An Overview of Shark Management in Florida

A Staff Report

to the

Florida Fish and Wildlife Conservation Commission

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ABBREVIATIONS AND SYMBOLS

ASMFC	Atlantic States Marine Fisheries Commission
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
EEZ	Exclusive Economic Zone
EFH	Essential Fish Habitat
ESA	Endangered Species Act
FAO	Food and Agriculture Organization
FL	Fork Length
ft	Feet
FMP	Fishery Management Plan
FWC	Florida Fish and Wildlife Conservation Commission
HMS	Highly Migratory Species
ICCAT	International Commission for the Conservation of Atlantic Tunas
ISFMP	Interstate Fishery Management Plan
MAFMC	Mid-Atlantic Fishery Management Council
MFC	Marine Fisheries Commission
MRIP	Marine Recreational Information Program
MSA	Magnuson-Stevens Fishery Conservation and Management Act
NEFMC	New England Fishery Management Council
nm	Nautical Miles
NMFS	National Marine Fisheries Service
PSE	Percent Standard Error
SBSF	Shore-based Shark Fishing
SEDAR	SouthEast Data, Assessment, and Review
YOY	Young-of-the-year

INTRODUCTION AND PURPOSE

This report provides an overview and history of shark management in Florida, current stock status (where known), and biological/ecological information relevant to management of sharks within the eastern U.S. This document does not include information on rays and sawfishes, which are also part of FWC's Sharks and Rays Rule Chapter (68B-44, Florida Administrative Code).

There are a number of high-profile, shark-related topics relevant to Florida and throughout the eastern U.S. that are beyond the scope of this report. While this report does not examine these issues, there are many stakeholders with divergent viewpoints that advocate for diverse shark conservation and management actions and philosophies.

BACKGROUND

Many shark species are apex predators, and therefore have few natural predators. Because of their position in the food web, sharks have evolved a life history strategy that is dependent on the absence of predators. Compared to most bony fish species, sharks have a lower metabolism, grow more slowly, generally reach larger sizes, and are longer-lived (Musick, 2004). Consequently, sharks attain sexual maturity at late ages and have low fecundity compared with bony fishes (Helfman et al., 2009). All sharks reproduce internally and employ a range of reproductive strategies including egg laying (oviparity) to live birth (viviparity). Most species have extreme maternal nourishment, and thus have low numbers of offspring and long reproductive cycles. In species that give live birth, gestation periods can last from 9-24 months, with some species requiring a one to two-year resting period before they can reproduce again (Castro 2009; Conrath and Musick, 2013). Due to these strategies, lifetime reproductive capacity is extremely low for sharks. These life history traits result in slow rates of population growth and a limited ability to withstand high fishing pressure (Dulvy et al., 2014).

Shark exploitation along the eastern U.S. began in the mid-1970s when sharks were deemed an underutilized resource and commercial harvesters were encouraged to target sharks due to the decline of other commercially important fisheries (Musick et al., 1993; McCandless et al., 2014). Commercial shark landings steadily increased from the mid-1970s through the 1980s and peaked in 1989 as the demand for shark products (e.g., meat, fins, and cartilage) increased (ASMFC, 2008). Around the same time, a directed recreational shark fishery rapidly developed and shark fishing tournaments became increasingly popular, shortly after the movie "Jaws" was released in 1975 (Musick, 1993; Cortes et al., 2006). The increase in commercial and recreational landings coupled with extremely low population growth rates (Au et al., 2015) ultimately led to the significant decline of shark populations by the 1990s. While the magnitude of the decline has been debated, many species were negatively impacted. Large-bodied, coastal shark species were most affected by this expansion of commercial and recreational shark fisheries due to their large amount of meat, large fin sizes, and close proximity to land (Dulvy et al., 2014). In contrast, small coastal sharks experienced less dramatic declines (SEDAR 13, 2007), likely because they have higher population growth rates, making these species less susceptible to fishing pressure (Au et al., 2015).

Due to the overexploitation of many large coastal shark stocks, the National Marine Fisheries Service (NMFS) and Florida began implementing regulations for sharks in the early 1990s. In 1992, the Marine Fisheries Commission (MFC), one of FWC's predecessor agencies,

adopted the first shark regulations for Florida state waters while the first NMFS shark fishery management plan (FMP) was being finalized. In 1993, NMFS implemented the shark FMP that initiated promulgation of several commercial and recreational regulations in Atlantic federal waters. Since then, management actions at the state and federal level have contributed to preliminary recovery of some species (Peterson et al., 2017). However, many species remain data deficient, and therefore, knowledge of their stock status is relatively unknown.

The material provided in this document is intended to serve as a regulatory overview of Florida's shark fishery and provide process guidance as well as biological, ecological, and management considerations for species-specific regulations the Commission may want to consider.

MANAGEMENT BACKGROUND AND REGULATORY HISTORY

Shark Management Agencies

There are many layers to shark management, and sharks are managed by multiple agencies along the Atlantic and Gulf of Mexico. FWC manages sharks in Florida state waters (shore to 3 nm in the Atlantic and shore to 9 nm in the Gulf). However, along the Atlantic coast (from Maine through the east coast of Florida), state management of shark fisheries is coordinated by the Atlantic States Marine Fisheries Commission (ASMFC) through the Interstate Fishery Management Plan (ISFMP) for Atlantic Coastal Sharks. As a member state, Florida has agreed to a cooperative interjurisdictional management of sharks. The ISFMP was implemented in 2008. When modifications to the ISFMP are approved by ASMFC, the 15 member states are asked to adopt consistent or conservation equivalency regulations. Conservation equivalency measures allow states flexibility to develop alternative regulations that address specific state or regional differences while still achieving the goals and objectives of the ISFMP (ASMFC, 2016). If a member state does not implement management measures, ASMFC can request the U.S. Secretary of Commerce declare a moratorium on fishing for these species and prevent interstate commerce for that species in that state.

There have been several instances in FWC's shark regulatory history where FWC has implemented conservation equivalency measures rather than implementing regulations consistent with the ASMFC ISFMP for sharks. For example, in 2009, additional requirements were added to the ASMFC ISFMP, including establishing a 54-inch minimum size limit for blacktip sharks. FWC requested, and was approved for, conservation equivalency instead of implementing the 54-inch minimum size limit because FWC's commercial regulations were already more restrictive than those in the ASMFC Coastal Shark ISFMP.

NMFS Division of Highly Migratory Species (HMS) manages sharks in federal waters from the state waters boundary out to 200 nm offshore. HMS also participates in shark management at the international level through the International Commission for the Conservation of Atlantic Tunas (ICCAT), the Convention on International Trade in Endangered Species of Wildlife and Flora (CITES), and the United Nations Food and Agriculture Organization (FAO).

Essential Fish Habitat

Habitat conservation is a management objective in many fisheries. Sharks rely on specific habitat types and conditions at various stages throughout their life cycle. Therefore, habitats that support healthy fish and invertebrate populations are critical for effective management of recreationally and commercially valuable and ecologically important species. In 1996, an amendment was included in the Magnuson-Stevens Fishery Conservation and Management Act (MSA) concerning the identification, description, and conservation of essential fish habitat (EFH). EFH is defined by NMFS as "those waters and substrate necessary for spawning, breeding, feeding or growth to maturity." This definition encompasses the aquatic environment (including all physical, chemical, and biological properties), and its associated benthic habitat, such as sediment, seagrass, and shellfish beds. When this information is known, EFH is designated for federally managed species, including sharks.

HMS is responsible for developing and implementing FMPs for highly migratory species, including sharks, which contains the identification and designation of EFH. EFH is primarily identified through an analysis of information on known species associations with a habitat during specific life stages, reproductive traits (e.g., mating grounds, nursery locations, etc.), predator-prey relationships, and other research. EFH is identified for each life stage for each federally managed species. Many shark species have EFH in state waters of Florida, and EFH can cover large areas due to the migratory nature of some shark species (e.g., *see Figure 1 for great hammerhead shark EFH*). As a result, some FWC regulations address the importance of these habitats through species-specific prohibitions.

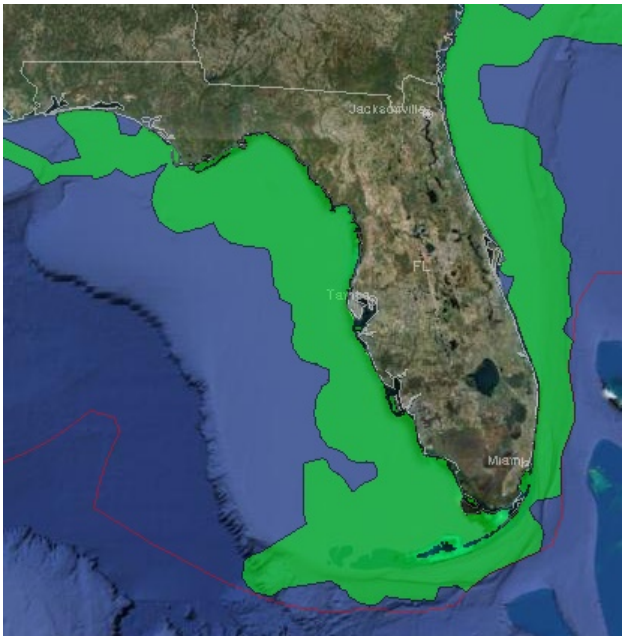


Figure 1. Great Hammerhead Shark Essential Fish Habitat. Image courtesy of the National Marine Fisheries Service.

Federal Shark Management Overview

HMS manages 42 shark species in federal waters in the Atlantic, Gulf of Mexico, and U.S. Caribbean. These 42 shark species are divided into five management groups: large coastal, small coastal, pelagic, smoothhound, and prohibited. Of the HMS managed-species, 23 are harvestable commercially, 21 are harvestable recreationally, and 19 species are prohibited from both commercial and recreational harvest in federal waters *(see Appendix 1 & 2 for list of species)*.

Spiny dogfish is harvestable in federal waters but is not managed by HMS; instead, it is jointly managed along the Atlantic coast by the Mid-Atlantic Fishery Management Council (MAFMC), the New England Fishery Management Council (NEFMC), and the ASMFC. With the addition of spiny dogfish, there are 24 species that are harvestable commercially and 22 recreationally from federal waters off Florida.

Commercial

Federal vessel permits are required for commercial shark harvest in federal waters. Permits include: Shark Directed, Shark Incidental, and Smoothhound Shark (allows harvest of smoothhound sharks only). Both the Shark Directed and Shark Incidental permits are limited-access, meaning there is a cap on how many permits are available, while the Smoothhound Shark permit is open-access. In addition to the three permits listed above, a limited Shark Research Fishery permit is available to Shark Directed permit holders, which allows selected commercial fishermen to harvest sandbar sharks. The Shark Research Fishery permit is highly regulated and provides important fisheries-dependent data to HMS for use in stock assessments. An Atlantic Shark Dealer permit is necessary to purchase sharks from licensed commercial fishermen.

The commercial shark fishery has a complex quota system to help maintain sustainable shark fisheries and conserve vulnerable and overfished species. The season length for each of the four-shark management groups varies based on available annual quota. Daily commercial trip limits vary by permit type, and HMS can adjust the trip limit throughout the fishing year based on available quota. All harvested sharks must have fins naturally attached when landed.

Recreational

Federal vessel permits are required for private and for-hire recreational shark fishermen in federal waters, and include the Atlantic HMS Angling and the Atlantic HMS Charter/Headboat permits. In addition to these permits, all recreational fishermen that fish in federal waters for sharks are required to obtain a shark endorsement, which requires completing an online shark identification and fishing regulation training course and quiz.

For the recreational shark fishery, federal bag limits vary by species, with a vessel limit of one shark per vessel for most species, and size limits apply for most sharks (*see Appendix 3 for more details on recreational shark regulations)*. All harvested sharks must have fins naturally attached when landed.

Stock Assessments

Shark populations are assessed at the national and international level. The Southeast Data and Assessment Review (SEDAR) conducts most stock assessments for domestically-managed fisheries, including sharks, in the Atlantic and Gulf of Mexico. However, external, third-party stock assessments, like those published in peer-reviewed journals, have been used in

HMS management. ICCAT conducts stock assessments at the international level for pelagic shark species like shortfin mako and porbeagle.

While some shark species have completed/accepted stock assessments, many species have not been assessed and their status is unknown. This is largely because many shark stocks are data-poor, meaning there is insufficient biological information, such as life history and population dynamics, and limited landings data available to conduct a stock assessment (*see Appendix 5 for details on stock status and assessment schedules*).

Federal Shark Fishery Management History

Management of sharks in federal waters has a complicated history with multiple management agencies (*see Table 1 for overview highlights*). The first federal management plan for sharks was the Preliminary Fishery Management Plan for Atlantic Billfish and Sharks in 1978 prepared by the U.S. Department of Commerce, but it primarily addressed the issue of foreign fisheries within the U.S. EEZ and noted the need for international shark management. During the 1980s, HMS (including sharks) were managed under the authority of the five Atlantic regional fishery management councils: New England, Mid-Atlantic, South Atlantic, Gulf of Mexico, and Caribbean. In 1990, the President of the United States signed the Fishery Conservation Amendments of 1990 into law, which amended the MSA. This law transferred management authority of HMS species from the regional fishery management councils to the U.S. Secretary of Commerce and NMFS. Subsequently, the HMS Management Division was created in 1992 and assumed responsibility for shark management.

The newly established HMS Management Division finalized the 1993 Atlantic Shark FMP. This FMP established a number of measures including commercial permit requirements, recreational bag limits, reporting and observer requirements, and a quota monitoring system. Over the years, several amendments have been made to the original FMP.

In 1999, HMS combined the FMPs for Atlantic swordfish, sharks, and tunas into a single FMP called the Final Fishery Management Plan for Atlantic Tuna, Swordfish, and Sharks. In this FMP, additional management measures were put in place for sharks, which included modifying commercial and recreational size limits, expanding the prohibited species list (to the current 19 species), and implementing limited-access commercial permits.

In 2006, the current HMS FMP was implemented, combining the management of all Atlantic HMS (Atlantic billfish, swordfish, sharks, and tunas) into the Final Consolidated Atlantic Highly Migratory Species FMP. Over the years, subsequent FMP amendments have been implemented to modify management of sharks.

Table 1. Federal Shark Management History Highlights.

