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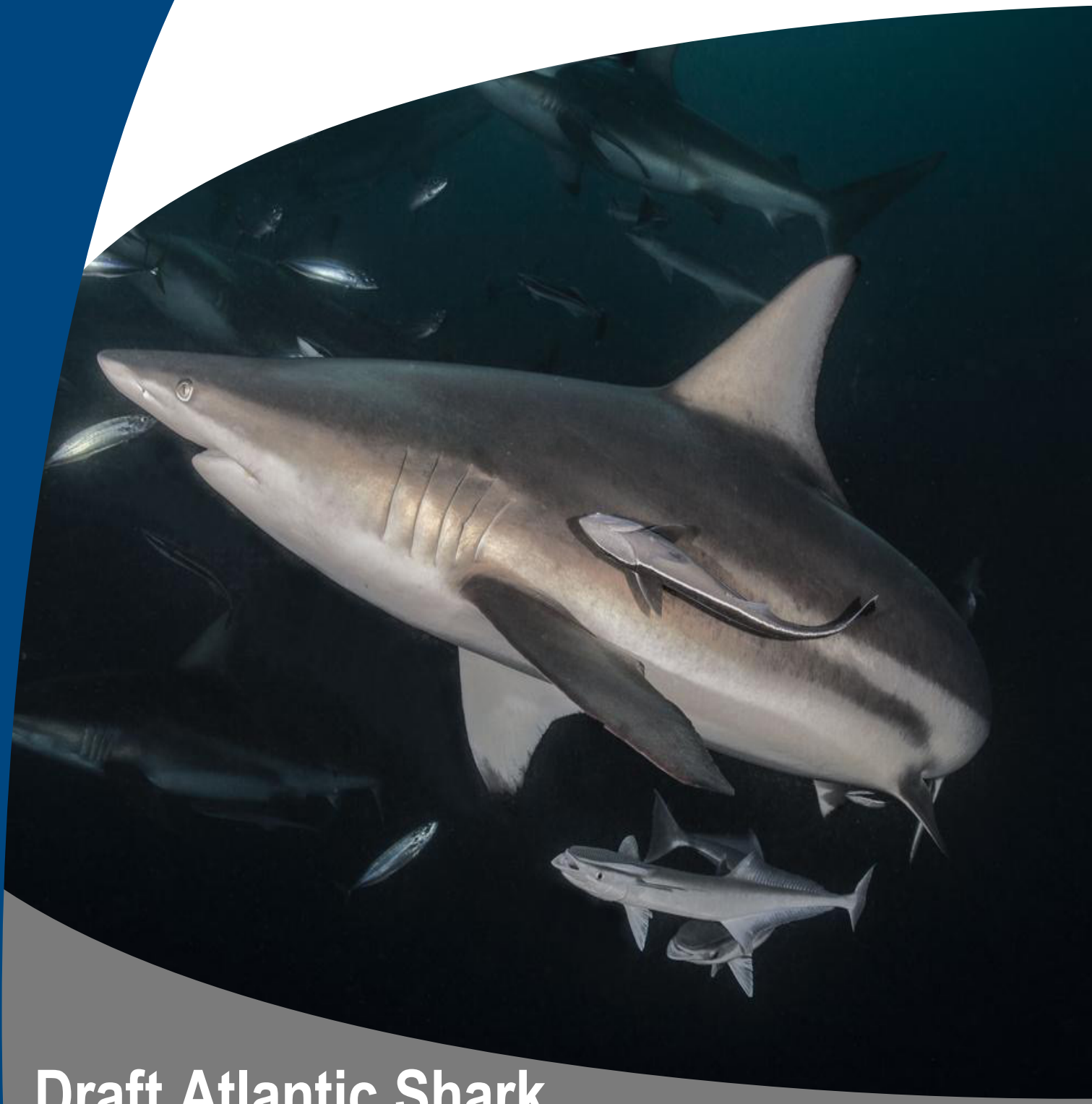

Draft Atlantic Shark Fishery Review (SHARE)

October 2021

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Executive Summary

The purpose of the Atlantic shark fishery review (SHARE) document is to analyze trends within the commercial and recreational shark fisheries to identify main areas of success and concerns with conservation and management measures and find ways to improve management of the shark fishery.

Under the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act), NOAA Fisheries is responsible for the sustainable management of Atlantic Highly Migratory Species (HMS) (16 U.S.C. §1852(a)(3)) and must comply with all applicable provisions of the Act when implementing conservation and management measures for shark stocks and fisheries. Under the Magnuson-Stevens Act, conservation and management measures must prevent overfishing while achieving, on a continuing basis, the optimum yield from each fishery (16 U.S.C. §1851(a)(1)). Where a fishery is determined to be in or approaching an overfished condition, NOAA Fisheries must adopt conservation and management measures to prevent or end overfishing and rebuild the fishery. (16 U.S.C. §§1853(a)(10); 1854(e)). In addition, NOAA Fisheries must, among other things, comply with the Magnuson-Stevens Act's ten National Standards, including a requirement to use the best scientific information available as well as to consider potential impacts on residents of different States, efficiency, costs, fishing communities, bycatch, and safety at sea (16 U.S.C. § 1851 (a)(1-10)). Internationally, the International Commission for the Conservation of Atlantic Tunas (ICCAT) has issued recommendations for the conservation of shark species caught in association with ICCAT fisheries, while the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) has passed measures that place requirements or restrictions on the trade of some shark species and shark fins.

Atlantic shark fisheries have been federally managed since 1993[1]. Unlike stock assessments, which focus on abundance of stocks and their status, SHARE focuses on the overall state of the fishery to assist in determining next steps for management. NOAA Fisheries began this review after noticing certain trends in the fishery. In the commercial fishery, trends include reduced landings, a decrease in active vessels, and an increase in shark discards. In the recreational fishery, trends include an increase in catch and release rates, an increase in effort by state-water or shore-based fishermen, and a decrease in targeted pelagic shark trips.

As such, the purpose of this document is to explore different aspects of the Atlantic shark fisheries to improve stability and resiliency within the fisheries. NOAA Fisheries has identified four objectives for this project: review the current state of the Atlantic shark fishery; identify areas of success in the fishery; identify areas of concern in the fishery; and identify ways to improve the fishery and potential future shark management actions. Based on the results of

[1] Multiple Atlantic shark fisheries are managed by NOAA Fisheries' HMS Management Division, as specified in the list of fisheries and authorized gears at 50 C.F.R. 600.725(v). For ease of reference and simplification, this document refers to "the Atlantic shark fishery" to encompass all the various fisheries and gear types collectively.

analysis in this document and public comments, NOAA Fisheries anticipates that there may be future management changes within the Atlantic shark fishery.

As part of the overview of the current state of the shark fishery, NOAA Fisheries reviewed commercial shark fishery vessel permits, trips targeting or retaining sharks, shark landings, dealer permits, and markets. These data indicate that catch of available quota and participation in the commercial shark fishery has dramatically declined from historical levels. Some ways to reverse this decline in the fishery while still maintaining the successes achieved in rebuilding stocks could be to revise the permit structure by allowing more open access incidental permits to fishermen who are unable to find or afford the limited access permits. In addition, the LCS and blacknose shark retention limits could be revised.

In the recreational shark fishery, NOAA Fisheries reviewed the recent permits with shark endorsements, fishing effort, survey data, and tournament landings. These data indicate increased shark fishing effort by state-water and shore-based fishermen along with the number of sharks being caught and released. Directed trips targeting pelagic sharks and tournament landings have declined since the shortfin mako shark size limits were implemented. Some ways to change the recreational shark fishery could be to revise size or bag limits, improve outreach, and improve data collection. Currently, the minimum size limit of 54 inches forked length that applies to most shark species is based on the size at maturity of sandbar sharks that are currently prohibited from retention. One of the biggest issues of concern in the shark recreational fishery is education on shark identification and handling techniques. Efforts to teach anglers these techniques must also extend beyond shark anglers themselves, as the majority of angler interactions with sharks involve cases of incidental catch.

Shark depredation, which occurs when a shark eats or preys upon fish that are caught on fishing gear, has been a growing concern in a wide variety of commercial and recreational fisheries. While the number of reports of depredation have increased, the underlying cause of the increase is uncertain--it could be due to an increase in the number of sharks as stocks rebuild; a learned behavior by sharks as they recognize motors, fishing techniques, or shark feeding locations as a source of food (this learned behavior is found in other animals such as marine mammals); an increase in the number of people using social media to report the depredation; or any combination of the above. NOAA Fisheries needs to collect more data in cooperation and communication with constituents. Improvements in outreach and education on shark identification could support those future projects. NOAA Fisheries needs additional data on these interactions to determine if specific shark species (dusky, sandbar, blacktip, bull, etc.) are indeed the primary species depredating on commercial and recreational fisheries as many anecdotal reports indicate. Mitigation techniques and technologies should be explored. Studies continue to be conducted on avoidance techniques (e.g., area, timing, etc.) along with deterrent technology.

NOAA Fisheries analyzed the effects of additional factors besides federal shark fishery management including fisheries for other non-HMS species, state regulations, other federal regulations, and binding international recommendations. Based this review, it is likely that other fisheries, state shark fin sale prohibitions, and binding international recommendations have directly and indirectly affected fishing effort and landings. Shark permit holders could be prioritizing other fisheries during the year for economic reasons or timing of peak seasons. State

shark fin bans have improved awareness for the conservation of shark species, but at the expense of the sustainable U.S. commercial shark fishery. Internationally, the United States has been actively participating in negotiations to help rebuild shark stocks worldwide. NOAA Fisheries works with state, federal, and international partners in various domestic and international venues to improve the management of shark stocks. Through these efforts, it can also attempt to increase stability in the shark fishery through sustainable shark quotas, retention limits, and seasonal closures, which may add value to the fishery by allowing for growing markets for shark products. Additionally, increasing NOAA Fisheries' communications about the sustainability of the shark fishery can improve the stability of the shark product market, which could subsequently draw more fishermen to the fishery. Support for the shark fishery through communication and outreach will help to bring awareness to the sustainability of domestically caught shark products. This also aligns with one of the Administration Priorities as well as the draft NOAA Fisheries Strategic Plan 2022-2025. As part of American Rescue Plan Act of 2021 - CARES Act & Consolidated Appropriations Act, the Administration would like to ensure competitiveness in the U.S. seafood industry by exploring ways to rebuild and create a U.S. seafood industry that will be more resilient to future market, environmental, or other shocks. If accomplished, participation in the shark fishery may increase, and a sustainably managed shark fishery will become a larger priority for fishermen that diversify their fishing activities.

Overall, this review has found that NOAA Fisheries is sustainably managing shark stocks; however, the commercial shark fishery is in decline in terms of use of available quota and the number of participants. This decline is happening despite fishermen having available quotas for many species, and, in most regions, an open season year-round. The review has also identified a need in the recreational fishery to improve species identification that could improve shark fishery data, thus improving management overall. Possible changes that could increase the productivity of the commercial shark fishery while remaining consistent with the Magnuson-Stevens Act's conservation requirements and the objectives of the 2006 Consolidated Atlantic HMS FMP include modifications to:

- Vessel permit structure, including changing limited-access shark incidental permits to open-access permits;
- Commercial vessel retention limits for LCS, blacknose, and other shark management groups;
- Regional and sub-regional quotas to better match regional expectations and opportunities;
- Recreational size and bag limits; and,
- Reporting mechanisms to enhance data collection of recreational shark species and shark depredation events.

We anticipate that such modifications would occur via rulemaking, with appropriate opportunity for public comment. Regardless of timing, NOAA Fisheries believes changes to the shark fishery are warranted to improve the overall performance of the fishery and health of shark stocks.

1 Introduction

Under the Magnuson-Stevens Act, NOAA Fisheries is responsible for the sustainable management of Atlantic HMS (16 U.S.C. §1852(a)(3)). NOAA Fisheries must comply with all applicable provisions of the Act in conserving and managing shark fisheries to achieve optimal yield while preventing overfishing (16 U.S.C. §1851(a)(1)). Where a fishery is determined to be in or approaching an overfished condition, NOAA Fisheries must include conservation and management measures to prevent or end overfishing and rebuild the fishery, stock or species (16 U.S.C. §§1853(a)(10); 1854(e)). In addition, NOAA Fisheries must, among other things, consider the Magnuson-Stevens Act's ten National Standards, including a requirement to use the best scientific information available as well as to consider potential impacts on residents of different States, efficiency, costs, fishing communities, bycatch, and safety at sea (16 U.S.C. §1851(a)(1-10)). Internationally, ICCAT has adopted recommendations for the conservation of shark species caught in association with ICCAT fisheries, while CITES has passed measures that place requirements or restrictions on the trade of some shark species and shark fins. The purpose of the SHARE document is to analyze trends within the commercial and recreational shark fisheries to identify main areas of success and concerns with conservation and management measures and find ways to improve management of the shark fishery.

This document constitutes NOAA Fisheries' overview of the Atlantic shark fisheries. Unlike stock assessments, which focus on the status of the shark species, SHARE focuses on the overall state of the fishery to assist in determining next steps for management. NOAA Fisheries began this review after noticing certain trends in the fishery. In the commercial fishery, trends include reduced landings, a decrease in active vessels, and an increase in shark discards. In the recreational fishery, trends include an increase in catch and release rates, an increase in effort by state-water or shore-based fishermen, and a decrease in targeted pelagic shark trips.

Since federal shark management began in 1993, NOAA Fisheries has often handled each regulatory change, usually from results of a stock assessment, on an individual basis. This approach of reacting to and addressing a particular situation at hand has led to the implementation of various regulations which are complex and complicate the ability to adjust to changing times and issues. NOAA Fisheries would like to examine ways to incorporate regulations that can adjust to the changing needs of the fishery on a timelier basis. Such an approach should increase the resiliency of the fishery to adapt to a host of issues including changing stock statuses, climate change, habitat degradation, and changing markets. To achieve this resiliency, in this document NOAA Fisheries considers specific long-term management goals for the shark fishery. These goals, as with all HMS fishery management goals, will be consistent with the Magnuson-Stevens Act, other applicable laws, and the objectives of the 2006 Consolidated Atlantic HMS FMP (2006 HMS FMP) and its amendments, including rebuilding overfished stocks, preventing overfishing, and achieving optimum yield.

As such, the purpose of this document is to identify main areas of success and concerns, and find potential ways to improve the management of the shark fishery. Based on the results and public comments on this document, NOAA Fisheries anticipates proposing future management changes within the Atlantic shark fishery. NOAA Fisheries requests public input through comments on

this document, particularly on the potential short-term and long-term changes to the Atlantic shark fishery described herein, as well as on any other potential future changes. Written comments on this document should be submitted via the Federal e-Rulemaking Portal (NOAA-NMFS-2021-0027) by January 3, 2022. For further information, contact Guý DuBeck, or Karyl Brewster-Geisz at (301) 427-8503.

Background

This document focuses on reviewing the overall Atlantic shark fishery from 2014 through 2019. In Amendment 6 to the 2006 Consolidated HMS FMP (80 FR 50073; August 18, 2015), which took a comprehensive look at the shark fishery, NOAA Fisheries used data ranging from 2008 through 2013. Management measures in Amendment 6 were designed to respond to the problems facing the Atlantic commercial shark fishery at that time, such as commercial landings that exceeded the quotas, declining numbers of fishing permits since limited access was implemented, complex regulations, derby fishing conditions due to small quotas and short seasons, increasing numbers of regulatory discards, and declining market prices. Amendment 6 accomplished some of those objectives; commercial landings have not exceeded quotas since 2015, the majority of the quotas remain open year-round, and market prices have stayed consistent. However, there is still an issue with the decline in active permit holders and revenue from the commercial shark fishery, as well as with complex regulations resulting in regulatory discards and a need to consider or identify any issues within the recreational fishery.

Another reason for starting the current review with 2014 data is NOAA Fisheries' confidence in the commercial landings data from NOAA Fisheries' electronic dealer reporting program, known as eDealer, while that program was being implemented. On August 8, 2012, NOAA Fisheries published a final rule (77 FR 47303) that modified existing HMS dealer reporting regulations for Atlantic sharks, swordfish, and bigeye, albacore, yellowfin, skipjack (BAYS) tunas. Starting on January 1, 2013, all HMS dealers were required to report commercially-harvested Atlantic sharks, swordfish, and BAYS tunas through a NOAA Fisheries-approved electronic reporting program on a weekly basis (Sunday through Saturday) no later than midnight, local time, of the first Tuesday following the end of the reporting week. These changes to reporting protocols were challenging for many shark dealers, transitioning from biweekly paper reporting to weekly, trip-level electronic reporting. This steep learning curve in addition to technical issues with the program in the beginning of 2013 resulted in some concerns regarding the first few months of 2013 data. Thus, the confidence level in the 2013 data is not has high as the confidence level in the data since.

As appropriate, NOAA Fisheries includes data from 2014 through 2019 as representative of recent trends. Such historical data include commercial market prices (which can show changes in the fishery following implementation of newer regulations) and recreational length data (which can be used to help improve the sample size of data for some shark species). In addition, NOAA Fisheries uses more recent data (2020), such as permit data for commercial fishermen and dealers along with recreational shark endorsement permit data, when the final data are available.

As part of the overview of the current state of the shark fishery, NOAA Fisheries reviewed commercial shark fishery vessel permits, trips targeting or retaining sharks, shark landings,

dealer permits, and markets. In the recreational shark fishery, NOAA Fisheries reviewed recent permits with shark endorsements, fishing effort, survey data, and tournament landings. Additionally, shark depredation---a shark eating or preying upon fish that are caught on fishing gear--has been a growing concern in a wide variety of commercial and recreational fisheries. NOAA Fisheries has received a substantial amount of formal and informal correspondence, along with requests from the South Atlantic and Gulf of Mexico Fishery Management Councils, about the shark depredation issue. Additionally, Congress has directed the Agency to assess and better understand the occurrence of conflicts between sharks and commercial, for-hire, and recreational fishing vessels in the Gulf of Mexico and South Atlantic including the degree to which it occurs and any recommendations for non-lethal methods to deter sharks from interfering with commercial, for-hire, and recreational fishing, in accordance with existing laws. As such, this document includes background information on the shark depredation issue, a review of the extent of depredation, and available data. Lastly, NOAA Fisheries reviewed additional factors that may impact the shark fishery, such as timing of other fisheries and binding international recommendations. NOAA Fisheries anticipates that this information will help inform the public on the state of the fishery and provide recommendations to improve stability and resiliency in the shark fishery.

Objectives

NOAA Fisheries is exploring different aspects of the Atlantic shark fishery to improve stability and resiliency within the fishery. NOAA Fisheries has identified the following objectives:

- Review the current state of the Atlantic shark fishery;
- Identify areas of success in the fishery;
- Identify areas of concern in the fishery; and
- Identify ways to improve the fishery and potential future shark management actions.

NOAA Fisheries will consider public comments on this document as well as input from consulting parties prior to identifying potential management measures to adjust in the future.

History of the Atlantic Shark Fishery

Atlantic HMS fisheries are managed directly by the Secretary of Commerce, rather than through a fishery management council, under provisions of the Magnuson-Stevens Act. 16 U.S.C. 1852(a)(3). That authority was delegated to NOAA Fisheries. HMS are defined in the Magnuson-Stevens Act to be tuna species, marlin (*Tetrapturus* spp. and *Makaira* spp.), oceanic sharks, sailfishes (*Istiophorus* spp.), and swordfish (*Xiphias gladius*). The HMS Management Division within NOAA Fisheries' Office of Sustainable Fisheries develops regulations for Atlantic HMS fisheries. Because of their highly migratory nature, HMS fisheries require management at the international, national, and state levels.

NOAA Fisheries manages U.S Atlantic HMS fisheries in federal waters (domestic) and the high seas (international), while individual states establish regulations for some HMS in their own waters. However, there are exceptions to this generalization. For example, as a condition of their

permit, federally-permitted shark fishermen are required to follow federal regulations in all waters, including state waters, unless the state has more restrictive regulations, in which case the state regulations prevail. Additionally, in 2005, the Atlantic States Marine Fisheries Commission (ASMFC) developed an interstate coastal shark fishery management plan (interstate shark FMP). The interstate FMP coordinates management measures at the state level among all states along the Atlantic coast (Florida to Maine) and promotes state and federal cooperation on complementary fishery regulations throughout the species' range. NOAA Fisheries participated in the development of the ASMFC's interstate shark FMP, which became effective in 2010. States are invited to send representatives to HMS Advisory Panel meetings and to participate in stock assessments, public hearings, or other fora. NOAA Fisheries continues to work on improving its communication and coordination with state agencies and welcomes comments from states about various shark measures.

In 1993, NOAA Fisheries finalized the first FMP for Sharks of the Atlantic Ocean (58 FR 21931; April 26, 1993) (1993 FMP). The 1993 FMP established many of the management measures for Atlantic sharks that are the basis for those in place today, including permitting and reporting requirements, management complexes, commercial quotas, and recreational bag limits. The majority of those management measures are a direct result of Atlantic shark stock assessments. NOAA Fisheries has continued to implement various management measures for the Atlantic shark fishery, including revised quotas, management groups, and a mechanism for establishing annual catch limits (ACLs). For more detailed information, please refer to the FMP amendments, individual rulemaking, or 2020 SAFE Report. Below is an outline of the shark stock assessments along with FMP amendments and other rules that affected the development of conservation and management measures in the commercial and recreational fisheries. NOAA Fisheries separated out the management history by commercial and recreational management measures to help show all of the changes that have impacted the different sectors.

1. Stock Assessments

The first shark stock assessment used for management purposes was conducted in 1992. That assessment formed the basis for the 1993 Shark FMP. Starting in the early 2000s, NOAA Fisheries began using the SouthEast Data, Assessment and Review (SEDAR) stock assessment process for most domestic assessments. SEDAR assessments have previously been classified as benchmark-type, standard-type, or update-type assessments. More recently, SEDAR assessments have been classified as either research track or operational assessments. These new classifications apply to future assessments undertaken under this new scheme; older assessments will remain as previously classified. Research track assessments are similar to benchmark assessments, in that they are peer reviewed and have numerous opportunities for public input; and are used to develop the tools, data, and models used in the stock assessment process. Research track assessments are not used to provide management advice. Instead, they establish the foundations for operational assessments that do provide management advice. Operational assessments, which may include procedures similar to the previous standard-type and update-type assessments, use previously approved methods and data sources to provide management advice quickly and efficiently. The major differences between research track and operational assessments are summarized in Table 2 of the best scientific information available (BSIA) framework for Atlantic Highly Migratory Species (HMS) stock assessments and stock status

determinations (https://www.fisheries.noaa.gov/resource/document/atlantic-highly-migratory-species-best-scientific-information-available-regional). The first HMS stocks that will be assessed using this approach will be the hammerhead shark complex in 2021-2023.

Some shark stock assessments are conducted outside the SEDAR process. ICCAT, through its Standing Committee on Research and Statistics (SCRS) conducts some shark stock assessments, primarily pelagic shark assessments (blue, porbeagle, and shortfin mako sharks). Information on these assessments is available at www.iccat.int/en/assess.html. In addition, NOAA Fisheries has accepted student manuscript assessments in the past and in limited instances has used them for management purposes (scalloped hammerhead shark, Hayes et al. 2009), and is exploring the use of peer reviewed stock assessments for management purposes.

Table 1 provides a list of the most current stock assessments. Information on all previous stock assessments conducted through SEDAR or ICCAT can be found on their stock assessment pages.

Table 1. Current shark stock assessments and determination by year.

Year	Species	Stock determination
2007 (SEDAR 13)[1]	Finetooth sharks – All regions	Not overfished, overfishing is not occurring
2009 (Hayes et al. 2009)	Scalloped hammerheads – All regions	Overfished, overfishing is occurring
2010 (SEDAR 21)[2]	Blacknose sharks – Gulf of Mexico region	Unknown
	Blacknose sharks – Atlantic region	Overfished, overfishing is occurring
2013 (SEDAR 34)	Atlantic sharpnose sharks – Atlantic region	Not overfished, overfishing is not occurring
	Atlantic sharpnose sharks – Gulf of Mexico region	Not overfished, overfishing is not occurring
	Bonnethead sharks – Atlantic region	Unknown
	Bonnethead sharks – Gulf of Mexico region	Unknown
2015 (SEDAR 39)	Smooth dogfish sharks – Atlantic region	Not overfished, overfishing is not occurring
	Smoothhound Complex – Gulf of Mexico region	Not overfished, overfishing is not occurring
2015 (ICCAT)	Blue sharks – North Atlantic region	Not overfished, overfishing is not occurring
2016 (SEDAR 21 Update)	Dusky sharks - All regions	Overfished, overfishing is occurring
2017 (SEDAR 54)	Sandbar sharks - All regions	Overfished, overfishing is not occurring
2017 (ICCAT)	Shortfin mako sharks – North Atlantic region	Overfished, overfishing is occurring
2018 (SEDAR 29 Update)	Blacktip sharks – Gulf of Mexico region	Not overfished, overfishing is not occurring
2020 (SEDAR 65)	Blacktip sharks – Atlantic region	Not overfished, overfishing is not occurring

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2020 (ICCAT)	Porbeagle sharks - Northwest Atlantic	Overfished, overfishing is not occurring
2021 - 2023 (SEDAR 77)	Hammerhead sharks - All regions	TBD

Note: Each species stock assessment lists who conducted the assessment and the reference to the stock assessment number.
[1] SEDAR 13 stock assessment also included blacknose sharks, bonnethead sharks, and Atlantic sharpnose sharks.
[2] SEDAR 21 stock assessment also included dusky sharks and sandbar sharks.
Source: Southeast Data, Assessment, and Review; Standing Committee on Research and Statistics reports; Hayes et al. 2009.

2. Management History

NOAA Fisheries divided the commercial shark fishery management history by years to highlight the large changes in the fishery. This section does not include some of the smaller rules such as annual specifications or inseason actions. Rather, this section focuses on actions that affected overall management. More detail on the individual actions can be found in the relevant Federal Register notice or on the HMS Management webpage.

Pre-1993

Preliminary Fishery Management Plan (PMP) for Atlantic Billfish and Sharks

In January 1978, the National Marine Fisheries Service (NOAA Fisheries) published the Preliminary Fishery Management Plan (PMP) for Atlantic Billfish and Sharks (43 FR 3818), which was supported by an Environmental Impact Statement (EIS) (42 FR 57716). This PMP was a Secretarial effort (not conducted by the Regional Fishery Management Councils). The management measures contained in the plan were designed to:

1. Minimize conflict between domestic and foreign users of billfish and shark resources;
2. Encourage development of an international management regime; and
3. Maintain availability of billfishes and sharks to the expanding U.S. fisheries.

Primary shark management measures in the Atlantic Billfish and Shark PMP included:

- Mandatory data reporting requirements for foreign vessels;
- A hard cap on the catch of sharks by foreign vessels, which when achieved would prohibit further landings of sharks by foreign vessels;
- Permit requirements for foreign vessels to fish in the Fishery Conservation Zone (FCZ) of the United States (later amended and the geographical area of coverage was changed to the Exclusive Economic Zone);
- Required radio checks by foreign vessels upon entering and leaving the FCZ;
- Boarding and inspection privileges for U.S. observers; and
- Prohibition on intentional discarding of fishing gears by foreign fishing vessels within the FCZ that may pose environmental or navigational hazards.

In the 1980s, the five Atlantic Regional Fishery Management Councils (New England, Mid-Atlantic, South Atlantic, Gulf of Mexico, and U.S. Caribbean) were responsible for the management of Atlantic HMS. As catches accelerated through the 1980s, shark stocks started to show signs of decline. Peak commercial landings of large coastal and pelagic sharks were reported in 1989.

In 1989, these five Councils asked the Secretary of Commerce (Secretary) to develop a Shark FMP. The Councils were concerned about the late maturity and low fecundity of sharks, the increase in fishing mortality, and the possibility of the resource being overfished. The Councils requested that the FMP cap commercial fishing effort, establish a recreational bag limit, prohibit finning, and begin a data collection system.

On November 28, 1990, the President of the United States signed into law the Fishery Conservation Amendments of 1990 (Pub. L. 101-627). This law amended the Magnuson-Stevens Fishery Conservation and Management Act and moved the management of Atlantic HMS, including sharks, from the Councils to the Secretary. The HMS Management Division was created shortly afterwards.

1993-1998

1993 Shark FMP

In 1993, the Secretary of Commerce, through NOAA Fisheries, implemented the first FMP for Sharks of the Atlantic Ocean (58 FR 21931; April 26, 1993). The 1993 FMP included management measures that:

- Established a fishery management unit (FMU) consisting of 39 frequently caught species of Atlantic sharks, separated into three groups for assessment and regulatory purposes (large coastal sharks (LCS), small coastal sharks (SCS), and pelagic sharks);
- Established calendar year commercial quotas for LCS and pelagic sharks and divided the annual quota into two equal half-year quotas that applied to the following two fishing periods – January 1 through June 30 and July 1 through December 31;
- Required that all sharks not taken as part of a commercial fishery be released uninjured;
- Established a framework procedure for adjusting commercial quotas, management units, fishing year, species groups, estimates of maximum sustainable yield (MSY), and permitting and reporting requirements;
- Prohibited shark finning (slicing shark's fin off for retention and discarding the rest of the body at sea) by requiring that the ratio between wet fins/dressed carcass weight not exceed five percent;
- Required annual commercial permits for fishermen who harvest and sell shark products (meat products and fins);
- Established a permit eligibility requirement that the owner or operator (including charter vessel and headboat owners/operators who intend to sell their catch) must show proof that at least 50 percent of earned income has been derived from the sale of the fish or fish products or charter vessel and headboat operations or at least $20,000 from the sale of fish during one of three years preceding the permit request;

- Required trip reports by permitted fishermen and persons conducting shark tournaments and requiring fishermen to provide information to NOAA Fisheries under the Trip Interview Program;
- Required NOAA Fisheries observers on selected shark fishing vessels to document mortality of marine mammals and endangered species;
- Established the LCS and pelagic quota at 2,436 metric tons (mt) dressed weight (dw) and 580 mt dw, respectively, based on a 1992 stock assessment;
- Prohibited the sale by recreational fishermen of sharks or shark products caught in the Exclusive Economic Zone (EEZ); and
- Established recreational bag limits for Atlantic LCS, pelagic sharks, and SCS for all recreational vessels fishing in the EEZ.

At that time, NOAA Fisheries identified LCS as overfished on the basis of a stock assessment. Under the rebuilding plan established in the 1993 FMP, the LCS quota was expected to increase in 1994 and 1995 up to the MSY estimated in the 1992 stock assessment (3,800 mt dw). In 1994, under the rebuilding plan implemented in the 1993 FMP, the LCS quota was increased to 2,570 mt dw based on the rebuilding schedule from the 1992 stock assessment.

In 1997, based in part on the results of a 1996 stock assessment, NOAA Fisheries reduced the LCS quota by 50 percent (62 FR 16648; April 7, 1997) and reduced the recreational bag limit for Atlantic LCS, pelagic sharks, and SCS. Additionally, in the same rule, NOAA Fisheries prohibited the retention of five species of sharks (white, whale, basking, sand tiger, and bigeye sand tiger) while allowing catch and release only for white sharks. Furthermore, this rule prohibited filleting sharks at sea. Instead sharks had to be landed and brought to the point of first landing with the flesh attached to the carcass and the spinal column present. Fishermen could remove the head and fins and eviscerate the catch.

1999-2004

1999 Fishery Management Plan for Atlantic Tunas, Swordfish, and Sharks (1999 FMP)

NOAA Fisheries published the final 1999 FMP, which included numerous measures to rebuild or prevent overfishing of Atlantic sharks in commercial and recreational fisheries. The 1999 FMP amended and replaced the 1993 FMP. The 1999 FMP included management measures that:

- Reduced the commercial LCS and SCS quotas to 860 and 359 mt dw, respectively;
- Established ridgeback and non-ridgeback categories for LCS;
- Established a pelagic shark quota of 488 mt dw and established a species-specific quota for porbeagle sharks of 93 mt dw;
- Implemented a commercial minimum size of 4.5 feet fork length (FL) for ridgeback sharks;
- Established essential fish habitat (EFH) for 39 species of sharks;
- Implemented limited access permits (LAPs) in the commercial shark fishery;
- Established a shark public display quota;

- Established new procedures for counting dead discards as well as state landings of sharks after Federal fishing season closures against Federal quotas;
- Established season-specific over- and underharvest adjustment procedures;
- Expanded the list of prohibited shark species;
- Created new management of deepwater/other sharks and established a prohibition on finning for this management group;
- Established the recreational bag limit at one shark per vessel per trip;
- Established a minimum size of 4.5 feet FL (equivalent to 137 cm FL) for all sharks;
- Established an allowance for one Atlantic sharpnose shark per person per trip with no minimum size restriction; and
- Required that all sharks harvested by recreational fishermen have heads, tails, and fins attached to the carcass.

Due to litigation stemming from the 1997 quota rule, a number of the measures in the 1999 FMP (including the commercial quotas and the commercial minimum size) had delayed implementation or were never implemented.

In 2002, NOAA Fisheries implemented measures required by the 2001 Biological Opinion (BiOp), among other things, in the HMS shark gillnet fishery (67 FR 45393; July 9, 2002). The final rule required that both the observer and vessel operator look for whales, the vessel operator contact NOAA Fisheries if a listed whale is taken, and shark gillnet fishermen must conduct net checks every 0.5 to 2 hours to look for and remove any sea turtles or marine mammals from their gear. This final rule also required all HMS bottom and pelagic longline vessels to post sea turtle handling and release guidelines in the wheelhouse.

Amendment 1 to the Fishery Management Plan for Atlantic Tunas, Swordfish, and Sharks

In 2003, NOAA Fisheries published the final rule to Amendment 1 to the 1999 FMP (68 FR 74746; December 24, 2003) based on a stock assessment for LCS and SCS conducted in 2002. The changes in Amendment 1 affected all aspects of shark management. Management measures in Amendment 1 included, among other things:

- Re-aggregated the LCS complex;
- Divided LCS and SCS management and quotas between three regions (South Atlantic, North Atlantic, and Gulf of Mexico). The South Atlantic region was defined to include all waters east of the Gulf of Mexico region north to the border between North Carolina and Virginia roughly 36°30’ N. lat. including the waters surrounding the U.S. Caribbean. The North Atlantic region was defined to include all waters north of the North Carolina and Virginia border at roughly 36°30’ N. lat. The Gulf of Mexico region was defined to include all waters of the U.S. EEZ west and north of the boundary stipulated at 50 CFR 600.105(c);
- Used maximum sustainable yield as a basis for setting commercial quotas instead of the estimate of MSY;
- Eliminated the commercial minimum size;

- Established regional commercial quotas and trimester commercial fishing seasons, established gear restrictions to reduce bycatch or reduce bycatch mortality;
- Established a time/area closure off the coast of North Carolina to reduce fishing mortality of dusky sharks and juvenile sandbar sharks; Updated EFH identifications for sandbar, blacktip, finetooth, dusky, and
- nurse sharks;
- Removed the deepwater/other species group from the management unit and required data collection only;
- Changed the administration for issuing permits for display purposes;
- Established the retention limit of one bonnethead shark per person per trip with no minimum size restriction; and
- Limited the allowable gears in the recreational shark fishery to handline and rod and reel gear.

2005-2007

2006 Consolidated HMS FMP

In July 2006, the final Consolidated HMS FMP was completed and the implementing regulations were published on October 2, 2006 (71 FR 58058). Measures that were specific to the shark fishery included:

- Established mandatory protected species safe handling, release, and identification workshops and certification for HMS pelagic, bottom longline, and shark gillnet vessel owners and operators with a mandatory certification renewal every three years;
- Established mandatory shark identification workshops for all shark dealers with a mandatory certification renewal every three years;
- Prohibited all HMS fishing for all gear types year-round except for surface trolling only from May through October in the Madison-Swanson and Steamboat Lumps Marine Reserves;
- Established criteria to consider when implementing new time/area closures or making modifications to existing time/area closures;
- Identified sources of finetooth fishing mortality to target appropriate management actions to prevent overfishing of finetooth sharks;
- Established a differentiation between pelagic longline and bottom longline gear based on the species composition of the catch onboard or landed;
- Required that the second dorsal fin and the anal fin remain attached to the carcass on all sharks through landing; and,
- Prohibited the sale or purchase of any HMS that was offloaded from an individual vessel in excess of the retention limits specified in §§ 635.23 and 635.24.

In 2007, NOAA Fisheries expanded the equipment required for the safe handling, release, and disentanglement of sea turtles caught in the Atlantic shark bottom longline fishery (72 FR 5633; February 7, 2007). As a result, the equipment required for bottom longline vessels is now consistent with the requirements for the pelagic longline fishery (e.g., vessels must carry

dehookers and line cutters). Furthermore, this action implemented several year-round bottom longline closures to maintain consistency with the Caribbean Fishery Management Council regulations related to EFH.

2008-2012

Amendment 2 to the 2006 Consolidated Atlantic HMS Fishery Management Plan

In 2008, NOAA Fisheries published the final rule for Amendment 2 to the 2006 Consolidated HMS FMP (73 FR 35778; corrected version published July 15, 2008; 73 FR 40658) based on stock assessments conducted in 2005/2006 for the LCS complex, sandbar, blacktip, porbeagle, and dusky sharks. The management measures in Amendment 2 included, among other things:

- Established an annual shark season instead of trimesters;
- Modified the shark stock assessment schedule from every 2-3 years to every 5 years;
- Established a research fishery for sandbar sharks with established base quotas of 116.6 mt dw and a 50 mt dw non-sandbar LCS research quota;
- Implemented commercial quotas of 188.3 mt dw for Atlantic non-sandbar LCS and 439.5 mt dw for Gulf of Mexico non-sandbar LCS;
- Implemented a base commercial quota of 454 mt dw for SCS;
- Implemented commercial quotas of 488 mt dw for pelagic sharks (other than blue and porbeagle sharks), 273 mt dw for blue sharks, and 1.7 mt dw for porbeagle sharks;
- Implemented time/area closures recommended by South Atlantic Fishery Management Council (SAFMC);
- Established a boundary between the Gulf of Mexico region and the Atlantic region, defined as a line beginning on the east coast of Florida at the mainland at 25°20.4'N.lat, proceeding due east. Any water and land to the south and west of that boundary was considered within the Gulf of Mexico. Any water and land to the north and east of that boundary line was considered within the Atlantic region;
- Established a 33 non-sandbar LCS per trip retention limit for directed permit holders and a 3 non-sandbar LCS per trip retention limit for incidental permit holders;
- Established no trip limit for SCS or pelagic sharks for directed permit holders and 16 SCS and pelagic sharks for incidental permit holders;
- Required that all Atlantic sharks must be offloaded with fins naturally attached; and
- Prohibited the retention of sandbar sharks in the commercial fisheries unless participants were part of the shark research fishery
- Allowed recreational fishermen to land tiger sharks and non-ridgeback LCS (blacktip, spinner, bull, lemon, nurse, great hammerhead, smooth hammerhead, and scalloped hammerhead sharks);
- Allowed recreational fishermen to land SCS (bonnethead, Atlantic sharpnose, finetooth and blacknose sharks), and pelagic sharks (shortfin mako, common thresher, oceanic whitetip, blue, and porbeagle sharks);
- Prohibited recreational anglers from retaining sandbar or silky sharks (and any other prohibited species); and

- Established the retention limit of one shark greater than 54 inches FL per vessel per trip, also one Atlantic sharpnose and one bonnethead per person per trip with no minimum size.

Amendment 3 to the 2006 Consolidated Atlantic HMS Fishery Management Plan

On June 1, 2010 (75 FR 30484), NOAA Fisheries published the final rule for Amendment 3 to the Consolidated HMS FMP. This Amendment focused on management for small coastal sharks (SCS), porbeagle sharks, and smoothhound sharks. The management measures for Amendment 3 included, among other things:

- Established new SCS commercial complexes and quotas;
- Linked the non-blacknose SCS and blacknose shark fishery so that both fisheries would close when landings of either reached 80 percent of its quota;
- Maintained all current authorized gear types for the Atlantic shark fishery including gillnet gear (prohibiting gillnet gear from South Carolina south had been proposed);
- Added smooth dogfish and Florida smoothhound sharks to the HMS management unit;
- Maintained the recreational retention and minimum size limits for SCS;
- Promoted the release of shortfin mako sharks brought to fishing vessels when alive; and
- Established that NOAA Fisheries would take action at an international level to work toward ending overfishing of shortfin mako sharks, given that the United States is responsible for a small portion of the catch and international cooperation is necessary in order to meet conservation goals for the stock.

In 2011, NOAA Fisheries published a final rule (76 FR 53652; August 28, 2011) that implemented ICCAT recommendations 10-07 and 10-08, which prohibited the retention, transshipping, landing, storing, or selling of hammerhead sharks in the family *Sphyrnidae* (except for *Sphyrna tiburo*) and oceanic whitetip sharks caught in association with ICCAT fisheries. This rule applied to the commercial HMS pelagic longline (PLL) fishery and recreational fisheries for tunas, swordfish, and billfish in the Atlantic Ocean, including the Caribbean Sea and Gulf of Mexico.

In 2012, NOAA Fisheries published a final rule (77 FR 60632; October 4, 2012) that implemented ICCAT Recommendation 11-08, which prohibited retaining, transshipping, or landing silky sharks caught in association with ICCAT fisheries. In order to facilitate domestic compliance and enforcement, NOAA Fisheries also prohibited the storing, selling, and purchasing of the species. This rule primarily applied to the commercial Atlantic HMS pelagic longline fishery for tuna and tuna-like species in the Atlantic Ocean, including the Caribbean Sea and Gulf of Mexico.

Amendment 5a to the 2006 Consolidated Atlantic HMS Fishery Management Plan

On July 3, 2013 (78 FR 40318), NOAA Fisheries published the final rule for Amendment 5a to the Consolidated HMS FMP. The management measures for Amendment 5a included, among other things:

- Established regional quotas for different LCS and SCS management groups;
- Established regional quota linkages between management groups whose species are often caught together in the same fisheries to prevent exceeding the new established quotas through discarded bycatch;
- Established the recreational minimum size limit of 78 inches FL for all hammerhead sharks; and
- Modified public outreach to the recreational community regarding shark identification and recreational regulations for all sharks.

Post 2013

Amendment 6 to the 2006 Consolidated Atlantic HMS Fishery Management Plan

On August 18, 2015 (80 FR 50074), NOAA Fisheries published the final rule for Amendment 6 to the 2006 Consolidated HMS FMP. The management measures for Amendment 6 included, among other things:

- Modified the allowable LCS retention limit for directed LCS permit holders so that it ranged from zero to a maximum of 55 LCS other than sandbar sharks per trip with a default of 45 LCS other than sandbar sharks per trip;
- Adjusted the sandbar shark research fishery quota;
- Established regional non-blacknose SCS commercial quotas;
- Modified regional quota linkages between blacknose and non-blacknose SCS;
- Removed the upgrading restrictions for shark LAP holders;
- Apportioned the Gulf of Mexico regional commercial quotas for aggregated LCS, blacktip, and hammerhead sharks into western and eastern sub-regional quotas along 88° 00' W. long.;
- Established a management boundary in the Atlantic region along 34° 00' N. lat. (approximately at Wilmington, North Carolina) for the SCS fishery; and
- Maintained SCS quota linkages south of the 34° 00 N. lat. management boundary; and prohibiting the harvest and landings of blacknose sharks north of the 34° 00' N. lat. management boundary.

Amendment 9 to the 2006 Consolidated Atlantic HMS Fishery Management Plan

On November 24, 2015 (80 FR 73128), NOAA Fisheries published the final rule for Amendment 9 to the 2006 Consolidated HMS FMP. The management measures for Amendment 9 included, among other things:

- Established a smoothhound shark TAC of 1,430.6 mt dw and commercial quota of 1,201.7 mt dw in the Atlantic region;
- Established a smoothhound shark TAC of 509.6 mt dw and commercial quota of 336.4 mt dw in the Gulf of Mexico region;

- Established a soak time limit of 24 hours for sink gillnet gear and a 0.5 to 2 hour net check requirement for drift gillnet gear in the Atlantic shark and smoothhound shark fishery;
- Required Federal shark directed permit holders with gillnet gear on board to use VMS only in the Southeast U.S. Monitoring Area, pursuant to Atlantic Large Whale Take Reduction Plan requirements;
- Implemented the smooth dogfish-specific measures in the Shark Conservation Act of 2010 to establish an allowance for the removal of smooth dogfish fins while at sea including:
    - Smooth dogfish must make up at least 25 percent of the retained catch, and other sharks may be retained provided their fins remain naturally attached to the carcass;
    - Required any state commercial fishing permit that allows smooth dogfish retention in conjunction with the federal smoothhound permit; and
    - Applied the exception for smooth dogfish along the Atlantic Coast but not to Florida's coast in the Gulf of Mexico.
    - Defined the limited area in which the exception would apply.

- Required an HMS Angling or Charter/Headboat permit for recreational fishing and retention of smoothhound sharks (i.e., smooth dogfish) in federal waters.

In 2016, NOAA Fisheries published a final rule (81 FR 57803; August 24, 2016) that implemented ICCAT Recommendation 15-06 regarding porbeagle sharks caught in association with ICCAT fisheries. Recommendation 15-06 required, among other things, fishing vessels to promptly release unharmed, to the extent practicable, porbeagle sharks caught in association with ICCAT fisheries when brought alive alongside for taking on board the vessel. This action applied to fishermen fishing in the commercial HMS pelagic longline fishery and the HMS recreational fisheries for tunas, swordfish, and billfish in the Atlantic Ocean, including the Caribbean Sea and Gulf of Mexico.

In 2017, a final rule (81 FR 90241; December 14, 2016) established a commercial retention limit of eight blacknose sharks for all Atlantic shark limited access permit holders in the Atlantic region south of 34°00' N. lat.

Amendment 5b to the 2006 Consolidated Atlantic HMS Fishery Management Plan

On April 4, 2017 (82 FR 16478), NOAA Fisheries published the final rule for Amendment 5b to the 2006 Consolidated HMS FMP. The management measures for Amendment 5b included, among other things:

- Took measures to end overfishing of and rebuild dusky sharks;
- Required Atlantic shark LAP holders fishing with pelagic longline gear to release all sharks that are not being boarded or retained by using a dehooker or by cutting the gangion less than three feet (91.4 cm) from the hook as safely as practicable;

- Required completion of a shark identification and fish regulation training course as a new part of all Safe Handling and Release Workshops for HMS pelagic longline, bottom longline, and shark gillnet vessel owners and operators;
- Increased dusky shark outreach and awareness through development of additional outreach materials, and require HMS pelagic longline, bottom longline, and shark gillnet vessels to abide by a dusky shark fleet communication and relocation protocol;
- Established a circle hook requirement in the shark directed bottom longline fishery;
- Required all HMS recreational permit holders to obtain a "shark endorsement" on their permit to fish for, retain, possess, or land sharks which requires watching a video prohibited species identification and safe handling followed by an educational quiz; and
- Established a circle hook (non-offset, corrodible) requirement for anglers fishing recreationally for sharks south of 41°43' N latitude, except when using artificial lures or flies.

In 2018, NOAA Fisheries published a final rule (83 FR 31677; July 9, 2018) that revised the closure regulations for the commercial shark fishery to remain open after the fishery's landings reach or are projected to reach 80 percent of the available overall, regional, and/or sub-regional quota, if the fishery's landings are not projected to reach 100 percent of the applicable quota before the end of the season. This final action also changed the minimum notice time between filing of the closure notice with the Office of the Federal Register and the closure going into effect from five days to four days.

On March 2, 2018, NOAA Fisheries published an emergency rule in response to ICCAT Recommendation 17-08 (83 FR 8946). The emergency measures in this rulemaking included measures for commercial fishermen using pelagic longline gear to release all live shortfin mako sharks and retain a shortfin mako shark only if the shark is dead at haulback. Fishermen using non-pelagic longline gear were required to release all shortfin mako sharks alive or dead. Additionally, the minimum size of shortfin mako sharks was increased to 83 inches (210 cm) FL.

Amendment 11 to the 2006 Consolidated Atlantic HMS Fishery Management Plan

On February 21, 2019 (84 FR 5358), NOAA Fisheries published the final rule for Amendment 11 to the 2006 Consolidated HMS FMP. The management measures for Amendment 11 included, among other things:

- Allowed the retention of shortfin mako sharks caught with longline or gillnet gear by persons issued a shark Directed or Incidental LAP only if the shark is dead at haulback; Retention of dead shortfin mako sharks with pelagic longline gear is allowed only if there is a functional electronic monitoring system on board the vessel;
- Established the foundation for developing an international rebuilding plan for shortfin mako sharks;
- Established the minimum size limit for the retention of shortfin mako sharks from 54 inches FL to 71 inches FL (180 cm FL) for male shortfin mako sharks and 83 inches FL (210 cm FL) for female shortfin mako sharks; and
- Required the use of circle hooks for recreational shark fishing.

Amendment 14 to the 2006 Consolidated Atlantic HMS Fishery Management Plan

On September 24, 2020 (85 FR 60132), NOAA Fisheries published a notice of availability for Draft Amendment 14 to the 2006 Consolidated HMS FMP. While this is a framework action with no implementing regulations, the management approaches within the framework eventually could result in different requirements related fishing practices. The potential measures are:

- Create a tiered Acceptable Biological Catch (ABC) control rule;
- Allow consideration of phase-in ABC control rules for any modifications in ABC;
- Actively manage all sector ACLs (commercial and recreational);
- Establish an ACL for each Atlantic shark management group, without commercial ACL quota linkages;
- Allow carry-over, and only for underharvest of the commercial quotas (landings only) under certain conditions; and
- Compare a three-year average of fishing mortality estimates to the overfishing limit to determine overfishing status.

2 Current State of the Atlantic Shark Fishery

Commercial Shark Fishery

In this section, NOAA Fisheries discusses all aspects of the commercial shark fishery including vessel permits (limited and open access), regional or non-regional shark management groups, gears, effort levels, landings, vessels that account for the largest percent of landings per year ("high-liners"), and dealers from 2014 through 2019. The information below reflects the trends in the commercial shark fishery within this timeframe. NOAA Fisheries also highlights some federal and state regulations that may have affected the commercial shark fishery. NOAA Fisheries did not include any data (trips, landings, revenue, etc.) from the shark research fishery since that fishery operates under separate management measures and some information cannot be presented due to data confidentiality requirements under the Magnuson-Stevens Act.

HMS Vessel Permits

LAPs

HMS limited access permits were first implemented in 1999 and currently can only be obtained by transferring an existing permit from a current permit holder. No new limited access permits are issued. All permits must be renewed annually. Only persons holding shark and swordfish limited access permits that did not expire in the preceding year are eligible to renew those permits. The HMS limited access permit program is made up of the following:

- Shark Directed permit
- Shark Incidental permit
- Swordfish Directed permit
- Swordfish Incidental permit
- Swordfish Handgear permit
- Atlantic Tunas Longline category permit
- Atlantic Tunas Purse Seine category permit

In federal waters, fishing vessels need either a shark directed or incidental permit to target and land non-smoothhound sharks. Generally, shark directed permits allow fishermen to target authorized LCS, SCS, and pelagic shark species, while shark incidental permits allow fishermen who normally fish for other species to land a limited number of those non-smoothhound shark species during the course of those operations.

Active/Inactive permits: The number of overall active (identified by permits landing at least one shark in a calendar year) directed and incidental permits has varied (Figure 1). The majority of shark directed and incidental permit holders have been inactive (identified as not landing any

sharks in a calendar year), but could have landed other HMS. For shark directed permit holders, active permits declined 36 percent, with the peak in 2014 (114) and the low in 2019 (73). For shark incidental permits, the number of inactive permits has remained stable throughout the period. However, active permits followed the trend of shark directed permits, declining 50 percent, with the peak in 2014 (66) and the low in 2019 (34). Overall, the total number of shark directed and incidental permits (active and inactive) declined by 10 percent.

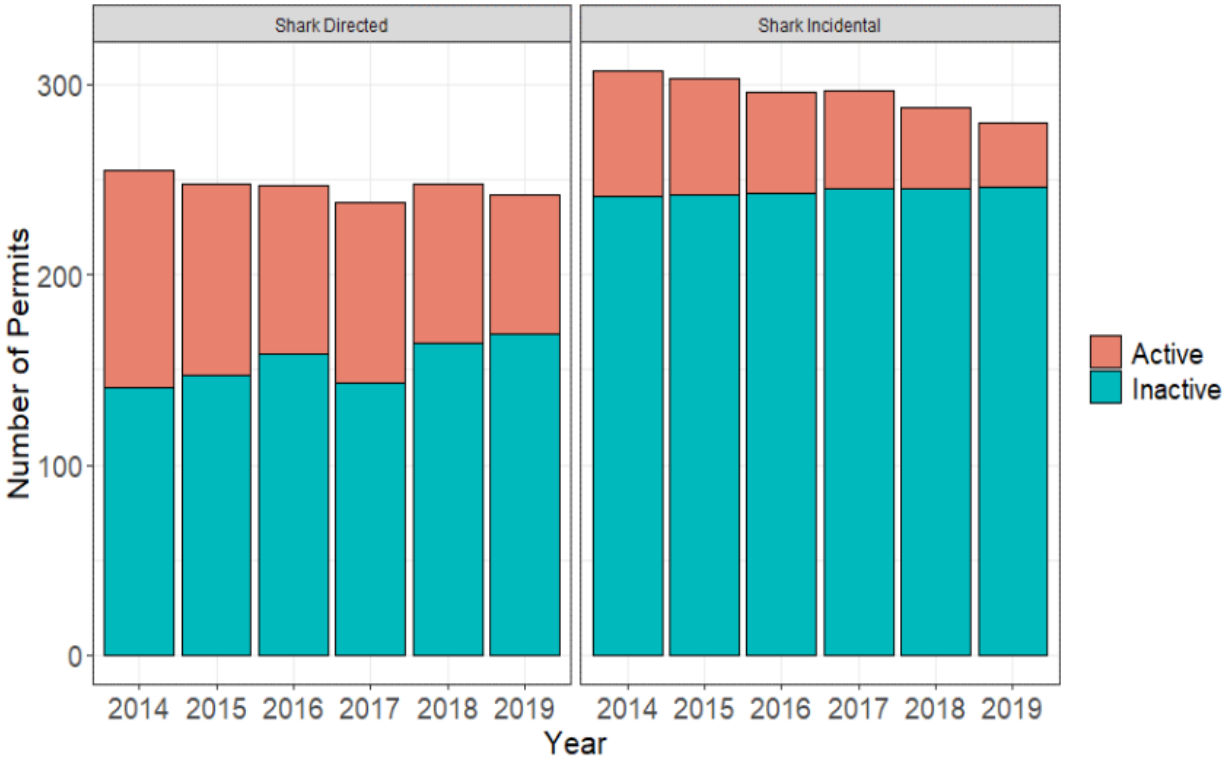

Figure 1. Number of shark directed and incidental permits (2014-2019).
Note: This includes permits from the "triple pack" permit holders (see discussion of "triple pack" permits, below).
Sources: Southeast Regional permit office (SERO); eDealer reporting system.

Regional active permits: The majority of the active permit holders were fishing in the Atlantic region (Figure 2). For shark directed permit holders, the highest number of Atlantic region permits was in 2014 (80), while the lowest number was in 2019 (64). In 2017, there was an increase in the number of Atlantic region permits from 2016, when NOAA Fisheries implemented a retention limit for blacknose sharks that allowed the non-blacknose SCS fishery to remain open all year. Similarly, in the Gulf of Mexico region, the most active permits holders were in 2014 (36) and the lowest in 2019 (9). For shark incidental permits, the highest number was in the Atlantic region in 2014 (48), while the lowest number was in 2019 (24). In 2017, there was no decline in the Atlantic region's active shark incidental permits, which was the same year as an increase in active shark directed permit holders. In the Gulf of Mexico region, there was a similar trend as in the Atlantic region where the highest number was in 2014 (22) and the lowest in 2019 (10).

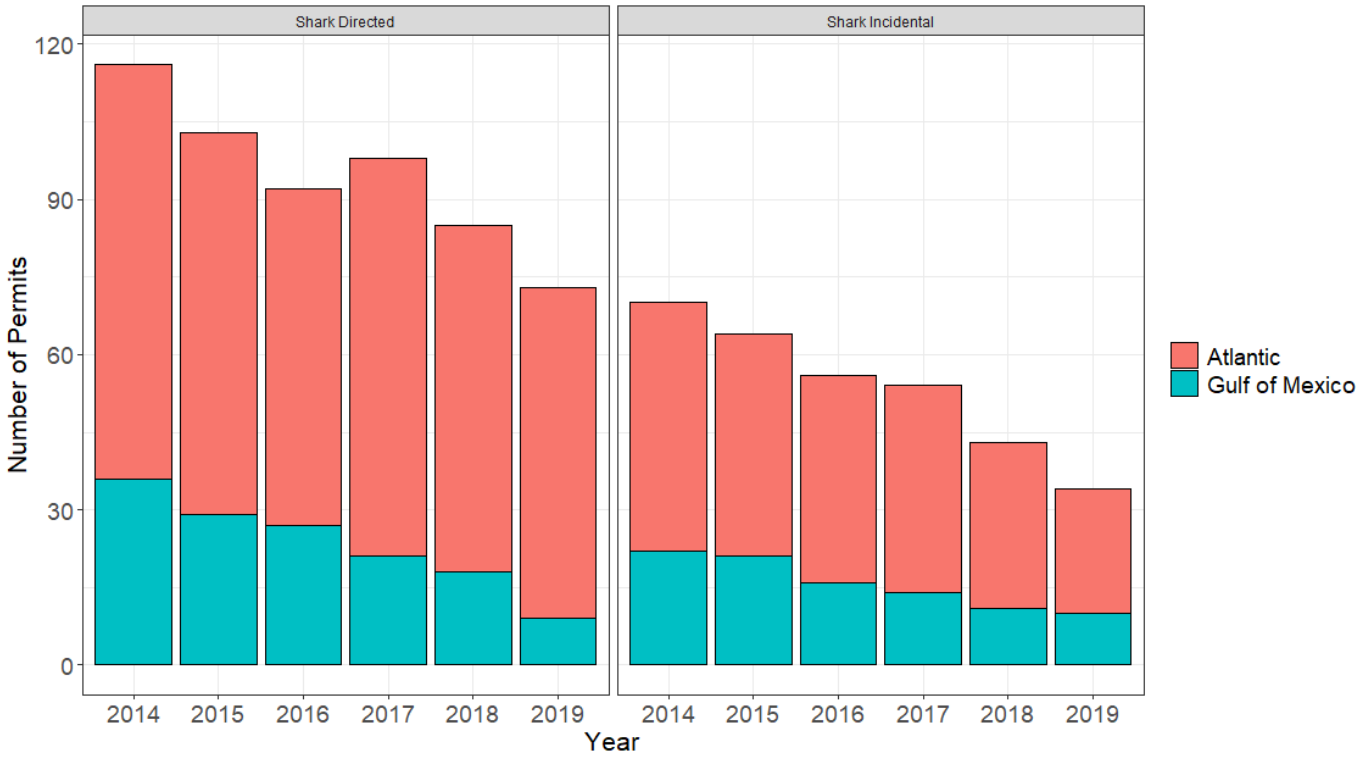

Figure 2. Number of active shark directed and incidental permits by region, 2014-2019.
Note: This includes permits from the triple pack permit holders. Sources: SERO; eDealer reporting system.

Triple pack permit holders: To reduce bycatch in the pelagic longline fishery, several of these permits were designed to be held in combination, allowing for limited retention of species that might otherwise have to be discarded due to regulations not allowing fishermen to retain the fish. For example, tunas and sharks can be caught when pelagic longline fishing for swordfish; if only a swordfish permit was maintained, then discarding tunas and sharks would be required. Therefore, swordfish directed and swordfish incidental permits are valid only if the permit holder also holds both an Atlantic Tunas Longline category and a shark directed or incidental permit. Permit holders who have this combination of permits are generally known as "triple pack" or "tri-pack" permit holders. As stated above, the retention limits for each shark management group varies based on whether the vessel has a shark directed or incidental permit. Thus, the vessel owner has to choose which permit would be best for their fishing activities and target species. Since 2014, there has been a consistent number of shark directed and incidental permit holders that are triple pack permit holders (Figure 3 and Figure 4). From 2014 to 2019, 44 to 48 percent held a shark directed permit, while 54 to 57 percent held a shark incidental permit.

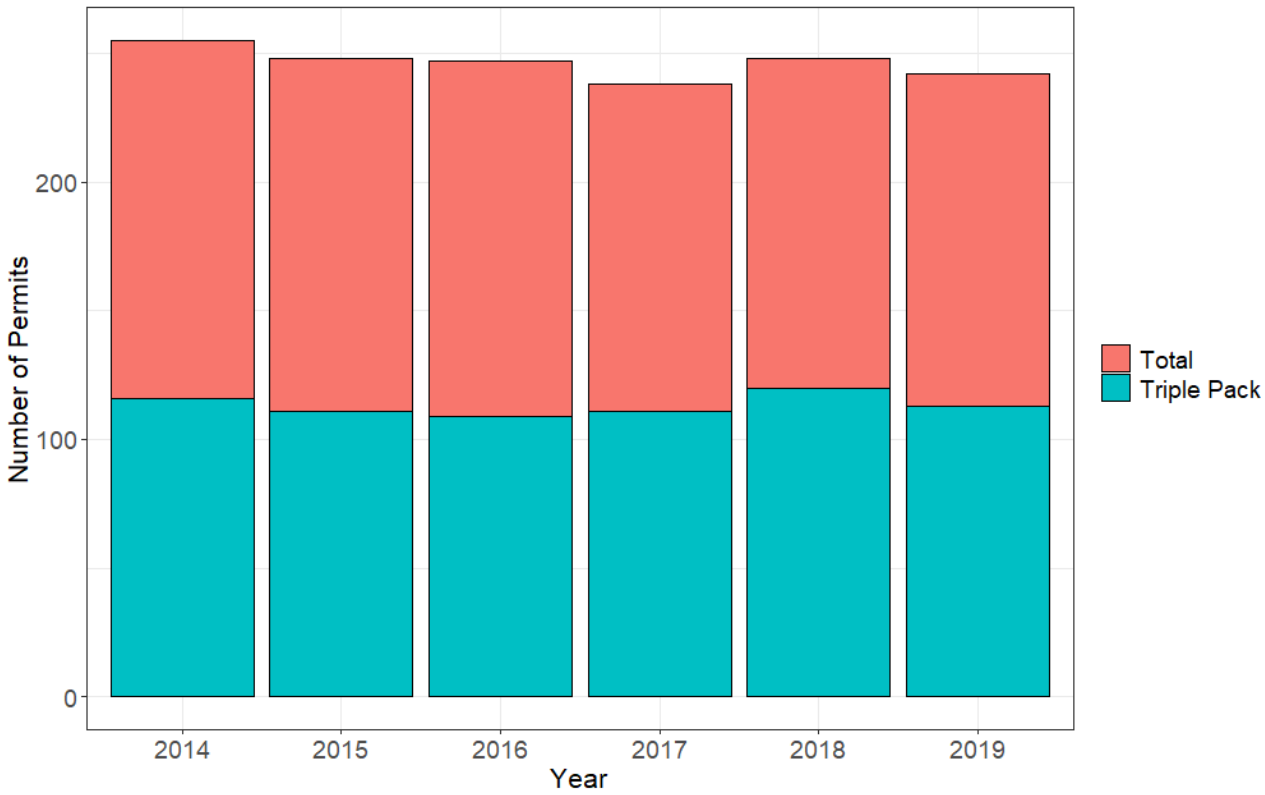

Figure 3. Number of shark directed permits considered triple pack permit holders, 2014-2019.
Note: This includes all of the directed permit holders who are divided into "shark directed only" and "shark directed triple pack permit holders" for purposes of this document. Source: SERO.

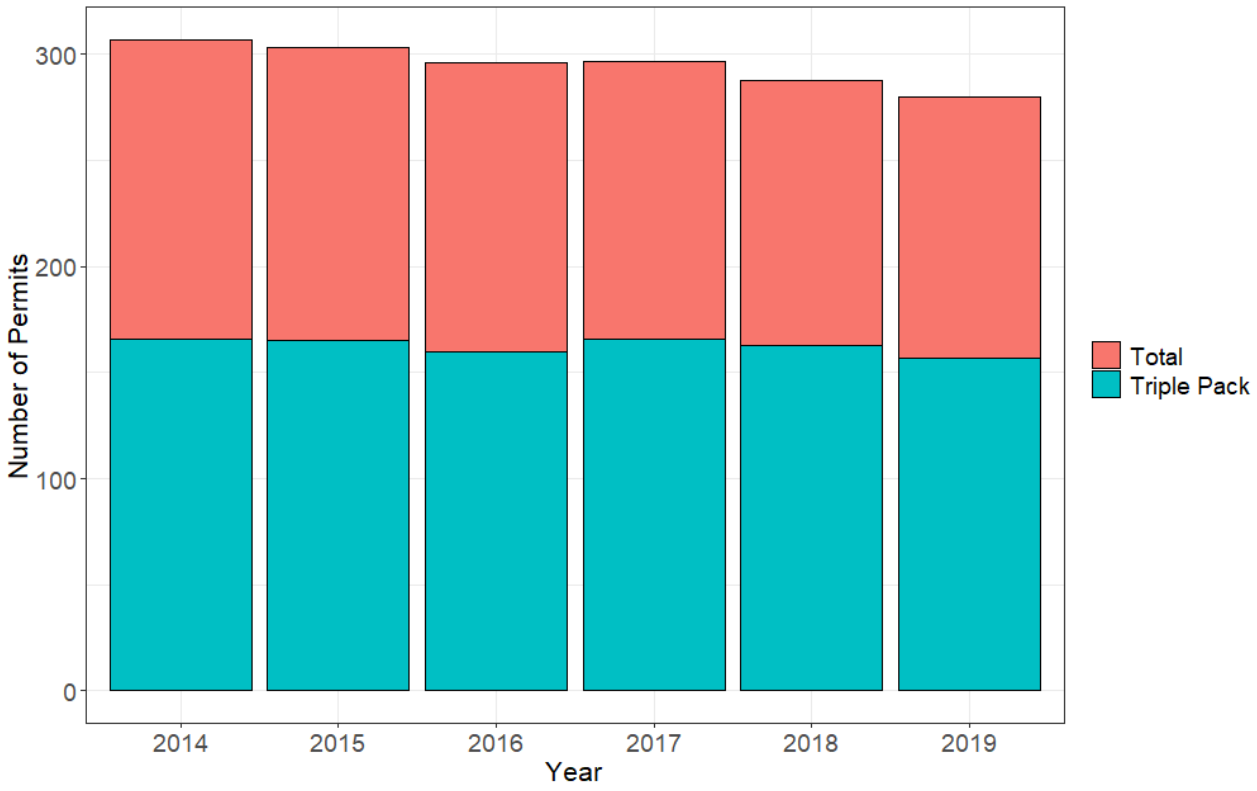

Figure 4. Number of shark incidental permits considered triple pack permit holders, 2014-2019.
Note: The triple pack permit holders are the orange bars, while the shark incidental only permit holders are the grey bars. Source: SERO.

Active directed permits by region: Overall, the majority of the active shark directed permit holders fished in the Atlantic region (Figure 5). There has been a decrease in both regions, but this decrease has been larger in the Gulf of Mexico region. In the Atlantic region, shark directed only permit holders declined from 2014 (32) to 2016 (27). The highest number of shark directed only permit holders was in 2017 (36). As mentioned above, this increase in 2017 could have been due to the implementation of a final rule that established a retention limit of eight blacknose sharks per trip (81 FR 90241; December 14, 2016). As for Atlantic shark directed triple pack permit holders, the number decreased from a high in 2014 (48) to a low point in 2018 and 2019 (35). There was an increase in active permits in 2017 similar to the shark directed only permit holders, but not to the same level. In the Gulf of Mexico, the highest number of shark directed only permit holders was in 2014 (24) and the lowest was in 2019 (5). That is the largest change in any active shark permits (directed or incidental) during this time series. NOAA Fisheries observed a similar trend for shark directed triple pack permit holders in the Gulf of Mexico, but the decline was not as sizeable as it was for the shark directed only permit holders.

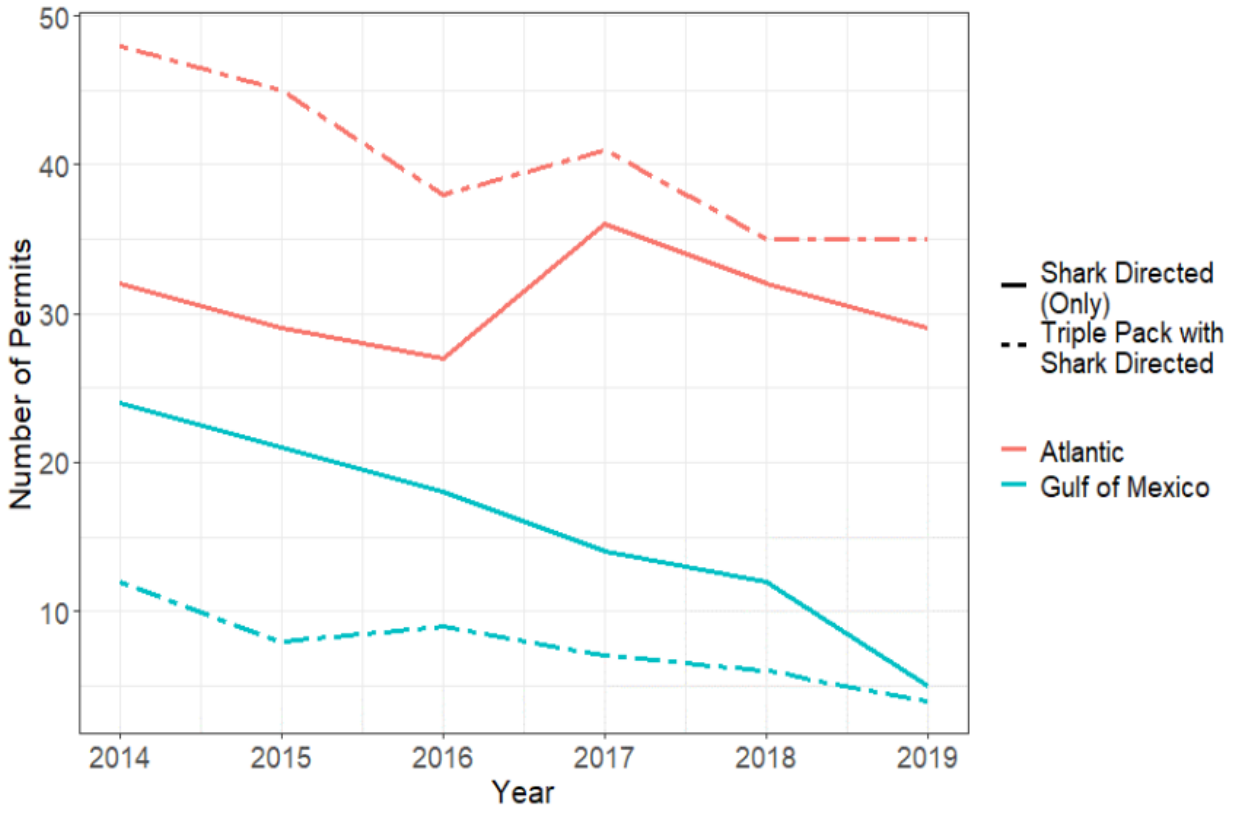

Figure 5. Number of active shark directed only permit holders and shark directed permit holders within the triple pack permit holders by region, 2014-2019.

Sources: SERO; eDealer reporting system.

Active incidental permits by region: Similar to the shark directed permits, the number of active shark incidental permit holders has decreased (Figure 6). In the Atlantic region, shark incidental triple pack permit holders peaked in 2014 (33) and increased in 2017 from the previous year, but decreased to 16 in 2019. In the Gulf of Mexico, shark incidental triple pack permit holders have decreased since 2014, while shark incidental only permit holders have increased since 2016. In 2019, five permit holders were active in both the shark incidental permit and shark incidental triple pack permit groupings.

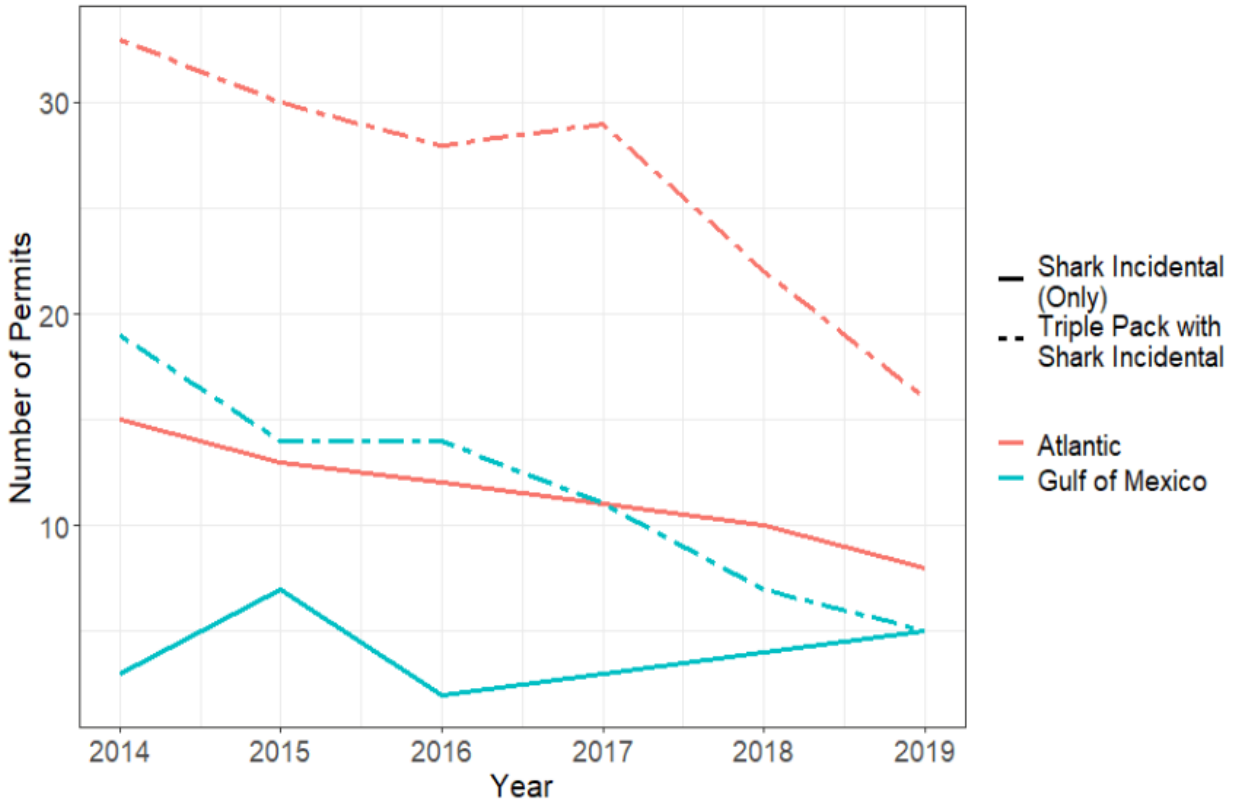

Figure 6. Number of active shark incidental only permit holders and shark permit holders within the triple pack permit holders by region, 2014-2019.

Sources: SERO; eDealer reporting system.

Active state-water permits by region: Overall, the number of active state-water permit holders was much larger than the number of active shark directed shark permit holders. As with federal shark directed permits, state-water permit holders landing sharks has decreased over time (Figure 7). In the Atlantic region, state-water permit holders landing sharks peaked in 2016 (176), which was the first time since 2013 that the LCS fishery opened on January 1, and were lowest in 2018 (123). In contrast, in the Gulf of Mexico, state-water permit holders landing sharks fluctuated, but increased overall from 2014 through 2018. However, the number dropped to 69 in 2019 (a 37-percent reduction from 2018). This decline may correlate with the timing of transport and distribution issues some shark dealers had in Texas.

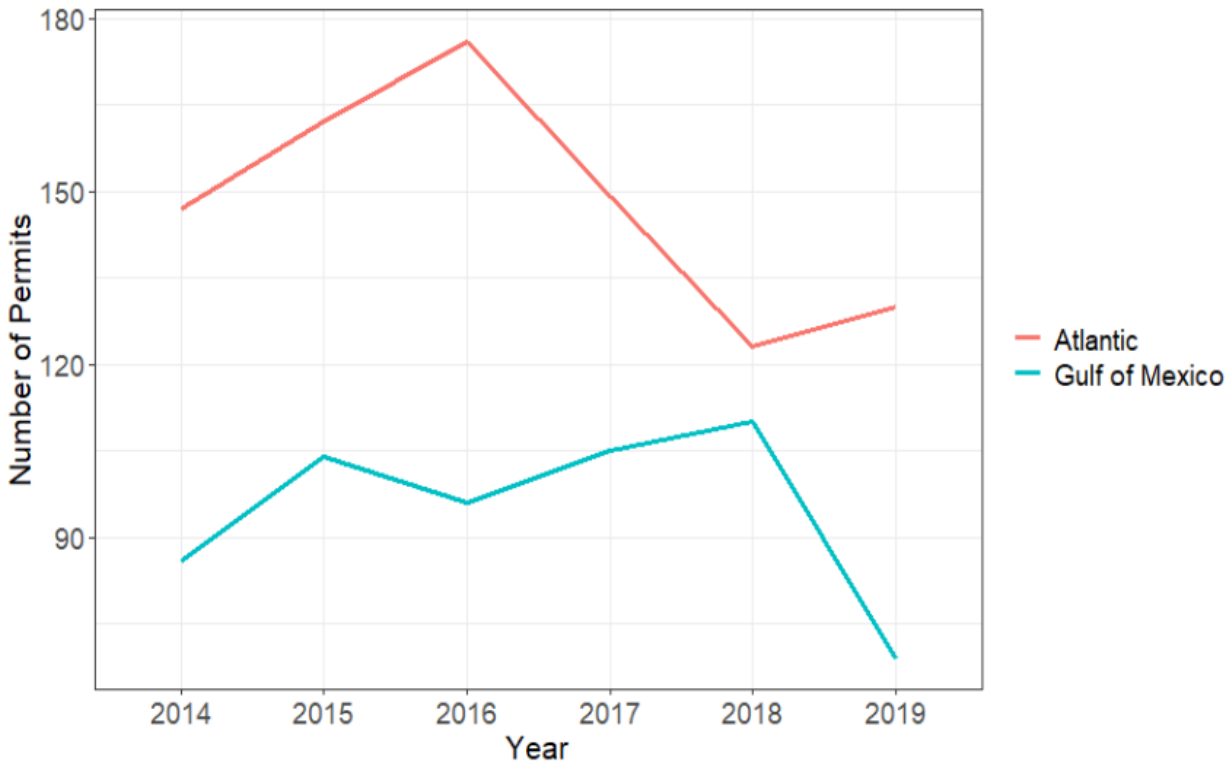

Figure 7. Number of active state-water permit holders landings sharks by region, 2014-2019.
Note: The number of state-water permit holder's landings sharks exclude smoothhound shark landings. Sources: SERO; eDealer reporting system.

Comparison of permit usage: Overall, there was a large decrease in the number of active directed and incidental permits. Active shark directed permit holders decreased by 39 percent, while active shark incidental permit holders have decreased by 28 percent (Figure 8). The number of active state-water permit holders decreased less than federal permit holders (i.e., 18 percent). The largest decrease in active permits since 2014 was shark incidental triple pack permit holders (56 percent). Even with these large decreases in active permits, the number of inactive permits only increased by nine percent during this time. This small percentage increase in the number of inactive permits may indicate that fishermen are actively choosing to leave the fishery.

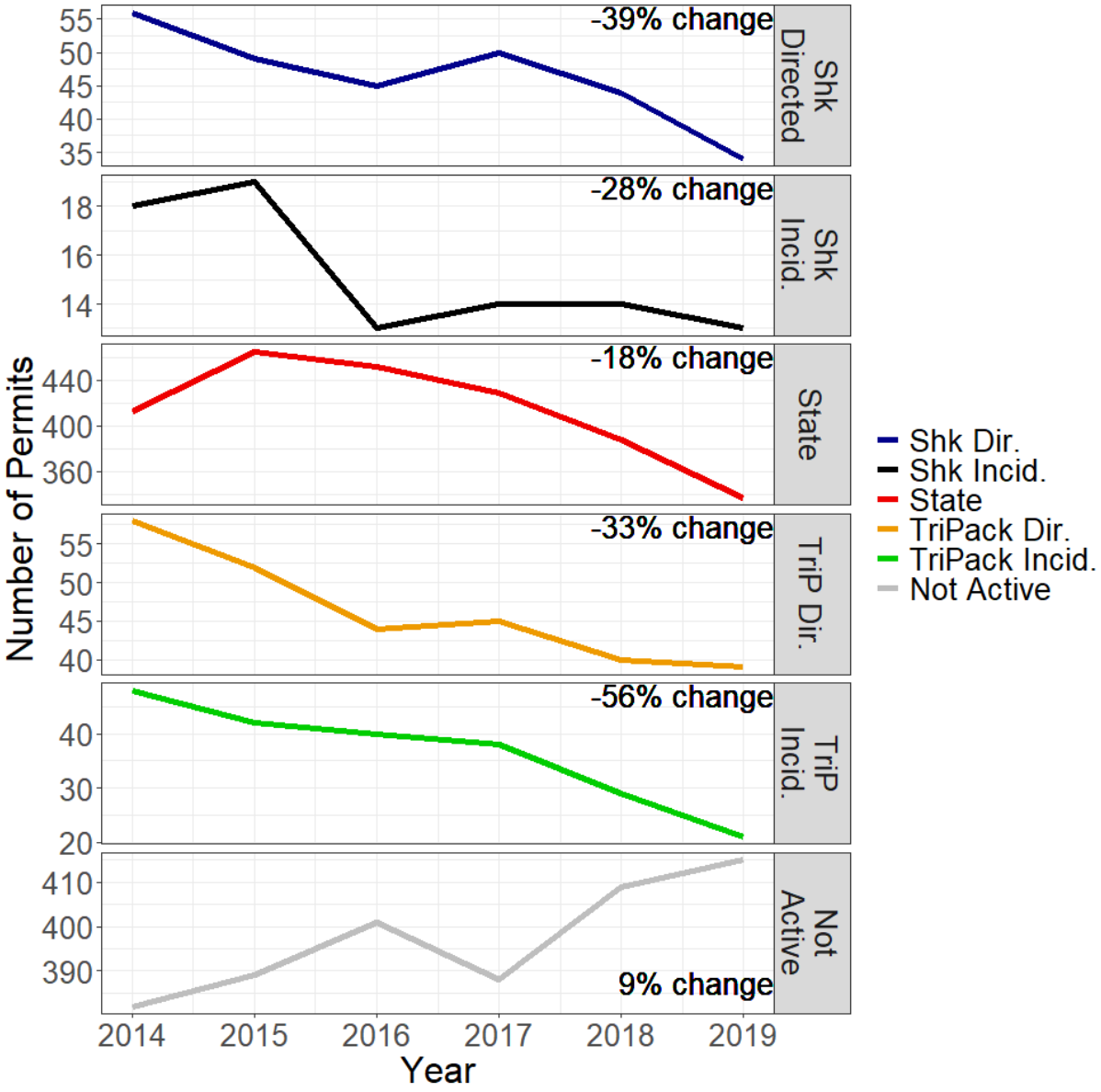

Figure 8. Percentage of change of active and inactive permits by type of permit, 2014-2019.
TriPack Dir. = Triple pack directed permit holders with a shark directed, swordfish, and Atlantic Tuna Longline permits.
TriPack Incid. = Triple pack incidental permit holders with a shark incidental, swordfish, and Atlantic Tuna Longline permits.
Note: The scales change between permit types. State is any vessel that lands a shark from state waters and are not included in the count of 'Not Active' permits. Sources: SERO; eDealer reporting system.

Summary of LAPs

The number of active shark limited access permit holders (shark directed or shark incidental) are at an all-time low. About half of the shark directed and shark incidental permit holders are held in combination with an Atlantic Tuna Longline and Swordfish Directed or Incidental permits. The majority of the permit holders are in the Atlantic region. Permit usage seems to fluctuate

with the implementation of management measures. The number of state-water permits participating in the shark fishery is nearly twice that of the number of federal permit holders in any given year. Limited access permits have allowed NOAA Fisheries to cap the number of participants who can fish for sharks. Since no new limited access permits are being issued, new entries into the shark fishery need to find and obtain a permit to participate in the fishery. Finding a limited access permit could be difficult at times especially finding the right permit (directed or incidental) at the right price. Due to some instability in the shark fishery (as described in more detail below), some fishermen might not be able to justify purchasing an expensive permit when other more stable fisheries have cheaper permits. In the future, NOAA Fisheries could look at ways to revise the permit structure to improve the fishery.

Shark Management Groups

The follow sections compile data by regional or non-regional shark management groups since each shark management group has its own quota and management measures. Since shark fishermen generally prefer to target only a certain management group, there is not much overlap of shark fishermen who target multiple shark management groups. Thus, NOAA Fisheries analyzed each regional or non-regional shark management group separately to show the current state of that management group fishery.

The commercial quotas for some shark management groups are split between two regions, the Gulf of Mexico and the Atlantic. The boundary between the Gulf of Mexico region and the Atlantic region is defined as a horizontal line beginning on the east coast of Florida at the mainland at 25º20.4' N. lat., proceeding due east. Shark management groups that are not split between two regions include pelagic sharks, such as thresher sharks, shortfin mako sharks, porbeagle sharks, blue sharks, and oceanic whitetip sharks.

Atlantic Region

NOAA Fisheries considers the Atlantic region as any water and land to the north and east of 25º20.4' N. lat. Blacknose sharks may only be commercially harvested south of 34°00' N. lat. (approximately at Wilmington, North Carolina). When a region is closed for a particular species/management group, fishermen in that region cannot possess or sell that species or management group, and dealers in that region cannot buy species in that group from federally permitted fishermen.

Gulf of Mexico Region and Sub-Regions

NOAA Fisheries defines the Gulf of Mexico region as any water and land to the south and west of 25º20.4' N. lat. In 2016, NOAA Fisheries split the region into western and eastern Gulf of Mexico sub-regions at 88°00′ W. long. All sharks harvested within the Gulf of Mexico region in catch areas in waters westward of 88°00′ W. long. are from the western Gulf of Mexico sub-region, and all sharks harvested within the Gulf of Mexico region in catch areas in waters eastward of 88°00′ W. long., including within the Caribbean Sea, are from the eastern Gulf of Mexico sub-region.

Large Coastal Shark Fishery

Until smoothhound sharks were added to the fishery management unit, the LCS fishery had been the primary Atlantic HMS commercial shark fishery. Table 2 shows the shark species within each regional shark management group. Because the regional commercial quotas are linked and shark fishermen targeting LCS could retain any shark species from those shark management groups, in this document, NOAA Fisheries, for the most part, has combined the regional LCS management groups to display the data and information.

Table 2. Species in each regional shark management group.

Region	Shark Management Group	Shark Species
Atlantic	Aggregated LCS[1]	Blacktip, Bull, Lemon, Nurse, Silky, Tiger, Spinner
	Hammerhead[1]	Great hammerhead, Smooth hammerhead, Scalloped hammerhead
Gulf of Mexico	Blacktip	Blacktip
	Aggregated LCS[1]	Bull, Lemon, Nurse, Silky, Tiger, Spinner
	Hammerhead[1]	Great hammerhead, Smooth hammerhead, Scalloped hammerhead

[1] The commercial quota for the hammerhead management unit is linked to the aggregated LCS management group.

Retention Limits

Under HMS regulations, § 635.24 (a), the commercial retention limit for sharks varies based on the type of limited access permit. For shark directed permit holders, the commercial retention limit for LCS other than sandbar sharks may range between zero and 55 LCS other than sandbar sharks per vessel per trip. The default commercial retention limit is 45 LCS other than sandbar sharks per vessel per trip unless NOAA Fisheries adjusts that retention limit based on consideration of criteria and other relevant factors per § 635.24 (a)(8). There is no limit on commercial retention for non-blacknose SCS and pelagic sharks under this permit, while eight blacknose sharks per vessel per trip is the commercial retention limit in the Atlantic region. For shark incidental permit holders, the commercial retention limit is three LCS other than sandbar sharks per vessel per trip and 16 combined SCS and pelagic sharks per vessel per trip with no more than eight blacknose sharks per vessel per trip.

The Large Coastal Shark Fishery in the Atlantic Region

In the Atlantic region, aggregated LCS landings from commercial fishermen were similar from 2014 through 2015 and then declined from 2016 through 2019 (Figure 9). Throughout these years, NOAA Fisheries made modifications to the retention limits and opening dates. In 2014, the aggregated LCS fishing year opened on June 1 and closed on November 30 (182 days), with a retention limit of 36 LCS other than sandbar sharks per vessel per trip. In 2015, the aggregated LCS fishing year opened on June 1 and closed on December 31 (213 days), with a retention limit of 36 LCS other than sandbar sharks per trip. NOAA Fisheries received a number of comments from fishermen from all areas of the Atlantic region requesting that the aggregated LCS and hammerhead shark management groups open in January. Thus, based on these comments, the

fishery opened on January 1 in 2016. If the quota was being harvested too quickly to allow fishermen throughout the entire region an opportunity to fish, NOAA Fisheries specified it would consider reducing the commercial retention limit (e.g., to 3 LCS other than sandbar shark per trip) after a portion of the quota was harvested (e.g., 20 percent)., NOAA Fisheries evaluated the quota later in the year (around July 15) and considered raising the commercial retention limit to a higher amount. In 2016, the retention limit opened at 36 LCS other than sandbar shark per trip, was reduced to 3 LCS other than sandbar sharks per trip (81 FR 18541; April 2, 2016), and increased to 45 LCS other than sandbar sharks per trip (81 FR 44798). This allowed the LCS fishery to remain open the entire year (365 days).

This same process of opening the fishery on January 1, reducing the retention limit for a portion in the beginning of the year, and then increasing the retention limit around July was used from 2017 through 2019. Similar to 2016 in 2017 through 2019, the LCS fishery remained open the entire year, only the retention limit changed. In 2017, the retention limit opened at 25 LCS other than sandbar sharks per trip, was reduced to 3 LCS other than sandbar sharks per trip (82 FR 17765; April 13, 2017), and increased to 36 LCS other than sandbar sharks per trip (82 FR 32490; July 16, 2017). In 2018, the retention limit opened at 25 LCS other than sandbar sharks per trip, was reduced to 3 LCS other than sandbar sharks per trip (83 FR 21744; May 12, 2018), increased to 36 LCS other than sandbar sharks per trip (83 FR 33870; July 18, 2018), and increased to 45 LCS other than sandbar sharks per trip (83 FR 55638; November 6, 2018). In 2019, the retention limit opened at 25 LCS other than sandbar sharks per trip, was reduced to 3 LCS other than sandbar sharks per trip (84 FR 12524; April 1, 2019), increased to 36 LCS other than sandbar sharks per trip (84 FR 29808; June 25, 2019), increased to 45 LCS other than sandbar sharks per trip (84 FR 42827; August 19, 2018), and increased to 55 LCS other than sandbar sharks per trip (84 FR 54522; October 9, 2019).

Despite this flexibility in retention limits and the fact that the fishery was open for the entire year (which had not happened since federal management began in 1993), there was a decrease in landings starting in 2017 through 2019. While it is possible that this approach contributed to the decline, the overall retention limit increase to 36 sharks on or around July 15 of 2017 through 2019 was comparable to the start dates and retention limits in the 2014 and 2015 fishing seasons. Thus, it is likely that factors other than start dates and retention limit might have contributed to the decline in landings.

In 2020, NOAA Fisheries specified that it intended to consider a retention limit reduction at a 35 percent threshold instead of a 20 percent threshold. Additionally, the retention limit on January 1 was moved to a higher amount, at 36 LCS other than sandbar sharks per vessel per trip. However, landings remained low. In fact, NOAA Fisheries increased the retention limit from 36 to 55 LCS other than sandbar sharks per vessel per trip for all directed permit holders on June 19, 2020 (85 FR 37390; June 22, 2020). While these changes resulted in a higher landing percentage than landings in 2018 and 2019, preliminary landings information still indicates that only 57 percent of the quota was landed.

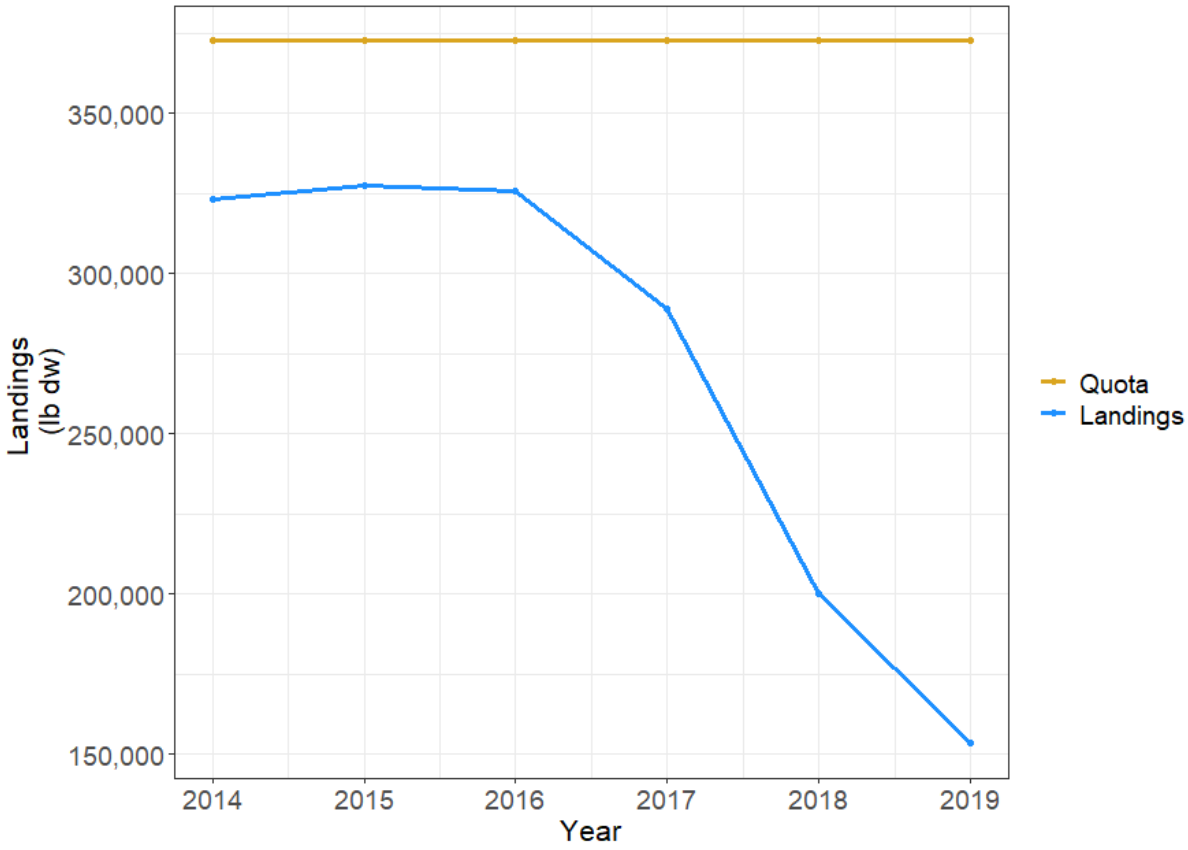

Figure 9. Atlantic aggregated large coastal shark quota and landings, 2014-2019.
Source: eDealer reporting system.

