Endangered Species Act - Section 7 Consultation
Biological Opinion

Action Agency: National Oceanic and Atmospheric Administration (NOAA), National Marine Fisheries Service (NMFS), Southeast Regional Office (SERO), Sustainable Fisheries Division (F/SER2).

Activity: The Continued Authorization of Shrimp Trawling as Managed under the Fishery Management Plan (FMP) for the Shrimp Fishery of the Gulf of Mexico (GOM).

Consulting Agency: NOAA, NMFS, SERO, Protected Resources Division (F/SER3).

Approved by: _____
Roy E. Crabtree, Ph.D., Regional Administrator

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Introduction

Section 7(a)(2) of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. § 1531 *et seq.*), requires each federal agency to ensure any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of any critical habitat of such species. When the action of a federal agency may affect an ESA-listed species or its critical habitat, that agency is required to consult with either NMFS or the U.S. Fish and Wildlife Service (USFWS), depending upon the protected species that may be affected.

Consultations on most listed marine species and their critical habitat are conducted between the action agency and NMFS. These consultations are concluded after NMFS has determined that an action is not likely to adversely affect listed species or designated critical habitat, or issues a biological opinion (opinion) identifying whether the proposed action is likely to jeopardize the continued existence of a listed species, or destroy or adversely modify any critical habitat. If jeopardy or destruction or adverse modification is found to be likely, NMFS must identify reasonable and prudent alternatives to the action, if any, that would avoid jeopardizing any listed species and avoid destruction or adverse modification of any designated critical habitat. The opinion establishes an incidental take statement (ITS) specifying the amount or extent of incidental take of the listed species that may occur, reasonable and prudent measures (RPMs) to reduce the effect of take, and may recommend conservation measures to further conserve the species. Notably, no incidental destruction or adverse modification of critical habitat can be authorized. Thus, there are no RPMs for critical habitat, only reasonable and prudent alternatives that must avoid destruction and adverse modification.

This document represents NMFS' opinion on the effects of the continued authorization of shrimp trawling as managed under the FMP for the Shrimp Fishery of the GOM Region (hereafter the GOM Shrimp FMP) on smalltooth sawfish, *Pristis pectinata*, in accordance with section 7 of the ESA. NMFS has dual responsibilities as both the action agency under the Magnuson-Stevenson Fishery Conservation and Management Act (MSFMCA) (16 U.S.C. §1801 *et seq.*) and the consulting agency under the ESA. For the purposes of this consultation, F/SER2 is considered the action agency and the consulting agency is F/SER3.

This opinion is based on information provided in Amendment 13 to the GOM Shrimp FMP (GMFMC and NMFS 2005), the smalltooth sawfish status review (NMFS 2000), more recent smalltooth sawfish publications (e.g., Poulakis and Seitz 2004, Simpfendorfer and Wiley 2004), observer and logbook fishery effort and protected species interaction data, and previous opinions on the GOM federal shrimp fishery and other relevant fisheries.

1.0 Consultation History

The effects of the shrimp fishery managed under the GOM Shrimp FMP (i.e., the GOM federal shrimp fishery) on endangered and threatened species have been analyzed as part of the proposed action of numerous formal section 7 consultations (i.e., NMFS 1992, 1994, 1996, 1998, and 2002). These consultations are summarized in the most recent opinion, dated December 2, 2002, on shrimp trawling in the southeastern United States under the sea turtle conservation regulations

and as managed by the GOM Shrimp FMP and the FMP for shrimp in the South Atlantic (hereafter the 2002 opinion).

The 2002 opinion included an analysis of the effects of the GOM federal shrimp fishery on both sea turtle and marine mammal species. NMFS concluded that shrimp trawling in the southeastern United States, under the proposed revisions to the sea turtle conservation regulations at that time and as managed by the FMPs for shrimp in the South Atlantic and GOM, is not likely to jeopardize the continued existence of endangered green, leatherback, hawksbill, and Kemp's ridley sea turtles, and threatened loggerhead sea turtles. An ITS was issued allotting take for each of these species. ESA-listed marine mammals, sturgeon, the olive ridley sea turtle, and Johnson's seagrass were all found not likely to be adversely affected. No incidental take was issued for these species.

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

F/SER2 recently requested F/SER3 review two proposed GOM Shrimp FMP amendments to determine if reinitiation of formal consultation on the GOM federal shrimp fishery was warranted. On April 6, 2005, F/SER2 requested initiation of the section 7 consultation process on Final Generic Amendment 3 for addressing essential fish habitat requirements, habitat areas of particular concern, and adverse effects of fishing in the FMPs of the GMFMC. Proposed Amendment 12 to the GOM Shrimp FMP establishing essential fish habitat for shrimp in the GOM is included as part of Generic Amendment 3. On July 29, 2005, F/SER2 requested initiation of the section 7 consultation process on Amendment 13 to the GOM Shrimp FMP.

F/SER3 reviewed the two proposed amendments and the 2002 opinion to determine if either amendment triggered reinitiation of consultation on the GOM federal shrimp fishery. F/SER3 also considered whether any other conditions existed warranting reinitiation of the 2002 opinion. The changes to the agency action (i.e., management and operation of the GOM federal shrimp fishery) proposed in Amendments 12 and 13 did not trigger any of the bases for reinitiation of formal consultation. Reinitiation of formal consultation on the GOM federal shrimp fishery was found necessary only to address the smalltooth sawfish, a newly listed species. Based on the species' presence in the GOM and its previous capture in otter trawls it may be adversely affected by, the GOM federal shrimp fishery may adversely affect it. Consequently, on August 25, 2005, NMFS reinitiated formal section 7 consultation on the GOM federal shrimp fishery and its effects on the smalltooth sawfish.

This opinion analyzes the effects of the GOM federal shrimp fishery only on the smalltooth sawfish. The 2002 opinion remains in effect for all other listed species that may be affected by the proposed action; it is incorporated by reference and appended hereto (Appendix 1).

2.0 Description of the Proposed Action

F/SER2 is proposing to continue authorization of the GOM federal shrimp fishery via the GOM Shrimp FMP and implementing regulations at 50 CFR part 622 under the authority of the MSFMCA. The GOM Shrimp FMP authorizes fishing only in the U.S. GOM EEZ. Within this area, shrimp are harvested with otter trawls by the commercial food shrimp fishery. Target species include penaeid shrimp species (i.e., white, brown, and pink shrimp) and royal red shrimp. Commercial bait and recreational fisheries for these shrimp species in the GOM occur almost exclusively in state waters, thus are not considered part of the proposed action.

The 2002 opinion includes a detailed description of the management and operation (i.e., vessels, gear, and fishing practices) of all southeastern shrimp fisheries. Amendment 13 to the GOM Shrimp FMP provides additional information on the GOM federal shrimp fishery and management measures proposed since completion of the 2002 opinion. Specific sections of these documents that describe characteristics of the GOM federal shrimp fishery relevant to the analysis of its potential effects on smalltooth sawfish are listed in Table 2.1. These sections are incorporated by reference. The 2002 opinion in its entirety is included in Appendix 1 and the referenced GMFMC and NMFS 2005 excerpts are provided in Appendix 2.

