

## Overview of North Carolina Spiny Dogfish Regulations and Commercial Landings<sup>1</sup>

Prior to 2000 there were no regulatory measures in place to control harvest of spiny dogfish along the east coast of the United States. In April 1998 the National Marine Fisheries Service (NMFS) declared spiny dogfish overfished, which resulted in the development of the federal Fishery Management Plan (FMP) for spiny dogfish. The federal spiny dogfish fishery is jointly managed by the Mid-Atlantic and New England Fishery Management Councils (MAFMC and NEFMC). In May 1999 the Atlantic States Marine Fisheries Commission (ASMFC) Policy Board approved the development of an interstate management plan for spiny dogfish within state waters.

Implementation of federal regulations did not begin until May 2000 at the beginning of the 2000/01 fishing year. The Federal FMP is based on a constant fishing mortality strategy to allow low bycatch landings in the initial stages with increased landings as the mature female portion of the stock rebuilds. In 2000/01 the allowed harvest was 4 million pounds with 58% allocated to Period I from May 1 to October 31 and 42% allocated to Period II from November 1 to April 30, and daily harvest limits of 600 pounds and 300 pounds respectively. In August 2000, the ASMFC Spiny Dogfish and Coastal Shark Board took emergency action to close state waters to commercial harvest, landings, and possession of spiny dogfish when federal waters were closed due to the fishery landing its quota. In 2001 the North Carolina Division of Marine Fisheries (DMF) issued proclamations to close state waters to the harvest of spiny dogfish to remain in compliance with the ASMFC emergency action.

The DMF continued to issue proclamations to close state waters to the harvest of spiny dogfish throughout 2002 until the ASMFC Interstate FMP for Spiny Dogfish was finalized. The ASMFC FMP was developed and a public comment period was conducted in the summer of 2002. The North Carolina Marine Fisheries Commission (MFC) provided comments for the ASMFC to consider prior to adoption of the Spiny Dogfish FMP. The MFC supported the overfishing definition of the spawning stock biomass (SSB) and a rebuilding schedule with a constant harvest strategy capped at a 8.82 million pound quota to both conserve the resource and optimize harvest. The MFC preferred utilizing the historical landings period from 1994-2000 as the reference period because of concerns over the accuracy of the reporting of landings prior to 1994. The MFC strongly supported changing the fishing year to January 1 – December 31 to alleviate some of the inequity in harvest along the entire east coast with a state-by-state allocation. Also, the MFC felt that quota overages should be deducted accordingly and transfer allowances between states should be provided within a single fishing year. The MFC also supported a 3,000-pound trip or possession limit for the entire fishing year.

The ASMFC Interstate FMP for Spiny Dogfish was finalized in November 2002 and implementation began in the 2003/04 fishing year (ASMFC 2002). There are a few ways that the interstate FMP differs from the federal FMP. The ASMFC FMP considers a quota payback provision, which deducts overages from the same period in the following fishing year and quota rollovers are prohibited until the stock rebuilds to the target SSB. Also, the

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<sup>1</sup> Sent to Spiny Dogfish CAP on March 10, 2008 for meeting on March 12, 2008.

ASMFC FMP allows special permits to be issued for biomedical research only and limits the number of dogfish that can be taken under the special permit (1,000 fish). Dogfish harvested for dissection or educational purposes can be taken from the commercial quota until it is fully harvested. The reference period to determine the seasonal allocations was years 1990-1997, allocating 58% to Period I (May-Oct) and 42% to Period II (Nov-Apr) (Table 1). North Carolina landings accounted for 15.28% of the total coastwide landings of spiny dogfish during the reference period and North Carolina had the second highest landings of spiny dogfish after Massachusetts along the east coast during the 1990-1997 time series (Figure 1).

Table 1. Spiny dogfish percent annual landings by state, 1990-2001 (ASMFC 2002). The reference period of 1990-1997 is used in the ASMFC Interstate Fishery Management Plan.

