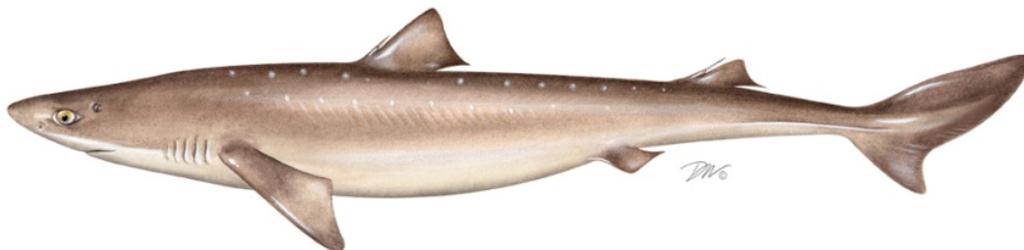


2018 REVIEW OF THE
ATLANTIC STATES MARINE FISHERIES COMMISSION
FISHERY MANAGEMENT PLAN FOR

SPINY DOGFISH
(*Squalus acanthias*)

2017/2018 FISHING YEAR



Spiny Dogfish Plan Review Team

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Developed November 2018

Approved January 2019

Executive Summary

The Mid-Atlantic (MAFMC) and New England Fishery Management Councils (NEFMC) have managed spiny dogfish within the U.S. EEZ since 1999. The Atlantic States Marine Fisheries Commission (ASMFC) implemented a complementary Fishery Management Plan for state waters in 2002.

Spiny dogfish was declared rebuilt in 2008 when female SSB exceeded the target level for the first time since implementation of the Interstate FMP. Spiny dogfish are not overfished and overfishing is not occurring (NEFSC 2018). Female SSB was estimated to be 106,753 metric tons (253.84 million pounds) in 2018. In 2017, F on exploitable females was estimated to be 0.202 and has remained below the target level since 2005.

In 2017, total spiny dogfish harvest (commercial and recreational harvest) along the Atlantic coast were estimated at 18.1 million pounds (8,196 metric tons). U.S. commercial landings were estimated at 17.8 million pounds (8,066 metric tons). Atlantic coast landings from Canada were estimated at 49 metric ton (108,026 pounds). Landings from distant water fleets were estimated at 0 pounds. U.S. recreational harvest was estimated at 81 metric tons (178,717 pounds).

The commercial quota for the 2017/2018 season was 39,099,717 pounds, and commercial landings for the 2017/2018 season were estimated at 17.8 million pounds. No regions or states exceeded their quota during the 2017/2018 season.

In 2017, all states have implemented management programs consistent with the Interstate FMP and Addendum I-V for Spiny Dogfish. New York and Delaware requested *de minimis* status for the 2018/2019 fishing season.

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I. Status of the Fishery Management Plan

| | |
|---------------------------------------|---|
| <u>Date of FMP Approval:</u> | November 2002 |
| <u>Amendments</u> | None |
| <u>Addenda</u> | Addendum I (November 2005) Addendum II (October 2008) Addendum III (April 2011) Addendum IV (August 2012) Addendum V (October 2014) |
| <u>Management Unit:</u> | Entire coastwide distribution of the resource from the estuaries eastward to the inshore boundary of the EEZ |
| <u>States with Declared Interest:</u> | Maine – North Carolina |
| <u>Active Boards/Committees:</u> | Spiny Dogfish Management Board, Advisory Panel, Technical Committee, and Plan Review Team |

In 1998, NMFS declared spiny dogfish overfished and initiated the development of a joint fishery management plan (FMP) between the Mid-Atlantic (MAFMC) and New England Fishery Management Councils (NEFMC) in 1999. NMFS approved the Federal Fishery Management Plan (FMP) in September 1999, but implementation did not begin until May 2000 at the start of the 2000/2001 fishing year.

In August 2000, the Atlantic States Marine Fisheries Commission (Commission) took emergency action to close state waters to the commercial harvest, landing, and possession of spiny dogfish when the Federal waters closed in response to the quota being fully harvested. With the emergency action in place, the Commission had time to develop an interstate FMP, which prevented the undermining of the Federal FMP and further overharvest of the coastwide spiny dogfish population. Needing additional time to complete the interstate FMP, the Commission extended the emergency action twice through January 2003. During that time, the majority of spiny dogfish landings were from state waters because states had either no possession limits or less conservative possession limits than those of the Federal FMP.

The Commission approved the Interstate FMP for Spiny Dogfish in November 2002 (first implemented for the 2003-2004 fishing year). In general, the Interstate FMP (“FMP”) for spiny dogfish complements the Federal FMP. The goal of the FMP is “to promote stock rebuilding and management of the spiny dogfish fishery in a manner that is biologically, economically, socially, and ecologically sound.” In support of this goal, the FMP established the following objectives:

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1. Reduce fishing mortality and rebuild the spawning stock biomass to prevent recruitment failure and support a more sustainable fishery.
2. Coordinate management activities between state, Federal and Canadian waters to ensure complementary regulations throughout the species range.
3. Minimize the regulatory discards and bycatch of spiny dogfish within state waters.
4. Allocate the available resource in [a] biologically sustainable manner that is equitable to all the fishers.
5. Obtain biological and fishery related data from state waters to improve the spiny dogfish stock assessment that currently depends upon data from the Federal bottom trawl survey.

