

**REVIEW OF THE
ATLANTIC STATES MARINE FISHERIES COMMISSION'S
INTERSTATE FISHERY MANAGEMENT PLAN FOR
SPINY DOGFISH
(*Squalus acanthias*)**



May 2005 – April 2006 FISHING YEAR

Board Approved: January 2007

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I. Status of the Fishery Management Plan

<u>Date of FMP Approval:</u>	November 2002
<u>Date of Addendum I Approval:</u>	November 2005
<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 - Florida
<u>Active Boards/Committees:</u>	Spiny Dogfish and Coastal Shark Management Board, Advisory Panel, Technical Committee, Stock Assessment Subcommittee, and Plan Review Team

The Mid-Atlantic and New England Fishery Management Councils jointly manage the federal spiny dogfish fishery. In April 1998, the National Marine Fisheries Service (NMFS) declared spiny dogfish overfished. NMFS partially approved the federal Fishery Management Plan (FMP) in September 1999, but implementation did not begin until May 2000, the start of the 2000-2001 fishing year. The federal FMP uses a target fishing mortality to specify a coastwide commercial quota and splits this quota into two seasonal periods (Period 1: May 1 to October 31 and Period 2: November 1 to April 30). The seasonal periods also have separate possession limits that are specified on an annual basis.

In August 2000, ASMFC took emergency action to close state waters to the commercial harvest, landing, and possession of spiny dogfish when federal waters closed because the quota was 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 prevented further overharvest of the coastwide spiny dogfish population. Needing additional time to complete the interstate FMP, the ASMFC extended the emergency action was twice through January 2003. During that time, the majority of spiny dogfish landings were from state waters because states had either no trip limits or less conservative trip limits than those of the federal FMP. The Interstate FMP for Spiny Dogfish was approved by ASMFC in November 2002 and was implemented for the 2003-2004 fishing year.

The management plan strives to promote stock rebuilding and management of the spiny dogfish fishery in a manner that is biologically, economically, socially, and ecologically sound. To achieve this, the FMP objectives are to reduce fishing mortality and rebuild the spawning stock biomass to prevent recruitment failure and support a more sustainable fishery; coordinate management activities between state, federal, and Canadian waters to ensure complementary regulations throughout the species range; minimize regulatory discards and bycatch; allocate the available resource in a biologically sustainable manner that is equitable to all fishers; and to obtain biological and fishery related data from the federal bottom trawl survey.

The interstate FMP establishes a target fishing mortality rate (F) of 0.03 and an F threshold of 0.11. Additional reference points are based on the female spawning stock biomass (SSB) and are established based on survey units from the NEFSC spring trawl survey; target SSB = 31 kg/tow

(167,000 metric tones(mt)) and threshold $\frac{1}{2}$ SSB = 15.5 kg/tow (83,500 mt). After evaluating the annual status of the stock, fishing year specifications are recommended by the Technical Committee and approved by the Management Board. Annual specifications include a commercial quota and separate trip limits for two seasonal periods (Period 1: May 1 – October 30; Period 2: November 1 – April 30. The annual quota is split by a fixed percentage between the two periods: Period 1 = 57.9%; Period 2: 42.1%. The percent split is based upon historical landings during the two periods. The interstate FMP prohibits finning in state waters.

There are a few ways in which the interstate FMP differs from the federal FMP. The interstate FMP deducts quota overages from the same period in the following fishing year, and allows for 5% quota rollovers (once the stock rebuilds to the target SSB). In addition, the interstate FMP mandates that states may issue special permits for biomedical research only and limits the number of dogfish that can be taken under the special permit to 1,000 fish. Dogfish harvested for dissection or educational purposes can be taken from the commercial quota until it is fully harvested.

In November 2005, the Spiny Dogfish and Coastal Sharks Management Board approved Addendum I to the Interstate FMP for Spiny Dogfish. Addendum I provides the Board with the authority, but not the requirement, to establish spiny dogfish specifications for up to five years. The Mid-Atlantic and New England Fishery Management Councils took similar action under Framework 1, recommending the adoption of multi-year management measures without the requirement of annual review to NOAA Fisheries for final approval. Framework 1 to the federal Spiny Dogfish FMP, which will allow the specification of commercial quotas and other management measures for up to five years, became effective February 21, 2006.

II. Status of the Stocks

The 2005-2006 Atlantic coast spiny dogfish population is not considered overfished, and overfishing is not occurring. The 43rd Stock Assessment Workshop (SAW) report estimated spiny dogfish SSB to be 106,180 mt. The 43rd SAW also updated the fishing mortality threshold value ($F_{\text{Threshold}}$) to 0.39 (previously 0.11) which corresponds to the fishing mortality rate where net reproductive rate (or lifetime pups per recruit) equals one. In 2005 the fishing mortality rate was 0.128, a value well below threshold.

A stochastic model that adjusts for variability inherent in trawl surveys and takes a three-year average using data from the previous and subsequent year, was used to calculate (SSB), and total population biomass. This is a different method (deemed more accurate by the SAW committee) than the index based three-year moving average used to calculate SSB in previous stock assessments prior to 2005.