Year	NC	ME	NH	MA	RI	CT	NY	NJ	DE	MD	VA
1990	0.13	19.60	0.57	54.83	4.01	0.07	0.06	13.99	0.00	6.72	0.02
1991	5.04	6.94	0.00	49.88	10.88	0.03	0.27	9.35	0.02	17.00	0.60
1992	23.23	4.63	1.08	49.44	5.46	0.06	0.42	6.82	0.00	8.24	0.62
1993	18.83	7.54	3.51	57.36	4.11	0.03	0.20	1.65	0.00	3.84	2.92
1994	21.94	4.48	6.42	57.40	1.31	0.42	0.59	2.79	0.00	3.53	1.11
1995	15.08	3.50	4.43	60.17	1.20	0.62	1.96	5.00	0.13	6.55	1.37
1996	22.26	1.53	1.82	45.17	1.90	1.19	2.10	7.80	0.00	12.05	4.18
1997	16.89	1.00	2.24	48.11	2.25	0.77	1.09	8.77	0.00	9.39	9.49
1998	10.46	0.58	3.99	52.52	3.73	0.56	3.07	13.29	0.00	5.06	6.73
1999	10.98	0.10	3.66	44.05	3.95	0.26	4.29	11.59	0.00	6.30	14.82
2000*	16.82	0.04	11.06	27.30	1.45	0.14	9.01	24.74	0.00	2.13	7.32
2001*	0.01	0.01	7.79	79.72	8.03	0.16	1.36	0.35	0.00	0.00	2.57
% 1990-97 combined	15.28	4.22	3.34	51.06	3.47	0.44	1.83	8.56	0.02	7.39	4.38

\*Landings were constrained by the Federal Spiny Dogfish FMP and ASMFC Emergency Action.

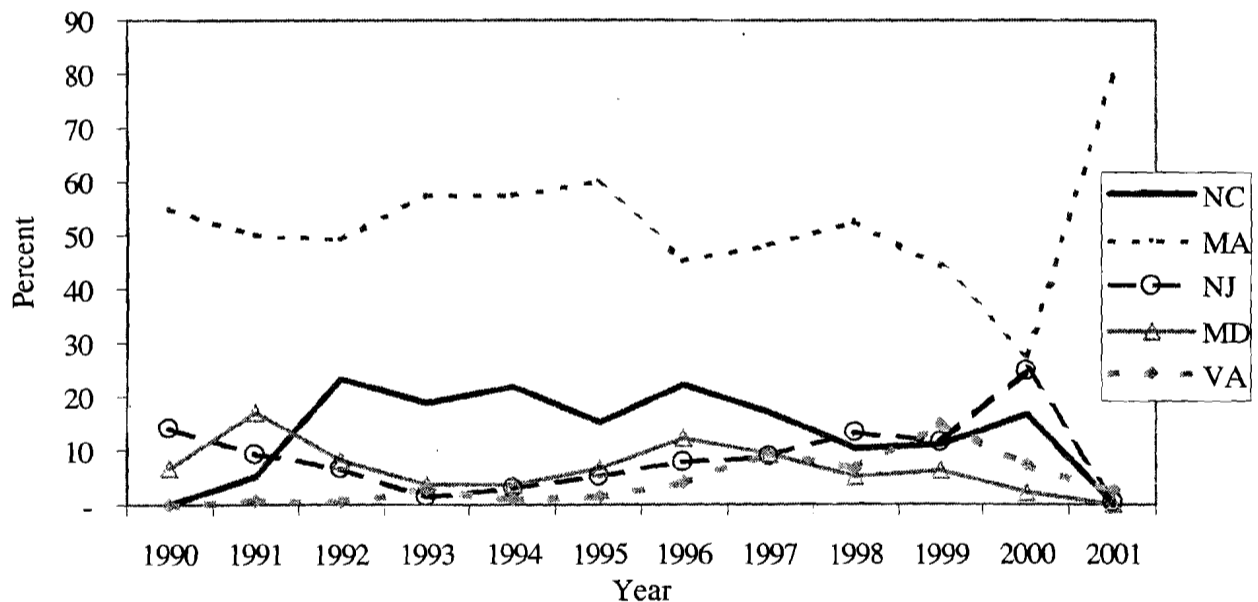


Figure 1. Spiny dogfish percent annual landings by state from 1990-1997. Showing the top five states accounting for 87% of the entire landings (ASMFC 2002).

The NMFS implemented a commercial quota of 4 million pounds with trip limits of 600 pounds in period one and 300 pounds in period two for the 2003/04 fishing year in federal waters. The states, independent from the ASMFC, agreed to maintain the commercial harvest below 4.4 million pounds although the ASMFC approved an 8.8 million pound commercial quota for the 2003/04 fishing year (ASMFC 2004). Each of the seasonal quotas was cut in half to bring the total harvest quota closer to the federally specified quota. The states continued to have the ability to implement trip limits up to 7,000 pounds. The trip limits enabled some states to continue a small-scale directed fishery in state waters during the 2003/04 fishing year. North Carolina established a 4,000 pound trip limit for the 2003/04 fishing year, which resulted in landings of 520,163 pounds (NC DMF Trip Ticket Program). This was the last fishing year to have any significant amount of spiny dogfish landings in North Carolina.