The original Interstate and Federal FMPs established an annual quota that was allocated via fixed percentages between two seasonal periods; 57.9% to Period I (May 1st to October 31st) and 42.1% to Period II (November 1st to April 30th). When the quota allocated to a period is exceeded, the amount over the allocation is deducted from the same period in the subsequent fishing year. The periods could have separate possession limits that were specified on an annual basis. The FMPs also allowed for a five percent rollover of the annual coastwide quota once the stock is rebuilt, and allows each state to harvest up to 1,000 spiny dogfish for biomedical supply or scientific research.

In November 2005, the Spiny Dogfish and Coastal Sharks Management Board (Board) approved Addendum I to the Interstate FMP for Spiny Dogfish. Addendum I provides the Board with the flexibility to establish spiny dogfish specifications (quota and possession limits) for up to five years. The MAFMC and the NEFMC took similar action under Framework 1 (providing flexibility to adopt specifications for up to five years without the requirement of annual review and approval by NOAA Fisheries), which became effective February 2006.

In October 2008, the Board approved Addendum II which established regional quotas in place of the FMPs semi-annual period allocation¹. Under the addendum, 58% of the annual quota was allocated to the states of Maine to Connecticut (Northern region), 26% was allocated to the states of New York to Virginia (Southern region), and the remaining 16% was allocated to North Carolina. The Board allocated a specific percentage to North Carolina because spiny dogfish are not available to their fishermen until late into the fishing season when most of the quota has already been harvested. The addendum also implemented accountability measures whereby any overage of a regional or state quota would be deducted from the corresponding region/state in the subsequent fishing year.

In March 2011, the Board approved Addendum III which was implemented prior to the 2011/2012 fishing year. The addendum divided the combined Southern region and the North Carolina quotas from Addendum II (i.e., 42% of the annual coastwide quota) into state-specific shares (Table 2) for those states of New York – North Carolina. Also, the addendum permits

¹ The seasonal allocation scheme was eliminated from the Federal FMP in August, 2014.

those states to implement possession limits that best suits their needs, and allows for quota transfer (states in the Northern region continue to implement the Federal possession limit as well as continue to share 58% of the coastwide quota and thus do not have individual quotas necessary for transfers). Lastly, the addendum allows for rollovers of up to five percent of that state or regions final allocation. The Board has continued to implement the allocation percentages described in Addendum III, and may revisit those allocations at any time through the adaptive management process (e.g., an addendum).

In August 2012, the Board approved Addendum IV. This Addendum addressed the differences in the definitions of overfishing between the NEFMC, MAFMC and the ASMFC. The Board adopted the fishing mortality (F) threshold to be consistent with the Federal plan. Overfishing is defined as an F rate that exceeds the $F_{threshold}$. The $F_{threshold}$ is defined as F_{MSY} (or a reasonable proxy thereof) and based upon the best available science. The maximum fishing mortality threshold (F_{MSY}) or a reasonable proxy may be defined as a function of (but not limited to): total stock biomass, spawning stock biomass (SSB), or total pup production, and may include males, females, both, or combinations and ratios thereof which provide the best measure of productive capacity for spiny dogfish. Currently $F_{MSY} = 0.2439$ which is that level of F that allows for the production of 1.5 female pups per female that will recruit to the spawning stock biomass.

In October 2014, the Board² approved Addendum V. The addendum mandates that all spiny dogfish must be landed with fins-naturally-attached to the corresponding carcass (i.e., the removal of any fin of spiny dogfish at-sea in state waters is prohibited). The addendum modified the FMP to maintain consistency with the Shark Conservation Act of 2010, which prohibits the removal of all shark fins (except smooth dogfish) at-sea.

II. Status of the Stocks

Stock size estimates (e.g., female SSB) for spiny dogfish rely heavily on fishery-independent data collected during the NEFSC spring bottom trawl survey. Due to mechanical problems, the 2014 survey was unable to sample strata in the mid-Atlantic region. As a result, the 2015 assessment update for spiny dogfish was unable to produce reliable estimates of stock size for 2014, as well as stock size projections utilized for annual specifications. Accordingly, at the direction of the MAFMC and the Science and Statistical Committee (SSC), the NEFSC examined alternative methods to smooth out the effects of the missing 2014 survey data on projected estimates of SSB, F, and other stock status indicators (NEFSC 2015b). A Kalman filter approach was ultimately chosen as the best method to smooth out the effects of the missing data, and to project SSB forward. In 2016, while all core survey strata were completed, the survey was delayed and the effects of the delay in survey timing on the abundance indices are unknown

² In May 2014, the Spiny Dogfish and Coastal Shark Management Board became two independent management boards. Accordingly, from this date forward, the "Board" only refers to the Spiny Dogfish Management Board. Also in 2014, the Board and Commission approved South Carolina's, Georgia's and Florida's request to be removed from the requirements of the FMP due to minimal reported catches of spiny dogfish and with the understanding that their interest in the FMP may be reconsidered if catch and/or landings increase.