The most recent three-year average of total stock biomass for 2005 was 1,001 million pounds (453,881 mt). This represents a 255 million pound increase over the 2004 estimate of 746 million pounds (338,170 mt). The most recent three-year average of SSB for 2005 was 234 million pounds (106,180 mt), which increased 129 million pounds (122%) from 2004. It is important to note that the 2005 estimate of SSB is strongly influenced by the 2006 survey estimate. The difference between the 2005 and 2006 survey estimates is not biologically reasonable based on life history traits of spiny dogfish; either the 2006 estimate is too high, or

the 2005 estimate is too low. Large variations in survey estimates have been observed in the past. It is anticipated that the 2007 estimate will help to resolve these differences.

The Interstate FMP for spiny dogfish uses female SSB to set ‘target’ (167,000 mt or 368 million pounds) and ‘threshold’ (83,500 mt or 184 million pounds) criteria. The current SSB of 234 million lbs (106,180 mt) falls between the threshold and target values (Figure 1).

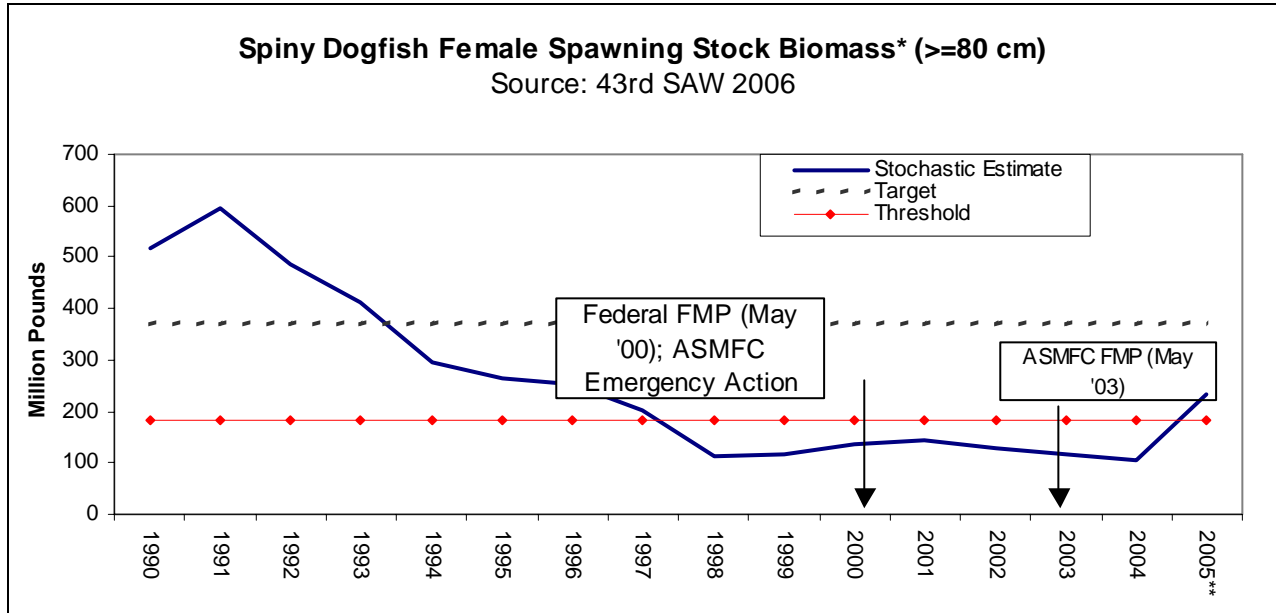


Figure 1. Three-year average of NEFSC spring trawl survey estimate.

To address the variability in the survey values, all pup biomass estimates are presented as three-year *moving* averages, which were calculated incorporating the previous 2 years data. Minimum footprint three-year moving average values represent the best available science since stochastic model output data were unavailable for pup biomass.

Using a three-year moving average, the 2006 pup biomass is 1.5 million pounds (70,000 mt) (Figure 2). This number is consistent with 9 years of low pup biomass numbers when compared to the previous 26 years data. The 2005 and 2006 pup biomass three year moving averages are identical and bring the 2006 SSB numbers into question as well. In terms of raw data, the 2006 SSB number (506.4 million lbs or 253,200mt) is an almost five-fold increase from the 2005 number (111.6 million lbs or 55,800 mt). Such a large increase in spawning females would likely coincide with some increase in pup numbers for that year, but estimated pup biomass decreased by almost half from 2005 to 2006.