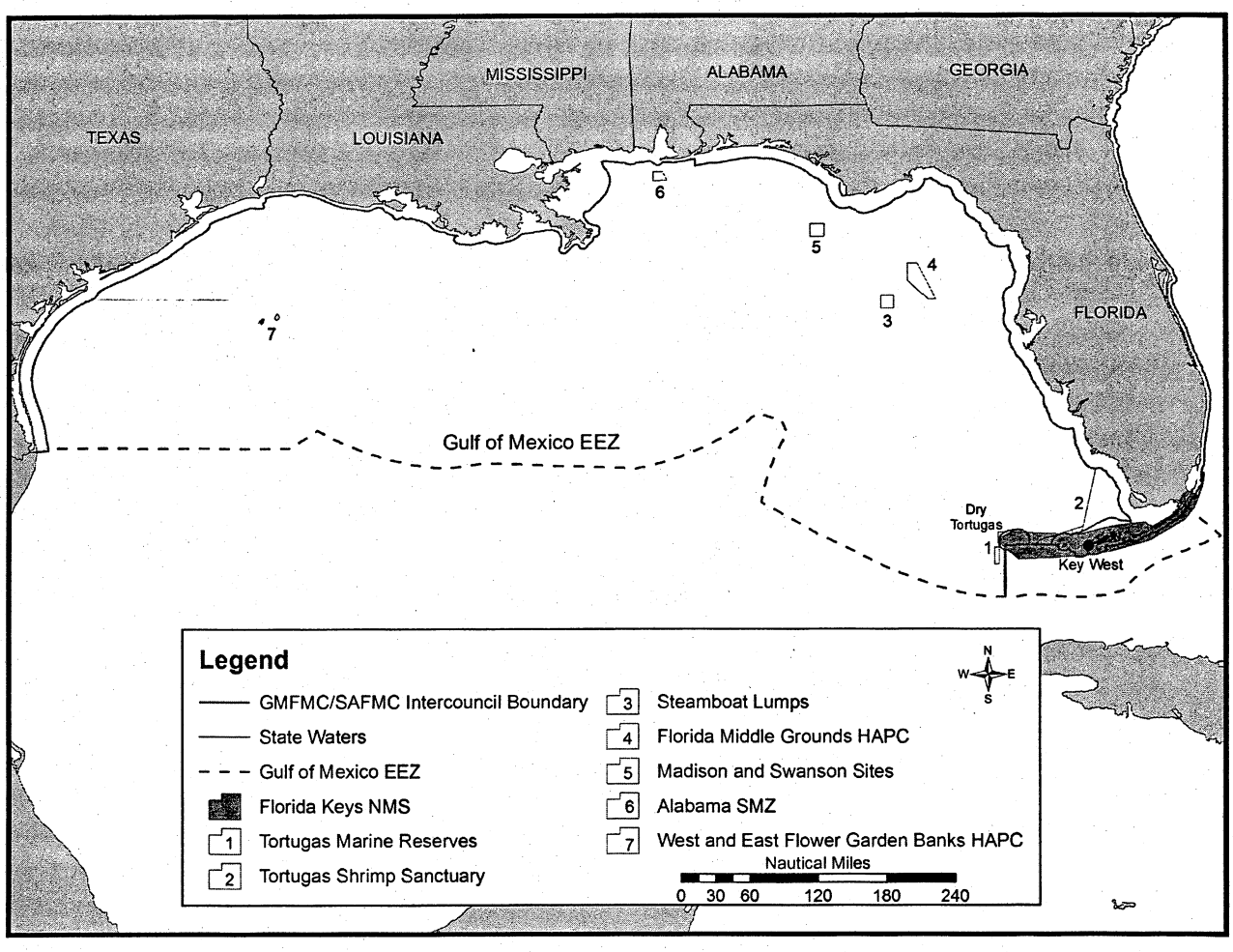
Table 2.1. GOM Federal Shrimp Fishery Descriptions Incorporated By Reference

Source Document	Section/Subsection/Heading Title	Incorporated Pages
NMFS 2002	Sea turtle Conservation Regulations	4-6
	Shrimp Fishery Gear	7-9
	U.S. GOM Area Shrimp Fishery	9-10
	History of Management Plans and Amendments of the GOM Area Shrimp Fishery	12-14
GMFMC and NMFS 2005	2.0 History of Management	5-7
	5.4.2 The Gulf Shrimp EEZ Fishery	62-64
	6.0 Description of the Fishery	105-107

2.2 Action Area

The action area for an opinion is defined as all of the areas affected directly or indirectly by the federal action and not merely the immediate area involved in the action. The management unit of the GOM Shrimp FMP is the U.S. GOM EEZ. The U.S. GOM EEZ extends offshore from 3 to 200 nautical miles off the coasts of Alabama, Mississippi, and Louisiana, and from 9 to 200 miles off the coasts of Florida and Texas. The GOM federal shrimp fishery may operate anywhere within the U.S. GOM EEZ. As discussed later in Section 5.0, indirect effects of the proposed action outside of this area are not expected. Therefore, the action area of the proposed action consists of this entire area. Fishing activity within this area is determined by a variety of biological (e.g., distribution of shrimp), socio-economic (e.g., market factors, location of ports, operating costs), and regulatory factors (e.g., gear-restricted closed areas). Figure 2.1 (p. 5) depicts the GOM EEZ, as well as special management areas (e.g., habitat area of particular concern, marine reserves) within the GOM EEZ where trawling is prohibited.

Figure 2.1 GOM Federal Shrimp Fishery Action Area



3.0 Status of Listed Species and Critical Habitat

The following endangered and threatened species are known to occur in the GOM EEZ:

Marine Mammals	**Status**
Sperm whale (*Physeter macrocephalus*)	Endangered
Sea turtles	
Green turtle (*Chelonia mydas*)	Endangered/Threatened[1]
Hawksbill sea turtle (*Eretmochelys imbricata*)	Endangered
Kemp's ridley sea turtle (*Lepidochelys kempii*)	Endangered
Leatherback sea turtle (*Dermochelys coriacea*)	Endangered

[1] Green sea turtles in U.S. waters are listed as threatened except for the Florida breeding population, which is listed as endangered. Due to the inability to distinguish between the populations away from the nesting beaches, green sea turtles are considered endangered wherever they occur in U.S. waters

Loggerhead sea turtle (*Caretta caretta*)	Threatened

Fish

Smalltooth sawfish (*Pristis pectinata*)	Endangered
Gulf of Mexico sturgeon (*Acipenser oxyrinchus desotoi*)	Threatened

Critical Habitat
None

This opinion analyzes the effects of the GOM federal shrimp fishery only on the smalltooth sawfish. The marine mammal, sea turtle, and sturgeon species listed above as occurring in the action area are analyzed in the 2002 opinion (Appendix1).

Smalltooth sawfish are known to occur in the GOM waters off Florida. Previous captures in otter trawls indicate the GOM federal shrimp trawl fishery may adversely affect smalltooth sawfish.

The following subsections provide a synopsis of the best available information on the life history, distribution, and population status of the smalltooth sawfish. Additional background information on the status of this species can be found in a number of published documents, including the smalltooth sawfish status review (NMFS 2000), the proposed and final listing rules (65 FR 12959, 68 FR 15674), and numerous recent publications (Simpfendorfer 2001, Seitz and Poulakis 2002, Simpfendorfer and Wiley 2004, Poulakis and Seitz 2004).