(NEFSC 2017). In 2017 and 2018, the survey was completed on time and all core strata were surveyed.

Based on results of the 2018 stock assessment update, and in comparison to the biological reference points below, spiny dogfish are not overfished and overfishing is not occurring (NEFSC 2018). The MAFMC’s SSC recommended not applying the kalman filter to the three year moving average of 2016-2018 given the survey data was available and gap filling was not needed. Spiny dogfish was declared rebuilt in 2008 when female SSB exceeded the target level for the first time since implementation of the Interstate FMP. Female SSB has remained above the threshold level and was estimated to be 106,753 metric tons (253.84million pounds) in 2018 (Table 1 and Figure 1). In 2017, F on exploitable females was estimated to be 0.202 and has remained below the target level since 2005 (Table 1 and Figure 2).

| | Female Spawning Stock Biomass (SSB) | Fishing Mortality (F) |
|-----------|---|--|
| Target | $B_{msy} Proxy = SSB_{max}$ (the biomass that results in the maximum projected recruitment) = 106,753 metric tons | There is no F target defined for management use at this time |
| Threshold | $\frac{1}{2}$ of $SSB_{max} = 79,644$ metric tons | $F_{msy} Proxy = 0.244$ |

The next benchmark stock assessment for spiny dogfish is tentatively scheduled for 2021. In the interim, in order to inform fishery specifications, the NEFSC has conducted annual data updates to summarize the most recent information on the status of spiny dogfish. The 2018 assessment update utilizes catch and landings data from 1982-2017, and NEFSC spring survey data from 1968-2017 (as noted, the survey was incomplete in 2014 and the 2016 survey was delayed). From 2009-2015, female SSB estimates based on area swept by NEFSC bottom trawl during spring surveys were above the target-level (NEFSC 2017). The 2016 estimate increased, while the 2017 estimate decreased to the lowest in the time series; in 2018 the estimate increased from 2017. It is important to note that these estimates from the assessment update are not based on outputs of the stochastic assessment model and cannot be directly compared to the SSB targets and thresholds.

III. Status of the Fishery

In the U.S., majority of spiny dogfish commercial fisheries operate in state waters targeting aggregations of large females. As a result, an estimated 95% of the commercial landings (2017) are comprised of females which is consistent with the long-term pattern (NEFSC 2018).

In 2017, total landings along the Atlantic coast were estimated at 18.07 million pounds (8,196 metric tons) which is a 33% decrease relative to 2016 and below average for the time series (Table 2). In 2017, U.S. commercial landings were estimated at 17.78 million pounds (8,066 metric tons). Atlantic coast landings from Canada were significant from the early 1990s to the mid-late 2000s (hovering around 4.5 million pounds or 2,000 metric tons). In 2017, landings

from Canada were estimated at 108,026 pounds (49 metric tons) which is more in line with the short term trend (Table 2). In 2017, landings from distant water fleets were estimated at 0 pounds. Recreational harvest is estimated via the Marine Recreational Information Program (MRIP) and all recreational data included in this report are derived from MRIP data released prior to the July 2, 2018 estimate recalibration based on the new Fishing Effort Survey (FES). In 2017, recreational harvest (A + B1) of spiny dogfish on the Atlantic coast was estimated at 32,435 fish or an estimated 178,717 pounds³ (781 metric tons) which is an 11% increase relative to 2016 (Table 2). Landings estimates for the U.S. commercial and recreational sectors, Canada, and distant water fleets are detailed in Table 2.

In 2017, total dead discards from the U.S. commercial and recreational sectors were estimated at 7.16 million pounds (3,248 metric tons) which is a 16% decrease relative to 2016 (Table 3). Recreational releases (B2, or fish caught by recreational anglers and released back to the water) were estimated at 2.01 million pounds (916 metric tons). Applying a 20% post-release mortality rate (NEFSC 2018), 2017 recreational dead discards were estimated at 403,886 pounds (183 metric tons) which is a 70% decrease relative to 2016 levels (1,378,769 pounds). Commercial dead discards for U.S. fisheries are estimated by multiplying total discards by gear-specific mortality rates (NEFSC 2018). In 2017, U.S. commercial dead discards were estimated at 6.75 million pounds (3,065 metric tons), with the largest proportion attributed to otter trawls (89%).