Year	Rulemaking
1978	• First federal management plan for sharks implemented by the U.S. Department of Commerce
1980s	• Sharks were managed by the five Atlantic regional fishery management councils
1990	• Fishery Conservation Amendments of 1990 transferred management authority of sharks from regional councils to NMFS
1992	• NMFS's HMS Management Division created and tasked with management of highly migratory species, including sharks
1993	• 1993 Atlantic Shark FMP finalized • FMP established additional shark management measures (e.g., commercial permit requirements and recreational bag limits)
1999	• HMS combined FMPs for Atlantic swordfish, sharks, and tunas • Established additional shark management measures (e.g., modifying size limits and expanding prohibited species list)
2006	• Final Consolidated Atlantic HMS FMP implemented, combined management of all Atlantic HMS
2008-Present	• Subsequent amendments implemented to modify shark conservation and management measures

Florida State Waters Shark Management Overview

In Florida state waters, there are 15 commercially harvestable shark species and 16 recreationally harvestable shark species (*see Appendix 2 for list of harvestable species and FWC Harvestable Species section for more details*). The difference between the numbers is because shortfin mako was prohibited from commercial harvest in state waters as of January 2020 due to federal rule changes. In Florida state waters, there are 27 species prohibited from recreational harvest, and 28 species prohibited from commercial harvest (*see Appendix 1 for list of prohibited species and FWC Prohibited Species section for more details*).

Licenses and Permits

In state waters, commercial shark fishermen are required to have both a commercial federal vessel permit and the state's commercial fishing license (the Saltwater Products License). Additionally, commercial harvesters may only sell their shark harvest to wholesale dealers who have a valid federal Atlantic Shark Dealer permit.

To fish for or harvest sharks recreationally, anglers must have a Florida fishing license. Additionally, when targeting or harvesting sharks from shore or when fishing with techniques or gear that increases the likelihood of catching a shark from shore, a no-cost, annual shore-based shark fishing (SBSF) permit and FWC's Shark-Smart Shark Fishing educational course are required. (Note: this permit is not required for individuals under 16 years of age.)

Regulations

In general, FWC manages the commercial and recreational shark fisheries with similar regulations in state waters. For harvestable shark species, fishers are allowed one shark per person per day with a maximum of two sharks per vessel. Seven species are subject to a minimum size limit of 54-inches fork length (FL*; see Appendix 3 for outline of state and federal recreational regulations*) and shortfin mako are subject to a minimum size limit of 83-inches fork length. Sharks without a minimum size limit include several small coastal species that do not generally reach 54-inches FL (e.g., Atlantic sharpnose shark).

The only allowable gear is hook-and-line. Non-stainless-steel, non-offset circle hooks are required when using natural bait, and the use of natural bait is prohibited when using treble hooks. The possession/use of a device capable of quickly cutting the leader or hook is required when targeting sharks from shore or a vessel. Additionally, all harvested sharks must be landed with the head, tail, and fins naturally attached. Fishermen that catch a prohibited species must keep the shark in the water with the gills submerged and must release the shark without delay when fishing from shore. When fishing in state waters, federal recreational shark permit holders must follow the more restrictive of state or federal regulations.

MFC/FWC Shark Management History

In 1992, MFC started adopting regulations for sharks in Florida's state waters while the federal shark FMP was being finalized. Over the years, the MFC/FWC has implemented various conservation and management measures for sharks (*see Table 2 for overview highlights*). Often, but not always, the MFC/FWC would implement rulemaking consistent with the federal shark FMP and ASMFC ISFMP to assure compliance with and enforcement of federal regulations. Below is the MFC/FWC reasoning for a variety of management measures in state waters.

Bag/Possession Limits

In 1992, MFC established a daily bag limit of one shark per person and a maximum possession limit of two sharks per vessel for both commercial and recreational fishermen in state waters. The MFC chose this philosophy to help prevent overfishing, maintain species diversity in a mixed-species fishery, minimize discard mortality, and to provide additional protection for sharks in state waters, that serve as nursery grounds for several species of sharks.

Protected/Prohibited Species

MFC/FWC have added species to the prohibited species list for a number of reasons. Those reasons include to protect species that are rare and vulnerable to overfishing in state waters, to protect species that have EFH in Florida state waters, and to be consistent with federal regulations to allow for ease of enforcement and additional conservation. In 2006, the FWC renamed the "Protected Species List" of sharks as the "Prohibited Species List."

Size Limits

In 2008, ASMFC adopted an ISFMP for Atlantic Coastal Sharks to complement federal regulations and help establish healthy, self-sustaining populations of Atlantic coastal sharks (ASMFC, 2008). The ISFMP laid out a number of management measures, including minimum size limits for several shark species, and requested each Atlantic state implement the prescribed

management to be compliant with the ISFMP. The minimum size limits were intended to help reduce fishing mortality and rebuild these stocks as well as allow some sharks to reach maturity before being harvested (HMS, 1999). As a result, in 2010, FWC established a 54-inch FL minimum size limit for bull, nurse, spinner, blue, common thresher, oceanic whitetip, shortfin mako, and porbeagle sharks. FWC requested, and were subsequently granted, conservation equivalency to exclude blacktip, finetooth, and blacknose sharks from the minimum size requirements because of additional regulations already in place that made Florida's overall shark regulations more conservative than the ASMFC ISFMP (e.g., commercial harvest is limited to recreational limits).

In 2020, FWC increased the minimum size limit of shortfin mako from 54 to 83 inches FL to meet the ASMFC request for member states to adopt size limits in state waters to provide consistency with recent federal changes. This size limit increase was intended to help rebuild the fishery.

Permit Requirements

In 1992, MFC implemented regulations requiring commercial harvesters to have a federal vessel permit for sharks, in addition to the Saltwater Products License, to assure compliance with and enforcement of the federal shark management plan.

In 2010, FWC implemented regulations to require all commercial shark landings be sold to a federally-licensed wholesale dealer.

In 2019, FWC implemented a mandatory, no-cost, annual SBSF permit for all fishermen aged 16 years and older who target or harvest sharks from shore. This is in addition to recreational fishing license requirements. This permit, along with several other shark fishing regulations, was intended to increase survival of released sharks, improve information gathering from the fishery, and address public safety concerns.

Gear Regulations

In 1993, MFC prohibited the use of longline gear (bottom and pelagic) and a number of other gears in Florida state waters in an effort to reduce the risk of overfishing and reduce bycatch mortality of non-targeted species. This is a general marine fisheries gear rule, not specific to sharks.

In 1995, a Florida Constitutional Amendment, passed by Florida voters, prohibited the use of gill or entangling nets in Florida state waters.

In 2010, FWC made hook-and-line gear the only allowable gear for harvesting sharks in state waters for both commercial and recreational harvesters. This regulation was implemented to meet the 2008 ASMFC request for all states to adopt complementary recreational gear requirements in state waters.

In 2019, FWC implemented regulations to maximize the survival of released sharks and reduce discard mortality. These included requiring the use of non-offset, non-stainless-steel circle hooks when using live or dead natural bait and the possession/use of appropriate line/hook cutters when fishing from shore and a vessel.

Table 2. MFC/FWC Rulemaking for Sharks in Florida State Waters Highlights.

Year	Rulemaking	Effective Date
1992	• Establishes daily bag limit of one shark per person, max possession of two sharks per vessel for recreational and commercial fishermen • Requires commercial fishermen to have a federal permit • Prohibits "finning" • Prohibits sharks caught by recreational fishermen from being transferred at sea and prohibits sale of sharks caught by recreational fishermen • Requires sharks be released in a manner to ensure likelihood of survival • Adds basking and whale sharks to "Protected Species" list	April 8, 1992
1993	• Marine fisheries gear rule: Prohibits the use of longline gear in Florida state waters, but allows transit through state waters	Jan. 1, 1993
1994	• Prohibits the removal of any shark fin from a shark harvested prior to landing (must land with fins still attached) • Conforms commercial season closure with federal waters	Feb. 14, 1994
1995	• Florida Constitutional Amendment: Prohibits use of gill or entangling nets in state waters	July 1, 1995
1998	• Adds sand tiger, bigeye sand tiger, and white sharks to "Protected Species" list • Prohibits filleting of sharks at sea (evisceration and removal of heads and tails is not prohibited)	Jan. 1, 1998
2003	• Adds spiny dogfish shark to "Protected Species" list	July 1, 2003
2006	• Renamed "Protected Species" list "Prohibited Species" list • Adds Atlantic angel, bigeye sixgill, bigeye thresher, bignose, Caribbean reef, dusky, Galapagos, longfin mako, narrowtooth, night, sevengill, sixgill, and smalltail sharks to "Prohibited Species" list	March 9, 2006
2010	• Adds sandbar, silky, and Caribbean sharpnose sharks to "Prohibited Species" list • Establishes a 54-inch FL minimum size limits for all sharks except Atlantic sharpnose, blacknose, blacktip, bonnethead, finetooth, and smoothhound sharks • Prohibits removal of shark heads and tails at sea • Requires hook-and-line gear to be the only gear to harvest sharks • Requires all commercial shark landings to be sold to a federally-licensed wholesale dealer	Jan. 19, 2010
2010	• Adds lemon sharks to "Prohibited Species" list	March 21, 2010

2012	• Adds great, scalloped, and smooth hammerhead sharks and tiger sharks to "Prohibited Species" list	Jan. 1, 2012
2019	• Creates mandatory, no-cost annual SBSF permit for anglers age 16+ who target or harvest sharks from shore ○ Requires completion of an online educational course • Prohibits delaying release of prohibited shark species when fishing from shore • Requires that prohibited shark species remain in the water (when fishing from shore and from a vessel) • Requires the use of non-offset, non-stainless-steel circle hooks with live or dead natural bait (when fishing from shore and a vessel) • Requires possession/use of a device capable of quickly cutting the leader or hook (when fishing from shore and a vessel) • Prohibits chumming when fishing for any species from a beach	July 1, 2019
2020	• Increases shortfin mako recreational size limit to 83-inches FL • Prohibits commercial harvest of shortfin mako	Jan. 1, 2020

FWC PROHIBITED SPECIES: REGULATORY RATIONALE

In state waters, 27 species are prohibited recreationally, and 28 species are prohibited commercially (19 species are prohibited from commercial and recreational harvest in federal waters). Over the years, FWC has added species to the Prohibited Species list for a number of reasons, including to protect species that are rare and especially vulnerable to overfishing; to be consistent with ASMFC and federal regulations for ease of enforcement, conservation, and management; and because Florida's waters act as EFH for some species. Below is a detailed overview of each shark species prohibited from harvest in Florida state waters, including stock status, pertinent biology/ecology, reason for FWC prohibition, and whether the species is also prohibited in federal waters (*see Appendix 1 for the full state and federal prohibited shark species list*).

Atlantic angel shark

- Stock status – Unknown; unassessed species.
- Pertinent biology/ecology – Benthic species commonly inhabiting waters from New England to Maryland, however, their range can expand south to the Florida Keys, Gulf of Mexico, and Caribbean (Castro, 1983). Migrate seasonally from shallow to deep water (Castro, 2011). Reproduce every 2 years, litter sizes ranging from 7-16 pups, and a pregnancy duration of about 10-12 months (Castro, 1983; Baremore, 2010; Ebert and Stehman, 2013). EFH habitat identified in Gulf of Mexico from Florida to Mississippi for all life stages (HMS, 2017).

- Reason for FWC prohibition – There is a general lack of biological data for this species, and it is highly susceptible to exploitation due to their vulnerability to be caught as bycatch in trawls. Concern regarding their global status caused NMFS to prohibit harvest in 2000 as a precautionary measure to prevent the development of a directed fishery or market for this uncommon and possibly seriously depleted species. In 2005, NMFS wrote a letter to FWC requesting Florida adopt regulations consistent with federal regulations. Due to the prohibition in federal waters and the rare or lack of occurrence in state waters south of Cape Lookout, NC, FWC implemented consistent regulations in 2006.
- Prohibited in federal waters – Yes.

Basking shark

- Stock status – Unknown; unassessed species.
- Pertinent biology/ecology – Second largest fish in the world. They are filter-feeding plankton eaters that commonly inhabit subpolar and cold temperate seas, spending summer months in high latitude and moving into warmer water during winter months (Castro, 1983; Diamond, 1985). Their habitat preference and migratory patterns are poorly known, but it is thought that basking sharks actively select areas along thermal fronts containing high densities of zooplankton (Sims et al., 2003). Satellite tags have shown basking sharks in the Atlantic can migrate from New England into tropical latitudes of The Bahamas, Caribbean Sea, and off the coast of South America (Skomal et al., 2009). When basking sharks move into southern latitudes, they move into deeper water habitat (up to 6,200 ft.) and often remain at those depths for an extended period. Very little information is known about basking sharks' reproductive biology, but it is hypothesized that areas near the Gulf of Maine and Cape Cod are likely important mating grounds. In the Atlantic, NMFS has identified the Gulf of Maine to the Outer Banks of North Carolina, and from South Carolina to coastal areas of northeast Florida as EFH (HMS, 2017).
- Reason for FWC prohibition – This species is rare and was identified as highly susceptible to overexploitation. The biology and life history of this species is unique and more vulnerable to overfishing compared to other large sharks. Following review of the draft federal Shark FMP, FWC added basking sharks to the Prohibited Species List in 1992, as a precautionary measure since the stock is vulnerable to overfishing. FWC also wrote a letter to NMFS requesting basking sharks be prohibited in federal waters, and NMFS added this species to their prohibited list in 1997.
- Prohibited in federal waters – Yes.

Bigeye sand tiger shark

- Stock status – Unknown; unassessed species.
- Pertinent biology/ecology – The bigeye sand tiger shark is likely widely distributed in deep tropical and subtropical waters, but there are few available records on the species. However, the species has been reported in the Gulf of Mexico (Branstetter and McEachran, 1986) and off eastern Florida (Kerstetter and Taylor, 2008). Because bigeye

sand tiger sharks are rarely caught, almost nothing is known about their biology and ecology. To this point, reproduction, age and growth, and maturity are unknown.
- Reason for FWC prohibition – NMFS identified this species as highly susceptible to overexploitation and added this species to their prohibited list in 1997 as a precautionary measure to ensure that directed fisheries did not develop. To be consistent with federal regulations and since this species is very rare in state waters, FWC added this species to the Prohibited Species List in 1998.
- Prohibited in federal waters – Yes.

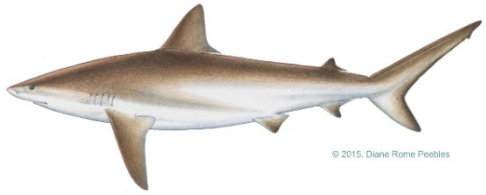
Bigeye sixgill shark
- Stock status – Unknown; unassessed species.
- Pertinent biology/ecology – The distribution of the bigeye sixgill shark is poorly understood, with specimens having been reported from deep waters of the Gulf of Mexico and Florida (Castro, 2011). The species can be found at depths of 656-1640 ft. off Florida. Reproduction and age and growth are unknown. Castro (2011) examined 26-32 in. juveniles caught in deep water off Panama City, which indicates that there are some nurseries in the Gulf of Mexico.
- Reason for FWC prohibition – NMFS added this species to their prohibited list in 2000 as a precautionary approach to prevent development of directed fisheries or a market for uncommon or seriously depleted species. In 2005, NMFS wrote a letter to FWC requesting Florida to adopt regulations consistent with federal regulations. Due to the prohibition in federal waters and the rare or lack of occurrence in state waters, FWC implemented consistent regulations in 2006.
- Prohibited in federal waters – Yes.