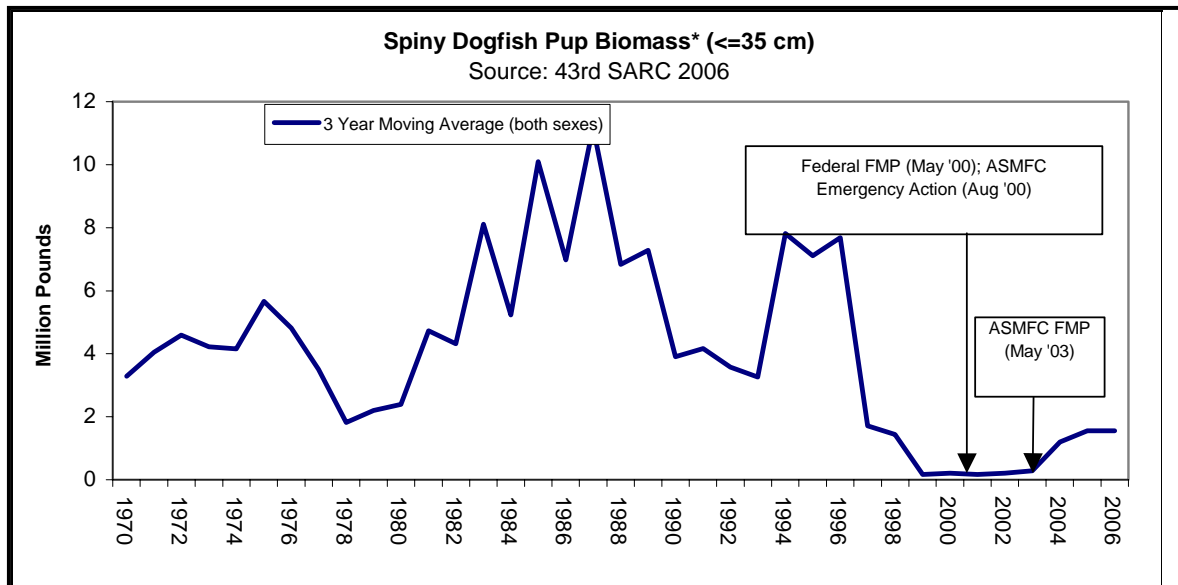


Figure 2. Three-year moving average of NEFSC spring trawl survey estimate

The spiny dogfish fishery escalated in the early 1990s. During this time, Canadian landings were historically quite low. Canadian landings began to increase in 1998 as US regulations were implemented (Figure 3). These landings dropped slightly in 2003, increased again in 2004, and dropped by roughly 41 percent in 2005 (the 2005 Canadian numbers have not yet been finalized). In 2005, Canadian commercial landings are projected to be 3.3 million pounds (1500 mt).

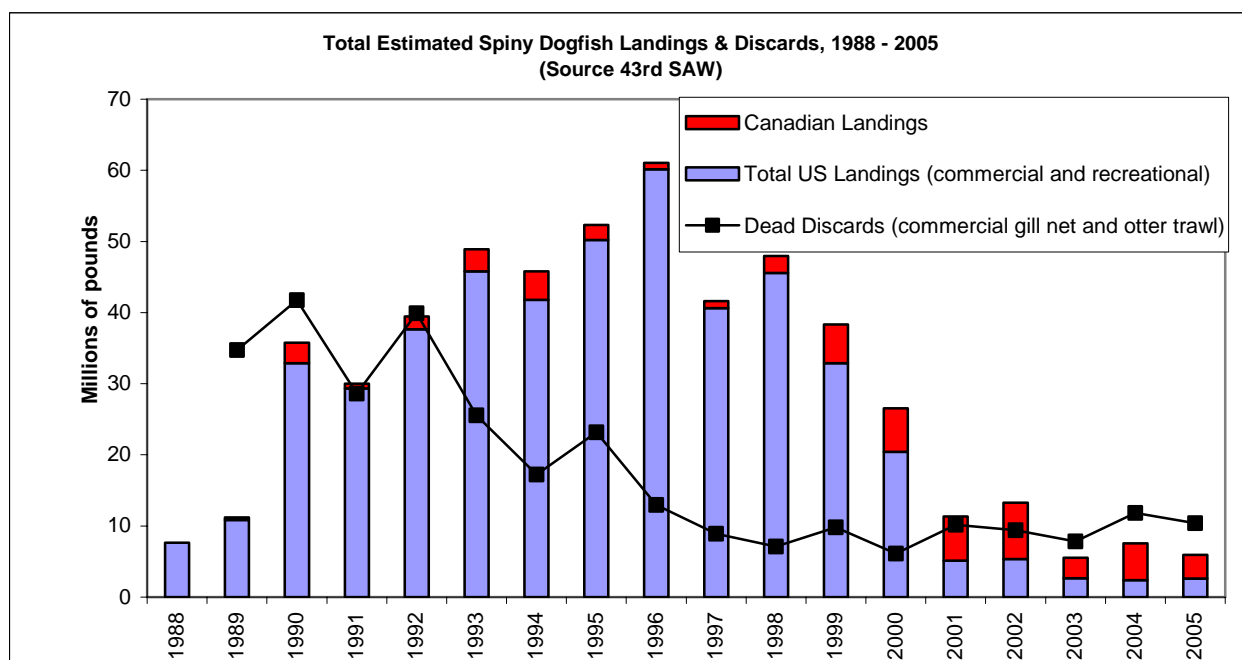


Figure 3. Comparison of spiny dogfish landings (millions of pounds) with dead discards.

Spiny dogfish are caught in a wide variety of fisheries and due to their low price per pound and the need for special handling procedures onboard, they are often discarded when more valuable species are present. High rates of dogfish bycatch and discards are expected. Using a ratio-estimator method, dead discards in US commercial fisheries were estimated to be 10.3 million pounds (4,714 mt) in 2005 (Figure 3).

Fishery-specific projected mortality rates are important parameters for estimating dead discards. The 43rd SAW reviewed mortality of discards for each fishery. Trawl mortality is likely higher due to compression of fish in the tow. If the catches are light, the dogfish are robust. The 43rd SAW determined discard mortality rates of 0.3 and 0.5 for gillnets and otter trawls respectively based on various scientific studies.