Monthly landings: Some of the reasons for the Atlantic aggregated LCS landings fluctuating over time are the opening dates and retention limit adjustments (Figure 10). In 2014 and 2015, the Atlantic LCS opening dates were June 1 and July 1, respectively. Thus, all of the LCS landings were during the summer and fall months. As described above, NOAA Fisheries changed the regulations to allow for changes in the retention limit throughout the year after opening the fishery on January 1 from 2016 through 2019. This change in regulations allowed more opportunity for fishermen throughout the Atlantic region to target sharks throughout the year. As shown in Figure 11, in 2016 through 2019, landings started low in January and increased in February through April before decreasing in May. This aligns with the opening in January and NOAA Fisheries' reduction of the retention limit (3 LCS other than sandbar sharks per vessel per trip) once either the LCS management group quota (aggregated LCS or hammerhead shark) reached a quota threshold. Around July, NOAA Fisheries would increase the retention limit (36 LCS other than sandbar sharks per vessel per trip) until the quota was reached. In some years after reviewing the inseason criteria (2018 and 2019), NOAA Fisheries increased the retention limit (45 or 55 LCS other than sandbar sharks per vessel per trip) to increase the fishing rate in an attempt to increase the likelihood the quota would be reached.

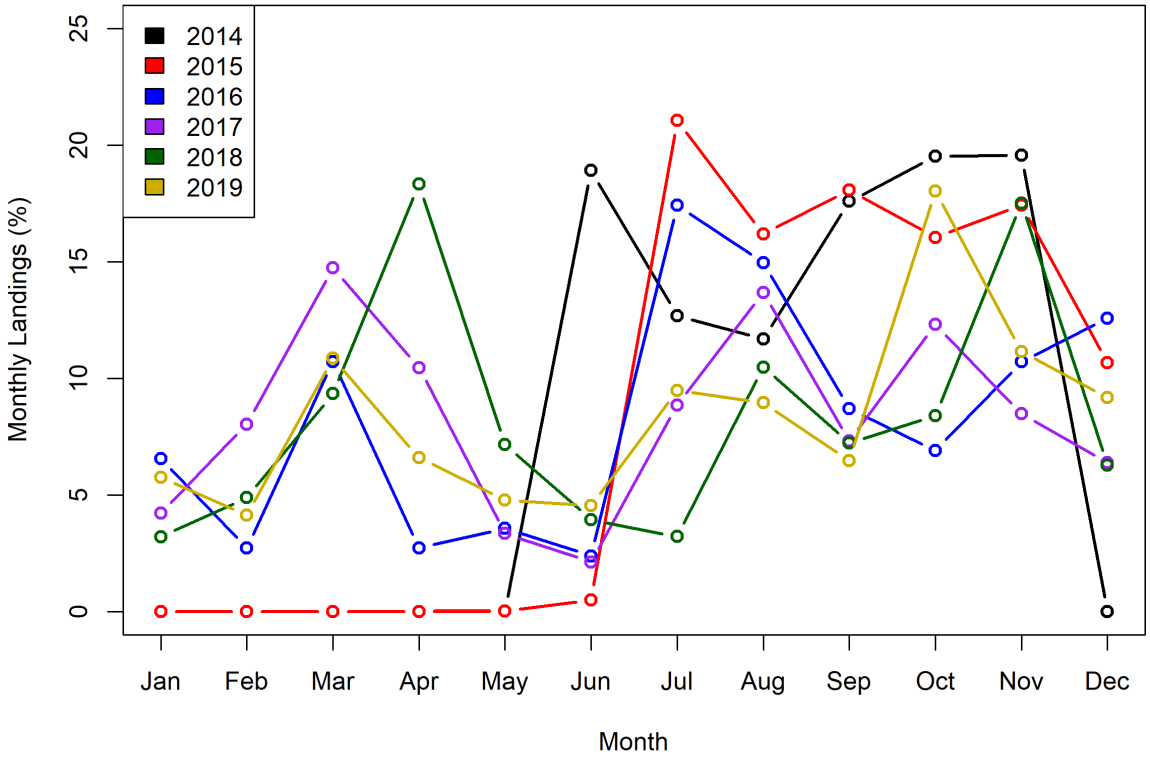

Figure 10. Percentage of monthly landings of aggregated large coastal and hammerhead shark management groups in the Atlantic region by year, 2014-2019.

Source: eDealer reporting system.

Hammerhead shark landings: While landings have fluctuated over the years, there is no discernable pattern, and landings have not been close to reaching the quota (Figure 11). Information gathered through personal communication with fishermen who fish primarily in the Atlantic region indicate that hammerhead sharks are not targeted when fishermen are fishing for aggregated LCS. Hammerhead shark meat has a higher urea content than some of the other aggregated LCS sharks and many consumers do not find the meat as flavorful as other shark meat. Hammerhead sharks were previously targeted for their fins. However, the number of shark fin dealers has declined in recent years so fewer hammerhead sharks are landed and brought in for sale.

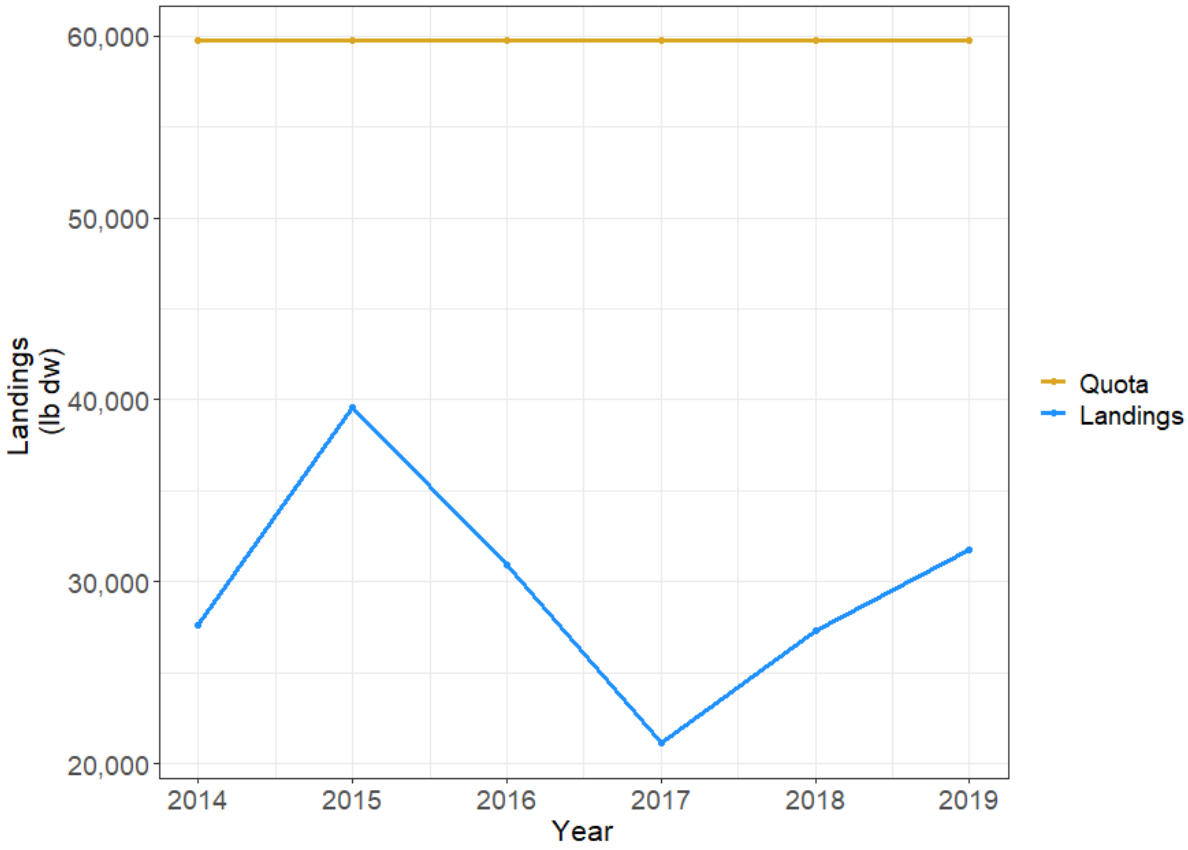

Figure 11. Atlantic hammerhead shark quota and landings, 2014-2019.
Source: eDealer reporting system.

Trips by permit type: For the purposes of this document, a shark trip is any trip that reported sharks through the eDealer reporting system. Based on the data reported by shark dealers, the state-water permit holders take more trips than shark directed permit holders when landing all LCS in the Atlantic region (Figure 12). In 2016, trips by state-water permit holders increased by over 50 percent due to the change in the aggregated LCS and hammerhead shark opening date. For shark directed only permit holders, the number of trips per year stayed fairly consistent from 2014 through 2017 then peaked in 2019 (452). Trips landing aggregated LCS and hammerhead sharks by shark directed triple pack permit holders increased from 2015 to 2017, and then decreased and was the lowest in 2019 (17). Shark incidental permit holder trips landings aggregated LCS and hammerhead sharks stayed consistent over time and cannot be shown for 2019 due to confidentiality requirements.

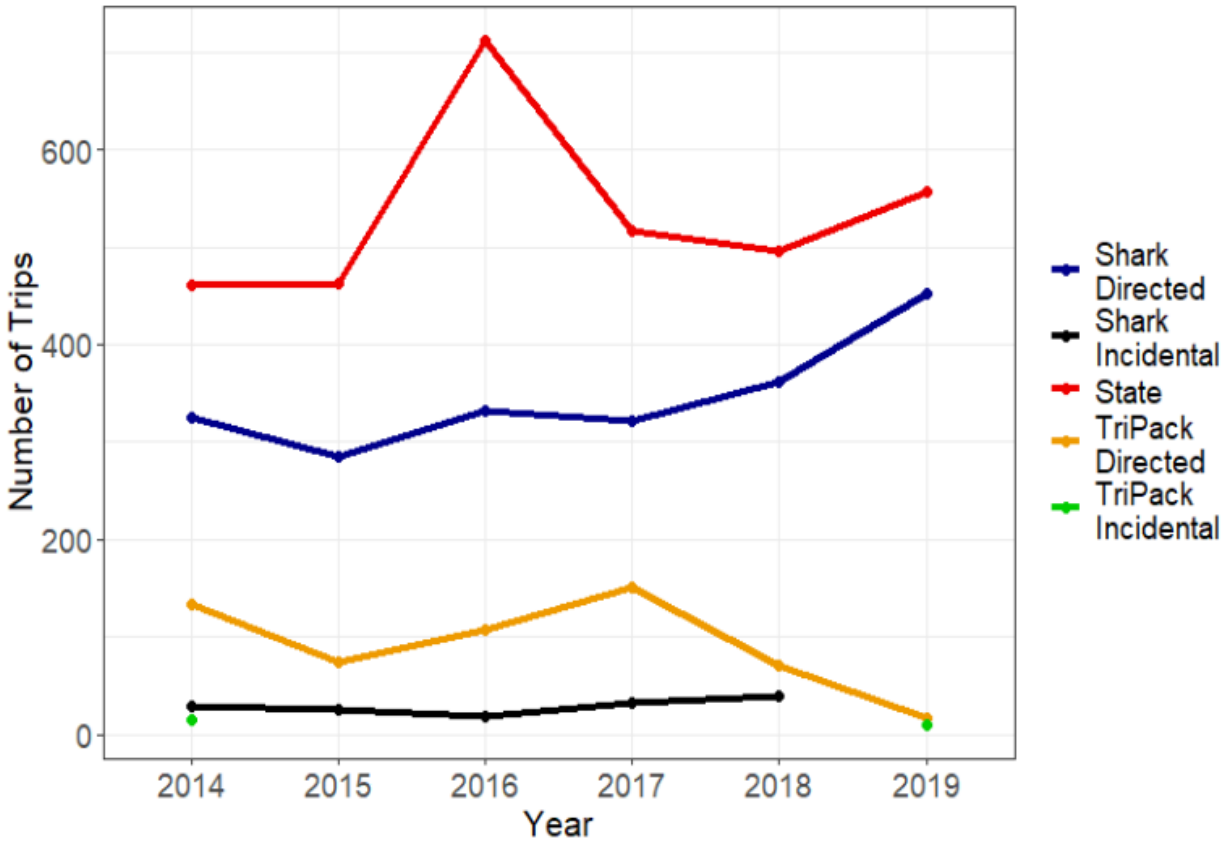

Figure 12. Number of trips landing aggregated LCS and hammerhead shark management groups by permit holder in the Atlantic region, 2014-2019.

Note: Not all of the trips by incidental shark permit holders were shown due to confidentiality requirements. Source: eDealer reporting system.

Landings in weight per trip: While state-water permit holders take more trips, state-water permit holders do not land more sharks per trip compared to their federal permit holder counterparts (Figure 13). From 2014 through 2018, shark directed triple pack permit holders had a mean (red dot) average of over 1,000 pounds (lb) dw of LCS per trip. There were trips that exceeded 2,000 lb dw, but the majority of trips were lower. However, their landings per trip decreased to a mean of about 400 lb dw in 2019. Shark directed only permit holders had lower mean landings per trip that ranged from approximately 200 to 500 lb dw. State-water permit holders averaged approximately 200 lb dw. In 2016, over 700 state-water permit holder trips landed aggregated LCS and hammerhead sharks and resulted in a mean of all trips at approximately 200 lb dw. Shark incidental permit holders landings were lower than shark directed, shark directed triple pack, and state-water permit holders every year except for 2016. Shark incidental triple pack permit holders also had very low landings in 2014 (approximately 200 lb dw). Due to confidentiality requirements, the majority of the shark incidental triple pack permit holder landings of LCS could not be shown.

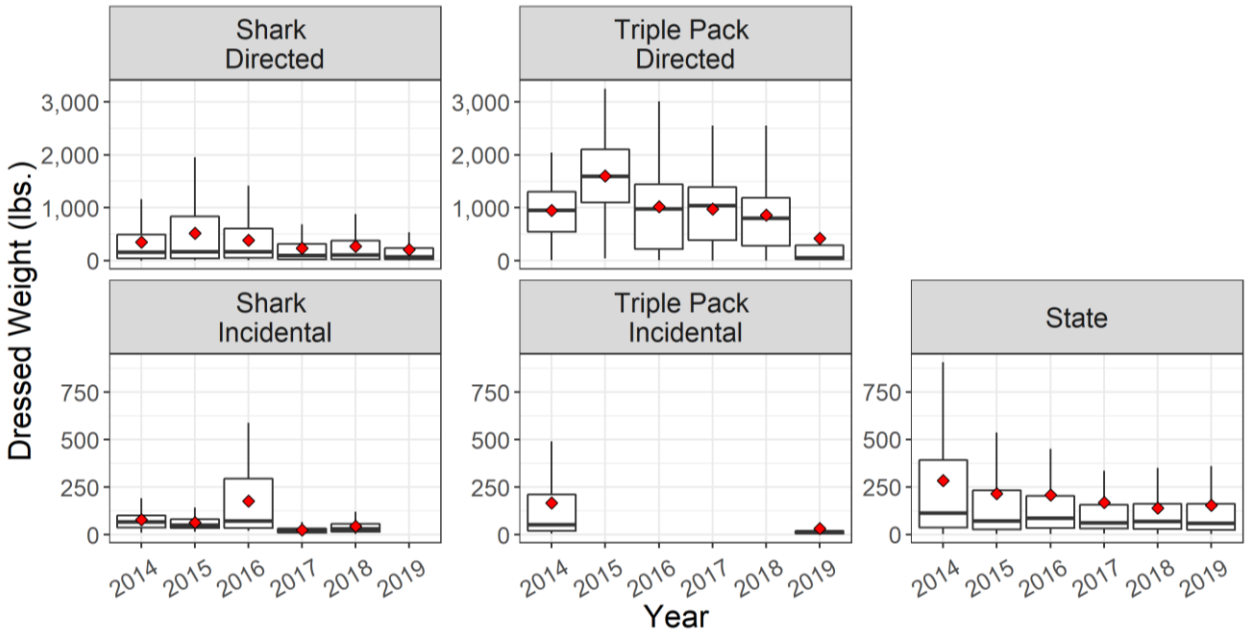

Figure 13. Landings in weight of aggregated LCS and hammerhead shark management groups per trip by permit holder in the Atlantic region, 2014-2019.

Vertical line = the minimum and maximum landings reported per trip
Box = the middle 50 percent of the landings per trip
Red dot = the mean landings
Horizontal black line = the median landings per trip
Note: Outliers have been omitted. The y-axis scale shifts depending on the amount of lb dw landed by permit type.
Sources: SERO; eDealer reporting system.

Landings percentage by permit type: In 2014, there was a fairly equal distribution of landings between shark directed (blue), state-water (red), and shark directed triple pack (yellow) permit holders (Figure 14). From 2017 to 2019, the percent of landings by shark directed triple pack permit holders was significantly lower (47 to 4 percent), and there was a correspondingly large increase in landings by state-water permit holder (28 to 46 percent) and shark directed permit holders (25 to 50 percent).

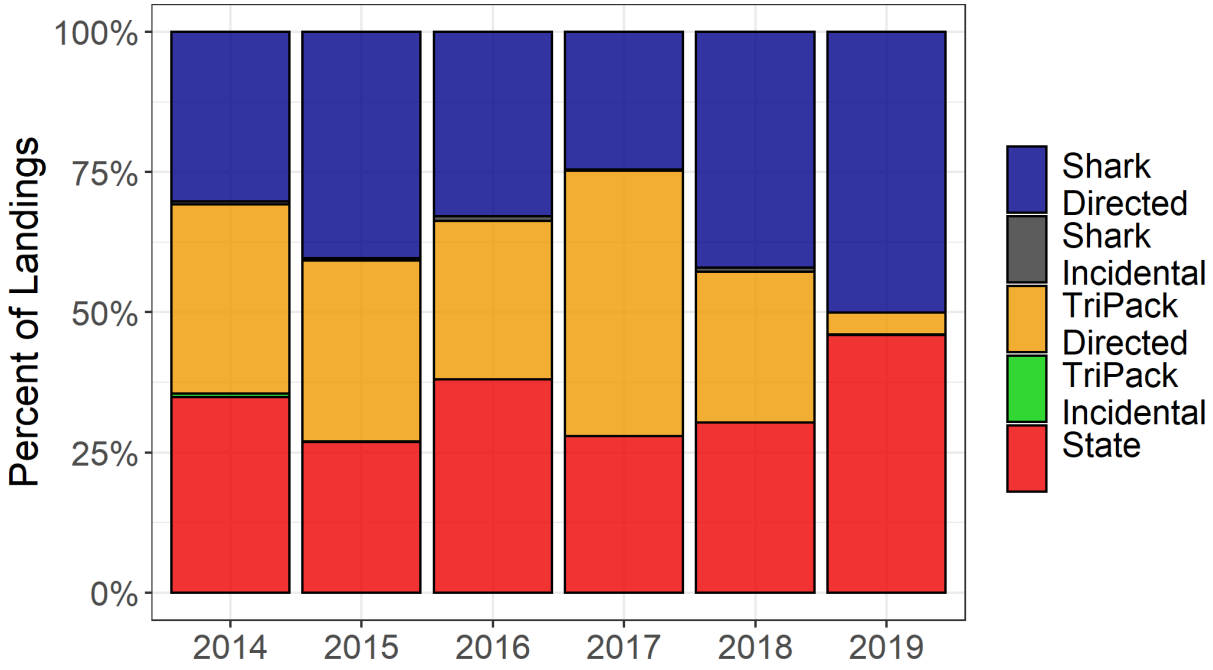

Figure 14. Percentage of aggregated LCS and hammerhead shark management groups landed by permit holder in the Atlantic region, 2014-2019.

Sources: SERO; eDealer reporting system.

Trips by gear type: For purposes of this section, a shark trip is as any trip that catch and retained at least one LCS with the gear type based on data in the HMS and Southeast Coastal Fisheries logbooks. Historically, bottom longline gear has been the primary gear type used to target LCS. However, that has changed in recent years. In 2014, trips using gillnet gear landed the most LCS (approximately 300), while bottom longline gear was used in approximately 230 trips (Figure 15). Data shows that the number of bottom longline trips stayed consistent through 2017 then decreased to 48 in 2019. With bottom longline trips showing a downward trend, there was a rise in gillnet trips. Gillnet became the primary gear type from 2016 through 2019. In 2019, the trips peaked at 430. This shows that fishermen are not directly targeting LCS as they have done in the past. Since gillnet gear is not the traditional primary gear targeting this species, NOAA Fisheries believes that gillnet gear is being used to incidentally catch and retain LCS. Only a small number of trips used pelagic longline or vertical line to retain LCS.

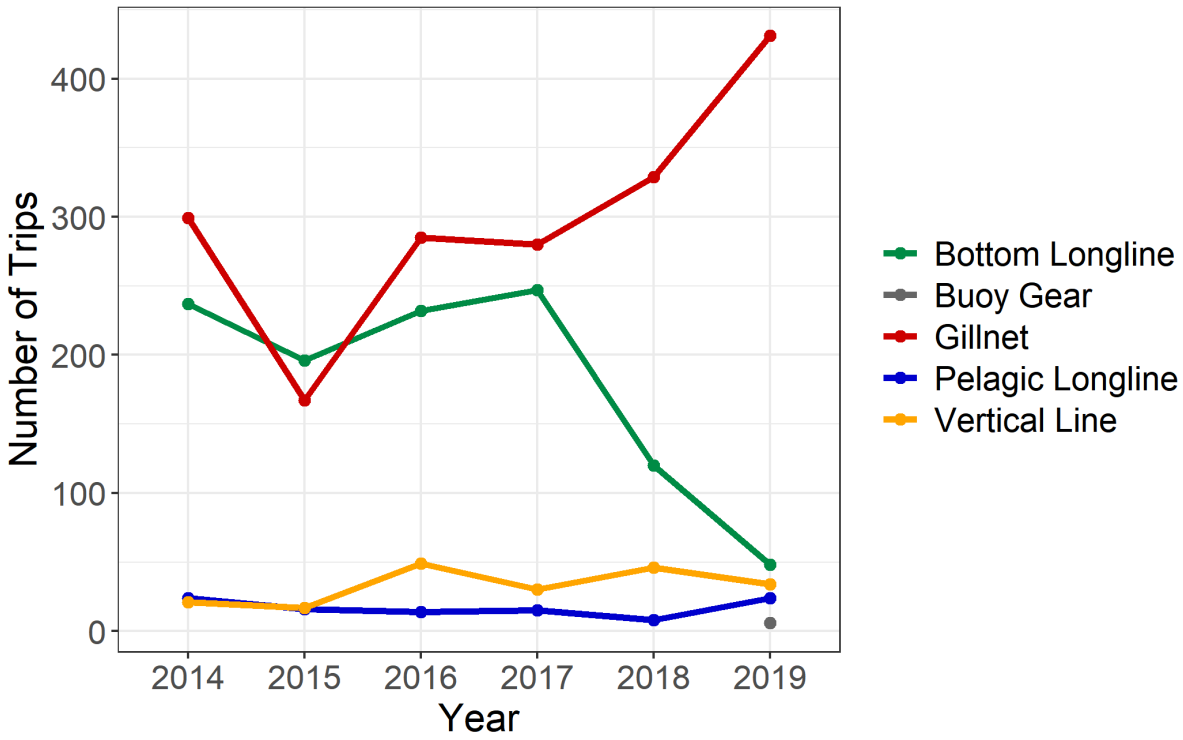

Figure 15. Number of trips by gear type taken that landed at least one shark from the aggregated large coastal and hammerhead shark management groups in the Atlantic region by year, 2014-2019.

Note: Not all of the trips with buoy gear were displayed due to confidentiality requirements. Source: Unified data processing (fishery dependent data from vessels and permitted dealers).

Directed trips by gear type: For purposes of this document, a directed shark trip is s a trip on which 2/3 of the landings by weight are sharks. Trips taken by bottom longline were the primary gear type used to direct on LCS in the Atlantic region from 2014 through 2018 (Figure 16). In 2017, the most directed LCS trips occurred with bottom longline gear (approximately 240). However, the number of trips has decreased over time and reached its lowest point in 2019 (42). Gillnet gear was the next popular gear type and the number of trips have fluctuated over time. In 2019, the number of gillnet trips overtook bottom longline gear with approximately 140. Only a small number of directed trips have used vertical line to retain LCS.

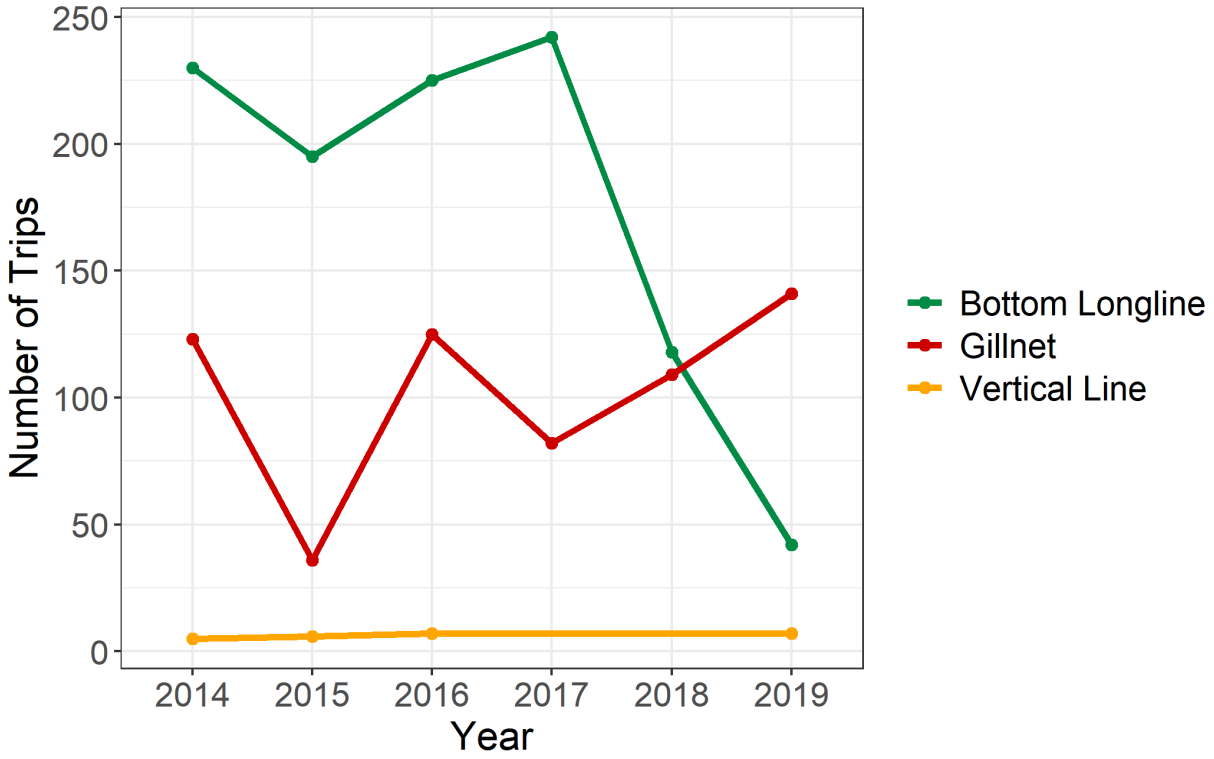

Figure 16. Number of directed trips by gear type taken that landed aggregated large coastal and hammerhead shark management groups in the Atlantic region by year, 2014-2019.

Note: Directed shark trips are trips where 2/3 of the landings by weight were sharks. Source: Unified data processing.

High-liner vessels: The vessels in this section account for the largest percentage of landings per year (also known as "high-liners") for the Atlantic LCS management group based on eDealer data. To keep each vessel anonymous, the vessels are represented by a letter and color-coding based on permit type. At the start of the time series, all vessels were ranked and labeled. NOAA Fisheries kept that label for each vessel throughout the time series. In other words, "A" refers to the same vessel in 2014 as it does in 2019. In cases of a permit type change, the color changes. In addition, the vessel identification is not the same for each shark management group. For example, Vessel H in Figure 17, the aggregated LCS and hammerhead in the Atlantic region figure is not the same vessel as Vessel H in other figures below. This individual vessel data shows a trend in the fishery of vessels switching permits, the importance of shark fishing to the individual vessels, and the variability of participants in the shark fishery.

Figure 17 shows only the top ten vessels for each year that landed aggregated LCS and hammerhead sharks in the Atlantic region. Overall, most vessels fluctuated from year to year with some exceptions. Vessel A (shark directed triple pack permit holder) landed the most LCS from 2014 through 2018. In 2017, Vessel A accounted the largest amount of the overall Atlantic LCS landings during this time series. Vessel B was within the top ten vessels landing LCS in the Atlantic region through 2016 but changed permits from shark directed triple pack permit holder to a shark directed only permit holder. Vessel B reentered the top ten in 2019. Vessel C carried a shark directed only permit and continued being a top vessel landing LCS through 2018. Through the time series, state-water permit holders were well represented in the top ten vessels each year.

In 2016, there seemed to be a change in the top ten vessels landing LCS in the Atlantic region. This corresponded when NOAA Fisheries opened the Atlantic LCS on January 1 instead of July 1, which was the opening date in 2014 and 2015.

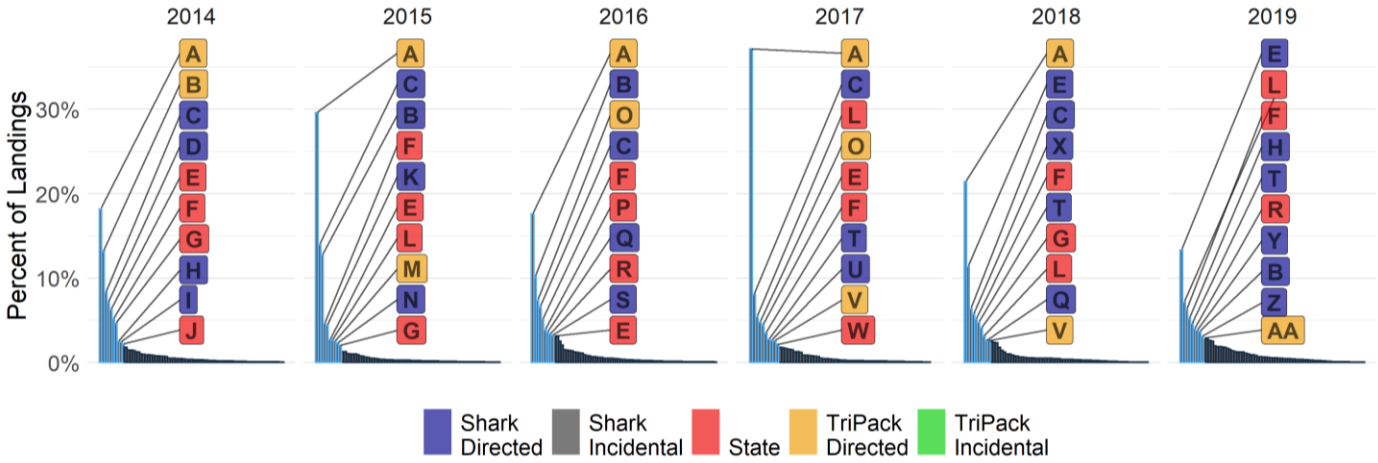

Figure 17. Top ten vessels with aggregated large coastal and hammerhead shark management group landings in the Atlantic region by year, 2014-2019.

Note: The letters are assigned to an individual vessel and tracked through the years. The colors for each letter are designated based on the permit type of each vessel. Source: eDealer reporting system.

Percentage of landings by top vessels: These percentages demonstrate how many vessels accounted for the majority of the shark management group landings. In the Atlantic region, the top ten vessels accounted for 69 percent of the overall landings of aggregated LCS and hammerhead sharks (Table 3). The top three vessels accounted for 42 percent of the LCS landings, while the top five vessels accounted for 53 percent of the LCS landings. In 2015, the top 10 vessels landed the largest overall percentage of LCS (78) when compared to the other years. This corresponds to when NOAA Fisheries implemented Amendment 6 to the 2006 Consolidated HMS FMP (80 FR 50073; August 18, 2015) that, among other things, increased the LCS retention limit from 36 LCS other than sandbar sharks per trip to 45 LCS other than sandbar sharks per trip. Thus, fishermen were able to land more sharks per trip.

Table 3. Percentage of annual aggregated large coastal and hammerhead shark management group landings in the Atlantic region that the top three, five, or ten vessels account for by year.

Year	Top Three Vessels	Top Five Vessels	Top Ten Vessels
2014	40%	53%	70%
2015	56%	65%	78%
2016	35%	47%	64%
2017	51%	60%	73%
2018	39%	50%	67%
2019	27%	36%	54%
Overall	42%	53%	69%

Source: eDealer reporting system.

Gulf of Mexico Large Coastal Shark Fishery

As mentioned above, NOAA Fisheries separated the Gulf of Mexico region into eastern and western sub-regions in 2016. The blacktip management group is subdivided among the Gulf sub-regions, but unlike the aggregated LCS and hammerhead management groups, the blacktip shark quota is not quota linked. Figures 18 through 22 show the commercial landings of each management group in both the eastern and western sub-regions by year; in these figures the data for 2014 and 2015 are for the entire Gulf of Mexico region, as sub-regions did not exist yet.

In the Gulf of Mexico region, the aggregated LCS, blacktip shark, and hammerhead shark quotas are generally opened and closed at the same time, but the timing has varied based on the sub-regions from 2016 through 2019. In 2014, the Gulf of Mexico opened on January 1 and closed on June 2 (152 days), and in 2015, it opened on January 1 and closed on May 3 (122 days). Once sub-regions were created, the aggregated LCS, blacktip shark, and hammerhead shark quotas were opened and closed together in the western sub-region based on comments from the regulated community. In 2016 and 2018, the western sub-region opened on January 1 and closed on March 12 and March 13 (both 71 days), respectively. In 2017, it opened on February 1 and closed on May 2 (90 days). However, in 2019, the season remained open all year likely due to other factors that affected the fishery (see the Market and Additional Factors section for more information). Figure 18 shows the blacktip shark landings and quota in the western Gulf of Mexico. Since the Gulf of Mexico blacktip shark population is healthy, NOAA Fisheries regulations specify that underharvest from the previous year may be carried over to the next year as long as the carryover amount does not exceed 50 percent of the base quota. Thus, the quota fluctuates year to year based on the underharvest amount. The commercial blacktip shark fishery in the western Gulf is a popular fishery, and therefore, at times the rate of landings can increase, causing the quota to be exceeded quickly if the fishery is not closely monitored. As was the case in 2015, when the commercial quota was exceeded by 13 percent before the fishery was closed. In 2016, NOAA Fisheries took that overharvest into consideration when calculating the sub-regional quotas, which were established in Amendment 6. In 2018, landings reached 95 percent of the quota. In 2019, NOAA Fisheries transferred 5.0 mt dw (10,835 lb dw) of blacktip quota from the western Gulf of Mexico to the eastern Gulf of Mexico sub-region (84 FR 48791; September 17, 2019) because the quota was not being landed in the western Gulf of Mexico sub-region due to outside factors. Thus, the adjusted 2019 quota dropped from previous fishing seasons due to the smaller underharvest carry-over amount and the quota transfer.

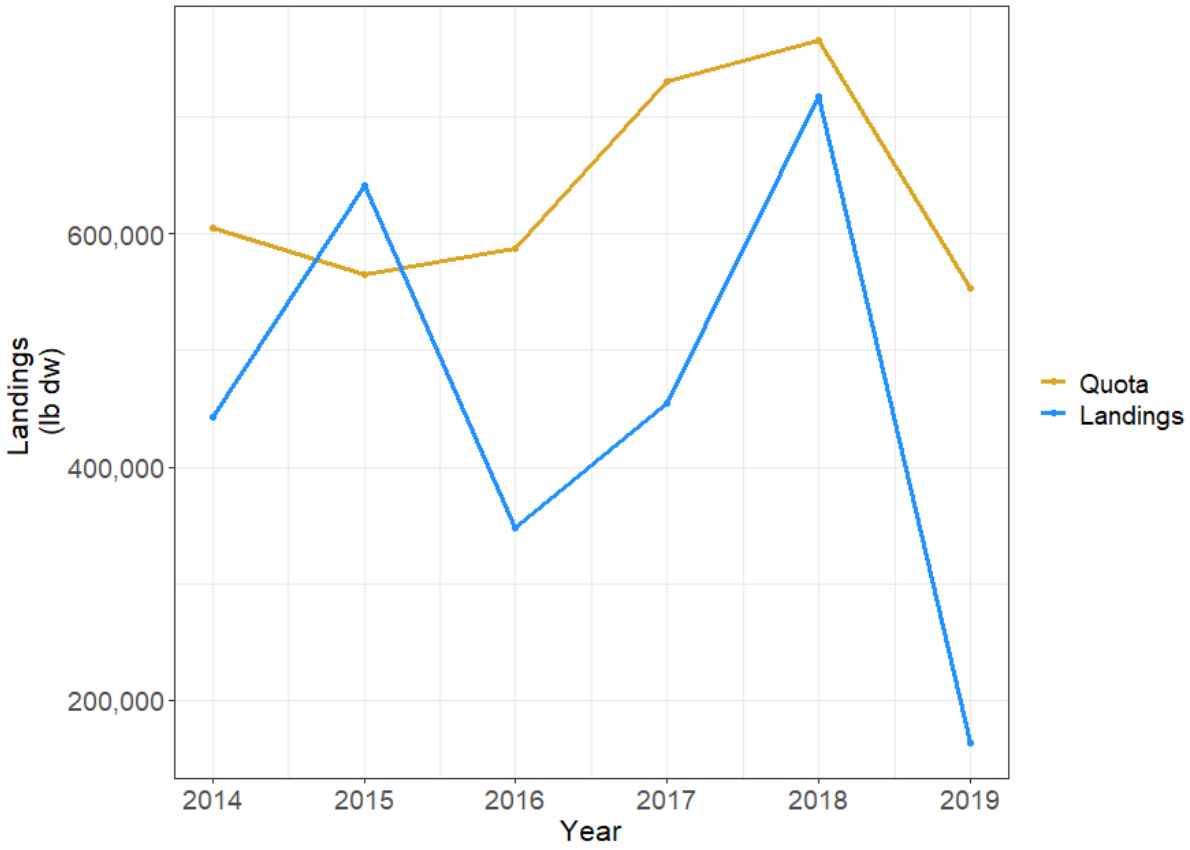

Figure 18. Western Gulf of Mexico sub-region blacktip shark quota and landings, 2014-2019.
Note: For 2014 and 2015, the entire Gulf of Mexico quota and landings are shown since the sub-regions were not created until 2016. Source: eDealer reporting system.

Landings in the aggregated LCS fishery in the western Gulf of Mexico sub-region are usually very close to, or at times exceed, the allocated quota to that sub-region. As shown in Figure 19, the quota was exceeded in 2014 (one percent) and 2018 (29 percent). NOAA Fisheries reduced the base quota in 2015 based on the 2014 overharvest. However, the 2018 sub-region overharvest did not reduce the 2019 quota because the overall Gulf of Mexico (combined western and eastern sub-regions) aggregated LCS quota was not exceeded in 2018. As with the 2019 transfer of blacktip shark quota between sub-regions discussed above, NOAA Fisheries transferred 50 mt dw (110,133 lb dw) of aggregated LCS quota and 8.0 mt dw (17,757 lb dw) of hammerhead shark quota from the western Gulf of Mexico to the eastern Gulf of Mexico sub-region in 2019. The quota transfer is reason for the change in commercial quota during the 2019 fishing season and not a reduction due to landings overharvesting the quota. Like the Atlantic hammerhead fishery, the western Gulf sub-region hammerhead fishery is not a primary target species in the sub-region (Figure 20). Hammerhead species are typically caught with aggregated LCS species; therefore, the western Gulf of Mexico sub-region hammerhead fishery is linked to the aggregated LCS fishery. The hammerhead shark landings typically stay below the quota, except for one instance during the time series in 2016 when the quota was exceeded by 40 percent. As with the 2018 aggregated LCS overharvest, NOAA Fisheries did not reduce the 2017 quota since the overall hammerhead shark quota (combined western and eastern sub-regions) was not exceeded. Additionally, 2019 data are not shown in the graph because of confidentiality requirements of the

MSA. Hammerhead shark landings have declined due to other factors (see the Market and Additional Factors section for more information).

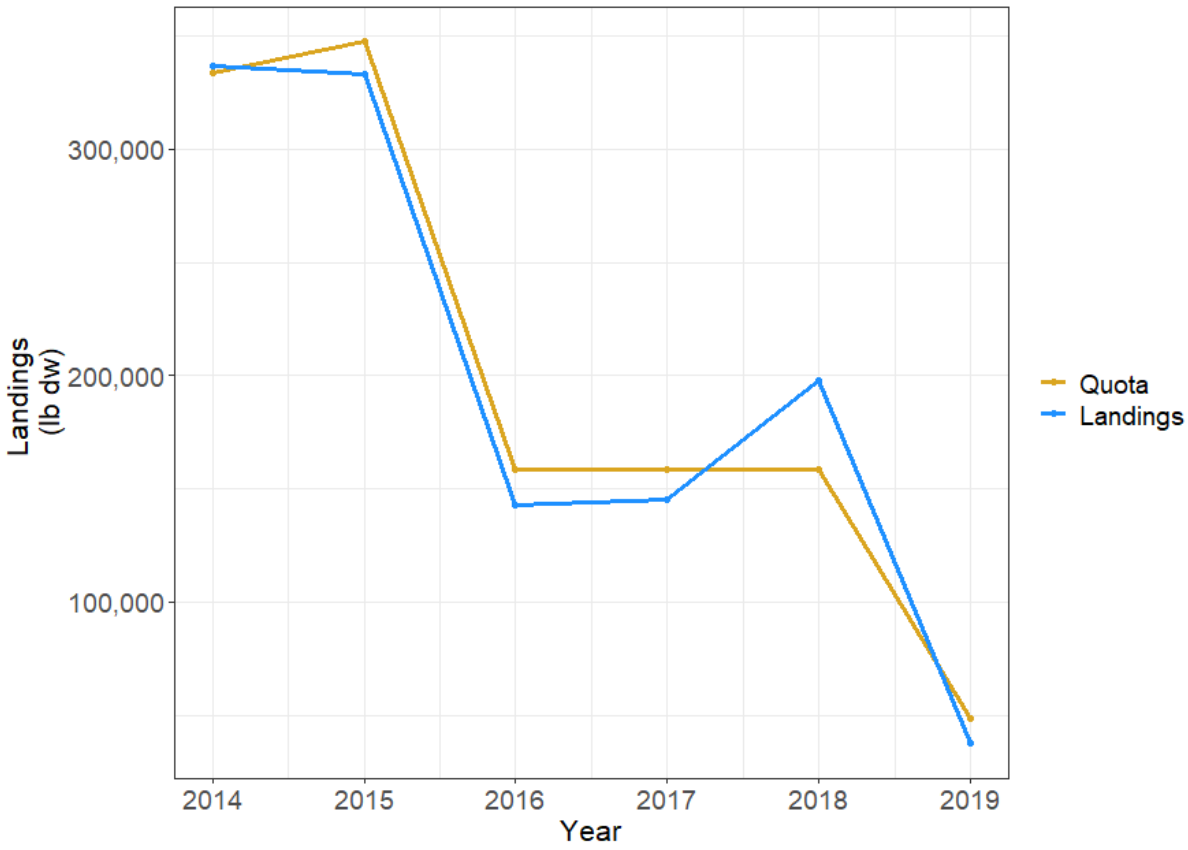

Figure 19. Western Gulf of Mexico sub-region aggregated large coastal shark quota and landings, 2014-2019.

Note: For 2014 and 2015, the entire Gulf of Mexico quota and landings are shown since the sub-regions were not created until 2016. Source: eDealer reporting system.

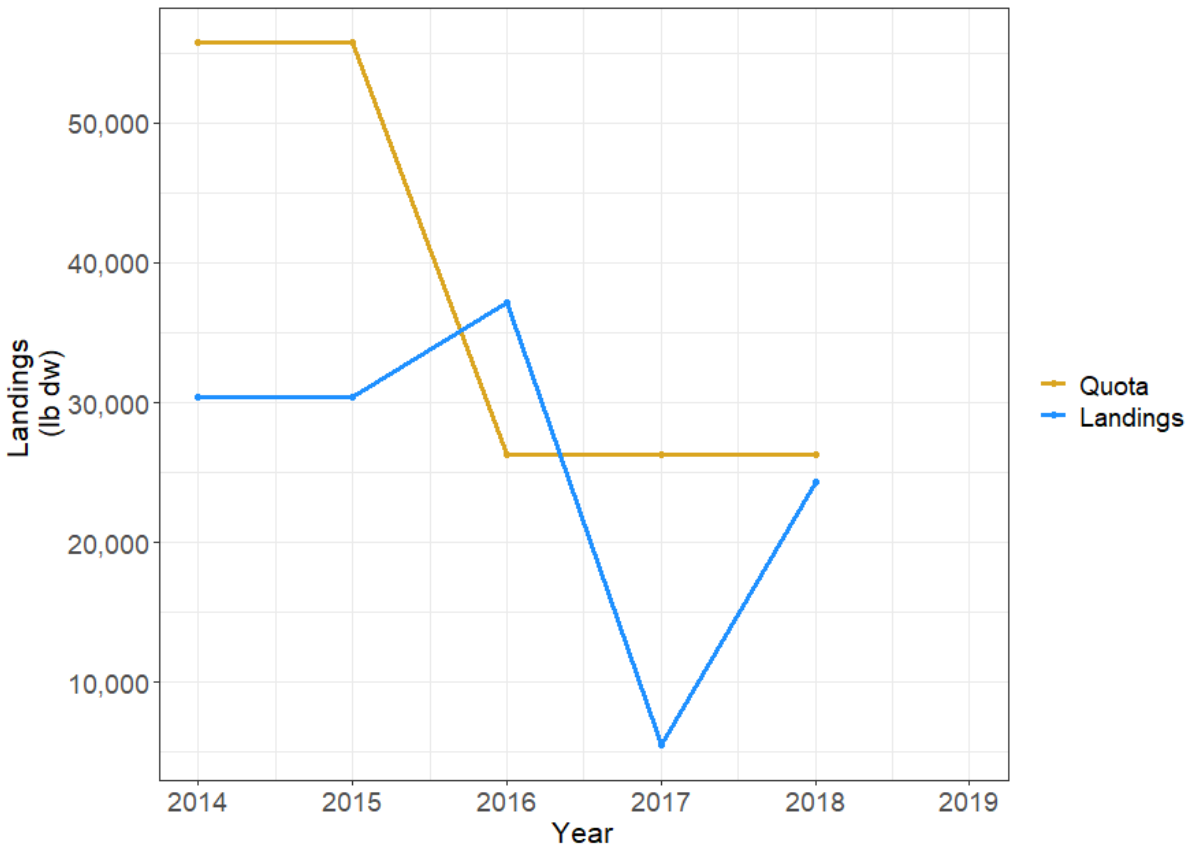

Figure 20. Western Gulf of Mexico sub-region hammerhead shark quota and landings, 2014-2019.
Note: For 2014 and 2015, the entire Gulf of Mexico quota and landings are shown since the sub-regions were not created until 2016. Due to confidentiality requirements, the 2019 data could not be shown. Source: eDealer reporting system.

The commercial blacktip shark fishery is also popular in the eastern Gulf of Mexico sub-region. Landings typically approach the quota each year (Figure 21). As explained above, NOAA Fisheries transferred blacktip quota from the western Gulf of Mexico to the eastern Gulf of Mexico sub-region in 2019. This transfer was meant to provide fishermen in the eastern Gulf of Mexico sub-region the opportunity to land more sharks while staying within the quota. However, landings in 2019 were 68 percent lower than the average landings in 2016 through 2018, indicating that factors other than quota level were influencing the fishery in 2019. One of those factors could be that fishermen were focusing on other shark species like aggregated LCS, which had its highest landings since the sub-regional split in 2016.

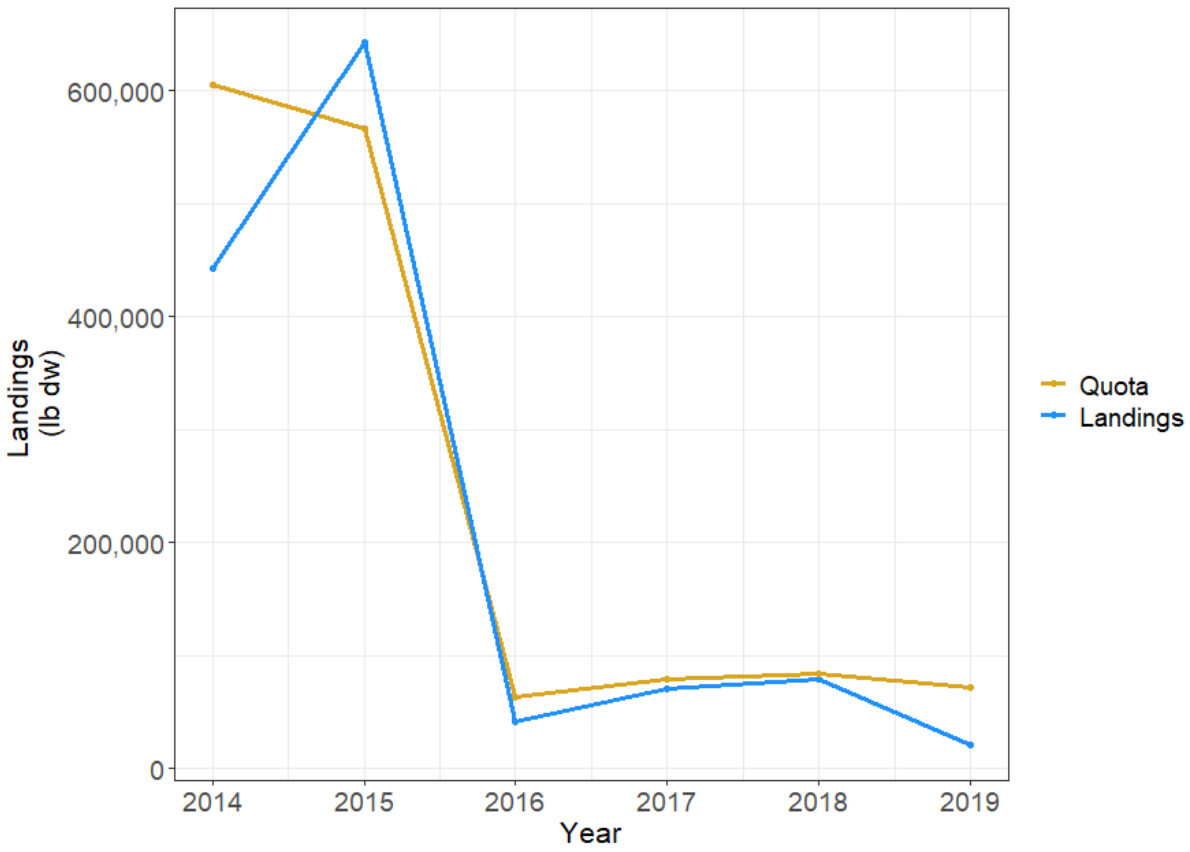

Figure 21. Eastern Gulf of Mexico sub-region blacktip shark quota and landings, 2014-2019.
Note: For 2014 and 2015, the entire Gulf of Mexico quota and landings are shown since the sub-regions were not created until 2016. Source: eDealer reporting system.

The Gulf of Mexico aggregated LCS landings, as mentioned above, were split into sub-regions in 2016, which is why there is a large reduction in commercial quota and landings in 2016 (Figure 22). Typically, the eastern sub-region fishermen consistently land aggregated LCS all year long and landings stay below the quota. The eastern sub-region hammerhead shark quota is linked to the eastern sub-region aggregated LCS quota. As with the blacktip shark quota, NOAA Fisheries transferred aggregated LCS quota and hammerhead shark quota from the western Gulf of Mexico to the eastern Gulf of Mexico sub-region in 2019. NOAA Fisheries made this transfer to provide additional opportunities for fishermen in the eastern Gulf of Mexico sub-region given that fishermen in the western Gulf of Mexico sub-region were not landing the quota. Unlike blacktip, landings of aggregated LCS and hammerhead sharks in 2019 were higher or consistent with landings in previous years. As in the western Gulf of Mexico, the hammerhead fishery is not the primary fishery of the LCS in the eastern sub-region. Because hammerhead sharks are not primarily targeted, landings typically are below the quota (Figure 23).

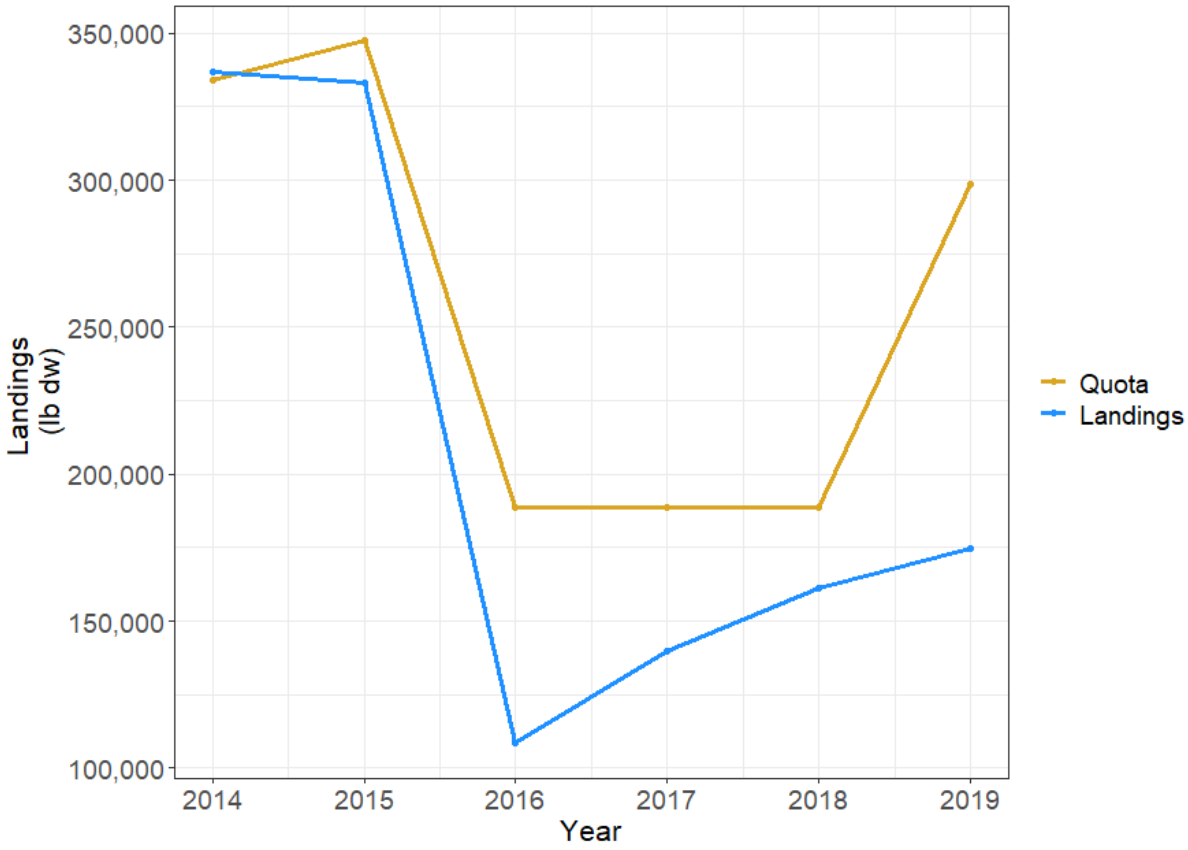

Figure 22. Eastern Gulf of Mexico sub-region aggregated large coastal shark quota and landings, 2014-2019.

Note: For 2014 and 2015, the entire Gulf of Mexico quota and landings are shown since the sub-regions were not created until 2016. Source: eDealer reporting system.

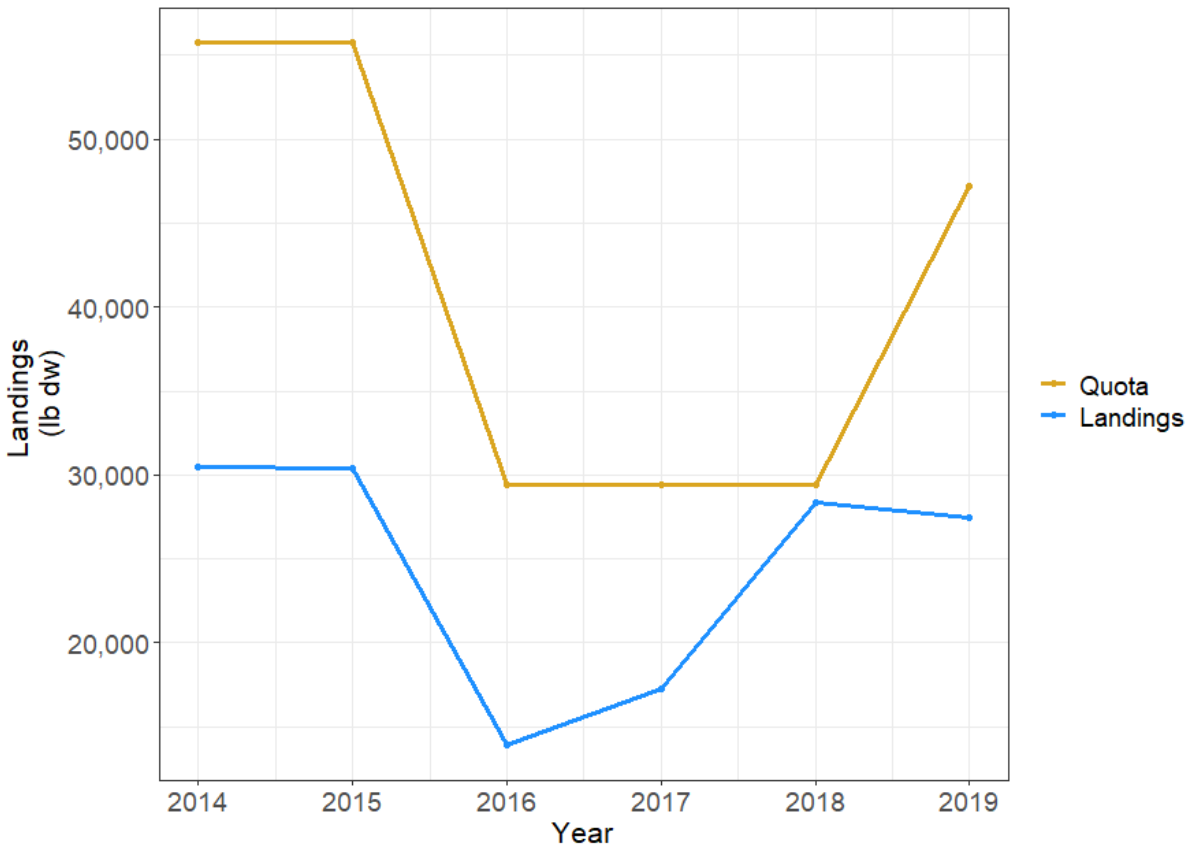

Figure 23. Eastern Gulf of Mexico sub-region hammerhead shark quota and landings, 2014-2019. Note: For 2014 and 2015, the entire Gulf of Mexico quota and landings are shown since the sub-regions were not created until 2016. Source: eDealer reporting system.

Monthly landings: Historically in the Gulf of Mexico region, the opening date for the fishery was January 1. Landings would occur in the first half of the year and taper off as fishermen would move to other fisheries (Figure 24). In 2014 and 2015, prior to the sub-regional split, the LCS fishery closed in May. Based on public comments on Amendment 6, NOAA Fisheries decided to split the region into two sub-regions to provide more equitable economic benefits to fishermen in both sub-regions, by allowing them increased likelihood of fully harvesting their sub-regional quota and maximizing the potential annual revenue they could gain upon implementation of sub-regional quotas in the Gulf of Mexico. Typically, western Gulf of Mexico sub-regional fishermen prefer to target LCS until the spring, while eastern Gulf of Mexico sub-regional fishermen prefer having the LCS fisheries stay open until year-end.

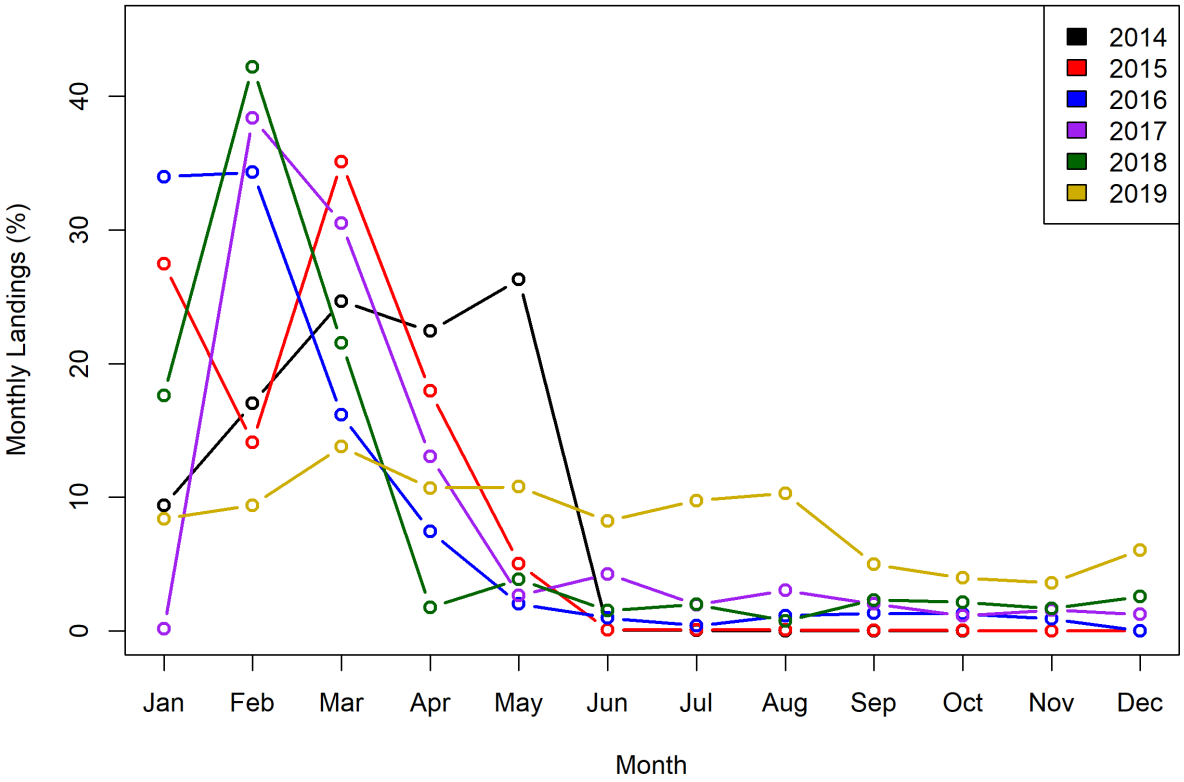

Figure 24. Percentage of monthly landings of blacktip shark, aggregated LCS, and hammerhead shark management groups in the Gulf of Mexico region by year, 2014-2019.

Note: Monthly landing percent are of the entire quota available in both the western and eastern Gulf. Source: eDealer reporting system.

Monthly western sub-region landings: Since the split into two sub-regions, the western sub-region's season typically closed in the spring when the quotas were reached (Figure 25). These shark fishermen would prefer to reach the quota before the State of Louisiana state water closure, which occurs each year for shark fishing from April 1 through June 30. During these federal and state closures, federal shark fishermen in Alabama nevertheless reported a few landings in 2018, although such landings were prohibited given the federal closure. In Alabama, under state law state-water gillnet fishermen targeting other fish are allowed to retain sharks as long as the total shark weight does not exceed 10 percent of total catch. In 2019, landings were lower in the beginning of the year. As a result, landings occurred throughout the year and the landings did not come close to the quota.

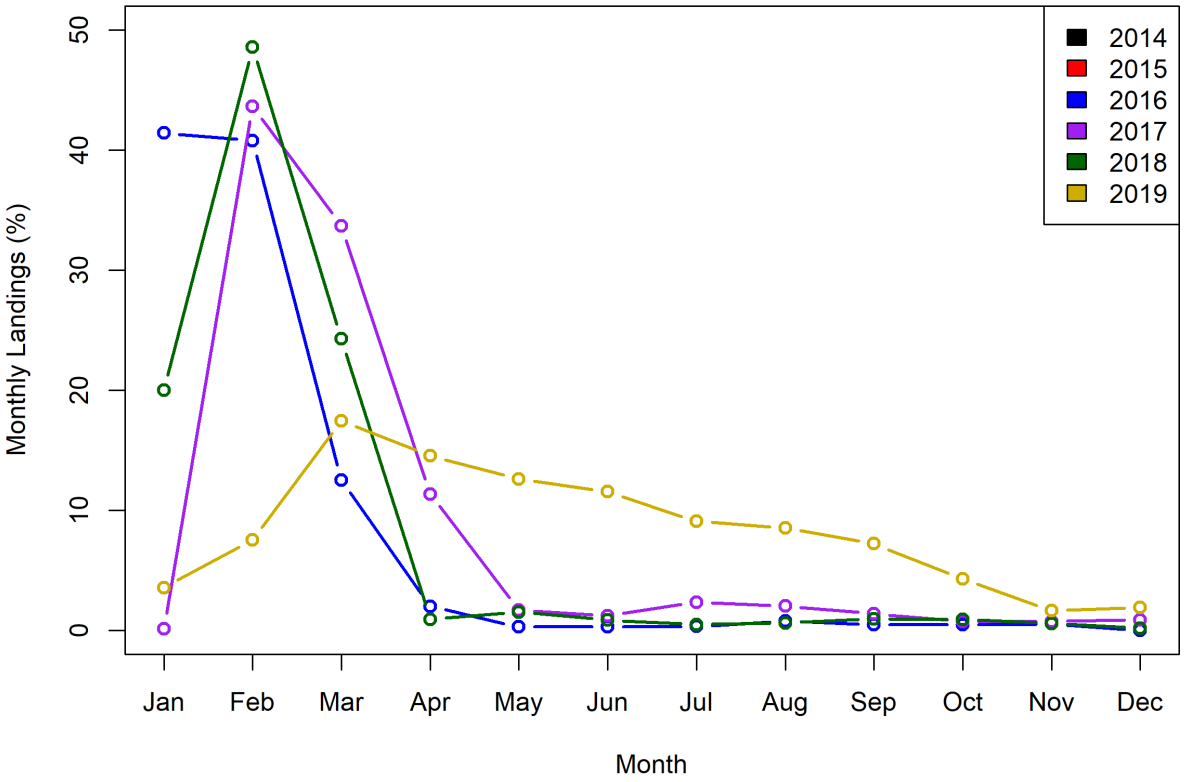

Figure 25. **Percentage of monthly landings of blacktip shark, aggregated LCS, and hammerhead shark management groups in the western sub-region of the Gulf of Mexico region by year, 2016-2019.**

Source: eDealer reporting system.

Monthly eastern sub-region landings: Overall, the landings pattern was similar to the western Gulf of Mexico sub-region in that fishermen landed more LCS in the first half of the year, but landings in the eastern sub-region stayed consistent throughout the year (Figure 26). In 2018 and 2019, however, landings increased from November to December, indicating a potential change in fishing practices. From the data, it is difficult to determine the reason for this change; it could be due to weather or to outside factors such as a change in another fishery.

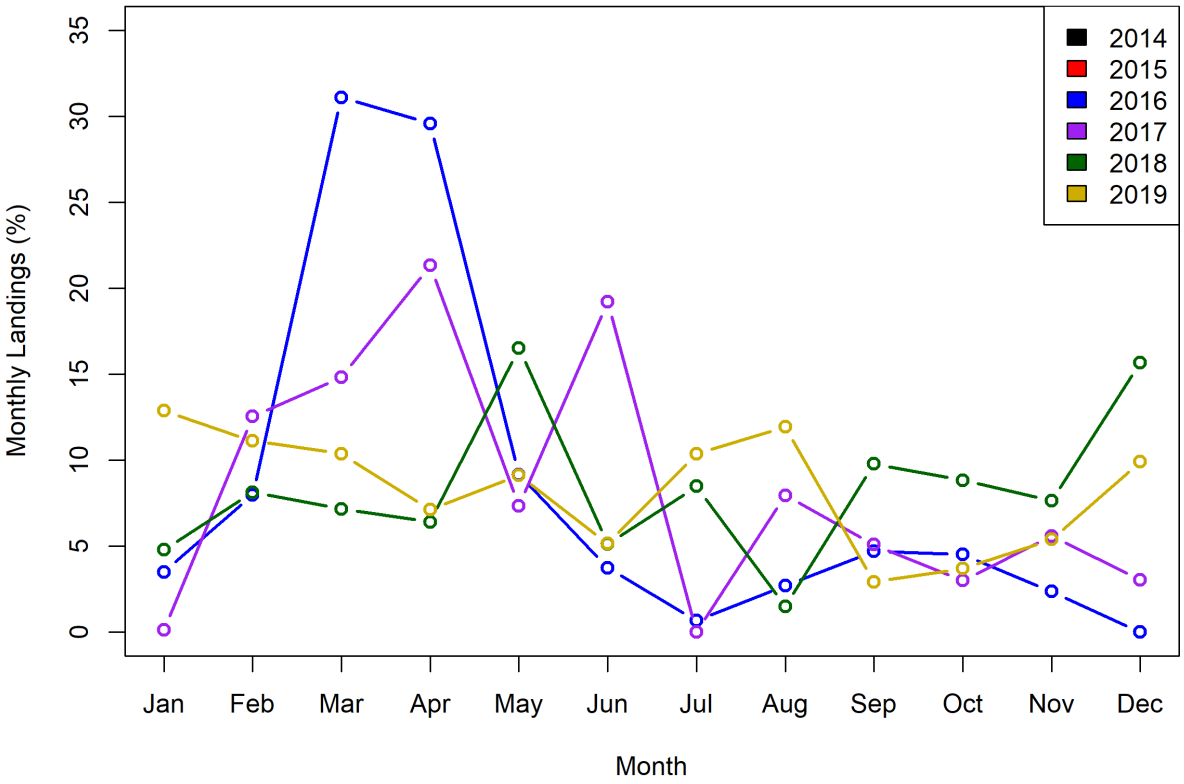

Figure 26. Percentage of monthly landings of blacktip shark, aggregated LCS, and hammerhead shark management groups in the eastern sub-region of the Gulf of Mexico region by year, 2016-2019.

Source: eDealer reporting system.

Trips by permit type: Based on eDealer data, shark trips landing LCS in the Gulf of Mexico region by shark directed permit holders have decreased since 2014, while trips from shark directed triple pack permit holders have increased (Figure 27). State-water permit holders, however, accounted for the majority of trips, especially from 2015 through 2018. As seen in the Atlantic region, Gulf of Mexico state-water permit holders took more trips than directed shark permit holders. In 2016 and 2017, while there was a decrease in state-water permit holder trips, likely due to the new sub-regional split, landings by state-water permit holders exceeded the amount of all other permit holders. In 2019, there was a decrease in state-water permit holder landings as a result of issues regarding selling shark products (see the Market and Additional Factors section).

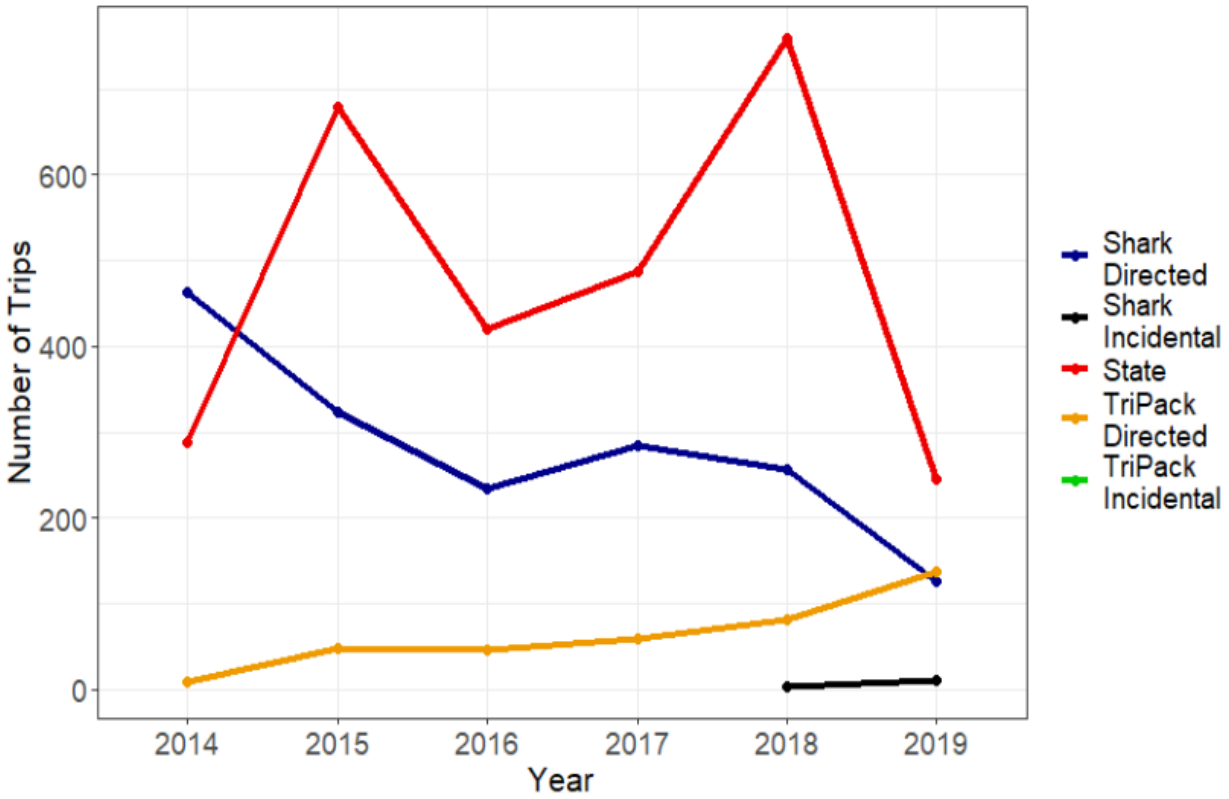

Figure 27. Number of trips landing blacktip shark, aggregated LCS, and hammerhead shark management groups by permit holder in the Gulf of Mexico region, 2014-2019.

Note: Not all of the trips by incidental shark permit holders were displayed due to confidentiality requirements.
Source: eDealer reporting system.

Western sub-regional trips by permit type: The sub-regional trips presented a clearer picture of the permit holders landing LCS by sub-region. In the western Gulf of Mexico sub-region, the trend of state-water and shark directed permit holders trips from 2016 through 2018 matched the overall regional trips (Figure 28). However, in 2019, the number of trips decreased to all-time lows. The number of state-water permit holder trips dropped from over 750 in 2018 to about 130 in 2019, which was approximately an 83 percent decrease in number of trips. This decrease could be as a result of the timing of transport and distribution issues some shark dealers had in Texas (see Additional Factors section).

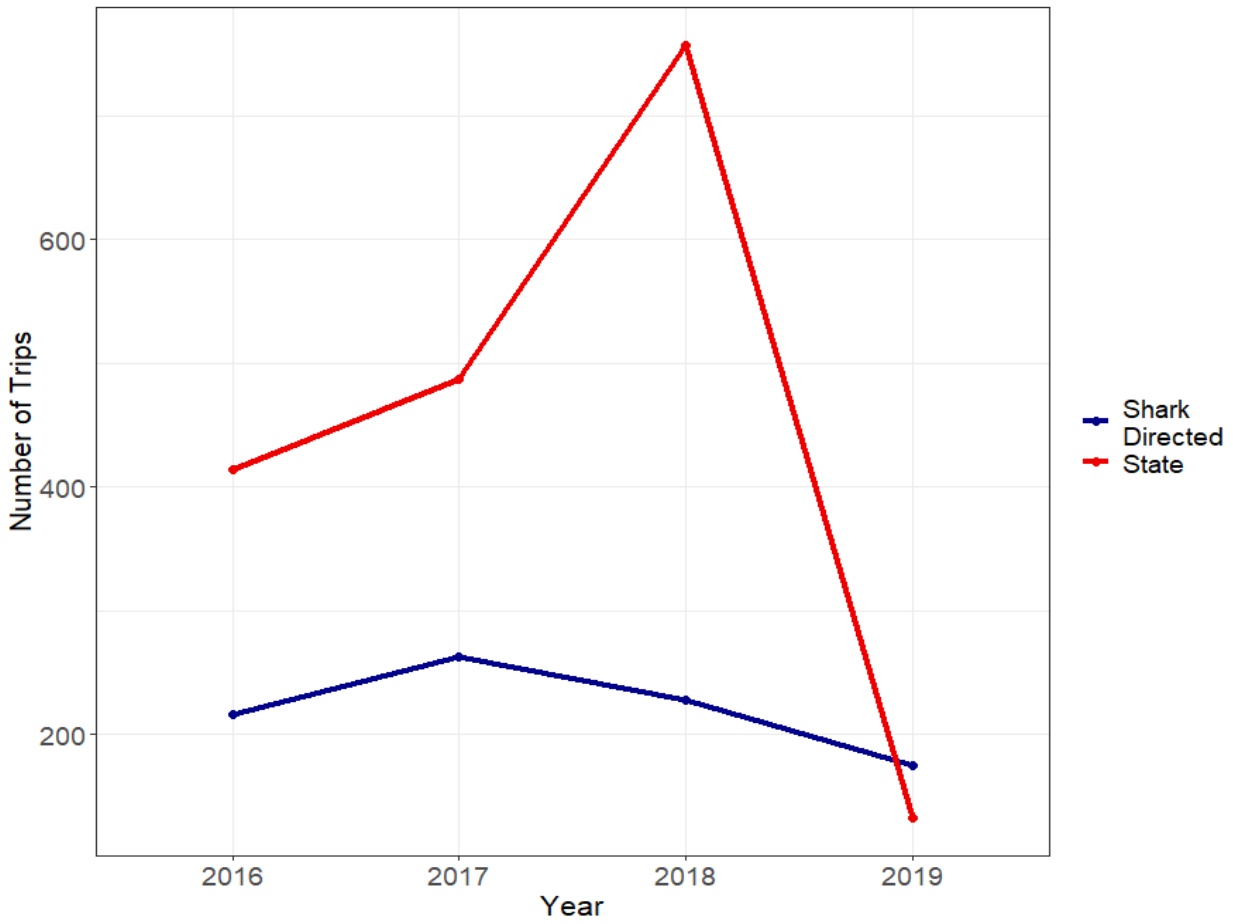

Figure 28. Number of trips landing blacktip shark, aggregated LCS, and hammerhead shark management groups by permit holder in the western Gulf of Mexico sub-region, 2016-2019.
Note: All of the trips by shark directed permit holders (shark only or part of the triple pack) were combined for confidentiality requirements. Source: eDealer reporting system.

Eastern sub-regional trips by permit type: There was the opposite trend for number of state-water permit holder trips as compared to the western sub-region (Figure 29). From 2016 through 2018, the number of trips by state-water permit holders landing LCS was very low, but increased dramatically from less than 5 (2018) to over 100 trips (2019). For the shark directed only and shark directed triple pack permit holders, the number of trips was lowest in 2016 (66), peaked in 2018 (119), and decreased in 2019 (88). The number of trips by shark incidental permit holders remained low throughout the time period.

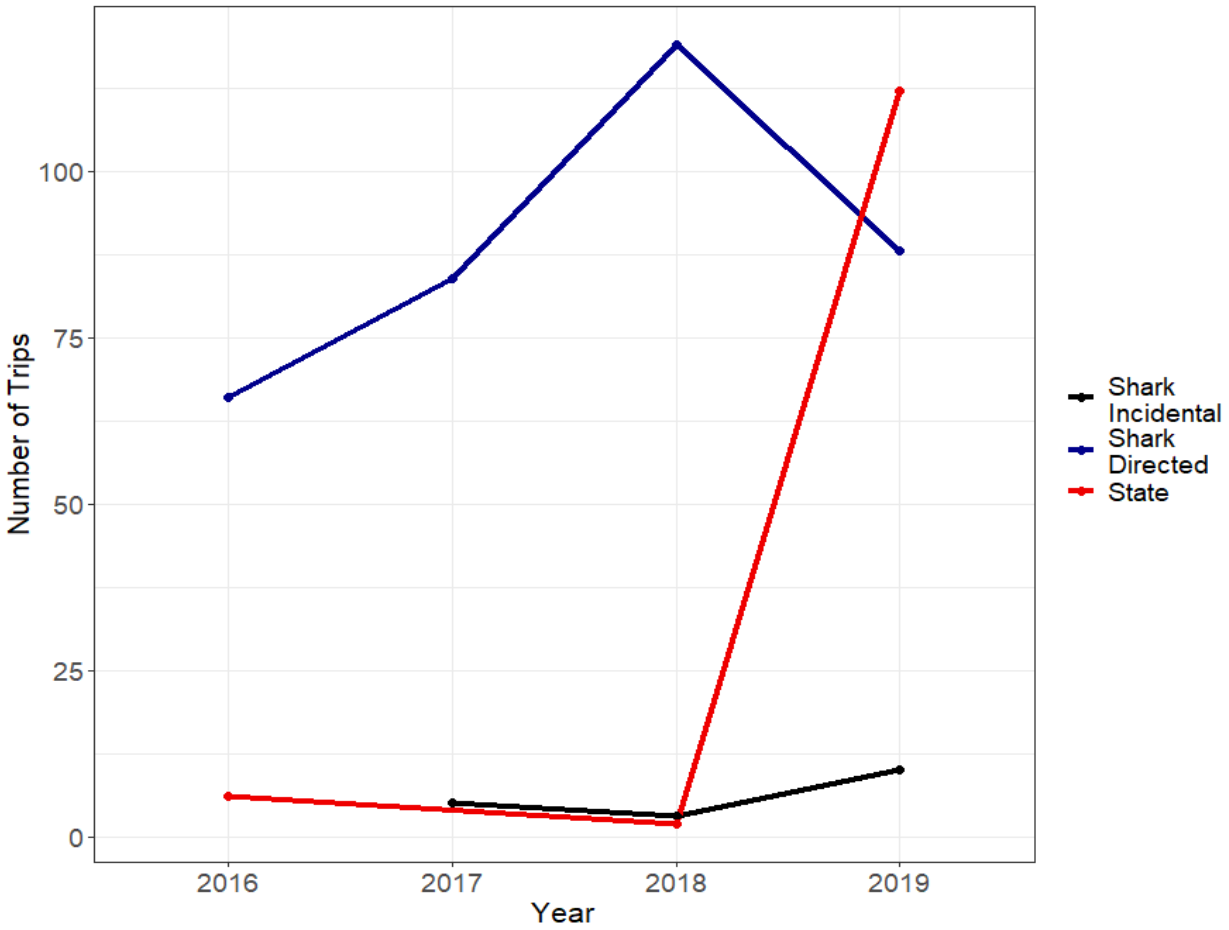

Figure 29. Number of trips landing blacktip shark, aggregated LCS, and hammerhead shark management groups by permit holder in the eastern Gulf of Mexico sub-region, 2016-2019.

Note: All of the trips by shark directed permit holders (shark directed and shark directed triple pack) and shark incidental permit holders (shark incidental and shark incidental triple pack) were combined for confidentiality requirements. Source: eDealer reporting system.

Landings in weight per trip: While state-water permit holders take more trips that land LCS than federal permit holders, federal permit holders typically land more LCS per trip by weight than state-water permit holders (Figure 30). There was a reduction by shark directed triple pack permit holders over the years, especially in the years 2017, 2018, and 2019. However, there was an increase through the years by shark directed only permit holders, with only a small decrease in 2017. State-water permit holder landings increased over time from 2014 through 2018, but decreased to all-time lows in 2019. Due to confidentiality requirements, the majority of the shark incidental permit holder landings cannot be shown until 2018 and 2019.

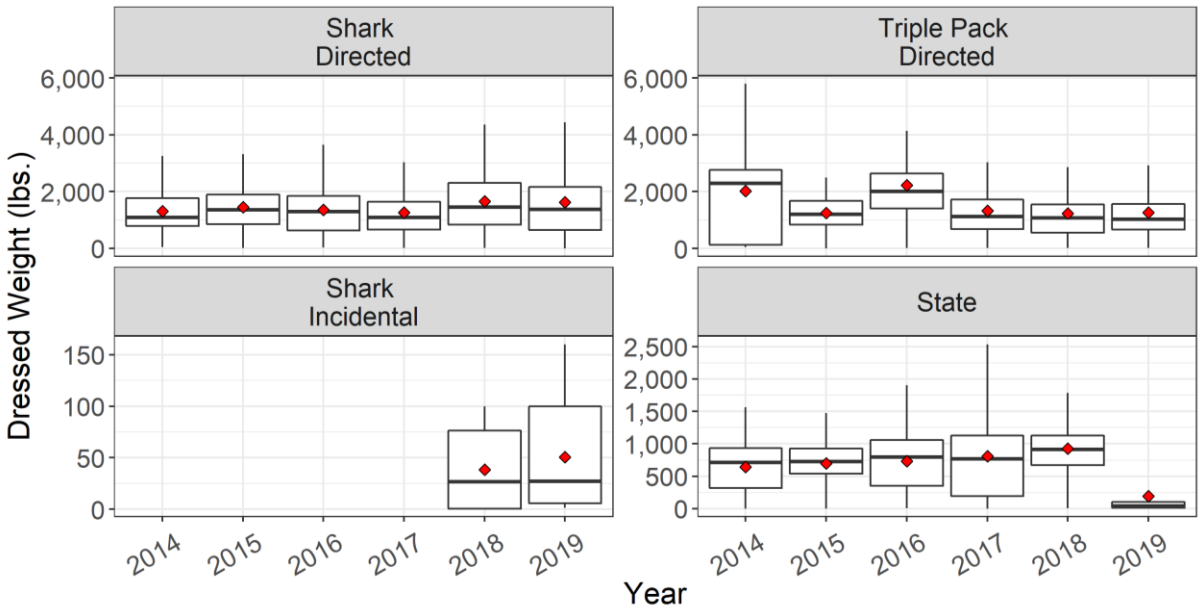

Figure 30. Landings in weight of blacktip shark, aggregated LCS, and hammerhead shark management groups per trip by permit holder in the Gulf of Mexico region, 2014-2019.

Vertical line = the minimum and maximum landings reported per trip
Box = the middle 50 percent of the landings per trip
Red dot = the mean landings
Horizontal black line = the median landings per trip
Note: Outliers have been omitted. The y-axis scale shifts depending on the amount of lb dw landed by permit type.
Sources: SERO; eDealer reporting system.

Sub-regional landings in weight per trip: In the western Gulf of Mexico sub-region, state-water permit holder landings were always lower than landings by shark directed permit holders (Figure 31). Shark directed permit holders are landing more or larger sharks than state-water permit holders. In addition, the mean landings from state-water permit holders decreased from approximately 900 lb dw per trip (2018) to approximately 200 lb dw per trip (2019). In the eastern Gulf of Mexico sub-region, confidentiality requirements are the reason for missing landings per trip for most of the permit holders except for the shark directed triple pack permit holders (Figure 32). The shark directed triple pack permit holders had the highest mean landings per trip in 2016, then their mean landings decreased in comparison in 2017 through 2019. In 2016, the shark directed permit holders had mean landings of approximately 1,900 lb dw per trip and increased to approximately 2,200 lb dw per trip in 2018. In 2019, the state-water permit holders took over 100 trips landing LCS, but the mean landings per trip was below 200 lb dw, which shows these permit holders only land a few sharks per trip.

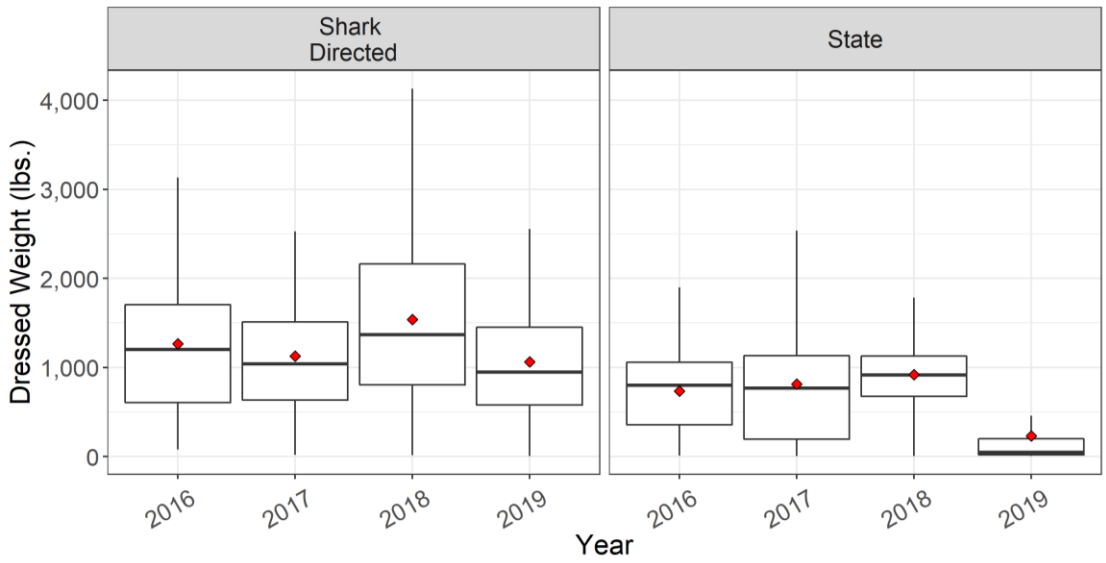

Figure 31. Landings in weight of blacktip shark, aggregated LCS, and hammerhead shark management groups per trip by permit holder in the western Gulf of Mexico sub-region, 2016-2019.

Vertical line = the minimum and maximum landings reported per trip
Box = the middle 50 percent of the landings per trip
Red dot = the mean landings
Horizontal black line = the median landings per trip
Note: All of the landings by shark directed permit holders (shark only or part of the triple pack) were combined to meet confidentiality requirements. Outliers have been omitted. Sources: SERO; eDealer reporting system.

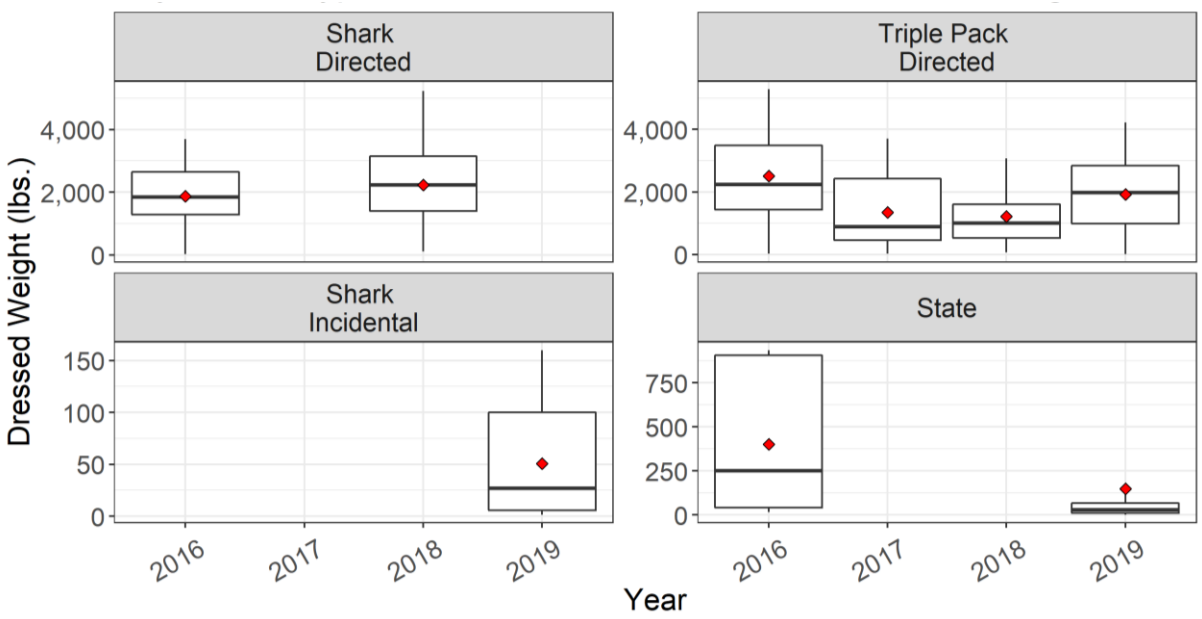

Figure 32. Landings in weight of blacktip shark, aggregated LCS, and hammerhead shark management groups per trip by permit holder in the eastern Gulf of Mexico sub-region, 2016-2019.

Vertical line = the minimum and maximum landings reported per trip
Box = the middle 50 percent of the landings per trip
Red dot = the mean landings
Horizontal black line = the median landings per trip
Note: All of the landings by shark directed permit holders (shark only or part of the triple pack) were combined to meet confidentiality requirements. Shark incidental permit holder landings could not be displayed for the same reason. Outliers have been omitted. The y-axis scale is the same amount of lb dw landed by permit type. Sources: SERO; eDealer reporting system.

Landings percentage by permit type: In 2014, shark directed permit holders landings accounted for 75 percent of the overall landings of LCS landings (Figure 33). The overall landings of LCS by shark directed permit holders decreased from 2015 through 2018 and increased in 2019. The amount of LCS landed by state-water permit holders increased from 2014 through 2018. In 2018, the state-water permit holders accounted for their highest percentage of the LCS landings (over 50). In 2019, state-water permit holders accounted for their lowest percent of LCS landings, which was a 65-percent decrease in overall landings. This is likely a result of the timing of transport and distribution issues some shark dealers had in Texas. Similar to state-water permit holders, shark directed triple pack permit holder landings accounted for the highest percentage of the overall landings over the time period and peaked in 2019 (about 40).