Bigeye thresher shark
- Stock status – Unknown; unassessed species.
- Pertinent biology/ecology – Bigeye thresher sharks are thought to be widely distributed in warm, deep waters. In the eastern U.S., the species ranges from Cape Cod to Florida and into the Gulf of Mexico and can be found anywhere in the deep waters of the Gulf Stream. During the day, bigeye thresher sharks reside at depths of 656-1640 ft. but rise to 32-426 ft. at night (Nakano et al., 2003). The reproductive cycle is believed to be annual with mature females giving birth to a litter size of two pups (Castro, 2011); the gestation period is unknown for the species. In the Atlantic, NMFS identified offshore pelagic habitats seaward of the continental shelf break in the EEZ from Blake Plateau (off the coasts of North Carolina to Florida) to Biscayne Bay (HMS, 2017).
- Reason for FWC prohibition – NMFS added this species to their prohibited list in 2000 as a precautionary approach to prevent development of directed fisheries or markets. In 2005, NMFS wrote a letter to FWC requesting Florida to adopt regulations consistent with federal regulations. Due to the prohibition in federal waters and the rare or lack of occurrence in state waters, FWC implemented consistent regulations in 2006.
- Prohibited in federal waters – Yes.

Bignose shark

- Stock status – Unknown; unassessed species.
- Pertinent biology/ecology – Bignose sharks are widely distributed in deep tropical and subtropical waters. In the eastern U.S., the species ranges from New York to Florida and the Gulf of Mexico (Kohler et al., 1998). The bignose shark is primarily a bottom-dwelling species in deep waters, and therefore, little is known about its biology and ecology. Sharks tagged off Maryland and Delaware by Kohler et al. (1998) were subsequently recaptured in the Gulf of Mexico and off Cuba, suggesting that the species travels north from the Caribbean in the summer before migrating southward in the fall. Little is known about reproduction, but maturity is thought to be reached by 78 in. and pupping occurs in the summer with litter sizes ranging from 3 to 11 pups (Castro, 1983).
- Reason for FWC prohibition – NMFS added this species to their prohibited list in 2000 as a precautionary approach to prevent development of directed fisheries and/or markets. In 2005, NMFS wrote a letter to FWC requesting Florida adopt regulations consistent with federal regulations. Due to the prohibition in federal waters and the rare or lack of occurrence in state waters, FWC implemented consistent regulations in 2006.
- Prohibited in federal waters – Yes.

Caribbean reef shark

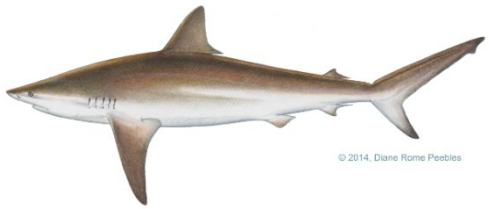


- Stock status – Unknown; unassessed species.
- Pertinent biology/ecology – Bottom-dwelling species that typically inhabits shallow coastal waters, typically around coral reefs from North Carolina, Bermuda, and Florida to Brazil (Castro, 1983; Jensen et al., 1995; Driggers et al., 2011). Caribbean reef sharks have strong site fidelity, reproduce every 2 years, and have an average litter size of 4-6 pups. Important mating grounds and nursery habitat are not clearly understood, but groups of adult males and females, and small individuals have been found at certain times of the year along the southern Florida coast, Florida Keys, and in the western Gulf of Mexico near the Flower Garden Banks National Marine Sanctuary, and U.S. Caribbean. These areas have been designated as EFH (HMS, 2017). Caribbean reef sharks are a species where negative interactions with fishermen's catch are known to occur.
- Reason for FWC prohibition – There is a significant lack of biological data for this species, and it is thought to be highly susceptible to exploitation. NMFS prohibited harvest in 2000 as a precautionary measure, to prevent the development of a directed fishery or market for this uncommon and possibly seriously depleted species. In 2005, NMFS wrote a letter to FWC requesting Florida adopt regulations consistent with federal regulations. Due to the prohibition in federal waters and the rare or lack of occurrence in state waters, FWC implemented consistent regulations in 2006.
- Prohibited in federal waters – Yes.

Caribbean sharpnose shark

- Stock status – Unknown; unassessed species.
- Pertinent biology/ecology – Closely related to Atlantic sharpnose (Springer, 1964); however, Caribbean sharpnose are found further south in Atlantic waters comparatively. Typically, only inhabiting Atlantic waters from 24˚N to 35˚S latitude, approximately around Miami, Florida, to about Montevideo, Uruguay. There also is insufficient information available to identify EFH for this species.
- Reason for FWC prohibition – NMFS prohibited harvest in 2000 as a precautionary measure to prevent the development of a directed fishery or market for this uncommon and possibly seriously depleted species. In 2008, ASMFC implemented an ISFMP for Atlantic Coastal Sharks that prohibited the possession of Caribbean sharpnose. To be compliant with the ASMFC ISFMP and due the rare or lack of occurrence in state waters, FWC implemented consistent regulations in 2010.
- Prohibited in federal waters – Yes.

Dusky shark



- Stock status – Overfished and overfishing is occurring based on 2016 federal benchmark stock assessment. Estimated time to rebuild is 100 years, or by year 2107.
- Pertinent biology/ecology – Migratory species that moves north to south seeking warmer water temperatures (Carlson and Gulak, 2012; Hoffmayer et al., 2014). Individuals found along the U.S. Atlantic and Gulf of Mexico make up a single genetic stock (Benavide et al. 2011). Dusky sharks are one of the slowest growing requiem sharks (part of the Family Carcharhinidae, like tiger and spinner sharks), reaching maturity between 17-21 years old (Natanson et al., 1995). It is thought they have a long pregnancy duration of about 16 months and a 3-year reproductive cycle, but average litter size is still unclear (Clark and von Schmidt, 1965; SEDAR, 2011). Young-of-the-year (YOY) and juvenile dusky sharks have been found in some coastal waters of South Carolina, Chesapeake Bay, nearshore waters of Massachusetts, and eastern/southern waters of Martha's Vineyard (Musick et al., 1986; Castro, 1993; Grubbs and Musick, 2003). Due to these findings, these areas have been identified as important nursery habitat and are considered EFH for YOY and juvenile dusky sharks. No EFH for this species has been identified in Florida. Dusky sharks are a species where negative interactions with fishermen's catch are known to occur.
- Reason for FWC prohibition – Catch rate data indicated large population declines of dusky sharks since the 1970s. NMFS prohibited harvest in 2000 to prevent the development of a directed fishery for this seriously depleted species. Dusky sharks are highly susceptible to fishing mortality, and there is concern that bycatch mortality alone has the potential to negatively impact this species' ability to rebuild to maximum sustainable yield (MSY) levels because of their low reproductive rate. In 2005, NMFS wrote a letter to FWC requesting Florida adopt regulations consistent with federal

regulations. Due to the prohibition in federal waters, FWC adopted consistent regulations in 2006.

- Prohibited in federal waters – Yes.

Galapagos shark

- Stock status – Unknown; unassessed species.
- Pertinent biology/ecology – Similar in appearance to the dusky shark and is often mistaken for it. Galapagos sharks prefer the open ocean and waters around oceanic islands (Castro, 1983). The limits of its distribution are poorly defined due to confusion with dusky sharks (Castro, 2011). There is little known about their reproduction, but Galapagos sharks are known to have an average litter size of about 8-9 pups and the pregnancy duration is about 12 months (Wetherbee et al., 1996; Dulvy and Reynolds, 1997). Currently there is insufficient information available to describe and identify EFH for this species.
- Reason for FWC prohibition – NMFS prohibited harvest in 2000 as a precautionary measure to prevent the development of a directed fishery or market. Galapagos sharks are very rare in U.S. waters since they prefer open ocean and waters around oceanic islands; however, they are similar morphologically to dusky sharks and the two species can be easily mistaken for each other. In 2005, NMFS wrote a letter to FWC requesting Florida adopt regulations consistent with federal regulations. Due to the prohibition in federal waters and rare occurrence in state waters, FWC adopted similar regulations in 2006.
- Prohibited in federal waters – Yes.

Great hammerhead shark

- Stock status – Unknown; federal research track stock assessment ongoing (began in May 2021).
- Pertinent biology/ecology – Unlike some other hammerhead species, great hammerhead sharks are solitary. They can be found both in warmer waters of the open ocean and shallow coastal areas (Castro, 1983). Great hammerhead sharks are found almost all year off northern and central Florida and can be found year-round in the Florida Keys (Castro, 2011). Tagging data suggests individuals can travel relatively far distances. One individual tagged in the Florida Keys traveled over 745 miles to New Jersey, which represents the northeastern range for the species (Hammerschlag et al., 2011). Great hammerhead sharks are long-lived, slow growing sharks with an estimated maximum age of about 44 years (Piercy et al., 2010). Females have a 11-12-month pregnancy duration, can have litters ranging from 20-40 pups, and are thought to have a 2-year reproductive cycle (Stevens and Lyle, 1989; Castro, 2011). Great hammerheads have low reproductive potential due to slow growth rates, late age-at-maturity, and do not reproduce annually. Although there is uncertainty on exact locations of pupping grounds, scientists believe coastal waters in southeast and southwest Florida are essential habitat for newborns and critical nursery areas due to the presence of YOY from January to November (Hueter and Tyminski, 2007; Macdonald et al., 2021).

Great hammerhead shark YOY have been caught in inshore and nearshore waters on the Atlantic just north of Biscayne Bay through the Florida Keys and in the Gulf of Mexico near Yankeetown, Tampa Bay, and Charlotte Harbor. NMFS has identified these inshore and nearshore waters as EFH for newborns/YOY, juveniles, and adult sharks (HMS, 2017). Post-release mortality studies have indicated that release mortality can be as high as 50% (Gallagher et al., 2014). Great hammerhead sharks are a species where negative interactions with fishermen's catch are known to occur.

- Reason for FWC prohibition – In 2011, FWC received requests from stakeholders to implement stricter regulations for hammerhead and tiger sharks, including great hammerhead, and the Commission directed staff to review management of sharks in Florida, including prohibiting harvest of additional species. After conducting seven public workshops around the state in 2011, FWC received supportive feedback from fishermen, researchers, shark conservation organizations, and concerned citizens, to prohibit harvest of hammerheads in state waters due to their low reproductive potential and vulnerability to overfishing. As great hammerhead sharks migrate to EFH in state waters throughout their life cycle, they are particularly susceptible to overexploitation due to fishing pressure in Florida inshore and nearshore waters. Additionally, at the time of prohibition, the great hammerhead stock was estimated to have declined by 50%. FWC added this species to their Prohibited Species List in 2012.
- Prohibited in federal waters – No.

Lemon shark

- Stock status – Unknown; unassessed species.
- Pertinent biology/ecology – Found year-round and abundant in south Florida and the Florida Keys and can be found seasonally on both coasts. Lemon sharks mature around 11-12 years old, and mating has been reported to occur from the end of April to mid-May off Sarasota (Castro, 2011) and Melbourne Beach (Dodrill, 1977). Lemon sharks have a 2-year reproductive cycle and have a 12-month pregnancy duration (Castro, 2011). This species has important nurseries along shallow beaches and mangrove islands of south Florida. Their nurseries extend along the western coast of Florida to at least Tampa Bay and extend as far north as South Carolina in the Atlantic. The nearshore waters of Cape Canaveral have been identified as an important nursery for lemon sharks in south Florida (Reyier et al., 2008). Large aggregations that occur annually off Jupiter, where many females appear pregnant and near term, are thought to be linked to the Cape Canaveral nursery area (Kessel et al., 2014). Lemon shark mating is also known to occur off Sarasota, Florida from late April to mid-May (Castro, 2011). Lemon sharks also exhibit natal philopatry, where some individuals return to their birthplace to give birth (Feldheim et al., 2014**)**. This area encompassing between Cape Canaveral and just south of Jupiter Inlet has been classified as a critical habitat of particular concern. EFH has been identified for newborns, juveniles, and adults along the east coast of Florida to the Florida Keys in the Atlantic and along the west coast of Florida to the Florida Keys in the Gulf of

Mexico (HMS, 2017). Lemon sharks are a species where negative interactions with fishermen's catch are known to occur.

- Reason for FWC prohibition – In 2009, stakeholders expressed concern about the vulnerability and status of lemon sharks at multiple FWC workshops and Commission meetings. At the September 2009 meeting, the Commission directed staff to gather additional feedback and develop a management recommendation for lemon sharks. Staff conducted two workshops in October 2009, and stakeholders expressed concern about the increasing effort shifting towards lemons due to federal regulation changes. Additionally, there was concern about this additional fishing pressure because large aggregations occur in Florida state waters for the purpose of reproduction. Research indicates that lemon sharks annually return to predictable sites off southeast Florida near Jupiter and off west central Florida near Sarasota to reproduce. Due to the importance of Florida state waters for lemon sharks, stakeholder feedback, and the species being highly susceptible to harvest pressure, FWC prohibited the possession and harvest of lemon sharks in 2010.
- Prohibited in federal waters – No.

Longfin mako shark

- Stock status – Unknown; unassessed species.
- Pertinent biology/ecology - There is a general lack of biological data for this species. However, it is a warm water oceanic species and limited observations suggest they are in Caribbean waters from April to November and travel northward in the Gulf Stream from December to May (Castro, 2011). Reproduction, age and growth, size-at-maturity, and nursery habitat are all unknown for this species. In the Atlantic, NMFS has identified EFH for longfin mako sharks between Blake Plateau off Georgia and Florida, and in southern Florida from Miami to the Florida Keys. In the Gulf, EFH has been identified along the southern edge of the West Florida shelf and along the Florida Panhandle (HMS, 2017).
- Reason for FWC Prohibition – NMFS prohibited harvest in 2000 as a precautionary measure, to prevent the development of a directed fishery or market for this uncommon and possibly seriously depleted species. In 2005, NMFS wrote a letter to FWC requesting Florida adopt regulations consistent with federal regulations. Due to the prohibition in federal waters and the rare or lack of occurrence in state waters, FWC implemented consistent regulations in 2006.
- Prohibited in federal waters – Yes.