Recruitment numbers remain low, dropping from 20,213,000 new recruits in 2005 to 8,330,000 recruits in 2006—a 59 percent reduction (Figure 4). The 43rd SAW cited an increasingly skewed sex ratio of the population (7:1 males:females) and smaller sized reproductive females (that produce fewer, smaller offspring) as the cause for low recruitment despite increases in total and spawning stock biomass over the past few years.

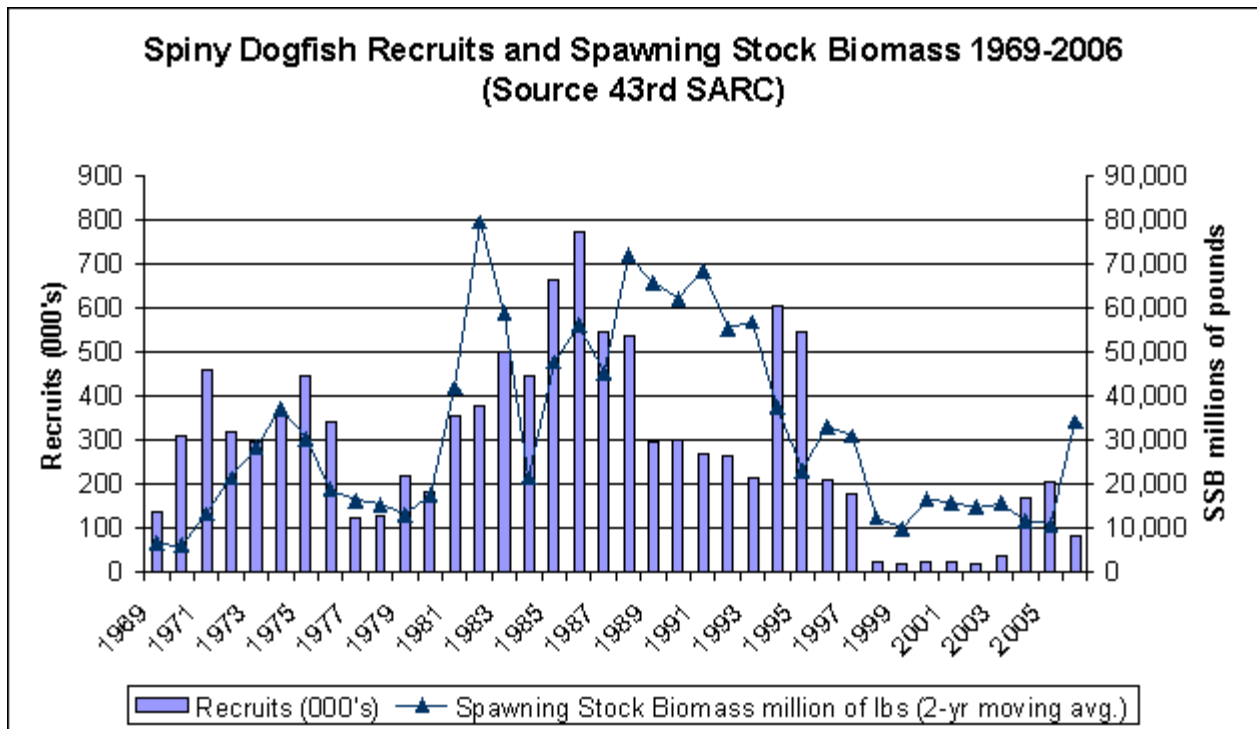


Figure 4. Estimated recruitment of spiny dogfish, <36 cm, NEFSS spring survey (2-year moving average of SSB deemed most appropriate method for comparison of recruitment by 43rd SAW).

Fishermen frequently encounter high densities of spiny dogfish, creating the perception of a healthy biomass of dogfish. Evidence from the trawl survey data suggests that these encounters happen because dogfish are frequently distributed inshore. The fraction of the population in inshore waters does appear to have increased in recent years.

III. Status of the Fishery

US commercial landings of spiny dogfish in 2005 were 2.53 million pounds (1150 mt). In 2004, the commercial fishery landed 2 million pounds (981 mt). Total landings are 83.5 percent female in 2005. This is consistent with the past several years, except during the late 1990's (Figure 5).