The ASMFC Spiny Dogfish and Coastal Sharks Management Board approved a commercial quota of 4 million pounds with trip limits of 600 pounds for Period I and 300 pounds for Period II for the 2004/05 fishing year. These actions were taken in response to the results and recommendations of the 37th Stock Assessment Review Committee and the ASMFC's Spiny Dogfish Technical Committee. North Carolina opened spiny dogfish harvest on December 8, 2004 with 600 and 300-pound trip limits for each harvest period. In August 2005, the MFC convened the first Spiny Dogfish Compliance Advisory Panel (CAP) meeting. The charge of the committee was to advise the MFC as to whether or not North Carolina should go out of compliance with the ASMFC Spiny Dogfish FMP. Total spiny dogfish landings from North Carolina for the 2004/05 fishing year was 20,442 pounds (NC DMF Trip Ticket Program).

In November 2005 the ASMFC Spiny Dogfish and Coastal Sharks Management Board approved Addendum I to the Interstate Fishery Management Plan for Spiny Dogfish (ASMFC 2006a). Addendum I provided 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 to the FMP, recommending the adoption of multi-year management measures without the requirement of annual review to NMFS for final approval.

The ASMFC Spiny Dogfish and Coastal Sharks Management Board approved a commercial quota of 4 million pounds with trip limits of 600 pounds for Period I and 300 pounds for Period II for the 2005/06 fishing year (ASMFC 2007a). These actions were taken in response to the results and recommendations of the recent stock assessment. North Carolina allowed a 600-pound trip limit in Period I and 300-pound trip limit in Period II. According to fishermen comments, a 300-pound trip limit had essentially the same impact as a moratorium on the dogfish fishery in North Carolina. There is little demand for small quantities of North Carolina dogfish because northern processing facilities require large volumes of product in order to operate efficiently. Fishermen indicated a trip limit approaching 4,000 pounds would be necessary to make the fishery feasible (DMF 2006). North Carolina spiny dogfish landings for the 2005/06 fishing year were 9,903 pounds (NC DMF Trip Ticket Program).

In May 2006 the 43<sup>rd</sup> Stock Assessment Review Committee (SARC) of the Southern Demersal Working Group and ASMFC Spiny Dogfish Technical Committee developed the spiny dogfish stock assessment for 2006 (ASMFC 2006b). The 43<sup>rd</sup> SARC determined that the coastwide population was not overfished, and overfishing was not occurring (ASMFC 2006b). The SARC 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. Full  $F$  on the female exploitable stock varied between 0.08 and 0.47 between 1990 and 2005. Even with the lower landings since 2001, fishing mortality rates on the fully recruited female stock component remained above the rebuilding target (0.03). The current estimate of full  $F$  on dogfish in 2005 was 0.128 (0.09-0.174; 80% confidence interval). Female spawning stock size dropped to below 100,000 mt in 1997, declined to about 50,000 mt in 1998 and remained below 100,000 mt through 2004. The extremely high estimate in 2006 raised the 3-year average female SSB estimate to 106,000 mt. An analytical model to express survey indices of biomass in absolute scale and in turn to provide estimates of fishing mortality rates was developed (ASMFC 2006b).

The MFC Spiny Dogfish CAP met in August 2006 and discussed sampling needs for spiny dogfish. The group reviewed a proposal from Massachusetts to the ASMFC requesting an increase in the spiny dogfish quota. The CAP felt the proposal was unfair to North Carolina and other Mid-Atlantic states because of where the quota split would occur between the Period I and II seasons. The Panel felt Rhode Island landings are actually from Massachusetts' fishermen and most of the dogfish would be harvested in the MA-RI waters well before reaching North Carolina waters in Period II. The Panel decided that a letter should be sent to the ASMFC expressing these concerns.