Narrowtooth shark

- Stock status – Unknown; unassessed species.
- Pertinent biology/ecology – Worldwide distribution in subtropical to warm-temperate coastal waters; however, the species has been seldomly observed in North America (Castro, 2011). Reproduction, age and growth, size-at-maturity, and nursery habitat are all unknown for this species.
- Reason for FWC prohibition – NMFS prohibited harvest in 2000 as a precautionary measure to ensure a directed fishery and market did not develop for this uncommon and

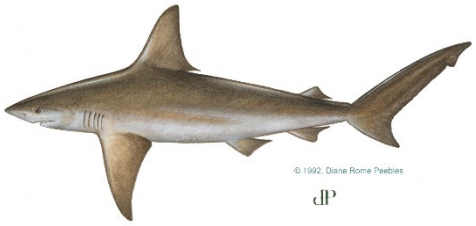
possibly seriously depleted species that is highly susceptible to overexploitation. In 2005, NMFS wrote a letter to FWC requesting Florida adopt regulations consistent with federal regulations. Due to the prohibition in federal waters and the rare or lack of occurrence in state waters, FWC implemented consistent regulations in 2006.

- Prohibited in federal waters – Yes.

Night shark

- Stock status – Unknown; unassessed species.
- Pertinent biology/ecology – Found in deep waters of the Gulf Stream from Virginia to Florida and in the Gulf of Mexico. One of the deeper dwelling requiem sharks, they are usually observed over the continental slopes off Florida at depths of 490-820 ft. or deeper during the day, while ascending to depths of 98-165 ft. at night (Castro, 2011). Pregnant females are common off the Carolinas and Georgia coasts and nurseries appear to be in the shallower portions of the continental slopes (Castro, 2011). EFH in the Atlantic Ocean includes portions of the southern and mid-east coast of Florida. EFH in the Gulf of Mexico includes areas spanning from the Florida Keys to the Florida panhandle. In general, EFH is seaward of the southwestern edge of the West Florida Shelf but comes farther inshore in the northern Gulf of Mexico (between the Florida/Alabama line and Cape San Blas) (HMS, 2017).
- Reason for FWC prohibition – Historically, night sharks were abundant along the southeastern U.S. and off Cuba. However, as the swordfish fishery developed, large numbers of night sharks were caught as bycatch. NMFS prohibited harvest of this species in 2000 because it was identified as highly susceptible to overexploitation. The prohibition on possession was a precautionary measure to ensure a directed fishery did not develop. There was also evidence of potential stock declines following the review of the 1999 Shark FMP. In 2005, NMFS wrote a letter to FWC requesting Florida adopt regulations consistent with federal regulations. Due to the prohibition in federal waters and the rare or lack of occurrence in state waters, FWC implemented consistent regulations in 2006.
- Prohibited in federal waters – Yes.

Sandbar shark



- Stock status – Overfished, but overfishing is not occurring based on 2018 federal stock assessment. Estimated time to rebuild is 66 years, around year 2070.
- Pertinent biology/ecology – Despite past severe depletion of the stock, the species remains one of the most abundant large sharks in coastal waters of the U.S., ranging from Cape Cod to Florida and throughout the Gulf of Mexico (Castro, 2011). Off southeastern Florida, mating takes place primarily in June (Springer, 1960). Females that mated in summer will winter off Florida and then some will migrate north towards nursery grounds that historically extended from Long Island, New York, to Cape Canaveral, Florida. Today, it has been suggested that there has been a considerable recession of

nursery grounds (Merson and Pratt, 2007) and major nurseries for the species are Delaware Bay (Merson and Pratt, 2001) and Chesapeake Bay (Grubbs and Musick, 2007). Secondary nursery grounds are thought to exist in the Gulf of Mexico based on the presence of neonates and juveniles (Carlson, 1999). The sandbar shark is a slow-growing, long-lived species and is estimated to reach maturity at between 12-13 years of age (SEDAR, 2017). They have a 11 to 12-month pregnancy duration and a 2-year reproductive cycle. EFH has been identified for newborns and juveniles in Florida waters of the Gulf of Mexico. For adults, EFH has been identified along the entire Florida Atlantic coast to the Florida Keys. In the Gulf of Mexico, EFH has been identified for adults in coastal areas from the Florida Keys to Anclote Key, offshore the Big Bend area, and coastal waters of the panhandle (HMS, 2017). Sandbar sharks are a species where negative interactions with fishermen's catch are known to occur.

- Reason for FWC prohibition – Due to their slow maturation and documented effects of past fishing pressure, this species is considered highly vulnerable to overexploitation. For example, some studies have estimated that the stock had been reduced by 85% based on catch per unit effort (CPUE) declines in the U.S. (Musick et al., 1993). In 2008, the ASMFC ISFMP prohibited the possession of sandbars in Atlantic state waters. FWC implemented consistent regulations in 2010.
- Prohibited in federal waters – No. Sandbar sharks can be commercially harvested but only with a Shark Research Permit. The quota is highly regulated and only a few permits are given out annually. From 2015-2019, commercial landings averaged 136,415 pounds/year in the sandbar shark research commercial fishery. As of 2009, HMS does not allow recreational harvest of sandbar or silky sharks because recreational anglers may confuse these species with dusky sharks, which are on the list of HMS prohibited shark species.

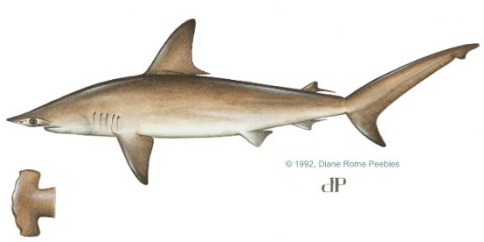
Sand tiger shark

- Stock status – Unknown; unassessed species.
- Pertinent biology/ecology – Often found in shallow, tropical, and warm temperate waters throughout the world (Castro, 1983). Along the Atlantic coast mature males and juveniles commonly occur between Cape Cod and Cape Hatteras while mature and gravid females mainly inhabit southern waters between Cape Hatteras and Florida. EFH have been identified from Massachusetts to Florida. Florida waters specifically have been identified as EFH for both neonate and adult sand tiger sharks. Sand tiger sharks are relatively slow growing, large coastal sharks, and research suggests males reach sexual maturity between four to five years old, and females likely do not reach maturity until at least six years old (Branstetter and Musick, 1994). Many ecological aspects of reproduction, including the timing and location, pregnancy period, and nursery grounds, remain unclear through most of the sand tiger shark range. However, there is some information available for populations found in the northwestern Atlantic, including research that indicates females likely give birth in March and April and have a maximum litter size of two pups (Lucifora et al., 2002). Some research also

suggests sand tiger sharks likely have a 2 or 3-year reproductive cycle (Branstetter and Musick, 1994; Bansemer and Bennett, 2009).

- Reason for FWC prohibition – NMFS prohibited this species in 1997 to help prevent overfishing and prevent the development of commercial and/or recreational fisheries. Florida waters have been identified as EFH and a critical nursery area. In 1998, FWC added sand tiger sharks to the Prohibited Species List to provide additional protection for this species and to be consistent with federal regulations. This species is highly susceptible to overexploitation and, due to demands for their meat and fins, there was evidence of potential stock declines following the review of the 1999 Federal Shark FMP.
- Prohibited in federal waters – Yes.

Scalloped hammerhead shark



- Stock status – Overfished and overfishing is occurring based on 2009 stock assessment; estimated time to rebuild is 10 years, around year 2023. Federal research track stock assessment is ongoing (began in May 2021).
- Pertinent biology/ecology – Large, schooling shark that typically inhabits shallow, warm waters. However, tagging data indicate scalloped hammerhead sharks will use offshore oceanic habitat, but do not regularly roam across large distances like other species (Kohler and Turner, 2001). There is sexual segregation of males and females. Females are commonly found in deeper water compared to males and have an increased tendency to move into offshore waters at a smaller size (Klimley, 1987; Branstetter, 1987; Stevens and Lyle, 1989). Scalloped hammerhead sharks are long-lived, slow-growing sharks with an estimated maximum age of about 35 years (Branstetter, 1987). Research suggests males mature between nine to 10 years old and females at a slightly older age, around 15 years (Branstetter, 1987; Hazin et al., 2001; Piercy et al., 2007). Female pregnancy duration is typically between nine to 10 months but can last as long as 12 months (Branstetter, 1987; Stevens and Lyle, 1989) and they likely reproduce annually (Castro, 2011). Compared to other shark species, scalloped hammerhead sharks can have a relatively large litter size with as many as 30 pups. However, scalloped hammerhead sharks have low reproductive potential due to slow growth rates and late age-at-maturity. Several areas within the south Atlantic and in the Gulf of Mexico have been identified as critical nursery habitats, including coastal waters off Florida (Abel et al., 2007; Adams and Paperno, 2007; Ulrich et al., 2007; Ward-Paige et al., 2014; Bethea et al., 2015). Specifically, newborns have been observed in the late spring to early summer in coastal waters adjacent to Cape Canaveral and in the Gulf near Yankeetown, Tampa Bay, and Charlotte Harbor (Adams and Paperno, 2007; Hueter and Tyminski, 2007). NMFS has identified several areas along the Atlantic and Gulf of Mexico as EFH for newborns/YOY and juvenile/adult scalloped hammerheads including the coastal and estuarine habitat listed above (HMS, 2017). Scalloped hammerhead sharks are a species where negative interactions with fishermen's catch are known to occur.

- Reason for FWC prohibition – In 2011, FWC received requests from stakeholders to implement stricter regulations for hammerhead and tiger sharks, including scalloped hammerhead, and the Commission directed staff to review management of sharks in Florida, including prohibiting harvest of additional species. After conducting seven public workshops around the state in 2011, FWC received supportive feedback from fishermen, researchers, shark conservation organizations, and concerned citizens, to prohibit hammerheads in state waters due to their low reproductive potential and vulnerability to overfishing. As scalloped hammerhead sharks migrate to EFH in state waters throughout their life cycle, they are particularly susceptible to overexploitation due to fishing pressure in Florida inshore and nearshore. Additionally, the 2009 stock assessment determined scalloped hammerheads were overfished and undergoing overfishing. FWC added this species to their Prohibited Species List in 2012.
- Prohibited in federal waters – No.

Sevengill shark

- Stock status – Unknown; unassessed species.
- Pertinent biology/ecology – Most often found in deep water off the continental slopes, in depth ranging from 88-3,280 ft. (Compango, 1984). There are two species of sevengill shark that are found in the western Atlantic, one species is found world-wide in deep tropical and warm temperate waters and the other has only been found in the western Atlantic from North Carolina and the northern Gulf of Mexico to Cuba and from Venezuela south to Argentina, and in the eastern Atlantic from Morocco to Namibia (Compango, 1984). Much is still unknown about the biology and behavior of sevengill sharks, like the length of the reproductive cycles and pregnancy duration, the location of nurseries, as well as other life history trait details. However, limited research estimated males typically mature at 33 in. and females at 36 in. (Compango, 1984), and litters can consist of 9-20 pups (Castro, 1983). Due to insufficient information, NMFS has not identified any EFH for this species.
- Reason for FWC prohibition – NMFS prohibited harvest in 2000 as a precautionary measure, to prevent the development of a directed fishery or market for this uncommon and possibly seriously depleted species. In 2005, NMFS wrote a letter to FWC requesting Florida adopt regulations consistent with federal regulations. Due to the prohibition in federal waters and the rare or lack of occurrence in state waters, FWC implemented consistent regulations in 2006.
- Prohibited in federal waters – Yes.

Shortfin mako shark (commercial only)

- Stock status – Overfished and overfishing is occurring based on 2017 ICCAT stock assessment. Estimated time to rebuild is 12 years but is being reevaluated.
- Pertinent biology/ecology – Shortfin mako is an oceanic species found in warm and warm-temperate waters worldwide. There is considerable variation in the descriptions of reproductive life history for shortfin mako sharks, one study estimated females mature

between 4-6 years (Cailliet and Mollet, 1997), while another study estimated males are likely to mature around 7-9 years and females between 19-21 years (Bishop et al., 2006). Similarly, reported litter size, pregnancy duration, and reproductive cycle vary by study. In general, most research reports a litter size ranging from 4-25 pups, a pregnancy duration from as few as 9 months to as long as 18 months, and a reproductive cycle between 2-3 years (Cailliet and Mollet, 1997; Mollet et al., 2000; Semba et al., 2011). Semba et al. (2011) also estimated female fecundity may increase as females grow. Gravid shortfin mako sharks have only been observed between Tulum, Mexico, to about Porto Alegre, Brazil (20˚ and 30˚ N or S latitude; Gilmore, 1993), and there is no information on where mating may occur. Due to insufficient information, NMFS has identified EFH seaward of the continental shelf break along the Atlantic coast and into the Gulf of Mexico for all life stages.

- Reason for FWC prohibition – In 2019, NMFS implemented new shortfin mako regulations due to a recent ICCAT assessment that determined the North Atlantic stock was overfished and undergoing overfishing. Per federal regulations, shortfin mako sharks can only be commercially harvested if it is already dead on a longline haul back or in gill nets. Since the use of longlines and gill nets are prohibited in state waters, there is no legal way to commercially harvest this species in state waters. Therefore, in 2020, FWC added shortfin mako sharks to the Prohibited Species List for commercial harvest only for clarification purposes. However, recreational harvest is allowed in both state and federal waters.
- Prohibited in federal waters – No.

Silky shark

- Stock status – Unknown; unassessed species.
- Pertinent biology/ecology – Adults primarily inhabit warm, tropical, and subtropical offshore waters, but juveniles commonly move into inshore waters during the summer. Along the western Atlantic, they can be found from Massachusetts to Brazil, including the Gulf of Mexico and Caribbean Sea (Bigelow and Schroeder, 1948). Tagging data indicate silky sharks move between the Gulf of Mexico and U.S. Atlantic and likely make up a single population (Kohler et al., 1998; Hoffmayer and Franks, 2010). There is considerable variation in the descriptions of reproductive life history for silky sharks and a strong possibility their reproductive potential may vary regionally. According to Bonfil et al. (1993), females caught in the Gulf off the coast of Mexico likely have a 12-month pregnancy duration, a 2-year reproductive cycle, and a litter size between 10-14 pups during the late spring and early summer. This study also estimated age-at-maturity for males around 10 years old and about 12 years old for females. Although it is not clear where critical nursery habitat for silky sharks is located, many scientists believe the Campeche Bank off the coast of Mexico is likely a prime nursery area in the Atlantic (Bonfil et al., 1993). Given the uncertainty of essential habitat for silky sharks, NMFS identified pelagic waters of the U.S. EEZ from Massachusetts to the southern coastal waters of Texas EFH for all life stages (HMS, 2017). Silky sharks are a species where negative interactions with fishermen's catch are known to occur

- Reason for FWC Prohibition – In 2008, the ASMFC ISFMP prohibited the possession of silky sharks. This species is vulnerable to overfishing due to their life history traits, including, slow growth rate, late to maturity, and limited reproductive potential. Additionally, local stocks of this species cannot sustain heavy fishing pressure. As a result, FWC implemented consistent regulations in 2010.
- Prohibited in federal waters – Prohibited recreationally only. As of 2009, HMS does not allow recreational anglers to land sandbar or silky sharks because recreational anglers may confuse these species with dusky sharks, which are on the list of HMS prohibited shark species.