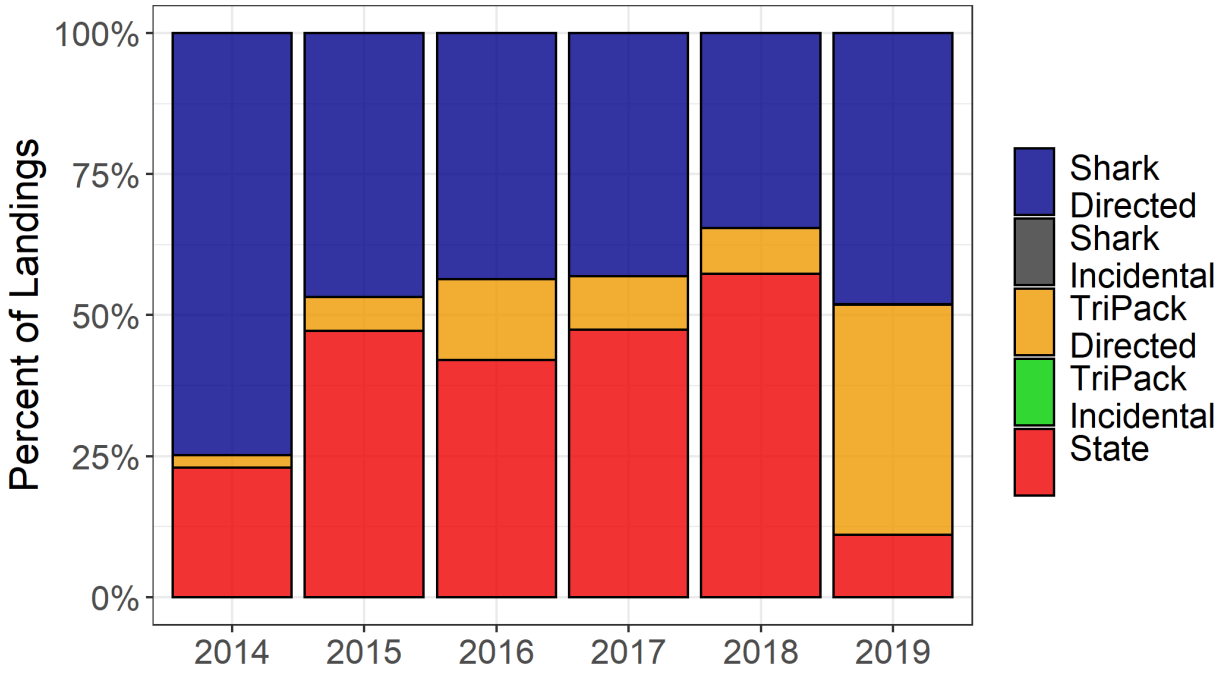

Figure 33. Percentage by weight of blacktip shark, aggregated LCS, and hammerhead shark management groups landed by permit holder in the Gulf of Mexico region, 2014-2019.
Sources: SERO; eDealer reporting system.

Western sub-regional landings percentage by permit type: Shark directed triple pack permit holders accounted for only a small percentage of these landings from 2016 through 2018 but accounted for a larger percentage in 2019 when the fishery was open all year (Figure 34). State-water permit holders accounted for a large percentage of these landings, which increased each year until 2019. Accounting for a large percentage of the state-water permit holder landings is likely due to Louisiana's regulations that allow state-water permit holders to stack permits, which means that multiple state-water permit holders can be on one vessel and that vessel retains sharks from multiple permits consistent with each permit's retention limits (e.g., one permit = 45 LCS per day; 2 permits = 90 LCS per day). For some fishermen, having a Louisiana state-water shark permit could be more efficient than having the Federal permits in this sub-region. Shark directed permit holders accounted for fewer landings than state-water permit holders from 2016 through 2018. However, shark directed triple pack permit holders accounted for a higher percentage in 2019 when the fishery was open all year and some shark dealers were having shipping issues (Figure 34).

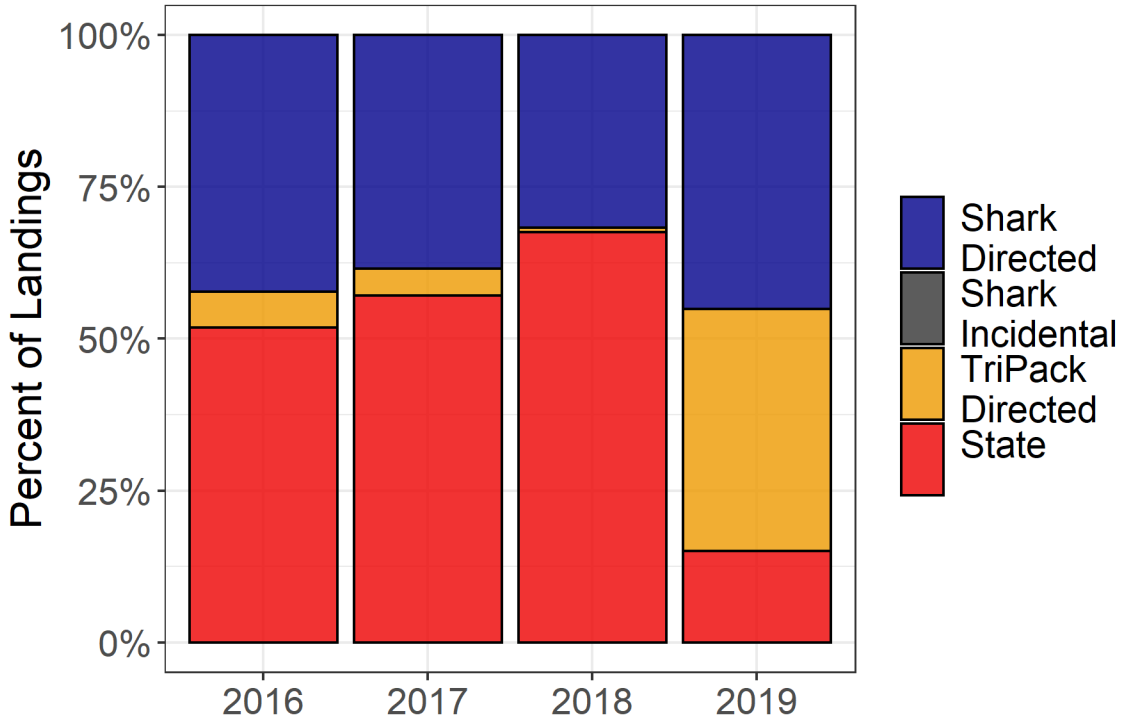

Figure 34. Percentage by weight of blacktip shark, aggregated LCS, and hammerhead shark management groups landed by permit holder in the western Gulf of Mexico sub-region, 2016-2019.

Sources: SERO; eDealer reporting system.

Eastern sub-regional landings percentage by permit type: Shark directed permit holders accounted for the largest percentage of these landings from 2016 through 2019, followed by the shark directed triple pack permit holders (Figure 35). When compared to the western sub-region, state-water permit holders in the eastern sub-region accounted for a much smaller percentage of these landings.

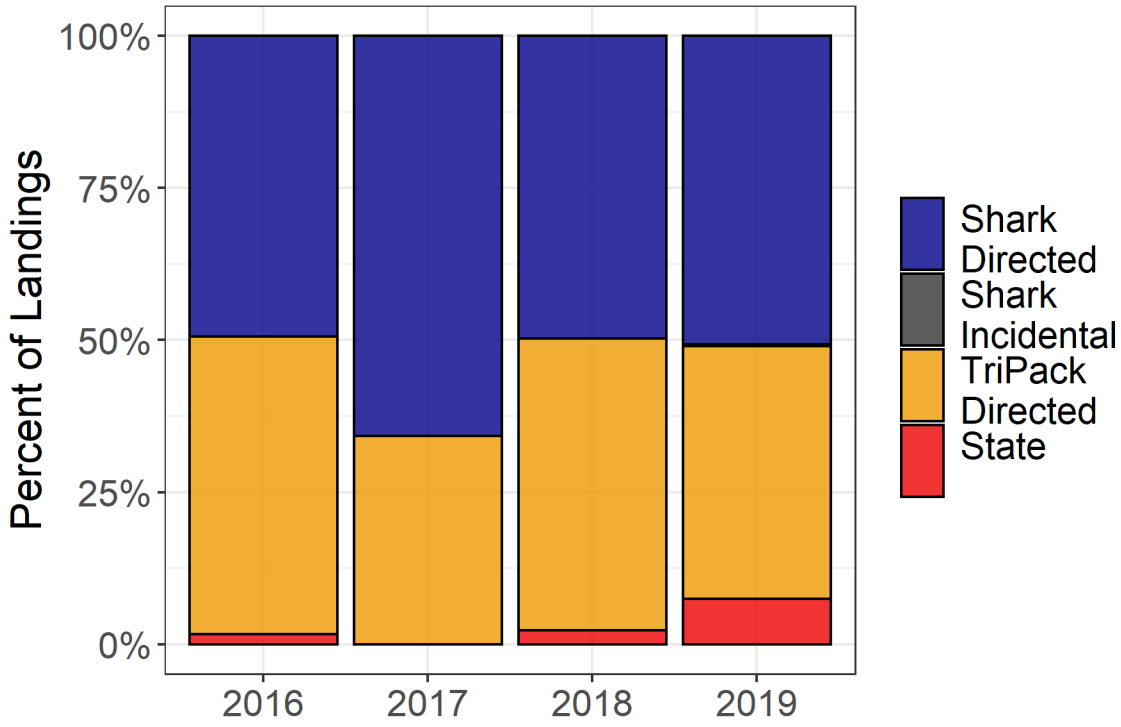

Figure 35. Percentage by weight of blacktip shark, aggregated LCS, and hammerhead shark management groups landed by permit holder in the eastern Gulf of Mexico sub-region, 2016-2019.

Sources: SERO; eDealer reporting system.

Trips by gear type: In Figure 36, the highest number of trips with bottom longline was in 2014 (625) and the number of trips decreased to the lowest point in 2019 (about 162). Only a small number of trips annually used vertical line (below 40) and pelagic longline gear (below 6). Due to confidently requirements, only the number of trips that caught LCS with gillnet gear can be showed from 2017.

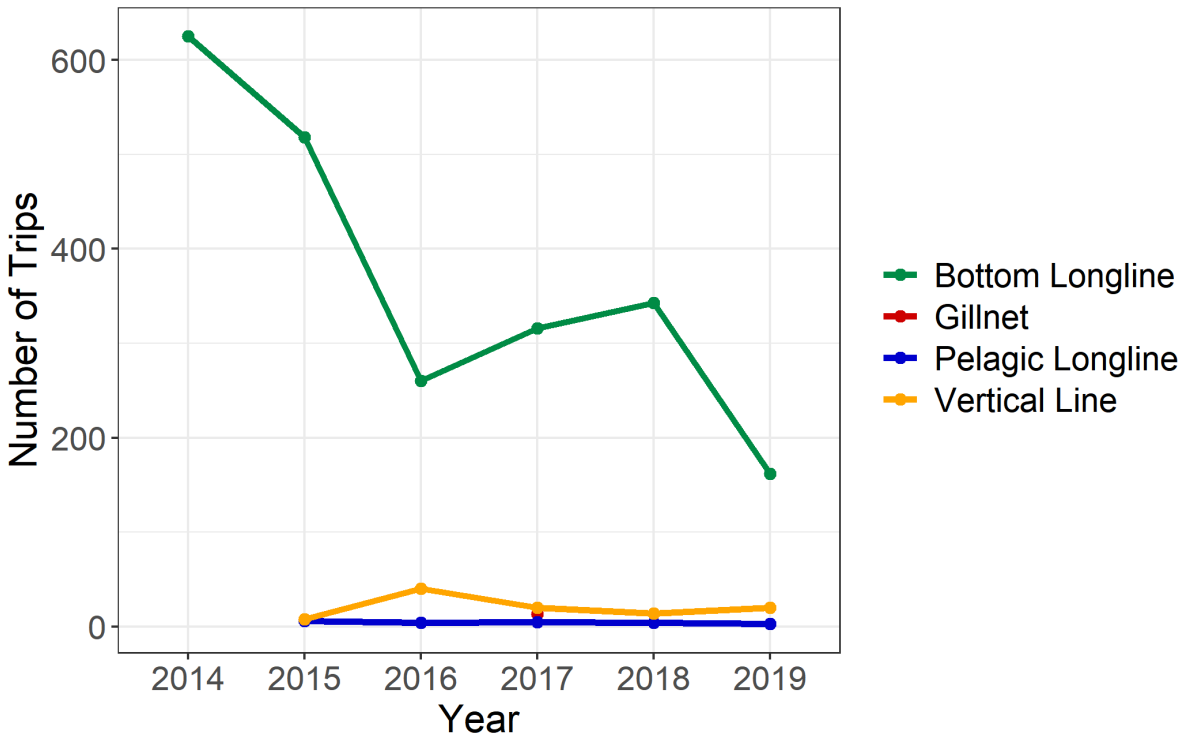

Figure 36. Number of trips by gear type taken that landed at least one shark from the blacktip shark, aggregated LCS, and hammerhead shark management groups in the Gulf of Mexico region by year, 2014-2019.

Note: Not all of the trips with gillnet and pelagic longline gear were displayed due to confidentiality requirements.
Source: Unified data processing.

Directed trips by gear type: The majority of the trips used bottom longline gear to target LCS in the Gulf of Mexico region (Figure 37). However, the number has dramatically decreased from 2014 (over 600) to 2019 (about 150). On average, the number of trips that used vertical line gear was approximately 18 over the time period. Due to confidentiality requirements, the number of trips that caught LCS with gillnet gear can only be shown for2017.

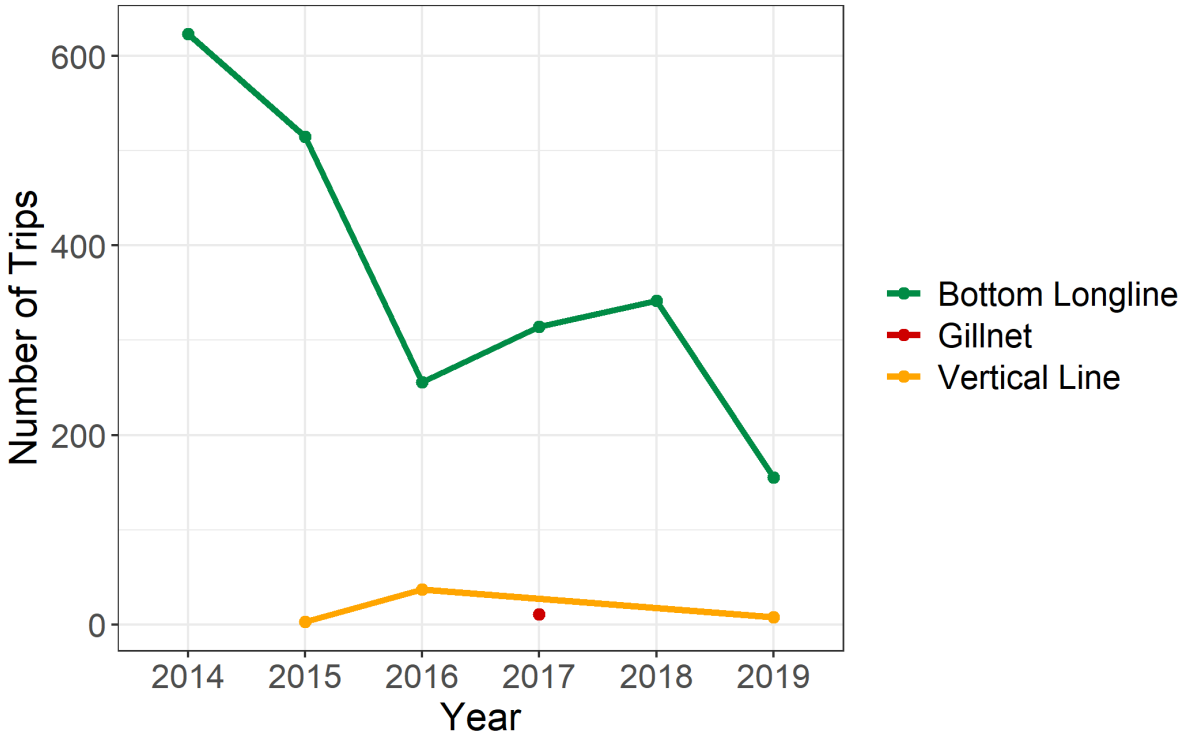

Figure 37. Number of directed trips by gear type taken that landed blacktip shark, aggregated LCS, and hammerhead shark management groups in the Gulf of Mexico region by year, 2014-2019.

Note: Directed shark trips are trips where 2/3 of the landings by weight were sharks. Source: Unified data processing.

High-liner vessels: Shark directed permit holders land the highest percent of the overall LCS annually by vessel and permit type (Figure 38). Overall, there is more variability in the different vessels and permit types landing LCS within the top ten vessels when compared to similar data from the Atlantic region. In the Gulf of Mexico region, ten vessels accounted for 54 percent of the overall landings of LCS (Table 4), which was lower when compared to the Atlantic region (69 percent) over the same time-period. From 2014 through 2018, the vessel with the most landings did not exceed about 12 percent of the annual LCS landings (Figure 38). Since a large number of state-water permit holders did not participate in the fishery in 2019 (representing a 37 percent drop in active vessels from 2018), fewer vessels landed LCS. Thus, all the top vessels accounted for a higher percent of the overall Gulf of Mexico LCS landings (96 percent). Vessel B (directed shark only permit holder) was a top vessel from 2014 through 2016 and 2018, but did not participate in the fishery in 2019 (Figure 38). Vessel O (directed shark only permit holder) continued to target LCS in the Gulf of Mexico during the time series and was the top lander in 2017 and 2019.

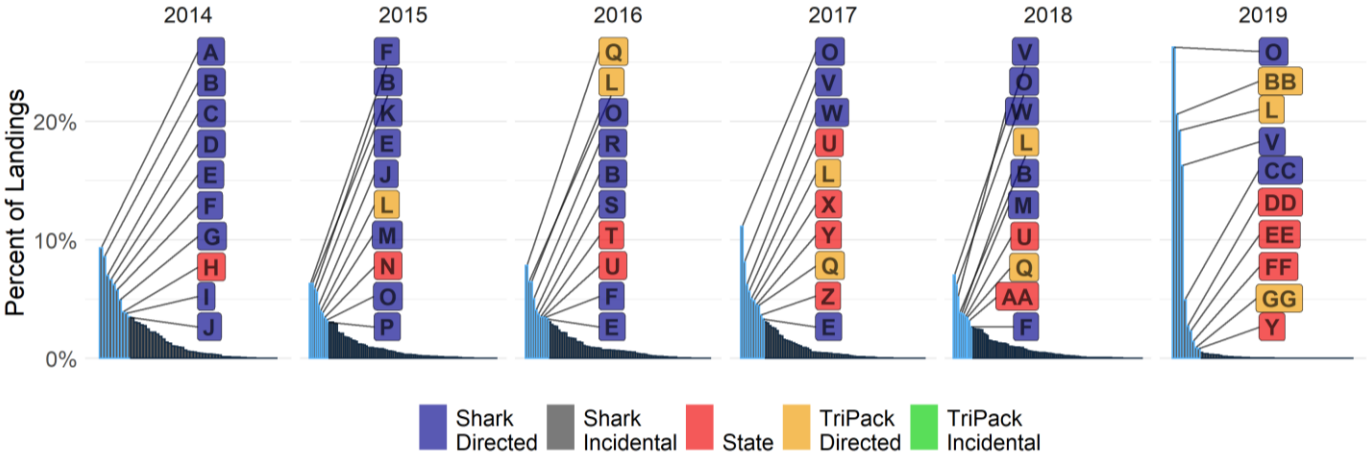

Figure 38. Top ten vessels that landed blacktip shark, aggregated LCS, and hammerhead shark management groups in the Gulf of Mexico region by year, 2014-2019.

Note: The letters are assigned to an individual vessel and tracked through the years. The colors for each letter are designated based on the permit type of each vessel. Source: eDealer reporting system.

Table 4. Percentage of annual blacktip shark, aggregated LCS, and hammerhead shark management group landings in the Gulf of Mexico region the top three, five, or ten vessels account for by year.

Year	Top Three Vessels	Top Five Vessels	Top Ten Vessels
2014	25%	38%	60%
2015	18%	29%	46%
2016	21%	30%	47%
2017	25%	36%	57%
2018	18%	26%	43%
2019	66%	87%	96%
Overall	25%	36%	54%

Source: eDealer reporting system.

Western sub-regional high-liner vessels: The high liners were a mixture of shark directed, shark directed triple pack, and state-water permit holders landing LCS (Figure 39). A shark directed permit holder landed the most LCS from 2016 through 2018, while a shark directed triple pack permit holder landed the most LCS in 2019. The top ten vessels accounted for less than 25 percent of the overall landings of LCS from 2016 through 2018 (Table 5). In 2019, the top three vessels accounted for 84 percent of the overall LCS landings and were all federal permit holders.

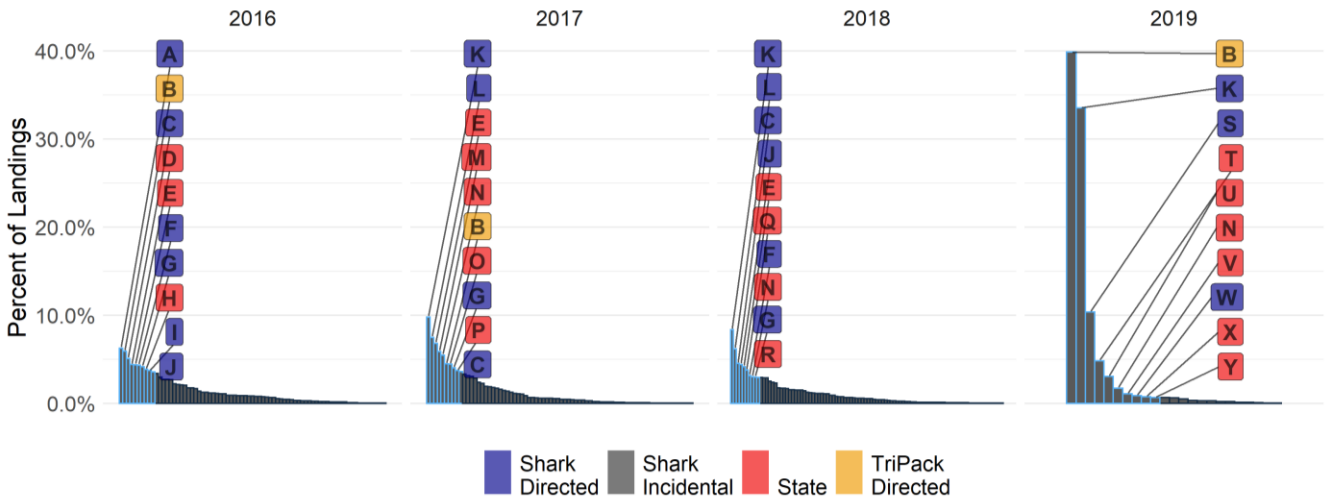

Figure 39. **Top ten vessels that landed blacktip shark, aggregated LCS, and hammerhead shark management groups in the western Gulf of Mexico sub-region by year, 2016-2019.**

Note: The letters are assigned to an individual vessel and tracked through the years. The colors for each letter are designated based on the permit type of each vessel. Source: eDealer reporting system.

Table 5. **Percentage of annual blacktip shark, aggregated LCS, and hammerhead shark management group landings in the western Gulf of Mexico sub-region the top three, five, or ten vessels account for by year.**

Year	Top Three Vessels	Top Five Vessels	Top Ten Vessels
2016	17%	26%	46%
2017	24%	35%	56%
2018	19%	28%	43%
2019	84%	92%	97%
Overall	25%	34%	52%

Source: eDealer reporting system.

Eastern sub-regional high-liner vessels: The top vessels were the same ones from 2016 through 2019, and they represent all of the vessels landing LCS. Vessel A (shark directed triple pack permit holder) was a top vessel from 2016 through 2018, but then did not land any LCS in 2019 (Figure 40). Vessel B (shark directed permit holder) landed the most LCS from 2017 through 2019. Overall, the top three vessels account for 90 percent of the sub-regional LCS landings and the top ten vessels account for 100 percent of the landings (Table 6). This shows that there are very few fishermen targeting LCS in the eastern Gulf of Mexico sub-region.

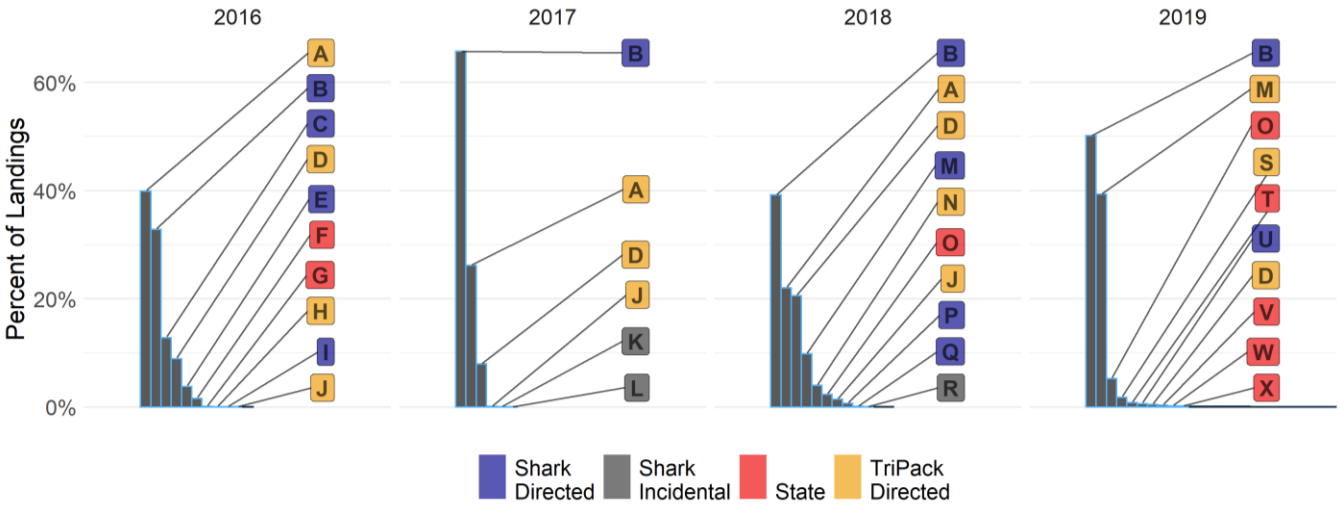

Figure 40. **Top ten vessels that landed blacktip shark, aggregated LCS, and hammerhead shark management groups in the eastern Gulf of Mexico sub-region by year, 2016-2019.**

Note: The letters are assigned to an individual vessel and tracked through the years. The colors for each letter are designated based on the permit type of each vessel. Source: eDealer reporting system.

Table 6. **Percentage of annual blacktip shark, aggregated LCS, and hammerhead shark management group landings in the eastern Gulf of Mexico sub-region the top three, five, or ten vessels account for by year.**

Year	Top Three Vessels	Top Five Vessels	Top Ten Vessels
2016	86%	98%	100%
2017	100%	100%	100%
2018	82%	95%	100%
2019	95%	97%	99%
Overall	90%	98%	100%

Source: eDealer reporting system.

Summary of LCS Fishery in the Atlantic and Gulf of Mexico Regions

In the LCS fishery, effort levels and landings are at an all-time low in the Atlantic and Gulf of Mexico regions from 2014 through 2019. Management measures in the past few years have allowed the LCS fishery, except for the western Gulf of Mexico sub-region, to remain open all year, which is what most fishermen and dealers would prefer. However, since 2016, LCS landings in the Atlantic and eastern Gulf of Mexico sub-region have been flat or declining, and a lot of the commercial quota is left unharvested in both regions.

In the Atlantic region, the aggregated LCS and hammerhead shark management groups have not needed to be closed due to quota exceedance since 2014, as a result of management measures in Amendment 6 and inseason retention limit adjustments. These management measures have allowed fishermen equitable opportunity to harvest LCS in the Atlantic region. Unfortunately, these same management measures may have not allowed fishermen the full opportunity to

harvest LCS, particularly when sharks were in their area or when they planned to target sharks. Due to the migratory patterns of LCS, these shark species are not present in all areas of the Atlantic region during the year. Shark fishermen need to plan on when to target these species based on migratory patterns. If the retention limit is not at optimum levels (36-55 LCS other than sandbar sharks per trip) to make a profitable targeted trip, shark fishermen would not participate in the fishery at that time. To improve the LCS fishery in the Atlantic region, NOAA Fisheries could consider ways to ensure commercial retention limits are at optimum levels to target sharks to maximum the opportunities to harvest available quota.

In the Gulf of Mexico region, the creation of sub-regions under Amendment 6 has helped management measures address the issue of differing priorities between Louisiana and Florida shark fishermen. As mentioned above and represented in Figure 25, fishermen in the western sub-region would prefer to target LCS at the beginning of the year before moving to other fisheries by March or April. In addition, the western sub-region aggregated LCS and blacktip shark quotas are fully utilized each year. In the eastern sub-region, fishermen would prefer the LCS fishery to remain open all year to ensure shark products are on the market at all times. To improve the LCS fishery in the Gulf of Mexico region, NOAA Fisheries could consider revising the sub-region quotas based on more recent landings history. In the western sub-region, the aggregated LCS and blacktip shark quotas are fully utilized most years, while the hammerhead shark quota is underutilized. In the eastern sub-region, about 80 percent of the aggregated LCS and hammerhead shark quotas are fully utilized most years, while the blacktip shark quota is underutilized.

Small Coastal Shark Fishery

The small coastal shark (SCS) complex consists of Atlantic sharpnose, blacknose, bonnethead and finetooth sharks. Fishing for SCS occurs in both the Atlantic and Gulf of Mexico regions. In the Atlantic region, the non-blacknose SCS management unit consists of Atlantic sharpnose, bonnethead, and finetooth sharks. Blacknose sharks are in a separate management unit in the region. In addition, the Atlantic regional non-blacknose SCS and blacknose shark commercial quotas are linked, and shark fishermen targeting SCS could retain any shark species from those shark management groups. For the most part in this document, the Atlantic regional SCS management groups are combined to display the data and information together because of confidentiality requirements in the MSA. In the Gulf of Mexico region, the non-blacknose SCS management unit consists of Atlantic sharpnose, bonnethead, and finetooth sharks. Commercial landings of blacknose sharks are prohibited in the Gulf of Mexico region.

Atlantic Small Coastal Shark Fishery

In the Atlantic region, the commercial quotas for blacknose shark and non-blacknose shark management groups are linked. As a result, when the quota is nearly filled for blacknose sharks, non-blacknose SCS automatically closes, even if quota is available. This linkage was established in Amendment 3 to the 2006 Consolidated HMS FMP to reduce the mortality of blacknose sharks and non-blacknose SCS. One of the unintended effects, however, was that quota was underharvested from 2014 through 2016 in the linked fishery (Figure 41 and Figure 42). From 2014 through 2015, the non-blacknose SCS quota (264.1 mt dw; 582,333 lb dw) and the

blacknose shark quota (17.5 mt dw; 38,638 lb dw) were linked. In 2014, both SCS fisheries opened on January 1 and closed on July 28 (208 days) when NOAA Fisheries announced landings of the blacknose shark management group exceed 80 percent of the quota. In 2015, both SCS fisheries opened on January 1, and closed on June 7 (157 days), when the blacknose shark quota was overharvested by approximately 3.0 mt dw (about 7,000 lb dw). Based on comments received throughout the year, NOAA Fisheries determined in the final rule (80 FR 74999; December 1, 2015) for the 2016 Atlantic shark commercial fishing season to spread the blacknose shark overharvest amount over a three-year period from 2016 through 2018. In addition, Amendment 6 implemented, among other things, a management boundary for SCS along 34° 00' N. lat. (approximately at Wilmington, North Carolina), which maintains the SCS fishery quota linkages between blacknose sharks and non-blacknose SCS south of the boundary and prohibited the retention of blacknose sharks north of the boundary. This management boundary allowed fishing for species in the non-blacknose SCS management unit north of 34° 00' N. latitude to remain open regardless of the blacknose shark landings, which reopened the non-SCS fishery from August 18 through the rest of the year. As part of Amendment 6, the non-blacknose SCS quota increased (264.1 mt dw; 582,333 lb dw) and the blacknose shark quota decreased (17.2 mt dw; 37,921 lb dw). In 2016, the non-blacknose SCS and blacknose shark management groups opened on January 1, and south of 34° 00' N. lat. non-blacknose SCS and blacknose shark fisheries closed on May 29 (149 days), which was the earliest the SCS fisheries has closed to date. To improve the possibility of the non-blacknose SCS fishery south of 34° 00' N. lat. to remain open year-round, NOAA Fisheries established an eight blacknose shark retention limit in 2017. The blacknose shark retention limit has restricted landings per trip and helped ensure that the blacknose shark quota is not reached or exceeded. From 2017 through 2019, the blacknose shark landings have decreased over time (Figure 41). Landings of non-blacknose SCS fluctuated over the time period due to the blacknose shark quota linkage and have increased from 2017 through 2019 (Figure 42); landings remain much lower than the available quota, which has been the case since a quota was first established for the SCS complex as a whole.

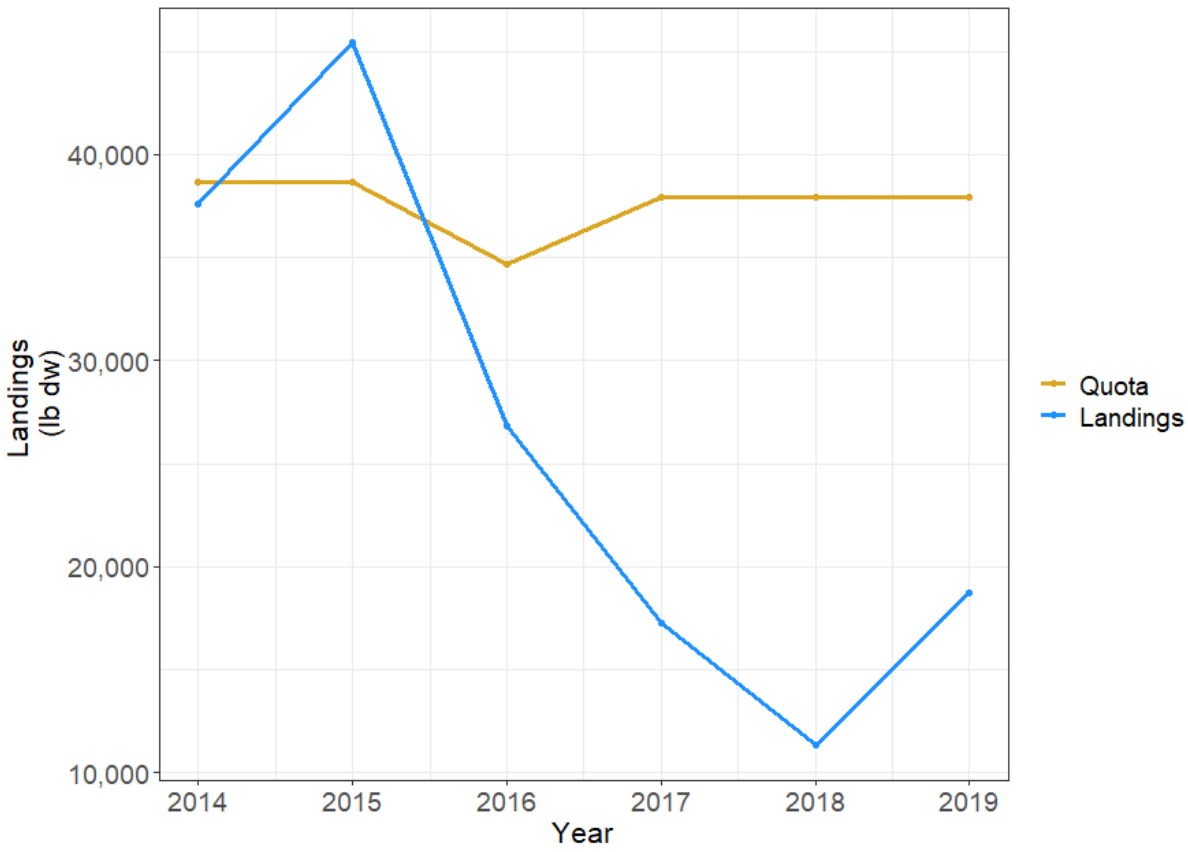

Figure 41. Atlantic blacknose shark quota and landings, 2014-2019.
Source: eDealer reporting system.

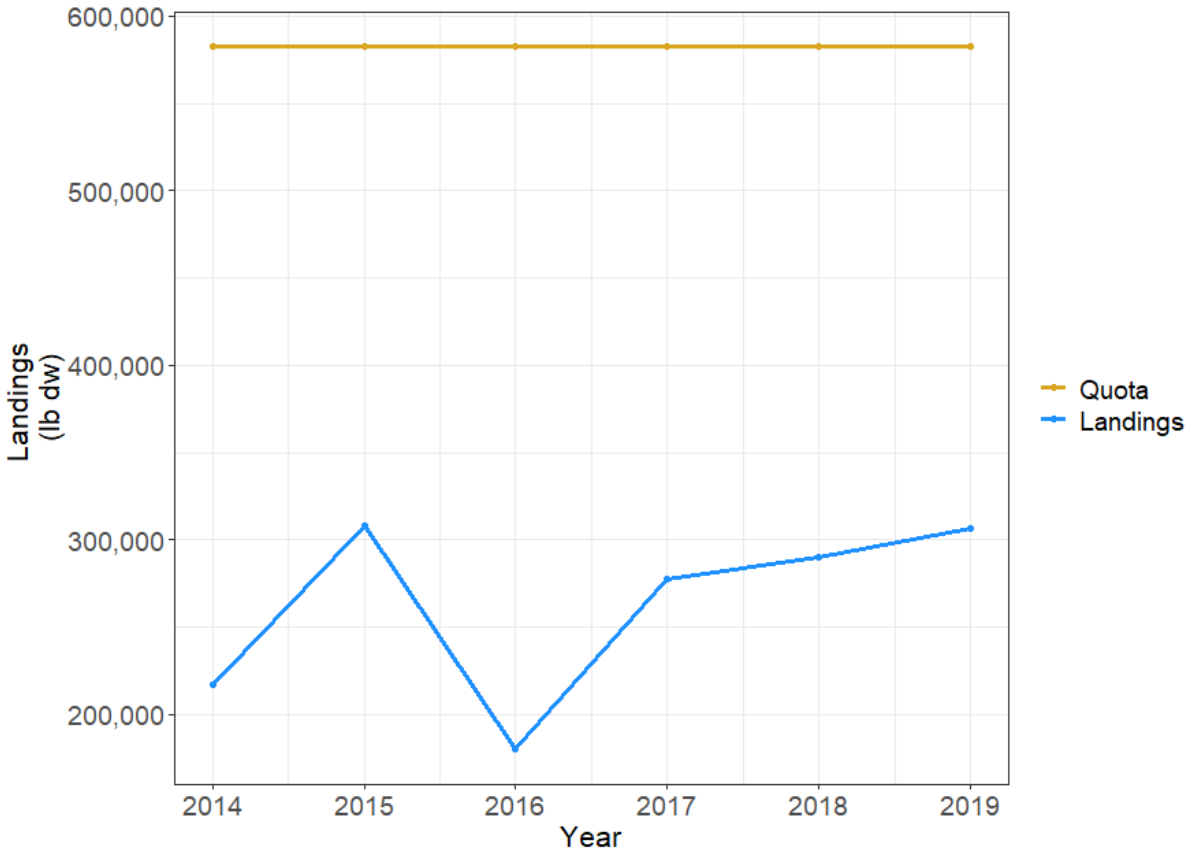

Figure 42. Atlantic non-blacknose SCS quota and landings, 2014-2019.
Source: eDealer reporting system.

Monthly landings: The Atlantic SCS landings have fluctuated over time. This could be due to weather or other fisheries being open (Figure 43). During most years, most of the landings occurred in the beginning of the season (January) with some peaks during the middle of the year (May through July) and later in the season (October through December). Due to management measures with the blacknose shark quota, the non-blacknose SCS landings decreased in 2014, 2015, and 2016. In 2015, non-blacknose SCS landings were allowed north of 34° 00' N. lat. starting in August so landings continued for the rest of the year. Once the blacknose shark retention limit was established in 2017, there were more consistent SCS landings throughout the year.

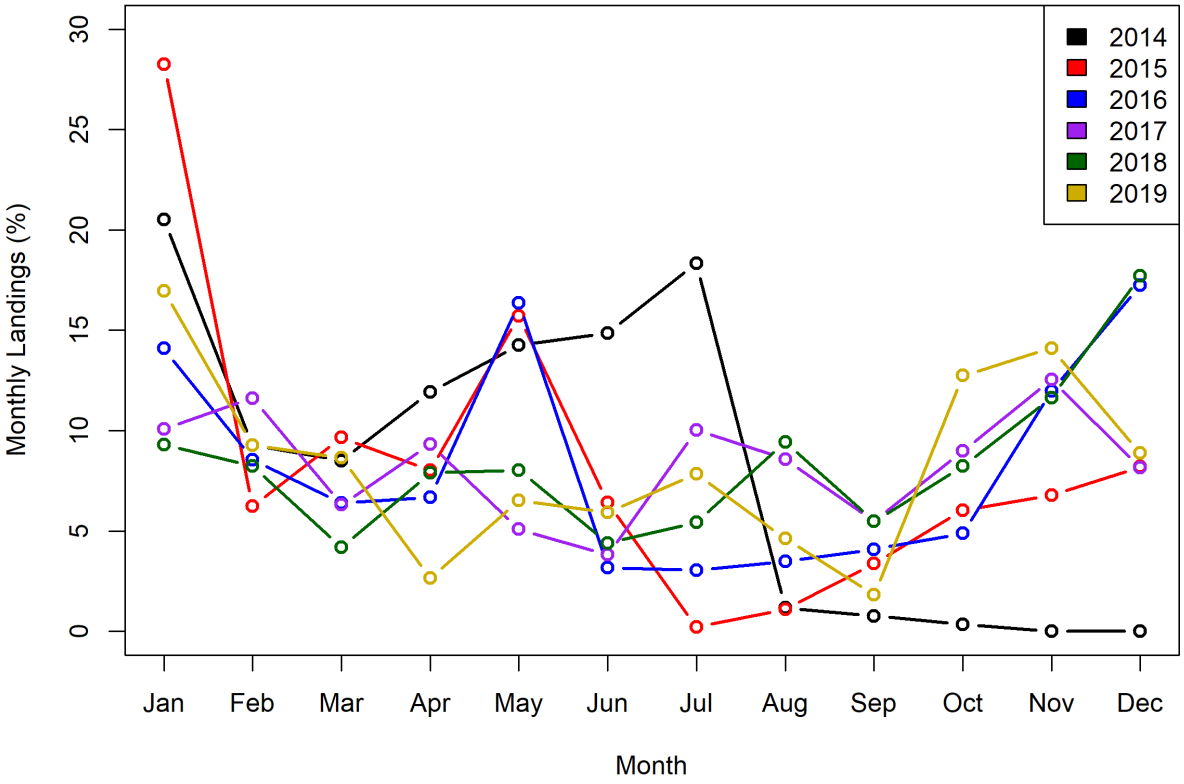

Figure 43. **Percentage of monthly landings of non-blacknose SCS and blacknose shark management groups in the Atlantic region by year, 2014-2019.**
Source: eDealer reporting system.

Trips by permit type: NOAA Fisheries combined non-blacknose SCS and blacknose shark management group data given data confidentiality requirements in the MSA. As shown in Figure 44, the state-water permit holders took the highest number of trips from 2015 through 2017 then the trips decreased below the number of trips by shark directed permit holders. Since taking the lowest number of trips in 2016, shark directed permit holders took the most trips from 2018 through 2019. In 2014, the shark directed permit holders took slightly more trips (304) than the state-water permit holders (285). In 2015 and 2016, the state-water permit holders took more than double the number of trips that shark directed permit holders took. In 2017, the number of trips by state-water (506) and shark directed (433) permit holders were more similar then in 2015 and 2016. In 2018 and 2019, the shark directed permit holders took more trips (594 and 580, respectively) than the state-water permit holders. This switch between the number of trips by state-water and shark directed permit holders could be because of the blacknose shark retention limit. The number of trips taken by shark directed triple pack permit holders consistently remained much lower than the number taken by shark directed and state-water permit holders.

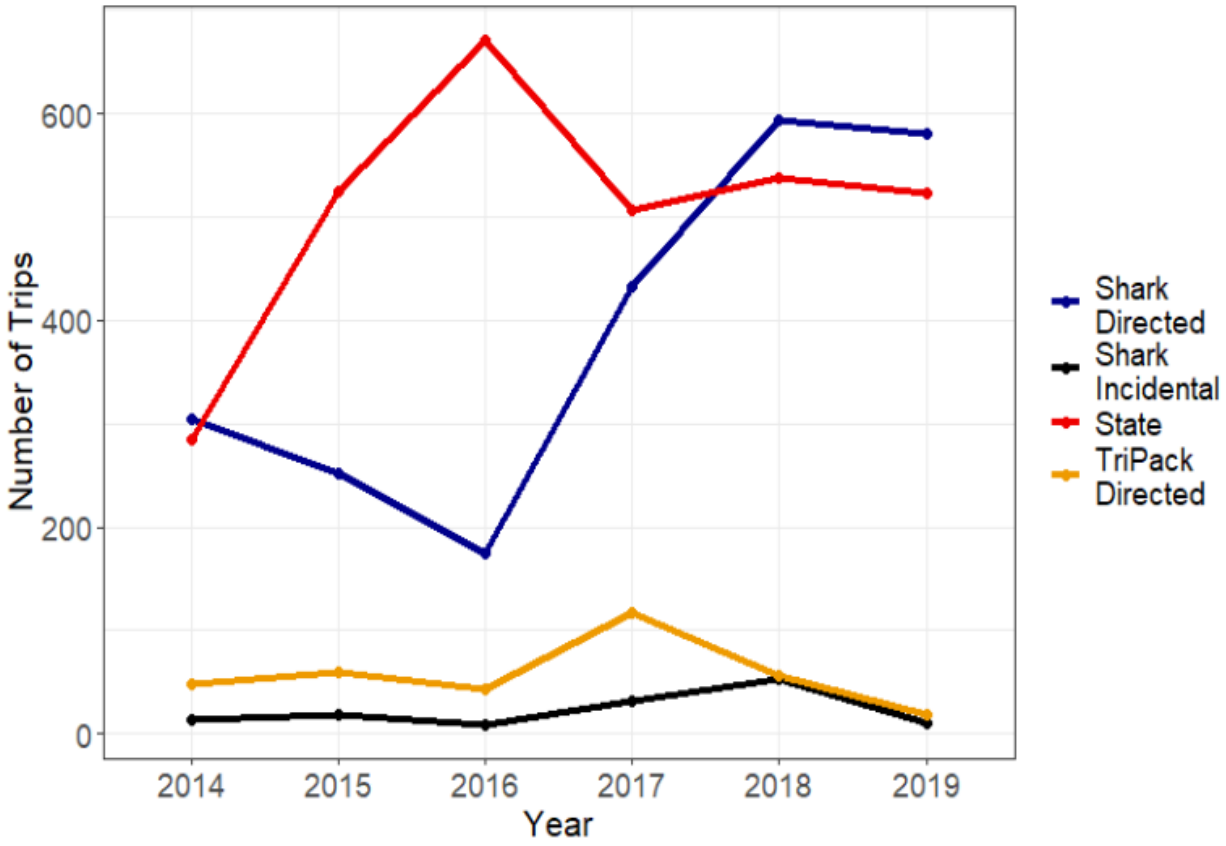

Figure 44. Number of trips landing non-blacknose SCS and blacknose shark management groups by permit holder in the Atlantic region, 2014-2019.

Source: eDealer reporting system.

Landings in weight per trip: Even though state-water permit holders took the most trips in 2015, 2016, and 2017 (Figure 44), the mean landings for those years were below 270 lb dw per trip (Figure 45). These mean landings were lower than the mean landings by shark directed permit holders during those years. Shark directed triple pack permit holders mean landings far exceeded those of the shark directed and state-water permit holders. The highest mean landings for shark directed triple pack permit holders was in 2015 with over 1,300 lb dw and was around 1,000 lb dw per trip the other years (Figure 45). Thus, the shark directed triple pack permit holders' trips landing SCS were generally directed trips, whereas trips by other permit holders appear to be landing SCS incidentally.

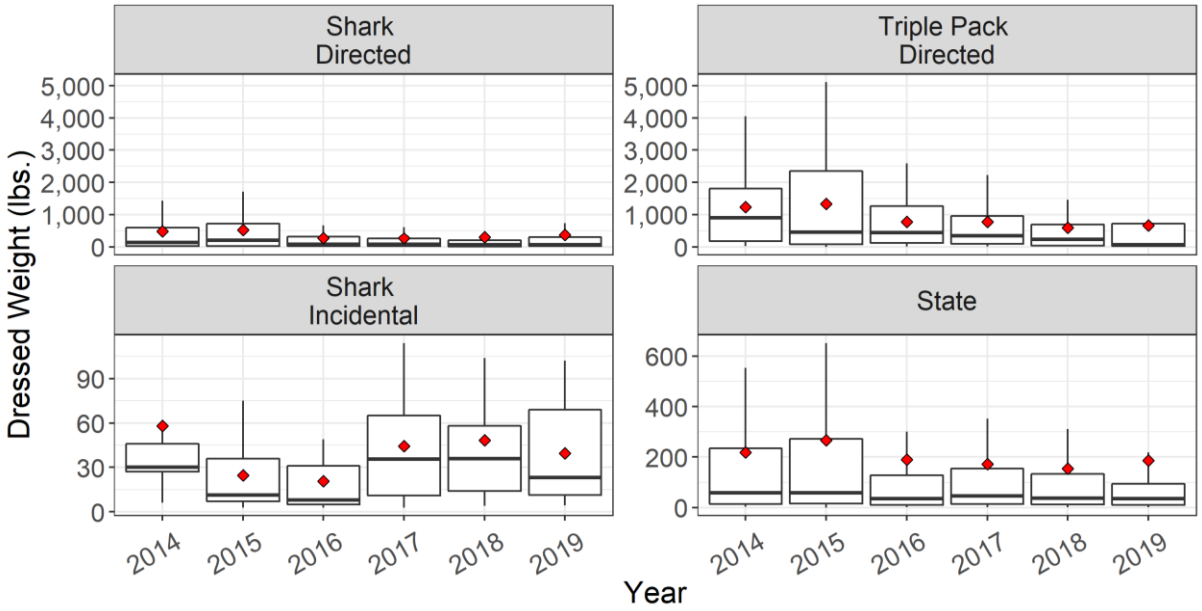

Figure 45. Landings in weight of non-blacknose SCS and blacknose shark management groups per trip by permit holder in the Atlantic region, 2014-2019.

Vertical line = the minimum and maximum landings reported per trip
Box = the middle 50 percent of the landings per trip
Red dot = the mean landings
Horizontal black line = the median landings per trip
Note: Outliers have been omitted. The y-axis scale shifts depending on the amount of lb dw landed by permit type.
Sources: SERO; eDealer reporting system.

Landings percentage by permit type: Even though the shark directed triple pack permit holders' trips landed more per trip, their landings did not account for more of the overall SCS landings when compared to the shark directed and state-water permit holders (Figure 46). Overall, the landings from shark directed triple pack permit holders only account for 18 percent of the annual SCS landings with the highest landings in 2017 (31 percent). Shark directed only permit holders accounted for the greatest proportion of SCS landings in 2014 (54 percent), 2017 (39 percent), 2018 (61 percent), and 2019 (66 percent). In 2015, the state-water permit holders landed the greatest proportion of SCS, which was when Amendment 6 was implemented.

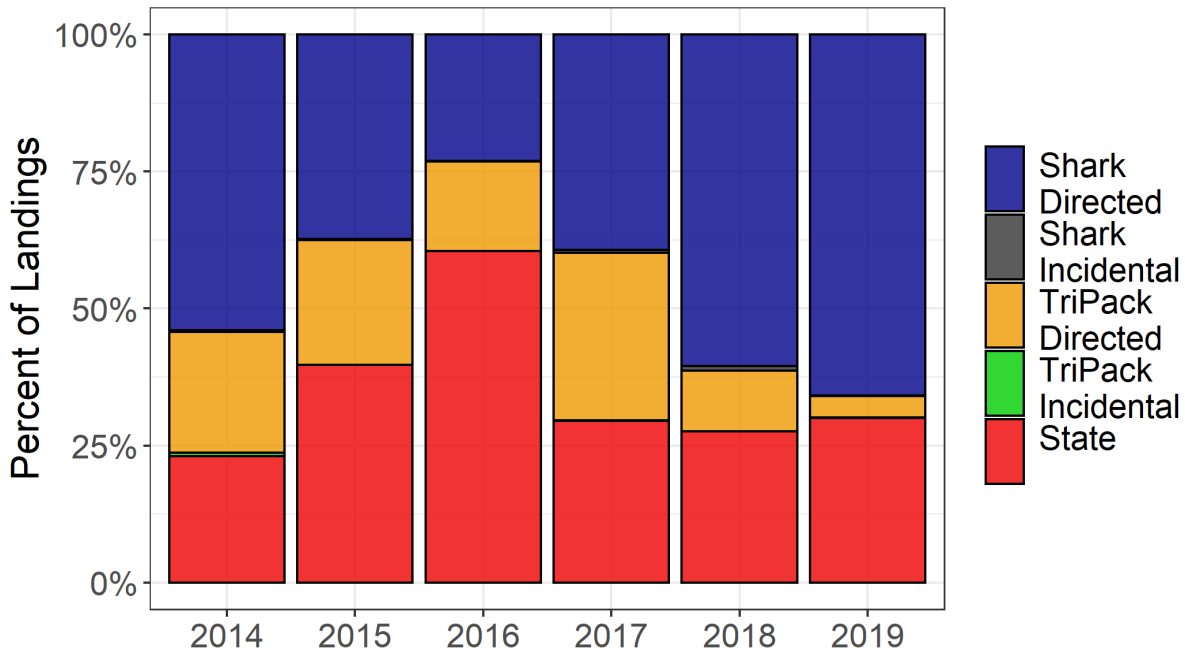

Figure 46. Percentage of non-blacknose SCS and blacknose shark management groups landed by permit holder in the Atlantic region, 2014-2019.

Sources: SERO; eDealer reporting system.

Trips by gear type: Overall, gillnet was the primary gear type based on logbook data (Figure 47). Gillnet gear was used on three times as many trips as longline gear especially in 2019 when gillnet was used on 629 trips. However, the number of directed trips was about half the number overall trips (Figure 48). Gillnet gear was the main gear type used to target SCS, but directed trips using bottom longline gear overtook those using gillnet gear in some years (2015 and 2017). The number of trips using gillnet gear was the lowest in 2015 (76) and peaked in 2019 (220). For bottom longline, the number of trips stayed consistent in 2014 and 2015 (85 and 86, respectively) before declining in 2016 (53). The number of directed trips peaked in 2017 (189), with the low in 2019 (46).

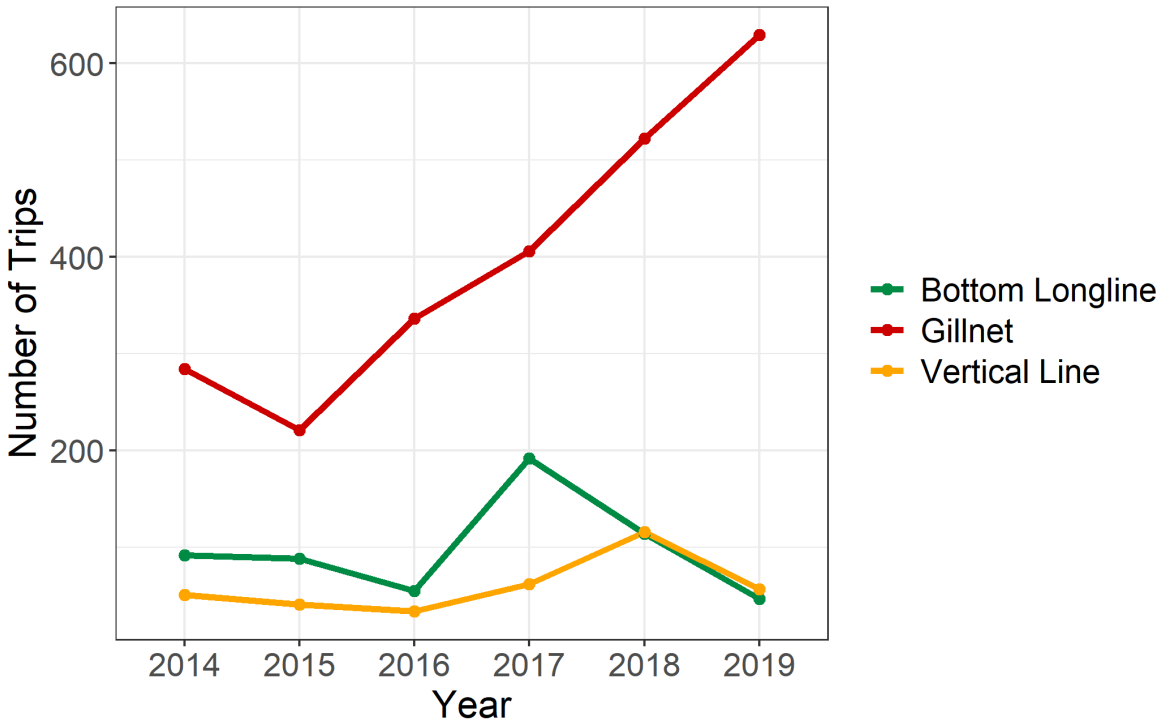

Figure 47. **Number of trips by gear type taken that landed at least one shark species from non-blacknose SCS and blacknose shark management groups in the Atlantic region by year, 2014-2019.**

Source: Unified data processing.

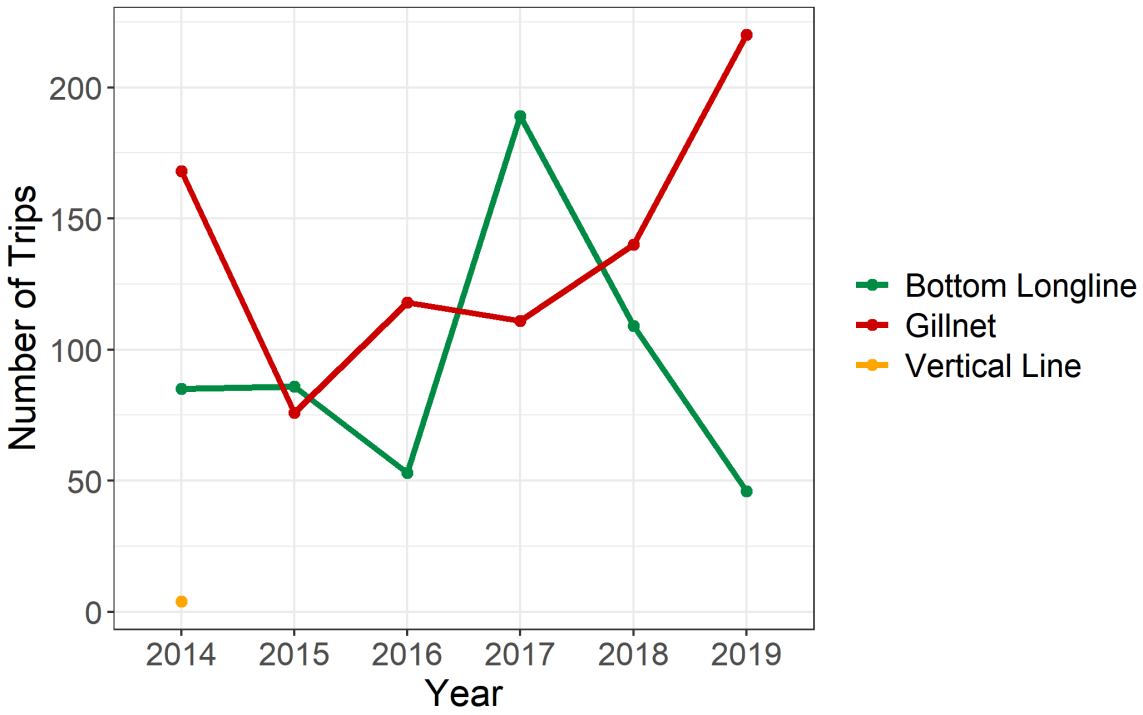

Figure 48. Number of directed trips by gear type taken that landed non-blacknose SCS and blacknose shark management groups in the Atlantic region by year, 2014-2019.

Note: Directed shark trips are trips where 2/3 of the landings by weight were sharks. Source: Unified data processing.

High-liner vessels: Since different types of permit holders and gear types were used to target SCS, the top vessels landing SCS are different from those landing LCS. In the Atlantic, there was a variety of vessels and permit type in the top ten vessels landing SCS when compared to the LCS fishery (Figure 49). From 2014 through 2017, the top vessel landing SCS did not exceed 15 percent of the overall landings. The percentage of landings from the top three vessels in 2018 and 2019 (46 and 48 percent, respectively) exceeded that of the top five vessels in the previous years (Table 7). Overall, the top 10 vessels accounted for 65 percent of the Atlantic SCS landings. Vessel A (shark directed triple pack permit holder) was a top ten vessel landing SCS from 2014 through 2017, and landed the most SCS in 2014 and 2016 (Figure 49). In 2018 and 2019, Vessel A did not land enough SCS to be considered a top ten vessel. Vessel O continued to land SCS and was a top ten vessel in 2015 through 2017 as a state-water permit holder. In 2018, Vessel O became a shark directed permit holder and landed the most SCS that year, which accounted for about 25 percent of the overall landings. The vessel continued to be a top vessel in 2019.

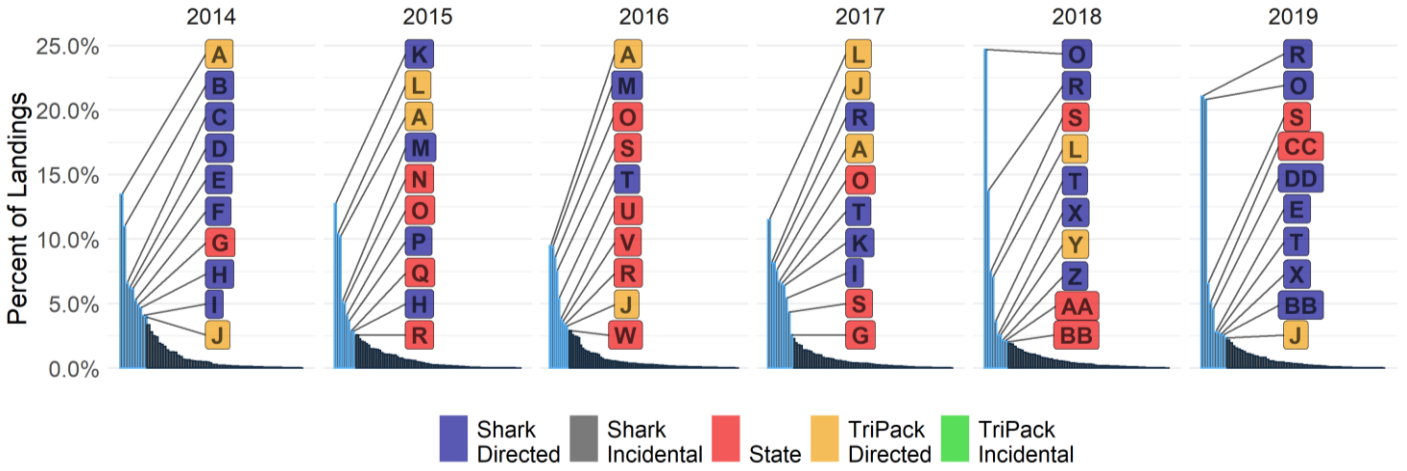

Figure 49. Top ten vessels that landed blacknose and non-blacknose small coastal shark management groups in the Atlantic region by year, 2014-2019.

Note: The letters are assigned to an individual vessel and tracked through the years. The colors for each letter are designated based on the permit type of each vessel. Source: eDealer reporting system.

Table 7. Percentage of annual blacknose and non-blacknose small coastal shark management group landings in the Atlantic region the top three, five, or ten vessels account for by year.

Year	Top Three Vessels	Top Five Vessels	Top Ten Vessels
2014	31%	43%	66%
2015	33%	43%	59%
2016	27%	40%	57%
2017	28%	42%	67%
2018	46%	57%	68%
2019	48%	58%	71%
Overall	36%	48%	65%

Source: eDealer reporting system.

Gulf of Mexico Small Coastal Shark Fishery

In the Gulf of Mexico, there have been similar issues with the SCS fishery as in the Atlantic region. From 2014 through 2015, the non-blacknose SCS quota (45.5 mt dw; 100,317 lb dw) and blacknose shark quota (2.0 mt dw; 4,513) were linked, so fisheries closed when either quota was reached. In 2014, the non-blacknose SCS and blacknose shark management groups were open January 1 through September 9 (251 days) and the non-blacknose SCS quota was overharvested by 5.3 mt dw (11,612 lb dw) (Figure 50). In 2015, the non-blacknose SCS quota was reduced as a result of the 2014 overharvest. That year, the non-blacknose SCS and blacknose shark management groups were open January 1 through July 4 (184 days). Later in 2015, Amendment 6, among other things, increased the non-blacknose SCS quota (112.6 mt dw; 248,215 lb dw) and prohibited blacknose sharks in the Gulf of Mexico region. Since the 2015 non-blacknose SCS landings were much lower than the new quota, NOAA Fisheries reopened the non-blacknose SCS management group for the rest of the year. The commercial landings continued to be dramatically below the commercial quota from 2016 through 2019.

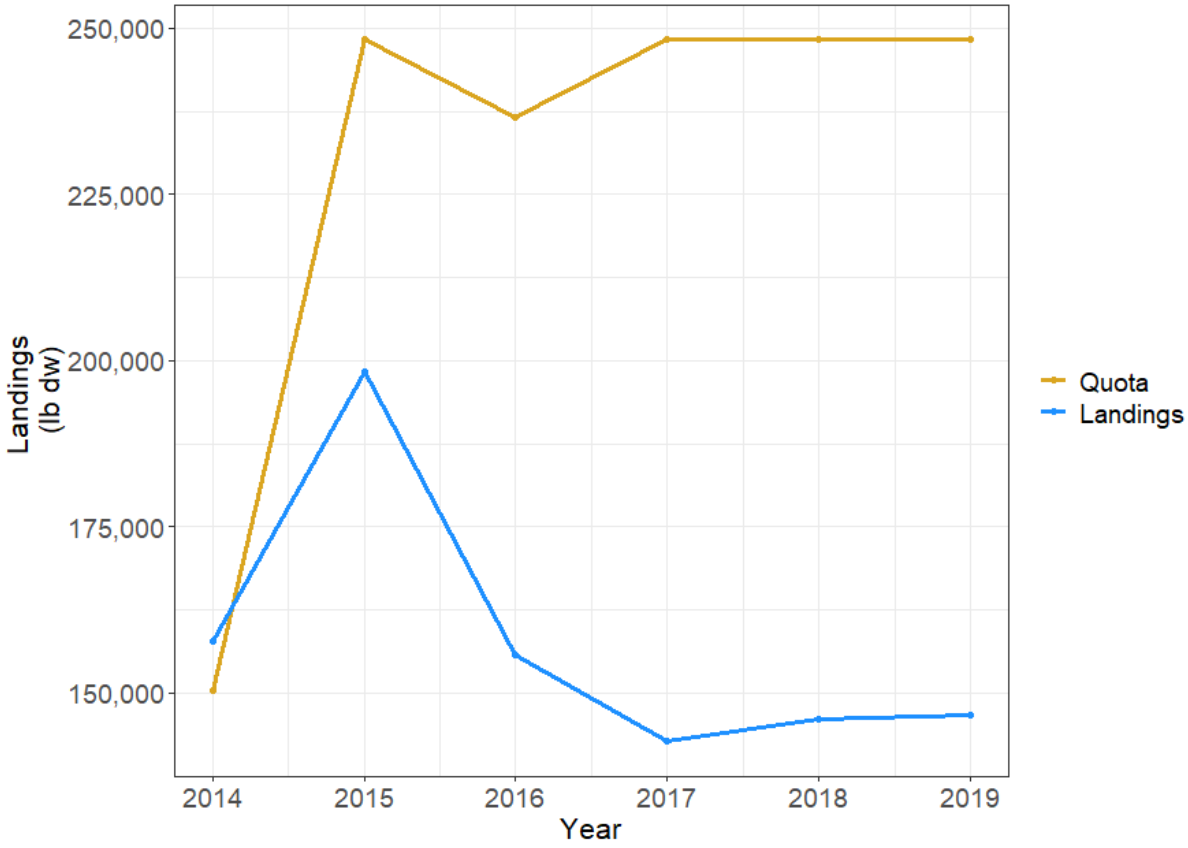

Figure 50. Gulf of Mexico non-blacknose SCS quota and landings, 2014-2019.
Source: eDealer reporting system.

Because commercial landings of blacknose sharks have been prohibited in the Gulf of Mexico since 2015 and because blacknose landings in 2014 and 2015 were low compared to non-blacknose SCS landings, blacknose landings were not analyzed separately. As such, the rest of this section focuses on the non-blacknose SCS landings during this time series. However, blacknose shark landings are included in the overall SCS analysis from 2014 through 2015.

Monthly landings: The Gulf of Mexico non-blacknose SCS landings started slow then stayed consistent during much of the fishing season (Figure 51) from 2014 through 2019. Most of the landings occurred in the spring, summer, and fall months. The peak months for landings have been April (2017), June (2014 and 2016), August (2018), and September (2015 and 2019). Since the non-blacknose SCS quota was increased and blacknose sharks were prohibited in 2015, the non-blacknose SCS fishery has remained open all year.

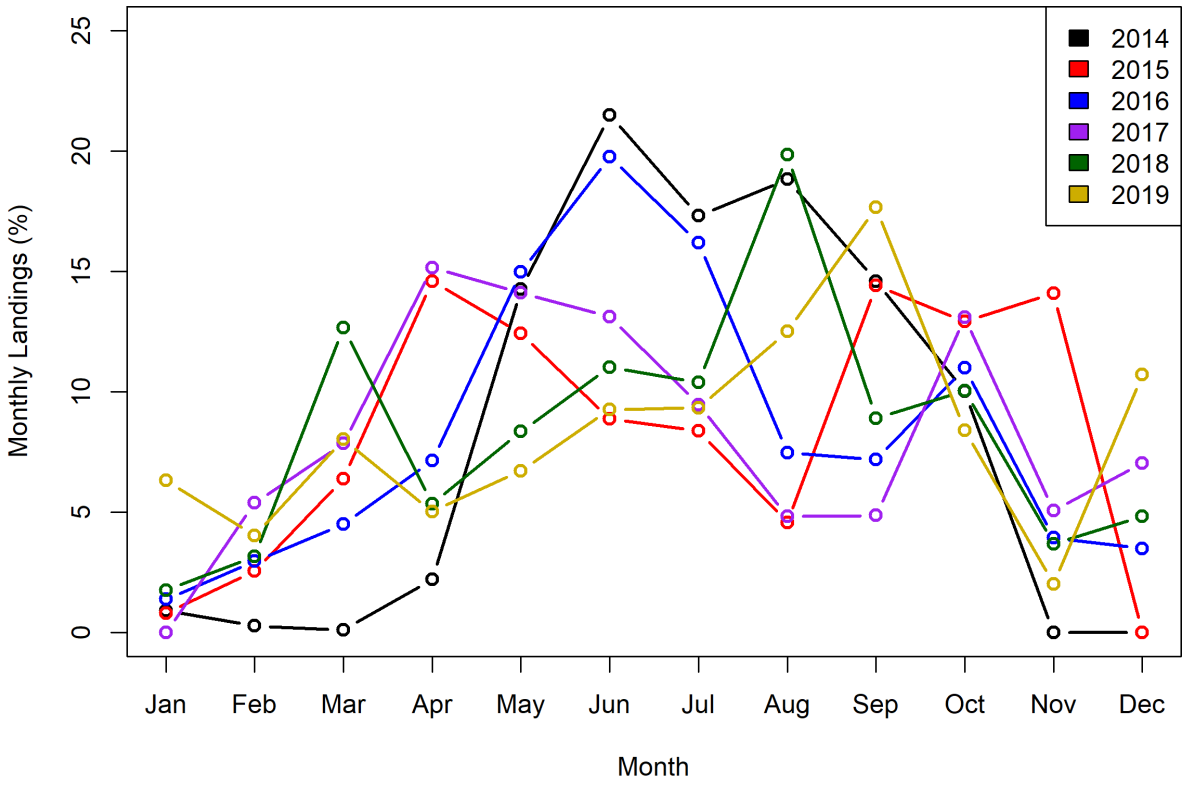

Figure 51. Percentage of monthly landings of non-blacknose SCS and blacknose shark management groups in the Gulf of Mexico region by year, 2014-2019.

Note: Blacknose shark landings were included from 2014 to 2015. Source: eDealer reporting system.

Trips by permit type: The state-water permit holders took the most trips landing non-blacknose SCS by a large margin from 2014 through 2019 (Figure 52). The number of trips by state-water permit holders peaked in 2017 (841), but declined in 2019 (277). Shark directed permit holder trips stayed consistent over time.

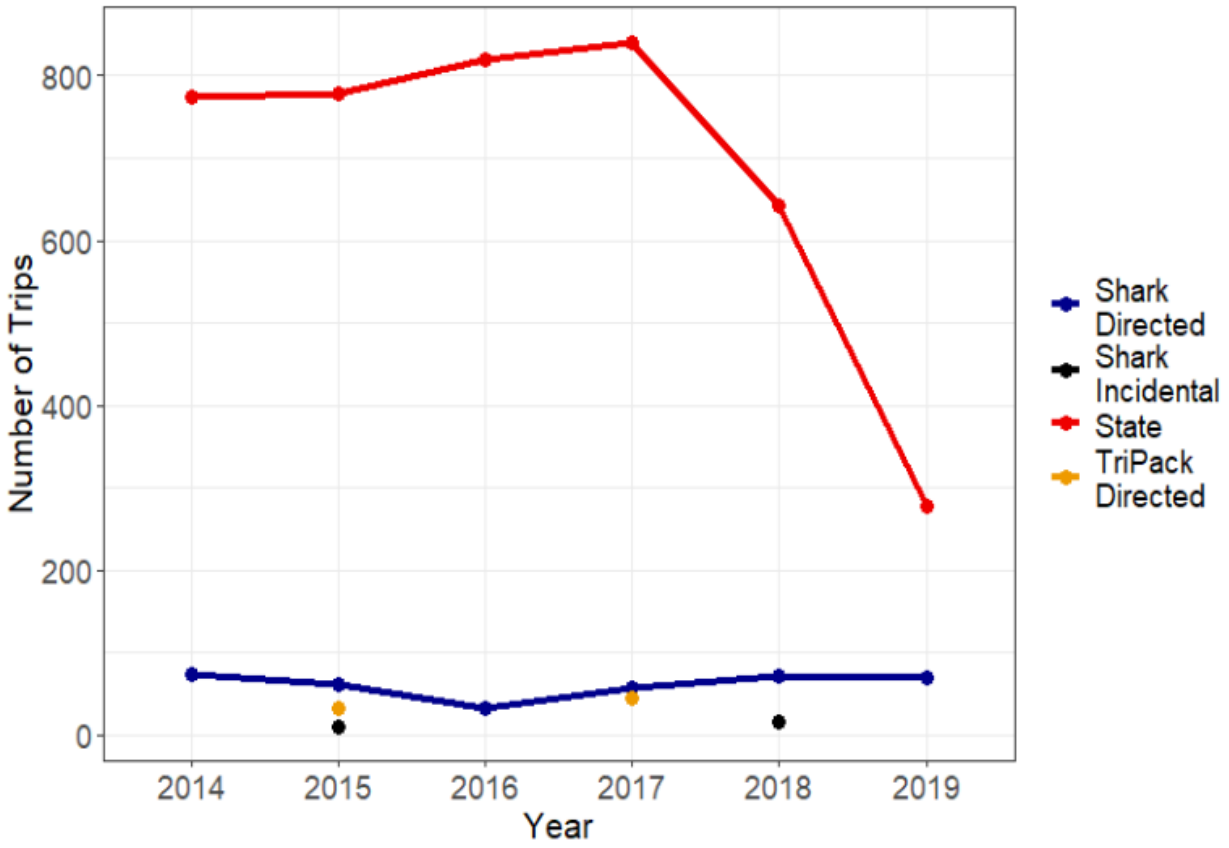

Figure 52. Number of trips landing non-blacknose SCS and blacknose shark management groups by permit holder in the Gulf of Mexico region by year, 2014-2019.

Note: Blacknose shark landings were included from 2014 to 2015. Due to confidentiality requirements, the full number of trips by shark incidental and shark directed triple pack permit holders could be shown for all years.
Source: eDealer reporting system.

Landings in weight per trip: Even though the state-water permit holders took the most trips, the shark directed permit holders landed the most weight per trip (Figure 53). The highest mean landings for state-water permit holders were in 2015 and 2019 at 165 lb dw for both years. The shark directed permit holders' mean landings were around 1,000 lb dw per trip with the highest mean landings in 2014 (1,304 lb dw). The shark directed triple pack permit holders seemed to land more weight per trip than the state-water permit holders. The highest mean landings for shark directed triple pack permit holders were in 2015 and 2018 with 711 and 748 lb dw per trip, respectively (Figure 53).

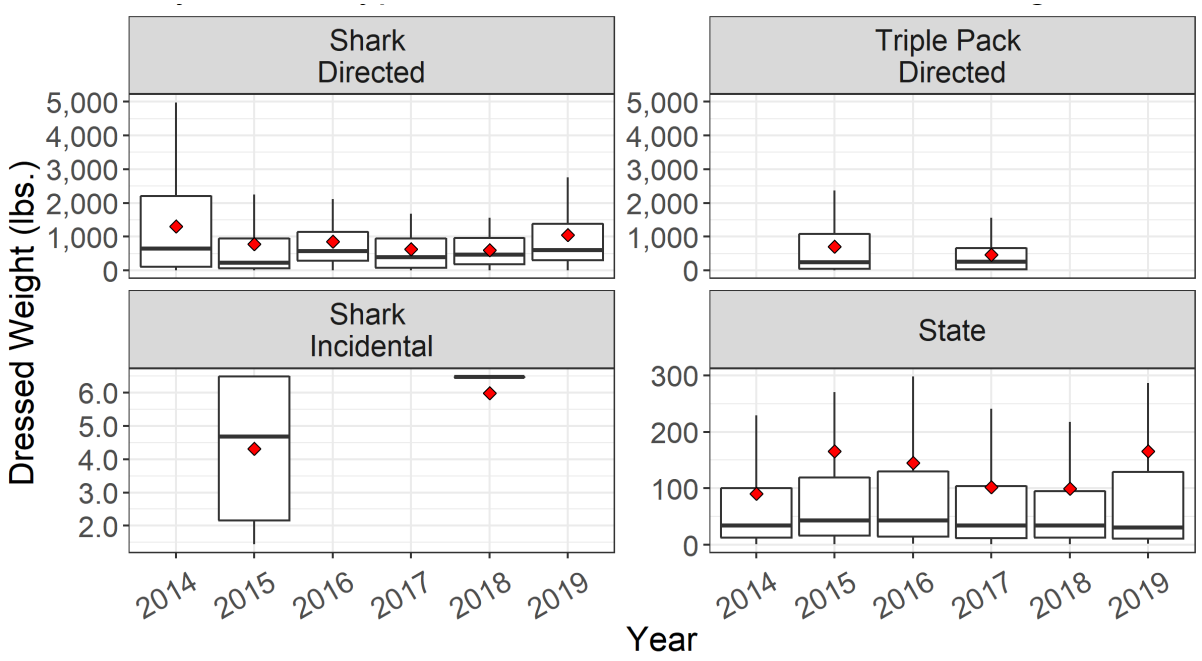

Figure 53. Landings in weight of non-blacknose SCS and blacknose shark management groups per trip by permit holder in the Gulf of Mexico region, 2014-2019.

Vertical line = the minimum and maximum landings reported per trip
Box = the middle 50 percent of the landings per trip
Red dot = the mean landings
Horizontal black line = the median landings per trip
Note: Blacknose shark landings were included from 2014 to 2015. Outliers have been omitted. The y-axis scale shifts depending on the amount of lb dw landed by permit type. Sources: SERO; eDealer reporting system.

Landings percentage by permit type: Overall, state-water permit holders accounted for more non-blacknose SCS landed (53 percent) per year than the other permit holders (Figure 54). State-water permit holders accounted for over 50 percent of the landings in 2015 (64), 2016 (74), and 2017 (60). For the years in which the number of state-water permit holder trips decreased (2018 and 2019), the amount of landings by shark directed permit holders increased (30 percent in 2018 and 50 percent in 2019).

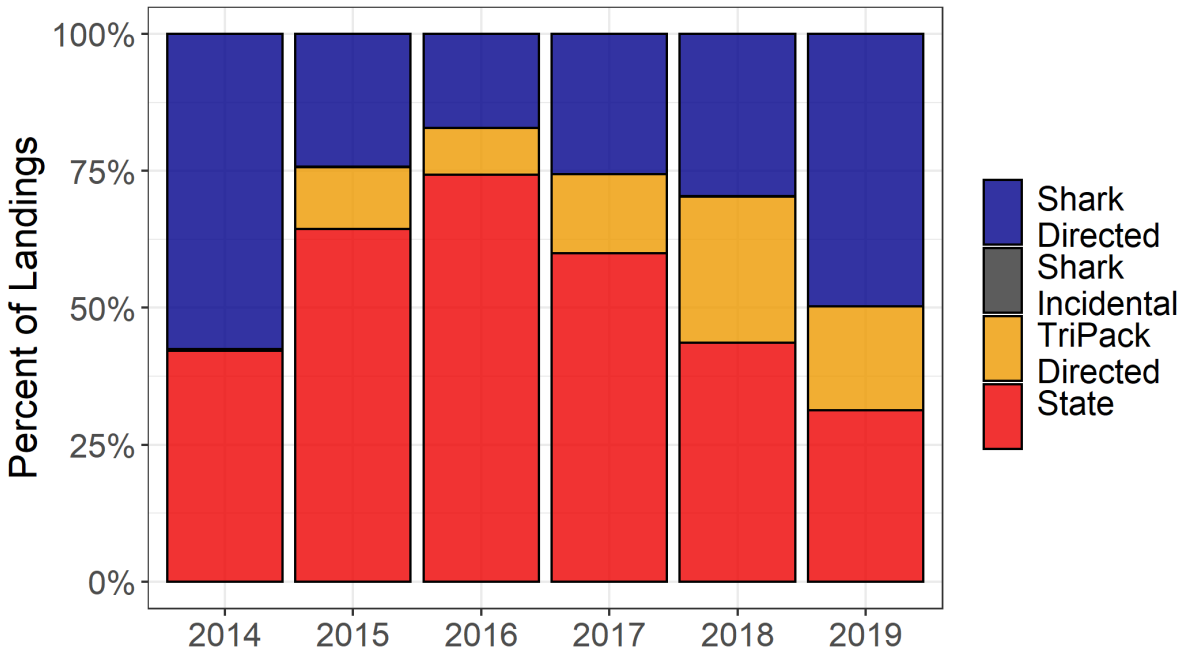

Figure 54. Percentage of non-blacknose SCS and blacknose shark management groups landed by permit holder in the Gulf of Mexico region, 2014-2019.

Note: Blacknose shark landings were included from 2014 to 2015. Sources: SERO; eDealer reporting system.

Trips by gear: In contract to the Atlantic region, bottom longline was used as the primary gear type to land non-blacknose SCS based on logbook data (Figure 55), followed by vertical line gear. However, the number of directed trips landing non-blacknose SCS was much lower, especially when compare to the Atlantic region (Figure 56). Bottom longline gear was reported as the major gear type used to target non-blacknose SCS in the Gulf of Mexico. The number of trips using bottom longline were the lowest in 2014 (31) and the highest in 2017 (58). Due to confidentiality requirements in the MSA, the majority of the gillnet gear trips could not be shown.

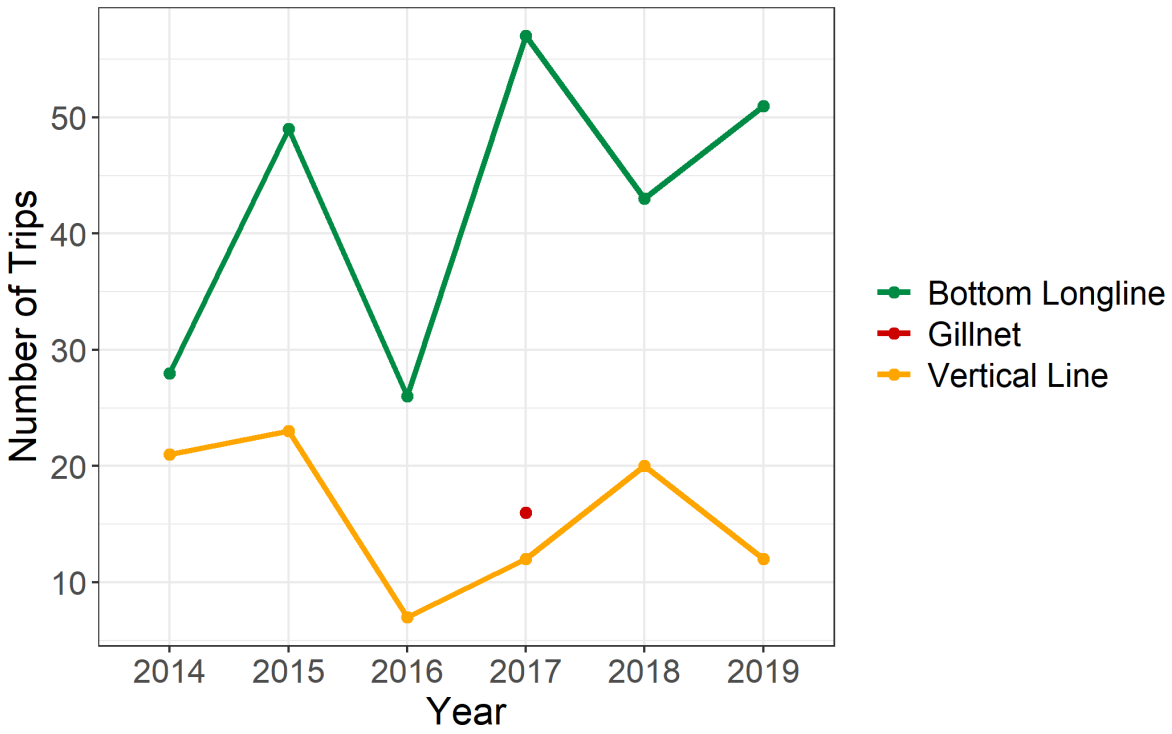

Figure 55. Number of trips by gear type taken landing at least one shark species from the non-blacknose SCS and blacknose shark management groups in the Gulf of Mexico region by year, 2014-2019.

Note: Blacknose shark landings were included from 2014 through 2015. Not all of the trips with gillnet gear were displayed due to confidentiality requirements in the MSA. Source: Unified data processing.

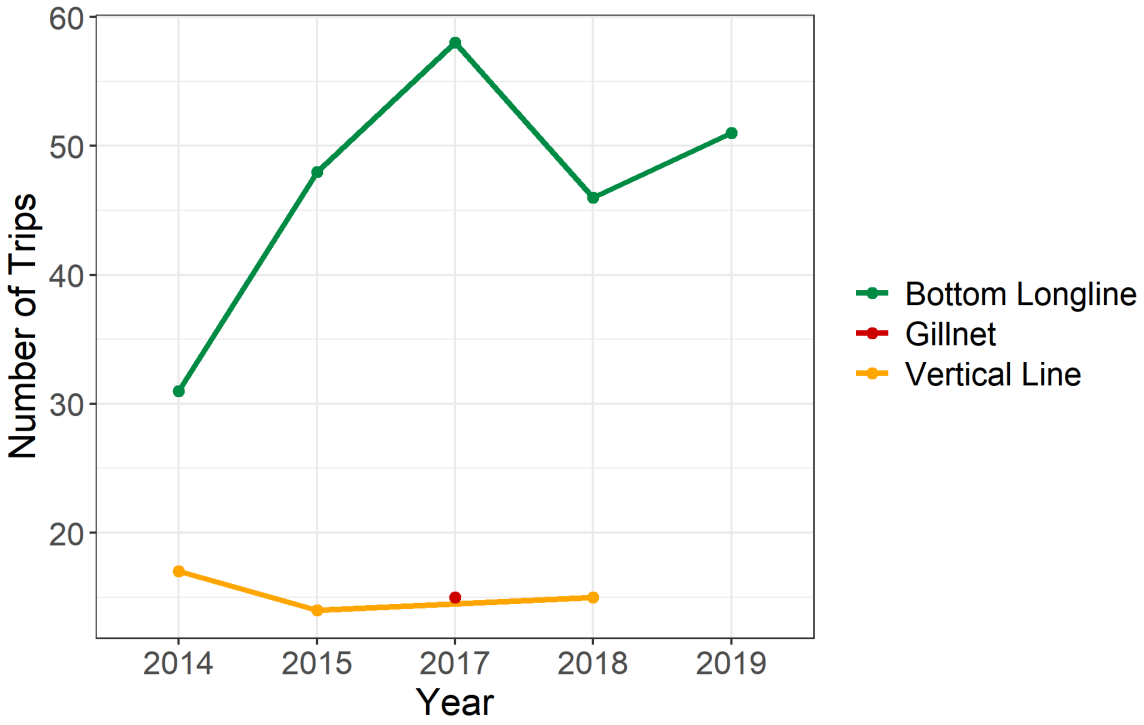

Figure 56. Number of directed trips by gear type taken that landed non-blacknose SCS and blacknose shark management groups in the Gulf of Mexico region by year, 2014-2019.

Note: Blacknose shark landings were included from 2014 to 2015. Directed shark trips are trips where 2/3 of the landings by weight were sharks. Source: Unified data processing.

High-liner vessels: The top 10 vessels landing non-blacknose SCS were mostly state-water permit holders (Figure 57). However, the only state-water permit holder to be the overall top vessel was in 2015 (Vessel K) before this vessel became a federal permit holder. Vessel A (shark directed permit holder) was a top vessel in 2014 and 2015, but dropped out of the top ten vessels. Vessel U (shark directed permit holder) was a top vessel from 2017 through 2019 while increasing its percentage of the overall landings each year. In 2019, Vessel U accounted for over 45 percent (Figure 57). Overall, the top ten vessels accounted for 81 percent of the annual non-blacknose SCS landings, while the top three vessels accounted for 56 percent (Table 8). Since 2014, the annual percentage of the top three vessels declined until 2019. In 2019, the top three vessels accounted for 80 percent of the non-blacknose SCS landings, while the top 10 vessels accounted for 95 percent.

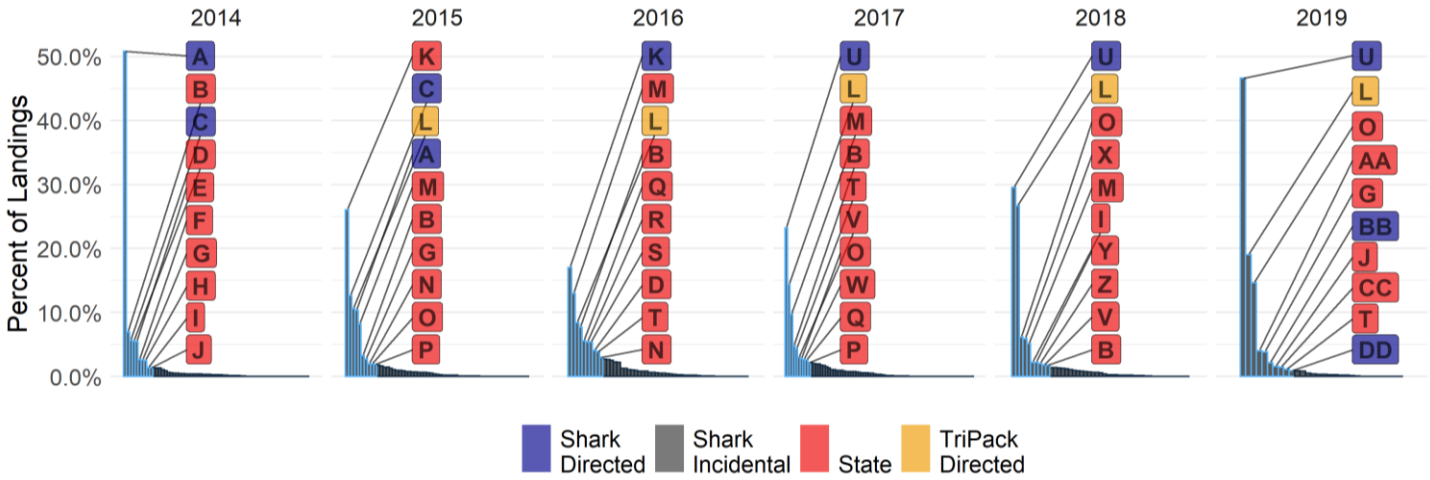

Figure 57. Top ten vessels that landed blacknose and non-blacknose small coastal shark management groups in the Gulf of Mexico region by year, 2014-2019.

Note: Blacknose shark landings were only included from 2014 through 2015. The letters are assigned to an individual vessel and tracked through the years. The colors for each letter are designated based on the permit type of each vessel. Source: eDealer reporting system.

Table 8. Percentage of annual blacknose and non-blacknose small coastal shark management group landings in the Gulf of Mexico region the top three, five, or ten vessels account for by year.

Year	Top Three Vessels	Top Five Vessels	Top Ten Vessels
2014	63%	74%	85%
2015	49%	68%	80%
2016	38%	52%	73%
2017	47%	56%	70%
2018	62%	73%	83%
2019	80%	88%	95%
Overall	56%	69%	81%

Source: eDealer reporting system.

Summary of SCS Fishery in the Atlantic and Gulf of Mexico Regions

Similar to the LCS fishery, landings decreased in the SCS fishery and fewer vessels targeted or landed SCS. Since Amendment 6 and the blacknose shark retention limit management measures were established, commercial quotas are not being exceeded as in the past. The blacknose retention limit in the Atlantic region and prohibition in the Gulf of Mexico has allowed the non-blacknose SCS fishery to remain open all year. However, some management measures have impacted the SCS fishery.

In both regions, the non-blacknose SCS and blacknose shark quota linkage caused the linked fishery to close with quota still available in some years. In the Atlantic region, NOAA Fisheries revised management measures (Amendment 6 and the blacknose shark retention limit rule) to mitigate this issue and increase the likelihood of the non-blacknose SCS quota to remaining open all year. However, the blacknose shark retention limit of eight sharks per trip has restricted

landings and quota has been underharvested. To allow more fishing opportunities for the SCS in the Atlantic region, NOAA Fisheries could re-evaluate blacknose shark retention limit in the future.

