contact - David Blewett (Added Jan 13, 2017)
Contact - David Blewett (Added Dec 9, 2010)
Contact - Demian Chapman (Added May 7, 2012)
Contact - Demian Chapman (Added Apr 25, 2011)
Contact - Doug Adams (Added Jan 13, 2017)
Contact - Doug Adams (Added Mar 24, 2010)
Contact - Eric A. Reyier (Added Nov 2, 2012)
Contact - Eric A. Reyier (Added Jan 13, 2017)
Contact - Eric Milbrandt (Added Jan 13, 2017)
Contact - Eric Milbrandt (Added Jun 18, 2012)
Contact - Gavin Naylor (Added Jun 6, 2017)
Contact - Gavin Naylor (Added Jun 14, 2017)
Contact - Gregg Richard Poulakis (Added Jan 18, 2017)
Contact - Hidetoshi Urakawa (Added Feb 3, 2015)
Contact - Hidetoshi Urakawa (Added Jan 13, 2017)
Contact - Janelle Johnson (Added Feb 15, 2018)
Contact - Jill Olin (Added Jan 13, 2017)
Contact - Jill Olin (Added Dec 9, 2010)
Contact - John Carlson (Added May 25, 2016)
Contact - John Carlson (Added Feb 2, 2017)
Contact - Joy Young (Added Jun 15, 2011)
Contact - Joy Young (Added Jan 13, 2017)
Contact - Kevin Feldheim (Added May 26, 2016)
Contact - Kevin Feldheim (Added Jan 13, 2017)
Contact - Matt Ajemian (Added May 5, 2016)
Contact - Matt Ajemian (Added Jan 13, 2017)
Contact - Matt Bunting (Added Sep 30, 2020)
Contact - Micah Bakenhaster (Added Jan 28, 2011)
Contact - Micah Bakenhaster (Added Jan 13, 2017)
Contact - Michael McCallister (Added Apr 11, 2014)

Contact - Michael McCallister (Added Jan 13, 2017)
Contact - Nate Miller (Added May 5, 2016)
Contact - Nicole M Phillips (Added Jul 11, 2017)
Contact - Nicole M Phillips (Added Aug 29, 2019)
Contact - Pat O'Donnell (Added Jan 13, 2017)
Contact - Pat O'Donnell (Added Mar 24, 2010)
Contact - Philip Stevens (Added Jan 13, 2017)
Contact - Philip Stevens (Added Dec 9, 2010)
Contact - R. Dean Grubbs (Added Sep 26, 2011)
Contact - R. Dean Grubbs (Added Jan 14, 2011)
Contact - R. Dean Grubbs (Added Jan 13, 2017)
Contact - Rachel Scharer (Added Jan 13, 2017)
Contact - Rachel Scharer (Added Sep 10, 2014)
Contact - Rebecca Blaxton (Added May 5, 2016)
Contact - Tonya Wiley-Lescher (Added May 25, 2016)
Contact - Tonya Wiley-Lescher (Added Jan 13, 2017)
Contact - Yannis Papastamatiou (Added May 10, 2012)
Contact - Yannis Papastamatiou (Added Jan 13, 2011)
Contact - Yannis Papastamatiou (Added Jul 5, 2011)
Project Description - (Added Feb 2, 2017)
Project Description - (Added Feb 2, 2017)
References - (Added Nov 10, 2016)
Resources Needed - (Added Nov 10, 2016)
Resources Needed - (Added Nov 10, 2016)

Status

Application Status:	Application Complete
Date Submitted:	November 10, 2016
Date Completed:	February 3, 2017
FR Notice of Receipt Published:	March 29, 2017 **Number:** 2017-06139
Comment Period Closed:	April 28, 2017 **Comments Received:** Yes **Comments Addressed:** Yes
Last Date Archived:	October 9, 2020

- **ESA Section 10(a)(1)(A) permit (other)**

  Current Status: Issued **Status Date:** May 31, 2017
  Section 7 Consultation: Formal Consultation
  NEPA Analysis: Categorical Exclusion
  Date Cleared by General Counsel: May 22, 2017
  FR Notice of Issuance/Denial Published: June 27, 2017 **Notice Number:** 2017-13434
  Expire Date: May 31, 2022

Analyst Information:

1) Malcolm Mohead
Phone: (301)427-8427
Fax: (301)713-0376
Email: Malcolm.Mohead@noaa.gov