Sixgill shark

- Stock status – Unknown; unassessed species.
- Pertinent biology/ecology – Sixgill sharks are one of the largest and most primitive sharks known and are primarily found in deep, cool waters between 328-3,280 ft. (Serena, 2005), but have been recorded in depths as deep as 8,200 ft. (Carey and Clark, 1995; Ebert and Stehmann, 2013). Very few mature sixgill sharks have been examined by biologists; thus, many life history traits and the reproductive process is poorly understood (McFarlane et al., 2002). Estimated age-at-maturity for males is around 11-14 years and for females around 18-35 years (McFarlane et al., 2002). Reported litter sizes range from 22-108 pups (Compagno, 1984; Ebert, 1992), and juveniles in the Pacific are often caught in coastal waters, suggesting these areas support nursery habitat (Compagno, 1984). However, there is minimal data on potential nursery habitat along the U.S. Atlantic (Castro, 2011). Due to insufficient information, NMFS has not identified any EFH for this species.
- Reason for FWC prohibition – NMFS prohibited harvest in 2000 as a precautionary measure, to prevent the development of a directed fishery or market for this uncommon and possibly seriously depleted species. Due to the lack of fisheries or landings data, it is also very difficult to evaluate how vulnerable this species is to overfishing. In 2005, NMFS wrote a letter to FWC requesting Florida adopt regulations consistent with federal regulations. Due to the prohibition in federal waters and the rare or lack of occurrence in state waters, FWC implemented consistent regulations in 2006.
- Prohibited in federal waters – Yes.

Smalltail shark

- Stock status – Unknown; unassessed species.
- Pertinent biology/ecology – Small, tropical/sub-tropical shark that primarily inhabits shallow coastal water and estuaries in the western Atlantic from the Gulf of Mexico to Brazil (Castro, 1983). Very few individuals have been caught, and there is almost no published data on the biology or reproduction of this species. Females observed in Trinidad suggest there is a potential long breeding season, and they may have an annual reproductive cycle. This study also estimated smalltail sharks likely reach maturity around 27 in. (Lessa et al., 1999). Due to insufficient information, NMFS has not identified any EFH for this species.

- Reason for FWC prohibition – NMFS prohibited harvest in 2000 as a precautionary measure to prevent the development of a directed fishery or market for this uncommon and possibly seriously depleted species. In 2005, NMFS wrote a letter to FWC requesting Florida to adopt regulations consistent with federal regulations. Due to the prohibition in federal waters and the rare or lack of occurrence in state waters, FWC implemented consistent regulations in 2006.
- Prohibited in federal waters – Yes.

Smooth hammerhead shark

- Stock status – Unknown; currently unassessed but a federal research track stock assessment is ongoing (began in May 2021).
- Pertinent biology/ecology – The smooth hammerhead shark is widely distributed in temperate seas, inhabits much cooler waters than other hammerhead species (Castro, 2011), and generally prefers waters less than 65 feet in depth. The species ranges from Nova Scotia to the Florida Keys but is rare off Florida and the southeastern U.S. Juveniles are reported to form large aggregations, while adults generally occur individually or in small groups. Smooth hammerhead sharks are likely highly migratory, traveling north in schools during the summer months and returning south in the winter (Ebert, 2003). There have been no aging studies performed on smooth hammerhead sharks, and there are few data available on the size-at-maturity with one report stating that the species matures between 94 and 106 in. (Cadenat and Blache, 1981). Regarding growth, Gallagher and Klimley (2018) suggested smooth hammerheads have the slowest growth rate of all the large hammerhead species. Reproduction is poorly understood, but likely is a 2-year reproductive cycle, and the location of nurseries are not well defined. Smooth hammerheads have low reproductive potential due to slow growth rates, late age-at-maturity, and they do not reproduce annually. YOY and juveniles have been reported from Delaware Bay to the Bay of Fundy. Fecundity is thought to be relatively high compared to other sharks, with a range of 20-49 pups per litter (Cortes, 2000). Smooth hammerhead sharks show high post-release mortality rates from incidental capture (e.g., 70-90% mortality; Gallagher and Klimley, 2018).
- Reason for FWC prohibition – In 2011, FWC received requests from stakeholders to implement stricter regulations for hammerheads and tiger sharks, including smooth hammerhead, and the Commission directed staff to review management of sharks in Florida, including prohibiting harvest of additional species. After conducting seven public workshops around the state in 2011, FWC received supportive feedback from fishermen, researchers, shark conservation organizations, and concerned citizens, to add hammerheads to the Prohibited Species List in state waters due to their low reproductive potential and vulnerability to overfishing. At the time of prohibition, studies indicated smooth hammerhead populations had declined by as much as 98%. Additionally, as smooth hammerhead sharks migrate to EFH in state waters throughout their life cycle, they are particularly susceptible to overexploitation due to fishing pressure in Florida inshore and nearshore waters. FWC added this species to their Prohibited Species List in 2012.

- Prohibited in federal waters – No.

Spiny dogfish

- Stock status – Not overfished and overfishing is not occurring based on an ASMFC 2018 update stock assessment.
- Pertinent biology/ecology – In the North Atlantic, spiny dogfish is found in temperate and sub-polar regions, ranging from Greenland to Georgia. Spiny dogfish is one of the most abundant sharks in the world and, consequently, is the most studied shark species. The species forms very large, highly localized schools that are usually composed of hundreds or thousands of individuals of the same size or sex. These schools show north-south coastal movements and onshore-offshore migrations that are primarily controlled by temperature (Castro, 2011). Wintering occurs from the Chesapeake Bay southward to the Carolinas and Georgia until early spring, when their northward migration begins. Despite their small size, spiny dogfish is one of the slowest growing and longest-lived shark species. Jones and Green (1977) estimated that age at 50% maturity is 19 years for males and 29 years for females. In the Atlantic, female size-at-maturity ranges from 33-37 in. (Castro, 2011). Spiny dogfish mate during the winter months and their litter size ranges from 2-15 pups (Nammack et al., 1985). The species has a 2-year reproductive cycle with a 23-month pregnancy duration (Ketchen, 1972), the longest known for any vertebrate. Nursery areas along the eastern U.S. are poorly defined but are believed to be in deep water near their wintering grounds (Castro, 2011).
- Reason for FWC Prohibition – In 1998, NMFS determined this species was overfished, and in 2000 implemented more restrictive regulations to reduce fishing effort and promote the rebuilding of the stock. In 2002, ASMFC approved an ISFMP for spiny dogfish, and requested FWC prohibit the harvest of this species since at the time the stock was overfished and relatively rare in Florida. FWC added this species to the Prohibited Species List in 2003.
- Prohibited in federal waters – No. Note: Spiny dogfish is not managed by HMS; instead, it is managed by MAFMC, NEFMC, and ASMFC.

Tiger shark

- Stock status – Unknown. Not individually assessed.
- Pertinent biology/ecology – Tiger sharks have a worldwide distribution in tropical and warm-temperate waters. In the eastern U.S., the species is found from Cape Cod to Florida, the Gulf of Mexico, and the Caribbean Sea. Historically, tiger sharks are year-round residents throughout much of the Florida coast, but today are relatively rare in Florida coastal waters due to past exploitation. Migration patterns exhibit north-south movements along the U.S. east coast with many sharks migrating from the southeast U.S. to the Caribbean and even to South America (Kohler et al., 1998). While the migration patterns of juveniles and adult males are not well understood, they appear to reside year-round in warmer waters of Florida and the Gulf of Mexico.

Pregnant females overwinter around Caribbean islands, then migrate north to the coastal waters of the southeastern U.S. in early spring to give birth in late May and early June (Lea et al, 2015). Tiger sharks are estimated to be mature by seven years for both sexes and are thought to live for at least 27-37 years (Natanson et al., 1999). Aside from knowledge of migration patterns of gravid females, reproduction is poorly understood for the tiger shark. Castro (2011) speculates that the reproductive cycle cannot be annual, and the pregnancy duration is about 12 months (Castro, 2009). Tiger sharks give birth in June and July to a litter size ranging from 18-70 pups, and their pupping grounds cover a large area along the continental shelf ranging from central Florida to the Carolinas (Castro, 2011). Tiger sharks have low reproductive potential due to slow growth rates, late age-at-maturity, and they do not reproduce annually. In Florida, EFH has been identified for newborns from northeast Florida to the Florida Keys on the Atlantic coast, and in coastal and offshore areas of the Gulf of Mexico. Relative to juveniles and adults, EFH has been identified in the Atlantic along the entire east coast of Florida to the Florida Keys. In the Gulf of Mexico, EFH for juvenile/adult tiger sharks includes pelagic and coastal habitats between Tampa Bay, Florida Bay and the Keys, and the edge of the West Florida shelf (HMS, 2017). Tiger sharks are a species where negative interactions with fishermen's catch are known to occur.

- Reason for FWC Prohibition – Following stakeholder comments and Commission direction, FWC held seven public workshops in 2011 to obtain feedback on listing hammerheads and tiger sharks on the Prohibited Species List. Stakeholders supported adding tiger sharks to the Prohibited Species List because of their low reproductive potential and vulnerability to overfishing. At the time of prohibition, studies indicated tiger shark populations had declined by 65-97%. As tiger sharks migrate to EFH in state waters throughout their life cycle, they are particularly susceptible to overexploitation due to fishing pressure in Florida inshore and nearshore waters. As a result, FWC added this species to their Prohibited Species List in 2012.
- Prohibited in federal waters – No.

Whale shark

- Stock status – Unknown; unassessed species.
- Pertinent biology/ecology – Whale sharks are the largest fish in the ocean and are primarily found in tropical offshore waters. Whale sharks are pelagic filter feeders often spotted swimming at the surface (Castro, 1983), and large feeding aggregations have been reported during the summer throughout the Gulf of Mexico (Hoffmayer et al., 2007; Hoffmayer et al., 2021). Tagging studies in the Gulf of Mexico have tracked whale shark movement, indicating these species can move great distances, with some moving at least as far as 4,480 miles. Some individuals were tracked moving through the northern Caribbean Sea to the south Atlantic Ocean (Hueter et al., 2013). Schmidt et al. (2009**)** looked into the genetic variation between geographically distinct populations and found low levels of variation, suggesting gene flow between populations. Although, there is limited information available on the biology and reproductive potential of whale sharks, a study in the Indo-Pacific estimated males mature around 17 years and females between

19-22 years old, and they have an estimated life span of about 80 years (Hsu et al., 2014). Few pregnant females have been examined; one female observed was carrying 300 young in several different stages of development (Hsu et al., 2014). The reproductive cycle, length of pregnancy, and location of nursery habitat remain unknown. Given this uncertainty, EFH for different life stages is unclear, but NMFS has identified waters off western Florida and the central Gulf of Mexico from the Florida panhandle to Texas as EFH that encompasses all life stages (HMS, 2017).

- Reason for FWC prohibition – This species was identified as highly susceptible to overexploitation, and the prohibition on possession was a precautionary measure to ensure a directed fishery did not develop. The biology and life history of this species is unique and more vulnerable to overfishing compared to other large sharks. Following review of the Federal Shark FMP, FWC added whale sharks to the Prohibited Species List in 1992. FWC also wrote a letter to NMFS requesting whale sharks be prohibited in federal waters. NMFS added this species to their prohibited list in 1997.
- Prohibited in federal waters – Yes.

White shark

- Stock status – Unknown; unassessed species.
- Pertinent biology/ecology – The presence of this species is often sporadic throughout their range, although there are a few known areas where they are seasonally common (e.g., along the coast of California, Australia, South Africa, and New England). In the western Atlantic, they can range from Newfoundland to Florida and into the Gulf of Mexico (Compagno, 1984). Recently, abundance of white sharks has increased in the western North Atlantic, which is linked to increasing seal populations that white sharks prey upon (Skomal et al., 2012; Curtis et al., 2014). Off Florida, white sharks are most common from January through September in the Gulf, and in every month outside of August in the Atlantic (Casey and Pratt, 1985; Curtis et al., 2014). Although the habitat and location of nursery areas are unknown, the occurrence of small and intermediate size white sharks in continental shelf waters of the Mid-Atlantic Bright up through coastal waters of Massachusetts suggest this area may serve as nursery habitat for juveniles (Casey and Pratt, 1985; Curtis et el., 2018). NMFS has identified offshore and inshore waters around Maine, Massachusetts, New York, New Jersey, and from Jacksonville to Cape Canaveral, Florida, as EFH and critical nursery areas (HMS, 2017). Reproductive patterns, including length of reproductive cycle and pregnancy duration, are largely unknown. There has been variability between the estimated age-at-maturity in past studies, with ages ranging from 9-14 years. (Casey and Pratt, 1985; Cailliet et al., 1985; Uchida et al. 1996). However, more recent studies have estimated age-at-maturity for male and female white sharks to be 26 and 33 years, respectively (Natanson and Skomal, 2015).
- Reason for FWC prohibition – White sharks are scarce, long-lived, apex predators with a limited reproductive potential and are vulnerable to longlines. To prevent the development of a directed fishery or market for this uncommon and possibly seriously depleted species, NMFS prohibited harvest in 1997 and FWC prohibited harvest in 1998.

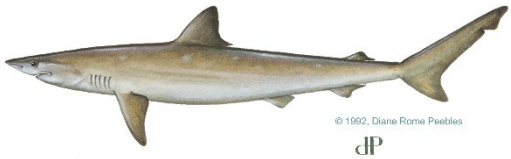
- Prohibited in federal waters – Yes.

FWC HARVESTABLE SHARKS: REGULATORY RATIONALE

In state waters, 15 species are harvestable commercially and 16 are harvestable recreationally. The numbers differ because shortfin mako sharks may not be commercially harvested in state waters (*see Appendix 2 for list of harvestable species in Florida*).

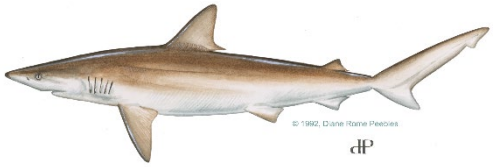
Allowing harvest of shark species is considered on a species-by-species basis, with stock status criteria and pertinent biological/ecological information ultimately driving science-based regulations. Below is a detailed overview of each harvestable species in Florida state waters, including current stock status, pertinent biology/ecology, and management considerations (*see Appendix 5 for more information on stock status for select species managed by HMS*). Note: there are separate Gulf of Mexico and Atlantic stocks for some species, and those separate stock statuses are noted below. Commercial landings data from HMS, where available, are described at the stock level (e.g., Atlantic and Gulf of Mexico). Data used to determine which species are targeted recreationally in Florida were derived from the Marine Recreational Information Program (MRIP). However, MRIP intercepts with shark landings are relatively infrequent and may not capture all harvestable species. As a result, error associated MRIP data can be quite high for sharks (e.g., > 100%) and species-specific landings data from the recreational sector were not used in this report. However, combined data for all recreationally caught sharks was used in a limited fashion.