IV. Status of Management Measures and Issues

Specifications

The spiny dogfish commercial fishery runs from May 1-April 30. The coastwide quota for the 2017/2018 season was set at 39,099,717 pounds. For the northern region, the maximum possession limit was set at 6,000 pounds. Possession limits for states of New York-North Carolina vary by state and are detailed in Table 6.

Quotas

Per Addendum III, 58% of the annual quota is allocated to the northern region (states from Maine-Connecticut), and the remaining 42% is allocated to the states of New York-North Carolina via fixed percentages. Table 4 details 2017/2018 commercial quotas by region and state. Addendum III also specifies that when the quota allocated to a region or state is exceeded in a fishing season, the amount over the allocation will be deducted from the corresponding region or state in the subsequent fishing season. All regions and states harvested within their quota the previous fishing year, therefore no deductions were applied to 2017/2018 quotas. Additionally, Addendum IV allows states and regions to roll over 5% of its allocation from the previous fishing year when the stock is above the biomass target; given the stock projection in 2017 indicate the stock was below the biomass target, no quota was eligible for rollover (Table 4).

³ Assuming the average weight of landed and discarded spiny dogfish is 5.12 pounds or 2.5 kilograms.

According to the Atlantic Coastal Cooperative Statistics Program's (ACCSP) Standard Atlantic Fishery Information System (SAFIS), commercial landings from the 2017/2018 fishing year were estimated at 17,783,252 pounds (8,066 metric tons) which is 45% of the coastwide quota and a 40.5% decrease relative to the previous season (Table 4). Massachusetts (38%), Virginia (15%), and New Jersey (7%) accounted for the majority of commercial landings by weight (Table 4).

From 2000-2011, the U.S. spiny dogfish commercial fishery, for the most part, had fully utilized its quota (MAFMC 2017a). However, in recent years (2012-present), the commercial fishery has significantly underutilized its quota. The MAFMC Advisory Panel (2018) noted that markets are critical for stimulating fishing activity and that the low level of harvest relative to the quota in recent years is primarily due to low prices and effort, not biomass. Vessels generally have no problem catching their limits. Being such a low value fishery (hovering around \$0.20/pound in most recent 10-years; MAFMC 2018), even a small increase in price could stimulate fishing activity. Participation in the fishery has been further discouraged due to general public sentiment regarding sharks and shark fins which has created regulatory issues (e.g., foreign and domestic import and shipping bans) and other barriers to the market (e.g., the species common name dissuades many consumers).

V. Status of Research and Monitoring

Under the Interstate FMP for Spiny Dogfish, the states are not required to conduct any fishery dependent or independent studies. The Interstate FMP requires an annual review of recruitment, spawning stock biomass, and fishing mortality which relies heavily on the NEFSC's spring trawl survey data. However, states are encouraged to submit any spiny dogfish information collected while surveying for other species. Table 5 details state implemented fishery-independent monitoring information relative to spiny dogfish compiled from annual state compliance reports. Please see individual reports for more information.

Exempted Fishing Permits (scientific/education permits)

States may issue exempted fishing permits for the purpose of biomedical supply, educational, or other scientific purposes. In 2017, North Carolina issued 55 exempted fishing permits. Of these permits, six reported catches of sharks and none reported catches of spiny dogfish.

VI. Annual State Compliance

The following lists the specific compliance criteria that a state or jurisdiction must implement in order to be in compliance with the Interstate FMP for Spiny Dogfish (*Section 5.1*):

1. States are required to close state waters to the commercial landing, harvest and possession of spiny dogfish for the duration of the seasonal period when the commercial quota is projected to be harvested in their state or region.
2. States are required to report landings weekly to NOAA Fisheries
3. Dealer permits issued pursuant to state regulations must submit weekly reports showing at least the quantity of spiny dogfish purchased (in pounds), the name, and permit number of the individuals from whom the spiny dogfish were purchased.

4. States in the northern region are required to implement possession limits as determined through the annual specification process.
5. States may issue exempted fishing permits for the purpose of biomedical supply not to exceed 1,000 spiny dogfish per year.
6. State regulations must prohibit “finning” as described in Addendum V.

Additionally, each state must submit a compliance report detailing its spiny dogfish fisheries and management program for the previous fishing year. Compliance reports are due annually on July 1st (Table 6) and must include at a minimum:

1. the previous fishing year’s fishery and management program including activity and results of monitoring, regulations that were in effect and harvest, including estimates of non-harvest losses;
2. the planned management program for the current fishing year summarizing regulations that will be in effect and monitoring programs that will be performed, highlighting any changes from the previous year; and
3. the number of spiny dogfish exempted fishing permits issued in the previous fishing year, the actual amount (in numbers of fish and pounds) collected under each exempted fishing permit, as well as any other pertinent information (i.e. sex, when and how the spiny dogfish were collected). The report should also indicate the number of exempted fishing permits issued for the current fishing year.