2) Erin Markin
Phone: (301)427-8416
Email: erin.markin@noaa.gov

Modification Requests

Modifications Requested

Number	Title	Description	Status	Date Submitted	Date Issued	Issued Version
1	add Dr. Gavin Naylor as an authorized recipient of tissue	I am requesting to add Dr. Gavin Naylor to the permit so he can receive tissues from sawfish necropsies. Gavin needs the freshest possible samples from major organs so he can sequence the entire genome of the smalltooth sawfish. These data will be used for historical population and demography research.	Issued	06/14/2017	06/26/2017	
2	add Dr. Olivier Fedrigo as an authorized recipient of tissue	I am requesting to add Dr. Fedrigo to the permit so he can receive tissues from sawfish necropsies. He needs the freshest possible samples from major organs so he can sequence the entire genome of the smalltooth sawfish. These data will be used for historical population and demography research. Dr. Fedrigo is working with Dr. Gavin Naylor.	Issued	07/11/2017	07/13/2017	
3	filming request for Discovery: Daily Planet	I am requesting authorization for a film crew to accompany us in the field in November and December 2017. They produce 5-7 minute documentaries for their daily show. We think this is a great opportunity to get the conservation message out about smalltooth sawfish. Felicia Nicholson is the producer (off camera), Ross MacIntosh is the camera man, and Michael Booth will record audio. Currently, they are planning to accompany us on 11/7/2017.	Issued	10/31/2017	11/03/2017	
4	Add 5 CIs, 1 recipient, and remove 2 CIs	I would like to add 5 CIs to the permit for field research activities. All five have completed the NOAA Sea Turtle training and will be field research staff. Alia Court, Andrew Wooley and Janelle Johnson will be CIs involved in all activities. While Christopher Brown, and Christopher Harshaw will be CIs involved in all activities but surgery. I would like to add Dr. Christine Bedore as a recipient to receive tissues for analyses. Please remove Cecily Burton and Geoff Huston as CIs from the permit.	Issued	02/15/2018	02/28/2018	
6	Add 2 personnel and remove 2	I would like to add 2 personnel to the permit. Manuel Coffill completed the NOAA Sea Turtle training on April 29, 2019 and will be involved in field research activities. I would like to add him as a Research Assistant. I would like to add Nicole Phillips as a recipient to receive tissues or sawfish parts for analyses. Please remove Christopher Brown and Christopher Harshaw as CIs from the Permit.	Issued	08/29/2019	09/06/2019	
7	Photographer/Reporter David Brown	We are requesting authorization to allow a photographer and reporter, David Brown, to accompany us during our research somewhere between September 13 - December 31, 2019. David is interested in writing an article on our research for Outdoor Life. David will not participate in research and will come alone.	Issued	08/29/2019	09/06/2019	
8	Change Manuel Coffill from RA to CI	Manuel was mistakenly asked to be added to the permit as a RA rather than a CI as intended in modification request #6. We'd like him to be added as a CI so the activities he is authorized for without supervision would be "all activities, except surgery".	Issued	09/12/2019	09/24/2019	

9	Change one co-investigator's "activities authorized" and remove former personnel.	I am requesting to change the activities authorized for existing co-investigator Matt Bunting from "All activities, except surgery" to "All activities". Matt has been working with us often during the pandemic and has replaced former employee Alia Court, who was authorized for all activities, in the field. To complete our NOAA-funded research moving forward, he has been trained on the surgery technique on sawfish carcasses as well as live sawfish and is familiar with the entire process. In addition, I am requesting removal of former employees John Hadden, Chrystal Murray, Alia Court, Christopher Harshaw, Christopher Brown, and Manuel Coffill. Thank you for the help!	Issued	09/30/2020	10/08/2020	

Reports

Reports Required

Nbr	Report Type	Report Period		Date Due	Status	Date Received
		Start Date	End Date			
1	Annual	06/01/2017	05/31/2018	09/01/2018	Submitted	08/24/2018
2	Annual	06/01/2018	05/31/2019	09/01/2019	Submitted	08/29/2019
3	Annual	06/01/2019	05/31/2020	09/01/2020	Submitted	08/28/2020
4	Annual	06/01/2020	05/31/2021	09/01/2021	N/A	
5	Combined Annual/Final	06/01/2021	05/31/2022	09/01/2022	N/A	
7	Incident	09/18/2019	09/18/2019	09/18/2019	Submitted	09/20/2019