Atlantic sharpnose shark



- Stock status – Not overfished and overfishing not occurring in the Gulf of Mexico and Atlantic based on 2013 federal standard stock assessment.
- Pertinent biology/ecology – Relatively small (max size: 32 in.) and fast growing; multiple Florida estuaries and bays have been identified as essential juvenile habitat (Bethea et al., 2014); annual reproductive cycle (Castro, 2011).
- Management considerations – Targeted by recreational and commercial fishermen in Florida waters; species with the highest commercial landings in the non-blacknose small coastal shark complex in the Gulf of Mexico and Atlantic; considered to be above target population levels (NOAA); 2015-2019 commercial landings averaged 98,267 pounds/year throughout the Gulf of Mexico (Texas to west Florida); 2015-2019 commercial landings averaged 256,279 pounds/year throughout the Atlantic (east Florida to Maine).
- Harvestable in federal waters – Yes.

Blacknose shark



- Stock status – Unknown in the Gulf of Mexico; overfished and overfishing is occurring in the Atlantic based on a federal 2011 benchmark stock assessment. Estimated time to rebuild in the Atlantic stock is 30 years, around year 2043.

- Pertinent biology/ecology – Found year-round off Florida; reproductive cycle, age-at-maturity, and life span varies between Gulf of Mexico and Atlantic (Castro, 2011; Hendon et al., 2014); EFH identified for YOY and juveniles in the Gulf of Mexico (Carlson et al., 2003; Hueter and Tyminski, 2007).
- Management considerations – Fishery not expected to be rebuilt until 2043 in the Atlantic; bycatch in shrimp trawls and other fisheries is highest source of mortality; targeted by recreational and commercial fishermen in Florida waters; 2015-2019 commercial landings averaged 700 pounds/year throughout the Gulf of Mexico (Texas to west Florida); 2015-2019 commercial landings averaged 168,706 pounds/year throughout the Atlantic (east Florida to Maine).
- Harvestable in federal waters – Yes.

Blacktip shark

- Stock status – Not overfished and overfishing not occurring in the Gulf of Mexico based on a federal 2020 benchmark stock assessment; Unknown in Atlantic based on federal 2018 update stock assessment.
- Pertinent biology/ecology – Migrate seasonally in large schools; 2-year reproductive cycle; pupping and nursery grounds in Florida considered EFH (Adams and Paperno, 2007; ASMFC, 2008).
- Management considerations – Species where negative interactions with fishermen's catch are known to occur; considered to be above target population levels (NOAA); targeted by recreational and commercial fishermen in Florida waters; 2015-2019 commercial landings averaged 519,247 pounds/year throughout the Gulf of Mexico (Texas to west Florida); 2015-2019 commercial landings averaged 168,706 pounds/year throughout the Atlantic (east Florida to Maine).
- Harvestable in federal waters – Yes.

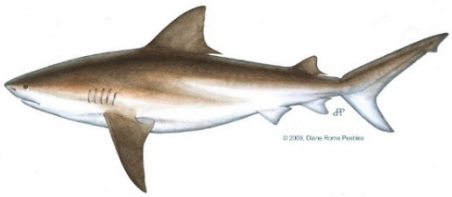
Blue shark

- Stock status – Not overfished and overfishing not occurring in Atlantic based on an ICCAT 2015 stock assessment. An upcoming assessment is scheduled to occur in 2022.
- Pertinent biology/ecology – Pelagic species not commonly found in Florida waters; migratory patterns can cover >600 miles (Queiroz et al., 2005); unknown reproductive cycle.
- Management considerations – Rarely targeted recreationally and commercially in Florida waters but is common bycatch in longline and driftnet fisheries; high degree of uncertainty in stock assessment and should be interpreted with caution; 2015-2019 commercial landings averaged 1,498 pounds/year throughout the Atlantic (east Florida to Maine).
- Harvestable in federal waters – Yes.

Bonnethead shark

- Stock status – Unknown in the Gulf of Mexico and Atlantic following a federal 2013 stock assessment. Next assessment (date TBD) will likely split this species into two different stocks (Gulf of Mexico and Atlantic).
- Pertinent biology/ecology – Do not exhibit long-distance migratory behavior (Lombardi-Carlson, 2007); short pregnancy duration (4.5-5 months); high site fidelity and annual reproductive cycle (Driggers et al., 2014; Gonzalez De Acevedo, 2014); several pupping and nursery grounds found in Florida state waters (Hueter and Tyminski, 2007; McCandless et al., 2002).
- Management considerations – Likely separate stocks between the Gulf of Mexico and Atlantic; commonly targeted by recreational and commercial fishermen in Florida waters; 2015-2019 commercial landings averaged 574 pounds/year throughout the Gulf of Mexico (Texas to west Florida); 2015-2019 commercial landings averaged 4,134 pounds/year throughout the Atlantic (east Florida to Maine).
- Harvestable in federal waters – Yes.

Bull shark



- Stock status – Unknown in the Gulf of Mexico and Atlantic; unassessed at the species level.
- Pertinent biology/ecology – 2-year reproductive cycle; 12-month pregnancy duration (Clark and von Schmidt, 1965; Jensen, 1976); several known pupping and nursery grounds in Gulf of Mexico and Atlantic coasts (Adams and Paperno, 2007; Hueter and Tyminski, 2007).
- Management considerations – Species where negative interactions with fishermen's catch are known to occur; targeted by recreational and commercial fishermen in Florida waters; 2015-2019 commercial landings averaged 172,661 pounds/year throughout the Gulf of Mexico (Texas to west Florida); 2015-2019 commercial landings averaged 27,306 pounds/year throughout the Atlantic (east Florida to Maine).
- Harvestable in federal waters – Yes.

Common thresher shark

- Stock status – Unknown; unassessed species.
- Pertinent biology/ecology – Generally not common south of Cape Canaveral due to preference for cool water (Castro, 2011); essential fish habitat off east-central Florida (Young et al., 2016); likely does not reproduce annually (Natanson and Gervelis, 2013).
- Management considerations – Not a species where interactions with fisher's catch are an issue; most landings come from North Atlantic and not commonly targeted by recreational

and commercial fishermen in Florida; 2015-2019 commercial landings averaged 65,529 pounds/year throughout the Atlantic (east Florida to Maine).
- Harvestable in federal waters – Yes.

Finetooth shark

- Stock status – Not overfished and overfishing not occurring based on federal 2007 benchmark stock assessment. Next assessment (date TBD) will likely split this species into two different stocks (Gulf of Mexico and Atlantic).
- Pertinent biology/ecology – Found in coastal/nearshore waters and estuaries; mating occurs in April – May and pupping occurs May – June; annual reproductive cycle in Gulf and 2-year reproductive cycle in Atlantic; pregnancy duration is about 12 months (Castro, 1993; Hendon et al., 2014; Brown, 2015).
- Management considerations – Targeted recreationally and commercially in Gulf of Mexico and Atlantic waters; 2015-2019 commercial landings averaged 60,180 pounds/year throughout the Gulf of Mexico (Texas to west Florida); 2015-2019 commercial landings averaged 12,198 pounds/year throughout the Atlantic (east Florida to Maine).
- Harvestable in federal waters – Yes.

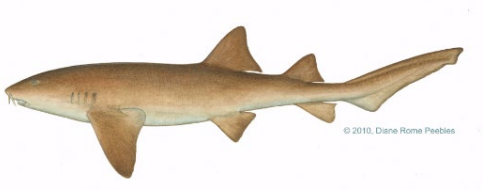
Florida smoothhound shark

- Stock status – Not overfished and overfishing not occurring in Gulf of Mexico based on federal 2015 benchmark stock assessment.
- Pertinent biology/ecology – Can be seasonally common in December – April along shallow coastal waters of the west coast of Florida (Castro, 2011); biology/ecology is poorly understood.
- Management considerations – Data poor species; not commonly targeted by recreational or commercial in Florida waters; no landings in 2016-2017 in the Gulf of Mexico (Texas to west Florida).
- Harvestable in federal waters – Yes.

Gulf smoothhound shark

- Stock status – Not overfished and overfishing not occurring in Gulf of Mexico based on federal 2015 benchmark stock assessment.
- Pertinent biology/ecology – Only observed from Panama City, Florida, to Bay of Campeche, Mexico (Heemstra, 1997); biology/ecology poorly understood.
- Management considerations – Data-poor species; not commonly targeted by recreational or commercial in Florida waters; no landings in 2016-2017 in the Gulf of Mexico (Texas to west Florida).
- Harvestable in federal waters – Yes.

Nurse shark



- Stock status – Unknown; unassessed species.
- Pertinent biology/ecology – Connectivity between coastal waters of west Florida and Florida Keys to mating grounds in the Dry Tortugas (Pratt et al., 2018); 2-year reproductive cycle and 5-6-month pregnancy period (Castro, 2011); coastal waters of Florida designated as EFH.
- Management considerations – Not a species where interactions with fishermen's catch are an issue; sometimes targeted by recreational fishermen, but rarely targeted commercially in Florida waters; 2015-2019 commercial landings averaged 79 pounds/year throughout the Gulf of Mexico (Texas to west Florida); 2015-2019 there were no landings in the Atlantic (east Florida to Maine).
- Harvestable in federal waters – Yes.

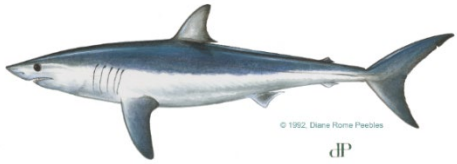
Oceanic whitetip shark

- Stock status – Unknown; unassessed species. Listed as Threatened under the Endangered Species Act in 2018.
- Pertinent biology/ecology – Long-lived, slow-growing, late maturing (D'Alberto et al., 2016); 2-year reproductive cycle with a 10-12-month pregnancy duration (Castro, 2011); strictly pelagic.
- Management considerations – Only shark species found in Florida waters that is ESA-listed; FWC regulations may warrant further evaluation due to ESA-listing; recent evidence suggests most populations are still experiencing levels of decline due to continued fishing pressure and associated mortality; rarely targeted by recreational and commercial fishermen in Florida waters; 2015-2019 commercial landings averaged 0 pounds/year throughout the Atlantic (east Florida to Maine).
- Harvestable in federal waters – Yes.

Porbeagle shark

- Stock status – Overfished and not undergoing overfishing in Atlantic based on an ICCAT 2020 stock assessment. Estimated time to rebuild is 100 years, around year 2108.
- Pertinent biology/ecology – Primarily found in the north Atlantic with the southernmost extension of its range occurring in New Jersey (Castro, 2011).
- Management considerations – Current rebuilding plan ends in 2108; zero landings in Gulf of Mexico; does not occur in waters off Florida and rarely targeted by recreational and commercial fishermen; and therefore, any regulatory changes would have a minimal impact on the fishery; 2015-2019 commercial landings averaged 811 pounds/year throughout the Atlantic (east Florida to Maine).
- Harvestable in federal waters – Yes.

Shortfin mako shark (recreational harvest only)



- Stock status – Overfished and overfishing is occurring based on an ICCAT 2017 stock assessment. Estimated time to rebuild is 12 years but is being reevaluated.
- Pertinent biology/ecology – Pelagic species ranging from New England to Texas; reproduction is poorly understood but thought to have a 3-year reproductive cycle and an 18-month pregnancy duration (Cailliet et al., 2009).
- Management considerations – Recent changes to retention regulations (e.g., recreational minimum size limit increase, commercial retention restricted to shortfin makos dead at haul back in federal waters); overfished and overfishing status warrants caution in relaxation of regulations; occasionally can be targeted by recreational and commercial fishermen in Florida, but increased restrictions throughout the eastern U.S. have reduced landings; 2015-2019 commercial landings averaged 119,767 pounds/year throughout the Atlantic (east Florida to Maine).
- Harvestable in federal waters – Yes. In commercial fishery, harvest is only allowed if shark is dead upon haul back in longline and gill net gear.

Smooth dogfish

- Stock status – Not overfished and overfishing not occurring in Atlantic based on federal 2015 stock assessment.
- Pertinent biology/ecology – Seasonally abundant from Cape Cod to South Carolina and can range southward to central Florida during colder months (Conrath et al., 2002); annual reproductive cycle with 10-month pregnancy duration (Castro, 2011).
- Management considerations – Smooth dogfish are not commonly found in Florida waters and are not commonly targeted by recreational and commercial fishermen in Florida; and therefore, any regulatory change would have a minimal impact of the fishery; 2016-2019 commercial landings averaged 811,850 pounds/year throughout the Atlantic (east Florida to Maine); no landings in the Gulf of Mexico (Texas to west Florida).
- Harvestable in federal waters – Yes.

Spinner shark

- Stock status – Unknown; unassessed species.
- Pertinent biology/ecology – Poorly understood reproductive cycle with pregnancy duration of 11-12 months (Branstetter, 1981); poorly known nursery habitat but appears to extend over a wide area from South Carolina to Florida (Castro, 2011).
- Management considerations – Species where negative interactions with fishermen's catch are known to occur; 2015-2019 commercial landings averaged 60,397 pounds/year throughout the Gulf of Mexico (Texas to west Florida); not commonly targeted by recreational fishermen but targeted by commercial fishermen; 2015-2019 commercial landings averaged 47,890 pounds/year throughout the Atlantic (east Florida to Maine).
- Harvestable in federal waters – Yes.

FLORIDA'S COMMERCIAL FISHERY OVERVIEW AND LANDINGS

The commercial shark fishery in the eastern U.S. targets several different species. There are a variety of gear that can be used, and the optimal fishing method varies by the targeted species, area fished, and harvester's preference. The most common gear utilized in the eastern U.S. are longlines and gill nets, although other gear include seines, trawls, and hook-and-line.

Florida's commercial shark fishery is highly regulated in both state and federal waters (*see Federal and State Shark Management Overview sections)*. Commercial shark fishermen in Florida state waters are required to have the state's commercial fishing license (Saltwater Products License) and a federal permit to commercially harvest sharks. In state waters, commercial fishermen are subject to strict regulations, including a daily limit of one shark per person with a maximum of two sharks per vessel and the only allowable gear is hook-and-line. In federal waters, fishermen are required to have a federal permit and the daily retention limits vary by permit type, region, and shark management group. Although retention limits are set at the beginning of the year, they can be adjusted throughout the fishing year based on available quota (*see HMS Commercial Compliance Guide and HMS website for most up to date retention limits and closures*). Due to the more restrictive regulations in Florida state waters, the vast majority of Florida's commercial shark harvest occurs in Florida federal waters (> 99.4% over the past 5 years) (*see Figure 2*).