3.1 Smalltooth Sawfish

The U.S. smalltooth sawfish distinct population segment (DPS) was listed as endangered under the ESA on April 1, 2003 (68 FR 15674). The smalltooth sawfish is the first marine fish to be listed in the United States. Critical habitat for the species has not been designated. Historically, smalltooth sawfish occurred commonly in the inshore waters of the GOM and the eastern U.S. seaboard up to North Carolina, and more rarely as far north as New York. Today, the core range for the species is from the Caloosahatchee River, Florida, to Florida Bay (Simpfendorfer and Wiley 2004).

All extant sawfish belong to the Suborder *Pristoidea*, Family *Pristidae*, and Genus *Pristis*. Although they are rays, sawfish physically more resemble sharks, with only the trunk and especially the head ventrally flattened. Smalltooth sawfish are characterized by their "saw," a long, narrow, flattened rostral blade with a series of transverse teeth along either edge.

Life History and Distribution
Life history information on smalltooth sawfish is limited. Small amounts of data exist in old taxonomic works and occurrence notes (e.g., Breder 1952, Bigelow and Schroeder 1953, Wallace 1967, Thorson et al. 1966). However, as Simpfendorfer and Wiley (2004) note, these relate primarily to occurrence and size. Recent research and sawfish public encounter databases are now providing new data and hypotheses about smalltooth sawfish life history (e.g.,

Simpfendorfer 2001 and 2003, Seitz and Poulakis 2002, Poulakis and Seitz 2004, Simpfendorfer and Wiley 2004), but more data are needed to confirm many of these new hypotheses.

As in all elasmobranchs, fertilization is internal. Development in sawfish is believed to be ovoviviparous. Bigelow and Schroeder (1953) report smalltooth sawfish litter size as 15 to 20. Simpfendorfer and Wiley (2004) caution this may be an overestimate, with recent anecdotal information suggesting smaller litter sizes (~10). Smalltooth sawfish mating and pupping seasons, gestation, and reproductive periodicity are all unknown. However, gestation and reproductive periodicity may be inferred based on that of the largetooth sawfish, sharing the same genus and having similarities in size and habitat. Thorson (1976) reported the gestation period for largetooth sawfish was approximately 5 months and concluded that females probably produce litters every second year.

Bigelow and Schroeder (1953) describe smalltooth sawfish as generally about 2 feet long (61 cm) at birth and growing to a length of 18 feet (5.49 m) or greater. However, recent data from smalltooth sawfish caught off Florida demonstrate young are born at 75-85 cm (Simpfendorfer and Wiley 2004), with males reaching maturity at approximately 2.7 m and females at approximately 3.6 m (Simpfendorfer 2002 and 2004). The maximum reported size of a smalltooth sawfish is 7.6 m (Last and Stevens 1994), but the maximum size normally observed is 6 m (Adams and Wilson 1995). No formal studies on the age and growth of the smalltooth sawfish have been conducted to date, but growth studies of largetooth sawfish suggest slow growth, late maturity (10 years) and long lifespan (25-30 years) (Thorson 1982; Simpfendorfer 2000).

Smalltooth sawfish feed primarily on fish, with mullet, jacks, and ladyfish believed to be their primary food resources (Simpfendorfer 2001). By moving its saw rapidly from side to side through the water, the relatively slow moving sawfish is able to strike at individual fish (Breder 1952). The teeth on the saw stun, impale, injure, or kill the fish. Smalltooth sawfish then rub their saw against bottom substrate to remove the fish, which are then eaten. In addition to fish, smalltooth sawfish also prey on crustaceans (mostly shrimp and crabs), which they locate by disturbing bottom sediment with their saw (Norman and Fraser 1937, Bigelow and Schroeder 1953).

Smalltooth sawfish are euryhaline, occurring in waters with a broad range of salinities from freshwater to full seawater (Simpfendorfer 2001). Their occurrence in freshwater is suspected to be only in estuarine areas temporarily freshwater from receiving high levels of freshwater input. Many encounters are reported at the mouths of rivers or other sources of freshwater inflows, suggesting estuarine areas may be an important factor in the species distribution (Simpfendorfer and Wiley 2004).

Literature indicates that smalltooth sawfish are most common in shallow coastal waters less than 25 m (Bigelow and Schroeder 1953, Adams and Wilson 1995). Indeed, the distribution of the smallest size classes of smalltooth sawfish indicate that nursery areas occur throughout Florida in areas of shallow water, close to shore and typically associated with mangroves (Simpfendorfer and Wiley 2004). However, encounter data indicate there is a tendency for smalltooth sawfish to move offshore and into deeper water as they grow. An examination of the relationship between

the depth at which sawfish occur and their estimated size indicates that larger animals are more likely to be found in deeper waters. Since large animals are also observed in very shallow waters, it is believed that smaller (younger) animals are restricted to shallow waters, while large animals roam over a much larger depth range (Simpfendorfer 2001). Recent data from sawfish encounter reports and from satellite tagging indicate mature animals occur regularly in waters in excess of 50 m (Poulakis and Seitz 2004, Simpfendorfer and Wiley 2004).

Mote Marine Laboratory (MML) data indicate smalltooth sawfish occur over a range of temperatures but appear to prefer water temperatures greater than 18°C (64.4°F) (Simpfendorfer 2001). The data also suggest that smalltooth sawfish may utilize warm-water outflows of power stations as thermal refuges during colder months to enhance their survival, or become trapped by surrounding cold water from which they would normally migrate. Almost all occurrences of smalltooth sawfish in warm-water outflows were during the coldest part of the year, when water temperatures in these outfalls are typically well above ambient temperatures. Further study of the importance of thermal refuges to smalltooth sawfish is needed. Significant use of these areas by sawfish may disrupt their normal migratory patterns (Simpfendorfer and Wiley 2004).

Historic records of smalltooth sawfish indicate that some large mature individuals migrated north along the U.S. Atlantic coast as temperatures warmed in the summer and then south as temperatures cooled (Bigelow and Schroeder 1953). Recent Florida encounter data, however, do not suggest such migration. One smalltooth sawfish has been recorded north of Florida since 1963 (i.e., a smalltooth sawfish captured off Georgia in July 2002) but it is unknown whether this individual resided in Georgia waters annually or had migrated north from Florida. Given the very limited number of encounter reports from the east coast of Florida, Simpfendorfer and Wiley (2004) hypothesize the population previously undertaking the summer migration has declined to a point where the migration is undetectable or does not occur. Further research focusing on states north of Florida or using satellite telemetry is needed to test this hypothesis.

Population Dynamics, Status, and Trends

Despite being widely recognized as common throughout their historic range up until the middle of the 20th century, the smalltooth sawfish population declined dramatically during the middle and later parts of the century. The decline in the population of smalltooth sawfish is attributed to fishing (both commercial and recreational), habitat modification, and sawfish life history. Large numbers of smalltooth sawfish were caught as bycatch in the early part of this century. Smalltooth sawfish were historically caught as bycatch in various fishing gears throughout their historic range, including gillnet, otter trawl, trammel net, seine, and to a lesser degree, handline. Frequent accounts in earlier literature document smalltooth sawfish being entangled in fishing nets from areas where smalltooth sawfish were once common but are now rare. Loss and/or degradation of habitat contributed to the decline of many marine species and continue to impact the distribution and abundance of smalltooth sawfish (NMFS 2000).