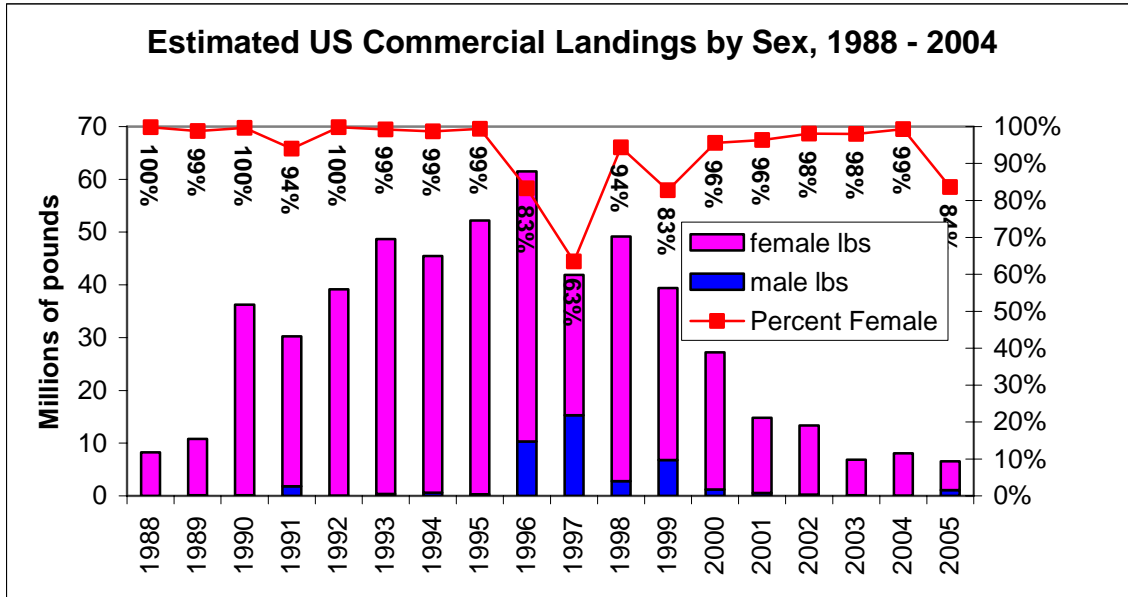


Figure 5. Commercial landings (millions of pounds) of spiny dogfish by sex (US and Canada).

The average weight of females caught in the US and Canadian commercial fisheries has decreased from 6.1 pounds in 2004 to 5.4 pounds in 2005 (Figure 6). The general trend since 1997 shows a slight increase in the average size of females; however, these average weights are significantly lower than those during the first part of the time series.

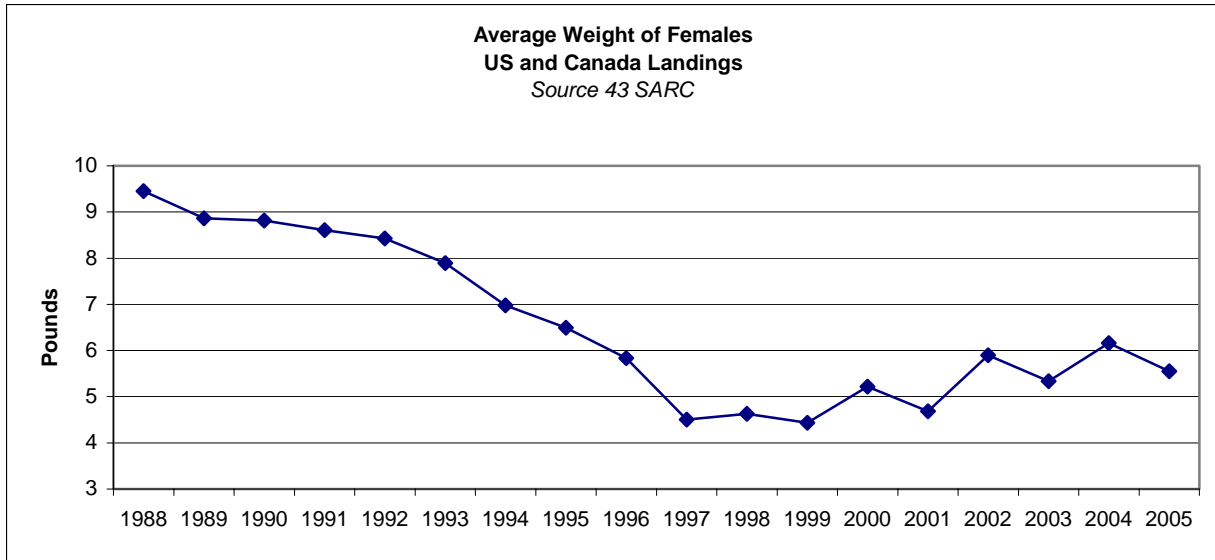


Figure 6. Average weight of female spiny dogfish caught in US and Canadian commercial fisheries

Recreational landings comprised 3.4% of the coastwide landings of spiny dogfish in 2005. Delaware, Massachusetts, New Jersey and Maryland landed the majority of recreationally caught spiny dogfish (Table 1).

Table 1. State Recreational and Commercial Landings (in pounds) for the May 1, 2004 to April 30, 2005 Fishing Year.*

State	Recreational Landings		Commercial Landings	
	MRFSS Lbs (A1 + B1 + B2)	% of Coastwide Recreational Catch	NOAA Weekly Quota Management Report	% OF Coastwide Commercial Catch
Connecticut	0	0.0%	91,573	3.7%
Delaware	23,302	26.3%	300	0.0%
Florida	0	0.0%	0	0.0%
Georgia	0	0.0%	0	0.0%
Maine	31	0.0%	30,098	1.2%
Maryland	12,238	13.8%	5,170	0.2%
Massachusetts	18,805	21.2%	1,975,246	79.7%
New Hampshire	6,526	7.4%	152,789	6.2%
New Jersey	21,613	24.4%	600	0.0%
New York	0	0.0%	43,820	1.8%
North Carolina	4,943	5.6%	9,432	0.4%
Rhode Island	893	1.0%	167,323	6.8%
South Carolina	0	0.0%	0	0.0%
Virginia	213	0.2%	2,140	0.1%
Total	88,564		2,478,491	

In 2005, Massachusetts landed the greatest proportion of the coastwide commercial (79.7%) landings by weight followed by New Hampshire(6.8) and Rhode Island (6.2%)(Table 1, Figure 8).