Pelagic Shark Fishery

The pelagic shark management group is made up of blue, porbeagle, thresher, and shortfin mako sharks. None of the pelagic shark management groups are divided by region. While blue and porbeagle sharks have their own quotas, separate from the thresher and shortfin mako quota, for this report, NOAA Fisheries combined landings data for all the pelagic sharks due to confidentiality requirements under the MSA In recent years, the commercial pelagic shark fishery has been mostly an incidental fishery with these species caught on pelagic longline sets targeting tuna and swordfish. A number of changes have been made to the pelagic shark fishery, many of which occurred through implementation of ICCAT recommendations. In 2008, Amendment 2 to the 2006 Consolidated HMS FMP, NOAA Fisheries determined that porbeagle sharks were overfished but overfishing was not occurring. Therefore, NOAA Fisheries reduced the commercial TAC to 1.7 mt dw as part of the rebuilding plan. In 2016, ICCAT Recommendation 15-06 required all parties to release porbeagle sharks alive when caught in association with ICCAT fisheries. Both of these measures are still in effect today.

For shortfin mako sharks, in June 2011, NOAA Fisheries implemented regulations as necessary and appropriate to carry out binding measures in ICCAT Recommendation 10-06. That recommendation noted that a 2008 risk assessment indicated that the species had low biological productivity and therefore the SCRS should conduct a stock assessment to determine the status of the species. In 2014, based upon the 2012 completed shortfin mako stock assessment, ICCAT stated that the fishing mortality of shortfin mako sharks should not be increased until more reliable stock assessment results are available, and that parties should improve reporting and monitoring of domestic shortfin mako catch (Recommendation 14-06). It also stated that another stock assessment should be completed to gather more information. At its November 2017 meeting, ICCAT adopted management measures in Recommendation 17-08 to maximize live releases of Atlantic shortfin mako sharks, allowing retention only in certain limited circumstances, increasing minimum size limits for retention, and improving data collection in ICCAT fisheries. Based on the 2017 ICCAT stock assessment, on December 13, 2017, NOAA Fisheries issued a status determination finding the stock to be overfished and experiencing overfishing.

In 2018, NOAA Fisheries published an interim final rule using emergency authority under the Magnuson-Stevens Act, 16 U.S.C. 1855(c), to implement measures in the HMS recreational and commercial fisheries consistent with Recommendation 17-08 (except for size limits). These measures were undertaken on an emergency basis to address overfishing of North Atlantic shortfin mako sharks. These measures were based on the stock assessment for North Atlantic shortfin mako sharks, which found the stock to be overfished with overfishing occurring. In the emergency rule, NOAA Fisheries required the live release of shortfin mako sharks in the commercial pelagic longline fishery and allowed retention only if the shortfin mako shark was dead at haulback. In the recreational fishery, NOAA Fisheries implemented a single minimum size limit of 83 inches (210 cm) FL for both male and female shortfin mako sharks. The

emergency measures were initially effective for 180 days, and on August 22, 2018, they were extended to March 3, 2019 (83 FR 42452). In 2019, NOAA Fisheries finalized Amendment 11 to adopt longer term conservation measures for the stock. Among other things, this rule allowed retention of shortfin mako sharks caught with longline or gillnet gear only if the shark is dead at haulback, required that vessels using pelagic longline gear have a functional electronic monitoring system on board the vessel to retain shortfin mako sharks, and established a minimum size limit of 71 inches (180 cm) FL for male and 83 inches (210 cm) FL for female shortfin mako sharks. In June 2020, ICCAT adopted Recommendation 19-06 which recommended ICCAT parties to release shortfin mako sharks alive, unless the following criteria are met: the shortfin mako shark is caught on a vessel 40 feet or longer, has an observer or an electronic vessel monitoring system, the shortfin mako is dead at haulback, and that the observer collects data on the shortfin mako shark(s). For vessels measuring 40 feet or less, a shortfin mako can be kept if it is dead at haulback. Amendment 11, as well as Recommendations 17-08 and 19-06, are still in effect today.

For blue sharks, in 2020, ICCAT adopted Recommendation 19-07, which took into consideration a 2015 stock assessment, indicated that there was a high level of uncertainty in the blue shark stock status. Recommendation 19-07 set an Atlantic-wide TAC of 39,103 mt and is still effect today.

Thresher shark management regulations implemented in the 2006 Consolidated HMS FMP remain in effect today.

Since the implementation of these management measures, pelagic shark landings have not been close to the commercial quota (Figure 58). However, porbeagle shark landings have at times exceeded the 1.7 mt dw quota, although not since 2016. Shortfin mako and common thresher sharks are the two most landed pelagic shark species; when the landings of one of those species decreases then the overall pelagic shark landings generally decrease.

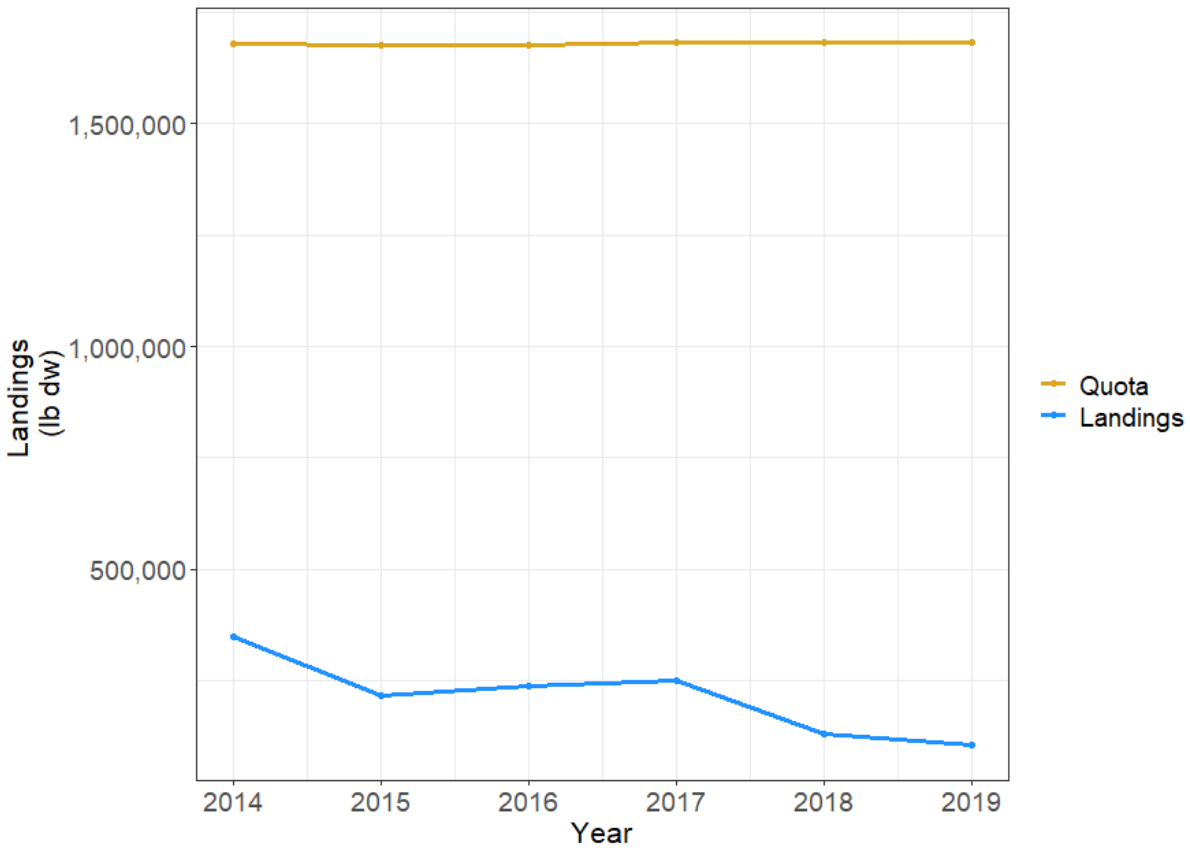

Figure 58. Pelagic Shark management group quota and landings, 2014-2019.
Note: This includes landings of oceanic whitetip, common thresher, and shortfin mako sharks. Blue and porbeagle shark landings have been excluded since the landings are very low and are considered confidential. Source: eDealer reporting system.

Monthly landings: Pelagic shark landings were fairly consistent during much of the fishing season (Figure 59). Most of the landings occurred during the beginning of the fishing season when fishermen are targeting other HMS. The peak months for landings were January (2017 and 2018), February (2018), April (2014), June (2016), and October (2019). Landings in 2015 were steady all year with a few months where landings peaked.

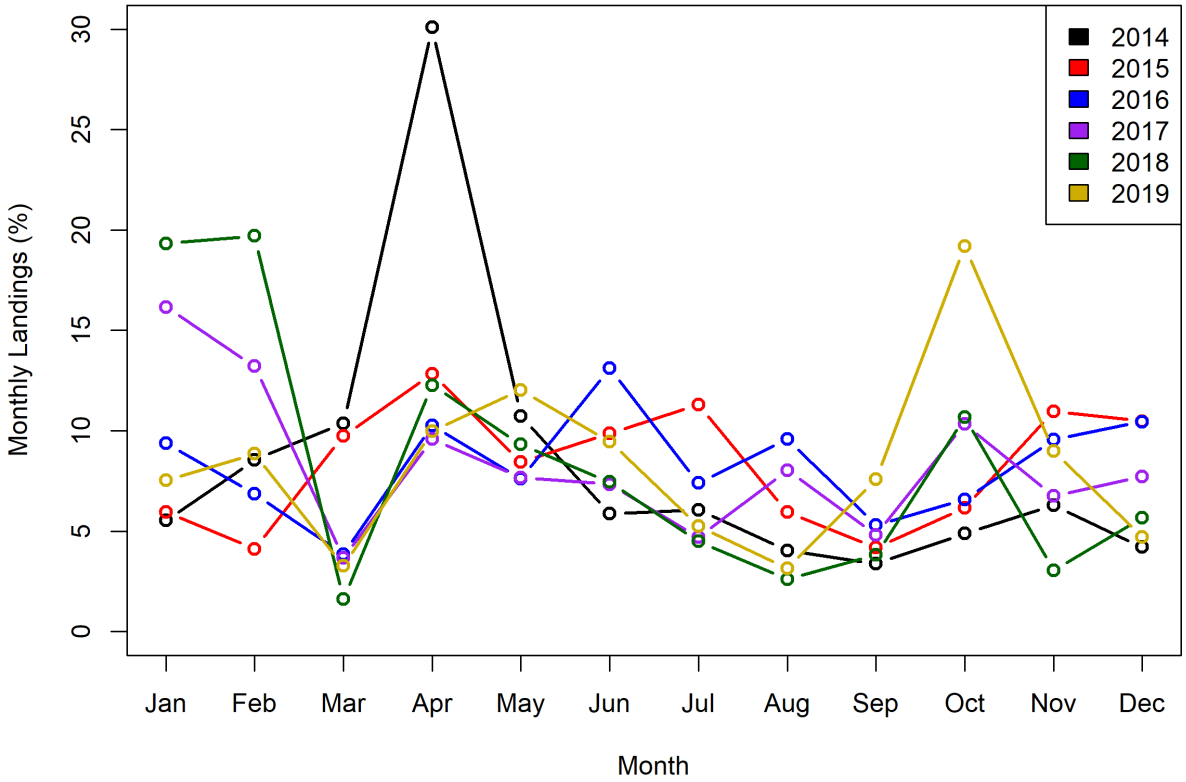

Figure 59. Percentage of monthly landings of pelagic shark management groups by year, 2014-2019.
Note: This includes landings of blue, porbeagle, common thresher, and shortfin mako sharks. Source: eDealer reporting system.

Trips by permit type: Trips landing pelagic sharks declined for every permit holder category with a larger decrease since the shortfin mako shark regulations were implemented in 2018 (Figure 60). The state-water permit holders took the most trips except for 2017. The number of trips by state-water permit holders peaked in 2014 (500), with a low in 2018 (269). Similar to the state-water permit holders, the number of trips landing pelagic sharks by the triple pack permit holders (directed and incidental) peaked in 2014 and declined to lows in 2019.

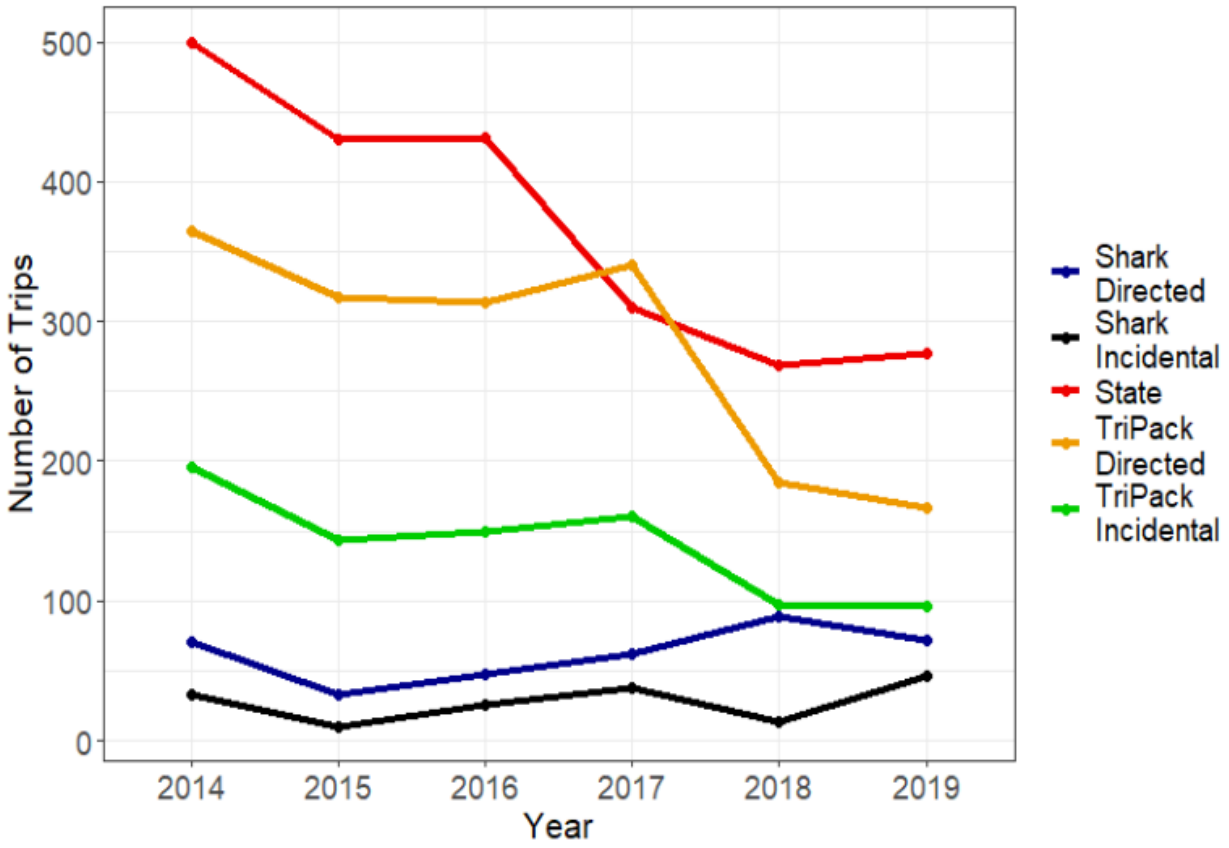

Figure 60. Number of trips landing pelagic sharks by year, 2014-2019.
Note: This includes landings of blue, porbeagle, common thresher, and shortfin mako sharks. Source: eDealer reporting system.

Landings in weight per trip: Even though state-water permit holders were taking more trips, the shark directed triple pack permit holders landed more pelagic sharks per trip (Figure 61). The highest mean landings per trip for state-water permit holders were in 2014 and 2018 with approximately 170 lb dw in both years. The shark directed triple pack permit holders mean landings peaked in 2014 (539 lb dw) and were the lowest in 2019 (193 lb dw). These landings per trip show that the pelagic sharks are incidentally caught and retained in the shark fishery when compared to the LCS and SCS management fisheries.

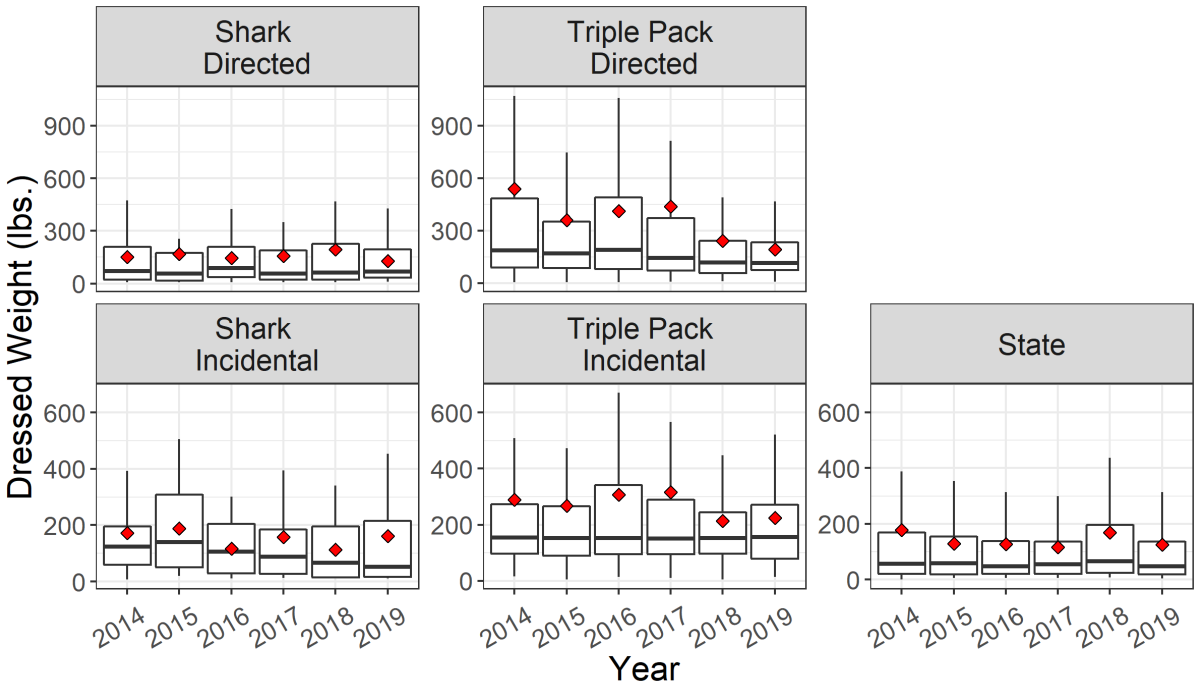

Figure 61. Landings in weight of pelagic sharks per trip by permit holder, 2014-2019.
Vertical line = the minimum and maximum landings reported per trip
Box = the middle 50 percent of the landings per trip
Red dot = the mean landings
Horizontal black line = the median landings per trip
Note: This includes landings of blue, porbeagle, common thresher, and shortfin mako sharks. Outliers have been omitted. The y-axis scale shifts depending on the amount of lb dw landed by permit type. Sources: SERO; eDealer reporting system.

Landings percentage by permit type: Landings from shark directed triple pack permit holders accounted for over 50 percent of the pelagic shark landings in in 2014 (55), 2015 (53), 2016 (54), and 2017 (59) (Figure 62). When the shortfin mako shark regulations were established in 2018, the shark directed triple pack permit holder landings declined. State-water permit holders accounted for the most pelagic shark landings in 2018 and 2019.

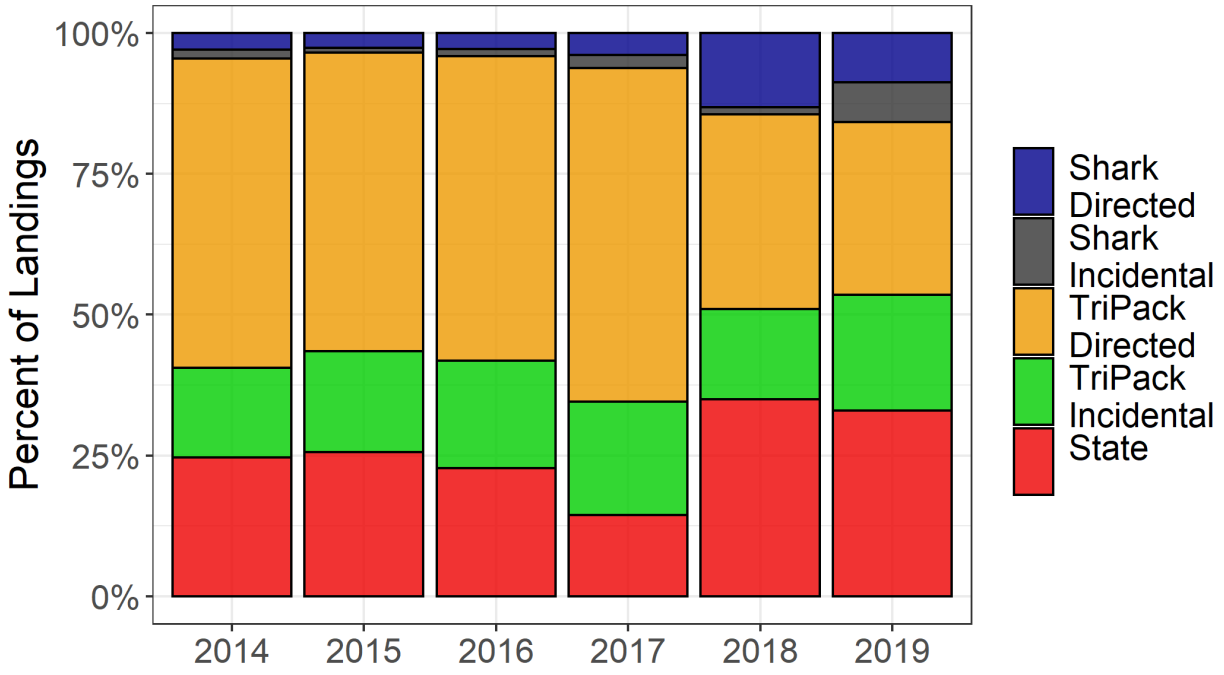

Figure 62. Percentage of pelagic sharks landed by permit holder, 2014-2019.
Note: This includes landings of blue, porbeagle, common thresher, and shortfin mako sharks. Sources: SERO; eDealer reporting system.

Trips by gear type: As expected, pelagic longline gear is the primary gear type used to catch pelagic sharks (Figure 63). In 2014, 467 trips used pelagic longline gear and the number of trips has declined to 211 in 2019. The number of trips using gillnet gear was consistent, and is related to the large number of state-water permit holder trips and landings. Even though buoy gear is not an authorized gear type to land sharks, some landings using this gear were reported in the logbook data. After examining the directed shark trips, gillnet gear seems to be the gear used to target pelagic sharks (Figure 64). In 2014, 44 trips used gillnet gear to directly target pelagic sharks and the number of trips fluctuated over time. For pelagic longline, the highest number of directed trips was in 2014 (21), with the in 2019 (less than 5).

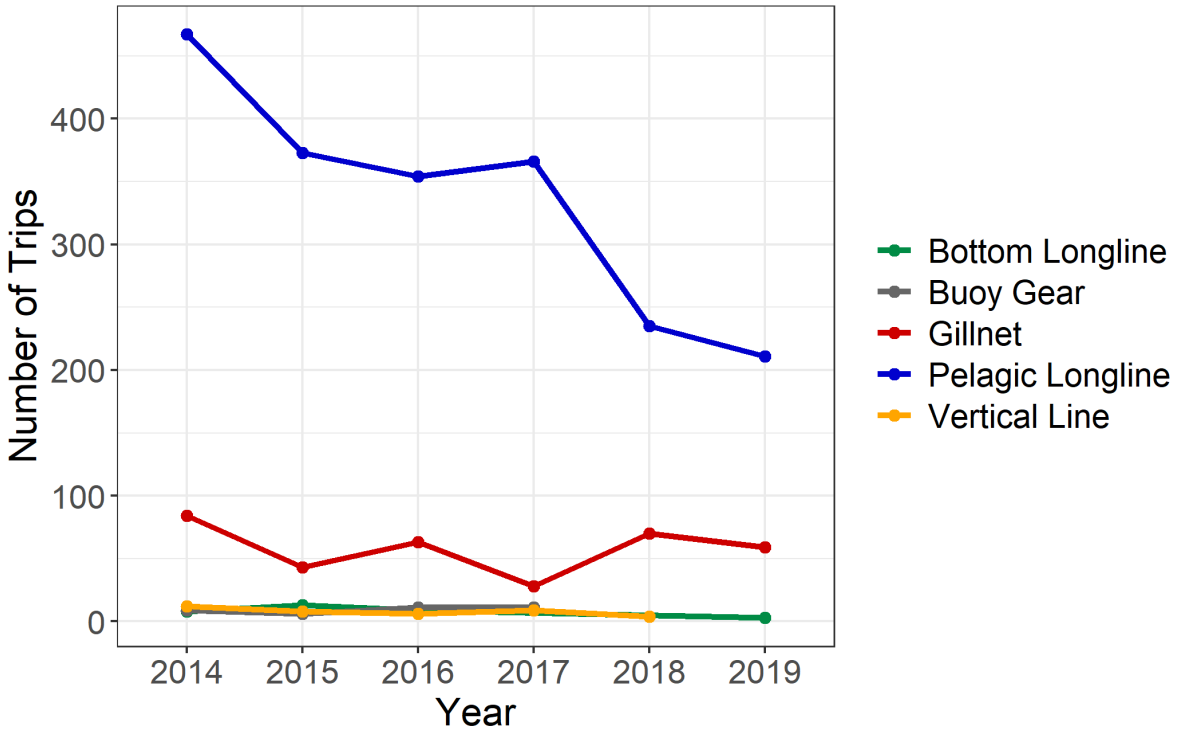

Figure 63. Number of trips by gear type taken that landed at least one pelagic sharks by year, 2014-2019.

Note: This includes landings of blue, porbeagle, common thresher, and shortfin mako sharks. Not all trips with buoy gear and vertical line gear were displayed due to confidentiality requirements. Source: Unified data processing.

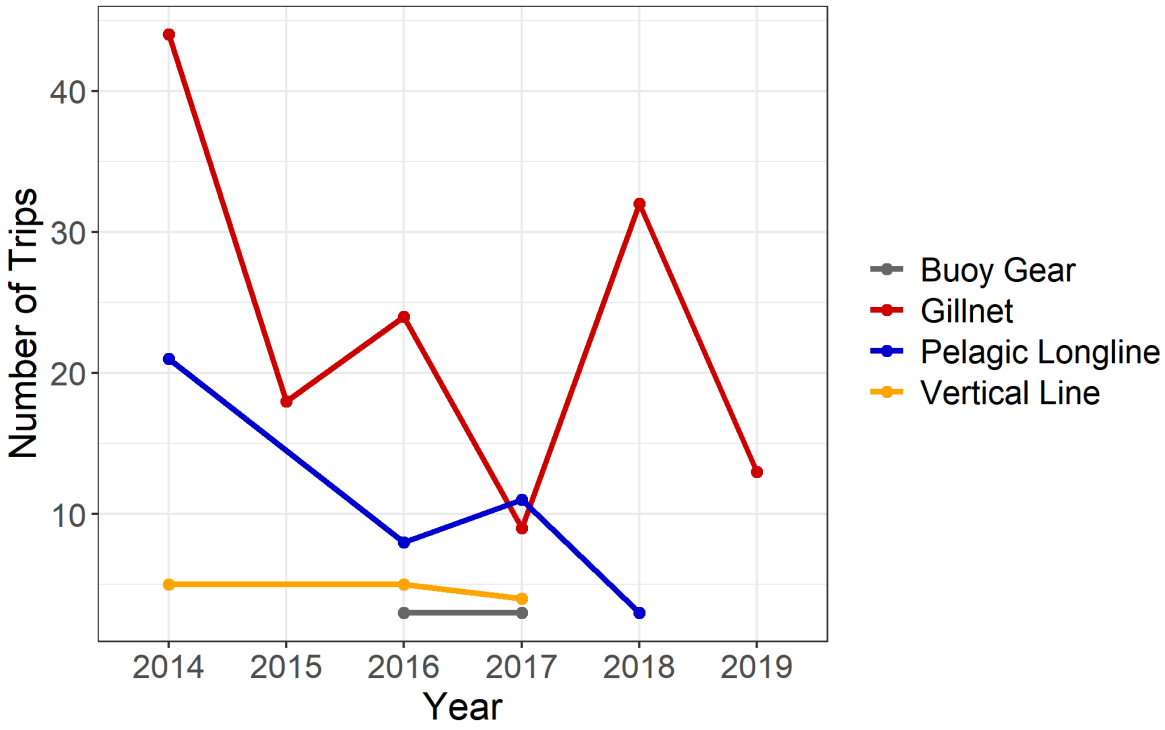

Figure 64. Number of directed trips by gear type taken that landed pelagic sharks by year, 2014-2019. Note: Directed shark trips are trips where 2/3 of the landings by weight were sharks. Not all trips with buoy gear and vertical line gear were displayed due to confidentiality requirements. Source: Unified data processing.

High-liner vessels: Most vessels landing pelagic sharks are triple pack permit holders that include either a shark directed or incidental permit (Figure 65). Of those vessels, the majority are incidental permit holders that target more profitable HMS like swordfish and tunas. Due to the incidental nature of this fishery, the top 10 vessels account for the lowest overall percentage of landings (44) compared to any other shark management group (Table 9). From 2014 through 2017, triple pack permit holders (with either a directed or incidental shark permit) comprised most of the top 10 vessels (Figure 65). That changed in 2018 when NOAA Fisheries implemented emergency measures for shortfin mako sharks, which allowed retention of shortfin mako shark only if dead at haulback. Since shortfin mako shark was the primary pelagic shark species landed, the overall landings of the top ten vessels declined to 37 percent in 2018 and 39 percent in 2019 (Table 9). In addition, there was an increase in the number of state-water permit holders landing pelagic sharks.

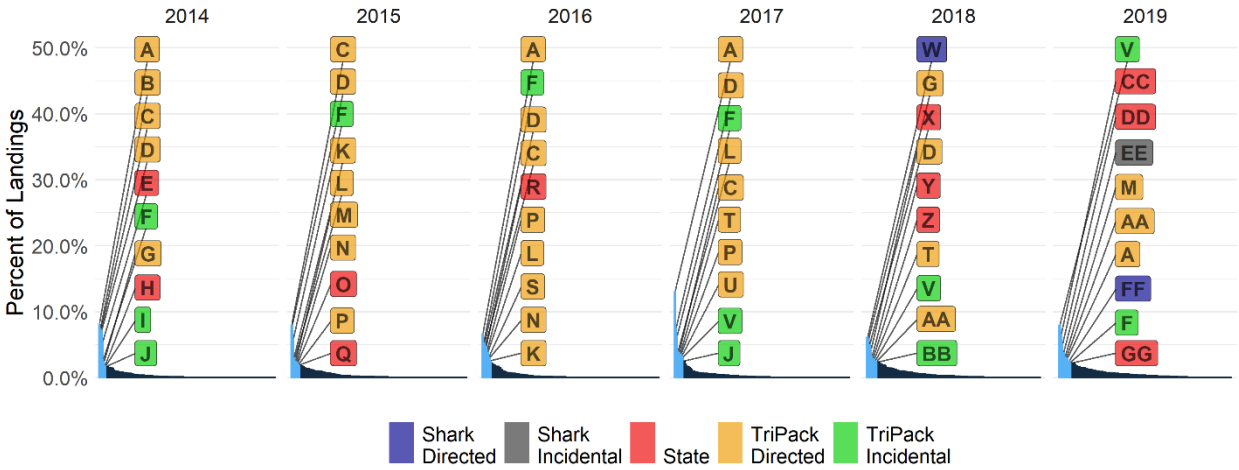

Figure 65. Top ten vessels that landed pelagic sharks by year, 2014-2019.
Note: This includes landings of blue, porbeagle, common thresher, and shortfin mako sharks. The letters are assigned to an individual vessel and tracked through the years. The colors for each letter are designated based on the permit type of each vessel. Source: eDealer reporting system.

Table 9. Percentage of annual pelagic shark landings the top three, five, or ten vessels account for by year.

Year	Top Three Vessels	Top Five Vessels	Top Ten Vessels
2014	23%	35%	46%
2015	22%	28%	38%
2016	17%	27%	43%
2017	27%	34%	51%
2018	17%	24%	37%
2019	20%	26%	39%
Overall	21%	30%	44%

Source: eDealer reporting system.

Summary of Pelagic Shark Fishery

The pelagic shark fishery is currently an incidental shark fishery, in large part because of various international management measures restricting the landing of these species. For the most part, these shark species cannot be targeted and can only be landed if dead at haulback. Thus, fishermen are generally targeting other HMS species rather than pelagic sharks. As a result, pelagic shark landings have declined along with effort levels. For the most part, any changes to these management measures would require changes at the international level in response to reaching management goals, such as ending overfishing or rebuilding stocks. To improve the pelagic shark fishery, NOAA Fisheries would continue to support U.S. fisheries and promote the MSA's fishery management objectives related to ending overfishing and rebuilding stocks at ICCAT and other international meetings for the conservation of pelagic sharks.

Open Access Permits

Unlike limited access permits, open access permits are not limited in the number issued, can be issued new, and may not be transferred between permit holders. The HMS open access permit program includes the following:

- Commercial Caribbean Small Boat permit (only valid in the U.S. Caribbean)
- Swordfish General Commercial permit
- Smoothhound Shark permit
- Atlantic Tunas General category permit
- Atlantic Tunas Harpoon category permit
- Atlantic Tunas Trap category permit
- Atlantic HMS Charter/Headboat permit
- Atlantic HMS Angling permit

This section reviews information about smoothhound shark open access permits as it is the only open access HMS permit that authorizes the commercial landings and sale of sharks. On June 1, 2021, a final rule became effective, which among other things, allows for a limited number of sharks to be landed and sold by Commercial Caribbean Small Boat permit holders in the U.S. Caribbean (86 FR 22882; April 30, 2021). (Information about Atlantic HMS Charter/Headboat and Angling permits are discussed in the Recreational Shark Fishery section, below). Other open access permits under NOAA Fisheries' purview do not allow commercial or recreational shark retention and therefore are not discussed in this document.

The commercial smoothhound shark permit has been required since March 15, 2016 (80 FR 73128; November 24, 2015) in order to retain smoothhound sharks, including smooth dogfish, Florida smoothhound, and Gulf smoothhound. Amendment 9 to the 2006 Consolidated Atlantic HMS FMP brought smoothhound sharks under Federal management and implemented, among other things, the smooth dogfish specific provisions in the Shark Conservation Act (SCA). The SCA requires that all sharks landed from Federal waters in the United States be landed with their fins naturally attached to the carcass, but includes a limited exception for smooth dogfish. Consistent with the SCA, Amendment 9 allowed fishermen to remove smooth dogfish fins while at sea, if four criteria are met: 1. 25 percent of retained catch on board the vessel must be smooth dogfish (other shark species can also be on board); 2. Federally-permitted smooth dogfish fishermen must possess a State commercial fishing license that allows fishing for smooth dogfish; 3. The vessel is located between the shore and 50 nm and is along the Atlantic Coast (Maine through the east coast of Florida); and 4. The fin-to-carcass ratio does not exceed 12 percent. In addition, fishermen must limit soak times to 24 hours when using sink gillnet gear and conduct a net check at least every 2 hours when using drift gillnet gear. Table 10 provides the number of permit holders by state from 2016 through 2020. Since the permit was established, the number of vessels obtaining the permit has grown from 114 permits in 2016 to the highest number (163 permits) in 2018. The overall average number of permits issued per year has been 150. On average, fishermen from the State of North Carolina (53 permits), State of New Jersey (33 permits), and the Commonwealth of Virginia (17 permits) have obtained the most smoothhound shark permits.

Table 10. Number of smoothhound shark permits by year and state.

State	2016	2017	2018	2019	2020	Average
Maine	1	0	0	1	1	1
Massachusetts	1	1	1	0	0	1
Rhode Island	4	9	6	6	6	6
Connecticut	0	1	0	0	0	0
New York	2	12	13	13	11	10
New Jersey	30	34	39	30	30	33
Delaware	2	2	3	2	2	2
Maryland	4	5	4	4	4	4
Virginia	16	20	17	18	16	17
West Virginia	0	0	1	0	0	0
North Carolina	42	48	56	61	57	53
South Carolina	5	6	6	6	7	6
Georgia	0	1	1	0	0	0
Florida	7	13	13	16	21	14
Alabama	0	1	0	0	0	0
Mississippi	0	0	1	0	0	0
Louisiana	0	1	2	1	3	1
Illinois	0	0	0	0	2	0
Total	**114**	**154**	**163**	**159**	**160**	**150**

Note: Number of permits and permit holders in each category and state is subject to change as permits are renewed or expire. Source: SERO.

From this point on in the SHARE document, when discussing smoothhound shark data, NOAA Fisheries is only referring to Atlantic smoothhound shark data. Due to confidentiality requirements under the MSA, NOAA Fisheries is not able to display any of the Gulf of Mexico smoothhound shark information since very few fishermen have used their permit or landed smoothhound sharks in that region and thus sufficient data does not exist for appropriate aggregation to maintain the confidentiality of data.

Active/Inactive permits: As with the limited access permits, the overall usage of smoothhound shark permits varied from 2016 through 2019 (Figure 66). The majority of the smoothhound shark permits (59 percent) were inactive during this period. The percentage of active smoothhound shark permits was highest in 2016 (54) and lowest in 2019 (34).

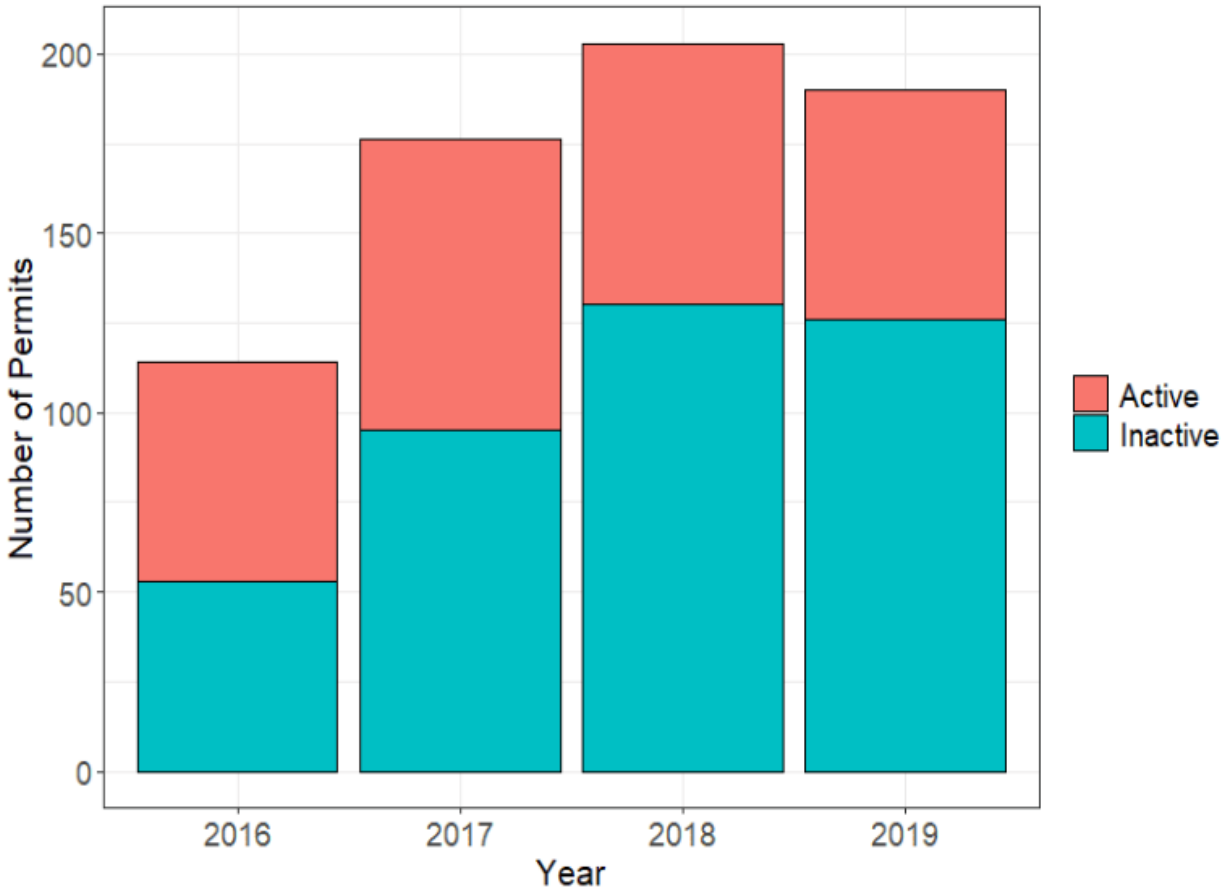

Figure 66. Number of active and inactive smoothhound shark permit holders in the Atlantic region, 2016-2019.
Sources: SERO; eDealer reporting system.

Comparison of active permit holders: From 2016 through 2019, the number of state-water permit holders landing smoothhound sharks dramatically outnumbered the active smoothhound shark permit holders (Figure 67). When the permit was created in 2016, the number of state-water permit holders (218) landing smoothhound sharks was the highest in relation to the other years (2016-2019). As fishermen started to obtain the open access smoothhound shark permit, the number of state-water permit holders declined to 167 in 2019, although this amount is still more than double the largest number of active smoothhound shark permit holders (81) from 2017.

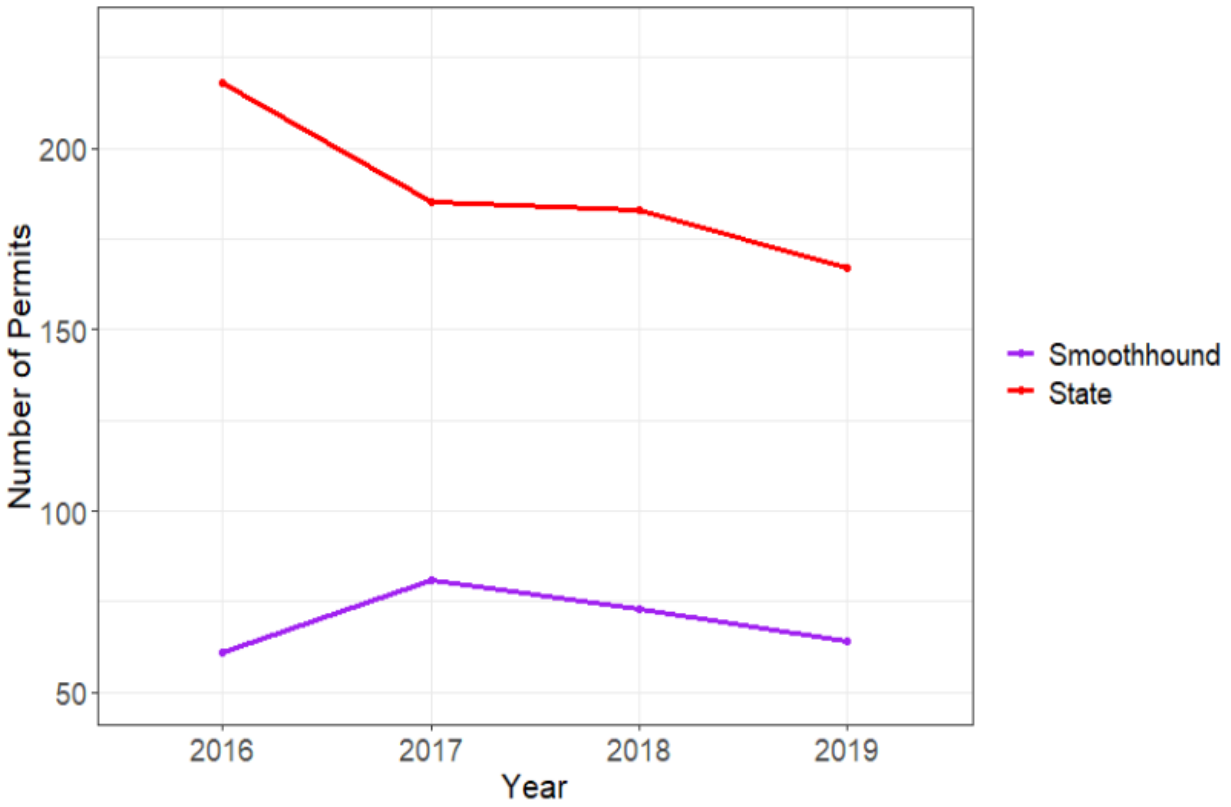

Figure 67. Number of active smoothhound shark permit holders and state-water permit holders landing smoothhound sharks in the Atlantic region, 2016-2019.

Sources: SERO; eDealer reporting system.

Landings: From 2016 through 2019, the smoothhound shark landings were much lower than the available commercial quota (Figure 68). In 2016, the smoothhound shark quota was 2,647,725 lb dw. In 2017, the commercial quota was adjusted upwards to 3,973,902 lb dw as a result of carry-over of underharvested quota. Underharvest adjustments of up to 50 percent of the base quota can only be applied to stocks or management groups that are not overfished and have no overfishing occurring (i.e., smoothhound shark management group). Due to the low smoothhound shark landings, an allowable quota adjustment from the previous fishing year has occurred from 2017 through 2019. The highest smoothhound shark landings occurred in 2018.

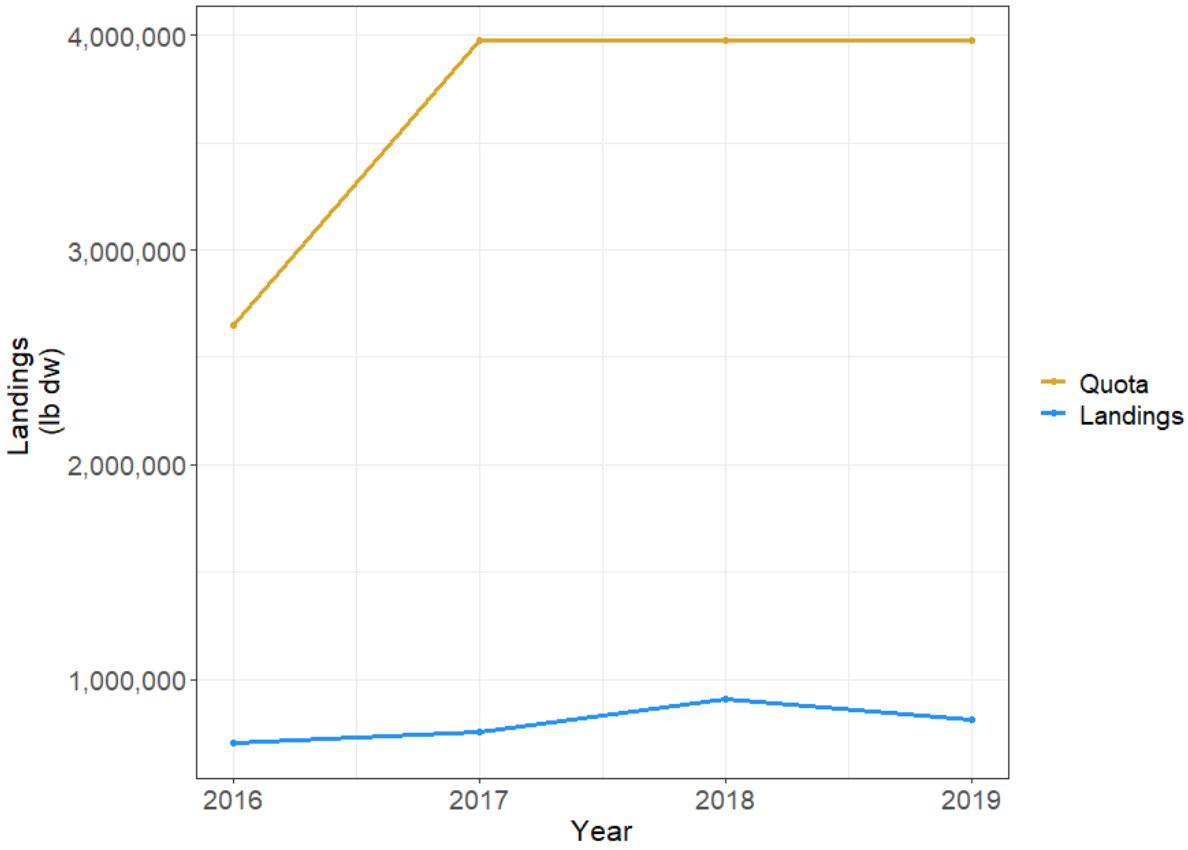

Figure 68. Atlantic Smoothhound Shark quota and landings, 2016-2019.
Note: HMS did not manage smoothhound sharks until 2016. Source: eDealer reporting system.

Monthly landings: The majority of the smoothhound shark landings occur during the summer months with a spike in landings in the fall (Figure 69). During the fishing season, landings start slowly before peaking in the summer, decreasing in the fall, and then dropping off in November and December. During the summer months, shark fishermen landed the highest percentage of the smoothhound shark quota especially in 2016, 2018, and 2019.

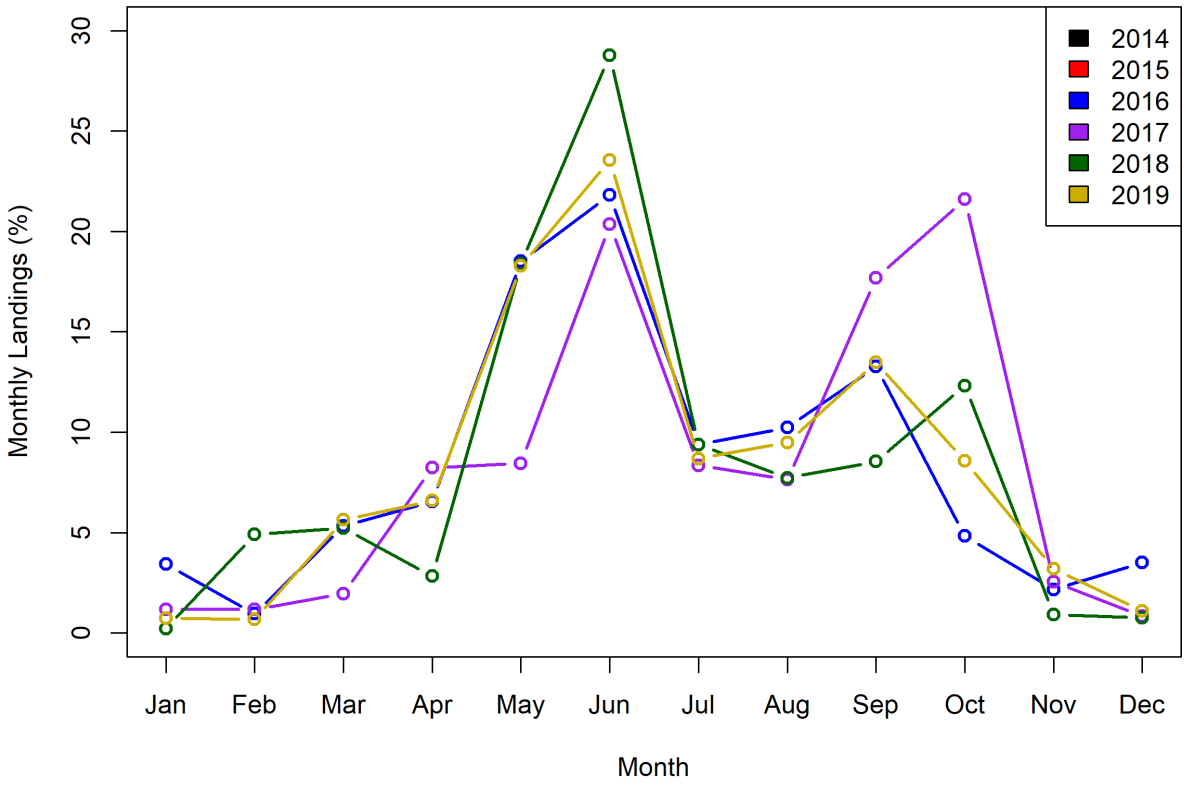

Figure 69. Percentage of monthly landings of the smoothhound shark management group in the Atlantic region by year, 2016-2019.

Source: eDealer reporting system.

Trips by permit type: The trips by state-water permit holders dramatically outnumber the trips by smoothhound shark permit holders (Figure 70). State-water permit holders landed smoothhound sharks on 2,500 trips in 2016 then increased to 2,693 trips in 2019. For smoothhound shark permit holders, the number of trips were low in 2016 (1,073) than peaked in 2017 (1,321) and declined in 2019 to 2016 levels.

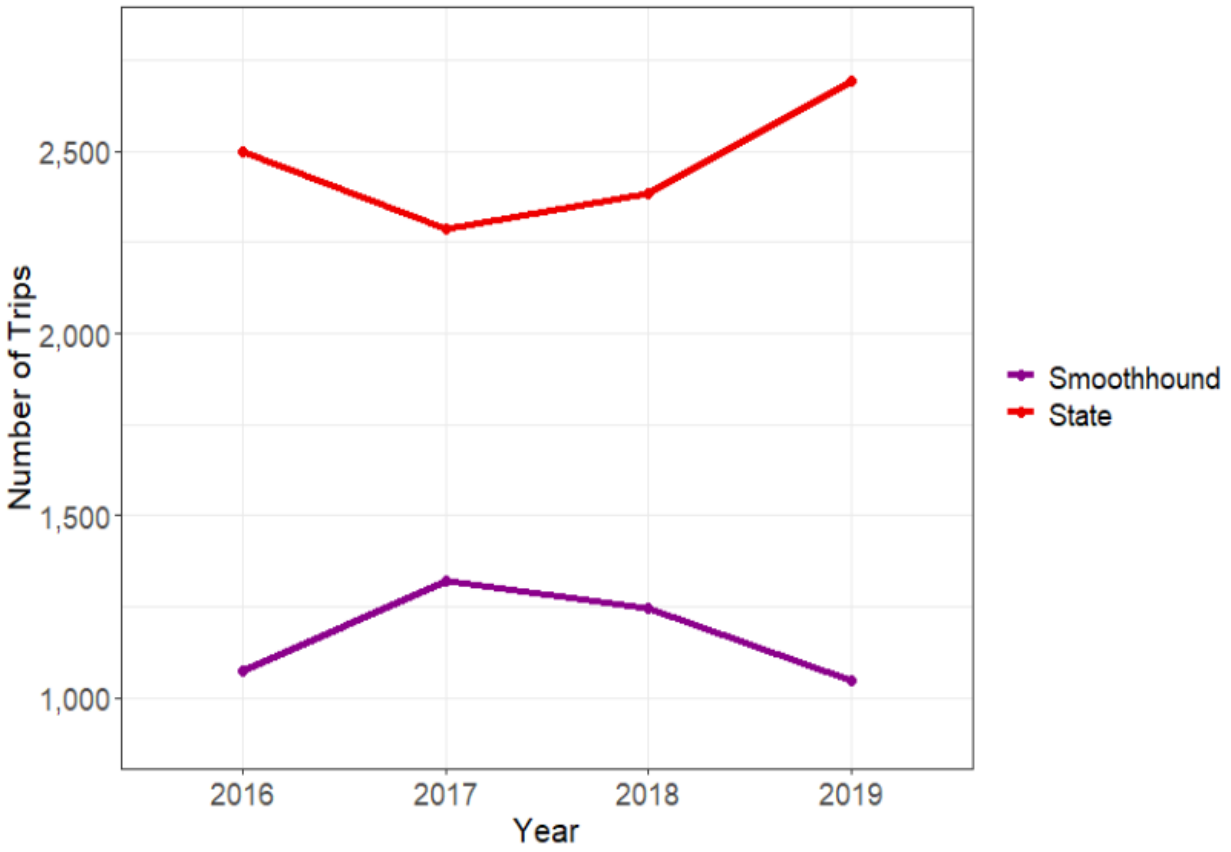

Figure 70. Number of trips landing smoothhound shark management group sharks in the Atlantic region by year, 2016-2019.

Source: eDealer reporting system.

Landings in weight per trip: Even though state-water permit holders are landing smoothhound sharks on more trips than federal smoothhound shark permit holders, their landings per trip are much lower (Figure 71). From 2016 through 2019, the mean landings per trip for state-water permit holders was the lowest in 2016 and 2018 (106 lb dw in both years) and peaked in 2019 (116 lb dw). For the smoothhound shark permit holders, the mean landings per trip increased from 2016 through 2018. In 2016, 400 lb dw were landed per trip and increased to 500 lb dw per trip in 2018. In addition, the maximum landings per trip increased during the time series for smoothhound shark permit holders (Figure 71).

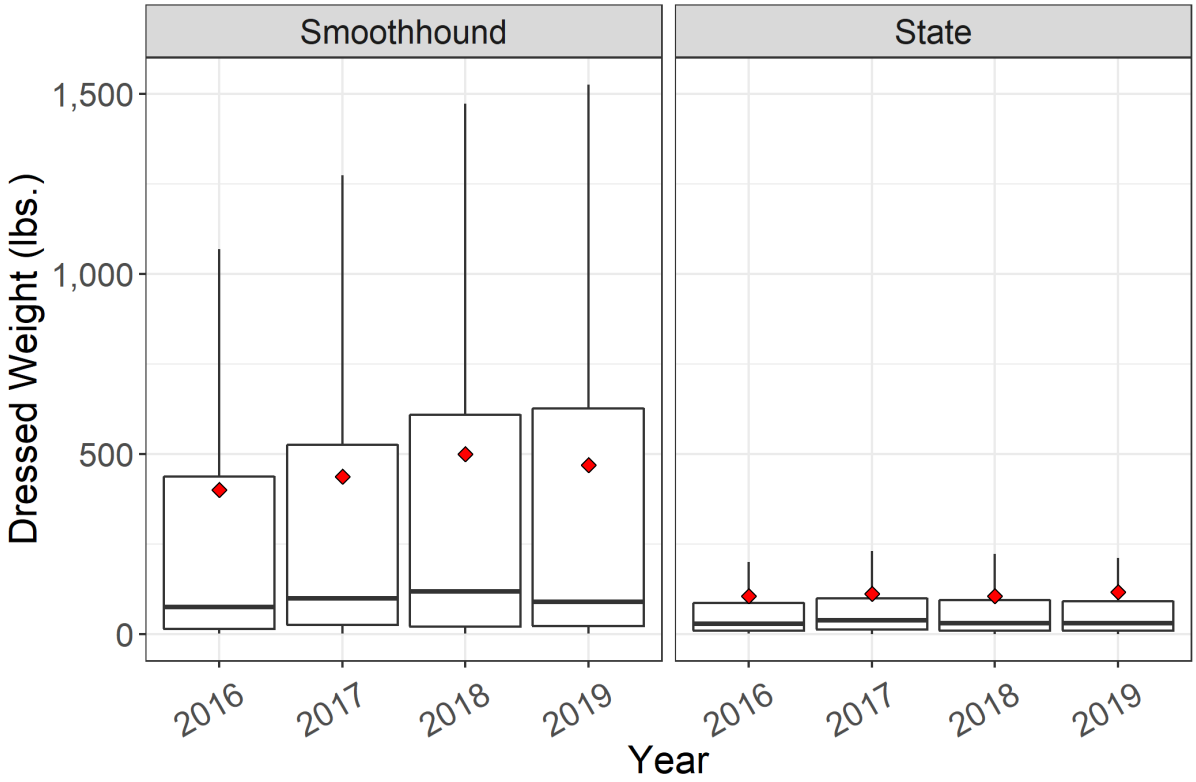

Figure 71. Landings in weight of smoothhound shark management group per trip by permit holder in the Atlantic region, 2016-2019.

Vertical line = the minimum and maximum landings reported per trip
Box = the middle 50 percent of the landings per trip
Red dot = the mean landings
Horizontal black line = the median landings per trip
Note: Outliers have been omitted. Sources: SERO; eDealer reporting system.

Landings percentage by permit type: Since smoothhound permit holders land more smoothhound complex sharks per trip than state-water permit holders, it is expected that they account for a higher percentage of the overall smoothhound shark landings. From 2016 through 2019, smoothhound permit holder landings accounted for more than 60 percent of the annual smoothhound shark landings (Figure 72). In 2017 and 2018, smoothhound shark permit holders accounted for 69 and 68 percent, respectively, of the overall smoothhound shark landings. In 2019, state-water permit holders landed 39 percent of the overall smoothhound shark landings.

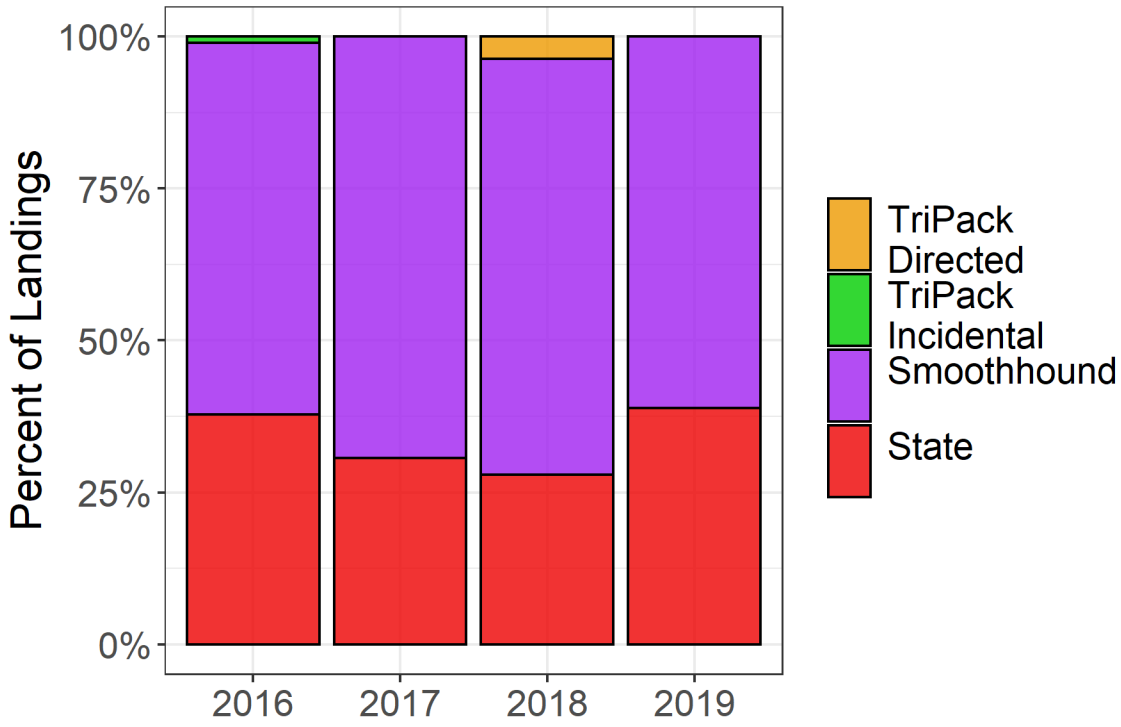

Figure 72. Percentage of smoothhound shark management group landed by permit holder in the Atlantic region, 2016-2019.
Sources: SERO; eDealer reporting system.

High-liner vessels: On March 15, 2016, the final rule for Amendment 9 to the 2006 Consolidated HMS FMP (80 FR 73128; November 24, 2015) brought smoothhound sharks under Federal management. However, at least some smoothhound shark landings in the Atlantic region were reported in 2014 and 2015, prior to federal management. NOAA Fisheries ranked the top ten vessels for those years to show that the same vessels landing smoothhound sharks before federal management measures were put in place are the same afterwards (Figure 73). The top vessels landing smoothhound sharks were consistently the same over time. During the management time series (2016 through 2019), the majority of the top vessels landing smoothhound sharks obtained the open access smoothhound shark permit. The overall top vessel landing the highest percentage of the landings exceeded six percent of the overall annual landings from 2016 through 2019. Overall, 52 percent of the smoothhound shark landings were landed by the top ten vessels (Table 11).

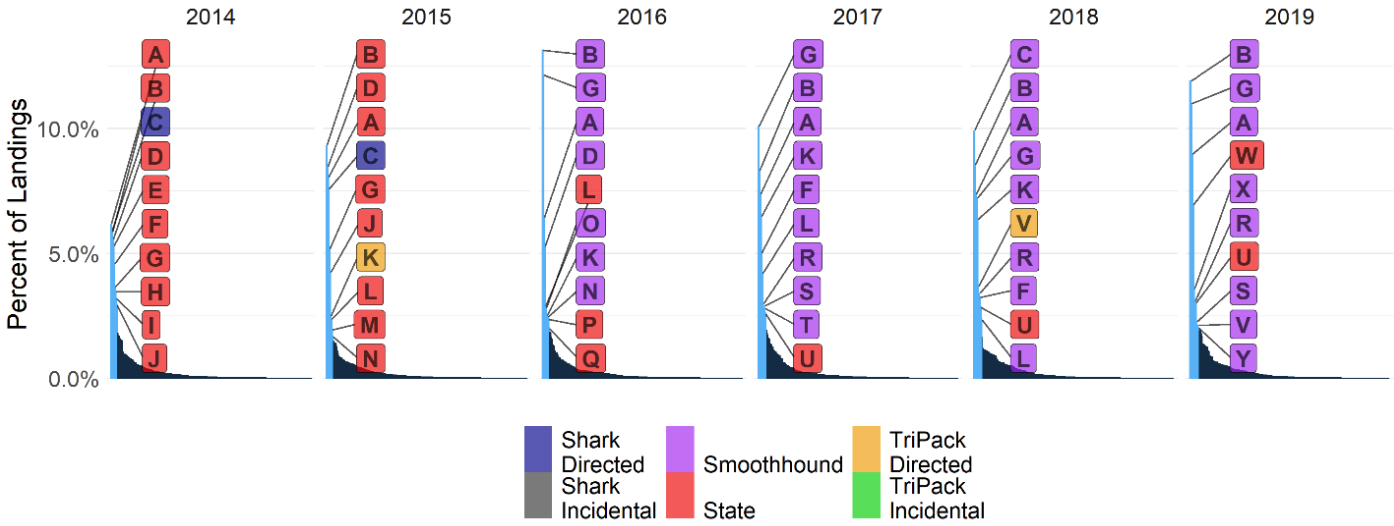

Figure 73. Top ten vessels that landed smoothhound sharks in the Atlantic region by year, 2014-2019. Note: The letters are assigned to an individual vessel and tracked through the years. The colors for each letter are designated based on the permit type of each vessel. NOAA Fisheries did not manage this species until 2016. Source: eDealer reporting system.

Table 11. Percentage of annual smoothhound shark landings in the Atlantic region the top three, five, or ten vessels account for by year.

Year	Top Three Vessels	Top Five Vessels	Top Ten Vessels
2014	18%	29%	46%
2015	26%	38%	51%
2016	32%	40%	52%
2017	26%	37%	53%
2018	26%	39%	55%
2019	32%	42%	55%
Overall	26%	37%	52%

Source: eDealer reporting system.

Summary of Smoothhound Shark Fishery in the Atlantic Region

NOAA Fisheries has been managing the smoothhound shark fishery since 2016. Since that time, active usage of the permit has declined, although landings have stayed consistent, and quotas have remained underharvested in the Atlantic and Gulf of Mexico regions. The majority of the landings of smoothhound sharks occur in the summer and fall, which overlaps with the peak-fishing season for spiny dogfish. The open access permit has allowed any fishermen interested in retaining smoothhound sharks to participate in the fishery. Even though the smoothhound shark fishery is underutilized, in terms of landings and available quota, this is the largest shark fishery in the Atlantic other than spiny dogfish. To improve the smoothhound shark fishery, NOAA Fisheries could consider ways to increase public awareness of this healthy and sustainable shark fishery.

Shark Dealer Permits

HMS dealer permits are open access federal dealer permits and required for the "first receiver" of sharks. A first receiver is any entity, person, or company that takes, for commercial purposes other than solely transport, immediate possession of the shark or any part of the shark as the sharks are offloaded from a fishing vessel. Federal shark permit holders are required to sell to a Federal shark dealer. State-water permits are allowed to sell to state shark dealers or Federal shark dealers that have the required state permits. Federal shark permit holders often state that dealers and markets are the drivers of the fishery. Specifically, dealers tell shark fishermen when to go fishing, what shark species to target, and the amount of shark products needed to support the markets. Each dealer can own only one shark permit.

The annual totals of Federal shark dealer permits issued in each state have fluctuated (Table 12). On average, 106 shark dealer permits were issued from 2014 through 2019, many from one of three states: Florida (31), North Carolina (19), and New York (11). Before 2014, the lowest number of issued shark dealer permits was in 2012, while the highest number was in 2007 (Table 13). There was a large decrease in the number of permits from 2007 (206 dealer permits) to 2008 (128 dealer permits). This was likely due to the implementation of Amendment 2 (73 FR 35778; corrected version published July 15, 2008; 73 FR 40658), which revamped the fishery with new commercial fishing season, quotas for regional LCS management groups, and new retention limits. NOAA Fisheries issued the lowest number of shark dealer permits in three consecutive years (2012 through 2014), which corresponded with more regulatory changes. Starting in 2013, all federal shark dealers were required to submit landings electronically. These changes may have resulted in some shark dealers not renewing their permits due to the extra reporting requirements.

Table 12. Number of Federal domestic sharks dealer permits by state, 2014-2019.

State/Territory	2014	2015	2016	2017	2018	2019	Average
AL	3	2	1	2	2	2	2
DE	-	-	-	-	2	-	2
FL	29	31	33	31	30	31	31
GA	1	1	1	1	1	1	1
LA	8	8	7	7	6	4	7
MA	7	7	6	6	6	6	6
MD	3	3	3	2	2	2	3
ME	1	1	1	1	1	1	1
NC	17	21	20	20	17	18	19
NJ	8	8	9	10	9	9	9
NY	5	4	9	13	15	17	11
RI	2	2	5	6	4	2	4
SC	9	10	10	9	9	8	9
TX	-	1	1	1	2	2	1
VA	3	3	5	4	2	1	3
Annual Totals	**96**	**102**	**111**	**113**	**108**	**104**	**106**

Note: The actual number of permits per state may change as permit holder's move or sell their businesses. Some states allow state-only dealer permit holders that are not represented in this table.

Table 13. Number of overall domestic shark dealer permits by year, 2007-2013.

Year	Total
2007	206
2008	128
2009	106
2010	108
2011	117
2012	92
2013	97

Similar to holders of vessel permits, not all dealers have historically actively used their permits. Figure 74 compares the number of active permits (that either accepted all sharks or smoothhound sharks only) to the number of issued permits. For purposes of this document, an active shark dealer permit is a dealer that accepted any shark product. The lowest number of dealer permits issued and active dealers were in 2014 and 2015, respectively. In 2016, there was an increase in the number of dealer permits issued and active permits. This corresponds to the federal management and establishment of commercial quotas for smoothhound sharks in Amendment 9 (80 FR 73128; November 24, 2015). From 2016 through 2019, the majority of the dealers that were issued permits were actively using them. In 2018, 100 percent of the dealers were active.

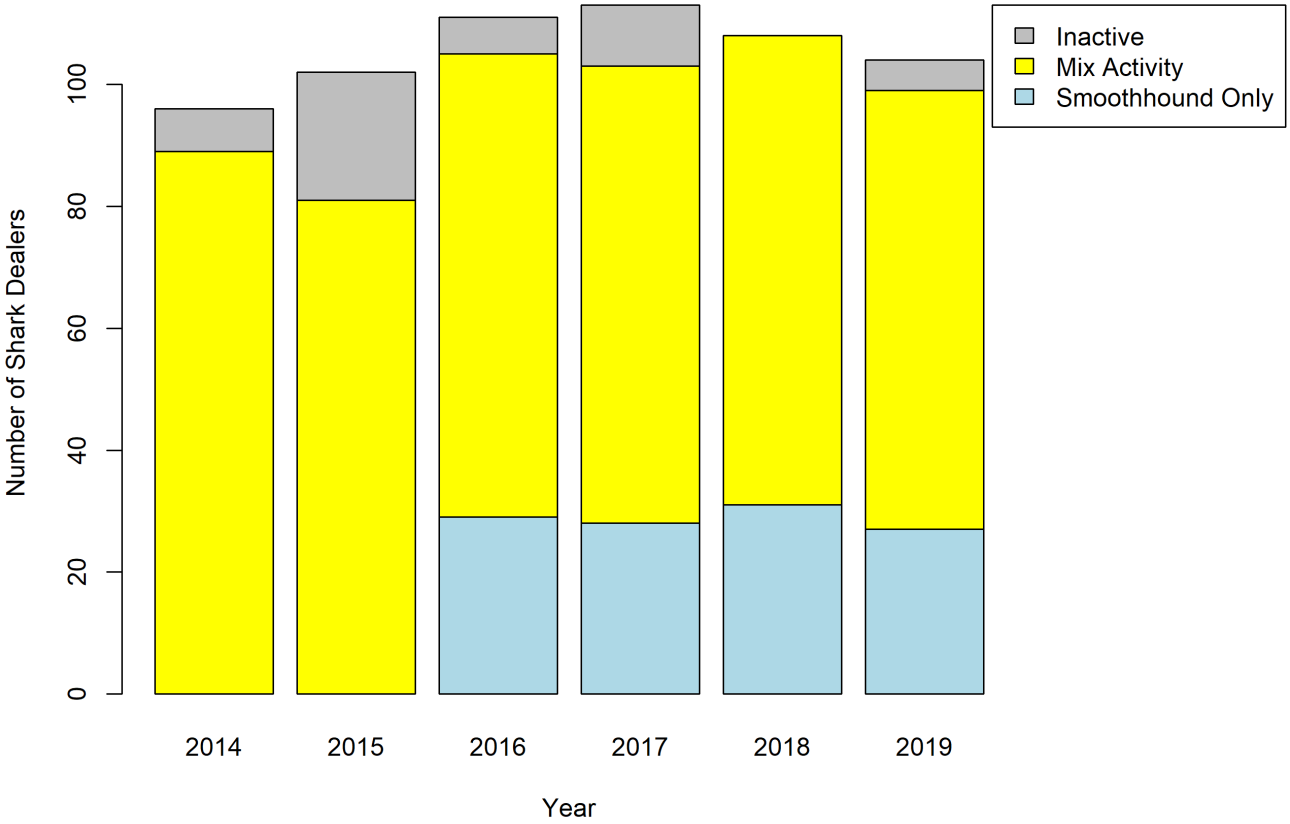

Figure 74. Annual number of shark dealer permits issued and active permits used by dealers accepting smoothhound only or any shark management group.

This includes all dealers that reported any shark species. The total height of all the three bars each year represents the total number of shark dealer permits issued. Mixed activity are dealers that accepted any shark species. Smoothhound sharks shark data was included in 2016 -2019.

The number of active dealers increased once smoothhound sharks became federally managed in 2016. When dealers buying only smoothhound sharks from fishermen are included in the number of active dealers, the number of dealers increases; however, this masks the decline in the number of active dealers who are reporting only LCS, SCS or pelagic sharks. The number of dealers purchasing LCS, SCS, or pelagic sharks declined from 89 to 72 (19 percent) from 2014-2019. Although the lowest number of shark dealer permits were issued in 2014 (96 permits), 89 dealers (93 percent) purchased sharks that year. Further, 2014 was the year with the most active dealers purchasing only LCS, SCS, or pelagic sharks. In 2017, of the 113 issued permits, only 75 (66 percent) used their permit to report LCS, SCS, or pelagic sharks were in 2017. This shows that the smoothhound shark fishery is likely an important part of the shark fishery. There were 29 (28 percent of active dealers), 28 (27 percent of active dealers), 31 (29 percent of active dealers), and 27 (27 percent of active dealers) smoothhound shark-only dealers in 2016, 2017, 2018, and 2019 respectively.

In the commercial shark fishery purchases are reported by dealers from Maine through Texas and the U.S. Caribbean through dealer reports. These dealer reports are used to determine commercial shark landings. In the following discussion, due to the confidentiality requirements of the MSA, NOAA Fisheries presents the information by combining some states together to

ensure sufficient data aggregation to maintain confidentiality; U.S. Caribbean shark data cannot be displayed due to confidentiality requirements of the MSA. The number of dealers that report shark purchases varied based on the season, year, and the opening date of each shark management group. From 2014 through 2015, more dealers from southern states (North Carolina through Alabama) reported sharks than from northern states (Virginia through Maine) (Figure 75). Once smoothhound sharks were added to federal management in 2016, dealers from New Jersey and north increased reporting of sharks.

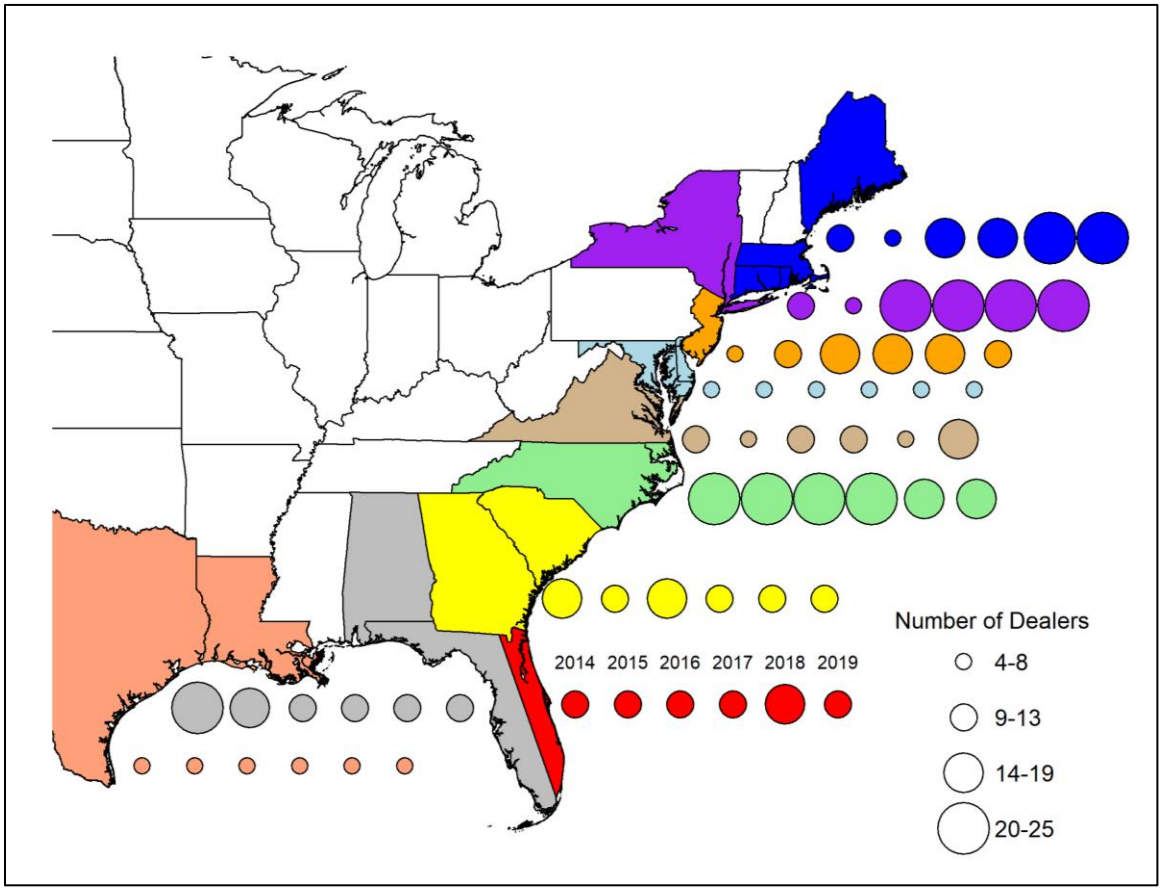

Figure 75. Number of dealers that reported shark landings by year.
Note: This includes all shark landings. The color of the bubbles corresponds to the color of the state or combined states. The bubbles from left to right for each state or combined states represent the years.

The amount of sharks reported by dealers among the states varied throughout the years. Shark landings from dealer reports from the Atlantic and Gulf of Mexico were compiled and used to determine the annual percentage of landings by state or combined states. Dealers from New York and other northeastern states had a large number of dealers report sharks in 2018 (24 dealers) and 2019 (25 dealers) (Figure 75). However, those dealers accounted for fewer than 10 percent of the annual landings for those years (Figure 76). In 2019, 13 dealers in New Jersey reported sharks that accounted for 23 percent of all the annual shark landings. In the Gulf of Mexico, the 4-8 dealers from Louisiana and Texas accounted for 32-41 percent of the annual shark landings in 2014, 2015, and 2018. In 2019, the annual landings reported by dealers from those states dropped one percent due to issues with shipping shark products. Based on discussions with

fishermen and dealers from those states, the issue resulted from the inability of dealers to ship sharks to Mexico through Texas due to Texas' shark fin ban. Dealers from Alabama and the west coast of Florida accounted for a higher percentage of shark landings in 2019 (28 percent) than in 2018 (15 percent).

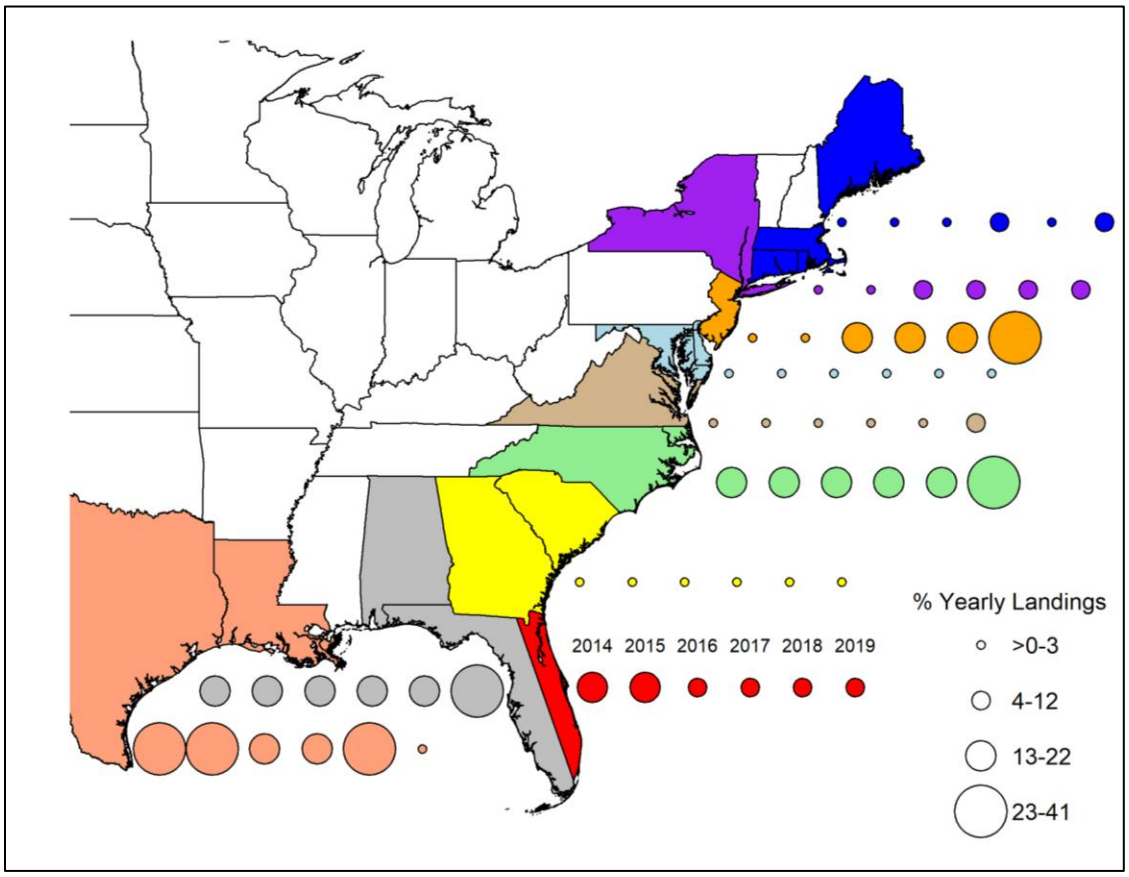

Figure 76. Percentage of annual shark landings reported by dealers for each state.
Note: This includes all shark landings. The color of the bubbles corresponds to the color of the state or combined states of which the percentage of annual landings occurred. The bubbles from left to right for each state or combined states represent the years.

As mentioned above, in analyzing the overall number of shark dealers, the number of smoothhound-only shark dealers masks the decline in the number of shark dealers purchasing only LCS, SCS, and pelagic sharks since 2016. Figures 77 and 78 are the same as Figures 75 and 76, respectively, but exclude smoothhound shark reports. From 2014-2019, a large number of dealers (16-23 dealers) reporting LCS, SCS, or pelagic shark landings were located in North Carolina (Figure 77). Fewer than 11 dealers located in New York and northeastern states reported shark landings by year, but when smoothhound shark data were included, 21-25 dealers from those states reported sharks in 2018 and 2019 (Figure 75). On the east coast of Florida, between 11 and 14 dealers reported only LCS, SCS, or pelagic shark landings from 2014 through 2018, but this number declined to 10 in 2019. In 2014 and 2015, a large number of dealers (18-20) in Alabama and the west coast of Florida reported only LCS, SCS, or pelagic shark landings, which then declined to 12-13 from 2016 thought 2019.

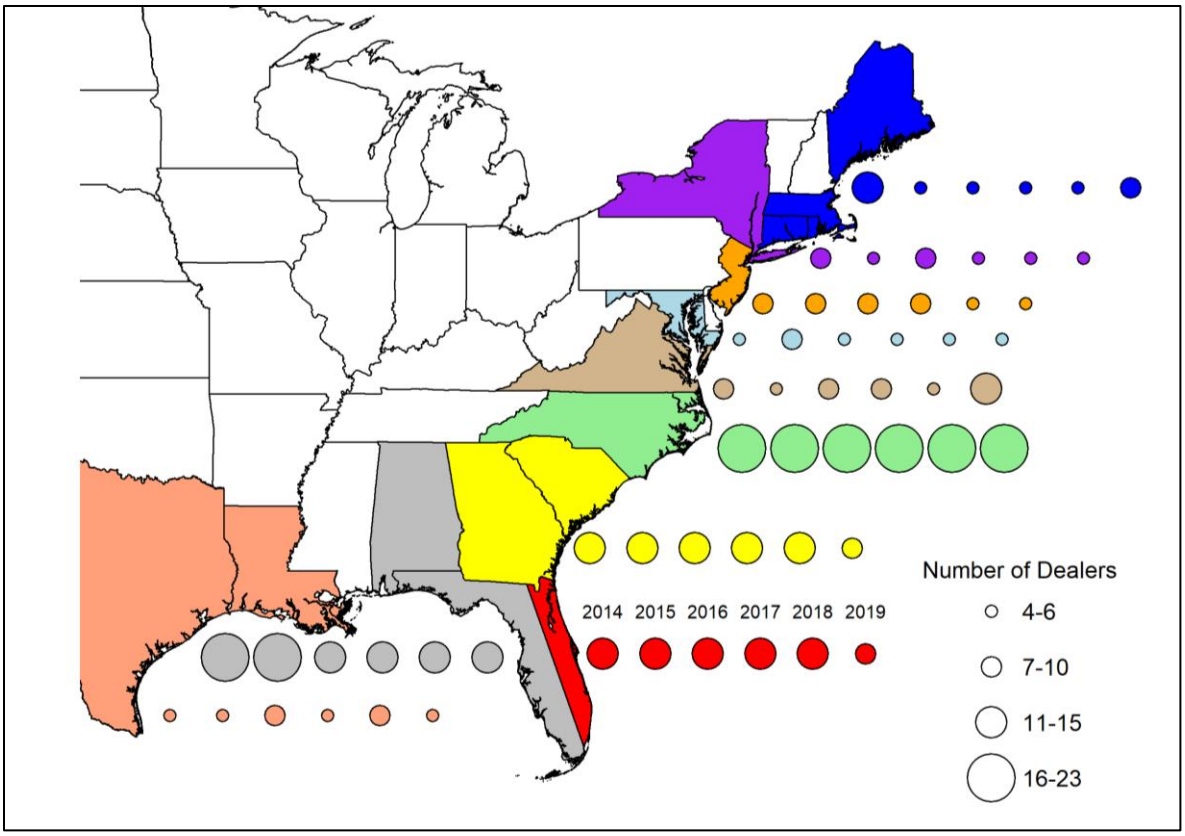

Figure 77. Number of dealers that reported shark landings by year excluding smoothhound shark only dealers.

Note: The color of the bubbles corresponds to the color of the state or combined states of which the number of dealers occurred in. The bubbles from left to right for each state or combined states represent the years.

Trends in the percentage of annual landings reported by dealers differed once smoothhound shark landings were removed. The largest change in percentage of annual landings reported by dealers were from Maine to Virginia. Dealers from those states account for 3-23 percent of the annual landings. When smoothhound sharks landings were removed, dealers from Maine through Virginia had the lowest annual landings (less than 3 percent) from 2014 through 2018 (Figure 78). Dealers located in North Carolina and the east coast of Florida did not see much change in the percentage of annual landings when compared to when smoothhound landings were included. When smoothhound sharks were included dealers from Louisiana and Texas reported the highest annual landings from 2014 through 2018 compared to all other states. In 2016 and 2017, the percent of reported annual landings increased when smoothhound sharks were removed. Dealers located in Alabama and the west coast of Florida consistently reported 21-23 percent of the annual landings reported from 2016 through 2018 when smoothhound shark landings were not included.

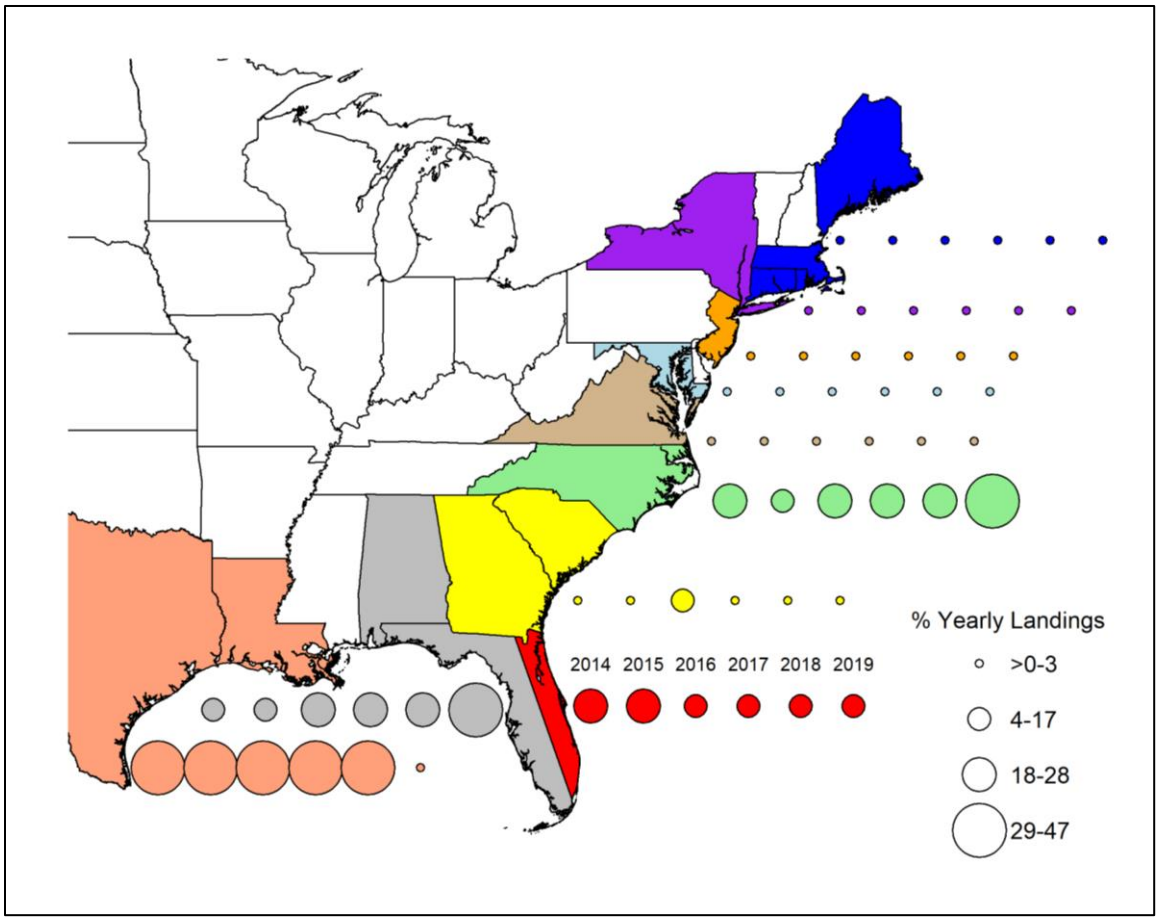

Figure 78. Percentage of annual shark landings reported by dealers for each state excluding smoothhound shark landings.

Note: The color of the bubbles corresponds to the color of the state or combined states of which the percentage of annual landings occurred. The bubbles from left to right for each state or combined states represent the years.

In the Atlantic and Gulf of Mexico LCS fisheries, the shark management groups were combined within a region since most of the shark dealers report all of the LCS species and fishermen commonly land these species together. For this data analysis, the aggregated LCS and hammerhead shark management group landings in the Atlantic region were combined, and the blacktip shark, aggregated LCS, and hammerhead shark management group landings in the Gulf of Mexico were combined. Overall, LCS landings were mostly reported in a few states or combined states. In the Atlantic region, LCS landings (aggregated LCS and hammerhead shark management groups) were primarily reported by dealers in Florida, and in Virginia and North Carolina (Figure 79). From 2014-2015 and 2018-2019, most of the dealers (16-19 per year) that reported LCS landings were located in Virginia and North Carolina (Figure 79). The number of dealers that reported LCS dropped slightly to 15 and 14 in 2016 and 2017, respectively, which could have been due to changes to the Atlantic LCS fishery opening date. This corresponded to a slight increase in the number of dealers (eight) that reported LCS on the east coast of Florida in 2016. Before and after 2016, there were fewer than eight dealers each year. In Maryland and north, LCS are not primarily targeted so the number of dealers that reported landings for these shark species in those states was lower.