Estimates of the magnitude of the decline in the smalltooth sawfish are difficult to make. Because of the species' limited importance in commercial and recreational fisheries and its large size and toothed rostrum, making it difficult to handle, it was not well studied before incidental bycatch severely reduced its numbers. However, based on the contraction of the species' range

and other anecdotal data, Simpfendorfer (2001) estimated that the U.S. population size is currently less than 5 percent of its size at the time of European settlement.

Seitz and Poulakis (2002) and Poulakis and Seitz (2004) document recent (1990 to 2002) occurrences of sawfish along the southwest coast of Florida, and in Florida Bay and the Florida Keys, respectively. The information was collected by soliciting information from anyone who would possibly encounter these fish via posters displaying an image of a sawfish and requesting anyone with information on these fish since 1990 to contact the authors. Posters were distributed beginning in January 1999 and continue to be maintained from Charlotte County to Monroe County in places where anglers and boaters would likely encounter them (e.g., bait and tackle shops, boat ramps, fishing tournaments). In addition to circulating posters, information was obtained by contacting other fishery biologists, fishing guides, guide associations, rod and gun clubs, recreational and commercial fishermen, scuba divers, mosquito control districts, and newspapers. The Poulakis and Seitz database includes a total of 2,620 smalltooth sawfish encounters (Poulakis, pers. comm. 2005).

MML also maintains a smalltooth sawfish public encounter database, established in 2000 to compile information on the distribution and abundance of sawfish. Encounter records are initially collected using some of the same outreach tactics as above in Florida statewide. To ensure the requests for information are spread evenly throughout the state, awareness-raising activities were divided into six regions and focused in each region on a biannual basis between May 2002 and May 2004. Prior to 2002, awareness-raising activities were organized on an ad-hoc basis because of limited resources. The records in the database extend back to the 1950s, but are mostly from 1998 to the present. The data are validated using a variety of methods (photographs, video, directed questions). As of July 20, 2005, a total of 643 sawfish encounters have been validated since 1998, most from recreational fishers (Simpfendorfer, pers. comm.).

Based on verified encounter records, the current range of the species is Atlantic and GOM waters from offshore Georgia to Pensacola, Florida. The capture of a smalltooth sawfish off Georgia in 2002 is the first record north of Florida since 1963. The majority of smalltooth sawfish encounters are in state waters from the southwest coast of Florida between the Caloosahatchee River and Florida Bay. Outside of this core area, the smalltooth sawfish appears more common on the west coast of Florida and in the Florida Keys than on the east coast, and occurrences decrease the greater the distance from the core area (Simpfendorfer and Wiley 2004).

There are no data available to estimate the present population size. Although smalltooth sawfish encounter databases may provide a useful future means of measuring changes in the population and its distribution over time, conclusions about the abundance of smalltooth sawfish now cannot be made because outreach efforts and observation efforts are not expanded evenly across each study period. Dr. Simpfendorfer reluctantly gives an estimate of 2,000 individuals based on his four years of field experience and data collected from the public, but cautions that actual numbers may be plus or minus at least 50 percent.

Recent encounters with neonates (young of the year), juveniles, and sexually mature sawfish indicate that the population is reproducing (Seitz and Poulakis 2002, Simpfendorfer 2003). The abundance of juveniles encountered, including very small individuals, suggests that the

population remains reproductively active and viable (Simpfendorfer and Wiley 2004). Also, the declining numbers of individuals with increasing size is consistent with the historic size composition data (G. Burgess, pers. comm. in Simpfendorfer and Wiley 2004). This information and recent encounters in waters beyond the core abundance area suggest that the population may be increasing. However, smalltooth sawfish encounters are still absent or rare along much of their historical range and from areas of historical abundance such as the Indian River Lagoon and the lower reaches of the St. Johns River on Florida's east coast (Simpfendorfer and Wiley 2004). With recovery of the species expected to be slow on the basis of the species' life history and other threats to the species remaining (see below), the population's future remains tenuous.

Threats

Smalltooth sawfish are threatened today by the loss of southeastern coastal habitat through such activities as agricultural and urban development, commercial activities, dredge and fill operations, boating, erosion, and diversions of freshwater run-off. Dredging, canal development, seawall construction, and mangrove clearing have degraded a significant proportion of the coastline. Smalltooth sawfish may be especially vulnerable to coastal habitat degradation due to their affinity for shallow, estuarine systems (NMFS 2000).

Fishing gear still poses a threat to smalltooth sawfish. Their long toothed rostrum makes it difficult to avoid entanglement in any type of netting. Smalltooth sawfish also bite baited hooks. Although changes over the past decade to U.S. fishing regulations such as Florida's net ban have started to reduce threats to the species over parts of its range, smalltooth sawfish are still occasionally incidentally caught in otter trawls, gillnets, and hook-and-line gear (e.g., bottom longlines, rod and reel).

The current and future abundance of the smalltooth sawfish is limited by its life history characteristics (NMFS 2000). Slow growing, late maturing, and long-lived, these combined characteristics result in a very low intrinsic rate of population increase and are associated with the life history strategy known as "k-selection." K-selected animals are usually successful at maintaining relatively small, persistent population sizes in relatively constant environments. Consequently, they are not able to respond effectively (rapidly) to additional and new sources of mortality resulting from changes in their environment (Musick 1999). Simpfendorfer (2000) demonstrates that the life history of this species makes it impossible to sustain any significant level of fishing and makes it slow to recover from any population decline. Thus, the species is susceptible to population decline, even with relatively small increases in mortality.

4.0 Environmental Baseline

The environmental baseline is a snapshot of the factors affecting the species in the action area. By regulation, environmental baselines for opinions include the past and present impacts of all state, federal, or private actions and other human activities in the action area, the anticipated impacts of all proposed federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of state or private actions which are contemporaneous with the consultation in process (50 CFR 402.02). Therefore, this section identifies and discusses the effects of past and ongoing human and natural factors within the action area leading to the current status of the smalltooth sawfish and its habitats.

4.1 Status of the Species Within the Action Area

Smalltooth sawfish are relatively rare in the action area. Based on our knowledge of smalltooth sawfish distribution and abundance, mature smalltooth sawfish may be present in the portion of the action area off Florida throughout the year intermittently, spending the rest of their time within the neighboring, shallower, state waters. Smalltooth sawfish are likely to be most abundant in the southeast portion of the action area adjacent to the species' core range. The status information in Section 3 provides a good representation of the status of the species within the action area.

4.2 Factors Affecting Smalltooth Sawfish Within the Action Area

Individuals found in the action area can potentially be affected by activities both within the action area and adjacent nearshore waters. Summaries of these activities are provided.

4.2.1 Federal Actions

Fisheries
Federal fisheries in the action area adversely affect smalltooth sawfish via hooking and entanglement in associated gear. Formal section 7 consultations have been conducted on Atlantic shark fisheries and the GOM reef fish fishery. A summary of each consultation is provided below; more detailed information can be found in the respective opinions (NMFS 2003, NMFS 2004).