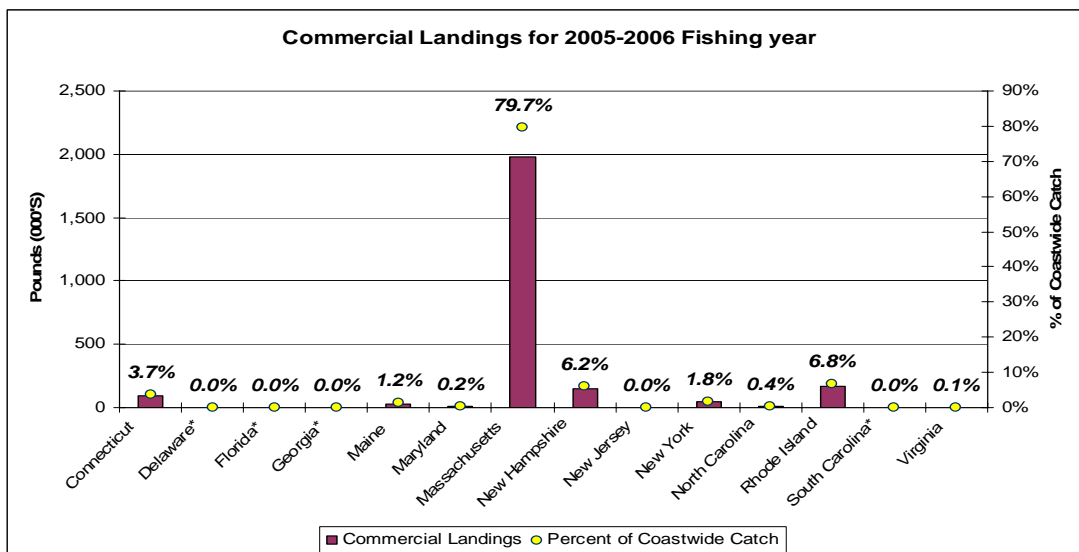


Figure 7. Commercial landings (thousands of pounds) for 2005/2006 fishing year.

IV. Status of Assessment Advice

The 43rd Stock Assessment Review Committee Southern Demersal Working Group met during May 10-12, 2006 at the NEFSC in Woods Hole, MA to develop the spiny dogfish stock assessment for 2006.

The 43rd SAW determined that the coastwide population is not overfished, and overfishing is not occurring. The SAW updated the $F_{\text{threshold}}$ value to 0.39. The 2006 fishing mortality rate (0.128) did exceed the rebuilding target of 0.03 but was below the new threshold value.

V. Status of Research and Monitoring

Under the Interstate Fishery Management 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. The annual review relies heavily on the NEFSC's spring trawl survey data to determine the annual status of the stock.

States are encouraged to submit any spiny dogfish information collected while surveying for other species. Maryland completes limited biological sampling of commercial catches onboard offshore trawlers if dogfish are present in the catch.

Connecticut also has a spring and fall trawl survey that encounters spiny dogfish. From 1985 to 1991, the trawl survey commonly caught spiny dogfish in the spring, but has caught fewer than ten fish per year for the last ten years. Delaware has two fishery independent surveys that have the potential for capturing spiny dogfish. A total of nine spiny dogfish were taken in 2005 in 90 tows, with most take in December.

The Massachusetts spring and autumn trawl survey has been conducted since 1978 and provides abundances indices and length frequency information for the spiny dogfish. Abundance indices for spiny dogfish from Massachusetts spring and autumn inshore bottom trawl surveys in 1978-2005 reveal two different facets of dogfish abundance. The spring survey usually occurs before the major influx of dogfish to Massachusetts waters and catches are low, but variable. In the fall, catches tend to be an order of magnitude larger and abundance indices have all been above the median since 2000 with a strong increasing trend. It would seem that as the species has become less available in other states, it has moved into Massachusetts waters. The biomass of spiny dogfish is so high in some regions in the fall (primarily eastern Cape Cod Bay and along the Backside of Cape Cod) that the survey cannot be conducted without altering standard methods. In areas of dense spiny dogfish, standard survey tows of 13 – 20 minutes have frequently been shortened to <5 minutes to limit the dogfish catch to a quantity that will not ruin the net. Size frequency patterns from the Massachusetts autumn survey are qualitatively similar to the NEFSC trawl survey for both sexes combined. Moreover, the Massachusetts survey shows changes in average size of mature female dogfish consistent with NEFSC surveys and the ASMFC shrimp survey. All of these surveys have shown declines in average size of 10 cm or more between 1990 and 2000.

North Carolina Division of Marine Fisheries (NCDMF) conducts dockside sampling of the ocean gill net fishery and collects information on length, sex, and aggregate weight when fish are available. No spiny dogfish were sampled by NCDMF staff during dockside fishery dependent sampling of the ocean gill net fishery for the fishing year 2005-2006. The low trip limits resulted in most ocean gill net fishermen choosing to discard incidentally caught spiny dogfish. Spiny dogfish are also independently sampled on the SEAMAP Cooperative Striped Bass Tagging Cruise, which occurred from January 19-28, 2006. The SEAMAP cruise has sampled dogfish since 1997. A total of 12,263 spiny dogfish were observed and the female to male ratio was 5:1. Of these, 9,569 spiny dogfish were tagged as part of an ongoing spiny dogfish tagging study conducted by East Carolina University. There is no other fishery-independent sampling by the NCDMF that catches a significant number of spiny dogfish.