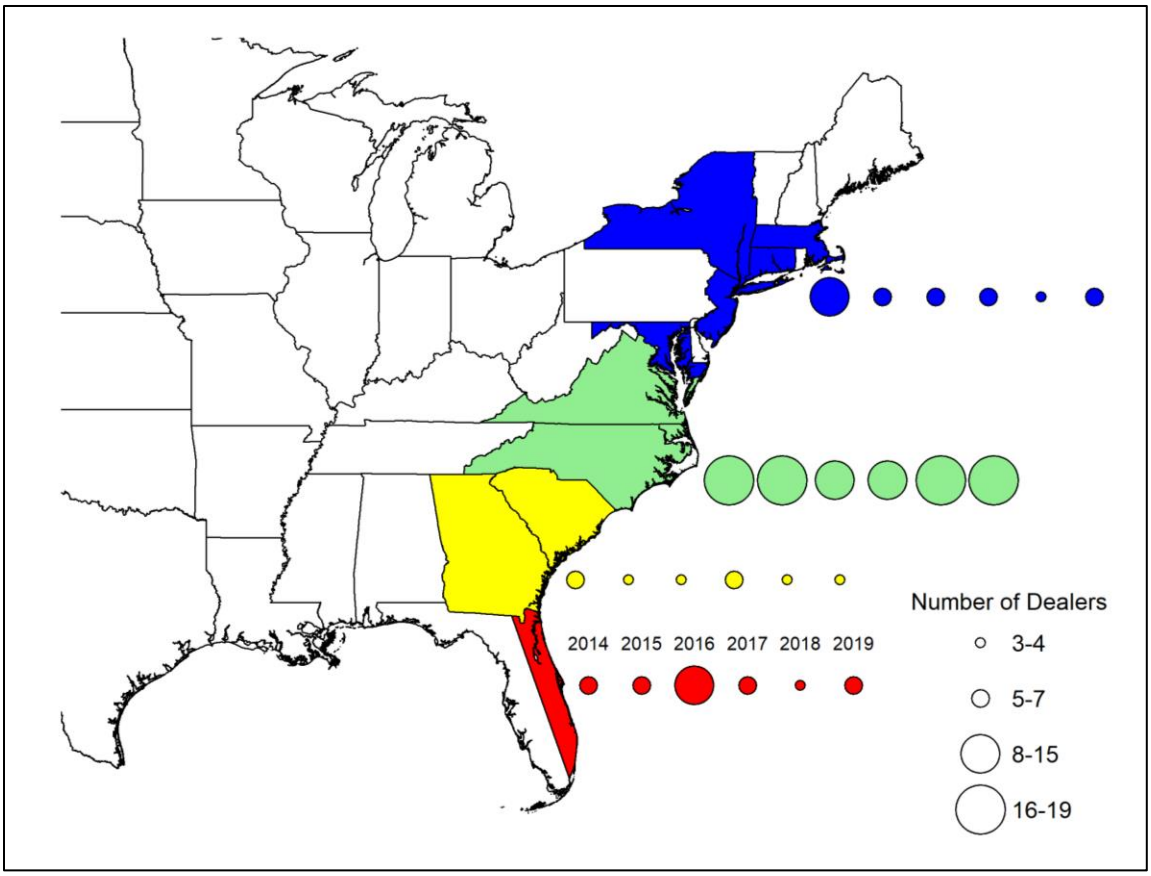

Figure 79. Number of dealers that reported any shark species from large coastal shark and hammerhead shark management groups in the Atlantic region by year.

Note: The color of the bubbles corresponds to the color of the state or combined states of which the number of dealers occurred in. The bubbles from left to right for each state or combined states represent the years.

Dealers located on the east coast of Florida account for the highest annual LCS landings reported in the Atlantic region (Figure 80), and they reported the most LCS per year (45-60 percent) in all years except in 2019. In that year, there was an increase in the percent of landings located in Virginia and North Carolina from previous years. This could be the result of several fishery management changes. In 2019, NOAA Fisheries increased the commercial retention limit to 45 LCS other than sandbar sharks per vessel per trip earlier in the fishing season (August vs. November) when compared to previous years. Since not many dealers in Maryland and north report LCS landings, these dealers consistently accounted for less than five percent of the annual LCS landings in the Atlantic region.

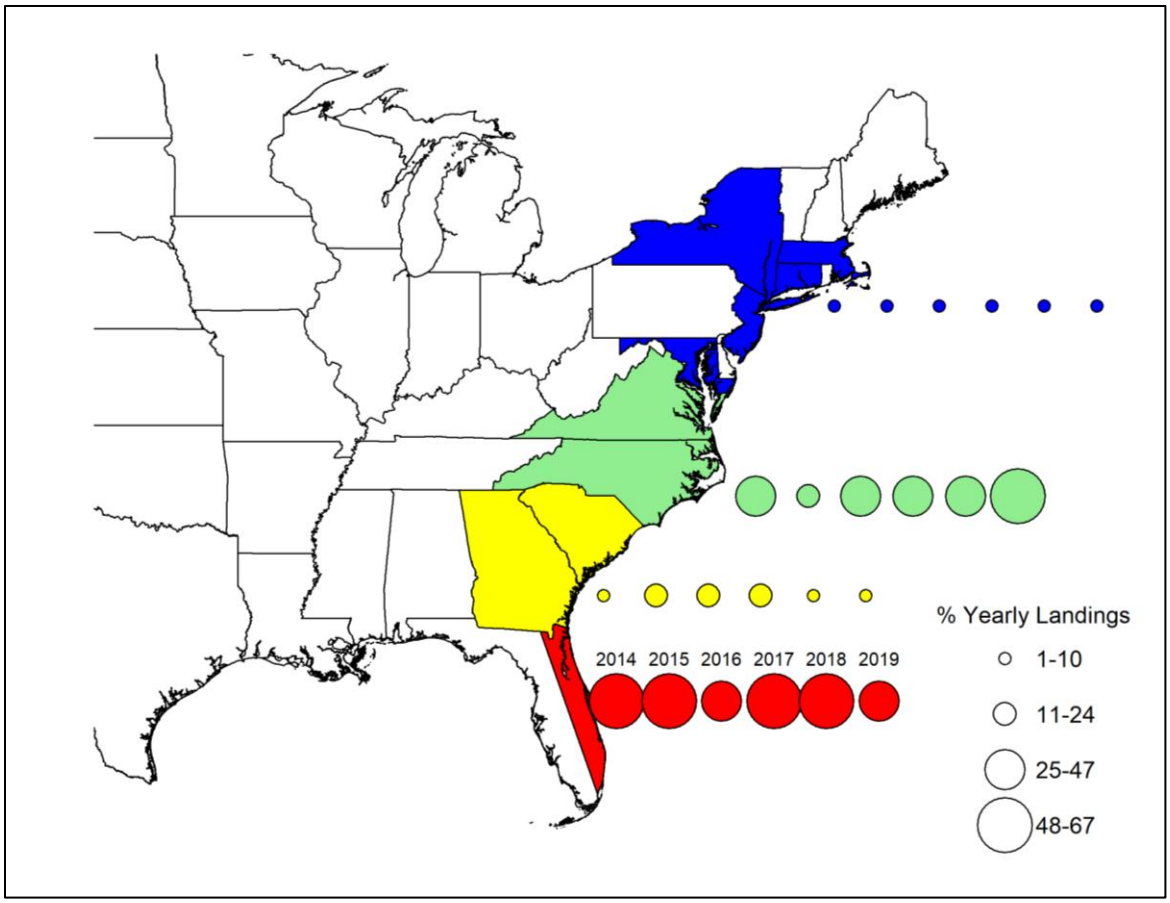

Figure 80. Percentage of annual Atlantic region's large coastal shark and hammerhead shark management groups landings reported by dealers for each state.

Note: The color of the bubbles corresponds to the color of the state or combined states of which the percentage of annual landings occurred. The bubbles from left to right for each state or combined states represent the years.

Some combined data in the Gulf of Mexico region is presented due to the confidentiality requirements of the MSA and the need to aggregate data at a level sufficient to maintain confidentiality. With the low number of dealers reporting LCS and the number of fishermen selling their landings to those dealers, some years were combined. The majority of dealers that reported LCS (blacktip shark, aggregated LCS, and hammerhead shark management groups) were located on the west coast of Florida (Figure 81), where across all the years, between 10 and 15 dealers reported LCS landings. Fewer dealers were located in Louisiana and Texas in 2014-2015 (five dealers) and 2016-2017 (six dealers), but increased slightly to seven dealers in 2018-2019. There were no reports from dealers in Mississippi.

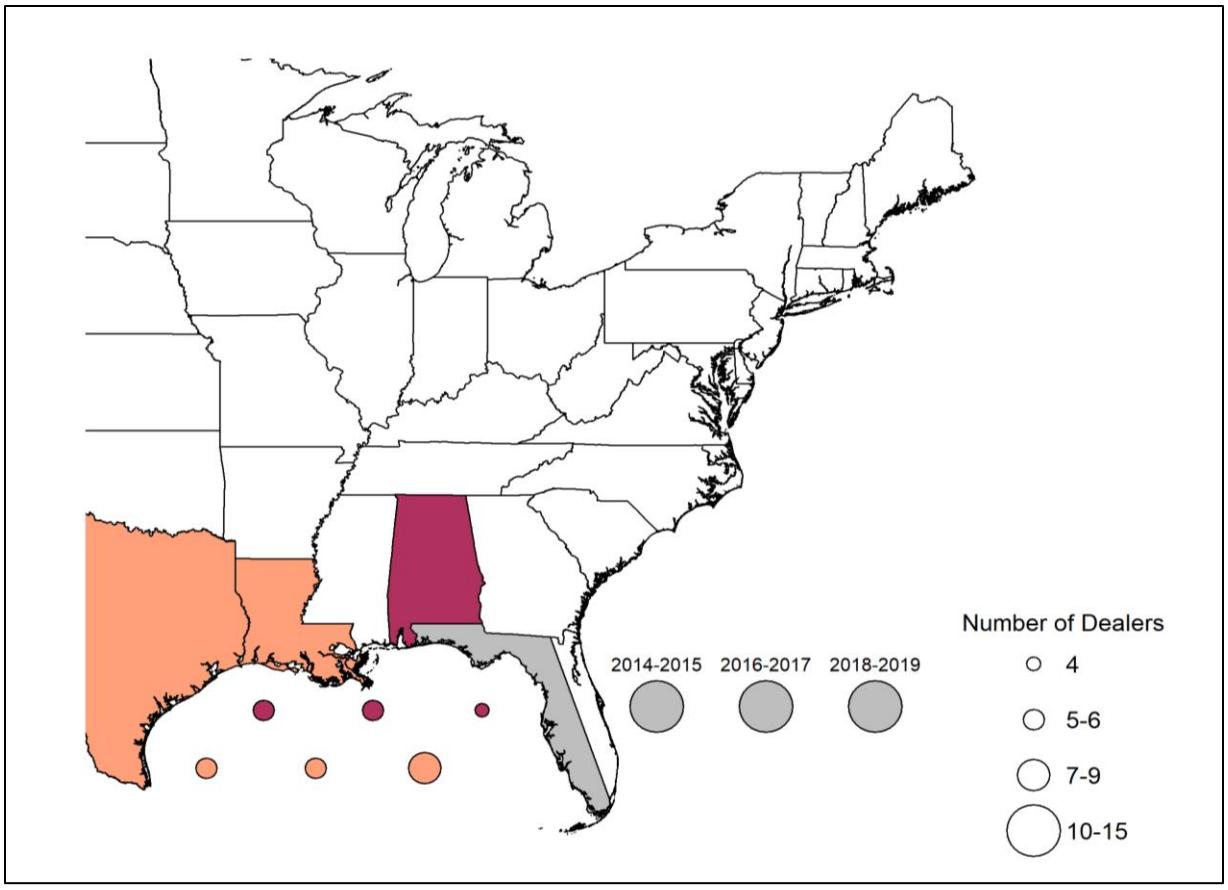

Figure 81. Number of dealers that reported blacktip shark, large coastal shark, and hammerhead shark management groups in the Gulf of Mexico region by combined years.

Note: The color of the bubbles corresponds to the color of the state or combined states of which the number of dealers occurred in. The bubbles from left to right for each state or combined states represent the years, with some years combined to maintain confidentiality as required under the MSA.

A small number of dealers in Louisiana and Texas reported the majority of annual LCS landings as reflected in dealer reports. For example, 5 to 6 dealers accounted for 88 percent of LCS landings in 2014-2015 and 69 percent in 2016-2017, while seven dealers reported 58 percent of the LCS landings in 2018-2019 (Figure 82). With a decline in the percent of LCS landings in Louisiana and Texas in 2018-2019, an increase occurred along the west coast of Florida. This decrease in the LCS landings from dealers located in Louisiana and Texas could be due the timing of transport and distribution issues some shark dealers had in Texas.

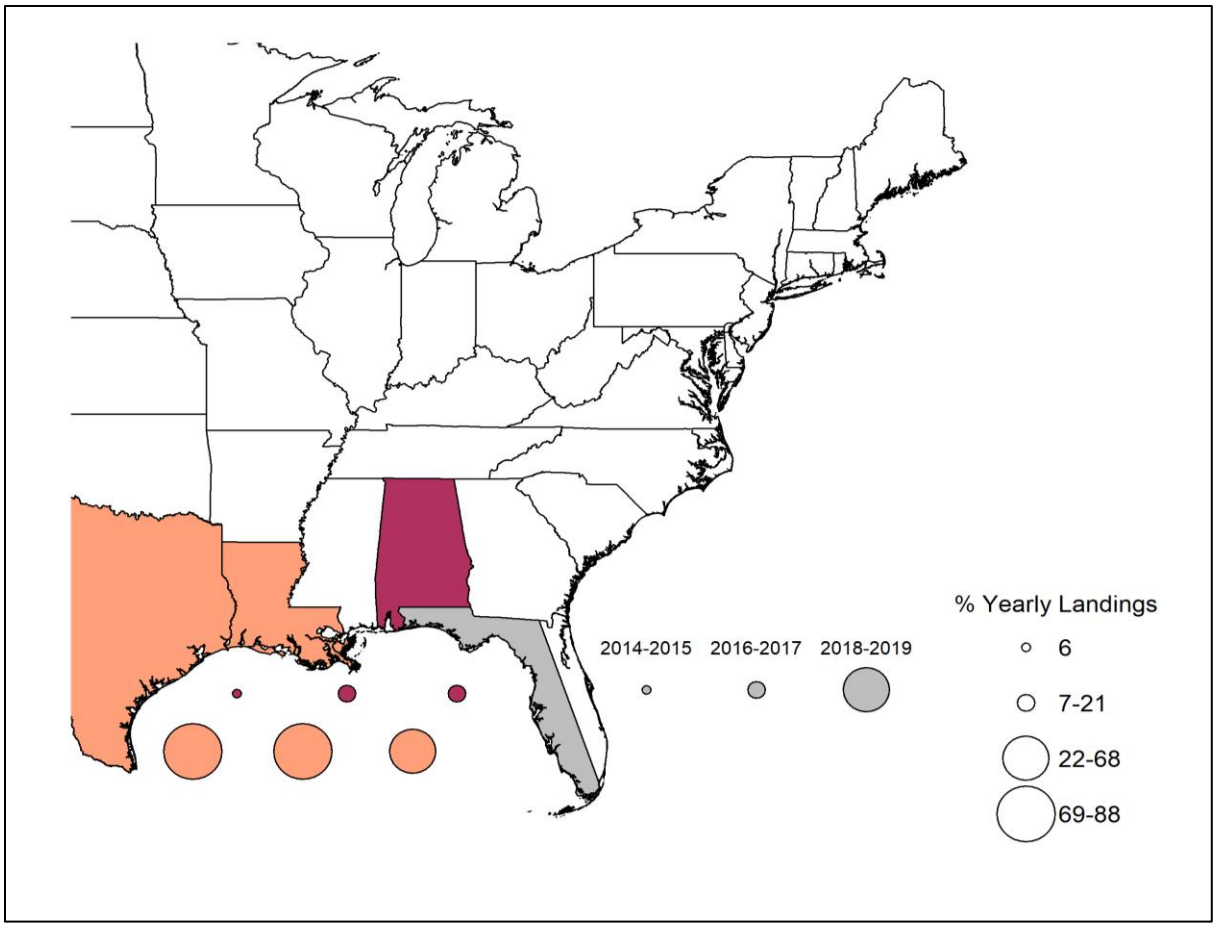

Figure 82. Percentage of annual Gulf of Mexico's region blacktip shark, large coastal sharks, and hammerhead shark management groups landings reported by dealers for each state.

Note: The color of the bubbles corresponds to the color of the state or combined states of which the percentage of annual landings occurred. The bubbles from left to right for each state or combined states represent, with some years combined to maintain confidentiality as required under the MSA.

As with the LCS fisheries, the regional SCS management groups were combined since most of the shark dealers report all of these shark species, and fishermen commonly land these species together. In the Atlantic region, the largest number of dealers (10-14 per year) reporting non-blacknose SCS and blacknose shark management groups were located in Virginia and North Carolina (Figure 83). A similar number of dealers reported Atlantic SCS in the northeast and South Carolina and Georgia from 2014 through 2019. The increasing number of dealers reporting Atlantic SCS on the east coast of Florida from 2016 through 2018 could be due to changes in SCS fishery regulations. In 2016, it was the first full shark season after NOAA Fisheries implemented Amendment 6, which among other things, revised non-blacknose SCS and blacknose shark quotas. In 2017, NOAA Fisheries published a rule that established a new retention limit of eight blacknose sharks per trip. This allowed the SCS fishery to remain open all year without concerns that the blacknose shark landings would trigger the closure of the non-blacknose SCS fishery.

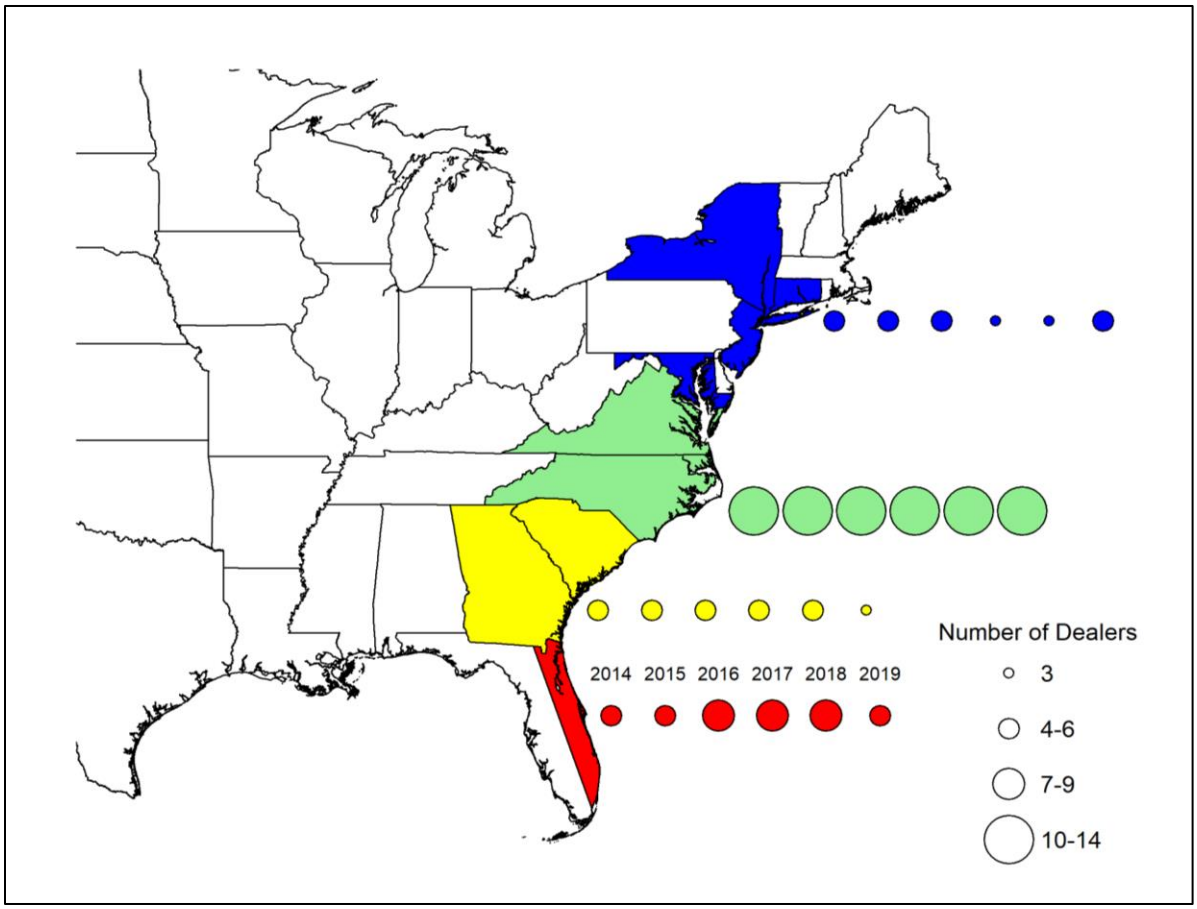

Figure 83. Number of dealers that reported blacknose shark and non-blacknose small coastal shark management groups in the Atlantic region by year.

Note: The color of the bubbles corresponds to the color of the state or combined states of which the number of dealers occurred in. The bubbles from left to right for each state or combined states represent the years.

In the Atlantic SCS fishery, dealers located in Virginia and North Carolina reported majority of the annual landings from 2016 through 2019 (61-82 percent) (Figure 84). Dealers from the northeast and South Carolina and Georgia reported fewer than 6 percent of the annual Atlantic SCS landings from 2014 through 2019. Even though there were more dealers from the east coast of Florida that reported Atlantic SCS in 2016 through 2018 compared to other years, those landings accounted for 16-34 percent of the annual landings, a decrease from 41-57 percent in 2014 and 2015.

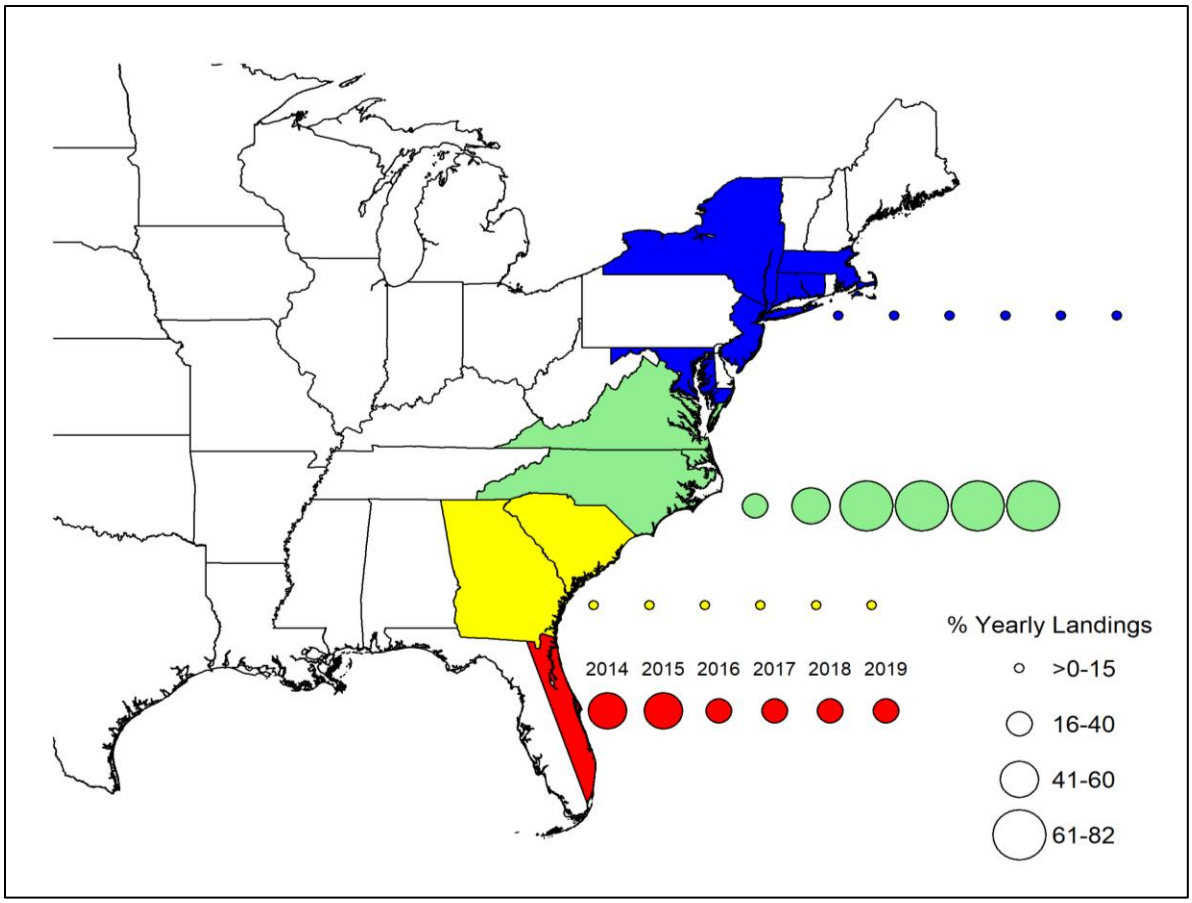

Figure 84. Percentage of annual Atlantic region's blacknose shark and non-blacknose small coastal shark management groups landings reported by dealers for each state.

Note: The color of the bubbles corresponds to the color of the state or combined states of which the percentage of annual landings occurred. The bubbles from left to right for each state or combined states represent the years.

Similar to the LCS fishery in the Gulf of Mexico region, years were combined due to the confidentiality requirements of the MSA and the need to aggregate data to maintain confidentiality. Similarly, for the SCS fishery, the non-blacknose SCS and blacknose shark management group landings for 2014 through 2015 were combined. Since 2016, blacknose sharks landings have been prohibited in the Gulf of Mexico, so only non-blacknose SCS landings are discussed. In Alabama, Louisiana, and Texas, the same number of dealers reported non-blacknose SCS in 2016-2017 as in 2018-2019 (Figure 85). The number of dealers reporting non-blacknose SCS on the west coast of Florida fluctuated during that time period with a decrease in 2016-2017 and an increase afterwards. Even though more dealers reported non-blacknose SCS from the west coast of Florida than from the other states, the total amount of reported weight was less than one percent of the overall annual landings during those time periods (Figure 86). In other words, the majority (99 percent) of the Gulf of Mexico non-blacknose SCS annual landings were reported by dealers in Alabama, Louisiana, and Texas.

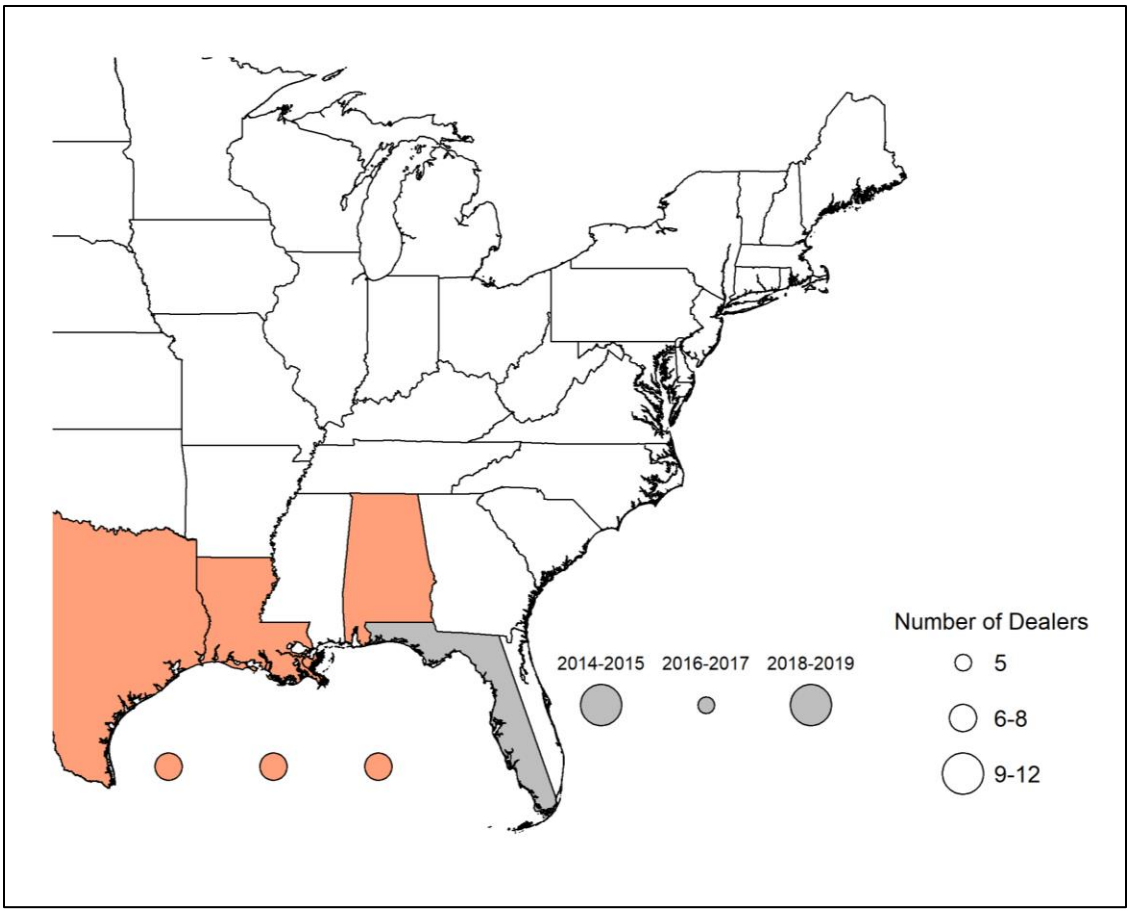

Figure 85. Number of dealers that reported blacknose shark and non-blacknose small coastal shark management groups in the Gulf of Mexico region by year.

Note: Blacknose shark landings were only included in 2014 and 2015. The color of the bubbles corresponds to the color of the state or combined of which the number of dealers occurred in. The bubbles from left to right for each state or combined states represent the years, with some years combined to maintain confidentiality as required under the MSA.

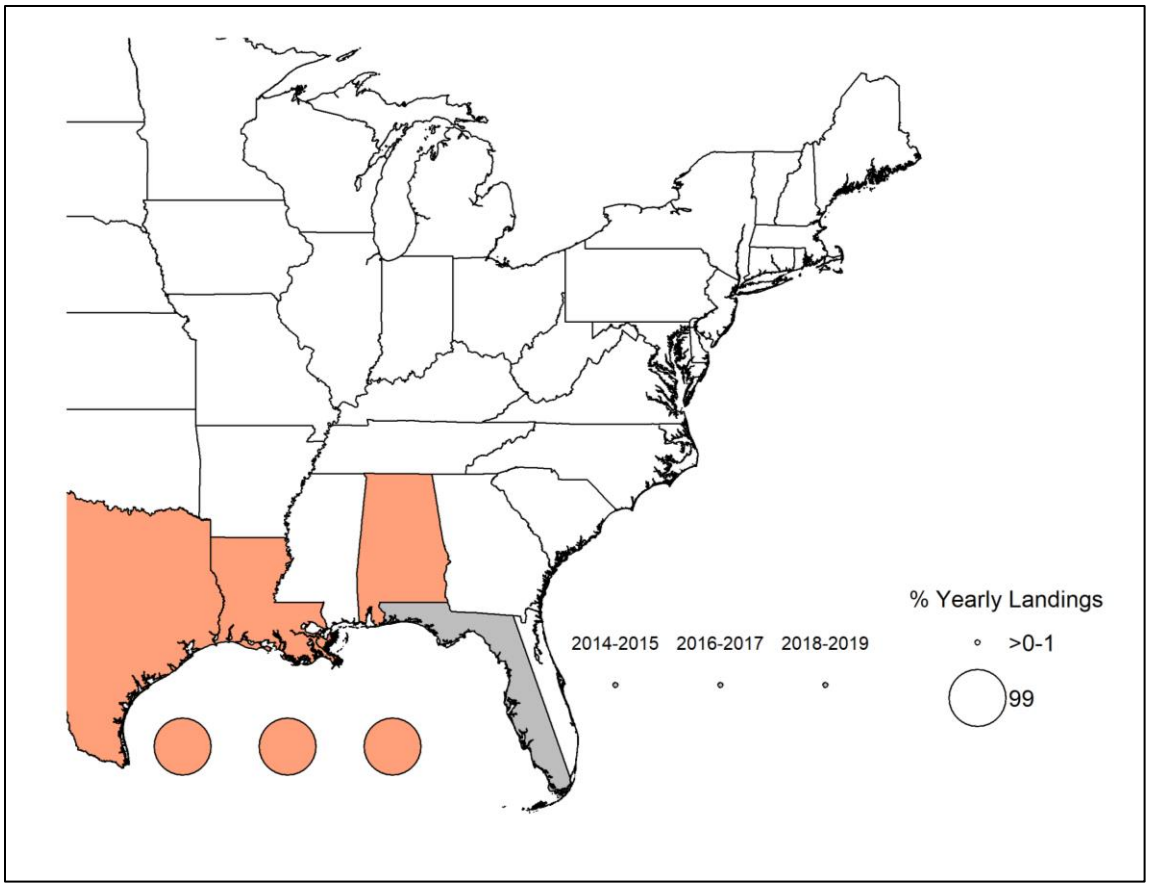

Figure 86. Percentage of annual Gulf of Mexico region's blacknose shark and non-blacknose small coastal shark management groups landings reported by dealers for each state.

Note: Blacknose shark landings were only included in 2014 and 2015. The color of the bubbles corresponds to the color of the state or combined states of which the percentage of annual landings occurred. The bubbles from left to right for each state or combined states represent the years, with some years combined to maintain confidentiality as required under the MSA.

For the pelagic sharks, the blue shark, porbeagle shark, and other pelagic shark management groups, landings and some state landings were combined. Landings for some of these shark management groups have been very low from 2014 through 2019. A consistent number of dealers (fewer than 11) reported pelagic shark species from Virginia to Maine through the years (Figure 87). North Carolina had the largest number of dealers reporting pelagic shark species when compared to other states or combined states. These dealers accounted for 33-61 percent of annual pelagic shark landings, which was the most by any state across years (Figure 88). From 2015-2019, fewer than 17 dealers annually reported pelagic sharks from southern combined states from South Carolina through Texas. The annual landings reported for either of the two groups of combined states never accounted for more than 10 percent of overall landings. Since Amendment 11 regulations were implemented in 2018, there was a decline in the number of dealers reporting pelagic shark species in 2019. This decline in reported pelagic sharks indicates that shortfin mako sharks accounted for majority of the pelagic shark landings and were important to some pelagic longline shark fishermen.

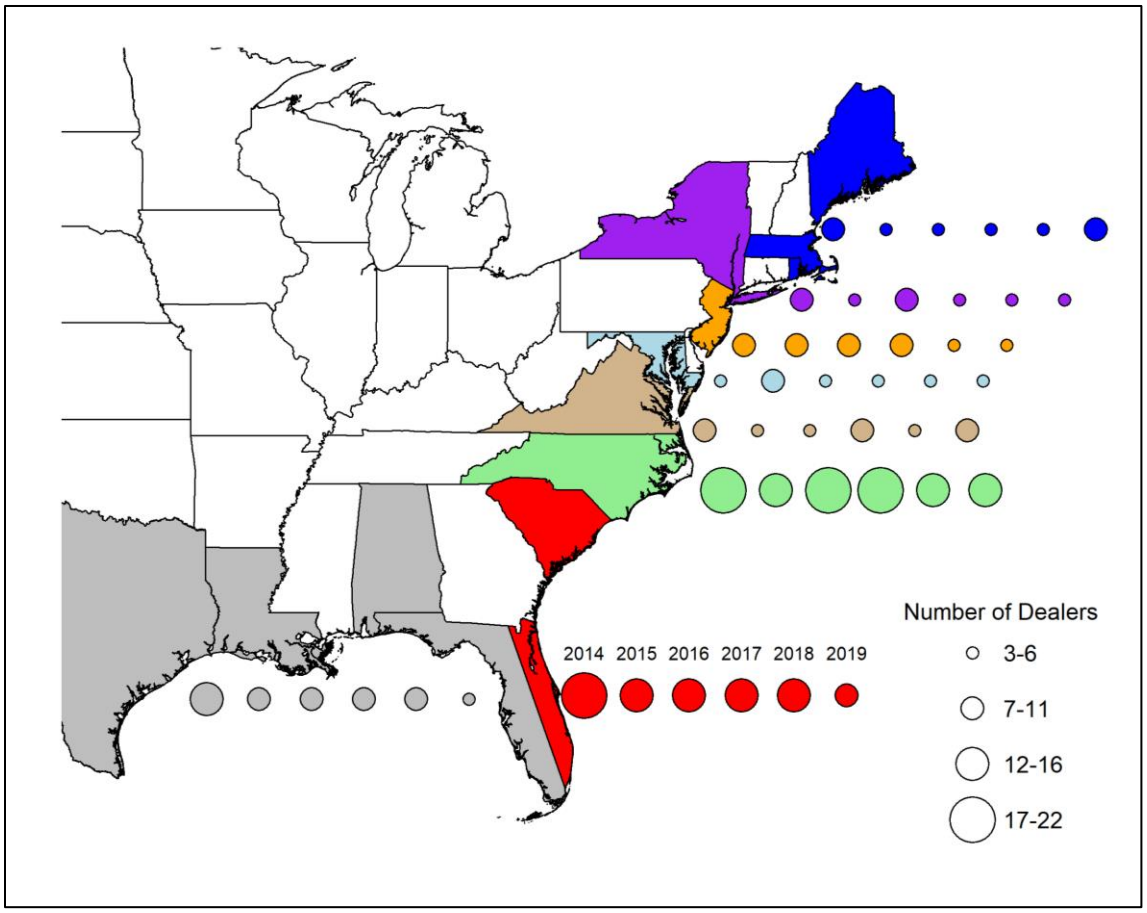

Figure 87. Number of dealers that reported blue shark, porbeagle shark, and other pelagic shark management groups by year.

Note: The color of the bubbles corresponds to the color of the state or combined states of which the number of dealers occurred in. The bubbles from left to right for each state or combined states represent the years.

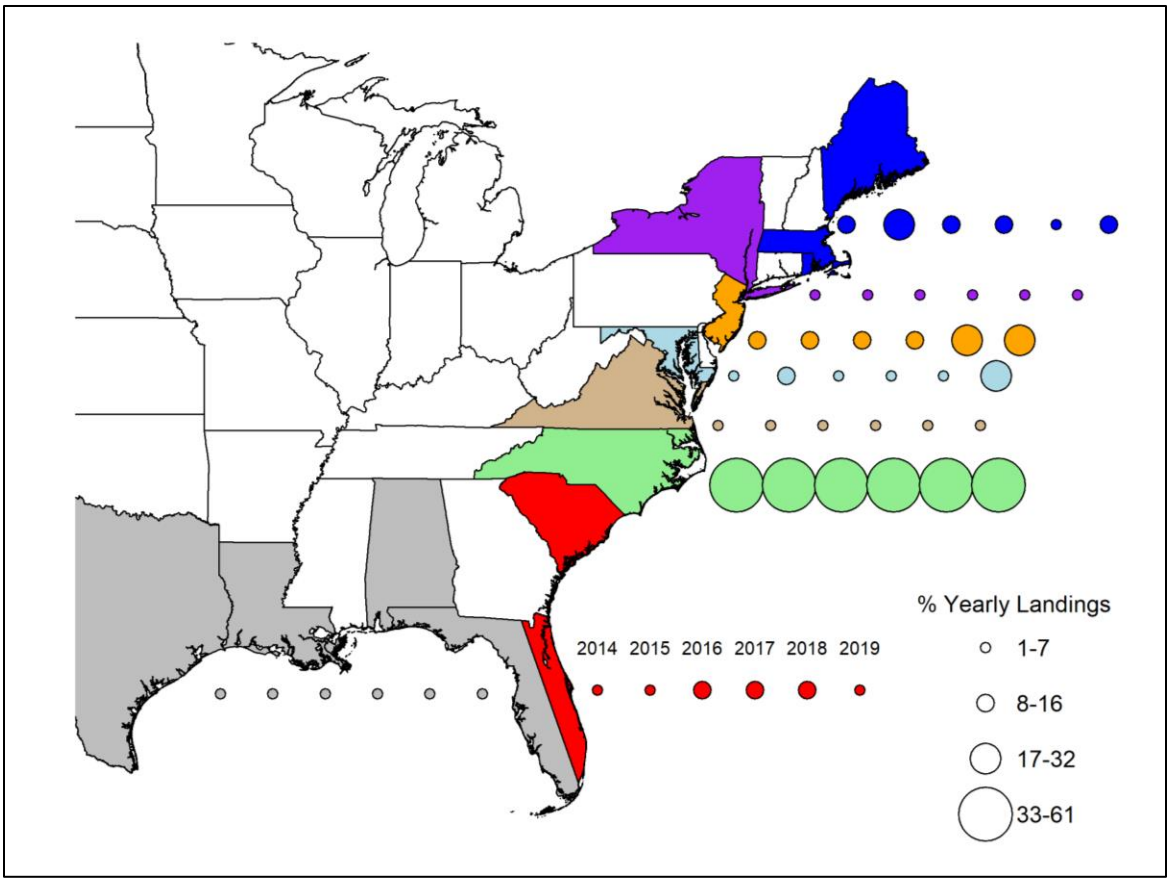

Figure 88. Percentage of annual blue shark, porbeagle shark and other pelagic shark management groups landings reported by dealers for each state.

Note: The color of the bubbles corresponds to the color of the state or combined states of which the percentage of annual landings occurred. The bubbles from left to right for each state or combined states represent the years.

Because federal smoothhound shark fishery management began in 2016, only data from 2016 through 2019 were considered. Due to confidentiality requirements of the MSA, dealer reports from the Gulf of Mexico have been excluded given insufficient data for aggregation to maintain confidentiality. Dealers from New York account for a large number of dealers (21-23) reporting smoothhound sharks during the time series (Figure 89). There was an increase in reports from dealers from North Carolina, South Carolina, and Georgia in 2016 and 2018. Even though fewer than 14 dealers reported smoothhound landings in New Jersey, those dealers accounted for 53-59 percent of annual landings (Figure 90). The larger number of dealers (21-23 dealers) from New York accounted for fewer than 25 percent of annual landings. Most of the other state or combined states accounted for fewer than 13 percent of annual smoothhound shark landings.

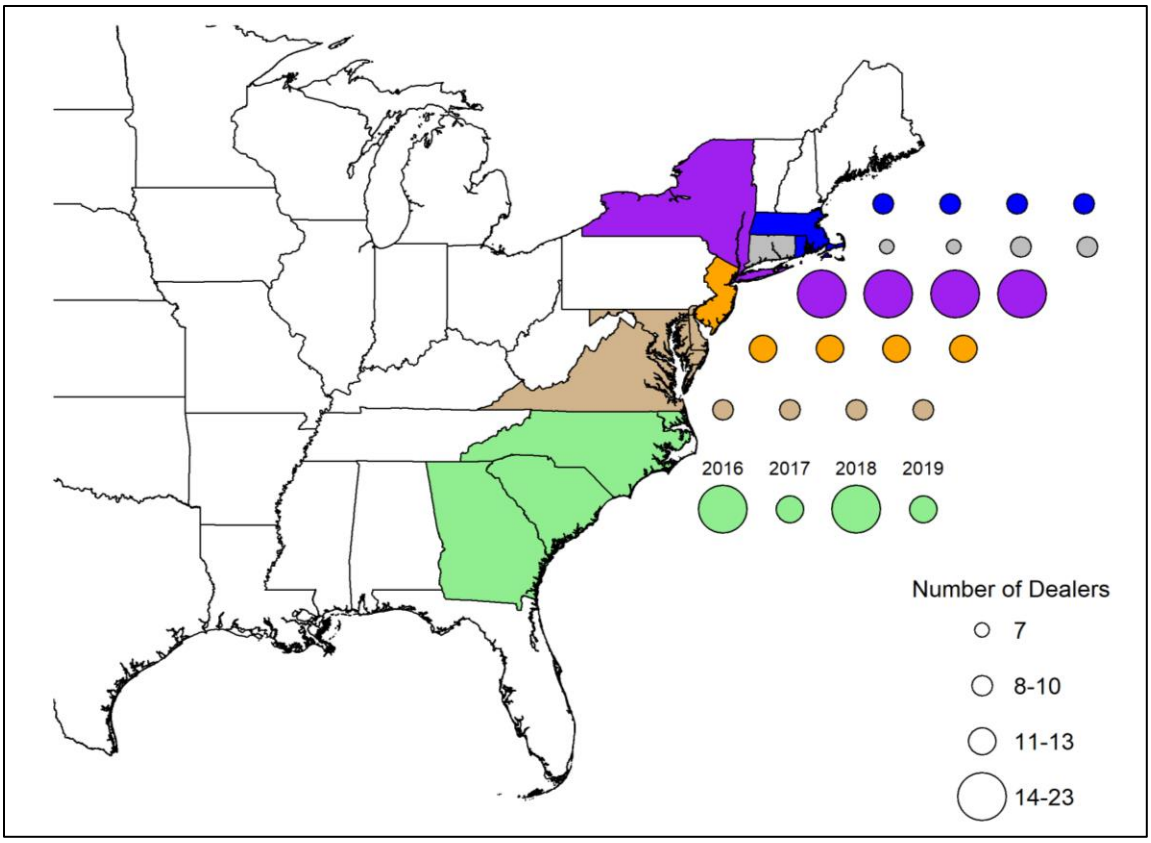

Figure 89. Number of dealers that reported smoothhound shark landings in the Atlantic region by year.
Note: The color of the bubbles corresponds to the color of the state or combined states of which the number of dealers occurred in. The bubbles from left to right for each state or combined states represent the years.

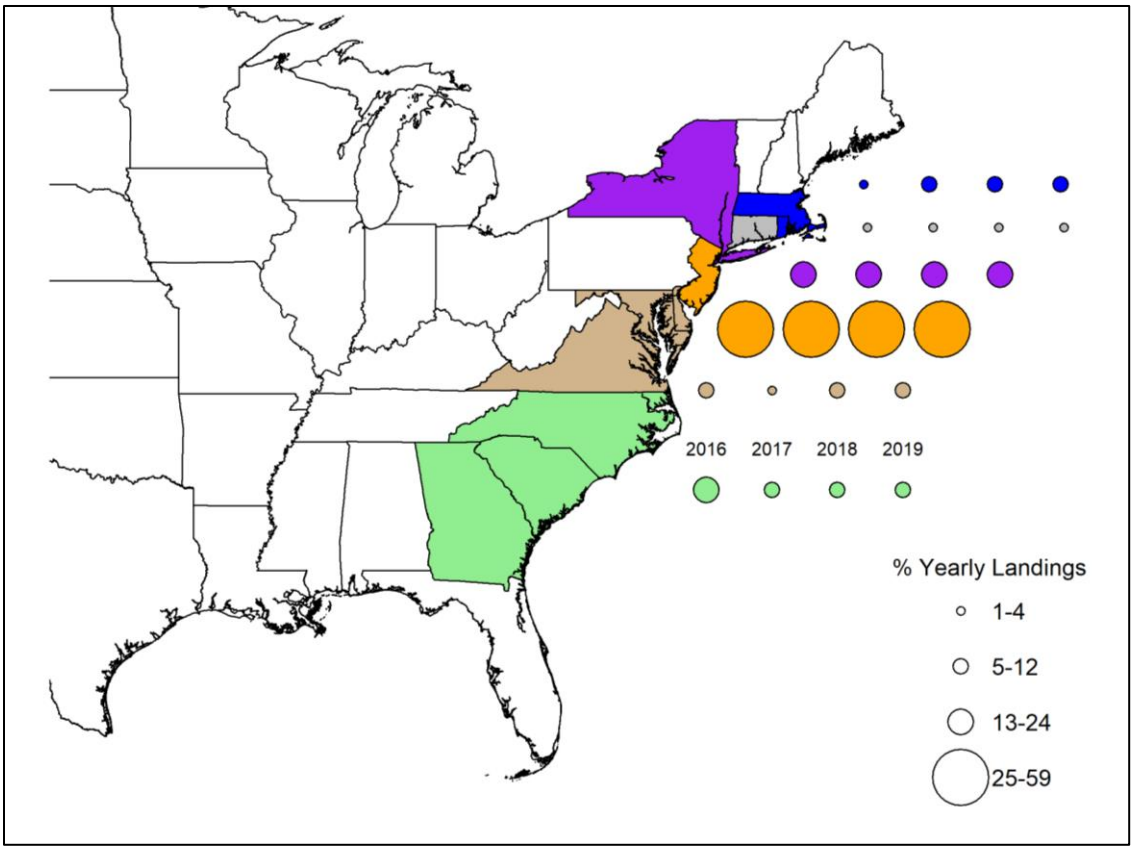

Figure 90. Percentage of annual smoothhound shark landings reported by dealers for each state.
Note: The color of the bubbles corresponds to the color of the state or combined states of which the percentage of annual landings occurred. The bubbles from left to right for each state or combined states represent the years.

Summary of Shark Dealers

Overall, most shark dealers are actively buying sharks. Additionally, while the total number of active shark dealer permits fluctuated slightly from 2014 through 2019, there has been a decline in the number of dealers that purchase LCS, SCS, and pelagic sharks. As mentioned in other sections of this document, the decline in number of permits could be due to a variety of factors (e.g., instability in the shark fishery, decreased value of shark products, state shark fin bans). Since 2016, which is when NOAA Fisheries first began managing the smoothhound shark fishery, dealers purchasing only smoothhound sharks have represented almost a third of active dealers each year. Therefore, it appears that the smoothhound shark fishery is an important part of the commercial shark fishery. The vast majority of LCS, SCS, and pelagic shark dealer reports occurred in states south of Virginia. In the Atlantic region, aggregated LCS and hammerhead sharks are primarily reported by dealers in Virginia/North Carolina and the east coast of Florida. In the Gulf of Mexico region, aggregated LCS, blacktip sharks, and hammerhead sharks are primarily reported by dealers in Louisiana/Texas. In 2019, the Texas shark fin ban likely impacted the regional annual landings. In the SCS fishery, dealers reporting non-blacknose SCS and blacknose landings occurred primarily in Virginia/North Carolina for the Atlantic region, while those in the Gulf of Mexico region reported the majority of landings from Texas/Louisiana/Alabama (>99%). The number of dealers reporting pelagic sharks has declined

in recent years and the largest portion of landings is coming from North Carolina regardless of the year.

Market and Trade

All dollar figures in this chapter are reported in current dollars. If analysis of real dollar trends controlled for inflation is desired, price indexes for 2014 through 2019 are provided in Table 14. To determine the real price in base year dollars, divide the base year price index by the current year price index and then multiply the result by the price that is being adjusted for inflation. As mentioned in the beginning of the Commercial Fishery section, NOAA Fisheries did not include the shark research fishery data in the analyses of this document. However, as noted below, some tables presented in this section are from the 2020 SAFE Report, and include shark research fishery data.

Table 14. Inflation Price Indexes, 2014–2019.

Year	CPI-U	GDP Deflator	PPI Unprocessed Finfish
2014	236.7	103.6	525.6
2015	237.0	104.6	610.2
2016	240.0	105.7	690.4
2017	245.1	107.7	674.9
2018	251.1	110.3	653.9
2019	255.7	112.3	673.4

Notes: CPI-U is the standard Consumer Price Index for All Urban Consumers (1982–1984=100) and the Producer Price Index (PPI) for unprocessed finfish (1982=100). The Gross Domestic Product (GDP) Implicit Price Deflator index is 2012=100. Source: U.S. Department of Labor Bureau of Labor Statistics (CPI-U and PPI); U.S. Department of Commerce Bureau of Economic Analysis (GDP).

Ex-Vessel Pricing and Revenue

In 2018, U.S. fishermen landed a total of 9.4 billion lb of all fish species, valued at $5.6 billion, at U.S. ports (Fisheries of the United States, 2018; NOAA Fisheries 2020). Relative to 2017, this represents a 5.3 percent decrease in landings (from 9.9 billion lb) and a 2.8 percent increase in value. In 2019, U.S. fishermen landed a total of 2.2 million lb of sharks with a total value of $2.28 million (NOAA Fisheries 2020).

Ex-vessel prices are a measure of the monetary worth of commercial landings. The ex-vessel price depends on a number of factors, including the quality of the fish (e.g., freshness, fat content, method of storage), the weight of the fish, the supply of fish, and consumer demand. It should be noted though that the sale of shark fin products does not rely on freshness as the product can be stored for many years. This ability to store the fins can alter the number of fins that enter a market in a given year. Landings weight and price for most sharks are collected from reports through NOAA Fisheries' electronic dealer reporting program, eDealer. The average ex-vessel prices per lb dressed weight for 2014–2019 by species and area are summarized in Table 15, and in the NOAA Fisheries 2020 SAFE Report (NOAA Fisheries 2020).

Table 15. Average Ex-Vessel Price Per Pound for Atlantic Sharks by Area, 2014–2019.

Species	Area	2014 ($)	2015 ($)	2016 ($)	2017 ($)	2018 ($)	2019 ($)
Large coastal sharks	Gulf of Mexico	0.52	0.49	0.60	0.53	0.62	0.73
	South Atlantic	0.72	0.78	0.73	0.86	0.89	0.87
	Mid-Atlantic	0.78	0.74	0.70	0.95	0.71	0.94
	North Atlantic	-	-	-	-	-	-
Pelagic sharks	Gulf of Mexico	1.31	1.00	1.84	1.47	0.73	1.38
	South Atlantic	1.47	1.57	1.62	1.62	1.50	1.47
	Mid-Atlantic	1.37	1.19	1.31	1.18	1.33	1.19
	North Atlantic	2.00	1.68	1.93	2.03	1.64	1.44
Small coastal sharks	Gulf of Mexico	0.37	0.35	0.38	0.41	0.54	0.59
	South Atlantic	0.74	0.76	0.73	0.98	1.02	1.02
	Mid-Atlantic	0.80	0.81	0.89	0.93	0.77	0.97
	North Atlantic	-	-	-	-	-	-
Smoothhound*	Gulf of Mexico	*	-	-	-	0.65	1.08
	South Atlantic	*	0.71	0.84	0.94	0.93	1.13
	Mid-Atlantic	*	0.67	0.77	0.73	0.77	0.82
	North Atlantic	*	0.35	0.47	0.37	0.42	0.38
Shark fins	Gulf of Mexico	9.75	9.92	11.47	11.37	11.18	11.10
	South Atlantic	9.57	10.26	8.50	7.88	7.94	8.11
	Mid-Atlantic	1.77	1.95	2.36	2.44	2.18	1.87
	North Atlantic	-	0.80	-	-	1.50	2.25

Notes: Shark research fishery data are not included. Gulf of Mexico is Texas, Louisiana, Mississippi, Alabama, and west coast of Florida. South Atlantic is east coast of Florida, Georgia, South Carolina, and North Carolina. Mid-Atlantic is Virginia, Maryland, Delaware, New Jersey, New York, and Connecticut. North Atlantic is Rhode Island, Massachusetts, New Hampshire, and Maine. *Smoothhound data were not collected until 2015. Source: eDealer reporting system; dealer weighout slips from the Southeast Fisheries Science Center and Northeast Fisheries Science Center.

Landings weight and price for most Atlantic HMS are collected from reports through NOAA Fisheries' electronic dealer reporting program, eDealer. Table 16 summarizes the total ex-vessel annual revenues of Atlantic sharks for 2014 through 2019.

Table 16. Estimates of the Total Ex-Vessel Annual Revenues of Atlantic Sharks, 2014–2019.

Shark Group	Value	2014	2015	2016	2017	2018	2019
Large coastal sharks	Ex-vessel*	$0.65	$0.66	$0.68	$0.72	$0.74	$0.82
	Weight**	1,368,178	1,593,989	1,276,747	1,311,408	1,634,872	796,415
	Fishery revenue	$764,162	$885,305	$720,802	$746,642	$878,279	$506,112
Pelagic sharks	Ex-vessel*	$1.48	$1.40	$1.54	$1.51	$1.42	$1.35
	Weight**	353,623	215,298	239,850	251,153	129,885	97,595
	Fishery revenue	$504,860	$323,129	$387,688	$386,446	$160,772	$130,664
Small coastal sharks	Ex-vessel*	$0.56	$0.57	$0.56	$0.74	$0.87	$0.94
	Weight**	434,377	553,419	370,118	437,094	432,483	456,167
	Fishery revenue	$342,887	$410,305	$253,406	$364,181	$375,877	$422,633
Smoothhound	Ex-vessel*	-	$0.65	$0.75	$0.70	$0.74	$0.78
	Weight**	-	915,723	702,400	832,631	907,277	794,998
	Fishery revenue	-	$570,805	$502,717	$567,076	$678,309	$607,971
Shark fins	Ex-vessel*	$7.71	$8.46	$8.36	$7.97	$8.71	$7.60
	Weight**	110,560	105,189	76,048	85,877	97,813	63,056
	Fishery revenue	$672,200	$839,642	$660,378	$726,961	$887,008	$612,746
Total sharks	Fishery revenue	$2,284,109	$3,029,186	$2,524,991	$2,791,306	$2,980,245	$2,280,126
Total HMS	Fishery revenue	$42,347,505	$35,896,078	$37,531,057	$38,334,753	$33,271,650	$34,597,788

Note: The shark research fishery data are not included. *Dollars per pound dressed weight. **Pounds dressed weight. Source: eDealer reporting system.

Operating Costs

NOAA Fisheries collects operating cost information from commercial permit holders via logbook reporting. Each year, 20 percent of active Atlantic HMS commercial permit holders are selected to report economic information along with their Atlantic HMS Logbook or Southeast Coastal Fisheries Logbook submissions (see 2020 SAFE Report Section 10.3.1 for information on data collections). In addition, NOAA Fisheries also receives voluntary submissions of the trip expense and payment section of the logbook form from non-selected vessels. A majority of the operating cost information collected from these logbooks are from pelagic longline and bottom longline gears. As operating costs from other gear types are limited, only pelagic longline and bottom longline gears are discussed below.

Operating costs for the Atlantic HMS commercial fleet vary considerably from vessel to vessel. The factors that impact operating costs include unit input costs, vessel size, fishing gear, target species, and geographic location. Through personal communication with commercial fishermen in the Atlantic and Gulf of Mexico regions, the continuing decreases in shark product prices, increasingly limited market for shark meat and fins, and subsequent decreases in revenue have made it difficult for many fishermen to offset the operating costs of continuing in the fishery.

The remainder of this chapter will focus primarily on pricing and revenue of shark meat and fins. For more information on vessel operating costs, please see the 2020 SAFE Report Chapter 8.

Shark Meat

Under HMS regulations (§ 635.5(b)(1)), dealers that are permitted to sell sharks are required to report through the eDealer system what they paid the vessel (price per pound) for any HMS product received, including both shark meat and/or fins by species. If the dealer did not pay the vessel for a certain product (*e.g.*, the product was low quality, kept for personal use, no buyer, etc.), then the dealer can report $0/lb as the price, and provide a justification, but reporting a price for any HMS product is required.

In the past, it was typical for fishermen to sell both their landed shark meat and fins to dealers under one weighout slip. However, as state shark fin bans have gone into place in various coastal and inland states, fishermen and dealers have sold far fewer fins, and shark meat has become the primary shark product for sale. From information gathered through personal communication with dealers, the reduction in fin sales has resulted in a slightly increased annual shark meat pricing, as dealers are providing fishermen with a price to compensate for lost revenue from fins. As shown in Figure 91, the overall annual median meat price dropped in both the Atlantic and Gulf of Mexico regions in 2015, but then recovered and increased above prices in 2014. In the Gulf of Mexico region, there has been a larger increase in median meat price, particularly from 2018 through 2019.

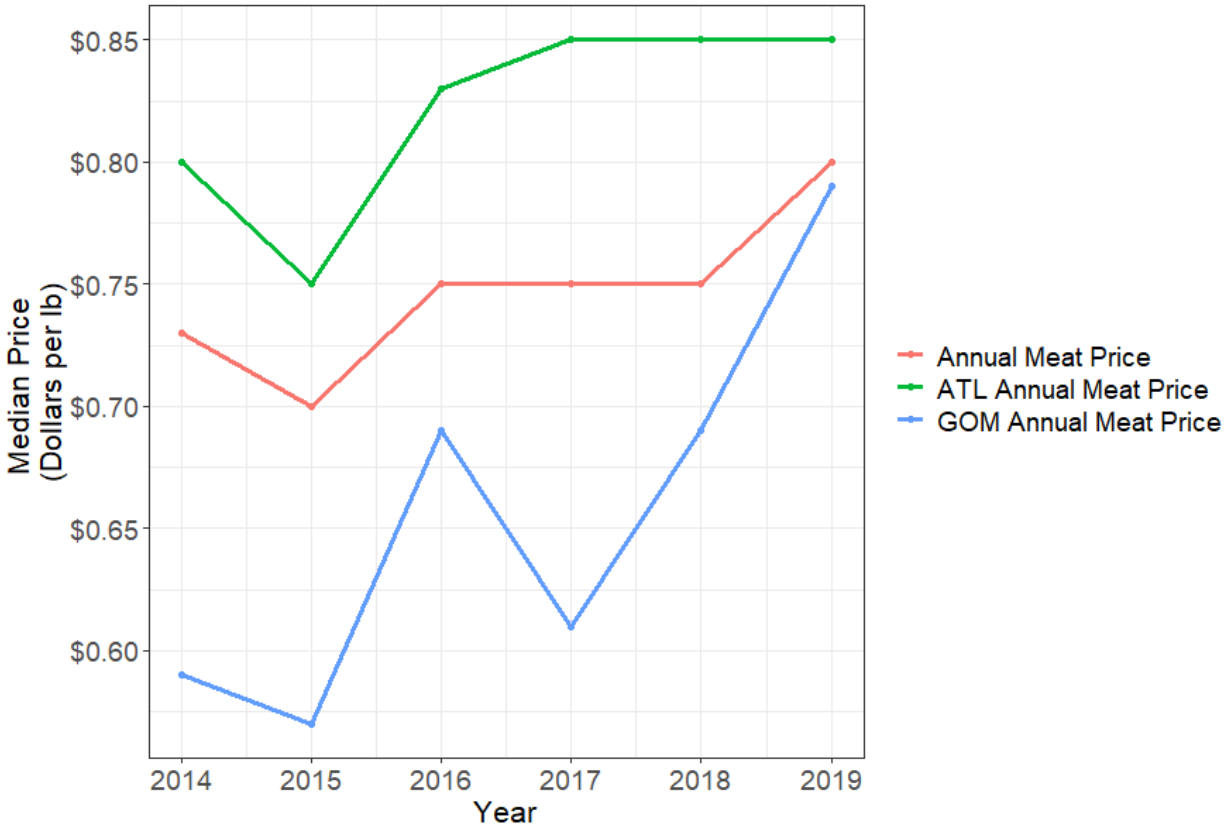

Figure 91. Overall and regional annual meat prices of sharks, 2014–2019.
Note: The shark research fishery data are not included. Source: eDealer reporting system.

Shark Fins

Dealers must report through the eDealer system the price per lb for any HMS product, including both shark meat and/or fins. However, as required under the SCA and subsequently in § 635.30, with one limited exception for smoothhound sharks in which they can be processed at sea (for more information on the SCA, see Additional Factors section), fishermen must maintain the shark fins including the tail naturally attached to the shark carcass until the shark has been offloaded from the vessel. Fishermen land whole sharks, which they sell to dealers, who then process the fish into its separate products for sale. Therefore, dealers are not required to provide exact pricing on only the fin product in eDealer. Given this, the data analyzed in this section is made up of data provided voluntarily by shark dealers, and therefore is not considered a complete picture of shark fin pricing. However, there was a decrease in both active fishing and dealer permit holders and subsequent shark landings, and while not all of the shark fin data are available, this data trends similarly to the overall reductions shown throughout the commercial fishery.

Shark fin median price per lb has fluctuated from 2014 through 2019 (Figure 92). In the Atlantic region, shark fin median prices from 2014 through 2016 were $3, and then decreased slightly in 2017 to a median prices of $2.15, where it remained through 2019. In the Gulf of Mexico region, the shark fin median prices were $10 in 2014 and 2015 and then increased to $11 from 2016 through 2018, and dropped back to $10 in 2019. However, while the regional prices stayed fairly consistent, overall prices dropped significantly in 2019, as there were far fewer fins on the market.

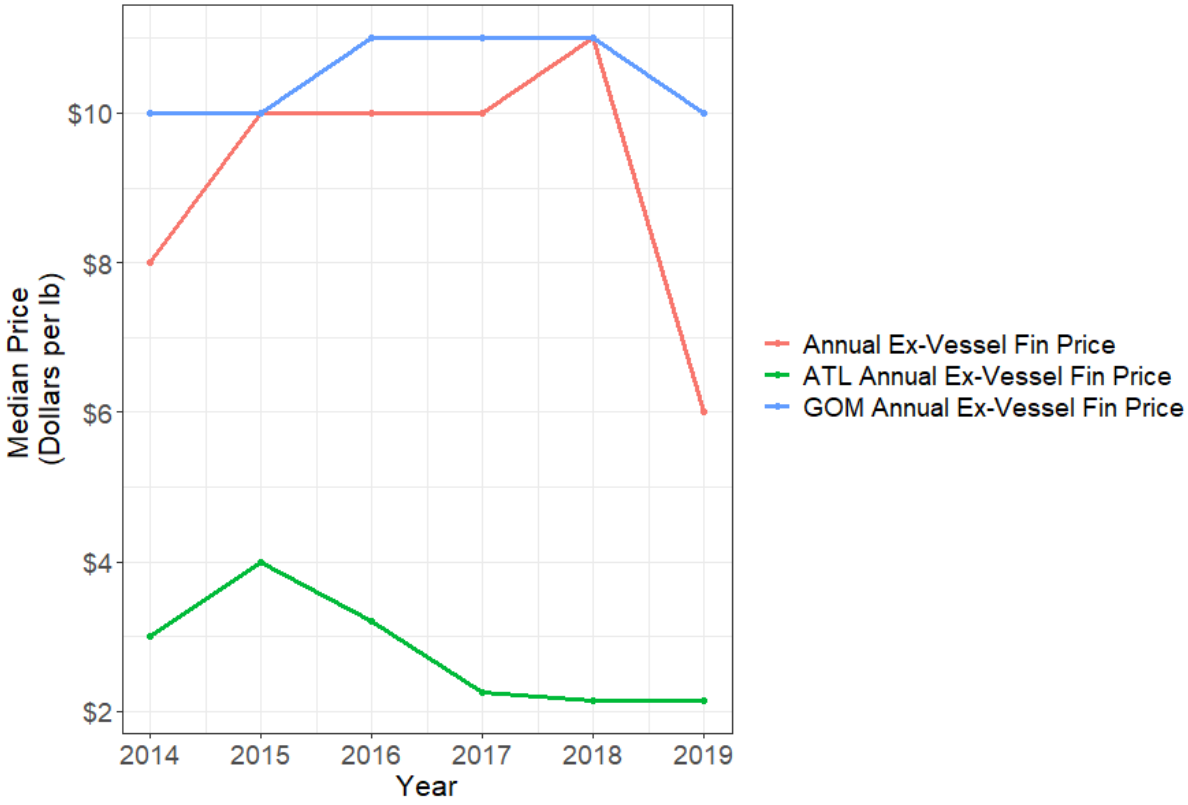

Figure 92. Overall and regional annual shark fin prices, 2014–2019.
Note: Shark research fishery data are removed. Source: eDealer reporting system.

While the median shark fin price in both regions stayed fairly consistent, other than the sharp drop in 2019 of the overall annual fin prices (Figure 92), annual shark fin revenues decreased significantly (Figure 93). In the Atlantic, there was a downward trend from 2014 through 2019 with peak revenues in 2014 at $184,787 and a low of $65,886. Therefore, from 2014 through 2019, there was an 18.6 percent average annual decline in shark fin revenue in the Atlantic. In the Gulf of Mexico, the annual shark fin revenues increased from 2014 to 2015 (the 2015 median shark fin revenue was $432,507), decreased in 2016 to $363,168, and then increased to a high of $604,257 in 2018. This increase was followed by a sharp decline to $342,465 in 2019 (a 43-percent average annual decline from 2018).

The shark fin revenue trend from the Atlantic region is consistent with the general declining trend shown in other aspects of the shark fishery (*e.g.*, general reduction in fishing permit renewals and landings). Through personal communications with various dealers in the Atlantic and the Gulf of Mexico regions, dealers have indicated that an increase in state shark fin bans, among other issues, and subsequent declining revenues have driven away active permit holders from the fishery. The revenue increase, and then sharp decrease in the Gulf of Mexico region does not appear to follow that trend. Specifically, from 2018 to 2019, revenue declined sharply back down to the 2014 level, which can potentially be attributed to the Texas state fin ban.

While the State of Texas shark fin ban went into effect in 2015, routine stops by law enforcement along the Texas border did not find any shark product that was out of compliance with the state ban until 2018. Shark products are typically sold to Mexico for consumption, particularly when sold around the Lenten season. A routine stop and inspection of a refrigerated truck at the Mexico border revealed that a Texas-based company was shipping shark carcasses, with the fins and tails removed, in violation of Texas law. This Texas-based company received shark products from Louisiana, North Carolina, and Florida, where the sale of shark fins was legal as long as the fins were landed naturally attached to the carcass. Those fishermen and dealers complied with federal regulations by landing the shark whole and then processing the product (including removing the fins) after landing and offloading. However, when the processed shark products crossed the State of Texas border by truck on route to Mexico, the State of Texas considered the processed fin product illegal for possession or sale within the State. Some out of state dealers routinely ship their products by truck through the State of Texas and into Mexico, as this is a direct and cost-efficient way to ship products. Landings and revenues data (Figures 18-23, 92, and 93) indicate that the sale of shark fin and meat, and revenues within the western Gulf of Mexico region began to plummet around the same time that this routine stop occurred, which may indicate that the risk of stop and seizure of processed shark products and shark fins in transit across the state strongly dissuaded sales.

As data are not yet finalized for 2020, NOAA Fisheries is unsure if the downward trajectory for pricing (Figure 92) and revenue (Figure 93) will continue. However, many dealers have indicated that they are currently unwilling to ship sharks without fins attached through Texas given the current Texas state law. This change in practice could have wide-ranging implications. For more information on state shark fin bans, please see Additional Factors section.

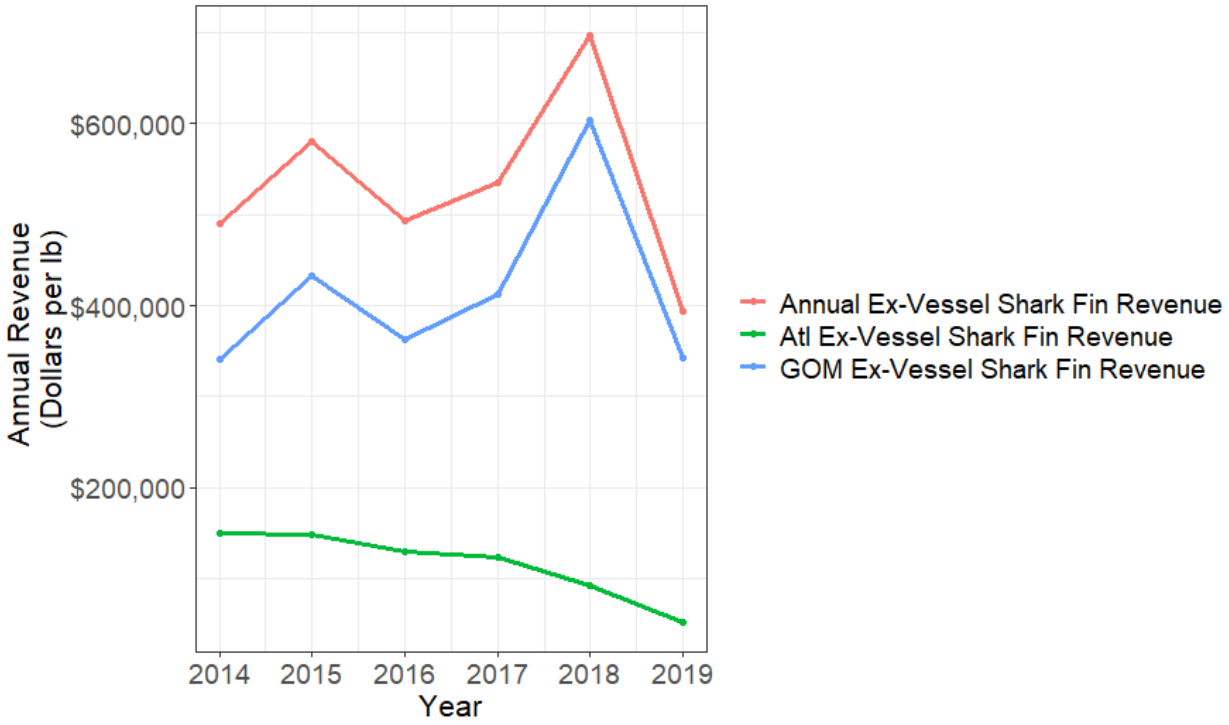

Figure 93. Overall and regional annual shark fin revenue, 2014–2019.
Note: Shark research fishery data are removed. Source: eDealer reporting system.

Shark fins are typically graded based upon fin quality, which is determined by species, size, and other factors such as moisture content, smell, and cut. Typically, sharks are processed by removing the fins and tail as soon as possible, and blood is drained from the carcass to remove naturally occurring bodily chemicals, which otherwise convert to ammonia and spoil the meat. The most valuable fins are the first dorsal fin, the pectoral fins, and the lower part of the tail. For additional information on grading, please visit the United Nations Food and Agriculture Organization Shark Fin Guide. U.S. grades include:

- Grade A: Fin sets containing pectoral fins > 10" in length, except for blacktip and spinner shark fins which are not typically reported as A. Pelagic shark (mako, blue, porbeagle, and thresher sharks) lower caudal fins > 10” in length could be reported as QA.
- Grade B: Fin sets containing pectoral fins 7"- 10" in length, including blacktip and spinner shark fins.
- Grade C: Fin sets containing pectoral fins 5"-7" in length.
- Grade D: Fin sets containing pectoral fins 3"-5" in length.
- Grade E: Fin sets containing pectoral fins < 3" in length, anal fins, 2nd dorsal fins, and smoothhound fins.
- Grade S: The smallest and lowest quality.

Additionally, the eDealer database allows for a grade to be entered as “unknown.” The majority of the fins in the eDealer database are classified as grade unknown, as it is not a requirement to include the shark fin grade when entering the data. For example, in 2019, there were 1,188 records of shark fins in the database with grade unknown and 399 records with a grade listed. This document displays only grades A, B, and unknown as the majority of data points are associated with these grades.

Grade A and B fins have similar median prices in 2014 through 2018 (Figure 94) and their difference in quality would be expected to vary only slightly. However, from 2018 to 2019, the price of Grade A fins doubled from $11 to $22, respectively, whereas Grade B fins only increase slightly. Average prices for fins where the grade was unknown were volatile from 2014-2019. As most shark fins were classified as grade unknown, it is most representative of how the shark fin prices have fluctuated over time. Grade A shark fin revenues increased from 2014 through 2018 (Figure 95). However, there was a drop in revenue in grade B and a sharp decrease in grade unknown. Additionally, Figure 95 shows the stark contrast between total revenues for grade A and grade B fins. Since prices per pound are roughly the same, the difference in revenue for these grades likely reflects the difference in quantity sold.

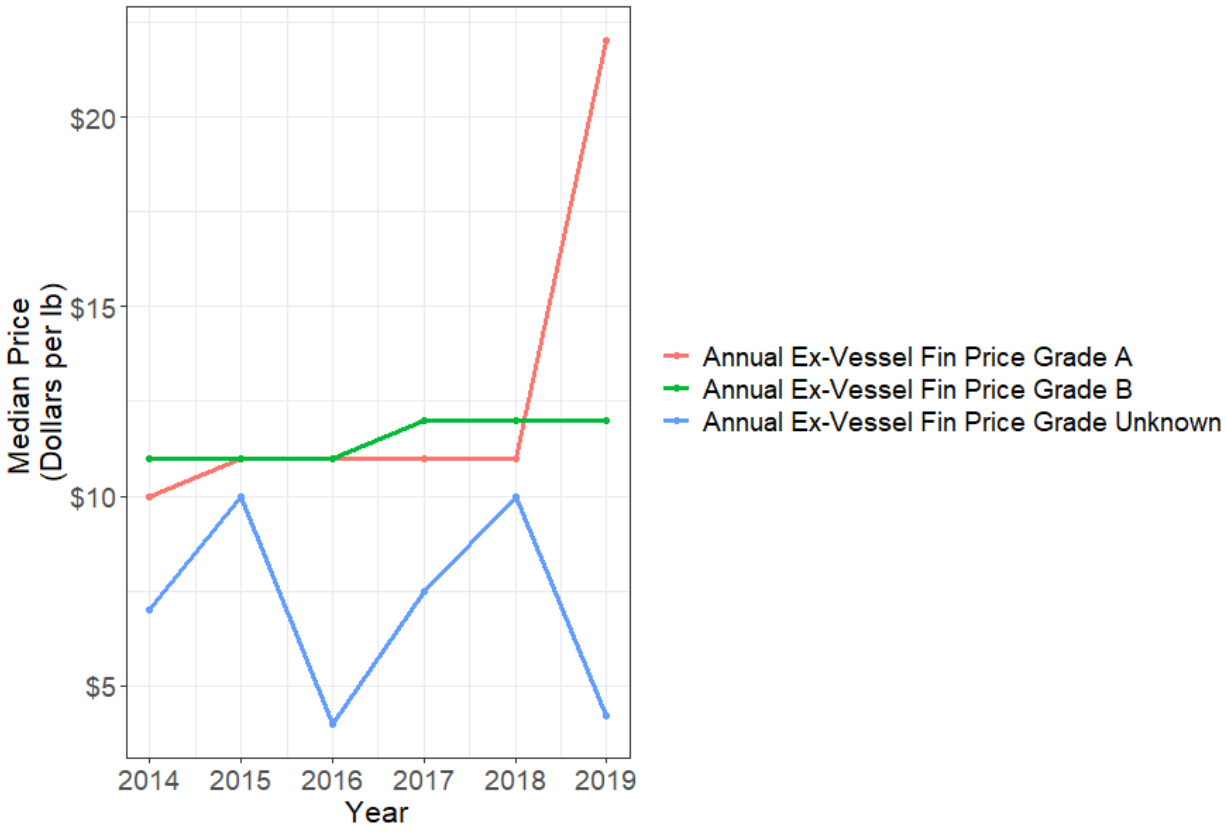

Figure 94. Annual median shark fin ex-vessel price by grade, 2014–2019.
Note: Shark research fishery data are removed. Source: eDealer reporting system.

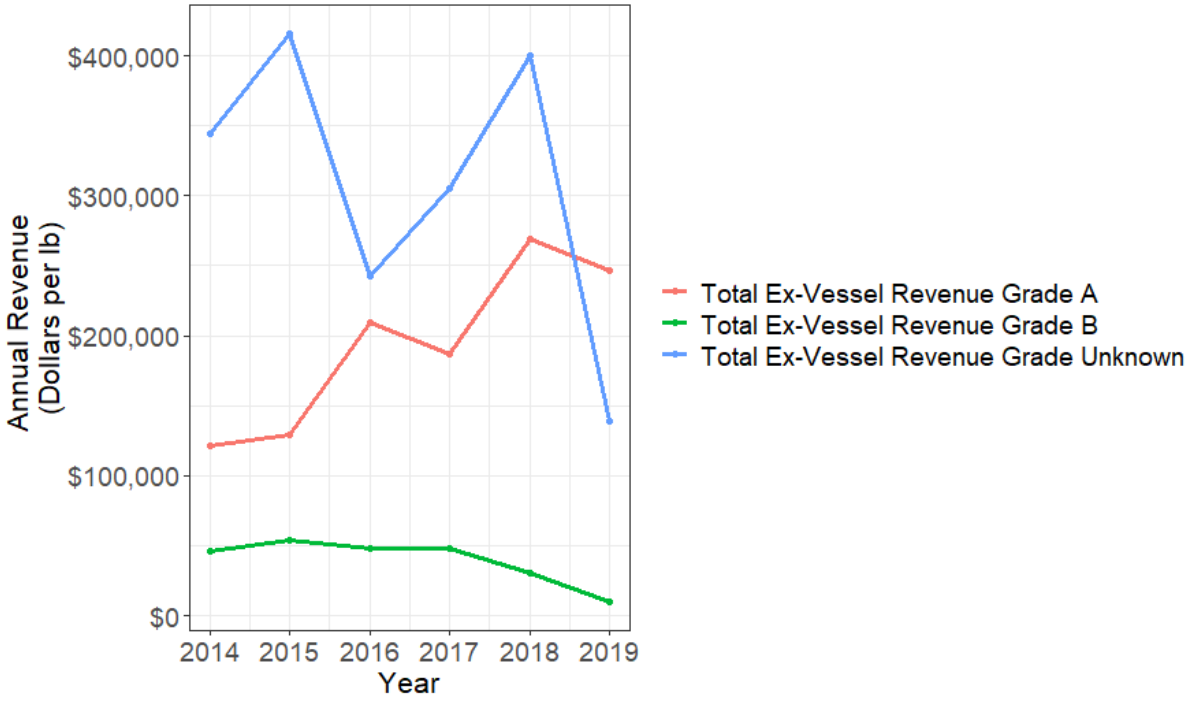

Figure 95. Overall annual shark fin revenues by grade, 2014–2019.
Note: Shark research fishery data are removed. Source: eDealer Reporting system.

Summary of Shark Markets

Overall, ex-vessel prices and revenue from shark meat and fins have decreased. Through personal communications with various dealers in the Atlantic and the Gulf of Mexico regions, dealers have indicated that declining prices and revenues have been driving active permit holders from the fishery. The state shark fin bans had the effect of eliminating the export of fins, the most lucrative product from the shark fishery, from many ports. Additionally, the stigma surrounding the use of shark meat for consumption has caused a lot of the market for the product to disappear. Therefore, many fishermen have found it difficult to continue in the fishery when market prices for products and annual revenues cannot offset the operating costs of continuing in the fishery.

International Trade

This section describes general U.S. trade monitoring programs for shark products from 2014 through 2019. Trade of CITES species can be found in the Additional Factors section. Several regional fishery management organizations (RFMOs) collect international trade data that is used to estimate landings in international HMS fisheries and identify compliance problems with RFMO management measures. The United States collects general trade data through the U.S. Customs and Border Protection's International Trade Data System, in collaboration with the U.S. Bureau of the Census (Census Bureau). NOAA Fisheries provides searchable Census Bureau trade data for marine fish products for the public at www.st.nmfs.noaa.gov/commercial-fisheries/foreign-trade.

Data on the amount and value of imports and exports are categorized under the Harmonized Tariff Schedule (HTS), which is the primary resource for determining tariff classifications of goods imported to the United States. Many HMS have distinct HTS codes, and some species are further subdivided by the disposition of the product (e.g., fresh or frozen, fillets, and steaks). Some species are combined into groups (e.g., sharks), which can limit the value of these data for fisheries management, when species-specific information is required.

Trade Document Programs

The International Fisheries Trade Permit (IFTP), effective September 20, 2016, is required for the import, export, or re-export of fishery products subject to NOAA Fisheries' trade monitoring programs. The new consolidated permit facilitates the transition from paper-based trade documentation programs to the electronic reporting system (Automated Commercial Environment or ACE) operated by U.S. Customs and Border Protection. The IFTP replaced the HMS International Trade Permit and Antarctic Marine Living Resources Dealer Permit.

Additionally, the new regulations made the IFTP a requirement for two other trade monitoring programs:

- The Tuna Tracking and Verification Program or 370 program.
- The Seafood Import Monitoring Program.

The consolidation of international trade permits under the IFTP provides a more streamlined and cost-effective approach for collecting import and export documentation. Therefore, importers and exporters only need one permit to trade in any species included under any of the four trade monitoring programs. For more information on these trade programs, please visit the NOAA Fisheries IFTP website at https://www.fisheries.noaa.gov/permit/international-fisheries-trade-permit. Table 17 shows the number of renewed and new IFTPs for 2016 through 2020 along with the number of permits that reported HMS trade. The number of IFTPs peaked in 2018 (2,070 permits), and of those, only 30 percent (613 permits) were used to trade any HMS products.

Table 17. Number of international trade permits and trade of shark fin and HMS products, 2016–2020.

YEAR	International Permits			Shark Fin Trade	HMS Trade	Percentage of Permits Reporting HMS
	RENEWALS	NEW PERMITS	Total			
2016	86	450	536	29	1	6%
2017	522	436	958	45	86	14%
2018	784	865	1,649	-	520	32%
2019	1329	741	2,070	-	613	30%
2020	1407	535	1,942	-	620	32%

Note: Shark fin trade and HMS trade columns represent the number of permits that reported using them for HMS products. Shark fins were not traded independently beyond 2017 and combined with the HMS trade. Shark research fishery data are included. Source: U.S. Census Bureau.

U.S. Exports of Shark Products

Export data for sharks gathered by the U.S. Census Bureau include trade data for sharks from any ocean area of origin. Shark exports are not categorized to the species level, with the exception of spiny dogfish, and are not identified by a specific product code other than fresh meat, frozen meat, and shark fins. There is no tracking of shark products besides meat and fins. As a result, NOAA Fisheries cannot track trade in shark leather, oil, cartilage, or other shark products.

Table 18 indicates the amount and value of shark exports, excluding smoothhound sharks, by the United States from 2014 through 2019. The amount and value of shark exports were greatest in 2016, and have decreased steadily since then. However, shark exports are a small percent of HMS exports when compared to tuna products. In 2019, fresh and frozen tuna products accounted for 11,402 mt dw of the 1.2 million mt dw (about 1 percent) of principal fresh and frozen seafood products exported from the United States, while total shark product exports (fin, fresh, and frozen) only accounted for 348 mt dw (less than 0.0003 percent) (NOAA Fisheries 2020). The value of these tuna products accounted for $49.3 million out of a national total of $4.9 billion (1 percent), while shark products were only valued at $1.15 million (less than 0.02 percent).

Table 18. Amount and value of U.S. shark products exported, 2014–2019.

Year	Fin Export* (mt)	Fin Value* ($ MM)	Fresh Export† (mt)	Fresh Value† ($ MM)	Frozen Export† (mt)	Frozen Value† ($ MM)	Total Exports (mt)	Total Value ($ MM)
2014	19	0.98	218	0.57	828	5.31	1,064	6.86
2015	18	1.02	273	0.66	930	4.92	1,221	6.60
2016	12	0.85	285	0.61	1,499	7.38	1,794	8.83
2017	11	0.62	474	0.89	730	2.05	1,305	3.79
2018	10	1.08	462	0.89	206	0.69	678	2.53
2019	6	0.37	320	0.71	23	0.08	348	1.15

Note: Shark research fishery data are included. Exports may be in whole weight or product weight. $ MM = millions of dollars. mt = metric tons. †Fresh and frozen shark product not provided to species. *Shark product not reported to species. Source: U.S. Census Bureau.

In 2017, HTS codes were implemented identifying other shark fin products as “frozen” and “fresh,” improving tracking of the product. The value of fins in these categories are much lower per unit than dried shark fins (Table 19). In 2017, the total value of shark fin exports was $0.85 million with the majority (89 percent) of the product fresh or frozen. In 2018, the total value of shark fin exports was $1.08 million with 38 percent of the product dried. In 2019, shark fin exports were even lower, coming in at only $620,000 with 15 percent of the product dried.

Table 19. Amount and value of total U.S. shark fin products exported, 2017–2019.

Year	Dried Exports (mt)	Dried Value ($ MM)	Fresh Exports (mt)	Fresh Value ($ MM)	Frozen Exports (mt)	Frozen Value ($ MM)	Total Exports (mt)	Total Value ($ MM)
2017	11	0.62	2	0.01	88	0.22	101	0.85
2018	10	0.95	4	0.03	12	0.10	26	1.08
2019	6	0.37	0	0	32	0.26	38	0.62

Note: Shark research fishery data are included. U.S. shark fin products include dried, fresh, and frozen shark fins. $ MM = millions of dollars. mt = metric tons. Source: U.S. Census Bureau.

U.S. Imports of Shark Products

NOAA Fisheries does not require shark importers to collect and submit information regarding the ocean area of catch. Shark imports are not categorized by species and lack specific product information on imported shark meat, such as the proportion of fillets and steaks. Table 20 and Table 21summarizes Census Bureau data on shark imports for 2014 through 2019. Imports of fresh and frozen shark were lowest in 2018 (34 mt) and 2019 (56 mt). In 2019, the United States imported $297.3 million (30,417 mt) of other tuna products, $80.03 million (10,456 mt) of swordfish products and only $0.24 million (56 mt) of shark products (NOAA Fisheries 2020). Thus, imports of shark products represent less than one percent of the overall imports of HMS products. Imports of shark fins declined from a high in 2017 (143 mt) to a low in 2019 (1 mt).

Table 20. U.S. imports of shark products† from all ocean areas combined, 2014–2019.

Year	Dried Fins (mt)	Fins Value ($ MM)	Fresh Shark* (mt)	Fresh Value* ($ MM)	Frozen Shark* (mt)	Frozen Value* ($ MM)	Total Imports (mt)	Total Value ($ MM)
2014	35	0.45	105	0.35	8	0.20	146	0.99
2015	24	0.29	88	0.32	21	0.26	133	0.87
2016	56	0.69	67	0.23	108	0.60	231	1.52
2017	35	0.54	65	0.26	30	0.20	238	1.30
2018	3	0.01	30	0.14	0	0	34	0.30
2019	0	0.00	56	0.24	1	0.01	56	0.24

Note: Data are preliminary and subject to change. Shark research fishery data are included. $ MM = millions of dollars. mt = metric tons. †Imports may be whole weight or product weight. *Shark product not reported to species. Source: U.S. Census Bureau.

Table 21. U.S. imports of total shark fin products, 2017–2019.

Year	Dried Fins (mt)	Dried Value ($ MM)	Fresh Fins (mt)	Fresh Value ($ MM)	Frozen Fins (mt)	Frozen Value ($ MM)	Total Fins (mt)	Total Value ($ MM)
2017	35	0.54	44	0.15	65	0.14	143	0.83
2018	2	0.15	3	0.01	0	0.00	4	0.15
2019	0	0.00	1	0.00	0	0.00	1	0.00

Note: Shark research fishery data are included. $ MM = millions of dollars. mt = metric tons. Source: U.S. Census Bureau.

Summary of International Trade

Overall, shark products account for a small portion of HMS exports and imports, and an even smaller portion of overall seafood products. Shark fins account for the lowest amount of HMS exports or imports. Given how few shark products the United States contributes to the global market, domestic shark regulations that create barriers and restrictions on the import or export of shark products, especially state shark fin bans, have little to no impact on the global market.

Commercial Shark Fishery Summary

The commercial shark fishery has changed dramatically from 2014 through 2019. In general, permit usage, shark trips, and landings were at their highest in 2014 and have declined since then. Active shark directed only permit holders have declined by 39 percent, while active state-water permit holder have declined by 18 percent during the time series. The number of state-water permit holders appears to have fluctuated over the years depending on the season opening date and target species. The percent of non-active permit holders increased by 8 percent. The decrease in the number of active limited access permit holders could indicate that access to, sale, limited access permits is too difficult or restricted. The value of each permit varies depending on whether the permit is a shark directed or incidental permit due to the retention limits along with being part of a triple pack. Triple pack permits are the most valuable in the fishery and are hard to come by. Under current regulations, limited access permits that are not renewed on an annual basis become invalid, rending them unrenewable. Beyond the decline in active permits, this regulation may also have resulted in a decline in the number of limited access permits available for sale or renewal, and this could be affecting fishermen from joining the fishery. The decline in the number of permits indicates a need to re-evaluate the permit structure.

In the LCS fishery, effort levels and landings are at an all-time low when compared to the shark fishery prior to 2014 in the Atlantic and Gulf of Mexico regions. Management measures in the past few years have allowed the LCS fishery, except for the western Gulf of Mexico sub-region, to remain open all year, which is what most fishermen and dealers would prefer. However, since 2016, LCS landings have been flat or declining and a lot of the commercial quota is left unharvested in both regions. In the Atlantic region, the quota threshold and frequent inseason retention limit adjustments may have contributed to not harvesting available quota to its fullest extent. In the Gulf of Mexico region, the creation of sub-regions has helped address the issue with different fishing priorities between Louisiana and Florida shark fishermen. Fishermen in the western Gulf of Mexico sub-region would prefer to target LCS at the beginning of the year, while fishermen in the eastern Gulf of Mexico sub-region would prefer the LCS fishery to remain open all year to ensure shark products are on the market at all times.

In the SCS fishery, landings and vessels targeting SCS have declined. Management measures like the blacknose shark retention limit in the Atlantic region and prohibition in the Gulf of Mexico has allowed the non-blacknose SCS fishery to remain open all year. However, these management measures could have caused the SCS fisheries to be underharvested each year and fishermen to focus on other more stable fisheries.

The pelagic shark fishery is currently an incidental fishery, in large part because of various management measures restricting the landing of these species. For the most part, these shark species cannot targeted and can only be landed if dead at haulback. Additionally, pelagic sharks are not worth as much as the tunas and swordfish that are caught in the pelagic longline fishery. As a result shark landings have declined along with effort levels. For the most part, any changes to these restrictive management measures would require international agreement.

NOAA Fisheries has been managing the smoothhound shark fishery since 2016. Since that point, active usage of the permit has declined, landings have remained level, and quotas have been underharvested in the Atlantic region. The majority of the landings of smoothhound sharks occur in the summer and fall, which overlaps with the peak-fishing season for spiny dogfish. Even though the smoothhound shark fishery is underutilized, in terms of landings and available quota, it is the largest shark fishery in the Atlantic other than spiny dogfish.

Overall, there are a number of shark dealers from Maine through Texas. The location and number of active dealers that report shark landings vary by year and shark management group. The number of dealers accepting LCS, SCS, or pelagic sharks has declined from 2014 through 2019. Landings from dealers in the northeast and Mid-Atlantic are dominated by smoothhound shark landings, especially in New Jersey. In the Atlantic region, dealers located in Virginia and North Carolina, and the east coast of Florida continue to report the most LCS, SCS, and pelagic sharks. In the Gulf of Mexico, dealers located in Louisiana and Texas accounted for the largest annual percentage of LCS landings except for 2019. This decline likely was due to the State of Texas shark fin ban and anticipated transportation complications across the State. Most of the active dealers and dealers reporting the most annual shark landings are only located in a few states. Most active fishermen with shark limited access or state-water permits are also located in the same states, which may indicate that the location of the dealers and fishermen may be what is keeping these shark dealers in business.

NOAA Fisheries and other government agencies have been tracking and monitoring the sale and trade of shark products for years. The commercial shark fishery has seen significant declines in shark product prices, revenue to fishermen and dealers, and trade in shark products. As domestic and international markets for shark products have declined, so have the prices, which have negatively affected U.S. fishermen. The United States contributes only a small amount to the international trade of shark products, and therefore, any further restriction or domestic regulation placed on U.S. fishermen will only negatively affect U.S. fishermen and have little to no impact on the global market for shark products. A potential way forward is to continue adding stability in the shark fishery by ensuring some shark products are available year-round.