On October 29, 2003, NMFS completed a section 7 consultation on the continued operation of Atlantic shark fisheries under the FMP for Atlantic Tunas, Swordfish, and Sharks (HMS FMP) and the July 2003 Proposed Rule for Draft Amendment 1 to the HMS FMP (NMFS 2003). Atlantic shark fisheries managed under the HMS FMP throughout the U.S. EEZ in the Atlantic Ocean, the Gulf of Mexico, and the Caribbean Sea include commercial shark bottom longline and drift gillnet fisheries, as well as recreational shark fisheries. The commercial shark bottom longline and drift gillnet fisheries were both found likely to adversely affect smalltooth sawfish. The consultation concluded the proposed action was not likely to jeopardize the continued existence of the smalltooth sawfish. An ITS was provided authorizing non-lethal takes.

On February 15, 2005, NMFS completed a section 7 consultation on the continued authorization of reef fish fishing under the GOM Reef Fish FMP and Proposed Amendment 23. The GOM reef fish fishery uses three basic types of gear: spear and powerhead, trap, and hook-and-line gear. Hook-and-line gear used in the fishery includes both commercial bottom longline and commercial and recreational vertical line (handline, bandit gear, rod and reel). The hook-and-line components of the fishery were all found likely to adversely affect smalltooth sawfish. The consultation concluded the proposed action was not likely to jeopardize the continued existence of the smalltooth sawfish. An ITS was provided authorizing non-lethal takes in the commercial and recreational hook-and-line components of the fishery.
Smalltooth sawfish may infrequently be taken in other GOM federal fisheries using gillnets and hook-and-line. However, data substantiating such takings is lacking. NMFS is collecting data to analyze the impacts of these fisheries and will complete section 7 consultations as appropriate.

ESA Permits

Regulations developed under the ESA allow for the taking of ESA-listed species for scientific research purposes. Prior to issuance of these authorizations for taking, the proposal must be reviewed for compliance with section 7 of the ESA. There is currently one active research permit issued for the smalltooth sawfish. The permit allows researchers to capture, handle, collect tissue samples, and tag up to 60 smalltooth sawfish per year in Florida waters (both South Atlantic and GOM). Although the research may result in disturbance and injury of smalltooth sawfish, the activities are not expected to affect the reproduction of the individuals that are caught, nor result in mortality.

4.2.2 State or Private Actions

A significant proportion of the Florida coast has been degraded by inland hydrological projects, urbanization, agricultural activities, and other anthropogenic activities such as dredging, canal development, seawall construction, and mangrove clearing. These activities have led to the loss and degradation of smalltooth sawfish habitat and may adversely affect their recovery.

Florida State fisheries conducted in waters off the west coast of Florida are known to occasionally take smalltooth sawfish. Fishers who capture smalltooth sawfish most commonly are recreationally fishing for snook (*Centropomus undecimalis*), redfish (*Scianops ocellatus*), and sharks (Simpfendorfer and Wiley 2004). Available data indicate that these takes are non-lethal. NMFS is encouraging the Florida Fish and Wildlife Commission (FWC) to apply for an ESA section 10 incidental take permit for its fisheries.

4.2.3 Conservation and Recovery Actions

Regulations restricting the use of gear known to incidentally catch smalltooth sawfish may benefit the species by reducing their incidental capture and/or mortality in these gear types. In 1994, entangling nets (including gillnets, trammel nets, and purse seines) greater than 500 square feet were banned in Florida State waters. Although intended to restore the populations of inshore gamefish, this action removed possibly the greatest source of fishing mortality on smalltooth sawfish (Simpfendorfer 2002). Other state regulations potentially beneficial to smalltooth sawfish include Florida's ban of the use of large trawls (i.e., with more than 500 square feet of mesh area) within 3 miles of the GOM coast and Florida's prohibition of longline gear with more than 10 hooks in state waters unless in transit. Regulations implemented under the Atlantic HMS FMP limiting the use of gillnets in federal waters may also aid recovery of this species.

Research, monitoring, and outreach efforts on smalltooth sawfish are providing valuable information on which to base effective conservation management measures. Research on smalltooth sawfish is currently being conducted by MML's Center for Shark Research and the FWC's Fish and Wildlife Research Institute with NMFS' Office of Protected Resources and NMFS' ESA Section 6 Program funding support. Surveys are being conducted using longlines, setlines, gillnets, and seine nets in southwest and south Florida, where sawfish are known to occur. Cooperating fishermen, guides, and researchers are also reporting smalltooth sawfish they encounter. Data collected are providing new insight on the species' current distribution and abundance, habitat use patterns, and the impact of its population decline.

Public outreach efforts are also helping to educate the public on smalltooth sawfish status and proper handling techniques and helping to minimize interaction, injury, and mortality of encountered smalltooth sawfish. Information regarding the status of smalltooth sawfish and what the public can do to help the species is available on the website of NMFS,[2] Mote Marine Laboratory,[3] and the Ocean Conservancy.[4] Reliable information is also available at websites maintained by noted sawfish expert Matthew McDavitt[5] and the Smalltooth Sawfish Recovery Team (see next paragraph).[6] These organizations and individuals also educate the public about sawfish status and conservation through regular presentation and various meeting in events.

In September 2003, NMFS convened a smalltooth sawfish recovery team. Under section 4(f)(1) of the ESA, NMFS is required to develop and implement recovery plans for the conservation and survival of endangered and threatened species. Such plans are to include: (1) A description of site-specific management actions necessary to conserve the species or populations; (2) objective, measurable criteria which, when met, will allow the species or populations to be removed from the endangered and threatened species list; and (3) estimates of the time and funding required to achieve the plan's goals and intermediate steps. The team has met every few months since its first meeting in November 2003, and has made significant progress developing a draft recovery plan. The team anticipates having the draft plan available for public comment and for peer review early in 2006.

5.0 Effects of the Action

In this section of the opinion, we assess the direct and indirect effects of the GOM federal shrimp fishery on the smalltooth sawfish. The analysis in this section forms the foundation for our jeopardy analysis in Section 7.0. A jeopardy determination is reached if we would reasonably expect the proposed action to cause reductions in numbers, reproduction, or distribution that would appreciably reduce the likelihood of the U.S. DPS of smalltooth sawfish surviving and recovering in the wild.

Direct effects of the GOM federal shrimp fishery on the smalltooth sawfish are expected to result from physical interactions with fishing gear. The otter trawl is the only gear type used to harvest shrimp species in federal waters. Otter trawls are classified as active fishing gear because animals do not voluntarily enter the gear; they are either swept up from the seabed or netted from the water by the gear (NRC 2002). In this manner, smalltooth sawfish that are foraging within or moving through an active trawling location may be captured via entanglement in the trawl's netting and subsequently injured or killed.

There are no significant indirect effects (i.e., effects caused by the proposed action that are later in time, but reasonably certain to occur) of the GOM federal shrimp fishery on smalltooth sawfish. Indirect effects generally include aspects such as habitat degradation, reduction of prey/foraging base, etc. The manner in which trawl gear temporarily degrades habitat by

[2] http://www.nmfs.noaa.gov/pr/species/fish/Smalltooth_sawfish.html
[3] http://www.mote.org/~colins?Sawfish/Index.phtml
[4] http://www.oceanconservancy.org/site/PageServer?pagename=fw_sawfish
[5] http://hometown.aol.com/nokogiri/
[6] http://www.flmnh.ufl.edu/fish/Sharks/Sawfish/SRT/srt.htm

disturbing seabed animals and sediments is not likely to affect the smalltooth sawfish. Although smalltooth sawfish do prey on benthic crustaceans, their primary food source is fish. Prey species for smalltooth sawfish appear to be abundant and widely distributed in shallow coastal waters throughout the species' current range (Simpfendorfer 2001). For this reason, we also do not expect the disturbances to seabed animals or the harvesting of shrimp in the action area to result in a reduction of the smalltooth sawfish prey/foraging base.