VI. Status of Management Measures and Issues

Interstate Specifications for 2005-2006

The Spiny Dogfish and Coastal Sharks Management Board approved a commercial quota of 4 million pounds with trip limits of 600 lbs for Period 1 and 300 lbs for Period 2 for the 2005-2006 fishing year. These actions were taken in response to the results and recommendations of the Stock Assessment Review Committee and the Commission's Spiny Dogfish Technical Committee.

Canadian Regulations

Canada continues to hold their regulations constant while the Department of Fisheries and Ocean (DFO) completes their five-year spiny dogfish research program. The fixed gear (less than 45 feet) sector is the only group permitted to actively fish for spiny dogfish in eastern Canada. The fixed gear fishery is allotted a 2,500 mt (~5.5 million pounds) quota. This quota is further divided among the different community management boards based on catch history and can be transferred among the communities. The inshore and offshore dragger fleets are permitted to retain bycatch in the amount of 25 mt for vessels less than 65 feet and vessels larger in size have an annual cap of 10 mt.

The 2004-2005 fishing year is the third year of the five-year sampling program. The sampling program is industry funded and collects information such as size, sex, and age. Thus far, sampling has raised questions regarding the assumption that spiny dogfish is a single stock. The DFO has committed a 2,500 mt quota to the fixed gear sector at least until the end of the five year sampling program. Canada has declined to participate in a transboundary assessment until DFO has an initial assessment of the stock in Canadian waters.

In the April 2002 - March 2003 fishing year, Canada had a 2,500 mt quota for the fixed gear sector plus a 700 mt sampling quota; total Canadian landings were 3,408.6 mt (including mobile gear landings). In the 2003-2004 fishing year, the fixed gear fishery landed only 1,270 mt of the 2,500 mt quota. Total landings, with mobile gear landings, were 1,277.2 mt. In 2005, Canadian commercial landings are projected to be 3.3 million pounds (1500 mt).

Biomedical Harvest

Maine was the only state to request an allowance to issue biomedical permits for the 2005/2006 fishing year. Mount Desert Biological Labs (MDBL) collected a total of 929 dogfish from Maine coastal waters. Of the 929 dogfish collected, 436 were females and 393 were males. Average lengths ranged from 73.2 to 81.0 cm and weights ranged from 0.7 to 1.4. All dogfish were used for biomedical research at MDBL.

CITES

In late December 2003, Germany submitted a proposal to list spiny dogfish, *Squalus acanthias*, in Appendix II of the Convention on International Trade of Endangered Species (CITES). An Appendix II listing means the species can be exported commercially under a system of international permits, sustainability determinations, and cooperative law enforcement. The purpose of such a listing is to ensure that a species does not become endangered because of international trade. The CITES Animal Committee determined that spiny dogfish meets the biological criteria for Appendix II. After the Animal Committee meeting, Germany failed to garner sufficient support from other European Union countries and thus could not submit the proposal during the next CITES conference (Convention of the Parties 13: Bangkok October 3 – 14, 2004).

On December 19, 2006, European Union Member States agreed to support Germany's proposals to provide protection for spiny dogfish sharks under the Convention on International Trade in Endangered Species. Following debate at the European Commission's CITES Committee, the proposals received the qualified majority needed to advance to the Conference of the Parties to CITES in June 2007.

VII. Annual State Compliance

The mandatory components of the Interstate Fishery Management Plan are to close state waters when the commercial quota is projected to be harvested, to report landings weekly to NMFS, state permitted dealers must report weekly, to implement possession limits as determined by the Commission's annual specification setting process, to limit the biomedical harvest of spiny dogfish to 1,000 fish (per state) per year, and report the amount of dogfish harvested under special permits, and maintain a prohibition on finning.

Table 2 summarizes the states' compliance with the Interstate Fishery Management Plan for spiny dogfish during the 2004-2005 fishing year and provides an update on the regulations for the current fishing year.

VIII. PRT Recommendations

State Compliance

All of the states with a declared interest in the management of spiny dogfish have regulations in place that are compliant with the Interstate Fisheries Management Plan for Spiny Dogfish.

De minimis Status

When the spiny dogfish Interstate FMP was implemented in 2003, Maine, Delaware, South Carolina, Georgia, and Florida were granted *de minimis* status. To achieve *de minimis* status the

FMP requires, “a state’s commercial landings of spiny dogfish to be less than 1% of the coastwide commercial total.” When given *de minimis* status, a state is exempted from biological monitoring of the commercial spiny dogfish fishery, but must continue to report both commercial and recreational spiny dogfish landings. Delaware, South Carolina, Georgia, and Florida are requesting *de minimis* status again and continue to meet the FMP requirements for achieving this status. Maine has also requested *de minimus* status but exceeds the 1% criteria by 0.2% (1.2% of coastwide catch). The PRT recommends granting all of these states *de minimis* status—including Maine. Maine’s commercial landings of spiny dogfish have been below 1% since 1997, and there are no plans to expand the commercial dogfish fishery in the near future.