Recreational Shark Fishery

To fish recreationally in federal waters for any authorized shark species, vessel owners must have a valid federal fishing permit for their vessel. The two primary categories of permits that can be used to recreationally fish for Atlantic HMS are: 1) HMS Angling, which covers private fishing trips, and 2) HMS Charter/Headboat which covers for-hire recreational fishing. In addition, the Atlantic Tunas General category and Swordfish General Commercial permits authorize the recreational harvest of sharks in registered HMS fishing tournaments. Each permit is issued to a vessel owner for a specific vessel. All passengers aboard a vessel with a valid HMS Angling or Charter/Headboat permit may recreationally fish for Atlantic HMS.

Recreational Shark Endorsement

On April 4, 2017, NOAA Fisheries published a final rule for Amendment 5b to the 2006 Consolidated HMS FMP, which among other things, created a shark endorsement permit with the objective of reducing the mortality of dusky sharks and other prohibited sharks (82 FR 16478; April 4, 2017). As a result of Amendment 5b, in 2018, NOAA Fisheries began requiring all recreational Atlantic HMS permit holders (HMS Angling and HMS Charter/Headboat) and commercial open access permit holders that are authorized to participate in registered HMS tournaments (Atlantic Tunas General category and Swordfish General Commercial) to obtain a shark endorsement on their HMS permit if they wished to fish for and retain sharks. A shark endorsement can be obtained at no extra charge, but requires the permit applicant to watch a short educational video on shark identification and safe handling practices and take a short quiz regarding those practices and the recreational shark management measures. Since its implementation, a majority (55-58 percent) of HMS permit holders have acquired the shark endorsement each year with HMS Charter/Headboat permit holders being the most likely (73-74 percent) to acquire a shark endorsement (Table 22).

Table 22. Counts of Atlantic HMS open access permits and shark endorsements issued each year by permit type, 2018-2020.

	2018			2019			2020		
HMS Permit	**Count**	**Shark End.**	**Percent**	**Count**	**Shark End.**	**Percent**	**Count**	**Shark End.**	**Percent**
Angling	20,076	10,769	54	21,407	11,740	55	22,833	12,912	57
Charter/Headboat	3,635	2,645	73	3,769	2,732	73	3,839	2,840	74
Atlantic Tunas & Swordfish	2,979	1,274	43	2,757	1,276	46	2,671	1,298	49
Total	26,690	14,688	55	27,933	15,748	56	29,343	17,050	58

Note: Shark endorsement is abbreviated as Shark End. Source: HMS Permit Shop.

Permit data collected by the Large Pelagics Survey (LPS) revealed that 71 percent of HMS permitted vessels (of 1,626 unique permitted vessels surveyed) had acquired the shark endorsement during the first year of its availability (Figure 96, Total-2018). In 2019, the relative proportion of permit holders who chose to get a shark endorsement was similar to 2018, with 72 percent of 1,707 surveyed permitted vessels having the endorsement (Figure 96, Total-2019). In both 2018 and 2019, the percent of trips surveyed that had shark endorsements was similar to the

percent of permits that were surveyed. In 2018, 69 percent of trips surveyed were recorded as having the shark endorsement while in 2019 the percentage was 73 percent. The similarity between permit-level and trip-level data suggests that permits with and without shark endorsements are equally likely to take trips and be surveyed by the LPS. Among the three permit categories surveyed by the LPS, Charter/Headboat permit holders were most likely to have acquired the endorsement in both 2018 (81 percent of permits) and 2019 (84 percent of permits). Angling permits were the next most likely to have a shark endorsement in both years (70 percent in both 2018 and 2019). General permits (Atlantic Tunas General category and Swordfish General Commercial) had the lowest percentage of LPS surveyed permit holders with shark endorsements in 2018 (54 percent of permits) and 2019 (56 percent of permits).

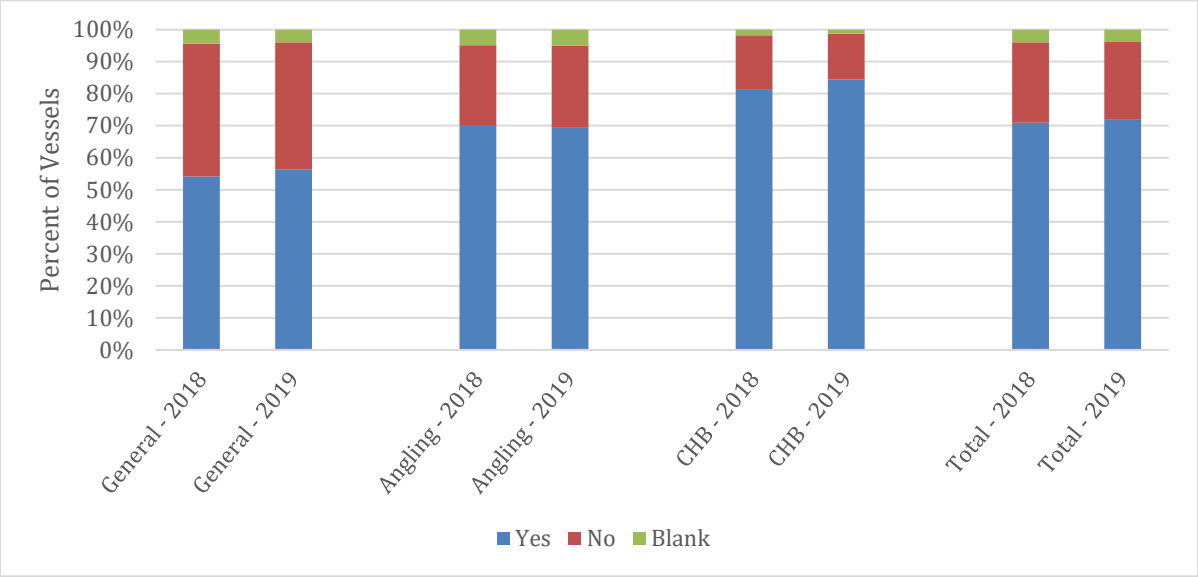

Figure 96. Percentage of HMS permitted vessels, by permit type, intercepted by the LPS with and without a shark endorsement, 2018-2019.

Source: LPS.

Overall, vessels surveyed by the LPS were more likely to have obtained a shark endorsement (71 percent in 2018, 72 percent in 2019) compared to the general population of HMS permit holders (55 percent in 2018, 56 percent in 2019). This could be due to a few reasons. The LPS specifically focuses on angling trips targeting HMS so it is more likely to intercept more avid HMS anglers who may in turn be more likely to obtain a shark endorsement than the average permit holder. It is also possibly due to the fact that pelagic sharks are more abundant in the northeast region where the LPS is conducted (Maine to Virginia), while recreational shark fishing in the southeast focuses more on coastal species that are largely caught in state waters as is demonstrated in the pursuing sections on directed and incidental shark fishing effort. The primary recreational data sources for the southeast region (North Carolina to Texas) are the surveys conducted under the NOAA Fisheries Marine Recreational Information Program (MRIP), the Louisiana Creel Survey (LA Creel), the Texas Parks and Wildlife Department survey (TPWD), and the NOAA Fisheries Southeast Regional Headboat Survey (SRHS). With the exception of the SRHS, none of these surveys collect permit data on intercepted trips. As such, data are not available to estimate the number or percentage of shark fishing trips in the southeast that possess HMS permits or shark endorsements. The majority of shark fishing trips

in the southeast are conducted in state waters or from shore where an HMS permit is not required to fish for sharks.

Directed and Incidental Effort

Fishing effort is an important indicator of the amount of pressure placed on a fishery. In recreational fisheries, both directed and incidental effort can be substantial sources of recreational catch. Directed effort consists of fishing trips where anglers purposely target a specific species to catch, and this is determined in angler surveys by asking them their primary and secondary target species for the trip. Incidental effort represents trips where anglers caught a given species, but did not list it as one of their two primary target species. In this section, NOAA Fisheries discusses directed and incidental effort for shark species that are legal to retain in the Atlantic and Gulf of Mexico. MRIP is the primary data source for coastal shark species, while the LPS is the primary data source for pelagic shark species.

Coastal Shark Fishing Effort

From 2014 through 2019, MRIP estimates indicate that there were on average 2.9 million recreational fishing trips (angler days[2]) each year that targeted or caught sharks in the Atlantic (Florida's east coast to Maine), excluding pelagic shark species. Of these, only 13 percent (approximately 366,000) were directed trips where sharks were indicated to be one of the two primary target species (Figure 97), and the remaining 87 percent were classified as incidental trips. Only 19 percent of the directed trips in the Atlantic indicated they were targeting a specific species, with the vast majority (82 percent) simply indicating they were targeting sharks in general (Figure 98). Of the 2.9 million trips that reported catching sharks, 9 percent reported catching a LCS species, 33 percent reported catching a SCS species, 28 percent reported catching a smooth dogfish[1] (i.e., smoothhound), and 33 percent reported catching a prohibited shark species or were not able to identify the species they caught (Figure 99). Shore-based trips accounted for 55 percent of trips targeting or catching sharks in the Atlantic, with 43 percent being private boat trips, and only 2 percent being for-hire trips (Figure 100). The recreational coastal shark fishery in the Atlantic is also overwhelmingly a state-water fishery as only 7 percent of trips targeting or catching coastal sharks occur in federal waters, while 43 percent were in inshore waters, and 50 percent were in state ocean waters (i.e., ocean-side waters from the beach out to the state/federal authority demarcation line) (Figure 101).

[2] MRIP measures fishing effort in angler day trips meaning one trip equals one day of fishing by one angler. Other sections of this report referencing trips are generally referring to vessel trips which may last multiple days. MRIP does not use vessel trips as its measure of fishing effort because it surveys both vessel-based and shore-based anglers. The LPS measures fishing effort in daily vessel trips as it only surveys vessel-based anglers.

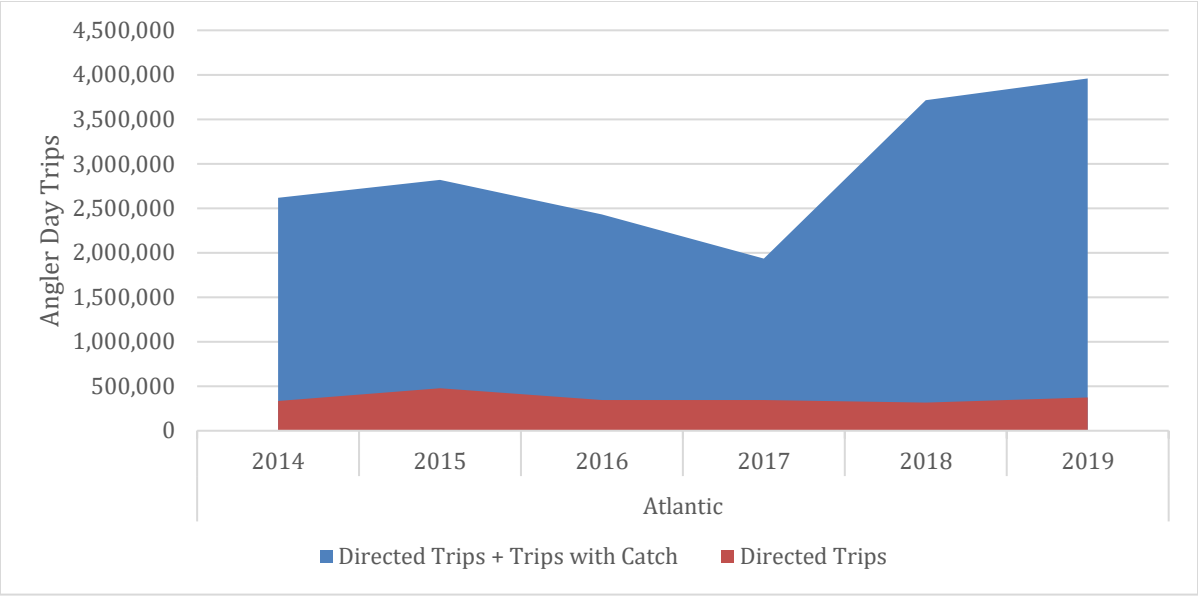

Figure 97. Estimated number of directed coastal shark trips, and trips with coastal, prohibited, or unidentified shark catch in the Atlantic, 2014-2019.

Note: These estimates exclude pelagic shark trips and catch. MRIP trip estimates are angler trips, not vessel trips, as these estimates include shore-based trips. Source: MRIP.[3]

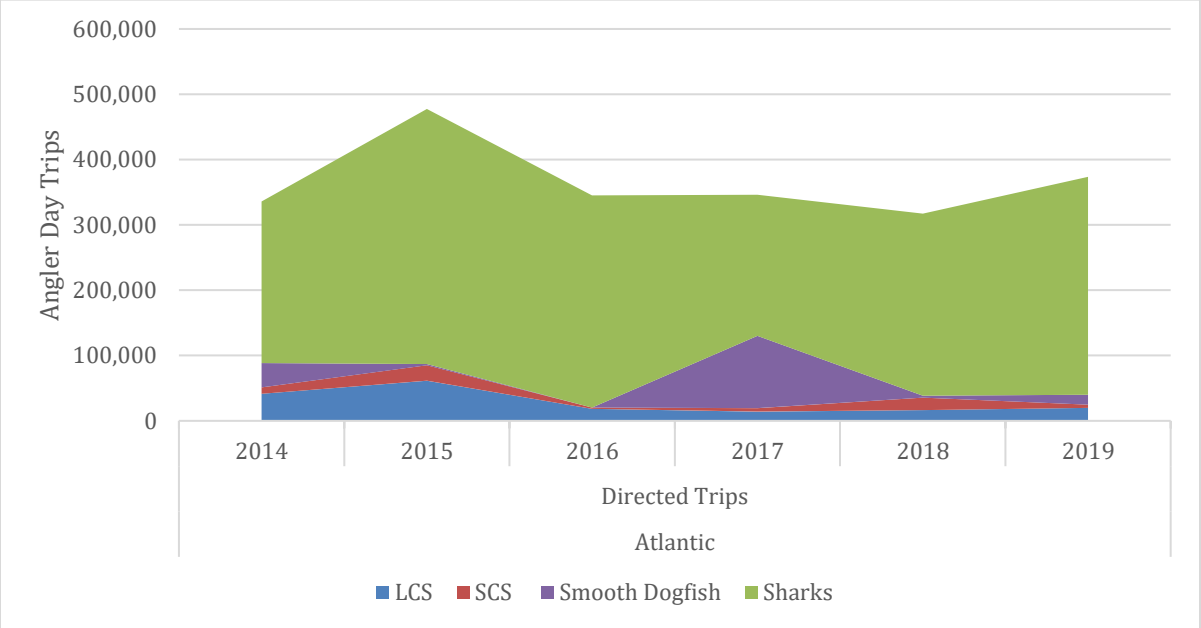

Figure 98. Estimated number of directed large coastal, small coastal, and generic shark trips in the Atlantic, 2014-2019.

Note: These estimates exclude pelagic shark trips and catch. Source: MRIP.

[3] While the name smoothhound is the term used in the commercial section of this report, NOAA Fisheries use smooth dogfish in the recreational section as it is the name used in the MRIP surveys and estimates. The term smoothhound is used in MRIP for several subspecies found in the Gulf of Mexico and Caribbean, but they are rarely caught in the recreational fishery.

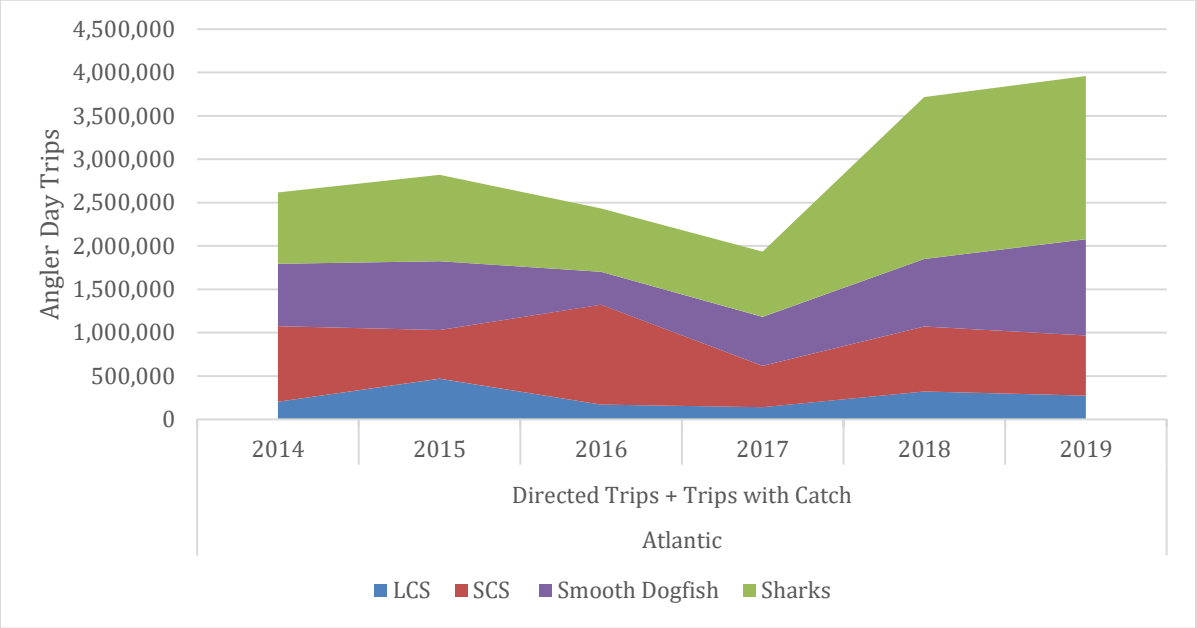

Figure 99. Estimated number of trips with large coastal, small coastal, and prohibited or unidentified shark catch in the Atlantic, 2014-2019.

Note: These estimates exclude pelagic shark trips and catch. Source: MRIP.

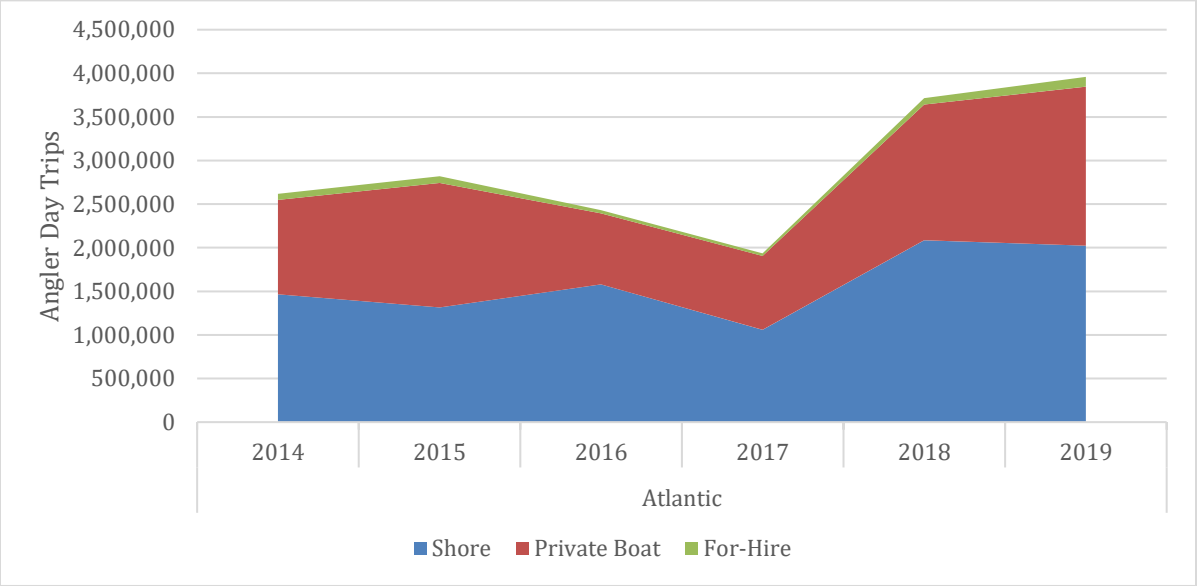

Figure 100. Estimated number of trips targeting or catching large coastal, small coastal, and prohibited or unidentified shark catch in the Atlantic, 2014-2019.

Note: These estimates exclude pelagic shark trips and catch. Source: MRIP.

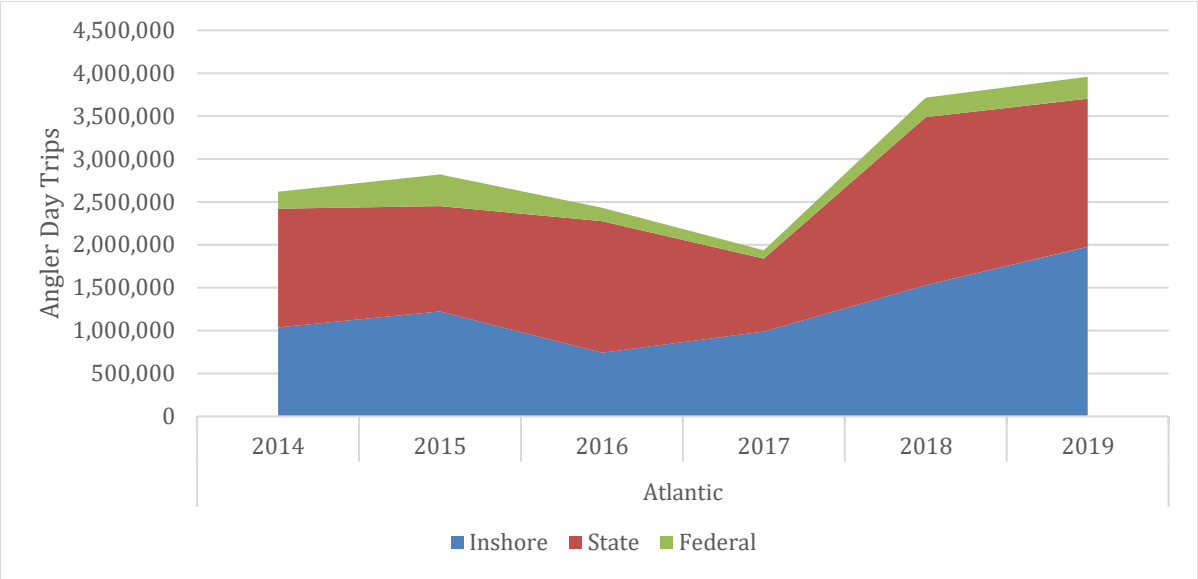

Figure 101. Estimated number of trips targeting or catching large coastal, small coastal, and prohibited or unidentified shark catch in inshore, state, and federal ocean waters of the Atlantic, 2014-2019.

Note: These estimates exclude pelagic shark trips and catch. Source: MRIP.

From 2014 through 2019, MRIP estimates indicate that there were on average 873,000 recreational fishing trips each year that targeted or caught sharks in the Gulf of Mexico (Florida, Alabama, and Mississippi), excluding pelagic shark species. Of these, only 21 percent (178,000) were directed trips where sharks were indicated to be one of the two primary target species (Figure 102), and the remaining 79 percent were classified as incidental trips. Of the directed trips in the Atlantic, 43 percent indicated they were targeting a specific species, with the majority (57 percent) simply indicating they were targeting sharks in general (Figure 103). Of the 873,000 trips that reported catching sharks, 27 percent reported catching a LCS species, 52 percent reported catching a SCS species, and 22 percent reported catching a prohibited shark species or were not able to identify the species they caught (Figure 104). Private boat trips accounted for 61 percent of trips targeting or catching sharks in the Atlantic, with 36 percent being shore-based trips, and only 3 percent being for-hire trips (Figure 105). The recreational coastal shark fishery in the Gulf of Mexico is also overwhelmingly a state-water fishery as only 6 percent of trips targeting or catching coastal sharks occur in federal waters, while 51 percent were in inshore waters, and 43 percent were in state ocean waters (Figure 106).

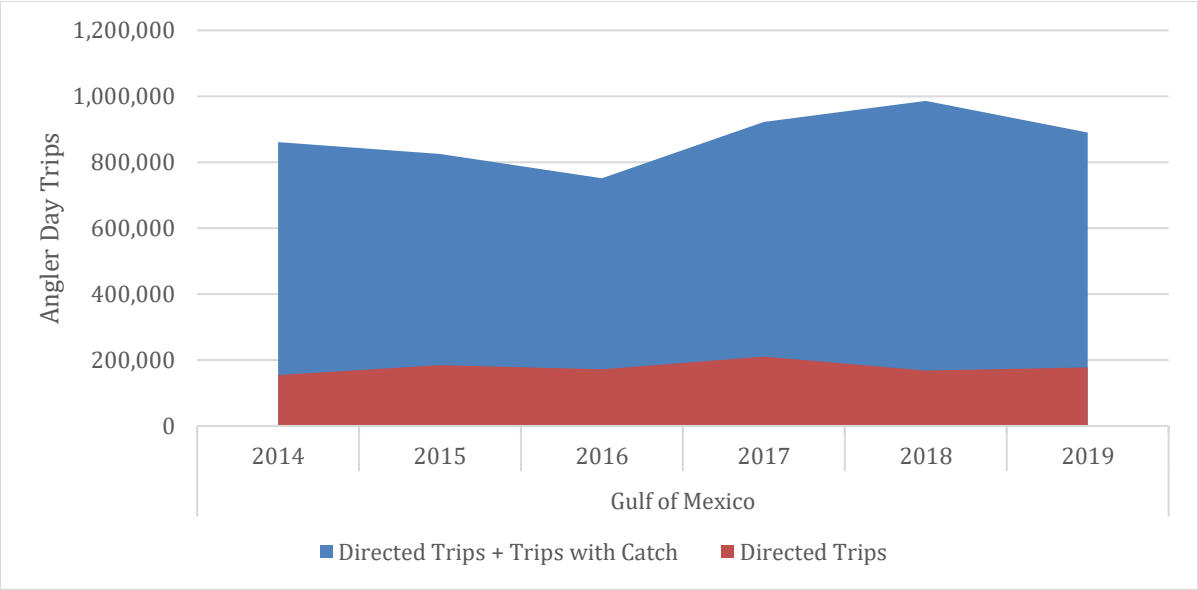

Figure 102. Estimated number of directed coastal shark trips, and trips with coastal, prohibited, or unidentified shark catch in the Gulf of Mexico (Florida to Mississippi), 2014-2019.

Note: These estimates exclude pelagic shark trips and catch. Source: MRIP.

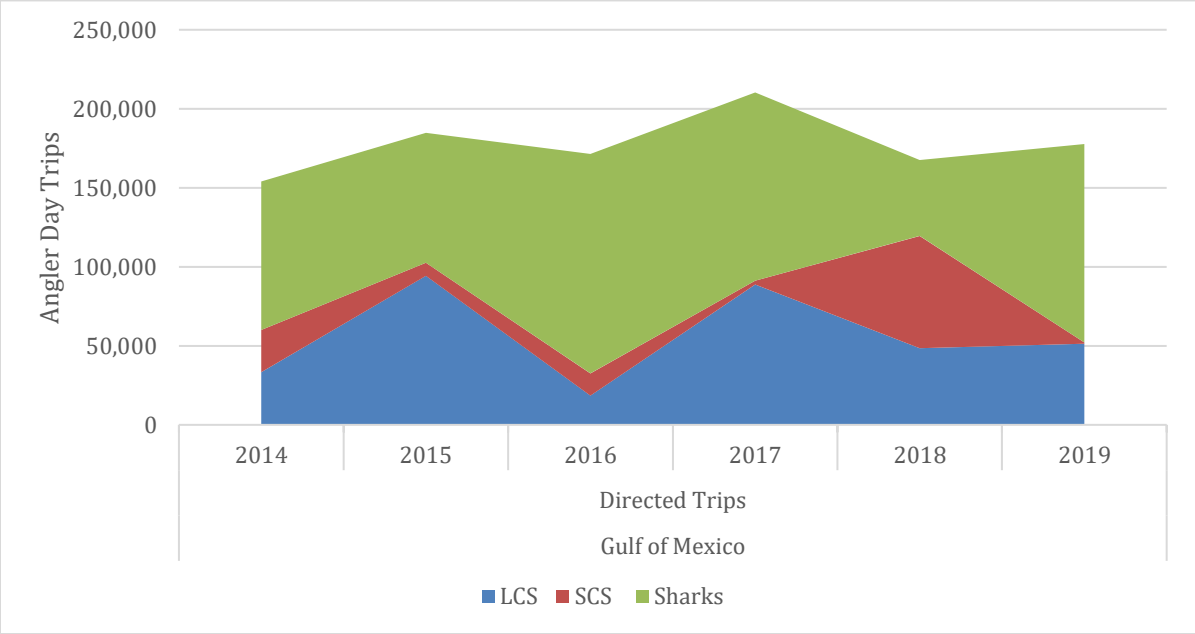

Figure 103. Estimated number of directed large coastal, small coastal, and generic shark trips in the Gulf of Mexico (Florida to Mississippi), 2014-2019.

Note: These estimates exclude pelagic shark trips and catch. Source: MRIP.

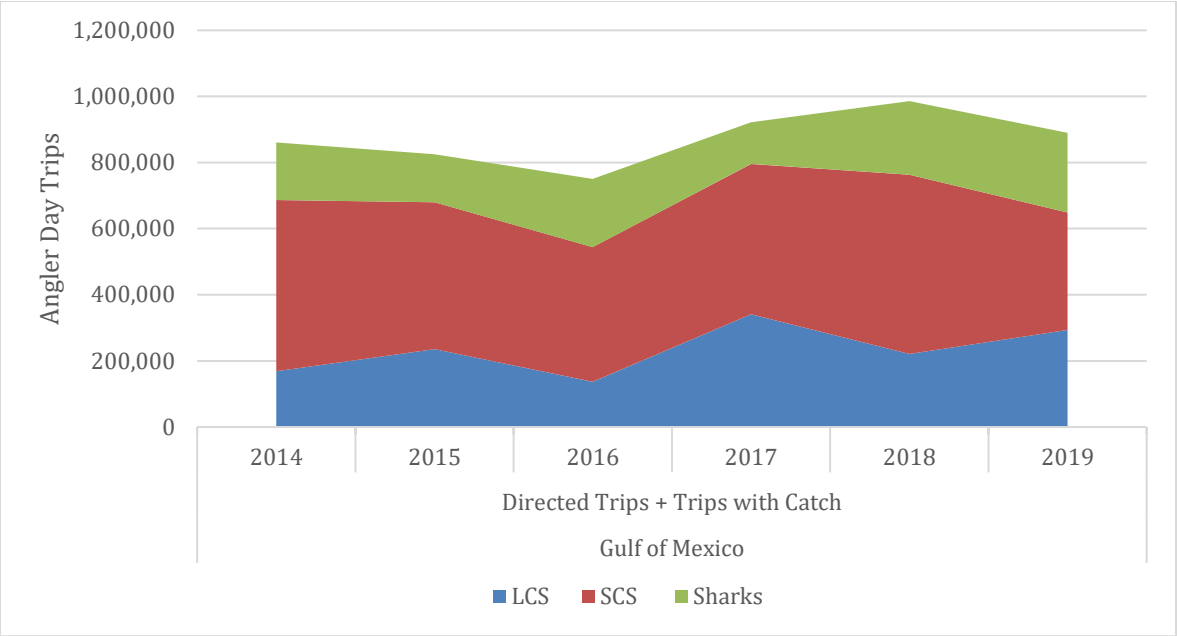

Figure 104. Estimated number of trips with large coastal, small coastal, and prohibited or unidentified shark catch in the Gulf of Mexico (Florida to Mississippi), 2014-2019.

Note: These estimates exclude pelagic shark trips and catch. Source: MRIP.

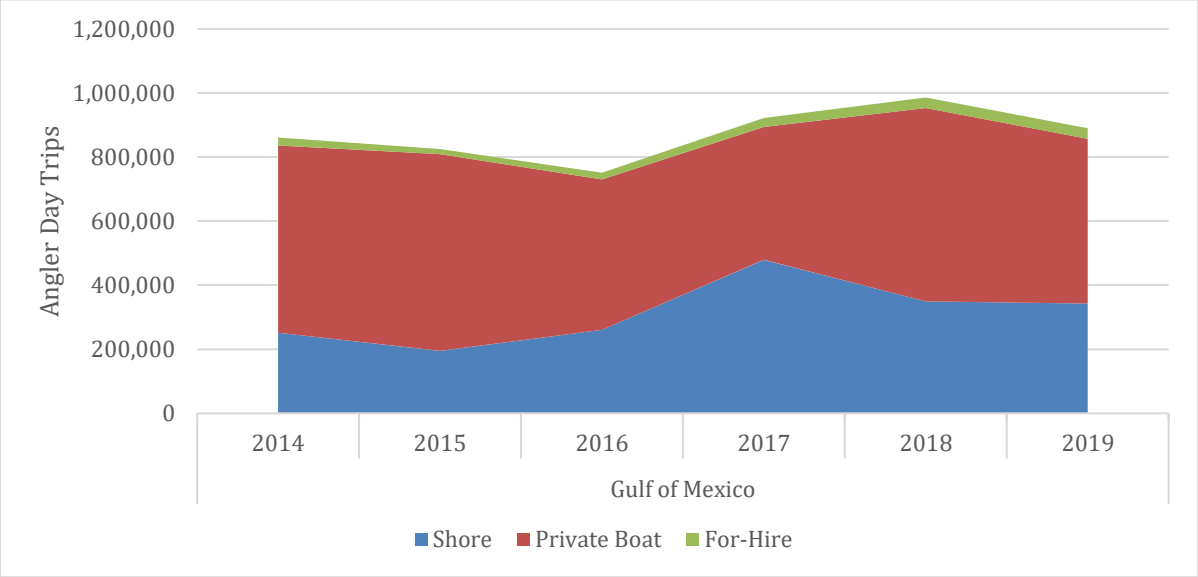

Figure 105. Estimated number of trips targeting or catching large coastal, small coastal, and prohibited or unidentified shark catch by fishing mode in the Gulf of Mexico (Florida to Mississippi), 2014-2019.

Source: MRIP.

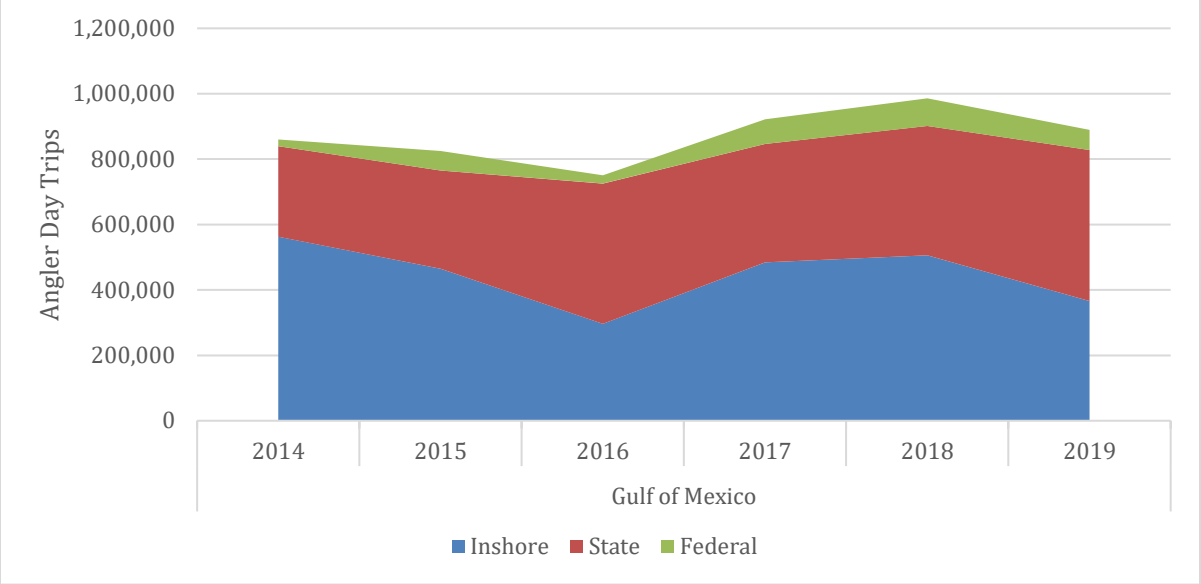

Figure 106. **Estimated number of trips targeting or catching large coastal, small coastal, and prohibited or unidentified shark catch in inshore, state, and federal ocean waters of the Gulf of Mexico, 2014-2019.**

Source: MRIP.

Pelagic Shark Fishing Effort

The LPS is the primary data source for recreational pelagic shark catch, which primarily occurs along the northeast Atlantic coast. The LPS is conducted from Maine to Virginia during the months of June through October. The Large Pelagic Telephone Survey (LPTS) involves interviews with HMS permit holders about their fishing effort, and the Large Pelagic Intercept Survey (LPIS) involves dockside interviews to collect catch data at marinas that are known offshore fishing access sites. In this area, recreational offshore anglers with HMS permits commonly report catches of shortfin mako, thresher, blue, and porbeagle sharks to the LPS. Catch of these species are occasionally reported to MRIP, the LA Creel, and the TPWD recreational angler survey outside of the LPS region and time period, but they are generally rare event species in those programs (see below for more information). As such, all trend analyses of recreational pelagic shark harvest in this report will focus on LPS data rather than MRIP.

From 2014 through 2019, LPS estimates indicate that there were on average 56,000 vessel trips that targeted HMS along the northeast Atlantic coast of the United States. Of those trips, just over 10,000 (18 percent of HMS trips) on average caught pelagic sharks, and approximately 7,720 (14 percent of HMS trips) targeted pelagic sharks (Figure 107). Despite the number of HMS trips increasing slightly over that time period, and the number catching pelagic sharks remaining fairly constant until 2019, there was a sharp drop in the number of trips targeting pelagic sharks in 2018 and 2019 (Figure 108). Because trips harvesting shortfin mako sharks account for approximately 62 percent of all trips targeting pelagic sharks, this drop in number of trips is likely due to the increase in minimum size limits that were implemented for shortfin mako sharks over those two years (Figure 109). Following an ICCAT stock assessment that found shortfin mako sharks overfished with overfishing occurring, NOAA Fisheries

implemented an emergency rule that increased the minimum size for all shortfin mako sharks from 54 to 83 inches FL in 2018 (83 FR 8946). The minimum size limit was further modified in Amendment 11 (84 FR 5358; February 21, 2019) to a minimum size for female shortfin mako sharks of 83 inches FL and a minimum size limit for males of 71 inches FL. The smaller size limit for male sharks was still substantially greater than the previous minimum size limit of 54 inches FL, and shifted harvest pressure from female to male sharks. Overall, the number of directed trips for pelagic sharks declined by approximately 33 percent from 2014 to 2019. The reduction in directed trips was slightly greater for charter trips (36 percent), than for private vessel pelagic shark trips (31 percent) (Figure 110). On average, charter trips accounted for a quarter of all directed pelagic shark trips.

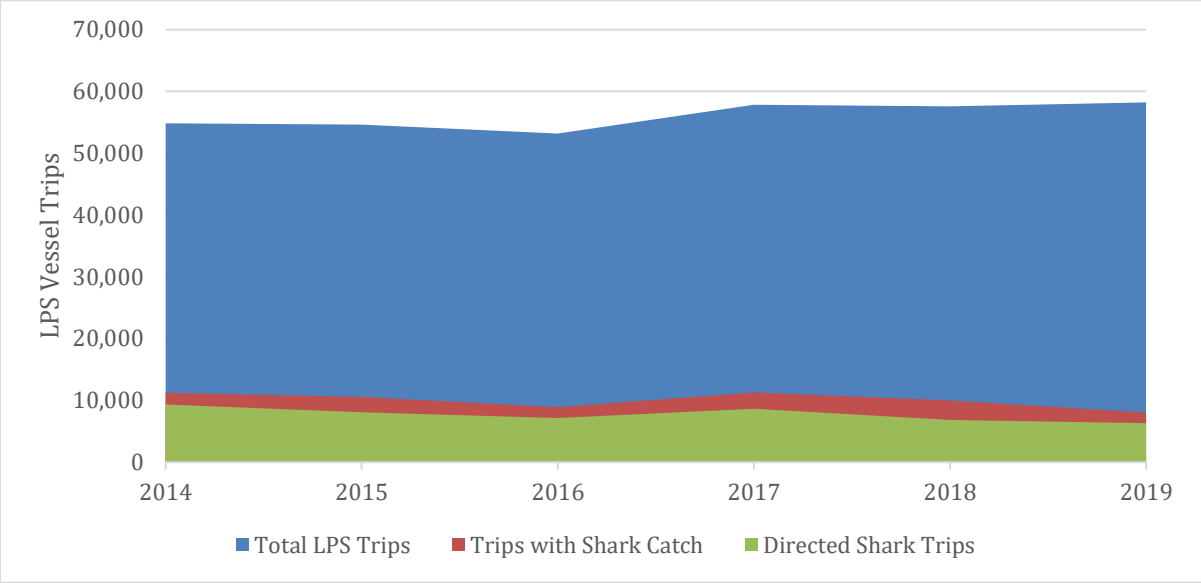

Figure 107. Estimated number of total LPS vessel trips, LPS trips with incidental pelagic shark catch, and directed pelagic shark trips with or without catch, 2014-2019.

Source: LPS.

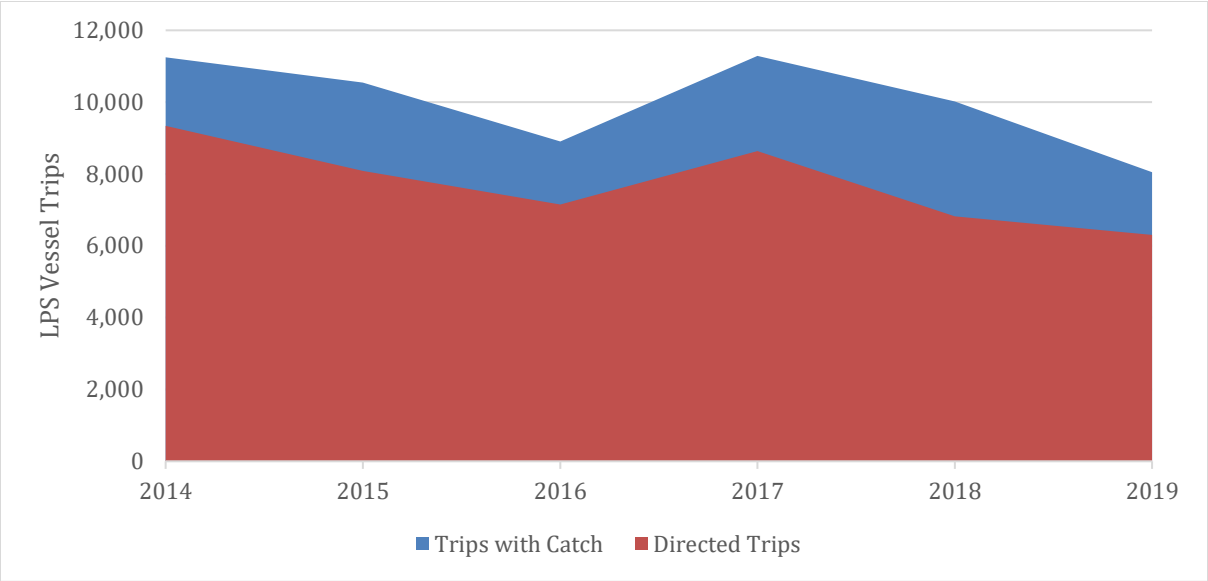

Figure 108. **Estimated number of LPS vessel trips with incidental pelagic shark catch, and directed pelagic shark trips, 2014-2019.**

Source: LPS.

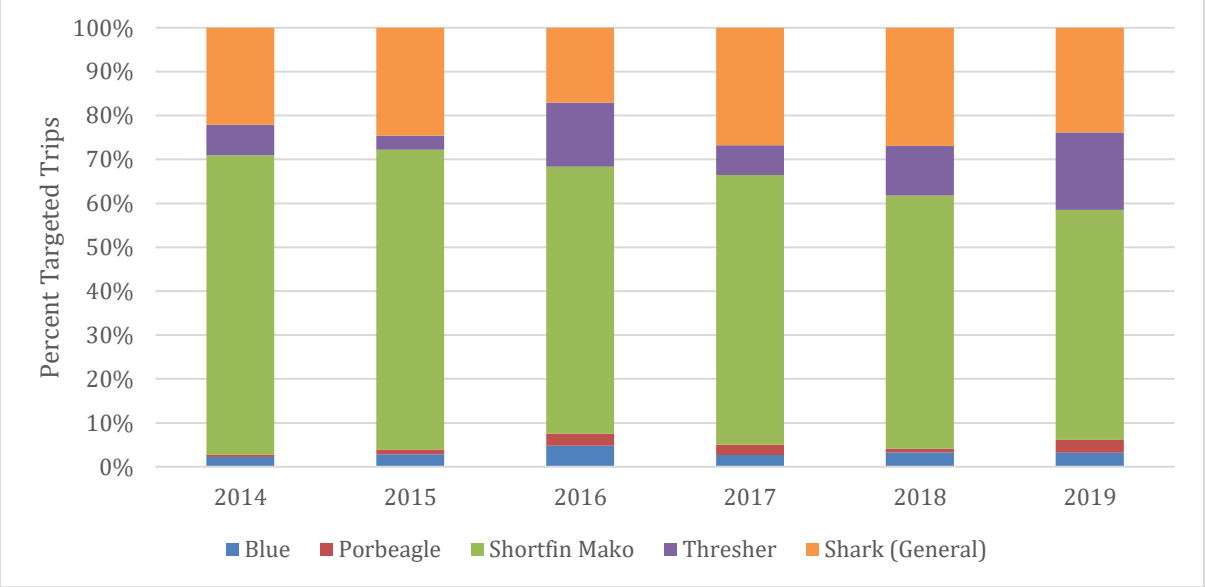

Figure 109. **Percentage of directed pelagic shark trips by primary target species, 2014-2019.**
Source: LPS.

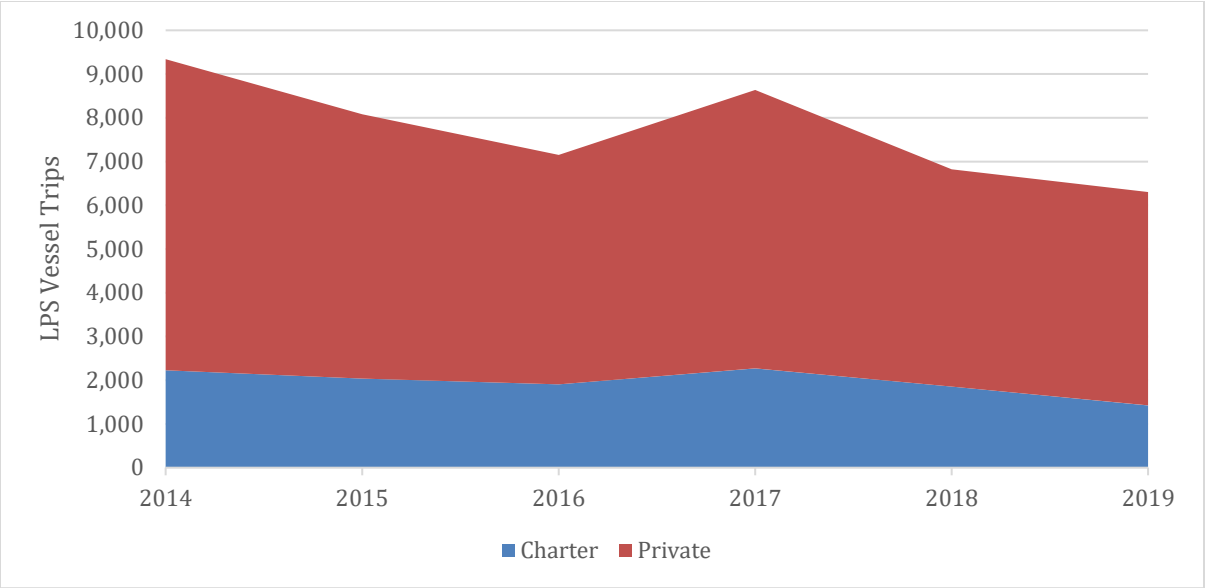

Figure 110. Estimated number of directed pelagic shark vessel trips by charter and private vessels, 2014-2019.

Source: LPS.

Discussion of Fishing Effort Trends

Overall, directed effort targeting coastal shark species remained fairly constant over the review period in both the Atlantic and Gulf of Mexico regions. However, the coastal shark fishery is overwhelmingly an incidental fishery, and incidental fishing effort for coastal sharks has increased in the Atlantic region as indicated by the increasing number of trips with interactions with unidentified sharks. This increase has been particularly pronounced in inshore waters, and to a slightly lesser extent in state ocean waters. In both the Atlantic and Gulf of Mexico regions, the coastal shark fishery is fairly evenly divided between shore and private boat based trips, with the for-hire sector making up a relatively small portion of overall fishing effort. Regulatory changes, including the increased minimum size limit for hammerhead sharks to help end overfishing of scalloped hammerhead sharks (78 FR 40318; August 3, 2013) and the requirement to use circle hooks while shark fishing (82 FR 16478; April 4, 2017), appear to have had minimal impact on fishing effort in the overall coastal shark fishery.

Conversely, the pelagic shark fishery is seeing a steady decline in targeted effort as a result of increased restrictions on the harvest of shortfin mako sharks implemented in 2018 and 2019. As discussed in the following sections, shortfin mako sharks have historically dominated the harvest of pelagic sharks, and were the primary target species in that fishery. With significantly higher minimum size limits recently enacted, directed effort in that fishery has declined by nearly a third.

Recreational Catch of Sharks

This section examines the recreational catch of sharks in the Atlantic and Gulf of Mexico regions from 2014 through 2019. In the context of the recreational fishery, total catch refers to both sharks that were harvested, either kept or discarded dead, by anglers, and those that were

released alive. For coastal shark species, the primary data sources in the Atlantic region are MRIP and the SRHS, while in the Gulf of Mexico region, the data sources are MRIP (Florida to Mississippi), the LA Creel, and the TPWD recreational angler survey. For pelagic sharks, data are from the LPS. In addition to catch data, this section provides length-frequency data of harvested sharks for select species for which there is adequate sample size. This section also provides an overview of catch composition and is then divided into four subsections by species groups including 1) SCS, smooth dogfish, and blacktip sharks; 2) non-blacktip LCS; 3) pelagic sharks; and 4) unidentified shark catch.

Given the terminology used in MRIP reporting, throughout the following section on the recreational catch of sharks, we will be using the following terms to refer to different types of recreational catch:

- **Observed Harvest** – Sharks that were caught, kept, and brought back to the dock where they were identified by a sampler.
- **Unobserved Harvest** – Sharks that were caught and discarded dead, or processed at the dock before they could be viewed by a sampler, and reported by individual anglers.
- **Harvest** – The combination of observed and unobserved harvest.
- **Released** – Sharks that were caught, released alive, and reported by an individual angler.
- **Total Catch –** The combination of harvested and released sharks.

Approximately 376,000 sharks were harvested by recreational anglers in the Atlantic and Gulf of Mexico regions each year with 241,000, or 64 percent, being harvested in the Atlantic region. On average, SCS and smooth dogfish accounted for more than four out of every five (52 and 31 percent, respectively) sharks harvested each year in the Atlantic region (Figure 111). LCS and unidentified dead discards account for an additional 4 and 12 percent of harvested sharks each, and pelagic sharks account for only 1 percent of all harvested sharks. Nearly 13 million sharks were estimated to be released by recreational anglers in this same region each year; only 50 percent of these sharks were identified to species (Figure 111). Unidentified sharks were largely reported by anglers that caught sharks incidentally. As reported in the Discussion of Fishing Effort Trends section, only 13 percent of trips catching sharks in the Atlantic region from 2014 through 2019 were directed trips that targeted sharks (Figure 97). Of the remaining sharks released each year (approximately 6 million) that were identified to species, 22 percent were identified as smooth dogfish, 18 percent were SCS, 10 percent were LCS, and less than half a percent were pelagic sharks (Figure 111).

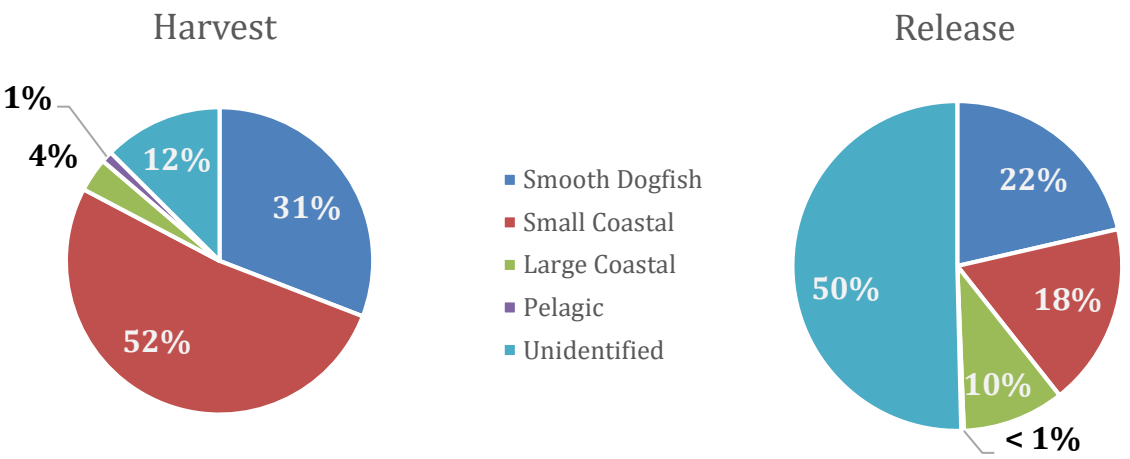

Figure 111. Percentage of sharks harvested and released by species management group and unidentified in the Atlantic, 2014-2019.

Sources: MRIP, LPS, SRHS.

Of the over 14 million sharks caught recreationally in the Atlantic region each year on average, only 9 percent were caught in federal waters with the remainder of the catch split between state inshore (41 percent) and ocean waters (50 percent) (Figure 112). Of the major non-pelagic species, less than 10 percent each of smooth dogfish, SCS, LCS, and unidentified sharks were caught in federal waters. The majority of SCS and unidentified sharks were reported to be caught in state ocean waters, while the majority of smooth dogfish were caught in inshore waters, and LCS catch were evenly split between inshore and oceanside state waters (Figure 112).

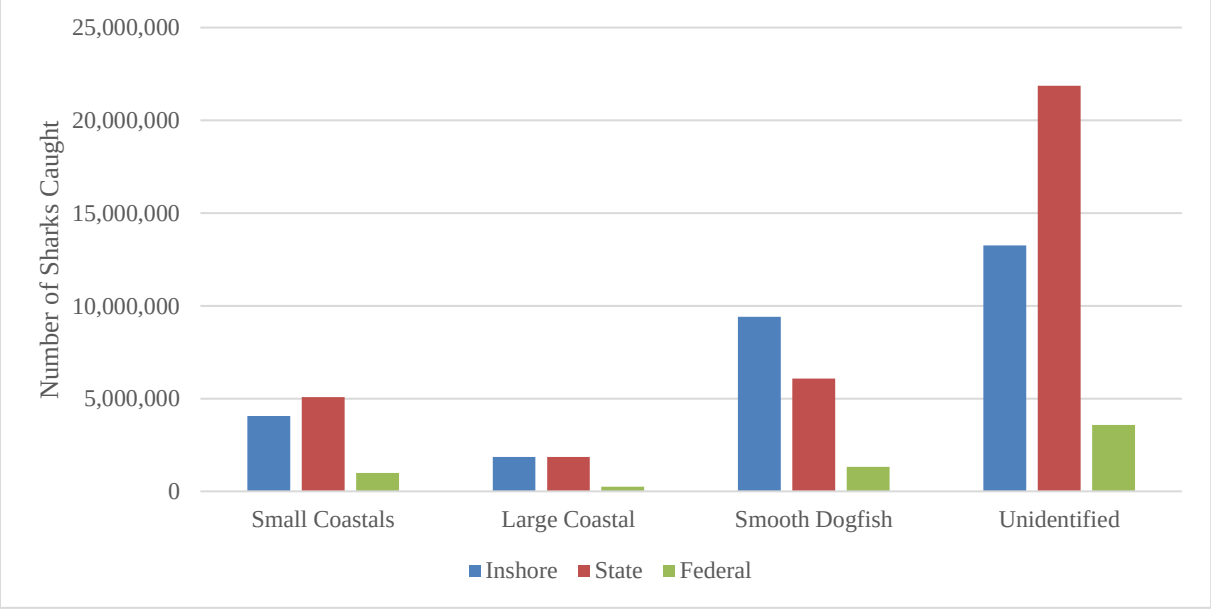

Figure 112. Distribution of SCS, LCS, smooth dogfish, and unidentified sharks caught (harvest and releases) in number by fishing area in the Atlantic, 2014-2019.

Source: MRIP, SRHS.

Approximately 135 thousand sharks were harvested by recreational anglers in the Gulf of Mexico region each year. On average, SCS account for 71 percent of the sharks harvested each year in the Gulf of Mexico region (Figure 113). LCS and unidentified dead discards account for an additional 22 and 7 percent of harvested sharks each, while reported harvest of pelagic sharks and smooth dogfish are both extremely rare. Nearly 2.3 million sharks were estimated to be released by recreational anglers in this same region each year; only 51 percent of these sharks were identified to species (Figure 113). Unidentified sharks were largely reported by anglers that caught sharks incidentally. As reported in the Discussion of Fishing Effort Trends section, only 20 percent of trips catching sharks in the Gulf of Mexico region from 2014 to 2019 were directed trips that purposely targeted sharks (Figure 102). Of the remaining sharks released each year (approximately 1 million) that were identified to species, 22 percent were identified as smooth dogfish, 31 percent were SCS, and 18 percent were LCS (Figure 113).

Of the 2.4 million sharks caught recreationally in the Gulf of Mexico region each year on average, only 14 percent were caught in federal waters with the remainder of the catch split between state inshore (48 percent) and ocean (38 percent) waters (Figure 114). LCS catch in the Gulf of Mexico region is split between state inshore waters and federal waters at 44 percent each, while only 3 percent of SCS were caught in federal waters of the Gulf of Mexico. The majority (62 percent) of SCS were caught in state inshore waters, while the majority (50 percent) of unidentified sharks in the Gulf of Mexico region were reportedly caught in state ocean waters (Figure 114).

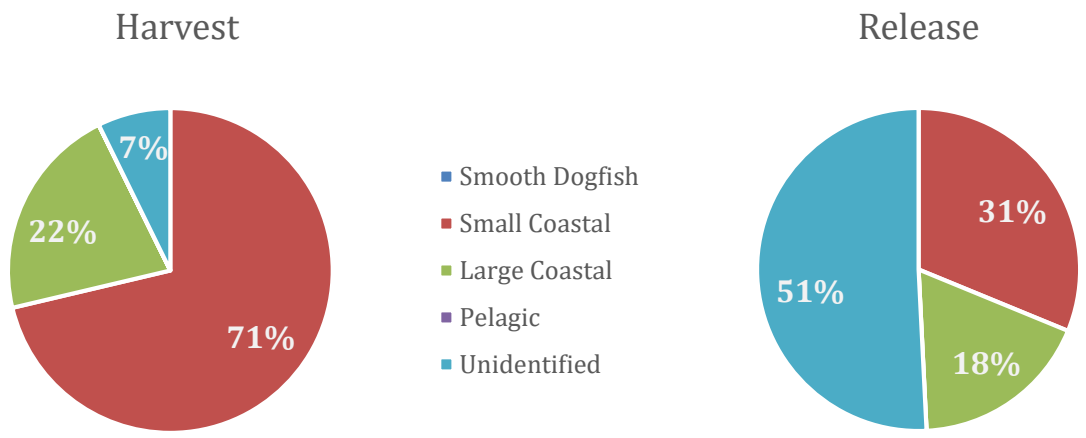

Figure 113. Percentage of sharks harvested and released by species management group and unidentified in the Gulf of Mexico, 2014-2019.
Sources: MRIP, SRHS, LA Creel, TPWD.

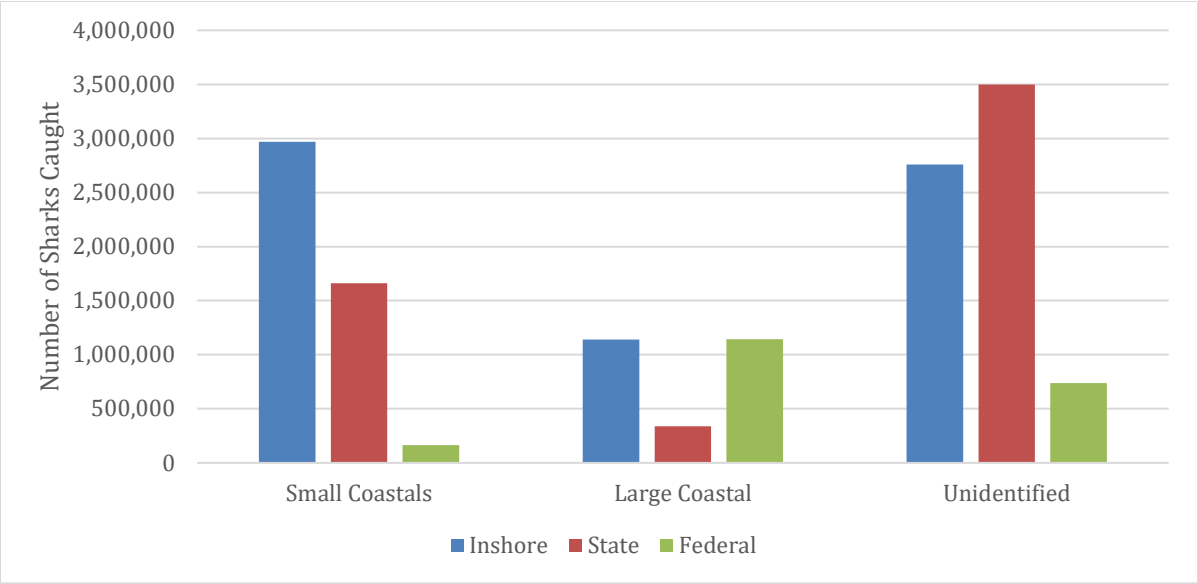

Figure 114. Distribution of SCS, LCS, and unidentified sharks caught (harvest and releases) in numbers by fishing area in the Gulf of Mexico, 2014-2019.
Source: MRIP, SRHS, LA Creel, TPWD.

Smooth Dogfish, Small Coastal, and Blacktip Shark Catch

The SCS complex includes the Atlantic sharpnose, bonnethead, finetooth, and blacknose sharks. These are among the most abundant, and most commonly caught shark species in U.S. Atlantic waters. Smooth dogfish and blacktip sharks have been added to this section as the frequency of their catch, and by extension the precision of their catch estimates, is much more comparable in scale to SCS than other shark species. Blacktip sharks are traditionally included in the LCS complex, but they make up such a large portion of overall LCS catch that it becomes very difficult to interpret graphical representations of other LCS species catch when placed alongside blacktip shark catch.

Figure 115 and Figure 116 show total harvest and releases, respectively, of smooth dogfish, SCS, and blacktip sharks from 2014 to 2019 by fishery management council region. These species represent the most commonly caught sharks in the Atlantic and Gulf of Mexico regions. In fact, excluding unidentified sharks, these six species account for more than 85 percent of all shark catches reported in the Atlantic HMS recreational shark fishery. Overall, 95 percent of the catch of these six shark species is released. Smooth dogfish were the third most commonly harvested shark, and overwhelmingly the most commonly released species with over 95 percent of their catch occurring in the Mid-Atlantic or New England area (Figure 115 and Figure 116). Atlantic sharpnose sharks were the most commonly harvested shark in the recreational fishery, and the third most commonly released, while bonnethead sharks were the second most commonly harvested and released. Both species were most commonly caught in the South Atlantic area, but see a significant portion of their catch occurring in the Gulf of Mexico region. Blacktip sharks rank fourth in both harvest and releases, but notably 88 percent of their harvest occurs in the Gulf of Mexico region while only 42 percent of their releases occur in the same region (Figure 115

and Figure 116). Blacknose and finetooth sharks were the only SCS species whose estimated catch is exceeded by any LCS species (blacktip, bull, and spinner sharks), and this is likely due to the fact that very few individuals of these species exceed the federal minimum size limit of 54 inches FL. Almost all harvest of these two species comes from Florida state waters where they are not managed under any minimum size limit.

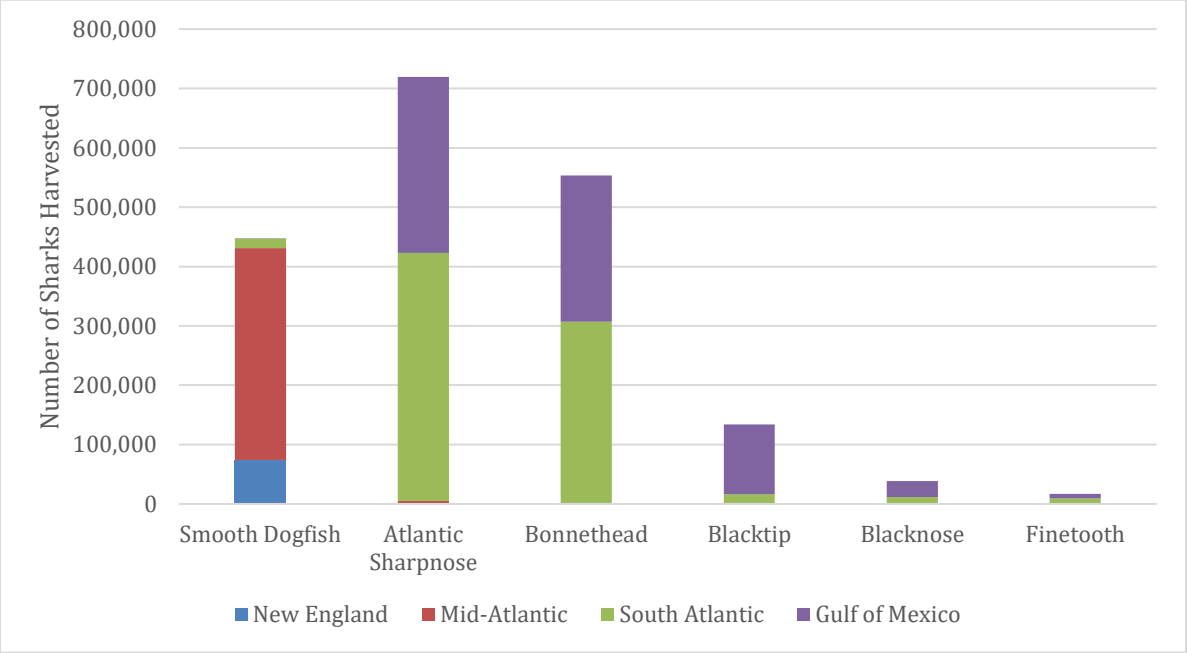

Figure 115. Number of smooth dogfish, SCS, and blacktip sharks harvested by fishery management council region, 2014-2019.
Source: MRIP, SRHS, LA Creel, TPWD.

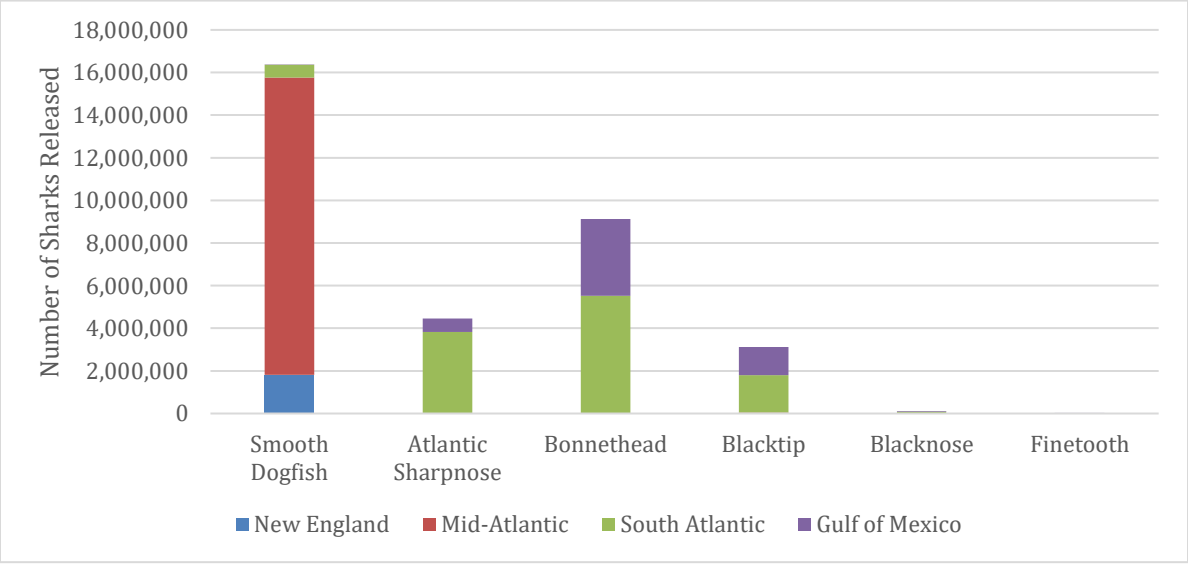

Figure 116. Number of smooth dogfish, SCS, and blacktip sharks released by fishery management council region, 2014-2019.
Source: MRIP, SRHS, LA Creel, TPWD.

Figure 117 presents the annual harvest and release estimates for smooth dogfish in the Atlantic region from 2014 to 2019. Less than 3 percent of smooth dogfish catch was harvested over the six-year time period, and this has remained relatively consistent across years. A trend of steeply declining catch estimates is evident across the time series with the 2019 release estimate approximately 32 percent of the 2015 estimate. Due to the rare event nature of many shark species in the recreational catch surveys like MRIP, it is not unusual for estimates to vary widely for many species from year to year, but smooth dogfish are reported frequently enough that this is generally not the case. In fact, the highest percent standard error (PSE) on any annual release estimate during this timeframe was only 18.5, a remarkably precise estimate for a shark species.

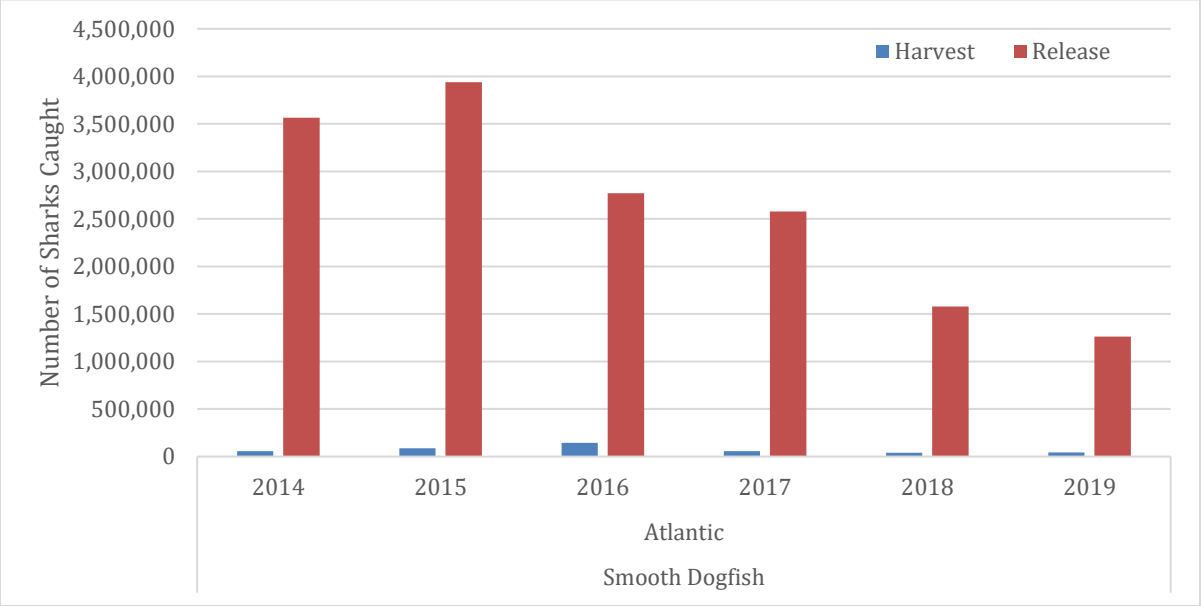

Figure 117. Number of smooth dogfish harvested and released by year in the Atlantic, 2014-2019.
Sources: MRIP, SRHS.

Figure 118 shows the length frequency distribution of harvested smooth dogfish observed by the MRIP dockside survey, the Access Point Angler Intercept Survey (APAIS), from 2010 through 2019. A longer timeframe was used for analysis of length data in order to insure adequate sample sized given the largely catch and release nature of most shark fishery. As smooth dogfish is one of the most frequently harvested shark species, and of the 809 individuals MRIP measured over the 10-year period, average length was23.3 inches (60 cm) and median length was 20 inches. The length distribution skews towards smaller fish. The age at maturity for smooth dogfish ranges from 34 inches (86 cm) for males and 40 inches (102 cm) for females (Conrath et al. 2002). Approximately 80 percent of the recreational smooth dogfish catch was below the age at maturity.

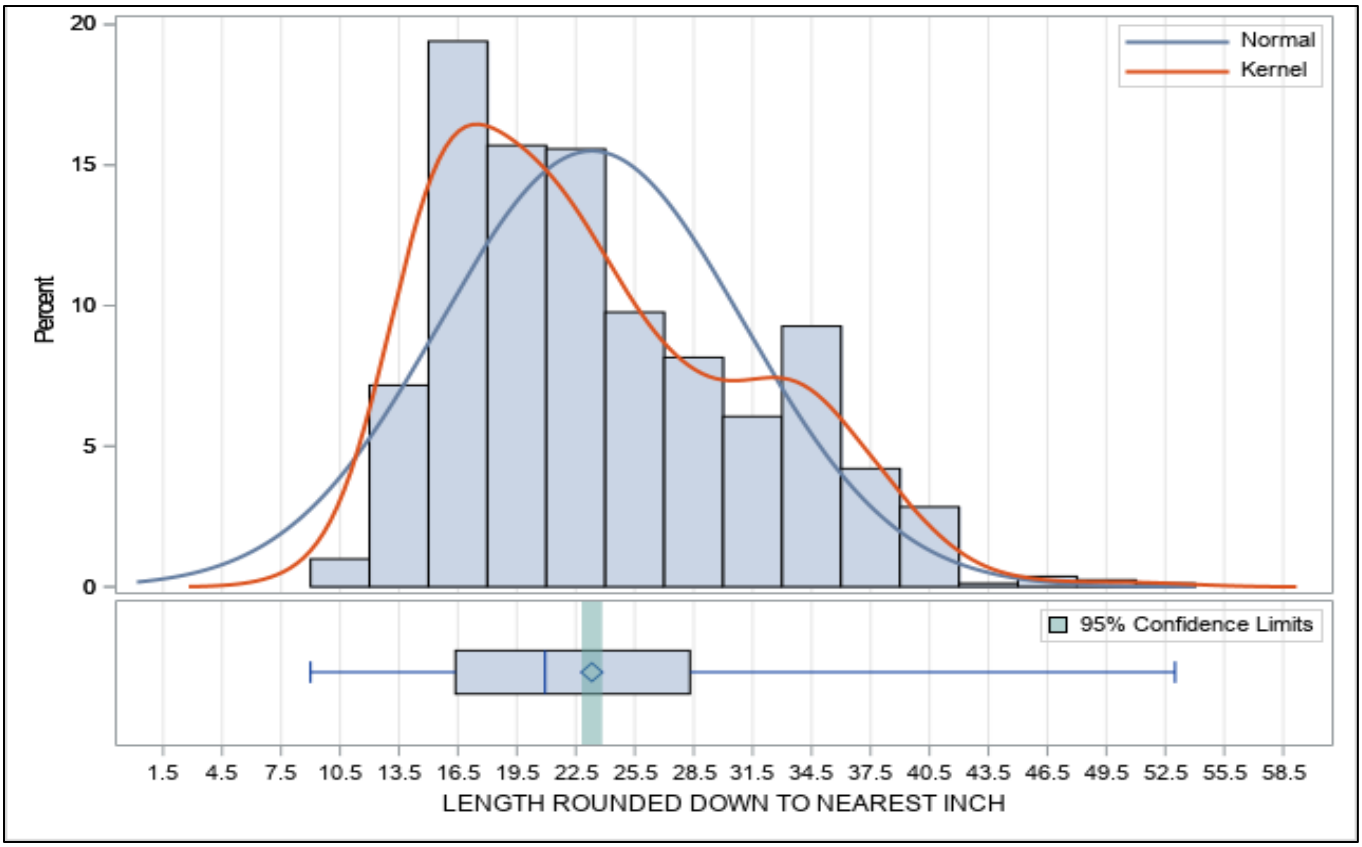

Figure 118. Length frequency distribution of harvested smooth dogfish, 2010-2019.
Figure includes a histogram showing percent catch at size, and a box and whisker plot demonstrating average size (diamond) with box showing 95% confidence limit of the size estimate. Whiskers show size range of measured sharks. This figure also includes a kernel density plot to illustrate how much the observed length frequency data deviate from the normal distribution assumed when calculating population averages. Source: MRIP.

Figure 119 presents the annual harvest and release estimates for Atlantic sharpnose sharks, the most frequently harvested shark species, in the Atlantic and Gulf of Mexico regions from 2014 to 2019. Approximately 10 percent of the Atlantic region catch and 33 percent of the Gulf of Mexico region catch was harvested. Declining catch rates were observed in both the Atlantic and Gulf of Mexico regions from 2016 through 2019, although the 2016 estimate can be characterized as a spike in both regions, with the 2016 release estimate in the Atlantic region being almost double the 2015 estimate. Without the 2016 estimates, catch in the Gulf of Mexico region appears to have been flat across the six years, and there is a much more modest declining trend in the Atlantic region.

Figure 120 shows the length frequency distribution of harvested Atlantic sharpnose sharks observed by MRIP from 2010 to 2019. This includes measurements on 1,726 individual sharks, the most of any species by far. Average length of harvested Atlantic sharpnose sharks was 27.3 inches FL, or 70 cm, with the median size being only slightly larger at 27.5 inches FL. The length distribution is slightly skewed to the right, and heavily concentrated in the 24-31 inch range. Atlantic sharpnose sharks mature at 25-32 inches FL (65-80 cm) for males, and 34-36 inches FL (85-90 cm) for females (Frazier et al. 2014). Approximately 80 percent of Atlantic sharpnose sharks measured by MRIP fell within this size range.

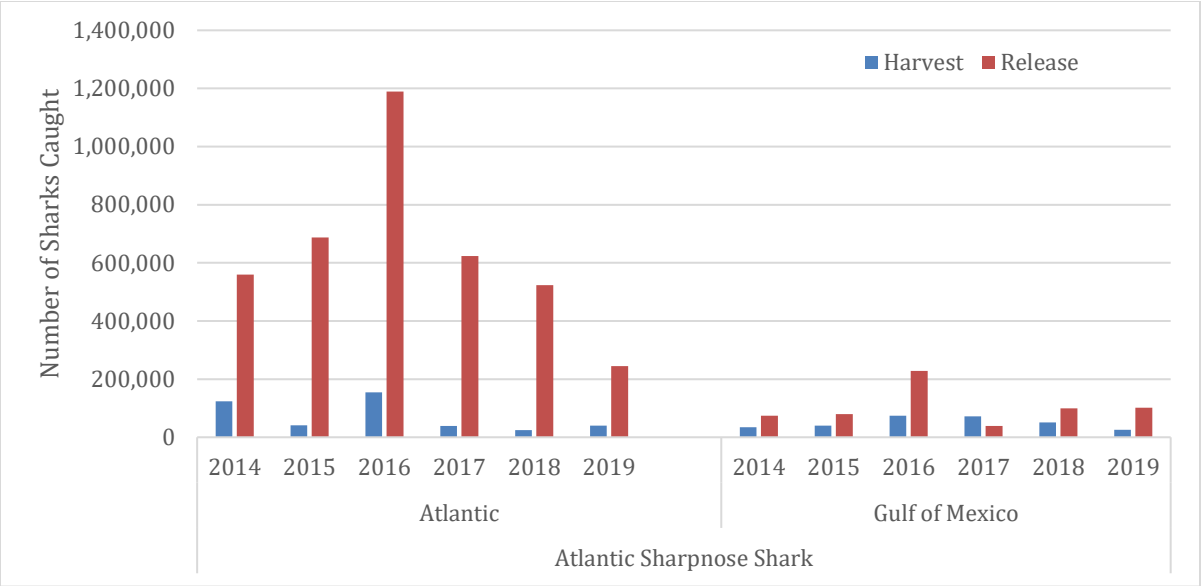

Figure 119. Number of Atlantic sharpnose sharks harvested and released by year in the Atlantic and Gulf of Mexico, 2014-2019.

Source: MRIP, SRHS, LA Creel, TPWD.

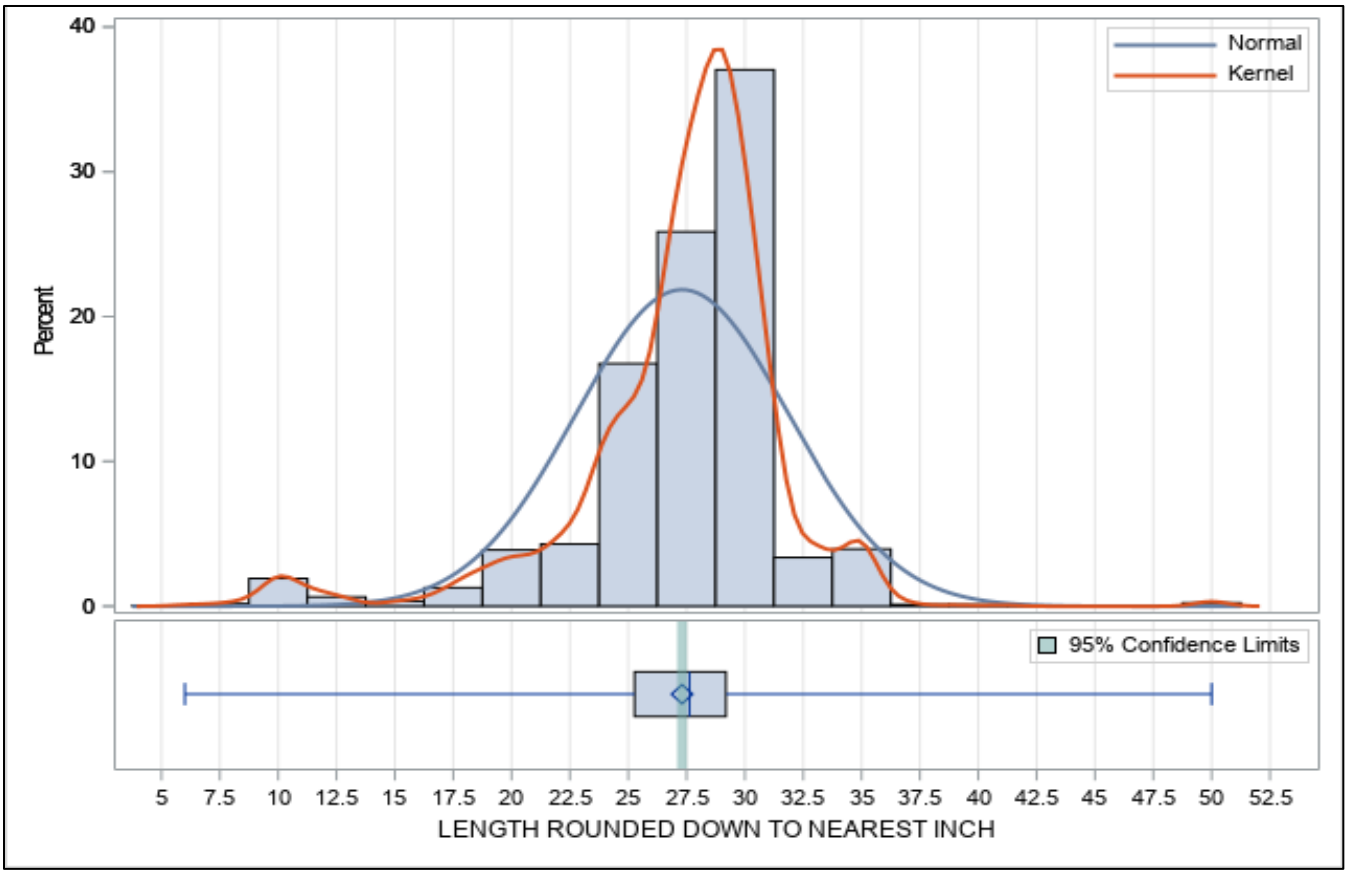

Figure 120. Length frequency distribution of harvested Atlantic sharpnose sharks, 2010-2019.
Figure includes a histogram showing percent catch at size, and a box and whisker plot demonstrating average size (diamond) with box showing 95% confidence limit of the size estimate. Whiskers show size range of measured sharks. Source: MRIP.

Figure 121 presents the annual harvest and release estimates for bonnethead sharks in the Atlantic and Gulf of Mexico regions from 2014 through 2019. Approximately 5 percent of the Atlantic region catch, and 6 percent of the Gulf of Mexico region catch was estimated to be harvested, making bonnethead sharks the least likely to be harvested among the SCS species as a proportion of their entire catch. No consistent pattern or trend in bonnethead catches could be observed over the time series. Catches in the Atlantic spiked in 2016 similar to Atlantic sharpnose sharks, but this was also the lowest year of catches in the Gulf of Mexico region. Overall, annual catches in the Gulf of Mexico region were generally more consistent than in the Atlantic.

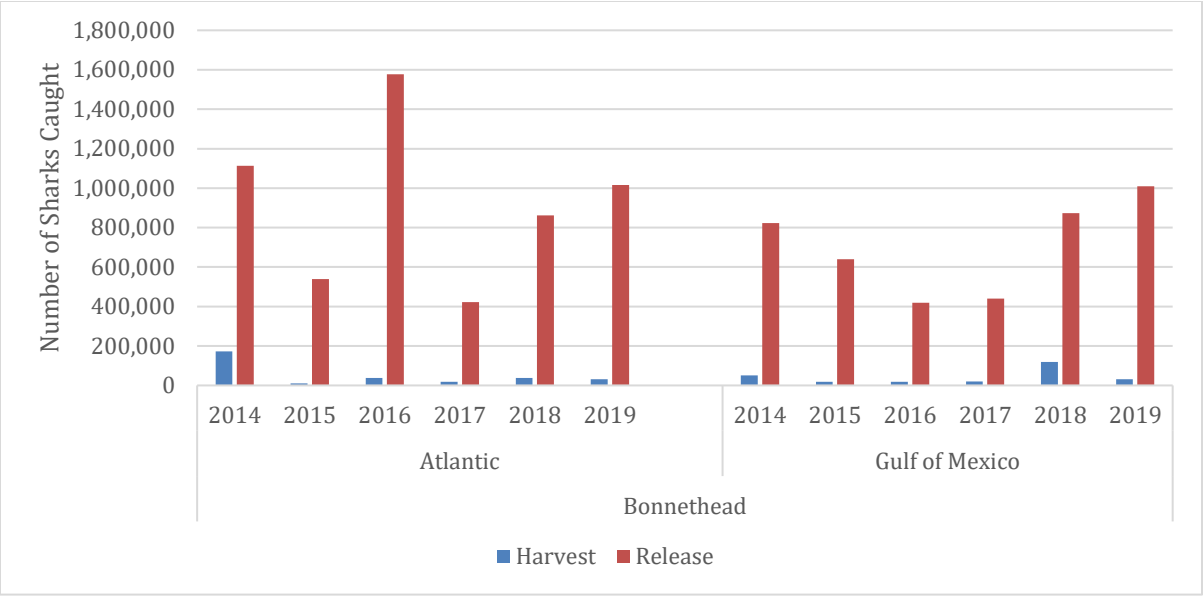

Figure 121. Number of bonnethead sharks harvested and released by year in the Atlantic and Gulf of Mexico, 2014-2019.

Source: MRIP, SRHS, LA Creel, TPWD.

Figure 122 shows the length frequency distribution of harvested bonnethead sharks observed by MRIP from 2010 through 2019. This includes measurements on 358 individual sharks. Average length of harvested bonnethead sharks was 26.4 inches FL, or 68 cm, with the median size being only slightly smaller at 26 inches FL. The length distribution is slightly skewed to the right (shorter fish), but presents the most normally distributed of all the shark length distributions. Approximately half of all measured bonnethead sharks were between 23 and 32 inches FL. Bonnethead sharks mature at 25 inches FL (62 cm) for males, and 34 inches FL (85 cm) for females (Frazer et al. 2014). Approximately 80 percent of bonnethead sharks measured by MRIP fell within this size range.

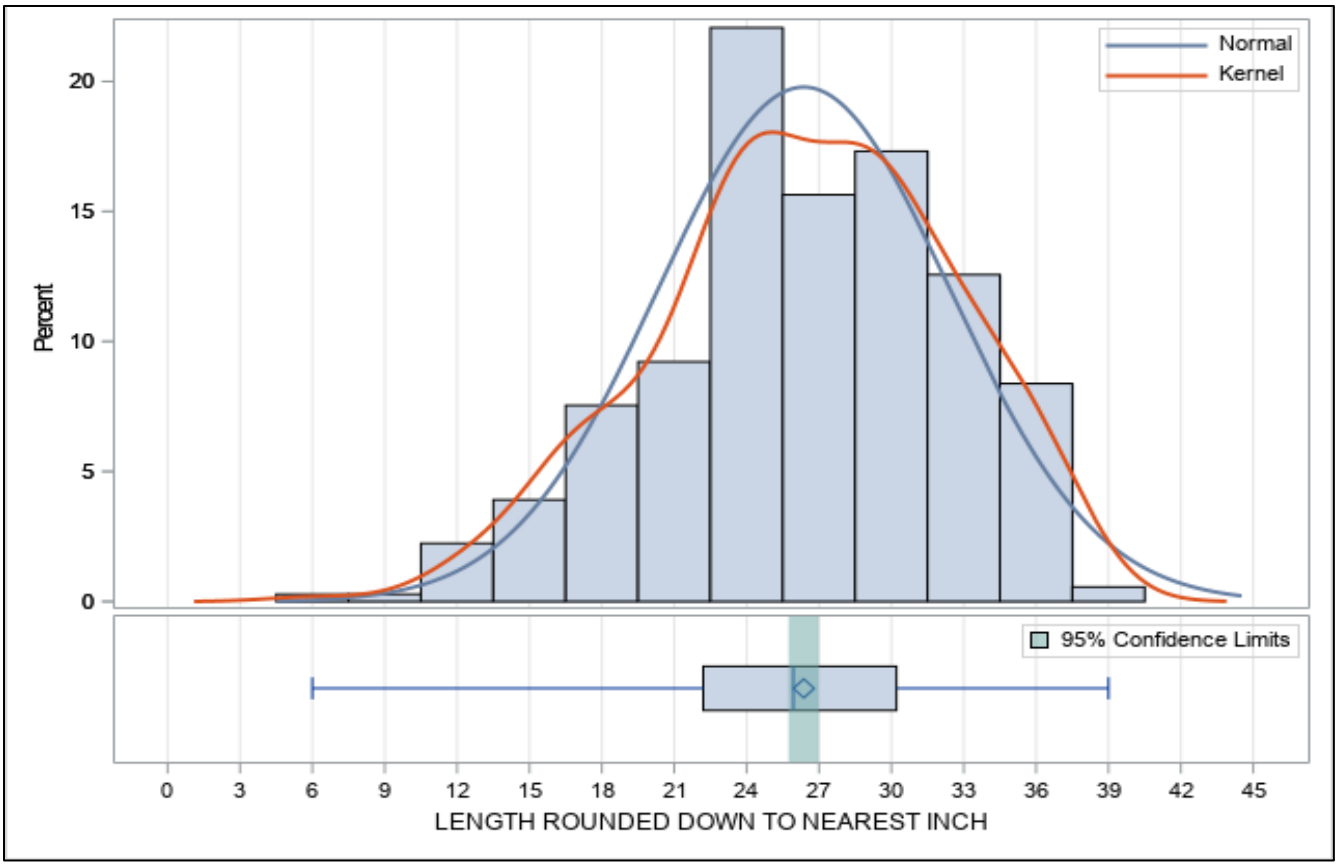

Figure 122. Length frequency distribution of harvested bonnethead sharks, 2010-2019.
Figure includes a histogram showing percent catch at size, and a box and whisker plot demonstrating average size (diamond) with box showing 95% confidence limit of the size estimate. Whiskers show size range of measured sharks. This figure also includes a kernel density plot to illustrate how much the observed length frequency data deviate from the normal distribution assumed when calculating population averages. Source: MRIP.

Figure 123 presents the annual harvest and release estimates for blacknose sharks in the Atlantic and Gulf of Mexico regions from 2014 through 2019. Approximately 12 percent of the Atlantic region catch and 48 percent of the Gulf of Mexico region catch of blacknose sharks was estimated to be harvested. The high percentage of blacknose shark catch harvested in the Gulf of Mexico region, compared to other SCS, suggests that many released blacknose sharks in the region may be reported to MRIP as generic sharks or requiem sharks rather than to the species. Blacknose sharks are a much rarer-event species in the recreational surveys compared to Atlantic sharpnose and bonnethead sharks. Despite this fact, the annual catch estimates for the species were fairly consistent with the exception of the 2015 release estimate of 52 thousand sharks. This one estimate is nearly five times greater than the second highest release estimate in the time series. Low annual estimates of releases, such as 2019 in the Atlantic, and 2017 in the Gulf of Mexico region suggest estimates of blacknose shark catch were highly susceptible to random sampling error, which is not uncommon for rare event species.

Figure 124 shows the length frequency distribution of harvested blacknose sharks (only 73 individuals) observed by MRIP from 2010 to 2019. Average length was 33 inches FL, or 85 cm, with the median size only slightly smaller at 32 inches FL. The length distribution of sampled blacknose sharks was bimodal with peaks at 30 and 36 inches FL. No blacknose sharks over 45

inches FL were sampled by MRIP during the 6-year time series and this is significant as blacknose sharks are managed under a 54-inch FL minimum size limit in all waters outside of Florida state waters. As blacknose sharks mature at 32 inches FL (80 cm) for males, and 34 inches FL (85 cm) for females (Driggers et al. 2010), half of the blacknose sharks harvested in the recreational fishery were immature.