Based on our understanding of the effects of the proposed action, our analysis will be based solely on direct effects. Our analysis assumes that smalltooth sawfish are not likely to be adversely affected by the GOM federal shrimp fishery unless they interact with the fishing gear. In the following subsections, we analyze the factors contributing to the likelihood and potential frequency of exposure of smalltooth sawfish-trawl interactions, review documented interactions to date, and then estimate the amount and extent of anticipated interactions.

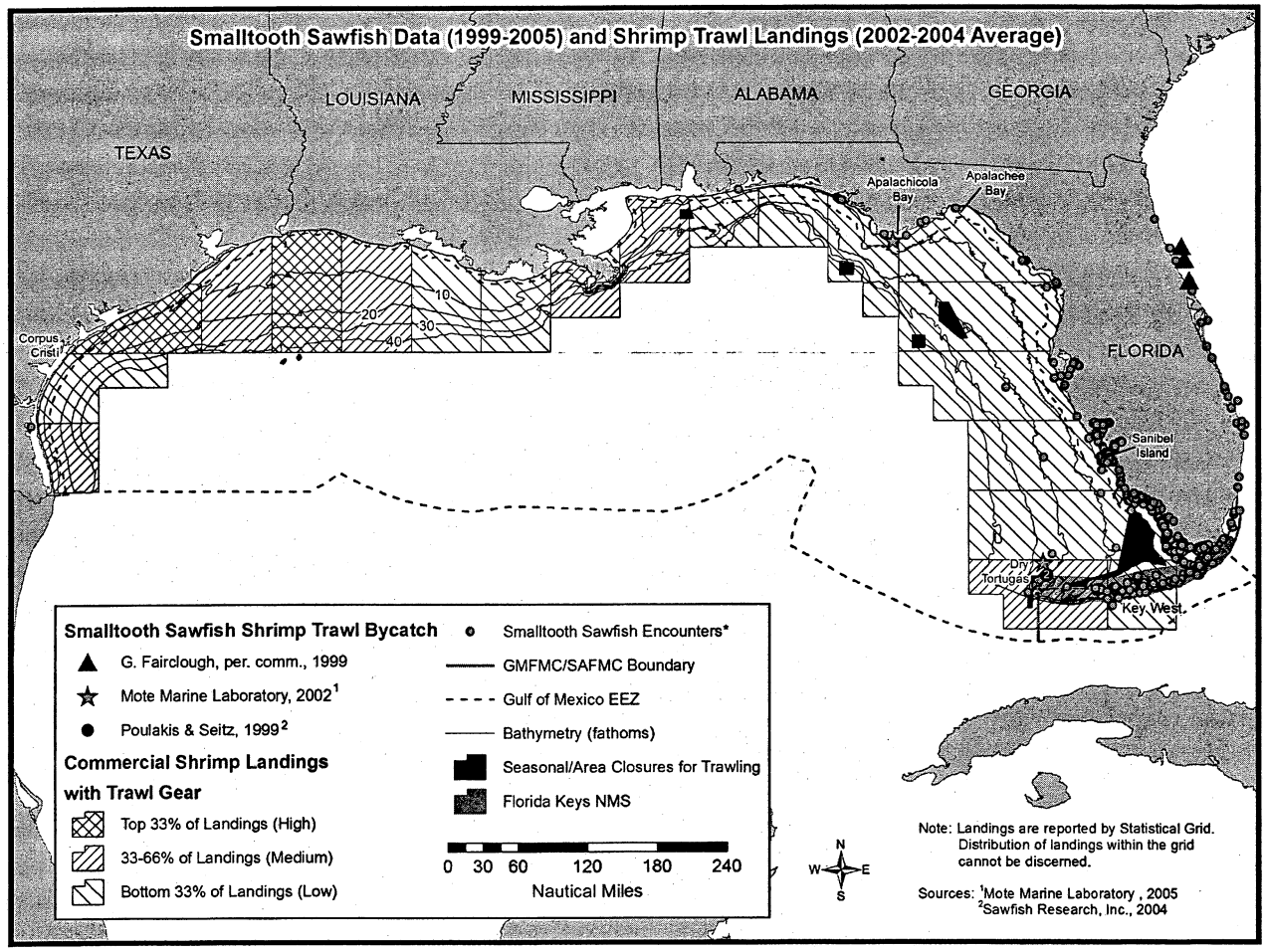
5.1 Analysis of the Factors Contributing to the Likelihood of Exposure to Direct Effects

Smalltooth sawfish-trawl interactions are likely to occur in areas where smalltooth sawfish distribution overlaps with fishing grounds because of both the species' behavior and morphology. Smalltooth sawfish are a demersal species, thus could occur within the direct path of trawl if in the same geographic area. The species' morphology causes it to be particularly vulnerable to entanglement in any type of netting gear, including the relatively small-mesh webbing used in shrimp trawls. The long toothed rostrum of the smalltooth sawfish penetrates easily through nets, causing the animal to become entangled when it attempts to escape.

Recent GOM smalltooth sawfish encounter data (i.e., verified sightings and captures) and reported relative[7] landings of shrimp (all species combined) by statistical area are depicted in Figure 2.1 (p. 15). By evaluating the spatial overlap between areas where shrimp trawl effort occurs and where smalltooth sawfish occur, as well as the relative trawl effort and smalltooth sawfish abundance within those overlapping areas, we can qualitatively hypothesize where and how frequently smalltooth sawfish-trawl interactions may occur. For this purpose, the landings data were used as a proxy for relative trawl effort within each statistical area and reported encounters were used as a proxy for relative species abundance. The landings data are reported by statistical area so they cannot be used to make inferences about the distribution of effort within each statistical area. However, bathymetry lines are provided to infer where actual fishing may occur within each statistical area based on our knowledge of the location and depths at which shrimp species are targeted.

Figure 5.1. Smalltooth Sawfish Encounter Data and Shrimp landings Data Within the Action Area

[7] Low= 107,157-6,464,781 lbs (tails) ; Medium= 6,464,782-12,822,405 lbs; High= 12,822,406-19,180,029 lbs.



Smalltooth sawfish occur in the action area only off Florida. MML encounter database records identified smalltooth sawfish encounters within the state of Florida from the central Florida Panhandle on the Gulf of Mexico coast to St. Augustine on the east coast, with most occurring in the region from Charlotte Harbor to Florida Bay. Simpfendorfer and Wiley (2004) state that the core range for the species is now from the area around the mouth of the Caloosahatchee River, south through Ten Thousand Islands, along the Everglades coast, and into Florida Bay. Simpfendorfer and Wiley (2004) also state that outside of the core range the smalltooth sawfish appears more common on the west coast of Florida and the Florida Keys.