In state waters, there is a very limited hook-and-line fishery that is likely primarily a bycatch or opportunistic fishery when harvesters are targeting other species (e.g., Spanish mackerel). This small amount of harvest is likely attributed to the more restrictive regulations in state waters compared to federal waters. Harvest is unlikely to significantly increase if the state were to increase harvest opportunities due to the prohibition of longlines and gill nets in state waters. The top shark species commercially harvested in state waters over the past five years are blacktip, shortfin mako, bull, bonnethead, and Atlantic sharpnose sharks (*Note: recent changes to federal shortfin mako regulations have impacted commercial state harvest. See FWC Prohibited Species: Regulatory Rationale section for more details*). The top species commercially harvested in Florida federal waters is similar to those harvested in state waters; however, there are differences since some species can be harvested in federal waters, but not in state waters (*see FWC Prohibited Species: Regulatory Rationale section for more details*). Top species harvested in federal waters over the past five years are blacktip, sandbar, bull, Atlantic sharpnose, and tiger sharks.

Sharks represent a unique resource in that virtually the entire organism can be used. The meat, fins, liver, and teeth each have an important commercial value. In Florida, the greatest overall value comes from the meat and fins; however, fins are the most valuable part of the shark by weight. In general, the total value of a shark is highly variable and depends on the species and size. For example, shark species that make up the highest food value are generally smaller, coastal species, but they typically have smaller, lower-value fins. In Florida, the species with the highest meat value are Atlantic sharpnose, bonnetheads, blacktips, spinners, blacknose, and lemon sharks. However, larger species like hammerhead, sandbar, and thresher sharks have the largest and most valuable fins. The demand for shark meat and fins has fluctuated over the years, and the market for these products has trended downward in more recent years (*see Figure 2 and Table 3*).

Due to the fluctuations in the market and restrictive shark regulations, many commercial shark fishermen are "portfolio" fishermen, meaning they target a variety of marine species

throughout the year. For these fishermen, harvesting and selling all parts of a shark are important and allow them to fill in gaps during the fishing year when other fisheries' seasons are closed or quotas have been met. According to HMS, eastern U.S. shark landings are at all-time low (HMS, 2021b). The number of active federal shark permit holders has declined as well as the number of trips landing and targeting sharks (HMS, 2021b). Additionally, shark product prices, revenues to fishermen and dealers, and trade in shark products have dropped (HMS, 2021b).

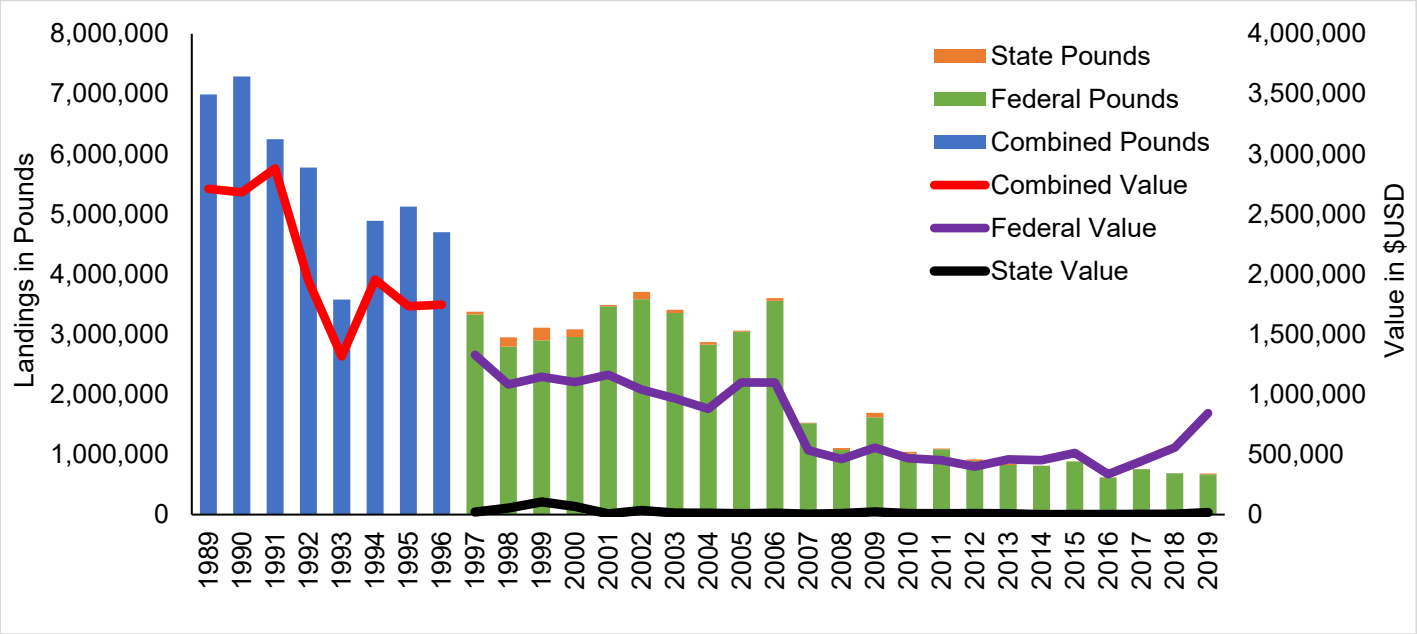


Figure 2. Florida Commercial Shark Landings (State and Federal Waters), 1989-2019. (Source: FWC Trip Ticket System) Note: Prior to 1997, many commercial landings did not specify the area fished on the commercial trip ticket or those areas were incorrectly reported as being from state waters. Some fields on the trip ticket, such as area fished, did not become mandatory to report until 1995. Therefore, to deal with potentially confusing or ambiguous data, those landings have been combined as both state and federal landings (blue bar).

Table 3. Total Florida Commercial Shark Landings and the Ex-vessel Value of Shark Meat and Fins Per Year. Ex-vessel value is the price the fisher gets from the wholesale dealer when he/she unloads the vessel. *2020 data are preliminary.

Year	Total Shark Landings (in pounds)	Shark Meat Value	Shark Fins Value
2007	1,546,443	$544,393	$1,008,784
2008	1,116,856	$474,453	$599,903
2009	1,693,436	$579,866	$973,856
2010	1,043,532	$477,677	$563,855
2011	1,100,336	$460,202	$623,882
2012	920,089	$409,057	$351,798
2013	844,114	$468,738	$220,925
2014	812,212	$453,143	$282,453
2015	886,343	$514,099	$389,160
2016	619,488	$336,923	$355,337
2017	758,549	$446,237	$339,275
2018	689,805	$561,022	$374,264
2019	684,745	$861,618	$469,139
2020*	443,574	$287,399	$187,677

FLORIDA'S RECREATIONAL FISHERY OVERVIEW AND LANDINGS

There are many aspects to the recreational shark fishery in Florida, including private vessel-based and shore-based fishing; for-hire trips; and HMS tournaments. The recreational fishery is primarily catch-and-release; however, some recreational fishermen harvest sharks for food. These sharks are primarily the same high-valued meat sharks targeted by the commercial fishery (e.g., Atlantic sharpnose, bonnethead, blacktip, spinner, and blacknose sharks).

Similar to the commercial fishery, the recreational shark fishery is highly regulated in state and federal waters. In state waters, private recreational anglers are required to have a recreational fishing license and for-hire operations need a charter captain or charter boat license if operating from a vessel. Additionally, if fishing from shore, a no-cost, annual SBSF permit and FWC's Shark-Smart Shark Fishing educational course are required. In recent years, there has also been an increase in shore-based guide operations targeting sharks. Since this activity occurs from shore, these captains are not required to have a state charter captain or boat license. However, these guides and their customers are still required to have the SBSF permit and complete the educational course. The recreational bag limit is one shark per person with a maximum two sharks per vessel, and many shark species are subject to a minimum size limit of 54-inches FL (*see Appendix 3 for outline of state and federal recreational regulations*). Hook-and-line is the only allowable gear, and, if using natural bait, non-stainless-steel, non-offset circle hooks are required.

If fishing in federal waters, federal vessel permits are required for both private anglers and for-hire operations. Additionally, recreational fishermen are required to obtain a shark endorsement, which requires completing an online shark identification and fishing regulation course and quiz. Bag limits vary by species, with a one shark per vessel limit for most species, and size limits apply for most sharks (*see Appendix 3 and HMS Recreational Compliance Guide for more specific species regulations*).

Other components of this fishery include SBSF and recreational shark tournaments. SBSF in Florida has grown in popularity in recent years, and it occurs from beaches, bridges, piers, and other shore-based structures. This fishery targets large and small coastal sharks that are commonly found close to shore. Additionally, recreational shark tournaments are popular fishing events that offer prizes for catching sharks that fit within the tournament's defined categories (e.g., largest shark). These tournaments can occur from shore or a vessel and often promote catch-and-release fishing; however, some sharks caught in tournaments are harvested. If a tournament targeting sharks or other HMS species occurs in federal waters, the tournament must be registered with HMS as an Atlantic HMS Tournament, and all anglers participating must be fishing from a vessel with a HMS federal vessel permit. Tournaments occurring from shore or in Florida state waters are encouraged, but not required, to register with HMS. Along the eastern U.S., Atlantic HMS Tournaments primarily target pelagic sharks, followed by large coastal, small coastal, and smoothhound sharks (*see Appendix 4*; HMS, 2021a). In 2019, Atlantic HMS Tournaments along Florida's Atlantic coast comprised 5% of the total eastern U.S. shark tournaments, and very few registered tournaments occurred along Florida's Gulf coast (HMS, 2021a).

According to HMS, the recreational shark fishery is primarily catch-and-release and largely incidental for most species along the eastern U.S. (HMS, 2020b). Additionally, in recent years directed for-hire and shore efforts for sharks have remained steady, while directed private boat effort has declined throughout the eastern U.S. (HMS, 2020b).

Recreational shark landings from Florida's state and federal waters vary but have decreased since 2016 (Figure 2). It should be noted that MRIP intercepts with shark landings are relatively infrequent and may not capture all harvestable species. As a result, the percent standard error (PSE) can be quite high for some species and years, indicating a lack of precision in the landings estimates. The most harvested species in Florida state and federal waters include Atlantic sharpnose, blacknose, blacktip, bull shark, scalloped hammerhead, nurse, finetooth, and unidentified sharks (MRIP, 2021). Additionally, through conversations with Florida fishermen, bonnethead shark is another commonly harvested species by recreational anglers. Comparatively, for the entire eastern U.S., small coastal sharks, like smoothhounds, Atlantic sharpnose sharks, bonnethead sharks, and smooth dogfish, are the most commonly caught species. However, species identification is a challenge, and in recent years, approximately 50% of released sharks have been reported as unidentified (HMS, 2021b).

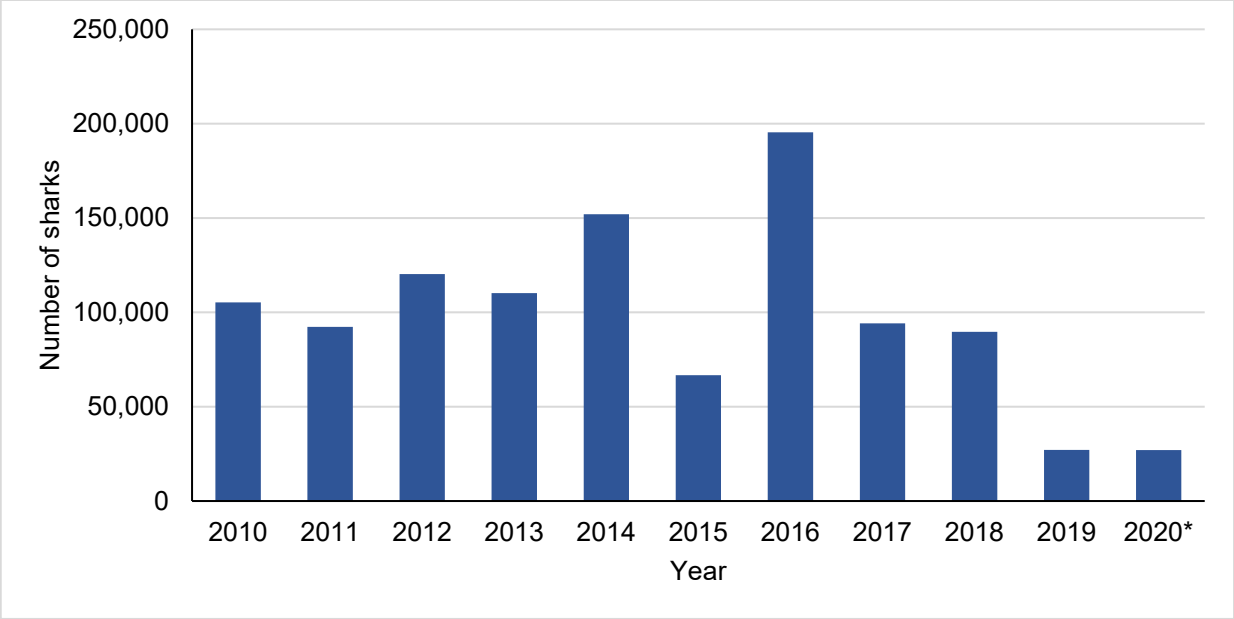


Figure 3. Florida Recreational Shark Landings (State and Federal Waters), 2010-2020. (Source: MRIP). Note: the percent standard error (PSE) for these landings ranged from (28.3 to 107.1). PSE is a value percentage that illustrates how far the estimate is likely to deviate from the actual population value. Therefore, the lower the PSE, the more precise the estimate. *2020 data are preliminary.

NEGATIVE SHARK INTERACTIONS

Successful shark conservation and management at both federal and state levels has led to a preliminary increase in shark numbers as some populations begin to recover. Over the years, there have been increasing reports of shark predation on fishermen's catch, where sharks will partially or completely consume an animal caught by fishing gear before it can be brought on board or after it is released back into the waters. These interactions are not a new phenomenon, and shark predation on fishermen's catch occurs in both commercial and recreational fisheries throughout the Atlantic, Gulf of Mexico, and even globally (Mitchell et al., 2018).

There are a range of biological, economic, and social impacts from these shark interactions. Sharks are opportunistic feeders and can selectively prey on weak or injured animals, including fish caught by fishermen, which can lead to loss of catch and mortality of released fish. Additionally, these interactions can lead to costly losses of valuable fish and gear damage. Furthermore, these interactions can lead to a reduction in fishing efficiency due to lost catch and having to relocate to different fishing grounds to avoid sharks, impacting the overall fishing experience. Finally, these increased and repeated predation interactions can foster an overall negative attitude towards sharks in general.