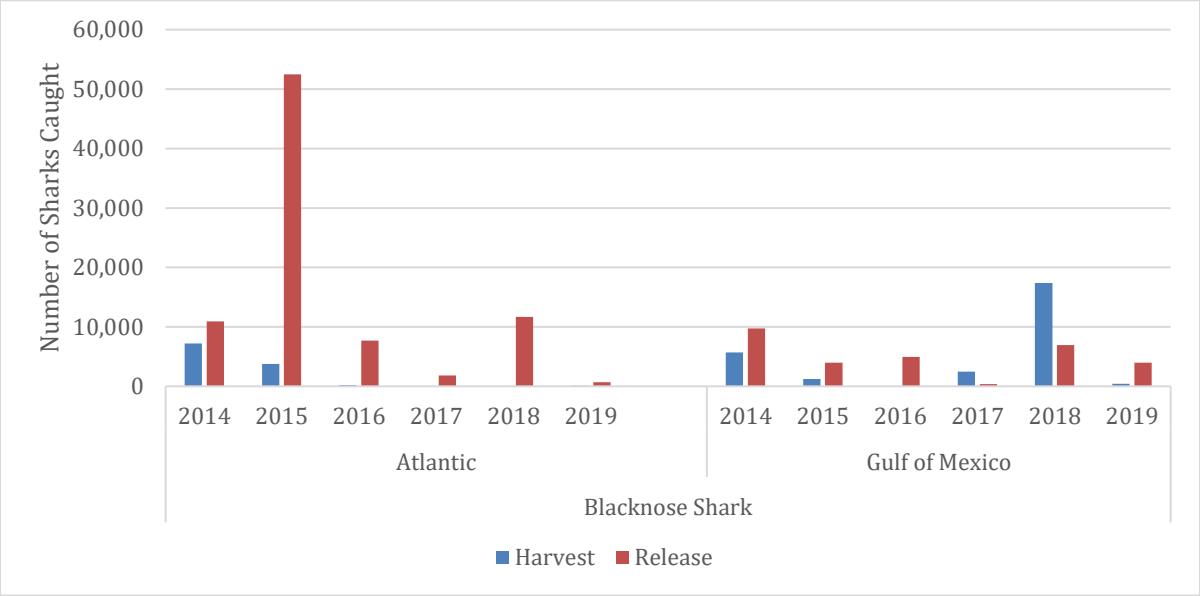

Figure 123. Number of blacknose sharks harvested and released by year in the Atlantic and Gulf of Mexico, 2014-2019.

Source: MRIP, SRHS, LA Creel, TPWD.

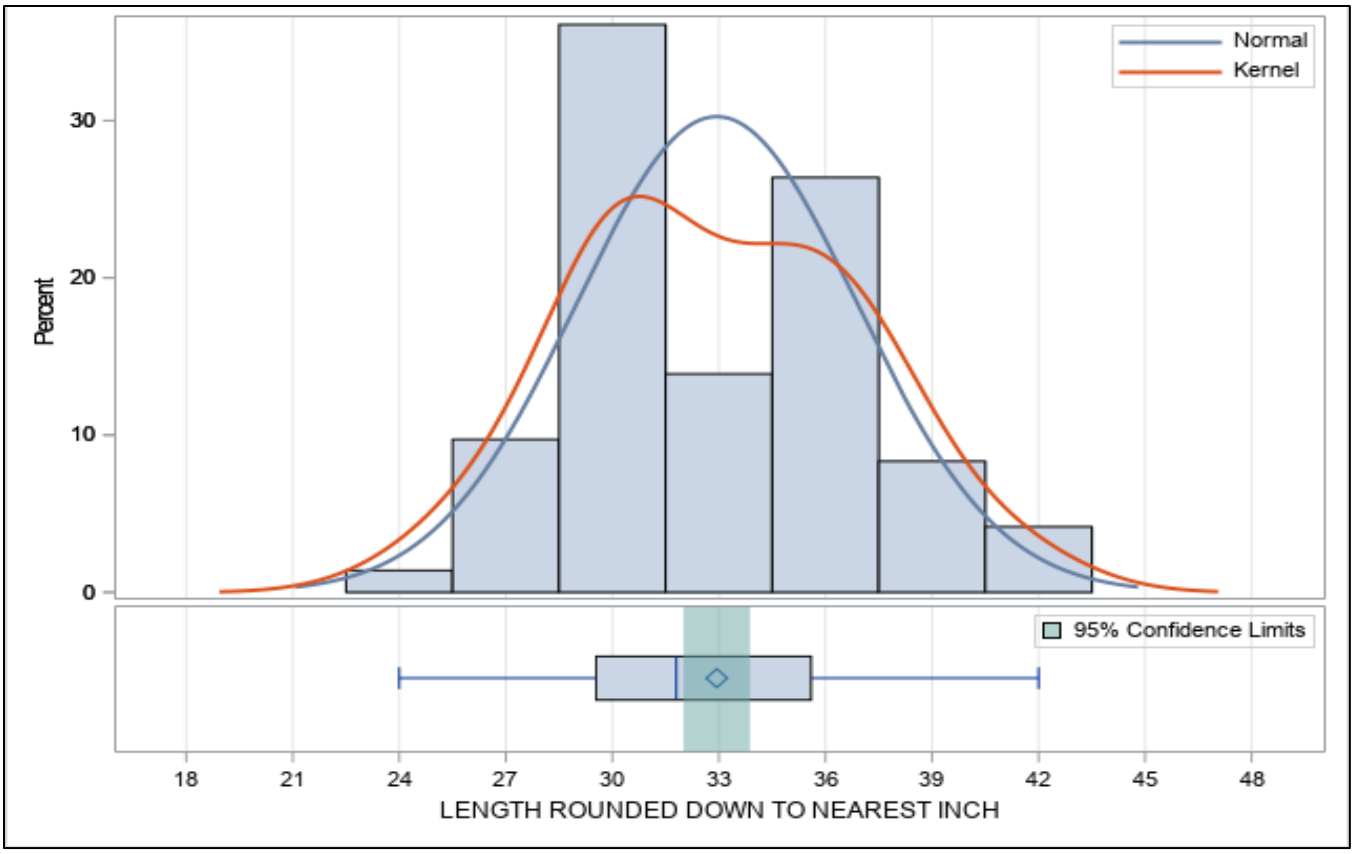

Figure 124. Length frequency distribution of harvested blacknose sharks, 2010-2019.
Figure includes a histogram showing percent catch at size, and a box and whisker plot demonstrating average size (diamond) with box showing 95% confidence limit of the size estimate. Whiskers show size range of measured sharks. This figure also includes a kernel density plot to illustrate how much the observed length frequency data deviate from the normal distribution assumed when calculating population averages. Source: MRIP.

Figure 125 presents the annual harvest and release estimates for finetooth sharks in the Atlantic and Gulf of Mexico regions from 2014 through 2019. Finetooth sharks are the rarest event species among the SCS complex, and that shows in the unusual patterns of harvest versus release estimates. An estimated 42 percent of finetooth sharks caught in the Atlantic region and a full 99 percent in the Gulf of Mexico region were harvested over the 6-year time series. This suggests a larger than normal percentage of released finetooth sharks were not reported to species. As a rare event species, the unusual patterns in the time series could also be partly explained by random sampling error as PSEs for both harvest and release estimates commonly exceed 50 percent.

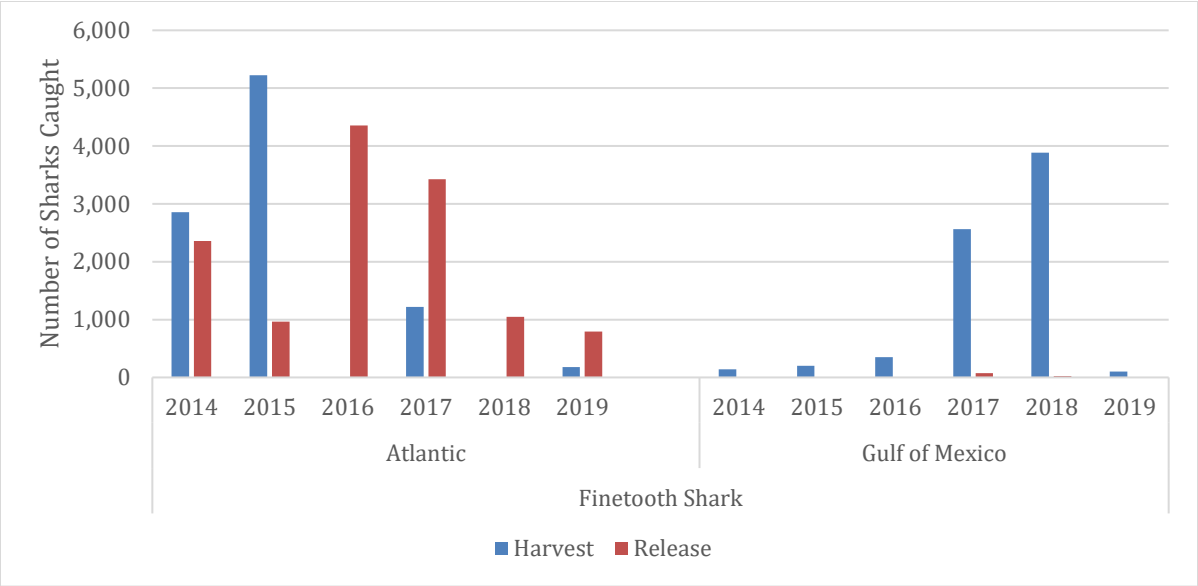

Figure 125. Number of finetooth sharks harvested and released by year in the Atlantic and Gulf of Mexico, 2014-2019.

Source: MRIP, SRHS, LA Creel, TPWD.

Figure 126 shows the length frequency distribution of harvested finetooth sharks (41 individuals) observed by MRIP from 2010 through 2019. Average length was 31 inches FL, or 79 cm, with the median size being several inches smaller at 27 inches FL. The heavy skew to the left of the distribution is not surprising as 40 percent of sampled finetooth sharks measured 27 inches FL. Similar to blacknose sharks, finetooth sharks are managed under a 54-inch FL minimum size limit in all waters except Florida state waters. Finetooth sharks mature at 37 inches FL (96 cm) for males, and 40 inches FL (104 cm) for females (Hendon et al. 2014). This suggests that approximately 67 percent of finetooth sharks harvested in the recreational fishery were immature.

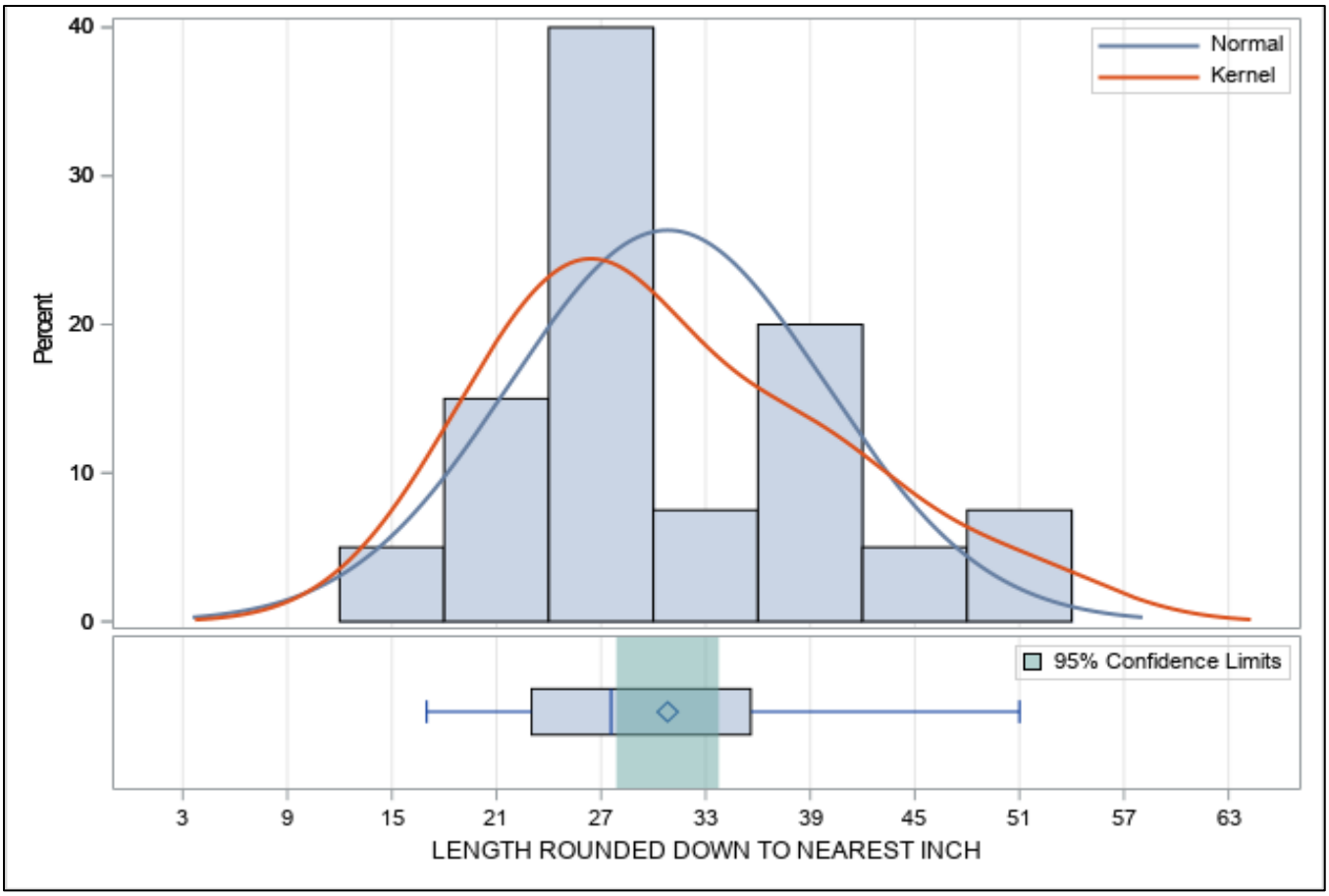

Figure 126. Length frequency distribution of harvested finetooth sharks, 2010-2019.
Figure includes a histogram showing percent catch at size, and a box and whisker plot demonstrating average size (diamond) with box showing 95% confidence limit of the size estimate. Whiskers show size range of measured sharks. This figure also includes a kernel density plot to illustrate how much the observed length frequency data deviate from the normal distribution assumed when calculating population averages. Source: MRIP.

Figure 127 presents the annual harvest and release estimates for blacktip sharks in the Atlantic and Gulf of Mexico regions from 2014 to 2019. Blacktip sharks are classified within the LCS complex, but tend to fall within a size range that fits somewhere between the SCS and the non-blacktip LCS. Only one percent of blacktip sharks caught in the Atlantic region, and 8 percent in the Gulf of Mexico region were harvested. Blacktip sharks were the fourth most commonly caught shark overall, and the most commonly caught of all the LCS, accounting for approximately 60 percent of total LCS recreational catch. Despite their higher catch rates and precise release estimates (all PSEs less than 50 percent and most less than 35 percent), there was significant variability in the blacktip shark catch estimates across the six-year time series. Release estimates in the Atlantic region dropped significantly in 2016 and 2017 before increasing in 2018 and 2019. Meanwhile, release estimates in the Gulf of Mexico region did not show a pattern, although four of the six years fell in the narrow range of 130-160 thousand sharks released. Recent stock assessments in both the Gulf of Mexico and Atlantic regions suggest each region's stocks are not overfished.

Figure 128 shows the length frequency distribution of harvested blacktip sharks observed by MRIP from 2010 to 2019. This includes measurements of 486 individual sharks, by far the most of any LCS species. Average length of harvested blacktip sharks was 32.5 inches (84 cm) FL, with the median size being exactly the same. The blacktip shark length distribution was bimodal with peaks at 20 and 40 inches FL. Only about 5 percent of measured blacktip sharks exceeded the federal minimum size limit of 54 inches FL and most are harvested in Florida where the species is not managed under a minimum size limit. Blacktip sharks mature at 42-46 inches FL (106-117 cm) for males, and 46-49 inches FL (117-124 cm) for females (Carlson et al. 2005; Baremore and Passerotti 2013). At this size at maturity, approximately 85 percent of the recreational blacktip shark harvest would be immature fish.

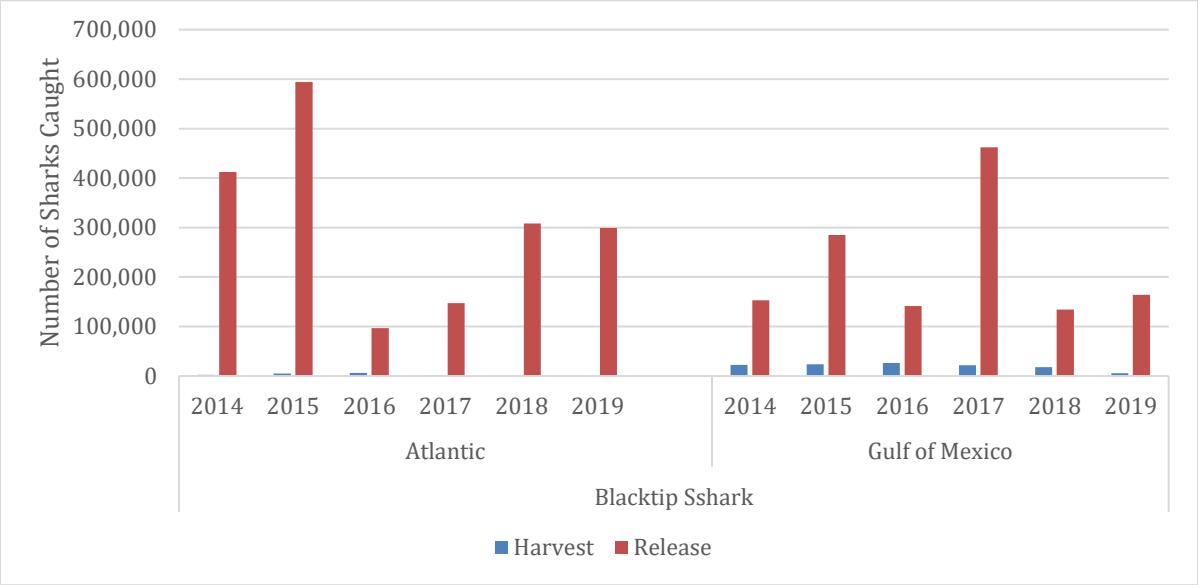

Figure 127. Number of blacktip sharks harvested and released by year in the Atlantic and Gulf of Mexico, 2014-2019.
Source: MRIP, SRHS, LA Creel, TPWD.

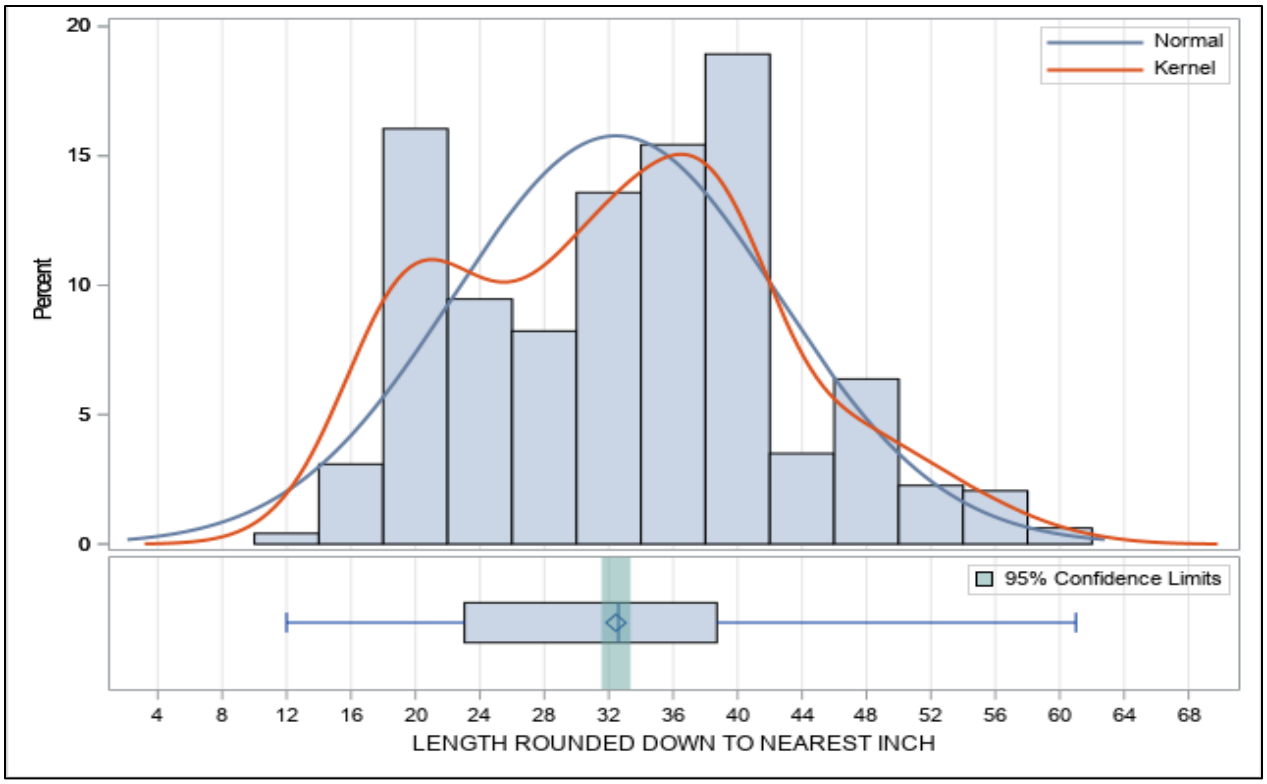

Figure 128. Length frequency distribution of harvested finetooth sharks, 2010-2019.
Figure includes a histogram showing percent catch at size, and a box and whisker plot demonstrating average size (diamond) with box showing 95% confidence limit of the size estimate. Whiskers show size range of measured sharks. This figure also includes a kernel density plot to illustrate how much the observed length frequency data deviate from the normal distribution assumed when calculating population averages. Source: MRIP.

Smooth Dogfish, SCS, and Blacktip Shark Catch Discussion

Smooth dogfish and SCS make up the overwhelming majority of the recreational shark harvest in numbers, accounting for 83 percent of harvest in the Atlantic region and 71 percent in the Gulf of Mexico region. However, estimates of both harvest and reported releases of smooth dogfish and Atlantic sharpnose sharks, the two most commonly caught species, have both sharply declined in the Atlantic region since spikes in catch in 2015 and 2016, respectively. This coincides with major changes in the MRIP surveys, but it is nevertheless a concerning trend that needs to be watched. Alternatively, if the spikes in catch observed in 2015 and 2016 were merely outliers, then these declining trends would not be quite as dramatic. The trend in Atlantic sharpnose catches in the Gulf of Mexico region has been comparatively steady.

Conversely, catches of both blacktip and bonnethead sharks have increased in the Atlantic following reductions in catch in 2016 and 2017, respectively. Catches of bonnethead sharks were following a similar pattern in the Gulf of Mexico region while blacktip shark catches there stayed consistent following a major spike in the 2017 estimate. Trends were harder to discern for both blacknose and finetooth sharks given their rare event nature, but in both cases catches were decreasing.

Non-Blacktip Large Coastal Shark Catch

The LCS complex includes blacktip (covered in the previous section), bull, hammerhead (great, scalloped, and smooth), lemon, nurse, sandbar, spinner, and tiger sharks. In addition to those species (other than blacktip), this section covers the catch of several prohibited species caught in the recreational fishery including dusky, sand tiger, and silky sharks. Non-blacktip LCS make up the smallest portion of directed fishing effort (approximately 3 percent per year), harvest (1-2 percent per year), and releases (approximately 4 percent per year) of any group of sharks in the recreational fishery, although they likely make up a substantial portion of the unidentified sharks that account for half of all released sharks. Despite being a small portion of the overall shark fishery, the recreational fishery for LCS attracts a substantial portion of media and stakeholder attention due to the growing popularity of the shore-based, trophy shark fishery that primarily targets these species. While this fishery is overwhelmingly catch-and-release, it draws significant attention from environmental organizations due to its high visibility on social media, concerns over post-release mortality due to the improper handling of sharks in the surf, and the conservation status of many of the species involved.

Figure 129 and Figure 130 show total harvest and releases, respectively, of non-blacktip LCS from 2014 through 2019 by fishery management council region. Overall, 98 percent of the catch of these shark species is released. Annual harvest estimates across these species ranges from as little as one to two individuals a year (great hammerhead) to as many as 4,000 per year (bull and spinner sharks). Bull and spinner sharks were the most commonly harvested sharks in this group, but were only the fourth and fifth most commonly released. The most commonly released sharks of this group were each rarely harvested, and include nurse, unidentified hammerhead, and sandbar sharks, each with releases averaging 180-200 thousand sharks per year. The annual estimate of unidentified hammerhead releases may be overestimated due to the possible inclusion of bonnethead sharks among those reported at the genus level. Sixty-one percent of overall non-blacktip LCS harvest, and 25 percent of releases occur in the Gulf of Mexico region. The large discrepancy between those statistics is due to release figures being dominated by rarely harvested nurse, hammerhead, and sandbar sharks which were predominantly caught in the South or Mid-Atlantic area. Forty-nine percent of releases occur in the South Atlantic area, which were dominated by nurse and unidentified hammerhead shark releases, while 25 percent occur in the Mid-Atlantic area with 4 out of every 5 being sandbar sharks. Overall, 76 percent of total non-blacktip LCS releases consist of nurse, unidentified hammerhead, and sandbar shark releases.

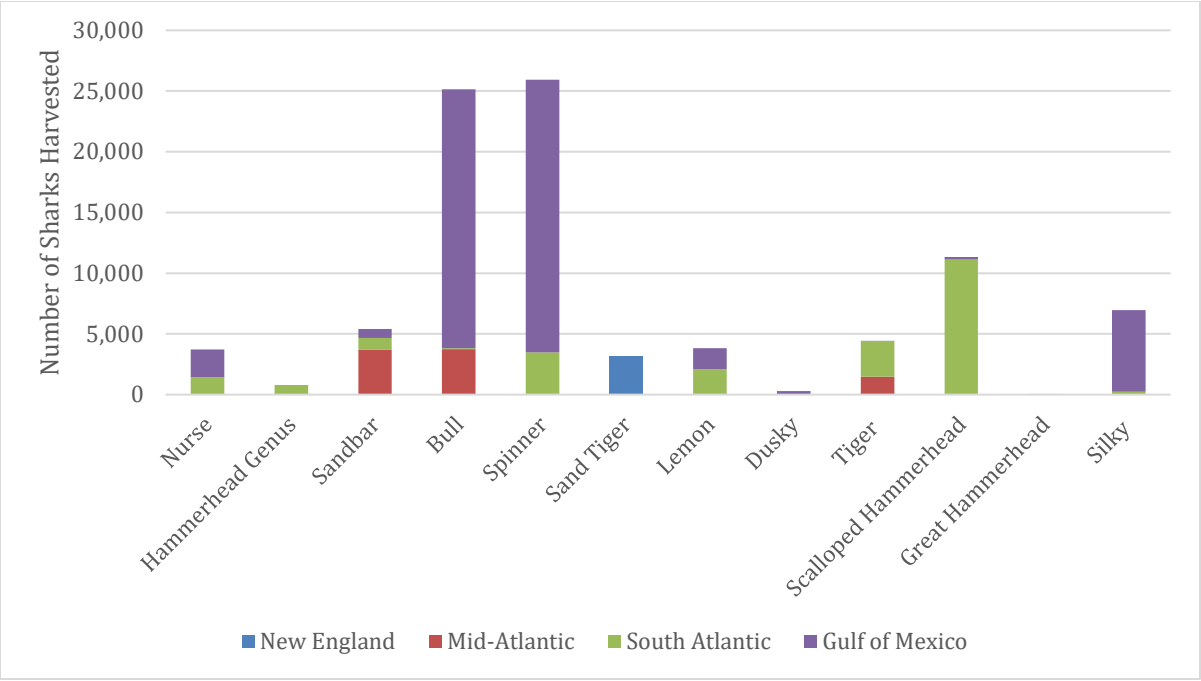

Figure 129. Number of non-blacktip LCS harvested by Council region, 2014-2019.
Source: MRIP, SRHS, LA Creel, TPWD.

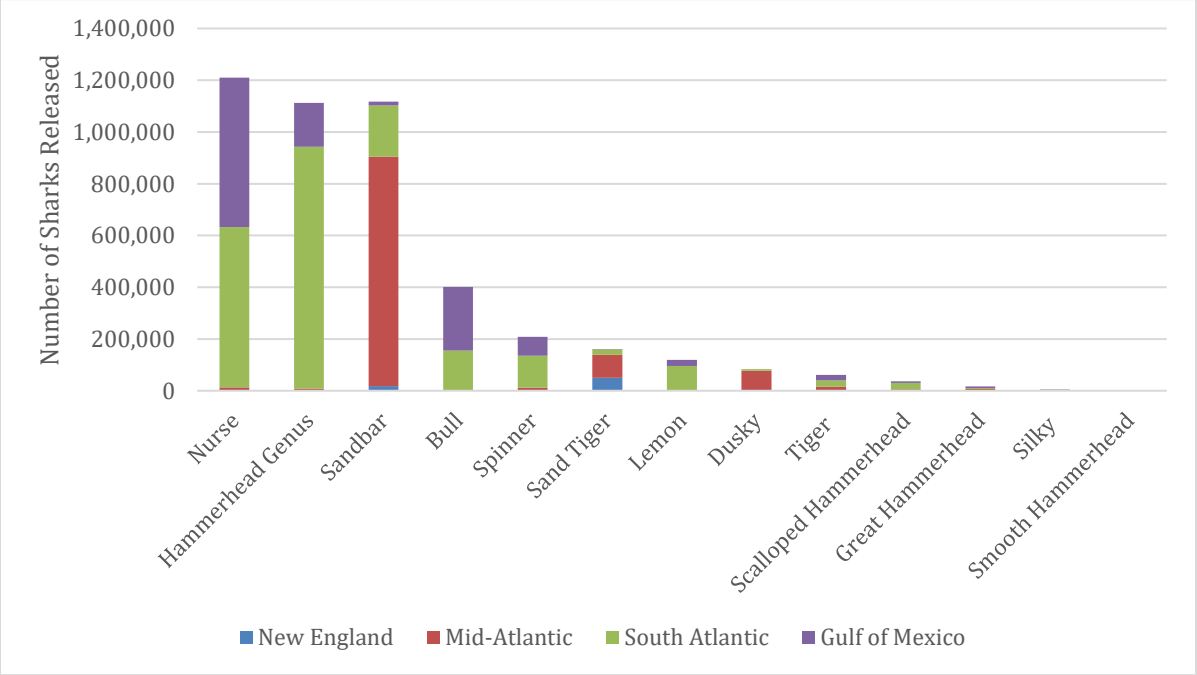

Figure 130. Number of non-blacktip LCS released by Council region, 2014-2019.
Source: MRIP, SRHS, LA Creel, TPWD.

Figure 131 presents the annual harvest and release estimates for bull sharks in the Atlantic and Gulf of Mexico regions from 2014 through 2019. Bull sharks were the third most frequently harvested LCS behind blacktip and spinner sharks with annual harvest estimates ranging from

532-8,730 sharks per year. Approximately 80 percent of bull shark harvest and 60 percent of releases occur in the Gulf of Mexico region. Bull sharks were the fifth most commonly released LCS with release estimates ranging from 23-118 thousand a year. Similar to most LCS, bull sharks are generally a rare-event species in recreational catch surveys with annual harvest estimate PSEs over 50 percent during the time series, and release estimate PSEs typically ranging from 35-45 percent. Length frequency data were not presented here as length data was only collected from 35 bull sharks by MRIP from 2010 through 2019.

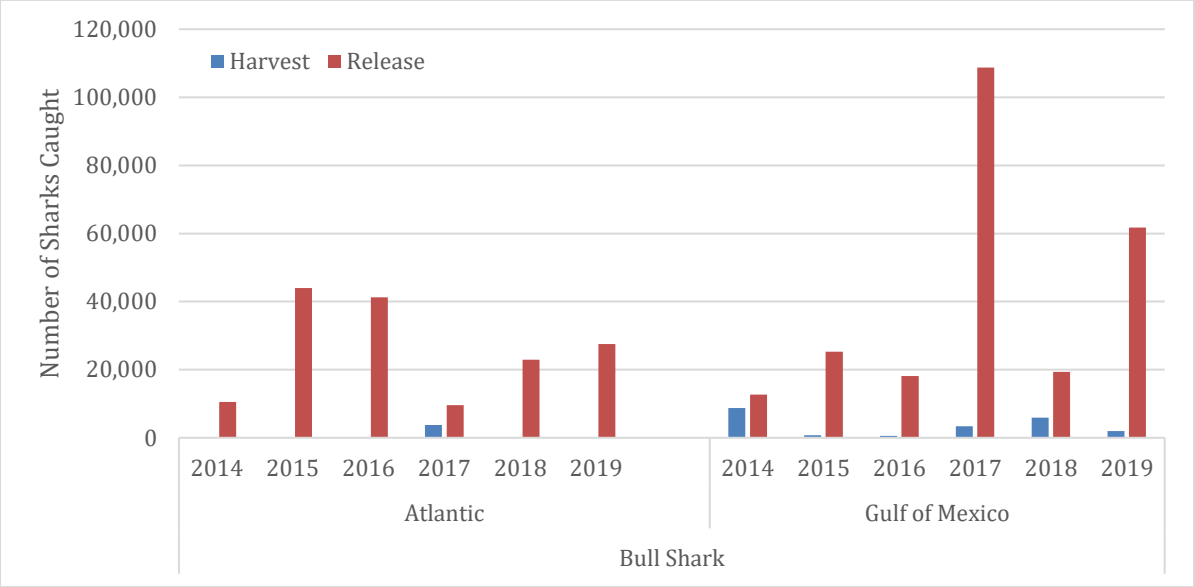

Figure 131. Number of bull sharks harvested and released by year in the Atlantic and Gulf of Mexico, 2014-2019.

Source: MRIP, SRHS, LA Creel, TPWD.

Figure 132 presents the annual harvest and release estimates for great hammerhead sharks in the Atlantic and Gulf of Mexico regions from 2014 through 2019. Great hammerheads were among the most rarely reported sharks in NOAA Fisheries' recreational catch surveys with smooth hammerheads being the only LCS reported less frequently. In the ten years between 2010 and 2019, measurements were only collected on three great hammerheads. From 2014 through 2019, harvest of more than two great hammerheads was only reported in 2015 when an estimated 49 were harvested in the recreational fishery. Releases were far more common with estimates ranging from 592 in 2014 to 8,292 in 2016, and these were likely significantly underestimated as most released hammerheads were reported as generic hammerheads.

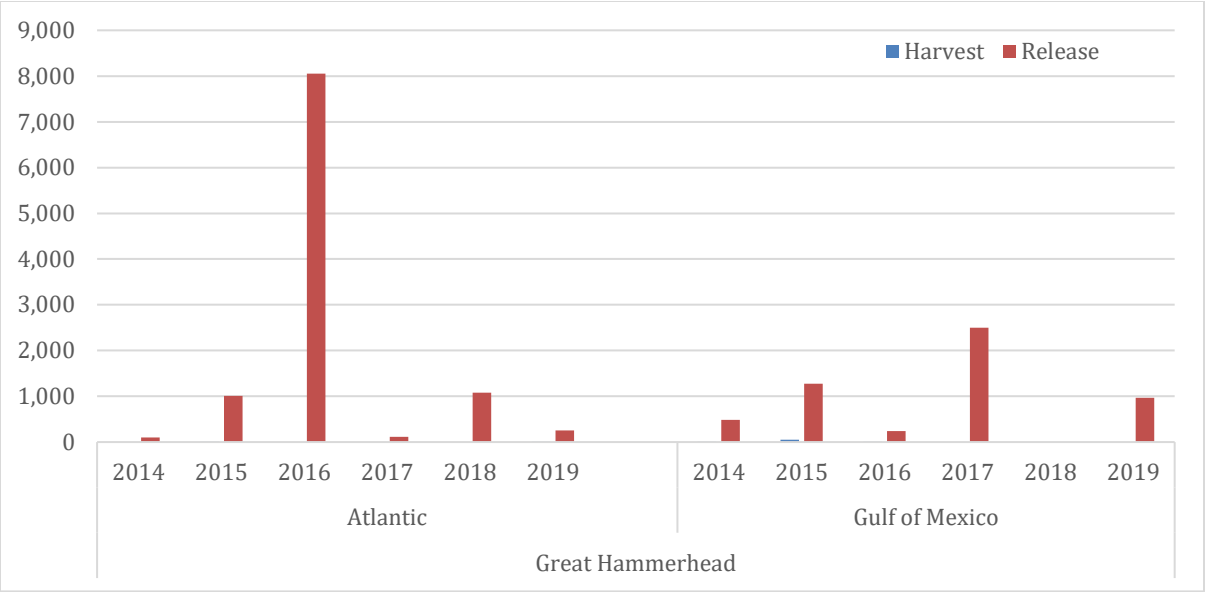

Figure 132. Number of great hammerhead sharks harvested and released by year in the Atlantic and Gulf of Mexico, 2014-2019.

Source: MRIP, SRHS, LA Creel, TPWD.

Figure 133 presents the annual harvest and release estimates for scalloped hammerhead sharks in the Atlantic and Gulf of Mexico regions from 2014 through 2019. Scalloped hammerheads were the most commonly reported hammerhead species in recreational catch surveys, excluding bonnethead sharks. Harvest reports were rare given the 78-inch FL minimum size for all hammerhead sharks that was implemented by Amendment 5a to the 2006 Consolidated HMS FMP (78 FR 40318; August 3, 2013). However, in 2014 there was an unusually high estimate of 11,197 sharks harvested and 18,030 released. Annual release estimates ranged from 1,296 in 2016 to 18,030 in 2014. As is the case for other hammerhead species, scalloped hammerhead shark estimates almost always have PSEs exceeding 50 percent, and their release estimates were biased low due to released sharks being reported as generic hammerheads. Only nine scalloped hammerheads were measured by MRIP from 2010 through 2019, so length data analysis is not presented here due to low sample size.

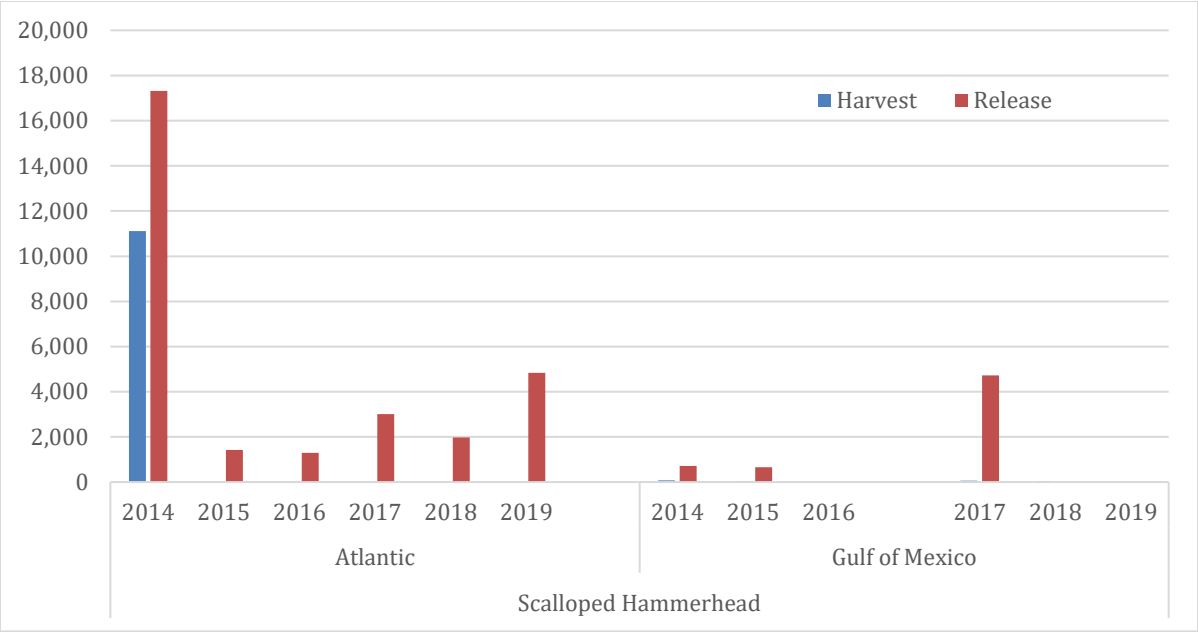

Figure 133. Number of scalloped hammerhead sharks harvested and released by year in the Atlantic and Gulf of Mexico, 2014-2019.

Source: MRIP, SRHS, LA Creel, TPWD.

Figure 134 presents the annual harvest and release estimates for smooth hammerhead sharks in the Atlantic and Gulf of Mexico regions from 2014 through 2019. Smooth hammerheads were the most rarely reported of all the LCS species with no reports in the Gulf of Mexico region, and release reports in only three of six years examined in the Atlantic region. Only one harvested smooth hammerhead shark was observed in any of the recreational surveys from 2010 through 2019, so there were no length data available for analysis.

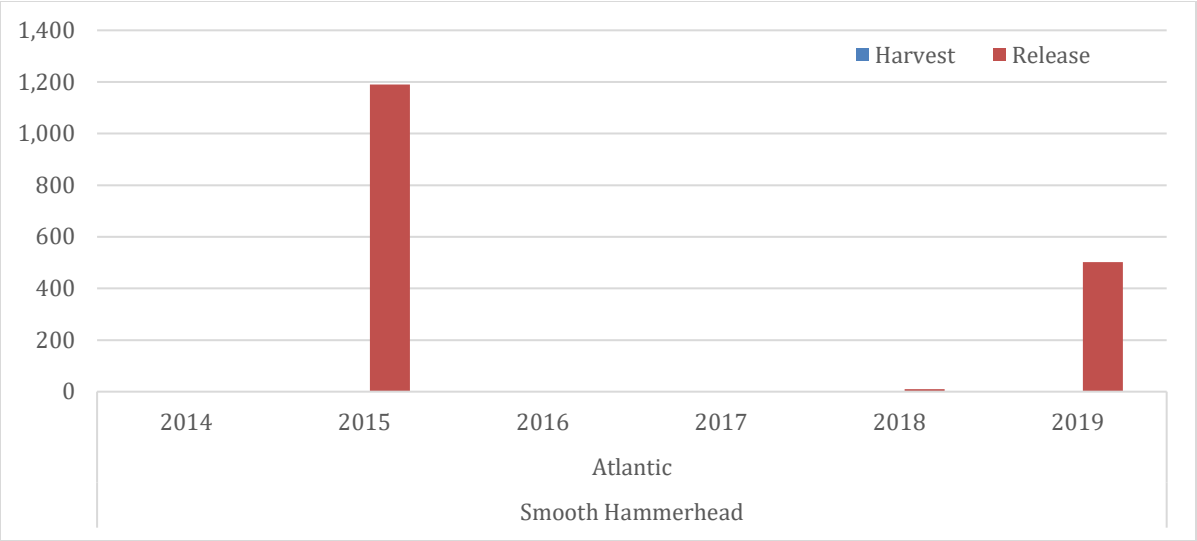

Figure 134. Number of smooth hammerhead sharks harvested and released by year in the Atlantic and Gulf of Mexico, 2014-2019.

Source: MRIP, SRHS, LA Creel, TPWD.

Figure 135 presents the annual release estimates for unidentified hammerhead sharks in the Atlantic and Gulf of Mexico regions from 2014 through 2019. Generic "hammerhead shark" is the third most commonly reported "species" of LCS in the MRIP surveys, especially in the Atlantic where the frequency of their reports lags only behind blacktip sharks. Annual estimates of generic hammerhead shark releases range from a low of 50 thousand in 2018 to a high of 368 thousand in 2015 which was nearly double the next highest year in 2017. The excessive use of the generic hammerhead identification in recreational catch reporting is likely to complicate future hammerhead shark stock assessments.

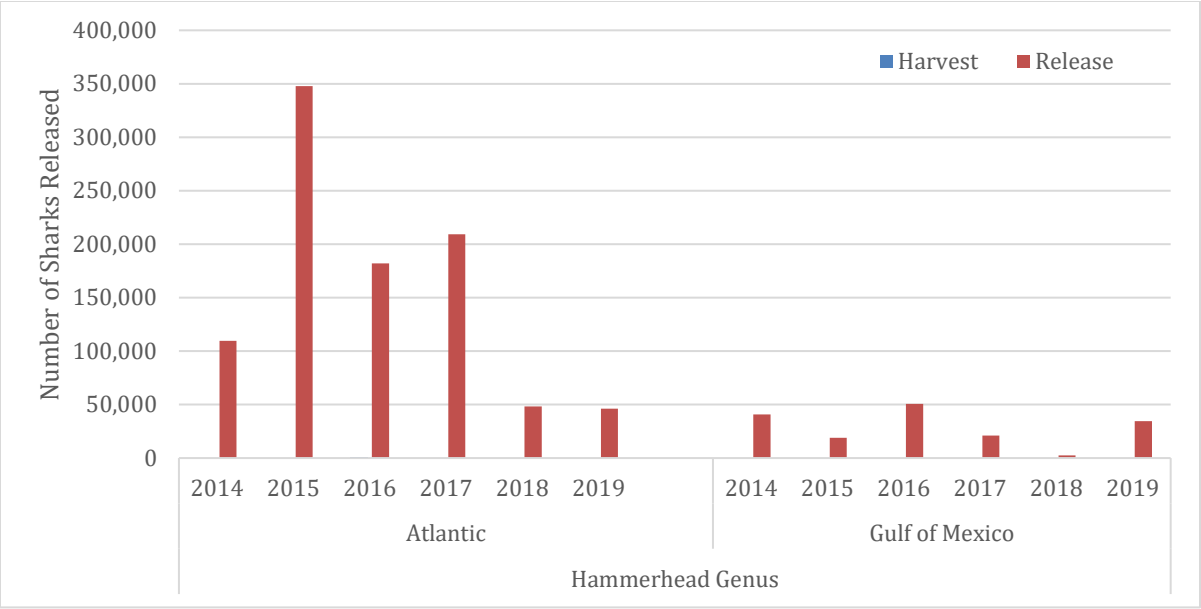

Figure 135. Number of unidentified hammerhead sharks released by year in the Atlantic and Gulf of Mexico, 2014-2019.

Unidentified hammerhead estimates for releases only due to the positive identification of landed sharks. Source: MRIP, SRHS, LA Creel, TPWD.

Figure 136 presents the annual harvest and release estimates for lemon sharks in the Atlantic and Gulf of Mexico regions from 2014 through 2019. Lemon shark catch estimates were in the middle among LCS species, and show the high variability of a fairly rare event species in the recreational catch surveys. Harvest of lemon sharks was observed only in 3 of the 6 years examined (2015-2019), with estimates ranging from 119-2,353. Release estimates were more robust, ranging from 2,846-44,291. Harvest estimate PSEs were consistently over 50 percent, while annual release estimate PSEs ranged from 18 to 54 percent. With only nine lemon sharks measured for length by MRIP from 2010 through 2019, no length frequency analysis was conducted.

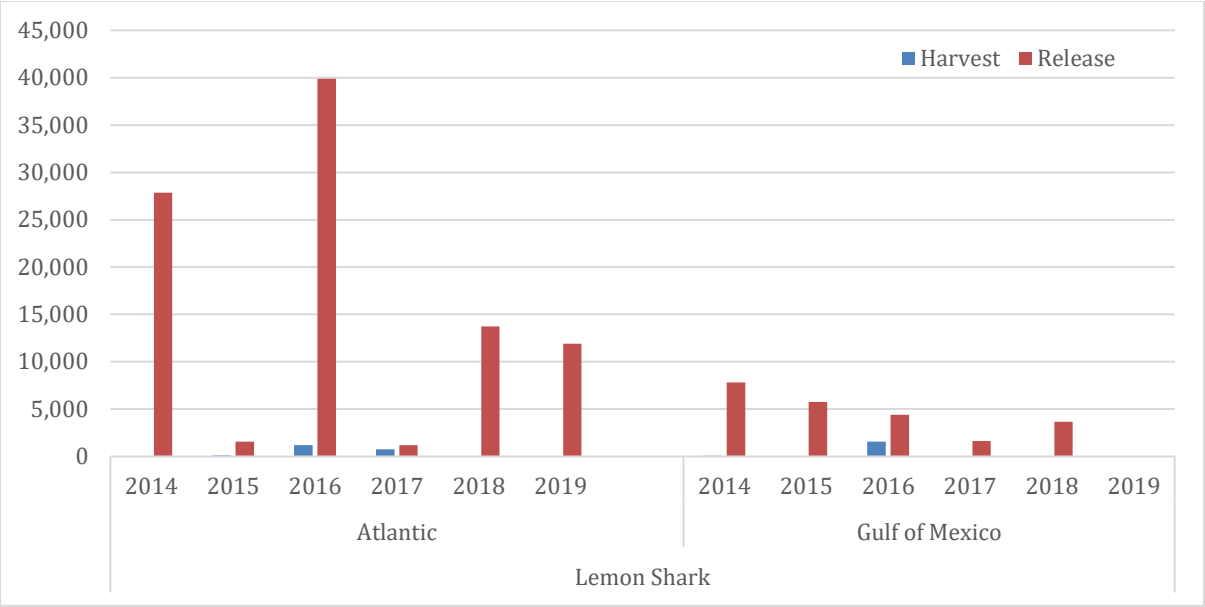

Figure 136. Number of lemon sharks harvested and released by year in the Atlantic and Gulf of Mexico, 2014-2019.

Source: MRIP, SRHS, LA Creel, TPWD.

Figure 137 presents the annual harvest and release estimates for nurse sharks in the Atlantic and Gulf of Mexico regions from 2014 through 2019. While harvest of nurse sharks is relatively rare, and reported in only three of the six years analyzed, they were one of the most frequently released of all the LCS species, behind only blacktip sharks in total releases. The amount of reported nurse shark releases was nearly equal between the South Atlantic and Gulf of Mexico. Given their unique appearance, they were likely one of the few shark species that is rarely reported as unidentified shark when released. There is no discernable trend in nurse shark release estimates over the 6-year period examined as they ranged from 84-422 thousand over the time period. Excluding an unusually large estimate for 2017, release estimates of nurse sharks were generally more consistent in the Gulf of Mexico than in the South Atlantic.

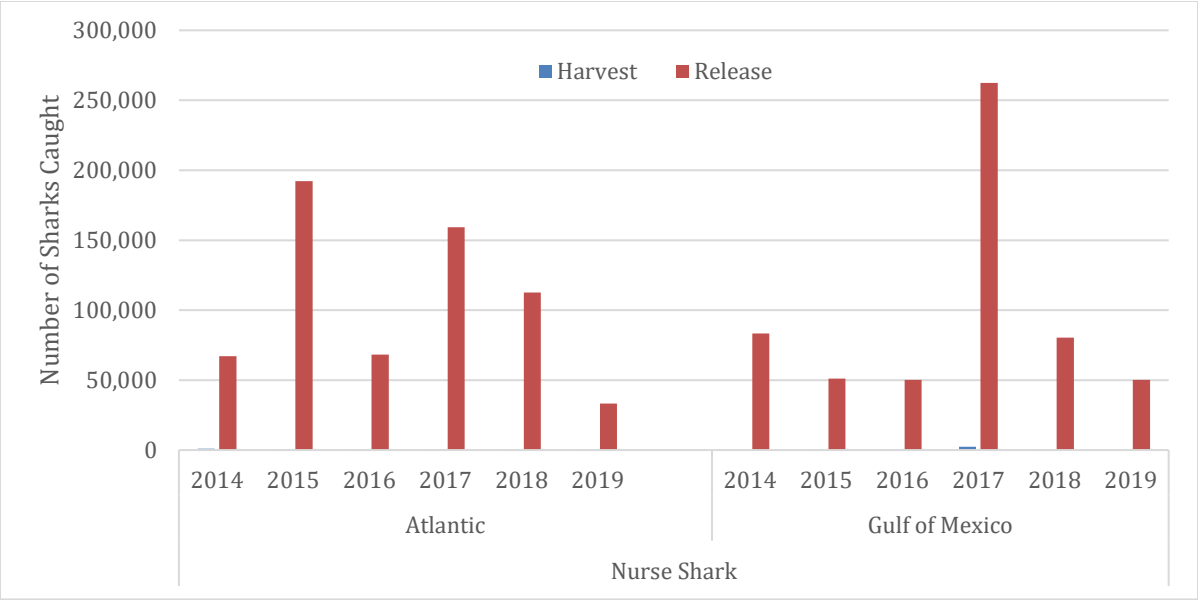

Figure 137. Number of nurse sharks harvested and released by year in the Atlantic and Gulf of Mexico, 2014-2019.

Source: MRIP, SRHS, LA Creel, TPWD.

Figure 138 presents the annual harvest and release estimates for spinner sharks in the Atlantic and Gulf of Mexico regions from 2014 through 2019. Spinner sharks were the most commonly harvested LCS species behind only the blacktip shark, with annual harvest estimates ranging from 1,613-4,984. Despite this, spinner sharks were only the sixth most commonly released species with release estimates ranging from 25-60 thousand per year. From 2010 through 2019, MRIP collected length data on 123 spinner sharks, and Figure 139 presents the length frequency distribution. Unfortunately, MRIP data reveals approximately two-thirds of harvested spinner sharks are below the minimum length limit of 54 inches FL. This is likely due in part to the fact that they are easily confused with blacktip sharks, which are not managed under a minimum size limit in Florida state waters, where spinner sharks were most frequently reported to be harvested. Average size of harvested spinner sharks measured by MRIP was 40 inches FL. As spinner sharks mature at 51 inches (130 cm) FL for males, and 59 inches (150 cm) FL for females (Branstetter 1987), this suggests that approximately 75 percent of recreationally harvested spinner sharks were immature.

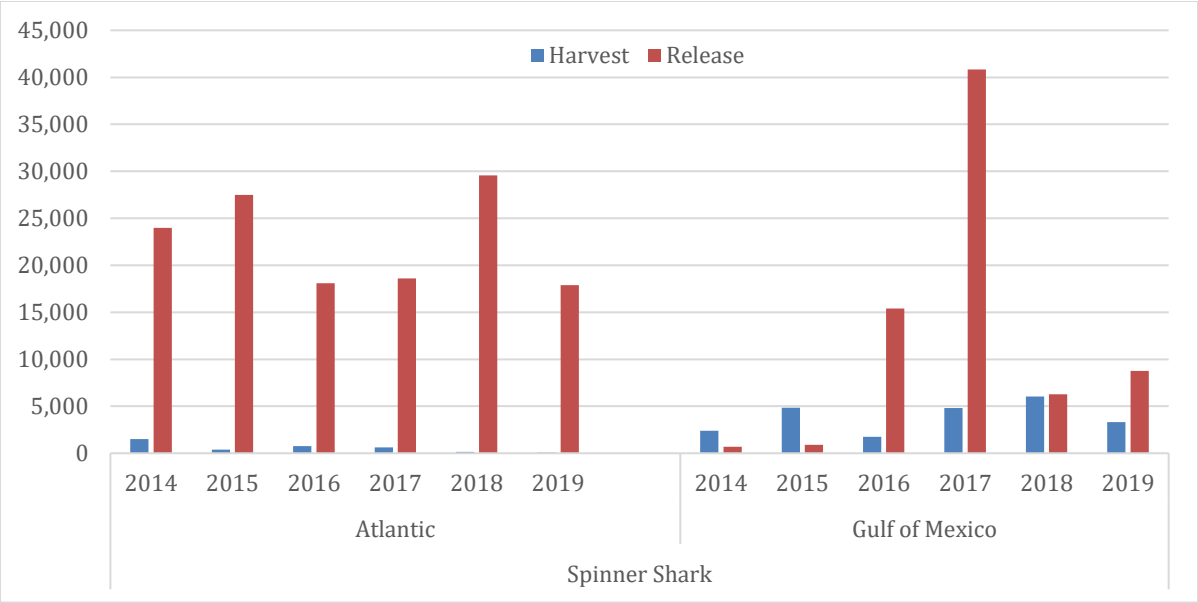

Figure 138. Number of spinner sharks harvested and released by year in the Atlantic and Gulf of Mexico, 2014-2019.
Source: MRIP, SRHS, LA Creel, TPWD.

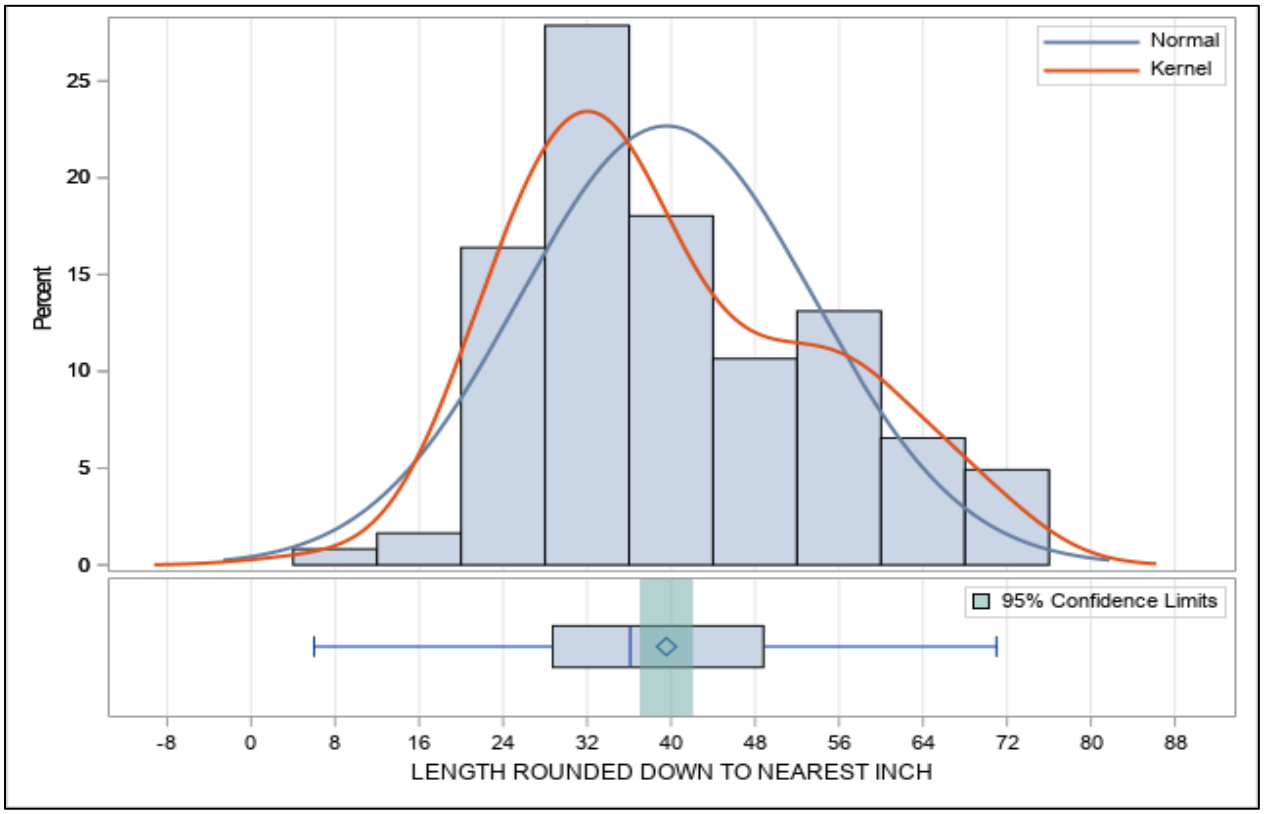

Figure 139. Length frequency distribution of harvested spinner sharks, 2010-2019.
Figure includes a histogram showing percent catch at size, and a box and whisker plot demonstrating average size (diamond) with box showing 95% confidence limit of the size estimate. Whiskers show size range of measured sharks. This figure also includes a kernel density plot to illustrate how much the observed length frequency data deviate from the normal distribution assumed when calculating population averages. Source: MRIP.

Figure 140 presents the annual harvest and release estimates for tiger sharks in the Atlantic and Gulf of Mexico regions from 2014 through 2019. Tiger sharks were a particularly rare event species in the various recreational catch surveys with estimate PSEs frequently above 50 percent for both harvest and release estimates. In the six-year period examined for this report, tiger shark harvest was reported in MRIP only in 2014 through 2016 with low estimates from the other recreational data collections from 2017 through 2019. The largest harvest estimate was from the Atlantic (2,061 sharks in 2016). Annual release estimates varied widely from 2,327 in 2019 to 29,570 in 2018 for the Atlantic and Gulf of Mexico combined. Only great and smooth hammerhead estimates were consistently smaller among the non-prohibited shark species. Only eight tiger sharks were measured by MRIP from 2010 through 2019 with an average length of 79 inches (200 cm) FL.

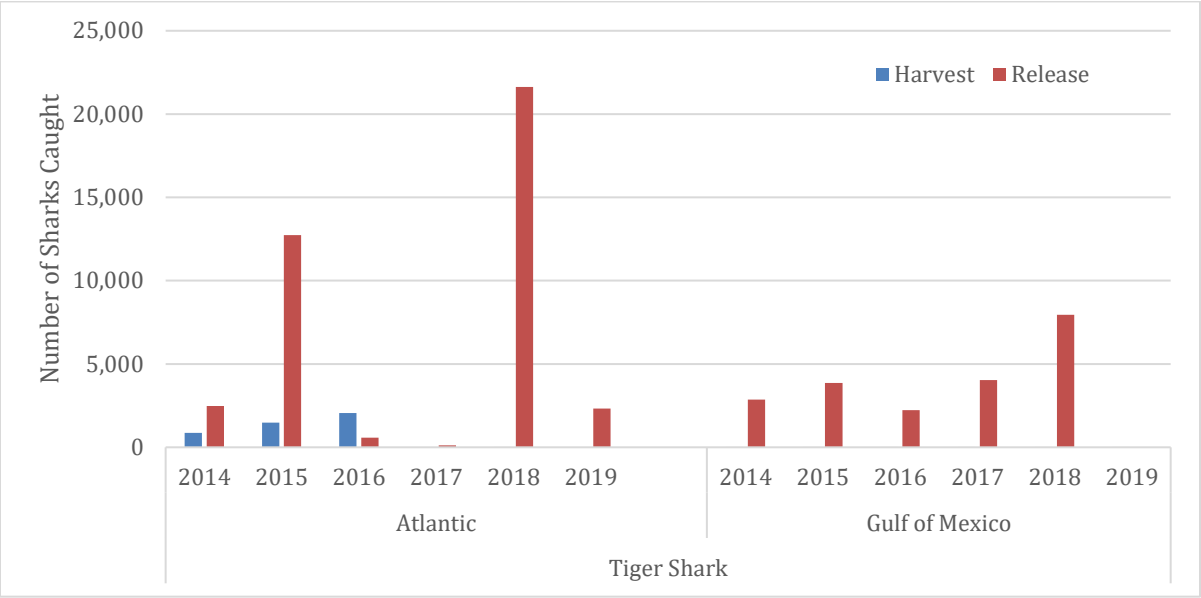

Figure 140. Number of tiger sharks harvested and released by year in the Atlantic and Gulf of Mexico, 2014-2019.

Source: MRIP, SRHS, LA Creel, TPWD.

Figure 141 presents the annual harvest and release estimates for sandbar sharks in the Atlantic and Gulf of Mexico regions from 2014 through 2019. Retention of sandbar sharks, although not on the prohibited species list, has been prohibited since 2008 when the stock was assessed as overfished. Despite their overfished status, sandbar sharks remain one of the most frequently reported LCS in the various recreational catch surveys with only blacktip and nurse shark releases being reported more frequently. Approximately 99 percent of sandbar sharks were caught in the Atlantic region were released, with 80 percent of the released sharks reported in Mid-Atlantic area waters where they were the second most frequently caught shark species in the HMS recreational fishery behind only smooth dogfish. Release estimates in the Atlantic range from 143-245 thousand a year, while in the Gulf of Mexico region they range from 0 to 6,782 sharks per year and were usually extrapolated from only one or two reports. MRIP observes a handful of sandbar shark, despite retention being prohibited, kept by anglers each year with 42 measured for length from 2010 through 2019. Given their generic appearance, and the high frequency of interactions with them in the recreational fishery, some level of mistaken harvest of the species is not unexpected.

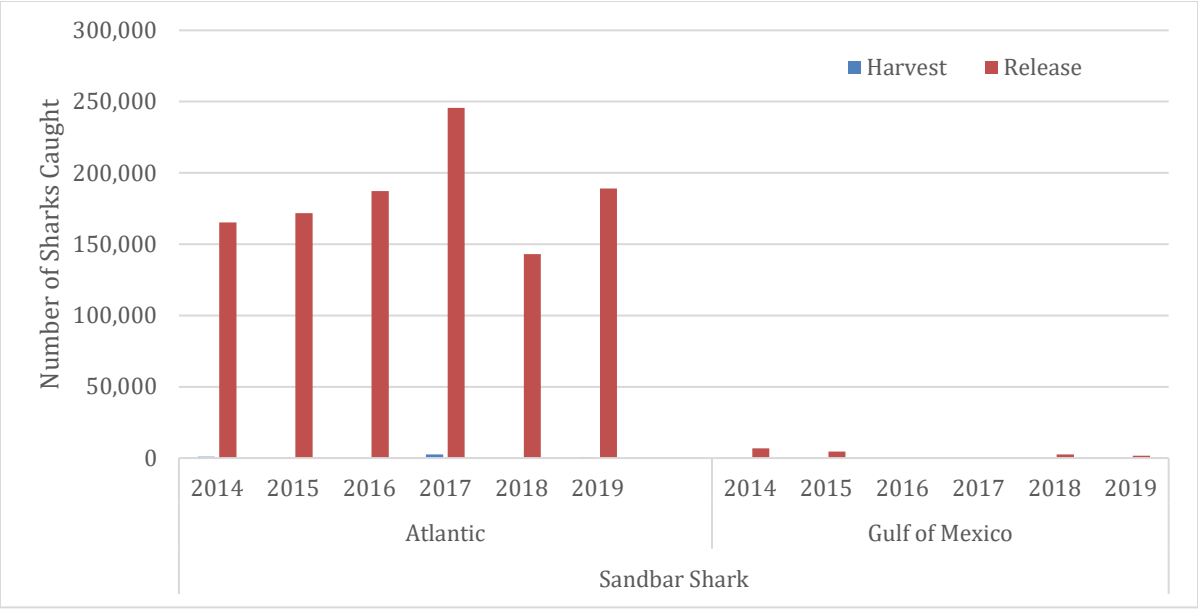

Figure 141. Number of sandbar shark harvest and release estimates by year in the Atlantic and Gulf of Mexico, 2014-2019.

Source: MRIP, SRHS, LA Creel, TPWD.

Figures 142 through 144 present annual harvest and release estimates for three prohibited shark species (dusky, sand tiger, and silky sharks) that were reported in the recreational catch surveys most years but are considered rare event species. Most catch estimates for these species were based on a few release reports or observations of illegal harvest that were then extrapolated. The vast majority of catch estimates for these species, both harvest and released, have high PSEs than 50 percent and often approaching 100 indicating that these were highly uncertain estimates. Of the three species, dusky sharks in the Atlantic were the most consistently reported, and in the six-year period examined for this report no illegal harvest of the species had been observed in the recreational catch surveys. This is likely due to diligent efforts by NOAA Fisheries and its state partners to communicate to anglers how to identify dusky sharks and the need to release them with minimal harm. Despite their prohibited nature and rare-event status in the MRIP survey, sand tiger and dusky sharks were the third and fourth most frequently caught shark species in the Mid-Atlantic behind smooth dogfish and sandbar sharks.

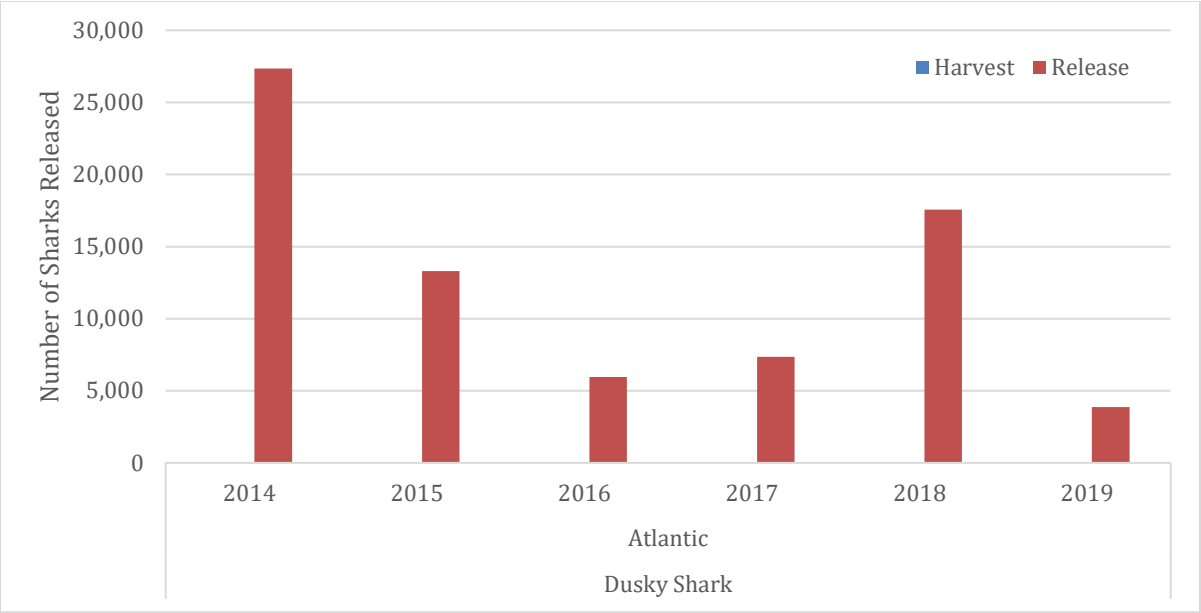

Figure 142. Number of dusky shark release estimates by year in the Atlantic and Gulf of Mexico, 2014-2019.

Note: No harvest of this prohibited species was observed during this time period. Source: MRIP, SRHS.

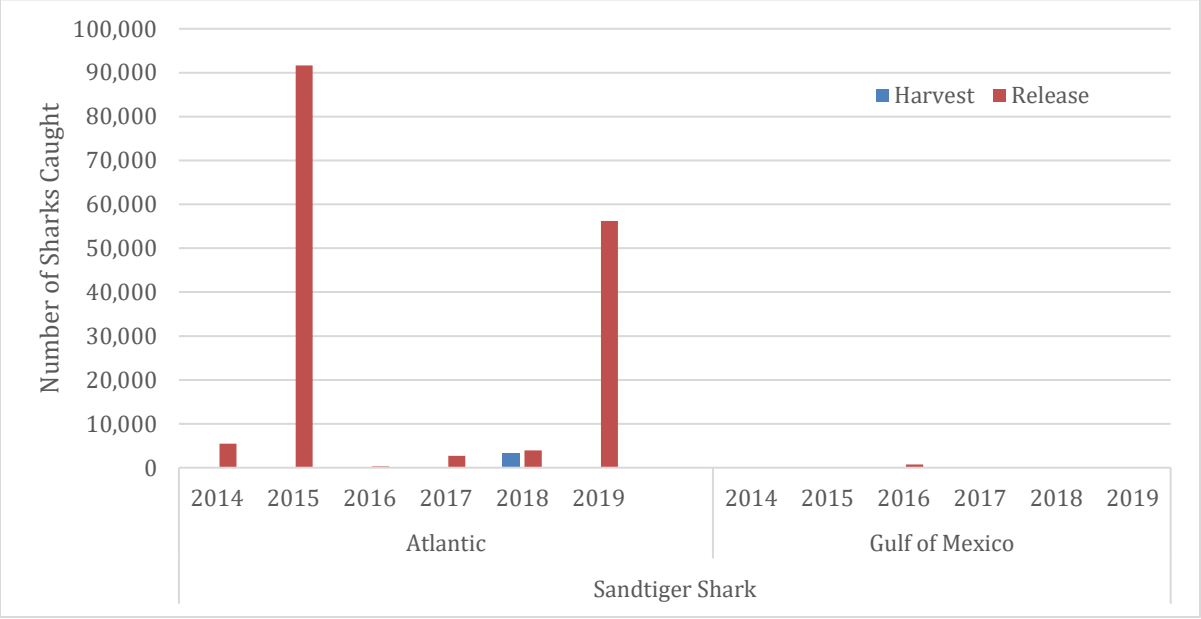

Figure 143. Number of sand tiger shark harvest and release estimates by year in the Atlantic and Gulf of Mexico, 2014-2019.

Source: MRIP, SRHS, LA Creel, TPWD.

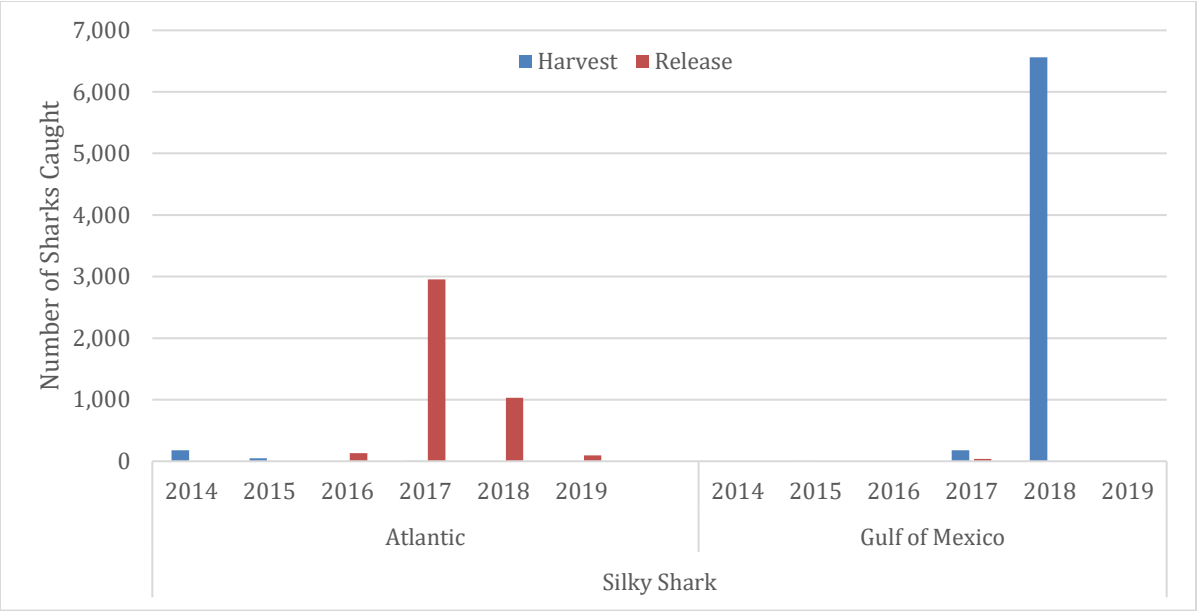

Figure 144. Number of silky shark harvest and release estimates by year in the Atlantic and Gulf of Mexico, 2014-2019.

Source: MRIP, SRHS, LA Creel, TPWD.

LCS and Prohibited Shark Catch Discussion

Interpreting trends in the catch of the LCS and prohibited shark species is complicated by their rare-event nature in the MRIP surveys, which results in highly variable estimates. The high variability in this data makes it harder to ascertain how much the peaks and low in the catch estimates are the result of actual changes in catch versus statistical noise and uncertainty. Despite these concerns, it is clear that the non-blacktip LCS fishery is a much smaller portion of the overall recreational shark fishery; however, the population sizes and characteristics of these species mean they are still a major conservation concern for fisheries managers.

Interpretation of trends in this fishery is further complicated by the large number of unidentified sharks that are reported to be released, many of which may be one of these species. It is particularly interesting that the most commonly caught and released species were among the least commonly harvested. Bull and spinner sharks were the most common species to be observed harvested in this group, and released individuals of both may be under-reported. Bull sharks were very generic looking making them easily misidentified or unidentified. Spinner sharks meanwhile were easily confused with blacktip sharks, and released individuals could easily be attributed to the wrong species. Meanwhile, the most commonly released shark species in this group include nurse sharks which were both abundant and easily identified due to their unique appearance; sandbar sharks which were prohibited from being retained; and hammerhead sharks identified to the genus level, estimates of which could include bonnethead sharks which were among the most commonly caught sharks in the Atlantic and Gulf of Mexico.

Catch estimates have remained relatively stable for more frequently caught species like nurse, spinner, and sandbar sharks. While nurse shark catch was abnormally low in 2019, it did not appear to be part of a declining trend. Reports of released generic hammerheads were at their

lowest in 2018 and 2019 after having been on the upswing from 2015 through 2017. Trends were difficult to ascertain for other species given the variability of the data.

Pelagic Shark Catch

The pelagic shark complex includes shortfin mako, common thresher, porbeagle, and blue sharks. The recreational fishery for these four species occurs in the northeast Atlantic states that are covered by the LPS from June through October. Each year, these four species make up approximately 10-18 percent of targeted effort in the northeast region's Atlantic HMS recreational fishery. While each of these species are also observed in the MRIP survey, NOAA Fisheries' focus on the LPS in this report as it is designed to specifically focus on the offshore recreational HMS fishery. As a result, it produces far more observations and reports of these species per year, and far more precise estimates of catch as a result. The LPS is the primary data source used for these species in the northeast region for management and international reporting purposes to ICCAT. Other data sources like MRIP are used to track catches in other regions, or in the northeast when the LPS is not being conducted (November through May), but observations of these species are sporadic outside the LPS resulting in estimates that are highly variable and often imprecise. Since the primary purpose of this report is to examine trends in the shark fishery, all analyses in this section will focus on the more precise LPS estimates.

Figure 145 presents the composition of harvested and released sharks in the recreational pelagic shark fishery during the period of 2014 through 2019. The LPS estimated that a total of 17,338 pelagic sharks were harvested from 2014 through 2019, and that the majority (57 percent) were shortfin mako sharks followed by thresher (32 percent), blue (9 percent), and porbeagle sharks (2 percent). In that same time period, over 177 thousand pelagic sharks were released with the vast majority (83 percent or over 146 thousand) being blue sharks followed by shortfin mako (12 percent), porbeagle (3 percent), and thresher sharks (2 percent). Figure 146 shows pelagic shark catch by state from 2014 through 2019, while Figure 147 shows the breakdown of pelagic shark catch by species and state. Figure 146 shows that New York accounts for more than 50 percent of pelagic shark catch in most years, and was never below 40 percent of total catch (harvested and released). The state with second-highest pelagic shark catch varies from year to year, but is usually New Jersey, Massachusetts, or Rhode Island. Figure 147 shows that blue sharks make up the majority of total catch in all LPS states except for Delaware and Virginia where shortfin mako accounted for most of the catch. However, as shown in Figure 147, these Delaware and Virginia were consistently minor participants in the overall pelagic shark recreational fishery. Meanwhile, thresher sharks were a small, but consistent presence in the pelagic shark catch across the LPS states while porbeagle catch is limited to Maine, New Hampshire, and Massachusetts.

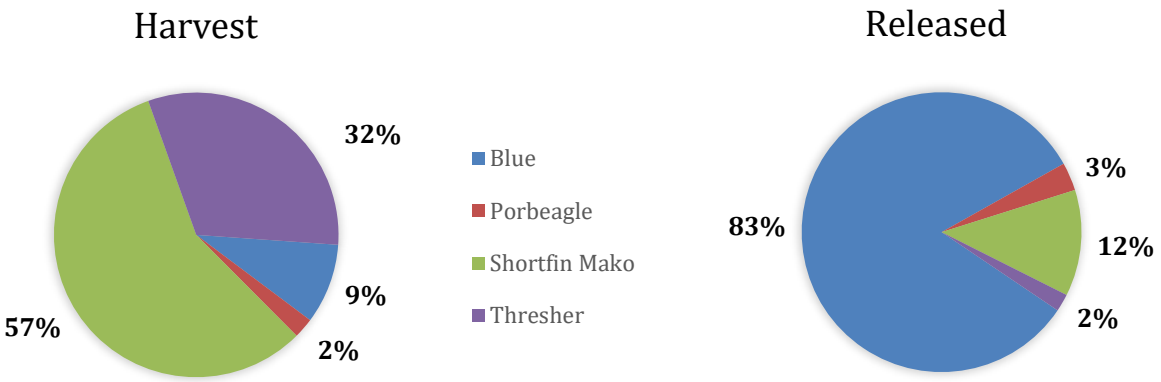

Figure 145. **Percent of pelagic sharks kept and released by species, 2014-2019.**
Source: LPS.

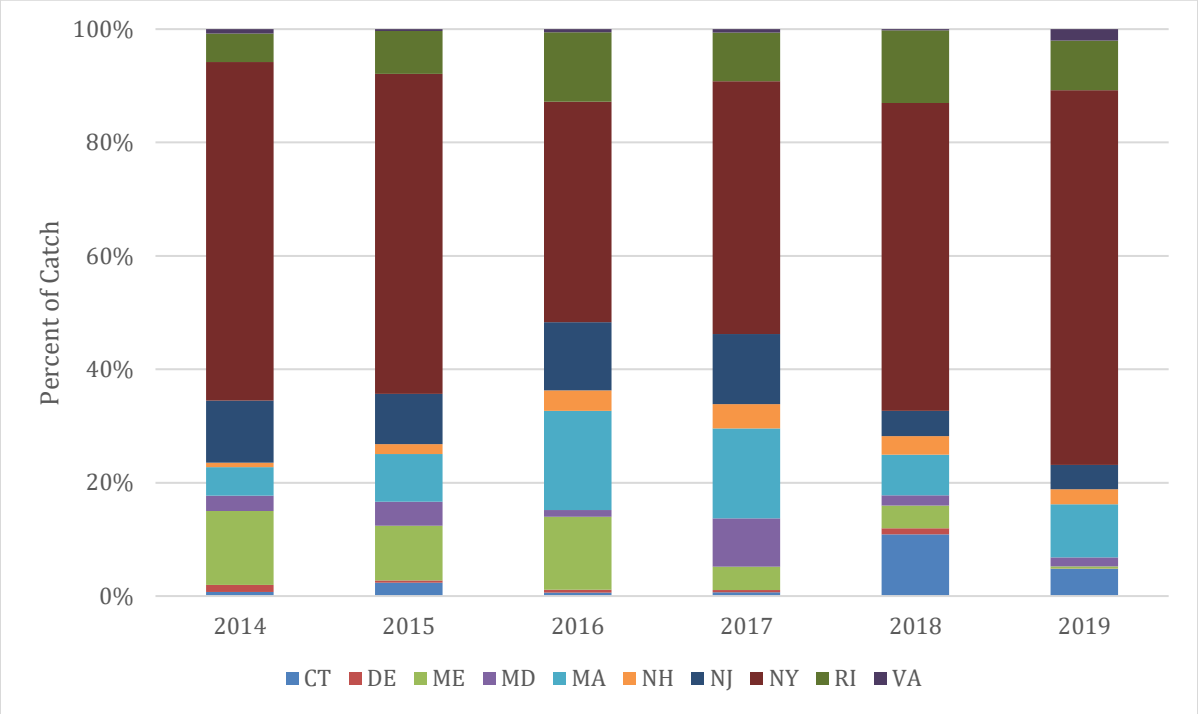

Figure 146. **Percent of total pelagic shark catch by state, 2014-2019.**
Source: LPS.

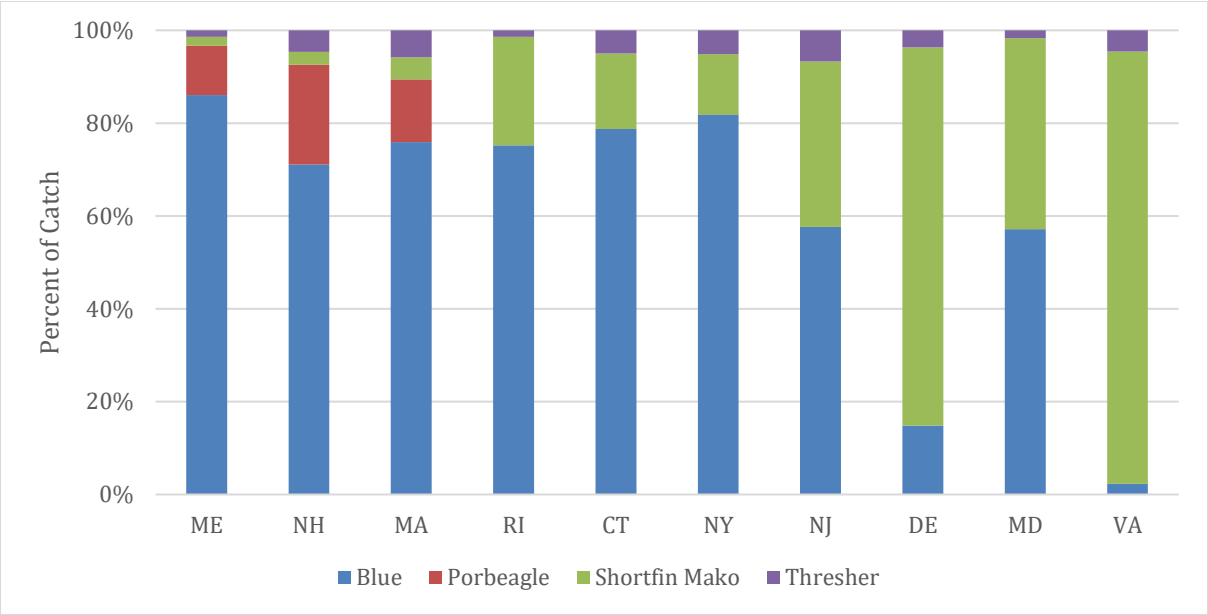

Figure 147. Percent of pelagic shark catch per species by state, 2014-2019.
Source: LPS.

Figure 148 presents the annual harvest and release estimates for blue sharks in the northeast Atlantic from 2014 through 2019. Blue sharks were rarely harvested in the recreational fishery with annual harvest estimates of only 155-385 over the six years examined. However, they do make up the overwhelming majority of total pelagic shark catch with an estimated 20-34 thousand releases per year. Release estimates for blue sharks declined by approximately 15 thousand per year from 2014 through 2016 before stabilizing at around 20 thousand each of the subsequent years. However, a look back further in the LPS time series shows blue shark catches have been declining steadily since a peak of 66 thousand in 2011. Figure 149 presents the estimated length frequency of observed blue sharks kept in the LPS from 2014 through 2019. Despite the minimum size limit being only 54 inches FL, blue sharks measured by the LPS ranged from 75-106 inches FL with a median of 91 inches FL. The large size range of kept blue sharks is likely due to the fact that 86 percent of those kept (LPS data) were caught by anglers fishing in HMS tournaments where there would be little incentive to keep smaller sharks. There is some disagreement on size at maturity for blue sharks. Estimates range from 51-72 inches (130-183 cm) FL for males, and 55-95 inches (140-243 cm) FL for females (Pratt 1979, Nakano 1994). The lower estimates would suggest that all blue sharks observed harvested in the LPS were mature fish, while the higher estimates would suggest all male sharks harvested are mature, but some female sharks may not be.

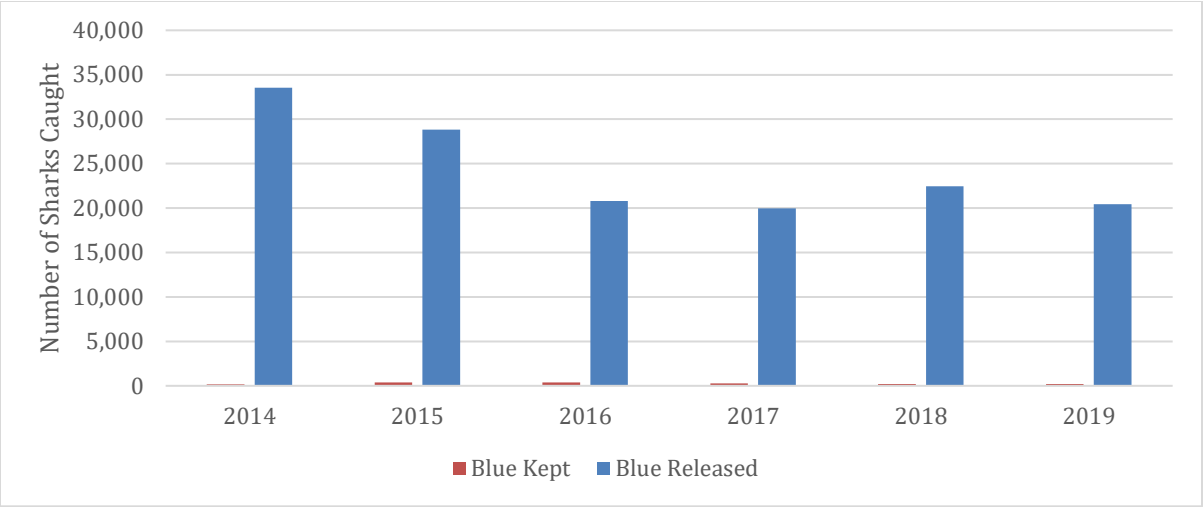

Figure 148. Number of blue shark harvest and release estimates by year, 2014-2019.
Source: LPS.

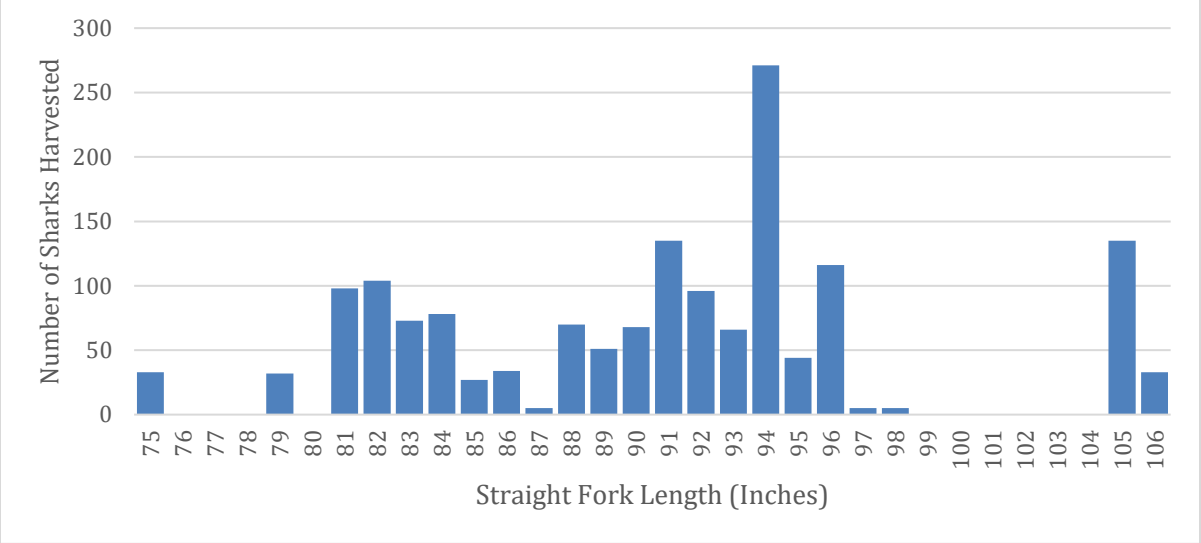

Figure 149. Length frequency distribution of harvested blue sharks, 2014-2019.
Source: LPS.

Figure 150 presents the annual harvest and release estimates for porbeagle sharks in the northeast Atlantic from 2014 through 2019. As was shown in Figure 147, the porbeagle shark fishery is largely limited to the states of Massachusetts, New Hampshire, and Maine where they were predominantly caught in the Gulf of Maine. Annual harvest estimates were generally low, and ranged from 28-118 harvested per year representing only 6 percent of the total catch. Release estimates tend to be more variable with a low of 365 released in 2014, and a high of 2,093 estimated to be released in 2017. In general, catches of porbeagle sharks were trending upward compared to the early 2000s when in some years fewer than 100 were estimated to be caught each year.

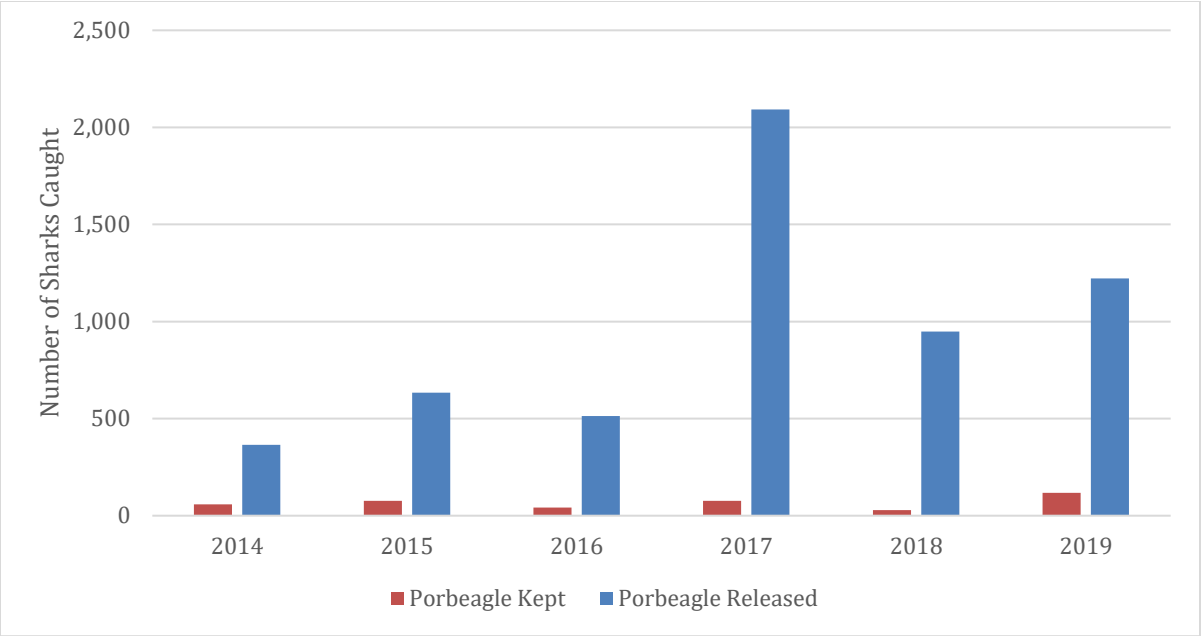

Figure 150. Number of porbeagle shark harvest and release estimates by year, 2014-2019.
Source: LPS.

Figure 151 presents the annual harvest and release estimates for shortfin mako sharks in the northeast Atlantic from 2014 through 2019. Shortfin mako sharks were the most commonly targeted of the pelagic shark species in the recreational fishery, but were assessed as overfished with overfishing occurring in a 2017 ICCAT stock assessment. As a result, NOAA Fisheries implemented an emergency rule in early 2018 that raised the recreational minimum size limit from 54 to 83 inches FL (83 FR 8946; March 2, 2018). The emergency rule was then followed by Amendment 11 to the 2006 Consolidated HMS FMP (84 FR 5358; February 21, 2019) in March 2019 that retained the 83 inches FL minimum size limit for female sharks while implementing a 71 inches FL size limit for male sharks. The reason for the separate size limits was that males mature at a smaller size, and establishing a smaller minimum size limit for male sharks would shift angler harvest away from larger, breeding sized female sharks. Relative to 2019, harvest of shortfin mako sharks declined by over 80 percent in 2018 and 2019 due to the larger size limits as was intended, and the estimated number of releases nearly doubled in 2018 before coming back down in 2019. Over the six-year period examined, shortfin mako shark harvest estimates ranged from a high of 2,651 (2014) to a low of 350 (2019). Conversely, release estimates ranged from a low of 1,933 (2016) to a high of 6,652 (2015).