Table 2. State-by-state compliance with the Interstate Fishery Management Plan for Spiny Dogfish.

	Report Submitted	De Minimis Request	Biomedical Permit Harvest	Finning Prohibition	Trip Limits
Maine	Yes	Yes, over by 0.02%, Recommended	Yes: 929 Collected	Yes	600 lb / 300 lb
New Hampshire	Yes	No	No	Yes	600 lb / 300 lb
Massachusetts	Yes	No	No	Yes	600 lb / 300 lb
Rhode Island	Yes	No	No	Yes	600 lb / 300 lb
Connecticut	Yes	No	No	Yes	600 lb / 300 lb
New York	Yes	No	No	Yes	600 lb / 300 lb
New Jersey	Yes	No	No	Yes	600 lb / 300 lb
Delaware	Yes	Yes, Recommended	No	Yes	Closed
Maryland	Yes	No	No	Yes	600 lb / 300 lb
Virginia	Yes	No	No	Yes	600 lb / 300 lb
North Carolina	Yes	No	No	Yes	600 lb / 300 lb
South Carolina	Yes	Yes, Recommended	No	Yes	600 lb / 300 lb
Georgia	Yes	Yes, Recommended	No	Yes	2 fish bag limit / 30" min size
Florida	Yes	Yes, Recommended	Protected Species	Protected Species	Protected Species

Research Recommendations¹

1) Attempt to allocate landings to statistical area (i.e. attempt proration) using Vessel Trip Report data for 1994 and later years.

The Working group successfully completed work to address this RR.

2) Evaluate the utility of length frequency for spiny dogfish sampled in the NEFSC Observer Program in the most recent years (2001 and later).

The Working group successfully completed work to address this RR.

3) Ensure the inclusion of recent (2000 and later) MADMF Observer sample data for spiny dogfish in the NEFSC database, for more efficient use in future assessments.

The Working group successfully completed work to address this RR.

4) Conduct tagging and genetic studies of spiny dogfish in U.S. and Canadian waters to clarify current assumptions about stock structure.

The Working Group reviewed an ongoing streamer tag project conducted by East Carolina University.

5) Conduct discard mortality studies for spiny dogfish, with consideration of the differences in mortality rates among seasons, areas, and gear types.

The Working Group reviewed a discard mortality study in North Carolina near-shore trawl and gillnet fisheries conducted by East Carolina University, and took these results into consideration in updating assumed discard mortality rates for the coast-wide trawl, gillnet, and hook fisheries.

6) 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 roundfish.

The Working Group made no progress on this RR.

7) Investigate the distribution of spiny dogfish beyond the depth range of current NEFSC trawl surveys, possibly using experimental research or supplemental surveys.

The Working Group made no progress on this RR.

43rd SAW Assessment Report 53

8) Initiate aging studies for spiny dogfish age structures (e.g., fin spines) obtained from NEFSC trawl surveys and other sampling programs. These studies should include additional age validation and age structure exchanges. The WG notes that other aging methodologies (e.g., Canadian studies on radiometry) are also in development.

The Working Group reviewed preliminary results of NEFSC aging work for spiny dogfish. Preliminary results agree more with validated ages for Pacific dogfish, then with current estimates used for Northwest Atlantic dogfish.

¹ Taken Verbatim from the 43rd SAW section 11.0 "SPINY DOGFISH RESEARCH RECOMMENDATIONS".

9) Additional analyses of the effects of environmental conditions on survey catch rates should be conducted.

The Working Group investigated the associations of temperature and depth with trawl survey densities. Examination of dogfish distributions in trawl surveys indicates greater concentrations closer to shore over the last five years.

10) Additional work on the stock-recruitment relationship should also be conducted with an eye toward estimation of the intrinsic rate of population increase.

The Working Group used the results from a new analytical model (LTM) to estimate parameters of a stock-recruitment relationship.

11) The SARC noted that the increased biological sampling of dogfish should be conducted and research trawl surveys. Maturation and fecundity estimates by length class will be particularly important to update. Additional work on the survey database to recover and encode information on the sex composition prior to 1980.

The Working group notes that a sampling program to collect aging structures (2003) and maturity data (1998) for dogfish has been implemented on NEFSC surveys. The WG examined sex composition data from NEFSC spring and fall surveys from 1968 to 1972, and this historical information has been included in this assessment.

New:

1) Incorporate Canadian commercial fishery sample data into the assessment when it is made available (expected in 2007).

2) Conduct an aging workshop for spiny dogfish, encouraging participation by NEFSC, NCDMF, Canada DFO, other interested state agencies, academia, and other international investigators with an interest in dogfish aging (US and Canada Pacific Coast, ICES).

3) Examine observer data to calculate a weighted average discard mortality rate based on an assumption that the rate increases with catch size.

4) Develop experimental estimates of discard mortality in the New England and Mid-Atlantic commercial fisheries.

43rd SAW Assessment Report 54

5) Develop experimental estimates of discard mortality in the New England and Mid-Atlantic recreational fisheries.

6) Conduct a coast-wide tagging study for spiny dogfish to explore stock structure, migration patterns, and mixing rates.