Shrimp trawl effort and fishing grounds for shrimp differ depending on the target shrimp species. The brown shrimp fishery, which is the most important species in the U.S. GOM shrimp fishery, extends offshore of Texas, Louisiana, and Mississippi to about 40 (71 m) fathoms. Annual commercial landings in recent years range from approximately 61 to 103 million pounds of tails depending on environmental factors that influence natural mortality. White shrimp, second in value, are found in nearshore waters to about 20 (36.5 m) fathoms from Texas through Alabama. There is a small spring and summer fishery for overwintering individuals, but the majority are taken from August through December. Recent annual commercial landings range from

approximately 36 to 71 million pounds of tails. Pink shrimp are found off all GOM bordering states, but are most abundant off Florida's west coast and particularly in the Tortugas grounds off the Florida Keys. Most landings are made from October through May with annual commercial landings ranging from approximately 6 to 19 million pounds of tails. In the northern and western GOM states, pink shrimp are landed mixed with brown shrimp and are usually counted as browns. Most catches are made within 30 (55 m) fathoms. Royal red shrimp are most abundant on the continental shelf from about 140 to 275 fathoms (256-503 m) east of the Mississippi River. Landings have varied from approximately 200,000 to 336,000 pounds in 1994.

The likelihood of smalltooth sawfish being exposed to and interacting with shrimp trawls in the action area also varies depending on the target shrimp species because of the differences in where each species is fished for and the amount of directed effort. Otter trawls targeting pink shrimp are most likely to encounter smalltooth sawfish. Even though pink shrimp fishing effort is considerably less than for other shrimp species, they are targeted in waters offshore of the core range of smalltooth sawfish, where smalltooth sawfish are more abundant. Smalltooth sawfish are less likely to be encountered when brown shrimp or white shrimp are the target species. These species are targeted mainly outside of the current known range of the smalltooth sawfish. Still, takes in the EEZ offshore of the Florida Panhandle are feasible. Otter trawls targeting royal red shrimp are least likely to encounter the smalltooth sawfish because they are targeted in waters at least 140 fathoms deep, well beyond the greatest depth recorded for smalltooth sawfish. Effort targeting royal red shrimp is also minimal compared to the penaeid species.

5.2. Documented Interactions Between Trawls and Smalltooth Sawfish

Smalltooth sawfish were historically caught as bycatch in otter trawls (NMFS 2000). Early literature accounts document smalltooth sawfish as being frequently caught by shrimp trawls. For example, Bigelow and Schroeder (1953; p. 30) noted smalltooth sawfish were of "considerable concern to fishermen as nuisances because of the damage they do to drift- and turtle-nets, to seines, and to shrimp trawls in which they often become entangled; and because of the difficulty of disentangling them without being injured by their saws." Entangled smalltooth sawfish frequently had to be cut free, causing extensive damage to trawl nets and presenting a substantial hazard if brought on board. Most smalltooth sawfish caught by fishermen were either killed outright or released only after removal of their saw.

Reports of recent interactions between smalltooth sawfish and otter trawls indicate interactions today are relatively rare. Since NMFS was petitioned to list the smalltooth sawfish in 1999, increased effort has been placed on collecting smalltooth sawfish data (e.g., Simpfendorfer and Wiley 2004, Poulakis and Seitz 2004). Only nine smalltooth sawfish interactions with shrimp trawls have been documented: six off the west coast of Florida in the GOM (three in state waters, three in the EEZ) and three off the east coast of Florida (all in the EEZ) (Fairclough, pers. comm. 1999; MML Sawfish Encounter Database 2004; Seitz and Poulakis Database 2004; and NMFS Shrimp Trawl Observer Database 2004). The approximate locations of these events are shown on Figure 5.1 (p. 15).

Available smalltooth sawfish data on the fate of recent trawl interaction mortality is scarce, but suggests smalltooth sawfish did not survive the interaction. The release conditions of smalltooth

sawfish recently reported as incidentally caught in shrimp trawls are known for only two interactions. In both cases, the smalltooth sawfish was caught in the netting prior to reaching the cod end and was left hanging there. Although the physical act of being captured by entanglement may not be lethal, the fact that the net is out of the water for periods of time with the smalltooth sawfish still hanging from it is likely to quickly result in mortality (Simpfendorfer, pers. comm. 2005).

5.3 Anticipated Take

Our analysis in Section 5.2 provides useful information in understanding the potential for interactions in the action area. At the present time, the only quantitative data on which to base the number of anticipated takes are the recently documented interactions discussed in Section 5.2. The three documented takes in the action area over the past six years average only 0.5 smalltooth sawfish annually. Rounding this number to the nearest whole number, we estimate up to one smalltooth sawfish may be taken annually. Based on the available smalltooth sawfish data on the fate of recent smalltooth sawfish-trawl interactions, we anticipate any annual take will be lethal.

6.0 Cumulative Effects

Cumulative effects include the effects of future state, tribal, local, or private actions reasonably certain to occur within the action area or within the range of smalltooth sawfish (i.e., GOM EEZ). Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

Throughout the southeastern coastal states urbanization has resulted in substantial loss of coastal habitat through activities such as agricultural and urban development (wetland conversion, flood control and diversion projects, dredge and fill operations). Smalltooth sawfish are particularly vulnerable to coastal habitat degradation because of their affinity for shallow, estuarine systems. Marine pollutants and debris may also negatively impact smalltooth sawfish.

Within the action area, state-regulated commercial and recreational fishing activities in the GOM currently result in the incidental take of smalltooth sawfish. It is expected that states will continue to license/permit large vessel and pleasure-boat operations that do not fall under the purview of a federal agency, and issue regulations that will affect fishery activities. Recreational hook-and-line fisheries have been known to take smalltooth sawfish in state waters. Future cooperation between NMFS and the states on these issues should help decrease the take of smalltooth sawfish caused by recreational activities. NMFS will also continue to work with coastal states to develop and refine ESA section 6 agreements and section 10 permits to enhance programs to quantify and mitigate these takes.

Beyond fisheries, NMFS is not aware of any proposed or anticipated changes in other human-related actions (e.g., habitat degradation) or natural conditions (e.g., changes in oceanic conditions, etc.) that would substantially change the impacts that each threat has on smalltooth sawfish covered by this opinion. Therefore, NMFS expects the effects of these actions on smalltooth sawfish will continue at similar levels into the foreseeable future.

7.0 Jeopardy Analysis: Effect of the Proposed Action on Likelihood of Survival and Recovery

The analyses conducted in the previous sections of this opinion serve to provide a basis to determine whether the proposed action would be likely to jeopardize the continued existence of smalltooth sawfish. In Section 5.0, we outlined how interaction with the GOM federal shrimp fishery may affect individual smalltooth sawfish and the extent of those effects in terms of an estimate of annual take. We now assess the smalltooth sawfish's response to this impact, in terms of overall population effects from the estimated take, and whether those effects of the proposed action, when evaluated in the context of the status of the species (Section 3.0), the environmental baseline (Section 4.0), and the cumulative effects (Section 6.0), will jeopardize the continued existence of smalltooth sawfish.

"To jeopardize the continued existence of" means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and the recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species (50 CFR 402.02). Thus, in our jeopardy determination we first look at whether there will be a reduction in the reproduction, numbers, or distribution. Then, if there is a reduction in one or more of these elements, we evaluate whether it will cause an appreciable reduction in the likelihood of both the survival and the recovery of the species.