Figure 152 shows the length frequency distribution of shortfin mako sharks as estimated by the LPS, with the time series divided between sharks harvested from 2014 through 2017 (orange) and those caught in 2018 and 2019 (blue). The length frequency distribution from the two time periods overlap with a median size of 76 inches from 2014 through 2017 and 81 inches FL for 2018 and 2019.

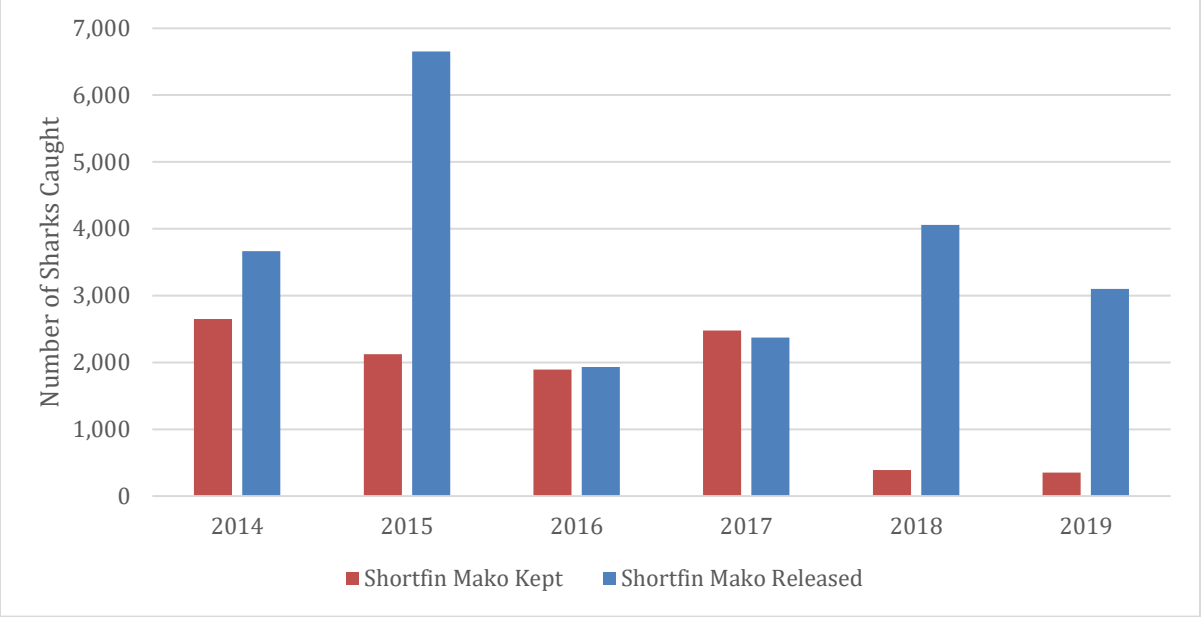

Figure 151. Number of shortfin mako shark harvest and release estimates by year, 2014-2019.
Source: LPS.

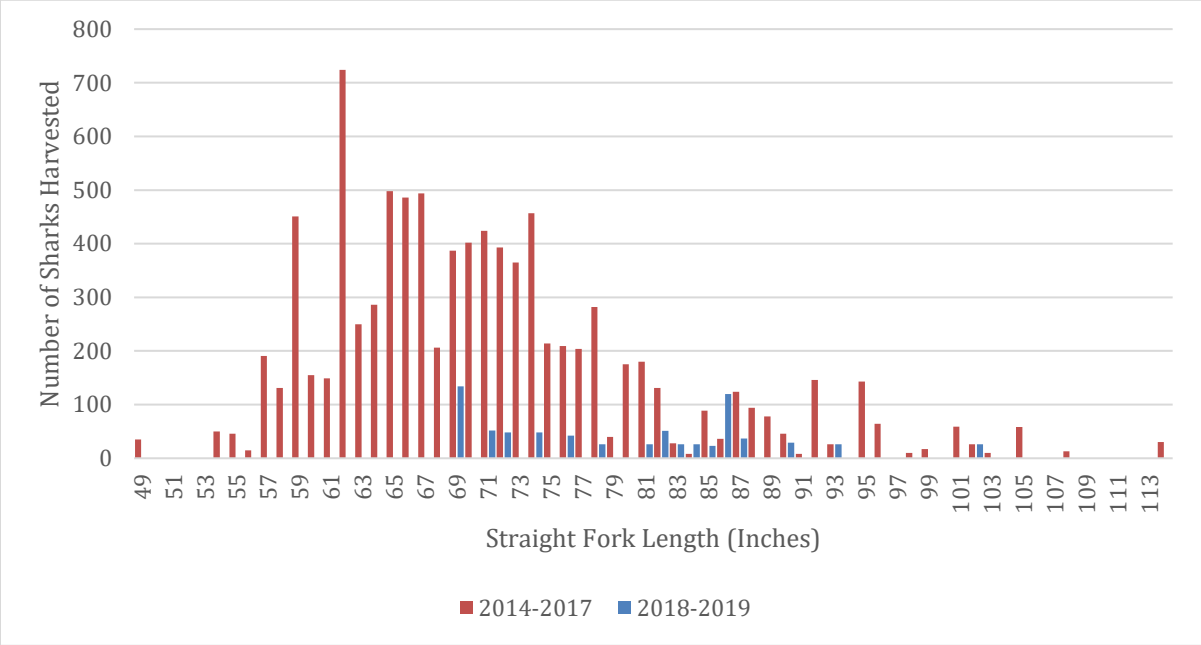

Figure 152. Length frequency distribution of harvested shortfin mako sharks, 2014-2019.
Note: The time series is divided between the period before and after the change from a minimum length limit of 54 inches FL to minimum size limits of 71 inches FL for male sharks and 83 inches FL for female sharks. Source: LPS.

Figure 153 presents the annual harvest and release estimates for common thresher sharks in the northeast Atlantic from 2014 through 2019. Common thresher are unique among sharks in the recreational fishery in that they may be the only commonly caught species that is more likely to be harvested than released, with harvested thresher sharks accounting for 60 percent of the total catch. Harvest estimates from 2014 to 2016 were approximately double or more relative to

estimated releases. The number of thresher sharks released increased significantly between 2017 and 2019 while the number harvested has increased slightly since 2016. Figure 154 shows the length frequency distribution of common thresher sharks (LPS estimate). The bulk of the length distribution ranges from 55-96 inches FL with a median size of 74 inches FL.

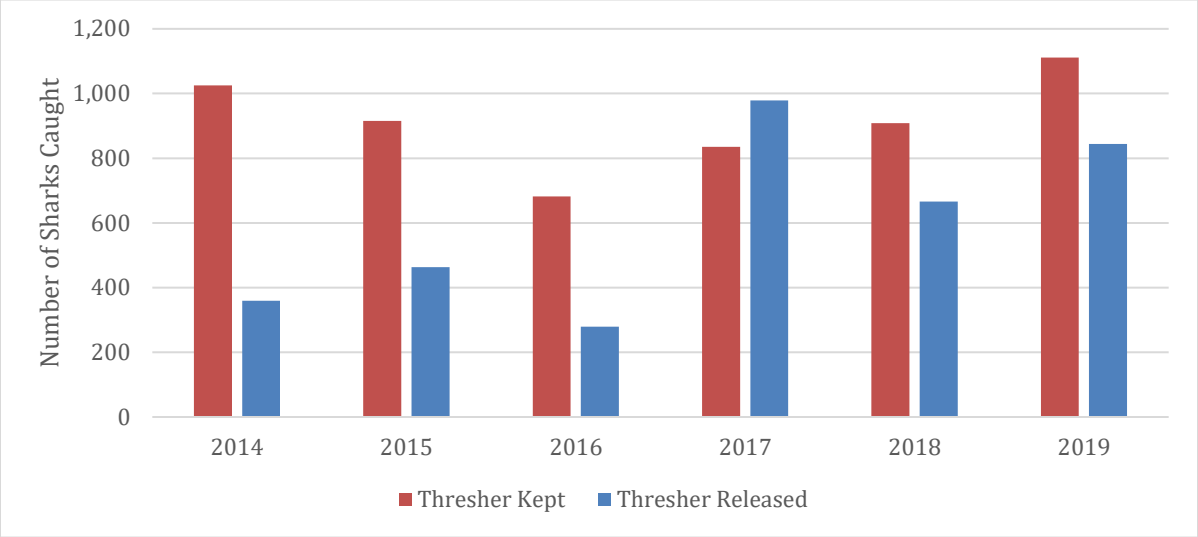

Figure 153. **Number of common thresher shark harvest and release estimates by year, 2014-2019.**
Source: LPS.

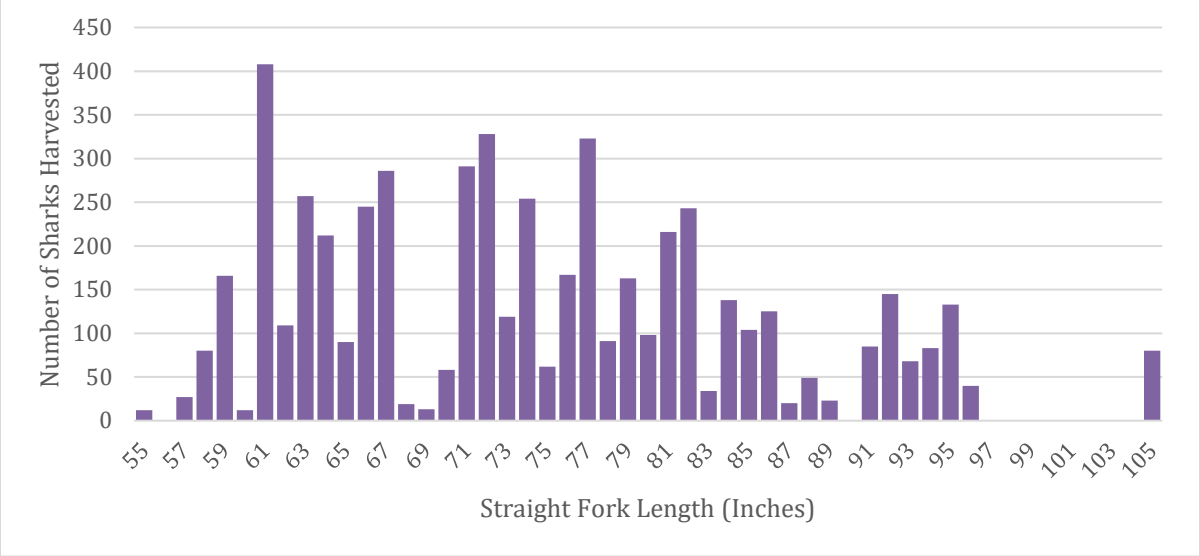

Figure 154. **Length frequency distribution of harvested common thresher sharks, 2014-2019.**
Source: LPS.

Tournaments in the Pelagic Shark Recreational Fishery

Fishing tournaments account for a significant number of recreational trips and catch for pelagic sharks. Only 23 percent of LPS intercepted trips from 2014 through 2019 were associated with HMS fishing tournaments, but tournament trips account for 43 percent of intercepted trips that

targeted pelagic sharks. The percentage of pelagic shark trips associated with tournaments remained fairly consistent at 40 to 45 percent from 2014 through 2019 before dropping to 35 percent in 2019. As shown in Figure 155, tournament trips targeting pelagic sharks were particularly concentrated in the month of June. The proportion of trips and tournament trips, respectively, targeting pelagic sharks was as follows: 43 and 70 percent in June; 27 and 20 percent in July; and 30 and 10 percent for August through October.

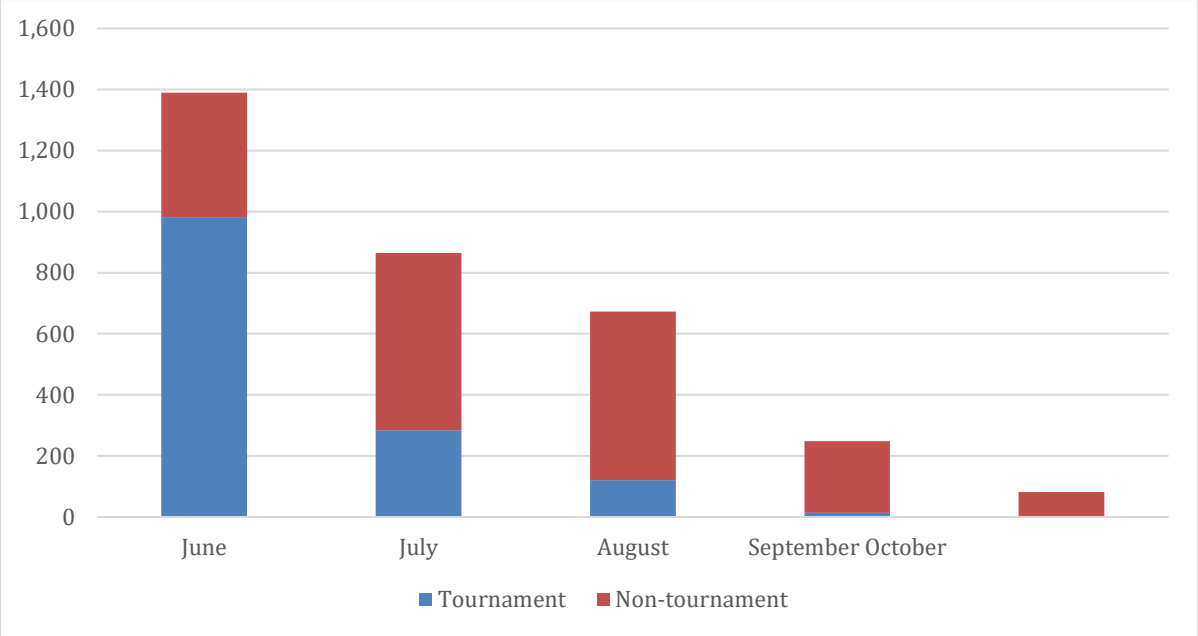

Figure 155. LPS intercepted pelagic shark directed trips by month and tournament status, 2014-2019.
Source: LPS.

From 2014 through 2019, approximately 53 percent of harvested pelagic sharks observed by the LPS were caught in tournaments, and 59 percent of released pelagic sharks reported to the LPS were associated with tournament trips. The percentage of pelagic sharks that were harvested in tournament versus non-tournament associated trips varied by species, but was consistently a significant portion of overall harvest. Blue shark harvest was most affected by tournaments, with 86 percent of all observed harvested blue sharks being associated with tournament trips (Figure 156). With harvested fish accounting for only 1 percent of overall blue shark catch, it is not surprising that tournament caught fish dominated harvested blue sharks as anglers showed little desire to keep them in general. Observed shortfin mako and thresher shark harvest was split between tournament and non-tournament trips with 50 percent of shortfin mako and 51 percent of thresher harvest being observed in tournament trips. The proportion of shortfin mako harvest associated with tournaments did not change following the implementation of the higher minimum size limits in 2018 and 2019; however, as discussed previously, overall harvest declined by approximately 80 percent (Figure 157). Porbeagle shark harvest was not affected by tournaments with only 26 percent of observed harvests being associated with fishing tournaments, although that is still a substantial percentage of overall harvest.

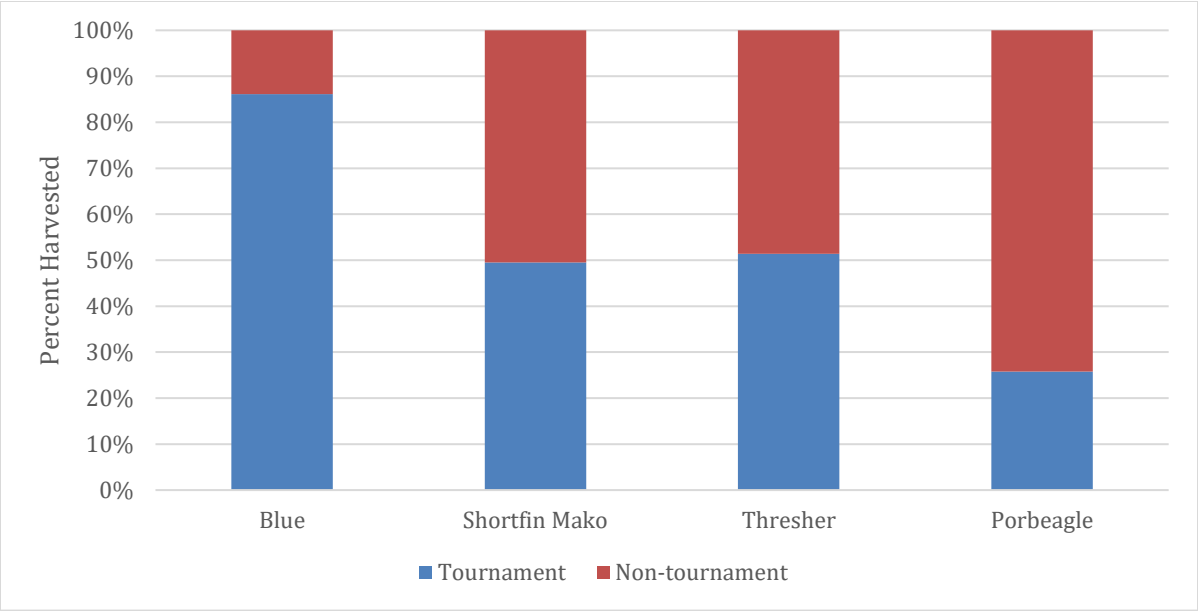

Figure 156. **Percentage of pelagic sharks by species observed harvested from the LPS in tournament versus non-tournament trips, 2014-2019.**

Source: LPS.

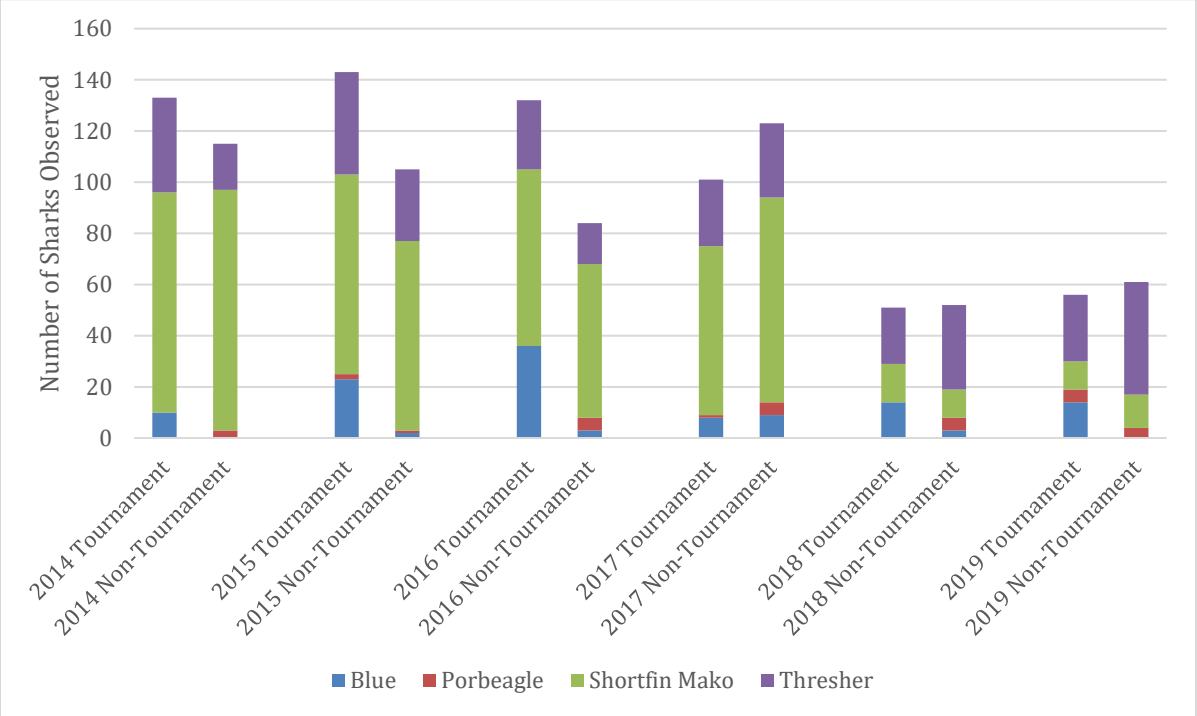

Figure 157. **Composition of observed pelagic shark harvest in tournament versus non-tournament trips by species and year, 2014-2019.**

Source: LPS.

Pelagic Shark Fishery Discussion

While the data presented in this report suggest that the pelagic shark fishery is a very small portion of the overall recreational shark fishery, they were the only group of sharks where the majority of catch for these species were from directed fishing effort rather than incidental catch. Unlike coastal sharks, pelagic sharks were overwhelmingly caught in federal waters meaning the anglers pursuing them are required to possess HMS permits and shark endorsements. As such, NOAA Fisheries has much more direct regulatory control over this fishery than it does over the recreational coastal shark fishery, and can more easily conduct outreach efforts for these anglers.

Despite the abundance of incidental blue shark catches and releases, the directed fishery for pelagic sharks is largely driven by the recreational fishery for shortfin mako sharks. Prior to the implementation of Amendment 11, and the emergency rule that preceded it, shortfin mako sharks made up the majority of harvested pelagic sharks. That distinction has now shifted to the common thresher shark since 2018 even though annual harvest of that species has only increased slightly. Shortfin mako shark recreational harvest estimates have decreased significantly, which has caused overall recreational pelagic shark harvest to be reduced by half. Overall catches of pelagic sharks in the recreational fishery have not decreased, but the number of releases has significantly increased since the implementation of the higher minimum size limits on shortfin mako sharks. Release estimates have been rising for all pelagic shark species except blue sharks which have remained steady.

The pelagic shark fishery, especially harvests, are greatly driven by tournament fishing in the months of June and July. These events continue to play a large role in the fishery following the implementation of Amendment 11 despite the overall reduction in annual harvest which has been cut in half in 2018 and 2019. Given the long-term projections for how long it will take to rebuild the North Atlantic shortfin mako shark stock, it is likely that the recreational pelagic shark fishery, and the tournament fishery by extension, will continue to see reduced harvest of pelagic sharks for at least another decade.

Recreational Shark Fishery Summary

The recreational shark fishery effort levels and harvest estimates have changed from 2014 through 2019. Overall, directed effort targeting coastal shark species remained fairly constant in both the Atlantic and Gulf of Mexico regions. The coastal shark fishery is overwhelmingly an incidental fishery with increasing number of trips with interactions with unidentified sharks in the Atlantic region. In the pelagic shark fishery, there has been steady decline in targeted effort as a result of recent management measures.

Smooth dogfish and SCS make up the overwhelming majority of the recreational shark harvest in numbers. However, there has been a sharp decline in the Atlantic region in both harvest and reported release estimates of smooth dogfish and Atlantic sharpnose sharks. This change coincides with revisions to the MRIP surveys. Catches of both blacktip and bonnethead sharks have increased, especially in the Atlantic region. Non-blacktip LCS fishery is a much smaller portion of the overall recreational shark fishery despite the high variability in data that makes it

harder to determine the catch estimates. Bull and spinner sharks were the most common species to be observed harvested in this group, while nurse sharks were the most commonly released.

Unlike coastal sharks, pelagic sharks were overwhelmingly caught in federal waters meaning the anglers pursuing them are required to possess HMS permits and shark endorsements. Nevertheless, the pelagic shark fishery is a very small portion of the overall recreational shark fishery. The directed fishery for pelagic sharks is largely driven by shortfin mako sharks. Prior to the implementation management measures in 2018, shortfin mako sharks made up the majority of harvested pelagic sharks. Since then, there has been a distinct shift to the common thresher shark, however annual harvest has only increased slightly. Release estimates have been rising for all pelagic shark species except blue sharks which have remained steady. The pelagic shark fishery is largely driven by tournament fishing during the early summer months.

The large number of unidentified sharks continue to complicate the trends in the recreational shark fishery. Even though majority of the unidentified shark species are released, these estimates impact the management of shark stocks. One of the most important measures to conserve and manage shark stocks and the fishery will be to continue providing information to recreational anglers about shark identification and proper handling and release techniques. Education efforts must extend beyond those who hold HMS permits, as the majority of sharks caught recreationally are caught in state waters where HMS permits are not required, or from shore where HMS permits do not apply (because HMS permits are vessel-based permits). Efforts to teach anglers these techniques must also extend beyond those directing on sharks, as the majority of angler interactions with sharks involve incidental catch. NOAA Fisheries will need to work closely with state agencies and the interstate fishery commissions to achieve these goals, and conserve these valuable components to the ocean ecosystem.

There are numerous challenges ahead regarding the management of the recreational shark fishery. In Draft Amendment 14 to the 2006 Consolidated HMS FMP (85 FR 60132; September 24, 2020), NOAA Fisheries is considering active quota management in the recreational shark fishery for the first time. This would involve establishing a recreational fishery quota and accountability measures to ensure the quota is not exceeded. This effort is complicated by the variability of the recreational data for most species and resulting uncertainty. As a result, management needs to be certain to account for that uncertainty and include flexible management measures like multi-year catch estimates. Given that the recreational fishery is overwhelmingly a catch-and-release fishery, the proper, science-based post-release mortality estimates will be essential for setting and monitoring quotas that will successfully conserve these stocks.

Shark Depredation

Shark depredation is the damage or removal of fish from fishing gear by a shark before the fish can be landed and can also include the associated gear damage and bait loss. The shark may or may not be incidentally caught by the fisherman during these events. While both peer reviewed literature and less formal reports of shark depredation date back to at least the 1950s, impacts from shark depredation have become more salient in fisheries worldwide in the last two decades (Mitchell et al., 2018). Accordingly, reports have increased across fisheries managed by NOAA Fisheries, regional fishery management councils, and states. The problem of depredation does not appear to be limited in scope, regions, fishing sectors, gears deployed, or species responsible. While depredation by other marine species, such as marine mammals and other fish, are of concern to stakeholders and NMFS; the focus of this section will be on shark interactions with fisheries.

Problems surrounding depredation are varied and in many cases difficult to address. One of the biggest hurdles is determining which species of sharks are involved in depredation events. This is in part due to the number of species that have been reported, and further exacerbated by the difficulty of positively identifying shark species while they are in the water. A lack of information has also created difficulties in determining the extent and magnitude of depredation. Aside from a few fisheries that have partial coverage by trained fishery observers, no uniform and regular reporting of shark depredation exists. Without scientific data upon which to make informed management choices while minimizing uncertainty and sufficiently evaluating tradeoffs between management objectives, regulations designed to mitigate or reduce depredation could be less effective than desired or have unintended consequences such as being directed at the wrong species, time, or area.

A variety of negative economic, ecological, and social impacts result from shark depredation. Economic value can be diminished for several reasons, primarily by revenue loss experienced by fishermen since there is little or no market value for fish damaged by predators (Mitchel et al., 2018). For example, from 2007 through 2019, data from the Pelagic Observer Program (POP) recorded four percent of the two most depredated species (swordfish and yellowfin tuna) as having some type of damage (Figure 158). Though regulations allow for the retention of shark bitten swordfish (77 FR 45273; July 31, 2012) as well as yellowfin and bigeye tuna damaged by marine predators (83 FR 51391; October 11, 2018); of the 6,330 individual yellowfin tuna and swordfish reported as damaged in the POP, only 739 (11 percent) were reported as being retained. There is also a financial burden to repairing or replacing gear lost or damaged due to shark depredation. Expenses and effort associated with extending the length of a trip to catch enough fish to fill catch limits (e.g., fuel and time) also contribute to trip costs. Revenues of charter businesses and infrastructure established around the fishing industry may be reduced due to shark depredation. Charter customers may be dissuaded from taking future trips if their perception is that their catch will be depredated before they have a chance to land the fish. Tournament outcomes could change quickly due to rules that disqualify fish which have been mutilated by sharks prior to landing or boating the catch.

Fundamental to the ecological concerns of fishery managers is the contribution of fishing mortality to the overexploitation of stocks (Sissenwine et al., 2014). This includes increased

discards due to depredation, which may have implications for total fishing mortality, which in turn may have implications for biological reference points and catch limits. Sharks depredating fish may also be caught by fishermen and die post-release, which can have deleterious effects on the health of shark populations. Without a reliable way to collect information on depredation fish, data are generally not available for calculating cryptic mortality and the impact on stocks.

Additionally, the social perceptions of the causes and effects of depredation also create conflict among ocean user groups. Examples of these conflicts have come from comments received during HMS AP meetings, fishery management council meetings, and Florida Fish and Wildlife Conservation Commission meetings. Some commenters have expressed concerns that the feeding of sharks associated with some diving operations contributes to changes in shark behavior, including associating the presence of boats with opportunities for food. While there is no conclusive evidence of this occurring, recent research has shown that sharks do seem to become habituated to human activities in the ocean. Mitchell et al. (2020) found that the time of arrival and feeding by sharks at baited video systems over repeated days decreased in a limited experimental study. Whether the particular interaction type (e.g., fishing or baited diving) increases this habituation remains uncertain. These types of studies highlight the need to better understand the mechanisms driving depredation and reconcile differing perspectives on the issue of shark conservation and management.

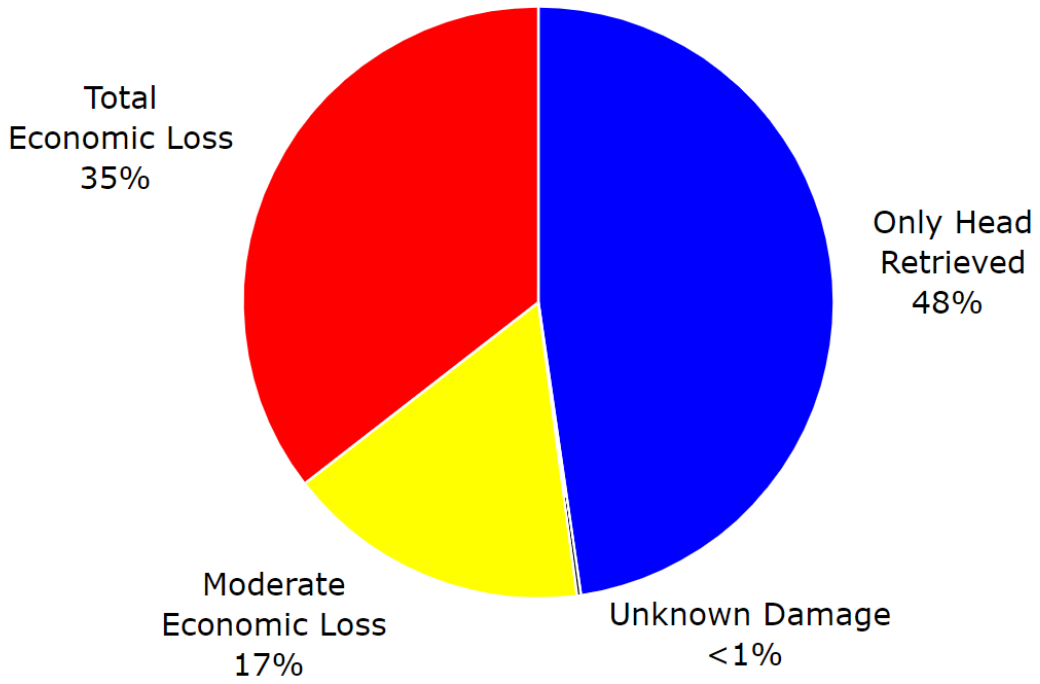

Figure 158. Observed damage extent of yellowfin tuna (YFT) and swordfish (SWO) from the Pelagic Observer Program, 2007-2019.

Note: Catch categorized as 'Only Head Retrieved' were vastly discarded and a total economic loss. Source: Southeast Fisheries Science Center Pelagic Observer Program.

Extent of Depredation

NOAA Fisheries has been receiving an increased number of reports of shark depredation from all areas of the northwest Atlantic from both recreational and commercial fisheries that operate in the Gulf of Mexico, South Atlantic, Caribbean, Mid-Atlantic, and Northeast. Reflecting the wide scope of the problem are formal requests from the Gulf of Mexico and South Atlantic Fishery Management Councils to be periodically updated on the status of management actions and research on shark management and depredation at future council meetings. Additionally, the Joint Explanatory Statement that accompanied the 2021 Appropriations Act included a congressional directive to "to assess and better understand the occurrence of conflicts between dolphins and sharks and commercial, for-hire, and recreational fishing vessels in the Gulf of Mexico and South Atlantic." Individual states have also had the issue raised by their constituents. The result of this widespread issue has been engagement between federal regulators, state regulatory bodies, academia, and private entities in efforts to address shark depredation. Though reports have been widespread, they have not been uniform and many different species of shark have been associated throughout the geographic region and in different fisheries. While not an exhaustive list of fisheries and regions, below are anecdotal examples of depredation from comments received by NOAA Fisheries. The accompanying figure (Figure 159) provides a regional representation of shark species and fisheries or target species which were mentioned by commenters in reference to depredation.

In the Northeast, stakeholders have described a difference in depredation events north and south of Cape Cod. In the Gulf of Maine, porbeagle sharks have been observed as a primary species depredating in the groundfish fishery. Reports of depredation from the Gulf of Maine also include blue and mako sharks, and in more recent years as their range has expanded northwards, white sharks feeding on Bluefin tuna and striped bass. Waters south of Cape Cod differed in that there were fewer issues with porbeagle, blue, or mako sharks. One member of the HMS AP that operates charter trips in the Mid-Atlantic Bight (off Delaware and Maryland) noted that they were not experiencing depredation to the extent described for other regions. Multiple stakeholders have indicated that depredation on tunas was particularly problematic around North Carolina, and noted that sandbar and dusky sharks were the main species involved. It was observed in the charter fleet that the more concentrated the fleet was in an area, the more interactions would occur with estimates up to 150 to 200 depredation events occurring per day. One HMS AP member that was performing research in the area stated that the extent of depredation reduced the effectiveness of research money focused on HMS.

Along the South Atlantic Bight (i.e., off North Carolina through the east coast of Florida), reports of depredation have been prevalent in the reef fish, billfish, mackerel, shrimp, and pelagic longline fisheries. Several comments were received from the SAFMC Snapper-Grouper AP regarding shark depredation on reef fish. It was noted in North Carolina that fishing has become more difficult due to grouper avoiding sharks and staying closer to structure than in the past. Comments from North Carolina south to Georgia indicated that Atlantic sharpnose, sandbar, and blacktip sharks are often perceived to be the most common predating species, although hammerheads were mentioned specifically in regard to the tarpon fishery. In the shrimp fishery, sharks have been causing damage to trawl nets, and large schools of both spinner and blacktip sharks have been observed following shrimp boats and feeding on fish caught in the nets as they

are brought to the surface. Chains or other materials are sometimes attached to the outside of the nets in effort to deter sharks and protect the fishing gear. An HMS AP member noted that very little shark depredation had been observed in an ongoing research project taking place in the South Atlantic Bight on deep-set pelagic longline gear.

NOAA Fisheries has received many comments regarding increased depredation along Florida's east coast from fishing clubs, industry organizations, AP members, and individuals. The charter fleet in south Florida have indicated that sailfish trips, which are generally catch and release operations, are experiencing increased depredation events resulting in more fish being discarded dead. They are also experiencing increased depredation in the reef fish and king mackerel fisheries. Comments from the Florida Keys fishermen indicate that shark depredation is perceived to be on the rise there, too. In December 2020, the Florida Fish and Wildlife Conservation Commission approved a draft proposal for a two-month fishery closure period each year to protect permit (fish) during times when spawning aggregations occur near the Western Dry Rocks, an area that has been reported as having high rates of shark depredation.

Bull, lemon, blacktip, and sandbar sharks have been on the list of commonly offending shark species in the Gulf of Mexico. During surveys in the Northern Gulf, Drymon et al., (2019) observed bull and blacktip sharks depredating on Atlantic sharpnose sharks using bottom longline gear. Deploying rod and reel vertical lines resulted in depredation of red snapper and gray triggerfish by genetically identified sandbar sharks. One Gulf of Mexico Council member stated that underwater research efforts have been curtailed due to the threat posed by sandbar sharks. A commercial fisherman noted that shark interactions have increased around the Tampa Bay area in the past 10 years, and observed that fishing in the Florida Middle Grounds has been particularly troublesome due to shark depredation. Interestingly, research on descender devices off Alabama's coast to reduce mortality caused by barotrauma observed no depredation events during the descents of 1,096 fish released over the 3-year period study (Drymon et al., 2020).

In the Caribbean, different species of sharks were identified as depredating than in other regions, including silky and Caribbean reef sharks. An AP member stated that depredation on HMS is a problem, in particular near the insular drop where other species besides silky and reef sharks might be depredating. The bigger issue with depredation is perceived to be in the shallow water grouper and snapper fishery. Another fishery affected across commercial and recreational sectors was the deepwater snapper fishery.

While there are nuanced differences in depredation occurring in the U.S. North Atlantic, it is uncommon to find an unaffected fishery. In the pelagic longline fishery, which operates throughout the region, blue sharks have been suggested as a leading species responsible for depredation in peer reviewed literature (Ward and Blanchard, 2004; MacNeil et al., 2009). In the shrimp fishery in the Gulf of Mexico and South Atlantic, sharks have been identified as causing damage to trawl nets, and sharks are feeding on fish discarded from the nets. Tournament organizers throughout the region have also expressed concern over fish being disqualified due to damage from sharks and at least one is looking at flexibility options to allow for the inclusion of depredated fish. Anecdotally, NOAA Fisheries has heard from multiple charter captains that witnessing an apex predator feed was once an awe-inspiring event for customers, but is now becoming a nuisance and creates difficulties for business.

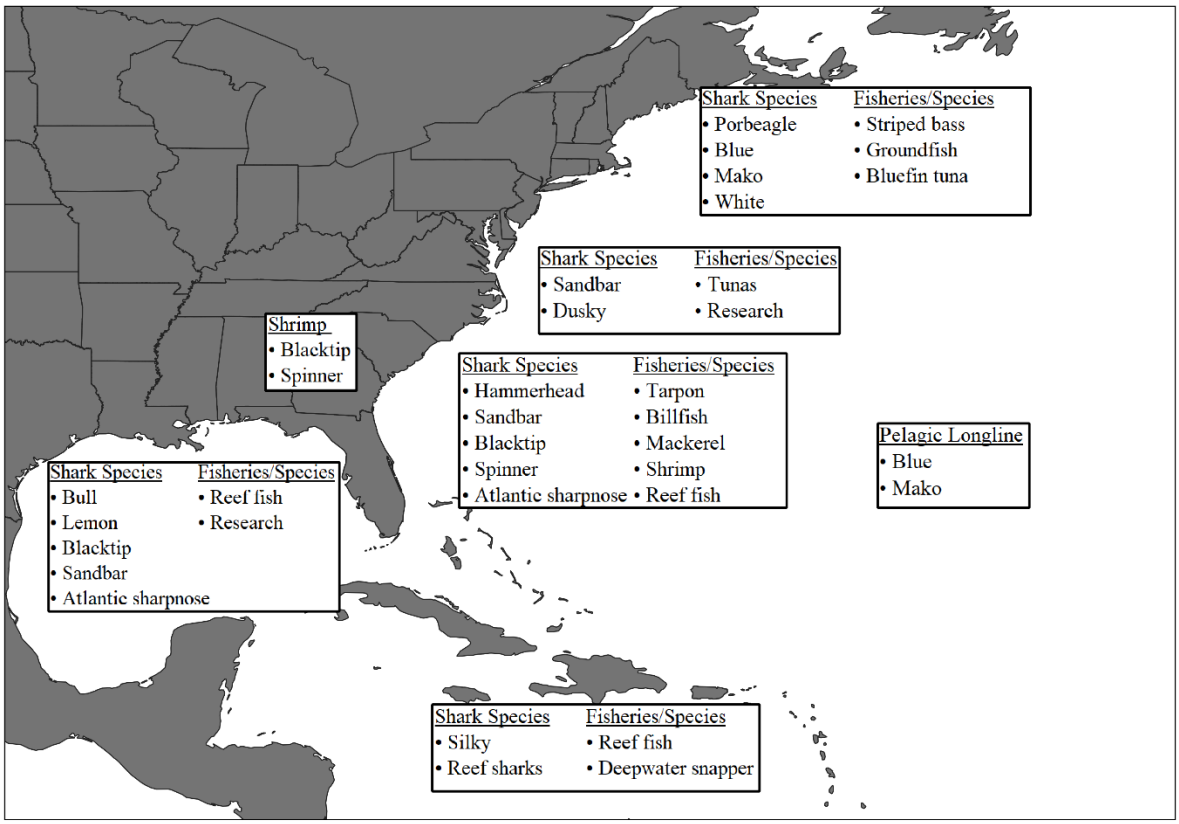

Figure 159. Shark species identified in depredation and affected species and fisheries collected from comments received by NOAA Fisheries by general region.

Data and Current Research

Depredation Mitigation

One of the underlying problems associated with addressing issues related to shark depredation is the availability of data on which to make informed management decisions. One crucial piece to the puzzle is determining what species of sharks are most involved with depredation events. This is made difficult by the challenges of recording sufficient morphological characteristics to positively identify a shark species, and the frequency of the shark being completely unobserved. Another difficulty that is the lack of uniform and regular reporting mechanisms regarding shark depredation. In many fisheries which have been the strongest proponents of urgent management action, there is little or no structured data collected on depredation. As science provides a better understanding of shark species' life histories, distributions, and habitat preferences and collaborative efforts across stakeholders and agencies reduce conflict between user groups; managing conflict between humans and sharks through mitigation and avoidance techniques will become a more fruitful endeavor.

Methods to reduce shark depredation often involve altering the behavior of fishermen or the use of devices to deter sharks. One of the simplest and most effective methods to reduce shark depredation currently used is avoidance. Avoidance includes the fisherman voluntarily relocating

to a different fishing location, fishing in areas where sharks are generally not found, and regulatory measures that minimize interactions with sharks. Unfortunately, relocating is not always the best solution. Sharks may be present at the new fishing location; and there is cost associated with curtailing fishing effort, moving locations, and redeploying fishing gear.

Research on shark deterrent methods dates back to the 1930's in efforts to develop a way to keep people safe in the event they end up in the water in areas where sharks are present. While research on shark deterrents has included chemical, visual, and auditory repellents; the primary technology applied to fishing methods have focused on electrical repellents. Induction of even relatively weak electrical fields has been shown to elicit a reaction in sharks and in some cases may deter them from eating bait or catch by saturating their specialized electroreceptors, ampullae of Lorenzini. In fisheries applications, fields can be passively induced by attaching electropositive metals or magnets to fishing gear, or by actively powering a source to generate the field. However, efficacy of magnets and electropositive metals has not been consistent across studies or shark species. For example, an experiment deploying rare earth magnets near bait recorded a 50 percent reduction in depredation by Galapagos sharks in some configurations. However, it was the conclusion of the researchers that these methods were less effective when more than three sharks were present (Robbins et al., 2011). Conversely, McCutcheon and Kajiura (2013) found lanthanide metals ineffective at repelling bonnethead and lemon sharks, and a study on pelagic longline gear using neodymium magnets placed above hooks had no effect in deterring blue sharks, and in some cases seemed to have an attractive effect (Porsmoguer et al., 2015). Assuming a configuration of repellent is used that deters sharks, deploying a shark repellant could be a viable option to reduce interactions with bait and catch. For instance, deploying a magnet in conjunction with vertical line gear while bottom fishing in a static location, such as is common in the reef fish fishery, would not require much effort over what is required to catch fish. Indeed, at least one product is available for consumers that is marketed to be deployed in this application. In other situations where the fishing gear is not stationary, configuring a magnetic repellant near the hook may not be effective in deterring depredation, as the field produced by a magnet small enough to not interfere with gear operations extends less than one meter. Costs associated with deploying magnets or electropositive metals at the scale of commercial fisheries may also be high, as they must be replaced due to dissolution in seawater.

Shark Populations

At the beginning of this document, NOAA Fisheries presented the list of current stock assessments and determinations for each assessed shark species. No broad stroke can classify all shark stocks in a similar status, as the status of different species or stocks cover the full gamut from overfished with or without overfishing occurring to healthy to unknown. Having more specific and more numerous stock assessments at the species or stock level will be beneficial to shark management in general and may also assist in finding more tailored approaches to mitigate depredation.

It is important to point out that sharks play a vital role in maintaining a healthy ocean ecosystem. As sharks and other fish species either rebuild (for overfished stocks) or maintain their population levels (for currently healthy stocks), there may be a shift in the ecological baseline

overall. This shift applies not only to their niche in their habitat, but also to depredation and other interactions with humans. It is likely that sharks could be seen in areas where they have not been seen for years or even decades. From this perspective, an important concept to work toward is not to end depredation, but balancing of the needs and uses of the ocean while maintaining sustainable shark fisheries.

Ongoing Research

NOAA Fisheries has identified quantifying depredation rates in all fisheries as a management-based research priority (https://www.fisheries.noaa.gov/resource/document/atlantic-highly-migratory-species-management-based-research-needs-and-priorities), and to that end have begun collecting data available on shark depredation. There exists regular collection of confirmed shark depredation events in some fisheries with mandatory coverage from fisheries observers. In 2007, the Pelagic Observer Program (POP) implemented protocols to collect detailed information on predator interactions as a result of the Pelagic Longline Take Reduction Plan. Under these protocols, observers differentiate between species groups interacting with catch (e.g., shark or whale) and record to the per-fish level what type and the extent of depredation that occurred. Additionally, information on the presence of predators and interactions with catch are also recorded by the Gulf of Mexico Reef Fish Observer Program, which has collected at the set-level what type of predator was present and the extent of interaction with captured fish occurred since 2006. This data, along with other information collected by fisheries observers, is being analyzed to identify influential factors and trends of depredation rates in the pelagic longline fishery and reef fish fisheries using bottom longline and vertical line gears.

Preliminary analyses indicate that shark depredation rates (quantified as proportion of sets that had a depredation event relative to the total number of observed sets) have fluctuated but remained relatively stable in the pelagic longline fishery, but show an increasing trend for sets deploying bottom longline and vertical line gear in the Gulf of Mexico reef fish fishery (Figure 160). The relatively flat trend observed in the pelagic longline fishery was also noted by MacNeil et al. (2009) when they examined data for the same fishery from 1992 through 2006. Their study drew a positive association between blue shark catch per unit effort (CPUE) and depredation rates. The hypothesis that blue sharks are responsible for much of the depredation in the fishery may be bolstered by recent CPUE indices from stock assessment of blue shark (ICCAT, 2015) also remaining relatively stable that is roughly mirrored in the depredation rates observed in the pelagic longline fishery. However, the observed depredation rates in the pelagic longline fishery were lowest in fishing areas most distant from shore in the North Central Atlantic (NCA), Northeast Distant (NED), and Sargasso Sea (SAR) areas, which might indicate that fishing activities occurring closer to shore are influenced by more than only those sharks considered ‘pelagic’.

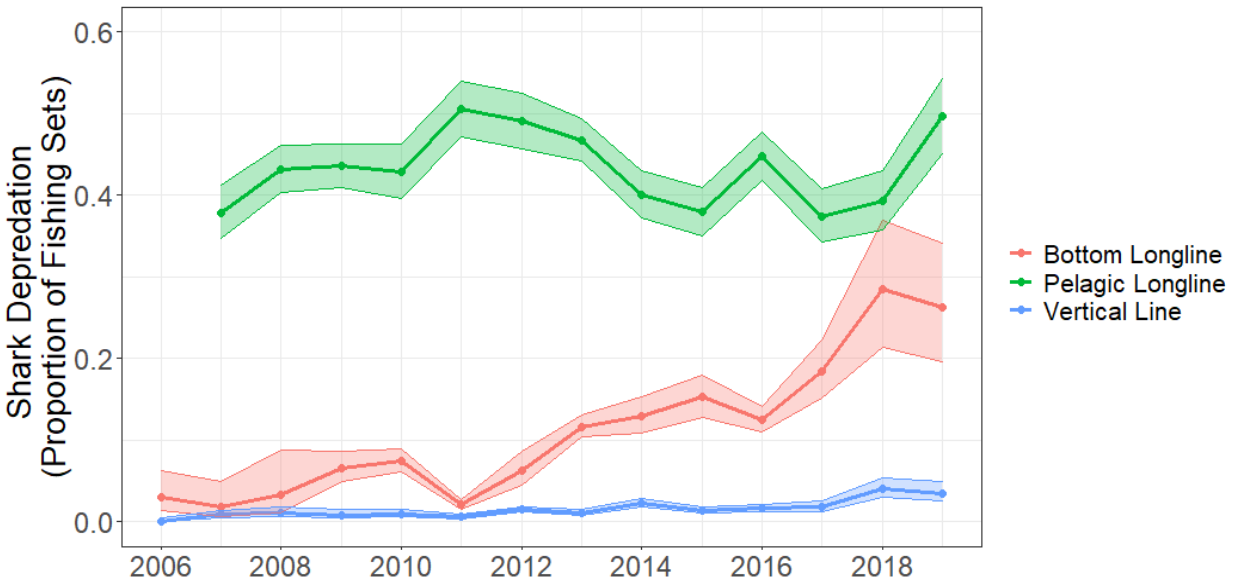

Figure 160. The proportions of fishing sets with shark depredation from bottom longline, vertical line, and pelagic longline gear types by year, 2006-2019.

Note: All the data are with 95 percent confidence intervals. Bottom longline and vertical line data are from 2006 through 2019. Pelagic longline data are from 2007 through 2019. Source: Southeast Fishery Science Center Observer Program.

Data were also examined for trends across seasons and fishing areas (fishing areas are shown in Figure 161). The Gulf of Mexico (GOM) was split into two regions (east and west) by the 85° W long. for the reef fish fishery and the regional fishing area designations recorded by the pelagic observer program were collapsed to combine the Caribbean (CAR) and Florida's East Coast (FEC) regions; the Mid-Atlantic Bight (MAB) and Northeast Coastal (NEC) regions; and NCA, NED, and SAR due to limited number of observed sets in certain years. The GOM and South Atlantic Bight (SAB) regions were treated individually. In the reef fish fishery, observed rates of shark depredation were higher in the warmer periods of summer and fall (Figure 162). Of particular note, depredation rates were not consistent for gears across the regions of the GOM. Bottom longline generally had higher rates of depredation in the eastern GOM, whereas vertical longline exhibited higher rates in the western GOM. Figure 163 shows the depredation rates for the pelagic longline fishery, which appear to exhibit less seasonal variation in more consistently warm regions. Shark depredation in the SAB was consistently higher than all other areas throughout all seasons, while rates were lowest in the NCA, NED, and SAR area. The GOM along with the MAB and NEC areas showed variation among seasons, though they peaked at different times of the year. Relatively high rates of shark depredation were observed in the CAR and FEC area throughout the year.

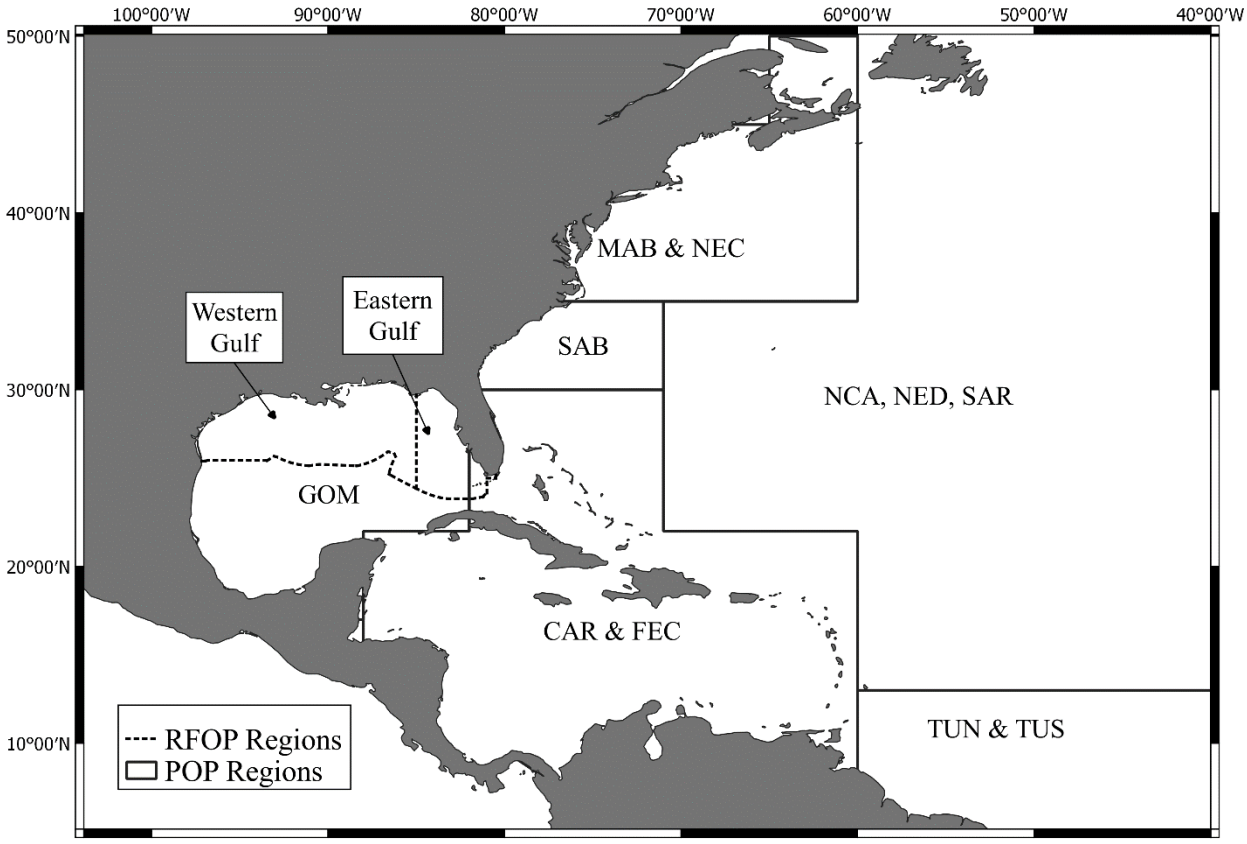

Figure 161. Spatial depiction of fishing areas for the reef fish and pelagic observer programs used for analyzing spatial trends in shark depredation rates.

Note: The reef fish observer program is the dashed lines. The pelagic observer program is the solid lines. MAB = Mid-Atlantic Bight. NEC = Northeast Coastal. NCA = North Central Atlantic. NED = Northeast Distant. SAR = Sargasso Sea. TUN = Tuna North. TUS = Tuna South. SAB = South Atlantic Bight. GOM = Gulf of Mexico. CAR = Caribbean. FEC = Florida's East Coast.

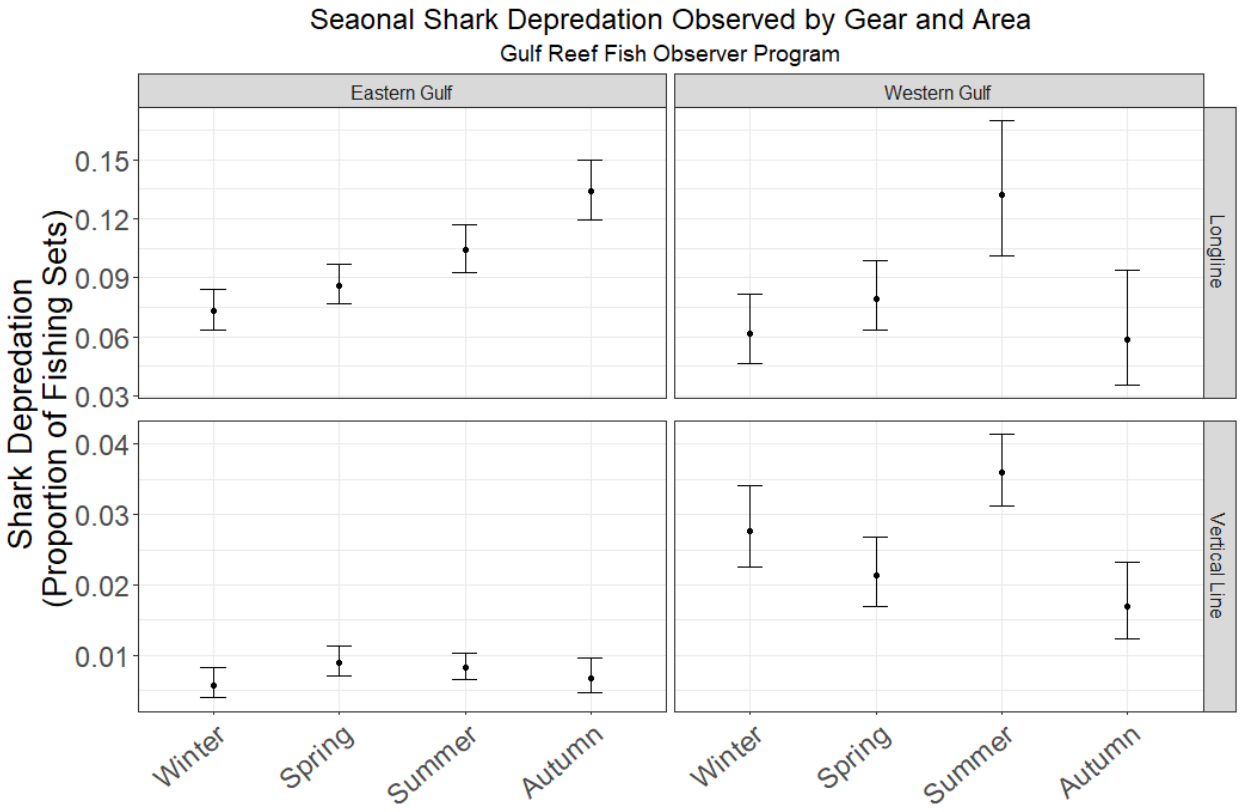

Figure 162. The proportions of fishing sets with shark depredation for each season, fishing area, and gear from the reef fish observer program, 2006-2019.

Note: All the data has 95 percent confidence intervals. Source: Southeast Fishery Science Center Reef Fish Fishery Observer Program.

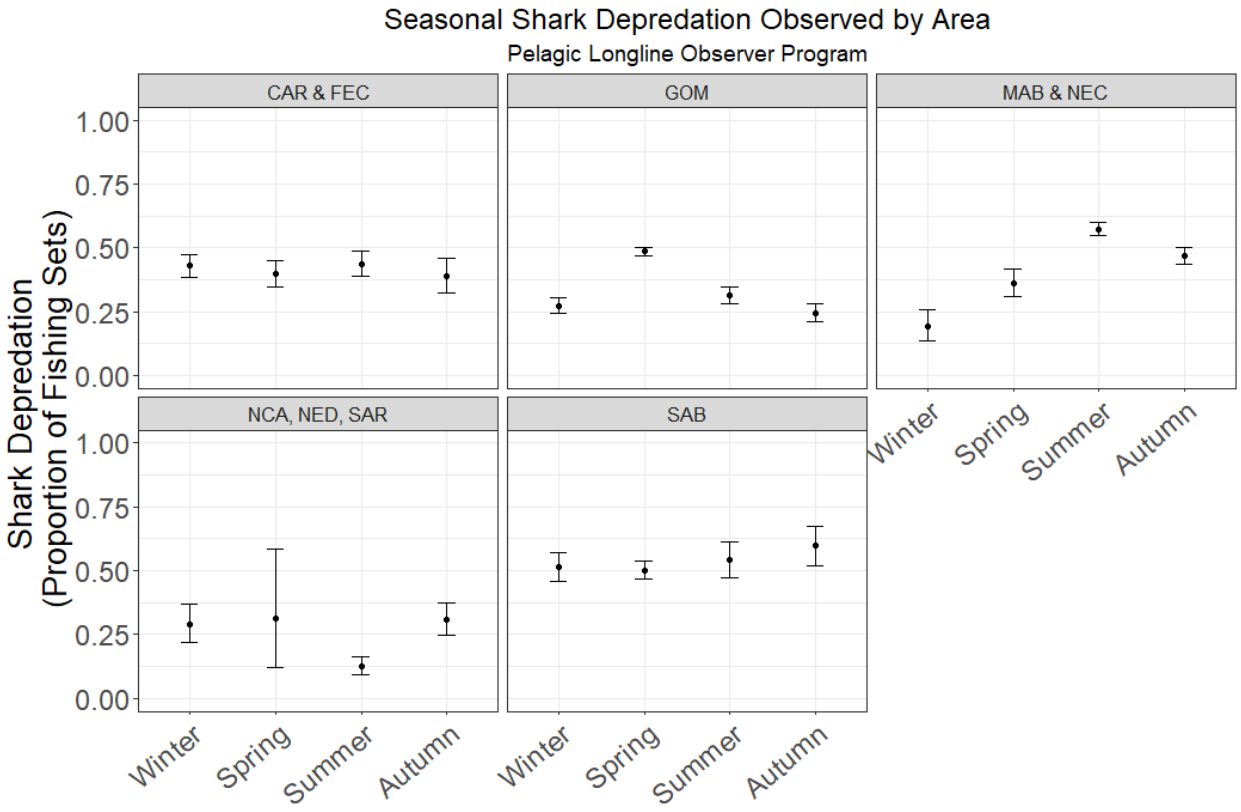

Figure 163. The proportions of fishing sets with shark depredation for each season and fishing area from the pelagic longline observer program, 2007-2019.

Note: All the data has 95 percent confidence intervals. Source: Southeast Fishery Science Center Pelagic Observer Program.

Future Research Avenues

Continued development of economically viable shark deterrent devices for use in a wide range of situations would most likely be widely adopted by fishery participants. One source of concepts to test for efficacy in deterring shark depredation may be to adapt methods used to deter marine mammal from depredating catch. In a similar vein, developing fishing practices that consistently reduce interactions with sharks while maintaining catch rates of targeted fish species could also be developed and adopted by many fishermen.

One of the most promising technologies for identifying shark species culpable for depredation seems to be genetic methods using material from shark-bitten catch. This would enable resource managers to focus their decision making on species that contribute most to depredation, and also provide further insight into life history and distribution of shark species identified through genetic markers. Expanding data collection to fisheries that do not currently have an avenue of reporting would assist in quantifying the extent and magnitude of shark depredation. Regular reporting of depredation at tournaments, dockside interviews, and headboat surveys would all provide insights into how depredation is affecting the recreational fishing sector and provide opportunities for outreach to the affected participants. Research toward understanding shark

sensory perceptions and how they become habituated to specific environmental cues may also provide important information on how to best avoid getting 'sharked'. In sum, there is still much unknown about shark depredation and a wide field of applied science for which research should be focused.

Summary Discussion

As with any recovering apex predator population, interactions between humans and sharks are expected to increase as their stocks and their prey rebuild, although, as noted above, other factors are likely at play in the increased incidences of shark depredation. Including considerations to manage these interactions in a positive way will become increasingly important as shark populations continue to increase. As noted by Carlson et al. (2019), "Implications for current and future conservation management need to be considered as part of conservation strategies in the context of how humans will interact and potentially compete with recovering species." Inclusion of all ocean user groups and points of view will need to be considered as well to ensure management needs meet the multiple goals of conservation, sustainability, and economic prosperity. Ultimately, new data collection methods focused on shark depredation in tandem with cooperation and communication between stakeholders could be used to create effective management measures that would provide more economic and fishing opportunities while maintaining conservation tenants under the Magnuson-Stevens Act. In the face of the great amount of uncertainty surrounding shark depredation, one fact remains true: depredation will persist so long as humans and sharks both use the oceans.

Additional Factors Impacting the Shark Fishery

In any fishery, there are factors that can cause complexities in managing the fishery. This section examines some of these factors, including other commercial and recreational fisheries, and international and state regulations. As described above, the shark fishery has shown an overall decline, with lower effort levels, lower landings, and fewer fishermen entering the fishery each year. Some of the factors discussed in this section could have contributed to the decline of the shark fishery.

Other Commercial Fisheries

Commercial fishermen usually hold multiple fishing permits in a variety of fisheries. This allows fishermen to diversify and offer flexibility to their livelihoods so that they can switch fisheries based on the season, regulation changes, or economic value. To understand the potential reliance on other fisheries in addition to the shark fishery, NOAA Fisheries used publicly available data from NOAA Fisheries' SERO and Greater Atlantic Regional Fisheries Office (GARFO) to determine the number of shark limited access permit holders that hold permits in other fisheries, as well as information about those other fisheries.

The SERO Permits Office usually issues permits for commercial fishermen in the south Atlantic area. However, some permits from SERO (HMS permits) are for all commercial fishermen from Maine through Texas and in the Caribbean. As of December 2020, 90 percent of the 183 shark directed limited access permit holders hold at least one other non-HMS permit issued by the SERO (Table 23). Of those shark directed limited access permit holders holding other non-HMS permits, over 50 percent (94 permit holders) of them hold four or more other non-HMS permits. Thus, the majority of the shark directed limited access permit holders are in multiple fisheries, which could affect the level of their participation in the shark fishery during the year.

Table 23. Number of Southeast Regional non-HMS permits held by shark directed permit holders.

Range of non-HMS permits	Number of shark directed permit holders with other non-HMS permits	Percent of shark directed permit holders with other non-HMS permits
0	18	10%
1 to 3	71	39%
4 to 6	70	38%
7 to 9	22	12%
10 to 12	2	1%
Totals	183	100%

Source: SERO.

NOAA Fisheries listed all the non-HMS fisheries and type of fishery (open or limited access) the shark directed permit holders are participants in (Table 24). Based on SERO data, the majority of the shark directed limited access permit holders are in Atlantic dolphin wahoo (73 percent) and

Spanish mackerel (55 percent) fisheries, which are both open access. The top limited access fisheries that shark directed permit holders participate in are king mackerel (36 percent), South Atlantic unlimited snapper/grouper (20 percent), and Gulf of Mexico reef fish (15 percent). Another limited access fishery important to the shark directed permit holders is commercial golden tilefish in the south Atlantic area. Even though only a few shark directed limited access permit holders (10) are participants in the commercial golden tilefish fishery, they represent 45 percent of all the issued permits in the fishery.

Table 24. List of most frequently held Southeast Regional non-HMS permits by shark directed permit holders.

List of Southeast Regional permits	Permit Type (Open or Limited Access)	Number of shark directed permit holders with other non-HMS permits	Percent of shark directed permit holders with other non-HMS permits
Atlantic Dolphin/Wahoo	Open	134	73%
Spanish Mackerel	Open	100	55%
King Mackerel	Limited	66	36%
South Atlantic Unlimited Snapper/Grouper	Limited	36	20%
Gulf of Mexico Reef Fish	Limited	28	15%
Atlantic Charter/Headboat for Dolphin/Wahoo	Open	19	10%
South Atlantic Charter/Headboat for Snapper/Grouper	Open	19	10%
South Atlantic Charter/Headboat for Pelagic Fish	Open	18	10%

Source: SERO.

Shark directed limited access permit holders have diversified into a number of other commercial fisheries, and may prioritize some fisheries over others due to opening dates and limited fishing seasons. Table 25is a representation intended to illustrate potential timing of other fisheries. In past years, the Atlantic LCS, SCS, pelagic shark, and smoothhound shark management groups, along with the Gulf of Mexico LCS western sub-region and SCS management groups, have been open all year. Thus, shark directed limited access permit holders might need to prioritize other fisheries based on timing, and which fishery would be the most economically viable for them to fish that year. The effect of other fisheries may not be evenly distributed across the shark fishery. For example, because a large percentage of the shark permit holders are in Florida, the timing of fisheries such as the Spanish mackerel fishery, which primarily operates in waters off Florida, may be reflected in the southern portion of the shark fishery, and not the northern portion.

Table 25. General seasonal peaks of the most frequently held non-HMS permits by shark directed permit holders.

Month	Dolphin Wahoo	Spanish Mackerel	King Mackerel	South Atlantic Unlimited Snapper/Grouper	Gulf of Mexico Reef Fish	Golden Tilefish
January		X			X	X
February		X			X	X
March				X	X	X
April			X	X	X	
May	X		X	X	X	
June	X		X		X	
July	X		X	X	X	
August			X	X	X	
September			X	X	X	
October					X	
November		X			X	
December		X			X	

Note: "X" indicates peak months. Source: Southeast Fisheries Management Council, Gulf of Mexico Fishery Management council.

Permits issued by the GARFO Permits Office are usually for commercial fishermen in the Mid-Atlantic Bight to Maine area. Based on the information from GARFO, only 21 percent of the 183 shark directed limited access permit holders hold at least one other non-HMS permit administered by GARFO (Table 26). Of those shark directed limited access permit holders holding other non-HMS permits, 14 percent (26 permit holders) hold five or more other non-HMS permits. Thus, the majority of the shark directed limited access permit holders hold more SERO issued permits than GARFO issued permits. Table 27 lists the top fishery permits administered by the GARFO the shark directed permit holders are participants in. They are the bluefish (20 percent), monkfish (15 percent), and tilefish (15 percent) fisheries. As with SERO permit holders, GARFO permit holders also might need to prioritize some fisheries over others due to opening dates, limited fishing seasons, and fisheries that are more economically viable (Table 28).

Table 26. Number of Northeast Regional non-HMS permits held by shark directed permit holders.

Range of non-HMS permits	Number of shark directed permit holders with other non-HMS permits	Percent of shark directed permit holders with other non-HMS permits
0	144	79%
1 to 4	13	7%
5 to 8	10	5%
9 to 12	14	8%
13 to 16	2	1%
Totals	183	100%

Source: GARFO.

Table 27. List of most frequently held Northeast Regional non-HMS permits by shark directed permit holders.

List of Northeast Regional permits	Number of shark directed permit holders with other non-HMS permits	Percent of shark directed permit holders with other non-HMS permits
Bluefish	37	20%
Monkfish	27	15%
Tilefish	27	15%
Spiny Dogfish	25	14%
Squid/Mackerel/Butterfish	25	14%
Skate	22	12%
Herring	19	10%
Northeast Multispecies	17	9%
Black Seabass	13	7%
Summer Flounder	9	5%
Atlantic Deep Sea Red Crab	9	5%
Scup	9	5%

Source: GARFO.

Table 28. General seasonal peaks of the most frequently held non-HMS permits by shark directed permit holders.

Month	Bluefish	Monkfish	Tilefish	Spiny Dogfish	Squid/Mackerel/Butterfish
January			X		
February			X		
March			X		
April		X	X		
May		X	X		X
June		X	X		X
July	X			X	X
August	X			X	X
September	X			X	X
October			X		X
November			X		X
December			X		X

Note: "X" indicates peak months. Source: NEFSC.

Based on the information about other commercial fisheries, it appears that some shark directed limited access permit holders prioritize other fisheries before participating in the shark fishery due to the peak fishing times for those fisheries. In the southeast Atlantic, shark directed limited access permit holders prioritize target golden tilefish and Spanish mackerel first. After their peak seasons are over in February or March, these fishermen appear to target sharks in their areas until they migrate north. At that point, they would target king mackerel and dolphin/wahoo during the summer months before the sharks migrate south for the winter. In the northern states along the Atlantic, the availability of some shark species due to their migratory patterns is limited. Thus, shark directed limited access permit holders are likely to target sharks when available (summer months), but at more incidental levels. Overall, the timing of peak fishing seasons of other commercial fisheries may have caused a decrease in effort levels in the shark fishery at certain times of the year.

Review of Federal Shark Finning and Conservation Laws

Another factor that could affect the shark fishery is federal finning and conservation law. On December 21, 2000, the President signed into law the Shark Finning Prohibition Act (SFPA) (Pub. L. 106–557). Among other things, the SFPA amended section 307 of the Magnuson-Stevens Act to prohibit removing any of the fins of a shark (including the tail) and discarding the

remainder of the shark at sea. In addition, the SFPA prohibited any person from having custody, control, or possession of shark fins aboard a fishing vessel without the corresponding carcass and prohibited any person from landing shark fins without the corresponding carcass. The final rule implementing the SFPA established a rebuttable presumption that any shark fins possessed on board a U.S. fishing vessel, or landed from any fishing vessel, were taken, held, or landed in violation of these regulations if the total wet weight of the shark fins exceeded five percent of the total dressed weight of shark carcasses landed or found on board the vessel. Lastly, the SFPA required NOAA Fisheries to provide Congress with an annual report describing efforts to implement the law. NOAA Fisheries published a final rule to implement the SFPA on February 11, 2002 (67 FR 6194).

On January 4, 2011, the Shark Conservation Act of 2010 (SCA) (Pub. L. 111-348, Jan. 4, 2011) amended the High Seas Driftnet Fishing Moratorium Protection Act (Moratorium Protection Act), 16 U.S.C. 1826d et seq., and the Magnuson-Stevens Act, 16 U.S.C. 1801 et seq. The SCA amended the Magnuson-Stevens Act to prohibit any person from: (1) removing any of the fins of a shark (including the tail) at sea; (2) having custody, control, or possession of a fin aboard a fishing vessel unless it is naturally attached to the corresponding carcass; (3) transferring a fin from one vessel to another vessel at sea, or receiving a fin in such transfer, unless the fin is naturally attached to the corresponding carcass; or (4) landing a fin that is not naturally attached to the corresponding carcass, or landing a shark carcass without its fins naturally attached. The SCA required fins be naturally attached for all sharks, and provided a limited exception smooth dogfish. For the purpose of the SCA and these regulations, "naturally attached," with respect to a shark fin, means to be attached to the corresponding shark carcass through some portion of uncut skin. NOAA Fisheries published a final rule to implement the SCA on July 29, 2016 (81 FR 42285; June 29, 2016).

Neither the SFPA nor the SCA prohibited the possession or sale of shark fins in federal fisheries. Rather, Congress prohibited shark finning, which is the discarding of shark carcasses at sea after the fins have been removed, and required that fins be naturally attached to the carcass of the corresponding shark. In implementing these provisions of these statutes consistent with its Magnuson-Stevens Act fishery management obligations, NMFS management measures therefore address the wasteful practice of shark finning while also providing opportunities to land and sell sharks and shark products legally harvested consistent with science-based conservation and management measures.

Relationship of Regulations with State Fin Bans

Current state bans on the sale of shark fins in the United States have effects on the sale and trade of products caught by federally permitted U.S. fishermen and dealers in sustainable fisheries.

Several states and territories have enacted statutes that address the sale and possession of shark fins within the state or territory (Table 29). Each statute differs in its precise details, but most contain a prohibition on possession, landing or sale of, distribution, or other activities involving shark fins. While these laws do not prevent fishermen from harvesting federally managed sharks for their meat or other products, they do create a disincentive to harvest and sell shark fins that were legally and sustainably caught in the federally managed commercial shark fishery.

In the final rule implementing the provisions of the SCA (81 FR 42285), NOAA Fisheries states that they examined many of the state fin ban laws and engaged in extensive discussions with states and territories. NOAA Fisheries had discussions with the following states and territories: California, Commonwealth of the Northern Mariana Islands, Delaware, Hawaii, Maryland, Massachusetts, New York, Oregon, Washington, and Guam. In those discussions, NOAA Fisheries sought additional information about the nature and details of the state laws and fisheries, economic factors, and the ability of federally permitted shark fishermen to sell legally-landed shark fins.

Following the discussions and further exchanges of information between NOAA Fisheries and the relevant states and territories, NOAA Fisheries concluded that the state shark fin laws as of 2017 were consistent with the Magnuson Stevens Act. The bases for these conclusions were that those state and territorial shark fin laws would have minimal impacts on federally licensed and permitted shark harvesters, because the state laws did not prohibit federally licensed and permitted fishermen from landing a legally-caught shark with fins naturally attached or selling the non-fin parts of the shark, and, based on the scale and nature of the shark fishery in those states and territories, the laws would have minimal impacts on federal fishermen. However, since 2017, additional states have enacted shark fin possession, sale and trade ban laws, and national campaigns aimed at reducing international trade of shark fins continue to affect the markets for shark fins.

Table 29. List of states with shark fin bans.

Law Enacted	State/Territory (Month)
2010	Hawaii (July)
2011	Northern Mariana Islands (January), Guam (March), Washington (May), California (October), Oregon
2012	American Samoa (November)
2013	Illinois (January), Delaware (May), Maryland (May), New York
2014	Massachusetts
2015	Texas (June)
2016	Rhode Island
2017	Nevada (June)
2018	-
2019	-
2020	Florida (September)
2021	New Jersey (January)

Note: Month of implementation was not supplied for all of the states. Source: Humane Society International.

As shown in the Commercial Fishery and Market Sections of this document, state and territorial shark fin bans have had direct and indirect impacts on the U.S. commercial shark fishery. In particular, there have been direct impacts on the sale and trade of shark fins through interstate commerce, which has led to an indirect impact on lawful harvest. For example, dealers in the Gulf of Mexico must have fins naturally attached to shark carcasses during transit, even though federal regulation does not require this after the shark has been landed. This has resulted in smaller shipments, more processing fees for removing the fins at the arrival site in Mexico, and subsequently a reduction in revenue for fishermen and dealers (Pers. comm. with Gulf of Mexico dealers).

Indirectly, the state fin bans likely have caused a decrease in the marketability of shark products in the United States. Based on conversations with some shark dealers, the buyers and markets of shark products have become limited due to the added state regulations and negative reputation that shark products have garnered over the years. Some shark dealers have not been able to sell any shark fins recently due to state shark fin bans limiting sale in those states and limiting transport through those states. Shipments of shark products are staying in local markets instead of making it out of the state or into the international market. Dealers that would like to expand their markets appear to be hesitant to do so given overarching confusion about transporting sharks (usually via truck) that are legally landed in one state and cross borders of states that may have an active shark fin ban.

The state shark fin bans are aimed at effective conservation of shark populations. The vast majority of shark species harvested in federal shark fisheries are species with above-target population levels, however. In the Atlantic HMS fishery, for example, 77 percent of all U.S. shark landings in 2019 were of four species (smooth dogfish shark, blacktip shark, Atlantic sharpnose shark, and finetooth shark), all of which are not overfished nor subject to overfishing. All other shark landings were from shark management groups with strict quotas that were not exceeded and have rebuilding plans to ensure the shark stocks are sustainable. It is true that unsustainable fishing, habitat loss, and other practices such as shark finning have greatly depleted some shark populations overseas; however, because of laws such as the Magnuson-Stevens Act and years of strict management, many U.S. shark stocks are healthy, and those U.S. sharks stocks that were overharvested are rebuilding.

International Requirements

Another factor that contributes to the complexity of federal shark management is international requirements that are negotiated as part of international conventions or agreements to which the United States is a party. Because fish and other marine wildlife cross national boundaries, the United States shares fish stocks with other countries. The way other countries manage these shared resources can directly affect the status of U.S. federally managed fish stocks. NOAA Fisheries engages with other countries bilaterally and through various multilateral international fisheries organizations to promote sound management and conservation of global fisheries resources in a manner consistent with U.S. domestic fisheries policy.

International Commission for the Conservation of Atlantic Tunas

Atlantic HMS fisheries are managed under the dual authority of the Magnuson-Stevens Act and the Atlantic Tunas Convention Act (ATCA). ATCA authorizes the Secretary of Commerce to promulgate regulations, as may be necessary and appropriate to carry out recommendations of ICCAT. The authority to issue regulations under the Magnuson-Stevens Act and ATCA has been delegated from the Secretary to the Assistant Administrator for Fisheries, ICCAT oversees the conservation and management of a variety of Atlantic marine species, including tunas, swordfish, billfish, and sharks, and adopts measures to minimize bycatch of turtles and seabirds associated with these fisheries. This responsibility is shared among ICCAT's 52 members, including the United States. NOAA Fisheries participates in the stock assessments conducted by the ICCAT SCRS and in the annual ICCAT meetings. ICCAT has assessed the Atlantic blue and the shortfin mako shark stocks, participated with the International Council for the Exploration of the Sea on a joint porbeagle assessment, and has conducted several ecosystem risk assessments for various shark species, among other things. Stock assessments and management recommendations or resolutions are listed on ICCAT's website at https://www.iccat.int/.

In recent years, ICCAT has adopted several shark-specific recommendations for sharks caught in association with ICCAT fisheries. In 2017, given that shortfin mako fishing mortality largely occurs in ICCAT fisheries, ICCAT adopted Recommendation 17-08 with measures to prevent further decrease of the North Atlantic shortfin mako shark population, stop overfishing and begin to rebuild the stock. Based on this recommendation, NOAA Fisheries first published an emergency rule with immediate, limited measures to help end overfishing. It later published a final rule for Amendment 11 (84 FR 5358; February 21, 2019) which, among other things, allowed the commercial retention of shortfin mako sharks with longline or gillnet gear, and only if the shark was dead at haulback. In the recreational shark fishery, NOAA Fisheries increased the minimum size limit to 71 inches (180 cm) FL for male and 83 inches FL (210 cm FL) for female shortfin mako sharks. As mentioned above in the Commercial and Recreational Fishery sections, ICCAT Recommendation 17-08 has resulted in a significant decline in U.S. shortfin mako shark landings. Commercial shortfin mako shark landings dropped from 184,993 lb dw in 2017 to 53,573 lb dw in 2019 (a 71-percent decrease in landings in two years). In the recreational fishery, shortfin mako shark landings through LPS dropped by about 80 percent during that time. In 2019, Recommendation 17-08 was replaced by Recommendation 19-06, which continues the same management measures and requirements.

Other ICCAT recommendations that have affected the shark fishery include Recommendations 10-07, 10-08, 11-08, and 15-06. Based on ICCAT Recommendations 10-07 and 10-08, NOAA Fisheries published a final rule to prohibit the retention, transshipping, landing, storing, or selling of hammerhead sharks in the family *Sphyrnidae* (scalloped, smooth, and great) and oceanic whitetip sharks caught in association with ICCAT fisheries (76 FR 53652; August 29, 2011). This rule affected the commercial HMS pelagic longline fishery and recreational fisheries for tunas, swordfish, and billfish in the Atlantic Ocean, including the Caribbean Sea and Gulf of Mexico. Before this rule, hammerhead shark species and oceanic whitetip sharks were not targeted with pelagic longline gear, but were incidentally caught and retained by HMS fishermen. Now, pelagic longline fishermen must discard any of these shark species rather than retaining the fish for sale or consumption. In 2012, NOAA Fisheries published a final rule prohibiting retaining, transshipping, or landing of silky sharks (Recommendation 11-08) caught

in association with ICCAT fisheries (77 FR 60632; October 4, 2012). This rule did not affect commercial fishermen fishing for sharks with bottom longline, gillnet, or handgear (given that they are not ICCAT fisheries), and it does not further affect recreational fishermen because harvesting silky sharks is already prohibited in the recreational fishery. Silky shark landings by commercial shark fishermen accounted for less than one percent of the overall 2019 LCS management group landings in the Atlantic and Gulf of Mexico regions. Based on ICCAT Recommendation 15-06, NOAA Fisheries published a final rule requiring fishing vessels to promptly release unharmed, to the extent practicable, porbeagle sharks caught in association with ICCAT fisheries when brought alive alongside for taking on board the vessel (81 FR 57803; August 24, 2016). Porbeagle sharks are not targeted by shark fishermen due to the small commercial quota (1.7 mt dw; 3,748 lb dw).

The Convention on International Trade in Endangered Species of Wild Fauna and Flora

NOAA Fisheries also actively participates in other international bodies that could affect U.S. shark fishermen and the shark industry including CITES. CITES is an international agreement that regulates the global trade in plants and wildlife to ensure that international trade does not threaten their survival. Currently, 175 countries, including the United States, are Parties to CITES. The Convention calls for meetings of the Conference of the Parties, held every 2 to 3 years, at which the Parties review treaty implementation, make provisions enabling the CITES Secretariat in Switzerland to carry out its functions, consider amendments to the lists of species in Appendices I and II, consider reports presented by the Secretariat, and make recommendations for the improved effectiveness of CITES. Any country that is a Party to CITES may propose for these meetings amendments to Appendices I and II, and resolutions, decisions, and agenda items for consideration by all the Parties. CITES has three appendices: Appendix I includes species prohibited in international commercial trade, Appendix II includes international trade of regulated species in part through CITES export permits issued by the exporting country, and Appendix III includes species for which a country has requested help with monitoring trade. More information about CITES appendices is available on the CITES Secretariat's website at https://cites.org/eng/app/appendices.php.

Species listed on Appendix II are vulnerable to overexploitation but not at risk of extinction. To import an Appendix II species or specimen, a proper export permit must be included with the import. That permit may only be issued if the CITES authorities of the exporting country make a determination that the export will not be detrimental to the survival of the species, the specimen was legally acquired in accordance with national wildlife protection laws, and any live specimen will be shipped in a manner that will minimize injury, damage, or cruel treatment. Appendix II species harvested on the high seas must be accompanied by an Introduction from the Sea certificate or an export permit, depending on where the specimen is landed. Specimens landed in the United States must be landed in a U.S. Fish and Wildlife-designated port. The re-export of any specimen of a species included in Appendix II requires a re-export certificate. Any dealer who intends to import, export, or re-export HMS listed on CITES Appendix II, or any fisherman who lands these species from the high seas, must have the appropriate permits from the U.S. Fish and Wildlife Service.

HMS manages a number of shark species listed on Appendix II of CITES (Table 30). As described below, the robust certificate and permitting system stated above has likely deterred commercial fishermen and dealers from trying to sell those species that can be commercially fished under U.S. management regulations due to the lengthy nature of the complex process, and for fear of being out of compliance.

Table 30. Atlantic HMS Managed Species Listed on CITES Appendix II.

Atlantic HMS Species on Appendix II	Conference of Parties (CoP)	Meeting Year
Basking shark	CoP13	2004
Whale shark	CoP13	2004
White shark	CoP13	2004
Hammerhead shark, great	CoP16	2013
Hammerhead shark, scalloped	CoP16	2013
Hammerhead shark, smooth	CoP16	2013
Oceanic whitetip shark	CoP16	2013
Porbeagle shark	CoP16	2013
Silky shark	CoP17	2016
Thresher shark	CoP17	2016
Longfin mako shark	CoP18	2019
Shortfin mako shark	CoP18	2019

In 2014, CITES listed hammerhead shark (great, scalloped, and smooth) species on Appendix II. Hammerhead shark landings in the Atlantic region and the combined Gulf of Mexico sub-regions have stayed below the quota (Atlantic 59,736 lb dw; combined western and eastern Gulf of Mexico 55,722 lb dw) for a number of years. Hammerhead sharks are not directly targeted in the commercial fishery and are mostly considered bycatch. Hammerhead shark meat is considered inedible so the fins are the only part of value for this shark species. Since the Appendix II listing in 2014, only two exporting permits were issued and commercial export shipments have occurred based on information from the Law Enforcement Management Information System (LEMIS). In 2017, one shipment contained 171 kg (377 lb) of scalloped hammerhead shark fins and 266 kg (586 lb) of great hammerhead shark fins. In 2019, another shipment contained 83 kg (183 lb) of scalloped hammerhead shark fins and 8 kg (18 lb) of great hammerhead shark fins. Thus, the total amount of hammerhead shark fins that have been exported is 1,165 lb from 2014 through 2019. Based on combined landings data from the 2020 SAFE Report, approximately 470,000 lb dw of great, scalloped, and smooth hammerhead sharks are landed from the Atlantic and Gulf of Mexico region during this timeframe. Based on data from the Southeast Fisheries Science Center, the carcass-to-fin ratio for hammerhead sharks is around 3 percent. If NOAA Fisheries uses a 3-percent carcass-to-fin ratio, then approximately 14,100 lb of hammerhead shark fins were landed over all those year. Because only 1,165 lb were exported, then the remaining fins (approximately 13,000 lb) were either used domestically, placed in storage waiting to be exported, or were thrown in the trash. Under any scenario, the inability to export hammerhead shark fins has affected the landings and may be one of the many causes of the general decline of the commercial shark fishery.

In 2016, CITES listed thresher sharks on Appendix II. Since that point, thresher shark landings have declined. In 2016, the thresher shark landings were the highest at 78,219 lb dw; landings decreased to 51,170 lb dw in 2019 (NOAA Fisheries 2020), which is a 35 percent reduction. This reduction could be due to the CITES listing or could be an indirect impact of the shortfin mako shark regulations. Currently, there are no data available to determine if the Appendix II listing for shortfin mako sharks in 2019 affected the commercial fishery. The reduction in shortfin mako shark landings are mostly due to NOAA Fisheries implementation of the ICCAT recommendation. The commercial landings for silky, porbeagle, and oceanic whitetip sharks were not impacted by the CITES listing. Longfin mako shark, whale shark, basking shark, and white shark are also listed on Appendix II of CITES, but retention of these shark species have been prohibited since 1997 (62 FR 16648; April 2, 1997).

Summary Discussion

Based on the review of additional factors impacting the shark fishery, it is likely that other fisheries, state shark finning prohibitions, and binding international regulations have directly and indirectly affected fishing effort and landings from 2014 through 2019. Ninety percent of the shark directed limited access permit holders hold at least one other non-HMS permit issued by SERO or GARFO, which means that shark fishermen have a diversified portfolio of fisheries. However, this means that shark directed permit holders could be prioritizing other fisheries during the year for economic reasons or timing of peak seasons. In the past few years, NOAA Fisheries has tried to bring more stability to the shark fishery by ensuring sharks are available year round; allowing fishermen to target sharks when it is most profitable for them.

State shark fin bans have improved awareness for the conservation of shark species, but have negatively affected the sustainable U.S. commercial shark fishery. State shark fin bans have created confusion for federal and state fishermen who are legally allowed to land and sell shark products in one state, but may not land and sell certain shark parts in others. Dealers also have to take into consideration stricter regulations in states where they have previously sold or shipped products. These regulations have affected the markets and shipping of legally landed shark products.

The United States actively participates in international negotiations to help rebuild shark stocks worldwide. In particular, through the implementation of ICCAT Recommendations 17-08 and 19-06 domestically, through 2019, the United States has reduced the commercial mortality of shortfin mako sharks by over 70 percent and the recreational mortality by 80 percent. CITES listings of commercially harvested shark species has improved the importing and exporting tracking of shark products. Nevertheless, these regulations have greatly affected U.S. shark fishermen. Before the ICCAT recommendation on North Atlantic shortfin mako sharks in 2017, the United States accounted for less than 10 percent of the overall catch. As of 2019, the United States accounted for about 3 percent of the overall catch. Some of the other countries that landed more North Atlantic shortfin mako sharks than the United States have not had as great of a reduction in catch since 2017. As for the CITES listings, NOAA Fisheries has experienced the reductions in the hammerhead shark fishery and the resulting low number of fins being exported.

3 Potential Ways Forward

The goals of this document are to:

- Review the current state of the Atlantic shark fishery.
- Identify areas of success in the fishery.
- Identify areas of concern in the fishery.
- Identify ways to improve the fishery and potential future shark management actions.

Overall, this review has found that, in general, while NOAA Fisheries has successfully found ways to rebuild or prevent the decline in population of many shark species, the commercial shark fishery is in decline. This decline is happening despite fishermen having available quotas for many species, and, in most regions, an open season year-round. The review has also found that there are issues to address in the recreational fishery, such as improving shark identification and reporting, that could improve the shark fishery and management overall. Additionally, other fisheries, state shark finning prohibitions, and binding international regulations have directly and indirectly affected fishing effort and landings from 2014 through 2019. Possible changes to consider that could increase the productivity of the commercial shark fishery while still remaining consistent with the Magnuson-Stevens Act and the 2006 Consolidated HMS FMP and its amendments include modifications to:

- Vessel permit structure, including consideration of changing incidental permits to open access permits;
- Commercial vessel retention limits for LCS, blacknose, and other shark management groups;
- Regional and sub-regional quotas to better match regional expectations and opportunities;
- Recreational size and bag limits; and
- Reporting mechanisms for enhancing data collection of recreational shark species and shark depredation events.

Any such revisions to the above regulations and/or management measures would occur via rulemaking and would include opportunity for public comment. Regardless of timing, NOAA Fisheries believes changes to the shark fishery are warranted to optimize the overall health of the fishery and its shark stocks.

Additionally, communication and outreach are important issues facing the shark fishery. In the commercial fishery, NOAA Fisheries should continue to explore ways to improve NOAA Fisheries' communications on the sustainability of the shark fishery, which could improve the stability of the shark product market and could subsequently draw more fishermen to the fishery. Along with increasing awareness of the shark fishery, NOAA Fisheries should consider ways to improve communications and understanding between fishermen, dealers, and different state or international regulations. The various state shark fin bans and federal trade regulations (i.e., CITES) have left fishermen and dealers confused and unsure how to proceed. In an effort to assist constituents with questions, NOAA Fisheries could consider creating a website as a central

location for the various state shark fin bans and trade restrictions along with contact information. In the shark recreational fishery, NOAA Fisheries needs to improve education on shark identification and handling techniques along with exploring mitigation techniques for reducing depredation (avoidance techniques and deterrent technology). Efforts to teach anglers the best safe handling techniques and mitigation techniques must extend beyond shark anglers themselves, as the majority of angler interactions with sharks involve cases of incidental catch. NOAA Fisheries will need to work closely with state agencies and the interstate fishery commissions to achieve this goal.

The United States has one of the most regulated shark fishery in the world, and most shark populations in U.S. waters are rebuilding consistent with conservation objectives. Support for the shark fishery through communication and outreach will help to bring awareness to the sustainability of domestically caught shark products. This also aligns with one of the Administration Priorities as well as the draft NOAA Fisheries Strategic Plan 2022-2025. As part of American Rescue Plan Act of 2021 - CARES Act & Consolidated Appropriations Act, the administration would like to ensure competitiveness in the U.S. seafood industry by exploring ways to rebuild and create a U.S. seafood industry that will be more resilient to future market, environmental, or other shocks. Internationally, the United States actively participates through negotiation in international fora to rebuild shark stocks worldwide and by domestically implementing international requirements that are agreed to. Through 2019, the United States has reduced the mortality of shortfin mako sharks by 70 to 80 percent and has implemented ICCAT recommendations, while other countries have not reduced mortality by similar magnitudes. NOAA Fisheries should continue to support U.S. shark fishermen internationally, while promoting the fishery management principles of the MSA, and assert that the United States continually applies conservation measures to prevent overfishing, reduces pressure on overfished stocks, and creates sustainable shark fishery for species that are able to be harvested.

This current document is a draft. NOAA Fisheries requests comments and input on any of the potential short-term and long-term changes to the Atlantic shark fishery that are described and comments on any potential future actions that NOAA Fisheries could implement. Any written comments on this document should be submitted via the Federal e-Rulemaking Portal (NOAA-NMFS-2021-0027) by January 3, 2022. For further information, contact Guý DuBeck, or Karyl Brewster-Geisz at (301) 427-8503.

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