Some of the commonly reported shark species involved in these predation events in Florida waters include bull, great hammerhead, sandbar, and dusky sharks. Of these species, great hammerhead, sandbar, and dusky sharks are prohibited from harvest in state waters; dusky sharks are prohibited from harvest in federal waters; and commercial sandbar harvest is only allowed under limited circumstances in federal waters. Furthermore, both sandbar and dusky are

under rebuilding plans. Other reported species include silky (prohibited in state waters), blacktip, spinner, blue, and Caribbean reef sharks (prohibited in state and federal waters). However, it is important to keep in mind that in some cases, it is unknown which shark species are responsible for these predation events. Additionally, some of the prey species involved in these interaction events are also under rebuilding plans, such as red snapper, certain grouper species, and blue and white marlin.

The impact of negative shark interactions events is poorly understood due to limited research and reporting. Additional research is needed to quantify the extent of these interactions, types of commercial and recreational fisheries involved, shark and prey species involved, as well as spatial and temporal variations. It should be noted that there is some research and widespread anecdotal reporting that suggest associated learned behavior patterns with sharks (Mitchell et al., 2018). For example, some reports show conditioning with sharks, where sharks associate the presence of fishing boats and the sound of an engine with the availability of easy prey (Labinjoh, 2014; Mitchell et. al., 2018).

More shark interactions with fishermen are likely an outcome of the successful management of sharks and prey, as well as increasing fishing participation. Successful management in the U.S. for both sharks and many fish populations has allowed for some populations to rebuild. The shark's prey base and target fish for fishermen are often the same. Therefore, as both shark and prey populations increase in abundance, shark interactions with fishermen are expected to continue. However, due to the critical role that sharks play in ecosystems and their high vulnerability to overfishing, care should be taken when considering potential management actions.

Federal and State Efforts

Stakeholders have raised concerns and requested the Gulf of Mexico Fishery Management Council, South Atlantic Fishery Management Council, HMS, and FWC address this issue. At the time of this report, there are several items underway to quantify and better understand the negative shark interaction issue among commercial and recreational fisheries in the Gulf of Mexico and South Atlantic. HMS has identified negative shark interactions as a management-based research priority (HMS, 2020a), and has several projects underway. In late Fall 2021, HMS is expected to release a Shark Fishery Review (SHARE) report, which will provide a detailed overview of all aspects of the eastern U.S. shark fishery, identify areas of concern in the fishery (including negative shark interactions), and potential future management actions. Additionally, NMFS has received a Congressional directive to review and report on the issue of shark and dolphin depredation in Gulf of Mexico and South Atlantic fisheries. Specifically, NMFS will aim to quantify the degree to which dolphins and sharks interfere with commercial, charter, and private recreational fishing, and provide recommendations for non-lethal methods to deter dolphins and sharks from interfering with fisheries. This report is expected to be finalized Spring 2022.

Additionally, FWC has been actively trying to better understand stakeholder concerns regarding negative shark interactions. FWC has reviewed and discussed the issue at recent Commission meetings in December 2020 and May 2021. FWC also conducted an exploratory survey of fishermen in March 2021 to better understand the types and frequency of predator interactions with fishermen's catch. This survey was not specific to sharks and included other predatory species such as dolphins, goliath grouper, and birds. Overall, results showed that

predation on fishermen's catch is widespread and that sharks are the most reported predator. Also, at the May 2021 Commission meeting, FWC hosted a roundtable discussion focused on the issue of negative shark interactions when fishing. Panelists included scientists, fishery managers, conservationists, and recreational and commercial fishery representatives. One key takeaway from the roundtable was the concept of shifting baseline syndrome, which can be applied to the recent trend of increased reports of shark interacting with fishermen's catch. The shifting baseline syndrome is described as the change in accepted norms of a resource or ecosystem due to lack of knowledge or memory about its historic condition. As some shark populations rebuild, leading to increased interactions with fishermen, some believe that these increased interactions are a result of an overpopulated stock that is creating ecosystem imbalance. However, this perception is based on observed changes compared to the new baseline for today's generation rather than the historical baseline. Simply put, it is important to consider both the historical fishery conditions prior to exploitation and current fishery conditions as a species recovers to evaluate population changes.

Research is underway in order to better quantify these negative shark interactions in recreational fisheries and identify the shark species and prey involved in these events. For example, NMFS has funded research conducted by Dr. Matt Ajemian (Florida Atlantic University) and Dr. Marcus Drymon (Mississippi State University) to quantify impacts of these events as well as angler attitude and opinions regarding the issue. Specifically, researchers will use onboard surveys, videos, genetic analyses, and social media to help assess the prevalence of negative shark interactions in recreational fisheries, and this work is expected to begin in late 2021. This research, in addition to work by state and federal agencies, will help better characterize these events and hopefully provide recommendations for management next steps and mitigation options to help avoid these interactions. It is important to keep in mind negative shark interactions with fishermen's catch are not a new phenomenon, and likely will always be present in recreational and commercial fisheries.

CONCLUSION

The management of shark populations in Florida and the eastern U.S. has largely been a success story as many shark populations are increasing in abundance (Peterson et al., 2017). Shark fisheries management is clearly complex. The information provided in this document is intended to serve as a regulatory overview of Florida's shark fishery and provide process guidance as well as biological, ecological, and management considerations for species-specific regulations that the Commission may want to consider. It should be noted that there are species where there are not enough data to evaluate the status of a particular stock. In these instances, a conservative regulatory approach may be warranted until more information can be gathered to better evaluate a species' stock status.

Commercial

Should the Commission wish to pursue updates to commercial shark fishing regulations, it is important to understand current constraints and to look at the fishery as a whole in Florida state waters. For example, Florida's commercial shark fishing regulations are generally more conservative than those coordinated by ASMFC and established federal regulations. In Florida state waters, commercial fishermen are bound by recreational possession limits, required to land sharks with the head and fins naturally attached, and restrictive gear requirements (e.g., hook-

and-line only). However, the primary methods for commercial shark harvesters in federal waters are the use of longline and/or gill net, both of which are prohibited from use in state waters. The Commission could consider modifying commercial possession limits; however, current gear restrictions will continue to constrain commercial harvest and effort in state waters.

Recreational

Should the Commission wish to pursue modifying current recreational shark regulations, a petition for conservation equivalency would need to be submitted to ASMFC for most species to explain why Florida is requesting to deviate from any regulations specified in the ISFMP. This petition would need to be supported by relevant biological and ecological information and explain how such an exemption fits within the ASMFC Shark ISFMP objectives. Florida's regulations largely match those of ASMFC; however, there are instances where FWC regulations are different than those required by ASFMC (e.g., recreational blacktip size limit). FWC would not need to petition ASMFC for a conservation equivalency if the Commission wanted to explore allowing the harvest of certain species currently prohibited from harvest in state waters that are allowable to harvest in federal waters. However, as stated in the FWC Prohibited Species: Regulatory Rationale section of this report, it should be noted that large hammerhead shark species (great, scallop, and smooth), tiger sharks, and lemon sharks were added to FWC's Prohibited Species List following a stakeholder-driven process that recognized their unique life history characteristics, vulnerability to exploitation, and the presence of EFH and nursery habitat in state waters.

APPENDICES

Appendix 1. Prohibited Shark Species in Florida State and Federal Waters.

State Waters	Federal Waters
Atlantic angel shark	Atlantic angel shark
Basking shark	Basking shark
Bigeye sand tiger shark	Bigeye sand tiger shark
Bigeye sixgill shark	Bigeye sixgill shark
Bigeye thresher shark	Bigeye thresher shark
Bignose shark	Bignose shark
Caribbean reef shark	Caribbean reef shark
Caribbean sharpnose shark	Caribbean sharpnose shark
Dusky shark	Dusky shark
Galapagos shark	Galapagos shark
Longfin mako shark	Longfin mako shark
Narrowtooth shark	Narrowtooth shark
Night shark	Night shark
Sand tiger shark	Sand tiger shark
Sevengill shark	Sevengill shark
Sixgill shark	Sixgill shark
Smalltail shark	Smalltail shark
Whale shark	Whale shark
White shark	White shark
Tiger shark	
Great hammerhead shark	
Scalloped hammerhead shark	
Smooth hammerhead shark	
Lemon shark	
Sandbar shark	
Silky shark	
Spiny dogfish	
Shortfin mako shark (*comm. harvest only*)	

Appendix 2. Harvestable Shark Species in Florida State and Federal Waters.

State Waters	Federal Waters
Atlantic sharpnose shark	Atlantic sharpnose shark
Blacknose shark	Blacknose shark
Blacktip shark	Blacktip shark
Blue shark	Blue shark
Bonnethead shark	Bonnethead shark
Bull shark	Bull shark
Common thresher shark	Common thresher shark
Finetooth shark	Finetooth shark
Florida smoothhound shark	Florida smoothhound shark
Gulf smoothhound shark	Gulf smoothhound shark
Nurse shark	Nurse shark
Oceanic whitetip shark	Oceanic whitetip shark
Porbeagle shark	Porbeagle shark
Shortfin mako shark *(rec. harvest only*)	Shortfin mako shark
Smooth dogfish	Smooth dogfish
Spinner shark	Spinner shark
	Tiger shark
	Great hammerhead shark
	Scalloped hammerhead shark
	Smooth hammerhead shark
	Lemon shark
	Sandbar shark (*comm. research permit only*)
	Silky shark (*comm. harvest only*)
	Spiny dogfish (*not managed by HMS*)

Appendix 3. List of Harvestable Sharks in Florida and Associated Recreational Regulations by FWC in State Waters and by HMS in Federal Waters (Note: Spiny dogfish is managed by ASMFC, MAFMC, and NEFMC).

<table>
<tr><th rowspan="2">Harvestable sharks in Florida</th><th colspan="2">Minimum Size Limit - inches Fork Length (FL)</th><th colspan="2">Bag/Vessel Limit</th></tr>
<tr><th>State waters (FWC)</th><th>Federal waters</th><th>State waters (FWC)</th><th>Federal waters</th></tr>
<tr><td>Spiny dogfish shark</td><td>Prohibited in state waters</td><td>No minimum size limit</td><td>Prohibited in state waters</td><td rowspan="3">No bag limit</td></tr>
<tr><td>Smooth dogfish</td><td>No minimum size limit</td><td>No minimum size limit</td><td rowspan="15">Aggregate bag/vessel limit: 1 shark per person/2 sharks per vessel total</td></tr>
<tr><td>Florida smoothhound shark</td><td>No minimum size limit</td><td>No minimum size limit</td></tr>
<tr><td>Gulf smoothhound shark</td><td>No minimum size limit</td><td>No minimum size limit</td></tr>
<tr><td>Atlantic sharpnose shark</td><td>No minimum size limit</td><td>No minimum size limit</td><td>1 per person</td></tr>
<tr><td>Bonnethead shark</td><td>No minimum size limit</td><td>No minimum size limit</td><td>1 per person</td></tr>
<tr><td>Blacknose shark</td><td>No minimum size limit</td><td>54 inches</td><td rowspan="13">Aggregate vessel limit: 1 shark per vessel</td></tr>
<tr><td>Finetooth shark</td><td>No minimum size limit</td><td>54 inches</td></tr>
<tr><td>Blacktip shark</td><td>No minimum size limit</td><td>54 inches</td></tr>
<tr><td>Bull shark</td><td>54 inches</td><td>54 inches</td></tr>
<tr><td>Nurse shark</td><td>54 inches</td><td>54 inches</td></tr>
<tr><td>Spinner shark</td><td>54 inches</td><td>54 inches</td></tr>
<tr><td>Blue shark</td><td>54 inches</td><td>54 inches</td></tr>
<tr><td>Common thresher shark</td><td>54 inches</td><td>54 inches</td></tr>
<tr><td>Oceanic whitetip shark</td><td>54 inches</td><td>54 inches</td></tr>
<tr><td>Porbeagle shark</td><td>54 inches</td><td>54 inches</td></tr>
<tr><td>Shortfin mako shark</td><td>83 inches</td><td>71 inches males; 83 inches females</td></tr>
<tr><td>Lemon shark</td><td>Prohibited in state waters</td><td>54 inches</td><td rowspan="5">Prohibited in state waters</td></tr>
<tr><td>Tiger shark</td><td>Prohibited in state waters</td><td>54 inches</td></tr>
<tr><td>Great hammerhead shark</td><td>Prohibited in state waters</td><td>78 inches</td></tr>
<tr><td>Scalloped hammerhead shark</td><td>Prohibited in state waters</td><td>78 inches</td></tr>
<tr><td>Smooth hammerhead shark</td><td>Prohibited in state waters</td><td>78 inches</td></tr>
</table>

Appendix 4. Shark Management Groups and Associated Harvestable Species
(Note: not all species listed below are harvestable in state waters, see *Appendix 2* for details).

Small Coastal Species	Atlantic sharpnose shark Blacknose shark Bonnethead shark Finetooth shark
Large Coastal Species	Blacktip shark Bull shark Nurse shark Spinner shark Lemon shark Great hammerhead shark Scalloped hammerhead shark Smooth hammerhead shark Tiger shark Sandbar shark Silky shark
Pelagic Species	Blue shark Common thresher shark Oceanic whitetip shark Porbeagle shark Shortfin mako shark
Other Species	Smooth dogfish Florida smoothhound shark Gulf smoothhound shark

Appendix 5. HMS Stock Status Information.

Species	Domestic Overfished Status	Domestic Overfishing Status	Years to Rebuild	Last Stock Assessment (Next if scheduled)
Northwest Atlantic porbeagle shark	Overfished	Overfishing is not occurring	100	2020
North Atlantic blue shark	Not overfished	Overfishing is not occurring		2015 (2022)
North Atlantic shortfin mako shark	Overfished	Overfishing is occurring	12	2017
Sandbar shark	Overfished	Overfishing is not occurring	66	2018
Gulf of Mexico blacktip shark	Not overfished	Overfishing is not occurring		2018
Atlantic blacktip shark	Unknown	Unknown		2020
Dusky shark	Overfished	Overfishing is occurring	~100	2016
Scalloped hammerhead shark	Overfished	Overfishing is occurring	10	2009 (2021)
Bonnethead shark - Atlantic stock	Unknown	Unknown		2013
Bonnethead shark - Gulf of Mexico stock	Unknown	Unknown		2013
Atlantic sharpnose shark - Atlantic stock	Not overfished	Overfishing is not occurring		2013
Atlantic sharpnose shark - Gulf of Mexico stock	Not overfished	Overfishing is not occurring		2013
Atlantic blacknose shark - Atlantic stock	Overfished	Overfishing is occurring	30	2011
Atlantic blacknose shark - Gulf of Mexico stock	Unknown	Unknown		2011
Finetooth shark	Not overfished	Overfishing is not occurring		2007
Atlantic smooth dogfish	Not overfished	Overfishing is not occurring		2015
Gulf of Mexico smoothhound shark complex	Not overfished	Overfishing is not occurring		2015

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