Under the Spiny Dogfish FMP, a state may request *de minimis* status if its commercial landings of spiny dogfish are less than 1% of the coastwide commercial total. If granted, the state is exempt from the monitoring requirements of the commercial spiny dogfish fishery for the following fishing year. However, all states, including those granted *de minimis* status, must continue to report any spiny dogfish commercial or recreational landings within their jurisdiction via annual state compliance reports. New York and Delaware have requested *de minimis* status for the 2017/2018 fishing season (Table 6).

VII. Plan Review Team Recommendations

Based on annual state compliance reports, the PRT determined that all states have implemented regulations that meet the requirements of the Interstate FMP for Spiny Dogfish and Addenda I-V. Also, New York and Delaware meet the requirements for *de minimis* status in the 2017/2018 fishing year.

Members of the PRT noted that moving forward, state compliance reports should be submitted in a more standardized and uniform format. Additionally, one PRT noted that there should be more consideration of the historical spiny dogfish biomass levels relative to recent stock projections in evaluating the current status of the resource.

VIII. Research Recommendations

The following research priorities pertaining to spiny dogfish were identified in Special Report No. 89 (2013):

Fishery-Dependent Priorities

High

- Determine area, season, and gear specific discard mortality estimates coastwide in the recreational, commercial, and non-directed (bycatch) fisheries.
- Characterize and quantify bycatch of spiny dogfish in other fisheries.
- Increase the biological sampling of dogfish in the commercial fishery and on research trawl surveys.
- Further analyses of the commercial fishery is also warranted, especially with respect to the effects of gear types, mesh sizes, and market acceptability on the mean size of landed spiny dogfish.

Fishery-Independent Priorities

- Conduct experimental work on NEFSC trawl survey gear performance, with focus on video work to study the fish herding properties of the gear for species like dogfish and other demersal groundfish.
- Investigate the distribution of spiny dogfish beyond the depth range of current NEFSC trawl surveys, possibly using experimental research or supplemental surveys.
- Continue to analyze the effects of environmental conditions on survey catch rates.

Modeling / Quantitative Priorities

- Continue work on the change-in-ratio estimators for mortality rates and suggest several options for analyses.
- Examine observer data to calculate a weighted average discard mortality rate based on an assumption that the rate increased with catch size.

Life History, Biological, and Habitat Priorities

- Conduct a coastwide tagging study to explore stock structure, migration, and mixing rates.
- Standardize age determination along the entire East Coast. Conduct an ageing workshop for spiny dogfish, encouraging participation by NEFSC, NCDMF, Canada DFO, other interested agencies, academia, and other international investigators with an interest in dogfish ageing.
- Identify how spiny dogfish abundance and movement affect other organisms.

Management, Law Enforcement, and Socioeconomic Priorities

- Monitor the changes to the foreign export markets for spiny dogfish, and evaluate the potential to recover lost markets or expand existing ones.
- Update on a regular basis the characterization of fishing communities involved in the spiny dogfish fishery, including the processing and harvesting sectors, based upon Hall-Arber et al. (2001) and McCay and Cieri (2000).

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- Characterize the value and demand for spiny dogfish in the biomedical industry on a state by state basis.
- Characterize the spiny dogfish processing sector

IX. References

Mid-Atlantic Fisheries Management Council (MAFMC). 2018. Spiny Dogfish Advisory Panel Information Document. Prepared by Jason Didden, Council Staff. 6 pages.

Mid-Atlantic Fisheries Management Council (MAFMC). 2018. Spiny Dogfish Advisory Panel Fishery Performance Report. 4 pages.

Northeast Fisheries Science Center (NEFSC). 2018. Update on the Status of Spiny Dogfish in 2018 and Projected Harvests at the Fmsy Proxy and Pstar of 40%. Report to the Mid Atlantic Fishery Management Council (MAFMC) Scientific and Statistical Committee (SSC) August 31, 2018. 82 pages.

Special Report No. 89 of the Atlantic States Marine Fisheries Commission. 2013. Research priorities and recommendations to support interjurisdictional fisheries management.

X. Tables

Table 1: Spiny dogfish female spawning stock biomass (SSB) in millions of pounds and fishing mortality (F) point estimates, 1991-2017. A Kalman Filter was applied to the 2015 point-estimate. Point-estimates from 1991-2014 via the Kalman filter were not available at the time of this report. Although the absolute values will change after the Kalman filter is applied, the time series trend is similar. Source: NEFSC 2018.