The proposed action is expected to result in the lethal take of one mature smalltooth sawfish annually. This lethal take would result in a reduction in the number of smalltooth sawfish. This lethal take could also result in a potential reduction in future reproduction if that individual was a female and would have survived other threats and reproduced in the future. Reduction in the distribution of the smalltooth sawfish would not occur, as one take would have no bearing on the overall position, arrangement, or frequency of the U.S. DPS' range.

Whether the reduction in numbers and reproduction of smalltooth sawfish attributed to the GOM federal shrimp fishery would appreciably reduce the species' likelihood of survival and recovery depends on the probable effect the changes in numbers and reproduction would have on the population's growth rate, and whether the growth rate would allow the species to recover. Available data summarized in Section 3 indicate the smalltooth sawfish population is increasing. Using a demographic approach and life history data from similar species, Simpfendorfer (2000) estimates the most likely range for the intrinsic rate of increase is 0.08 per year to 0.13 per year with population doubling times of 10.3 to 13.5 years. Although this rate is very slow, the lethal take of one mature male or female (worst-case scenario) individual is not expected to have any impact on this rate. The proportional change in overall survival and recovery of smalltooth sawfish from the lethal take of one smalltooth sawfish would be insignificant. Based on this information, we believe the proposed action will not appreciably reduce the smalltooth sawfish's likelihood of surviving and recovering in the wild. Therefore, we conclude the proposed action is not likely to jeopardize the continued existence of this species.

8.0 Conclusion

Based on our review of the best available scientific and commercial data, current status of the species, environmental baseline, effects of the proposed action, and cumulative effects, it is our opinion that the continued authorization of the GOM federal shrimp fishery under the GOM Shrimp FMP is not likely to jeopardize the continued existence of smalltooth sawfish.

9.0 Incidental Take Statement (ITS)

Section 9 of the ESA and protective regulations issued pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without a special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the ESA provided that such taking is in compliance with the terms and conditions of the opinion on that agency action.

This opinion establishes an ITS with RPMs and terms and conditions for smalltooth sawfish in the GOM federal shrimp fishery. The ITS, RPMs, and terms and conditions regarding take of sea turtles in the 2002 opinion remain applicable, required, and in force for the fishery.

9.1 Anticipated Amount or Extent of Incidental Take

NMFS anticipates the annual incidental lethal take of up to one smalltooth sawfish may occur as a result of the continued operation of the GOM shrimp fishery.

9.2 Effect of the Take

NMFS has determined one lethal take annually as specified in Section 9.1 is not likely to jeopardize the smalltooth sawfish.

9.3 Reasonable and Prudent Measures (RPMs)

Section 7(b)(4) of the ESA requires that when an agency action is found to comply with section 7(a)(2) of the ESA and the proposed action may incidentally take individuals of listed species, NMFS will issue a statement specifying the impact of any incidental taking. It also states that RPMs necessary and appropriate to minimize impacts, and terms and conditions to implement those measures must be provided and must be followed to minimize those impacts. Only incidental taking by the federal agency or applicant that complies with the specified terms and conditions is authorized.

The RPMs and terms and conditions are specified as required by 50 CFR 402.14 (i)(1)(ii) and (iv) to document the incidental take by the proposed action and to minimize the impact of that take on smalltooth sawfish. These measures and terms and conditions are non-discretionary, and must be implemented by NMFS in order for the protection of section 7(o)(2) to apply. NMFS

has a continuing duty to regulate the activity covered by this incidental take statement. If NMFS fails to adhere to the terms and conditions of the incidental take statement through enforceable terms, and/or fails to retain oversight to ensure compliance with these terms and conditions, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of the incidental take, F/SER2 must report the progress of the action and its impact on the species to F/SER3 as specified in the incidental take statement [50 CFR 402.14(i)(3)].

NMFS has determined that the following RPMs are necessary and appropriate to minimize impacts of the incidental take of smalltooth sawfish during shrimp trawling.

1. NMFS must ensure that fishermen are aware of the endangered status of the smalltooth sawfish and that the anticipated smalltooth sawfish take is handled in such a way as to minimize stress to the animal and increase its potential for survival.

2. NMFS must ensure that monitoring and reporting of any smalltooth sawfish encountered (1) detects any adverse effects resulting from the GOM federal shrimp fishery; (2) assesses the actual level of incidental take in comparison with the anticipated incidental take documented in that opinion; (3) detects when the level of anticipated take is exceeded; and (4) collects improved data from future encounters.

9.4 Terms and Conditions

In order to be exempt from liability for take prohibited by section 9 of the ESA, NMFS must comply with the following terms and conditions, which implement the RPMs described above. These terms and conditions are non-discretionary.

The following term and condition implements RPM No. 1.

SERO must develop outreach materials (e.g., fact sheets) that provide information on the status of the smalltooth sawfish and handling guidelines; these materials must be mailed to existing permit holders and with any permit issued for the first time.

The following terms and conditions implement RPM No. 2.

1. At least some of the shrimp observer trips must be from areas typically fished off the west coast of Florida, where smalltooth sawfish interactions are most likely to occur.

2. If feasible, observers should provide a total length measurement of the fish and the location where it was captured.

3. F/SER2 must collaborate with the SEFSC to ensure the following information is collected and reported to F/SER3 annually, based on available information:
    a. For each observed sawfish take, a total length measurement or estimate, time and location (i.e., lat./long. and approximate water depth) of capture, circumstances of capture (e.g., position of sawfish in the trawl net), and status (i.e., dead, alive, injured) upon return to the water should be reported.

b. Total observed fishing effort by statistical zone.
c. Observer coverage levels obtained in the commercial GOM federal shrimp fishery.

4. F/SER2, in collaboration with F/SER3 and the GMFMC, must develop and implement a method to collect smalltooth sawfish take information from all permitted shrimp vessels operating within the range of smalltooth sawfish (e.g., annual fishing questionnaire, logbook, regulation).

10.0 Conservation Recommendations

Section 7(a)(1) of the ESA directs federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. The following additional measures are recommended:

1. NMFS should conduct or fund research on the demographic, behavioral, spatial, and temporal patterns of smalltooth sawfish in GOM waters to improve understanding of the co-occurrence between the GOM federal shrimp fishery and the smalltooth sawfish.

2. NMFS should conduct or fund surveys or other alternative methods for determining smalltooth sawfish abundance in shrimp trawling areas off Florida, adjacent to areas where smalltooth sawfish are believed to occur in the greatest concentration.

3. NMFS should work to further its cooperation with the GOM shrimp industry to better understand the nature of smalltooth sawfish interactions.

4. NMFS should evaluate data gathered on sawfish bycatch in Australia's northern prawn fishery for its applicability to the U.S. shrimp fishery.

11.0 Reinitiation of Consultation

This concludes formal consultation on the effects of the GOM federal shrimp fishery on smalltooth sawfish. As provided in 50 CFR 402.16, reinitiation of formal consultation is required if discretionary federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) The amount or extent of the taking specified in the incidental take statement is exceeded; (2) new information reveals effects of the action that may affect listed species or critical habitat (when designated) in a manner or to an extent not previously considered; (3) the identified action is subsequently modified in a manner that causes an effect to listed species or critical habitat that was not considered in the biological opinion; or (4) a new species is listed or critical habitat designated that may be affected by the identified action. In instances where the amount or extent of incidental take is exceeded, F/SER2 must immediately request reinitiation of formal consultation.

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