| Year | Female SSB | F |
|------|------------|-------|
| 1991 | 516 | 0.082 |
| 1992 | 594 | 0.177 |
| 1993 | 485 | 0.327 |
| 1994 | 410 | 0.465 |
| 1995 | 294 | 0.418 |
| 1996 | 266 | 0.355 |
| 1997 | 252 | 0.234 |
| 1998 | 202 | 0.306 |
| 1999 | 114 | 0.289 |
| 2000 | 116 | 0.152 |
| 2001 | 136 | 0.109 |
| 2002 | 143 | 0.165 |
| 2003 | 129 | 0.168 |
| 2004 | 118 | 0.474 |
| 2005 | 105 | 0.128 |
| 2006 | 234 | 0.088 |
| 2007 | 312 | 0.090 |
| 2008 | 429 | 0.110 |
| 2009 | 360 | 0.113 |
| 2010 | 362 | 0.093 |
| 2011 | 373 | 0.114 |
| 2012 | 476 | 0.149 |
| 2013 | 466 | NA |
| 2014 | NA | 0.214 |
| 2015 | 371 | 0.126 |
| 2016 | 257 | 0.211 |
| 2017 | 235 | 0.202 |

Table 2: Landings estimates (pounds) of spiny dogfish off the Atlantic coast by commercial fisheries of the United States, Canada, and foreign fleets, and U.S. recreational harvest, 1981-2016. All values in pounds. Source: NEFSC 2018 and MRIP.

| Year | Canada | Distant Water Fleets | U.S. Commercial | U.S. Recreational | Total Landings |
|------|-----------|----------------------|-----------------|-------------------|----------------|
| 1981 | 1,243,406 | 2,147,300 | 15,134,716 | 3,290,809 | 21,816,231 |
| 1982 | 857,597 | 802,482 | 11,928,240 | 155,228 | 13,743,546 |
| 1983 | | 1,022,944 | 10,794,944 | 147,828 | 11,965,715 |
| 1984 | 4,409 | 862,006 | 9,811,419 | 201,247 | 10,879,082 |
| 1985 | 28,660 | 2,231,075 | 8,880,246 | 196,525 | 11,336,507 |
| 1986 | 44,092 | 811,300 | 6,057,436 | 403,806 | 7,316,634 |
| 1987 | 619,498 | 306,442 | 5,959,859 | 674,738 | 7,560,538 |
| 1988 | 2,205 | 1,426,389 | 6,845,658 | 793,826 | 9,068,078 |
| 1989 | 368,172 | 564,383 | 9,903,197 | 923,156 | 11,758,908 |
| 1990 | 2,885,848 | 866,416 | 32,475,331 | 393,464 | 36,621,058 |
| 1991 | 676,818 | 515,881 | 29,049,484 | 288,410 | 30,530,593 |
| 1992 | 1,913,610 | 147,710 | 37,165,286 | 535,770 | 39,762,376 |
| 1993 | 3,163,630 | 59,525 | 45,509,707 | 263,846 | 48,996,708 |
| 1994 | 4,012,408 | 4,409 | 41,441,357 | 341,311 | 45,799,486 |
| 1995 | 2,107,617 | 30,865 | 49,775,493 | 148,935 | 52,062,910 |
| 1996 | 950,191 | 520,290 | 59,823,640 | 56,990 | 61,351,111 |
| 1997 | 983,261 | 471,789 | 40,457,417 | 146,560 | 42,059,027 |
| 1998 | 2,325,874 | 1,338,204 | 45,476,080 | 133,761 | 49,273,919 |
| 1999 | 4,609,860 | 1,221,359 | 32,748,858 | 119,595 | 38,699,673 |
| 2000 | 6,042,863 | 886,257 | 20,407,500 | 11,262 | 27,347,883 |
| 2001 | 8,421,648 | 1,492,528 | 5,056,497 | 61,877 | 15,032,551 |
| 2002 | 7,901,358 | 1,044,990 | 4,847,674 | 451,666 | 14,245,687 |
| 2003 | 2,870,415 | 1,417,571 | 2,579,437 | 87,466 | 6,954,888 |
| 2004 | 5,207,312 | 727,525 | 2,164,011 | 264,970 | 8,363,819 |
| 2005 | 5,004,487 | 727,525 | 2,528,114 | 77,823 | 8,337,949 |
| 2006 | 5,377,068 | 22,046 | 4,957,360 | 175,290 | 10,531,764 |
| 2007 | 5,255,814 | 68,343 | 7,723,004 | 190,018 | 13,237,179 |
| 2008 | 3,466,368 | 288,805 | 9,057,020 | 251,427 | 13,063,620 |
| 2009 | 249,122 | 180,779 | 11,854,242 | 94,133 | 12,378,275 |
| 2010 | 13,228 | 279,987 | 11,993,133 | 35,418 | 12,321,766 |
| 2011 | 273,373 | 315,261 | 20,899,798 | 70,556 | 21,558,987 |
| 2012 | 143,300 | 302,033 | 23,501,249 | 41,413 | 23,987,996 |
| 2013 | | 134,482 | 16,120,181 | 80,859 | 16,335,523 |
| 2014 | 119,049 | 68,343 | 23,481,408 | 68,996 | 23,737,797 |
| 2015 | 2,205 | 50,706 | 19,098,623 | 86,832 | 19,238,366 |
| 2016 | 81,571 | 52,911 | 26,669,288 | 161,212 | 26,964,982 |
| 2017 | 108,026 | 0 | 17,783,299 | 178,717 | 18,070,042 |

Table 3: Total dead discards estimates (pounds) from the U.S. Atlantic coast spiny dogfish fishery by sector, 1981-2016. Commercial dead discards estimated via applying gear-specific mortality rates to discard estimates. Source: MRIP and NEFSC 2016.

| Year | Commercial | Recreational (20% B2) | Total Dead Discards |
|------|------------|--------------------------|------------------------|
| 1981 | 43,625,021 | 130,521 | 43,755,541 |
| 1982 | 50,245,935 | 153,982 | 50,399,918 |
| 1983 | 49,177,576 | 238,002 | 49,415,579 |
| 1984 | 46,931,730 | 186,871 | 47,118,601 |
| 1985 | 39,768,479 | 425,091 | 40,193,570 |
| 1986 | 38,222,379 | 523,373 | 38,745,752 |
| 1987 | 35,239,087 | 465,470 | 35,704,557 |
| 1988 | 35,307,210 | 386,152 | 35,693,362 |
| 1989 | 34,724,970 | 594,784 | 35,319,753 |
| 1990 | 41,754,621 | 515,830 | 42,270,451 |
| 1991 | 28,668,217 | 594,951 | 29,263,168 |
| 1992 | 41,401,992 | 449,048 | 41,851,040 |
| 1993 | 25,898,443 | 489,373 | 26,387,816 |
| 1994 | 18,435,804 | 426,776 | 18,862,580 |
| 1995 | 23,812,762 | 288,134 | 24,100,896 |
| 1996 | 13,136,779 | 145,103 | 13,281,882 |
| 1997 | 9,255,656 | 371,849 | 9,627,505 |
| 1998 | 7,305,008 | 268,875 | 7,573,883 |
| 1999 | 9,865,123 | 236,901 | 10,102,025 |
| 2000 | 6,128,182 | 304,436 | 6,432,619 |
| 2001 | 10,236,492 | 928,526 | 11,165,018 |
| 2002 | 10,392,799 | 737,755 | 11,130,554 |
| 2003 | 7,998,031 | 1,321,838 | 9,319,869 |
| 2004 | 12,011,321 | 1,450,007 | 13,461,328 |
| 2005 | 10,775,411 | 1,476,032 | 12,251,443 |
| 2006 | 10,847,557 | 1,565,462 | 12,413,019 |
| 2007 | 12,456,478 | 1,715,901 | 14,172,379 |
| 2008 | 9,843,805 | 1,188,294 | 11,032,099 |
| 2009 | 11,735,909 | 1,137,116 | 12,873,025 |
| 2010 | 8,146,291 | 871,034 | 9,017,325 |
| 2011 | 9,533,163 | 1,019,230 | 10,552,393 |
| 2012 | 10,081,275 | 605,902 | 10,687,177 |
| 2013 | 9,875,386 | 1,169,360 | 11,044,746 |
| 2014 | 10,657,861 | 2,090,825 | 12,748,685 |
| 2015 | 6,783,726 | 539,757 | 7,323,483 |
| 2016 | 7,122,686 | 1,378,769 | 8,501,456 |
| 2017 | 6,756,168 | 403,886 | 7,160,055 |

Table 4: Commercial quotas and landings estimates in pounds for May 1, 2017 - April 30, 2018 by region and state. There was no adjust to quotas due to the biomass estimate was below the target. Due to confidentiality, NY-NC landings estimates have been redacted. Source: ACCSP/SAFIS and validated by the states, August 31, 2018.

| State | Fixed Percent Allocation | Preliminary Quota | Adjusted Quota | Estimated Landings |
|---|--------------------------|-------------------|-------------------|--------------------|
| Northern Region | 58.00% | 22,677,836 | 22,677,836 | 10,803,751 |
| NY | 2.71% | 1,058,429 | 1,058,429 | |
| NJ | 7.64% | 2,988,782 | 2,988,782 | |
| DE | 0.90% | 350,333 | 350,333 | |
| MD | 5.92% | 2,314,703 | 2,314,703 | |
| VA | 10.80% | 4,220,814 | 4,220,814 | |
| NC | 14.04% | 5,488,036 | 5,488,036 | |
| Total | 100% | 39,099,717 | 39,099,717 | 17,783,299 |
| % of quota harvested | | | | 45.5% |
| % diff. relative to previous fishing year (2016/2017 landings = 24,987,891 lbs.) | | | | -28.8% |

Table 5: State implemented fishery-independent monitoring programs that encounter spiny dogfish. Source: annual state compliance reports, 2017. Note: this list is not comprehensive.

| Fishery-Independent Monitoring Programs That Encounter Spiny Dogfish | Number of Spiny Dogfish Encountered | Comments |
|--|-------------------------------------|--|
| ME-NH Inshore Trawl survey | 67 (spring), 124 (fall) | Large decrease from 2016 |
| RI DFW, Monthly and seasonal trawl survey | 55 | up from 2 in 2016 |
| CT Long Island Sound Trawl Survey | 3 | Spring; down from 2016 |
| NJ Ocean Stock Assessment (trawl) Survey | 35,395 lbs | 162% increase from 2016 |
| DE Bay Bottom Trawl (30- and 16-foot) | 369 (30-ft) | up from 2016, majority caught in April |
| NC DMF Gill Net Survey | 2 | decrease from 2016/2017 |

Table 6: State-by-state compliance with the Interstate Fishery Management Plan for Spiny Dogfish, 2017/2018 reporting period. Source: annual state compliance reports, 2017. ‘C’ is compliant; ‘NC’ is noncompliant.

| State | Report Submitted (Due July 1) | De Minimis Request | Biomedical [^] Permit Harvest | Finning Prohibition | Possession limit (pounds per trip) |
|----------------|-------------------------------|--------------------|--|---------------------|------------------------------------|
| Maine | C | No | No | C | 5,000 |
| New Hampshire | C | No | No | C | 6,000 |
| Massachusetts | C | No | No | C | 6,000 |
| Rhode Island | C | No | No | C | 6,000 |
| Connecticut | C | No | No | C | 6,000 |
| New York | C | Yes | No | C | 5,000 |
| New Jersey | C | No | No | C | 6,000 |
| Delaware | C | Yes | No | C | 10,000 [#] |
| Maryland | C | No | No | C | up to 2,500 [*] |
| Virginia | C | No | No | C | 6,000 |
| North Carolina | C | No | Yes | C | 20,000 |

[^] Maximum trip limit increased to 6,000 lbs following notification of the Federal trip limit increase. Specific implementation dates vary by state.

[#] It is unlawful for DE commercial fishermen to possess spiny dogfish taken from federal waters in excess of the federal possession limit

^{*} MD – possession limits range from 1,000 lbs to 2,500 lbs depending on permit category

XI. Figures

Figure 1: Spiny dogfish spawning stock biomass, 1991 – 2018. Point-estimate for 2015 was derived via application of a Kalman filter. NEFSC 2018.

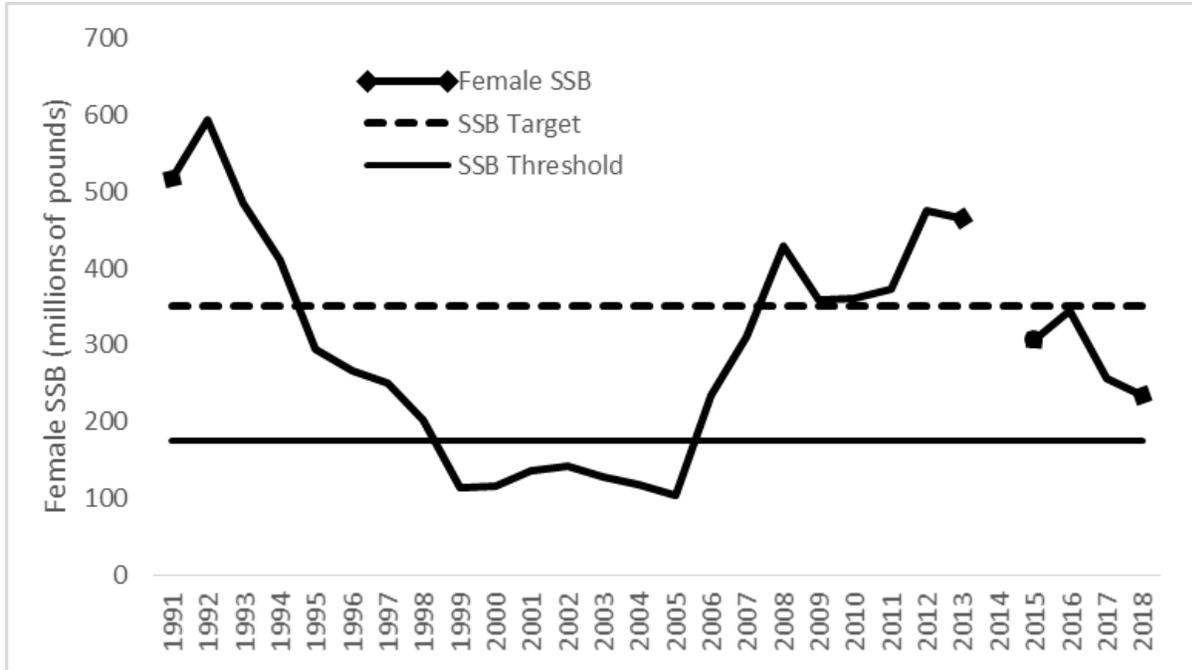


Figure 2: Fishing mortality rates in the spiny dogfish fishery, 1991 – 2017. Source: NEFSC 2018.