The Spiny Dogfish and Coastal Sharks Management Board final specifications for the 2006/07 fishing season included a commercial quota of 6 million pounds and allowed state's to set their own possession limits at the beginning of Period II (ASMFC 2007b). The line separating the states allowed separate harvest during Period I and II also changed for the 2006/07 fishing year. Quota allocation remained the same at 58% for Period I and included states from Maine to Connecticut and 42% for Period II including states from New York to North Carolina. Spiny dogfish landings from North Carolina for the 2006/07 fishing year were 141,177 pounds (NC DMF Trip Ticket program).

One of the objectives of the ASMFC Interstate FMP for Spiny Dogfish is to allocate the available resource in a biologically sustainable manner that is equitable to all the fishermen. There has been a shift in the allocation of spiny dogfish landings since the inception of the ASMFC FMP in 2002 (Table 2). Since the fishing year begins on May 1<sup>st</sup> it gives more opportunity for the northern states to intercept spiny dogfish because of their seasonal migration northward in the spring (Table 3 and Figure 2). By the time spiny dogfish return to the southern end of their migration the timing is in Period II and most of the quota has already been taken before dogfish reach North Carolina (Table 4). The states that gained the most in percent of the quota harvested from the regulatory changes were Virginia (11.99%), Massachusetts (10.53%), Rhode Island (3.80%), New Hampshire (2.81%), and Connecticut (4.02%)(Table 4). The states that lost the most in percent of the quota harvested



from the regulatory changes included North Carolina (11.02%), New Jersey (8.50%), Maryland (7.24%), and Maine (2.58%) (Table 4).

Table 2. Percent allocation of spiny dogfish landings for the reference period (1990-1997) and the 2003/04 to 2006/07 fishing years Period I and Period II separated by state. Percentages based on data taken from NERO weekly quota and monitoring reports as shown in the annual Interstate Fishery Management Plan for Spiny Dogfish (ASMFC 2004, 2006a, 2007a, and 2007b).

	Reference period	2003/04	2004/05	2005/06	2006/07
Period I	58	82.88	82.96	93.83	66.53
Period II	42	17.12	17.04	6.17	33.47

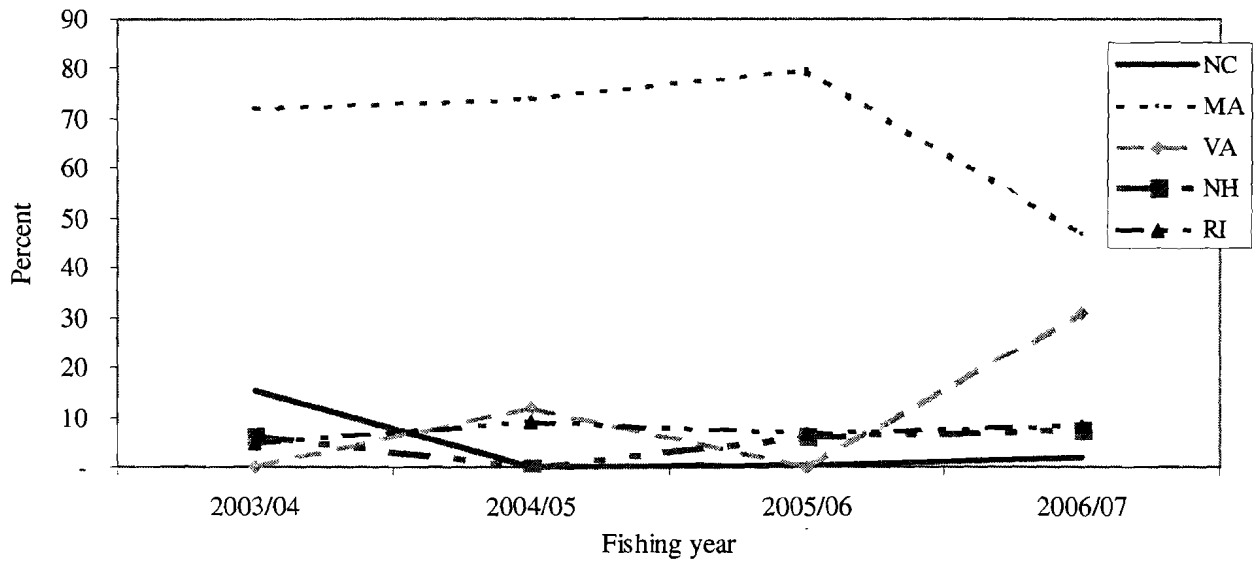


Figure 2. Spiny dogfish percent annual landings by state for fishing years 2003/04 through 2006/07. Showing the top five states accounting for 94% of the entire landings. Data taken from NERO weekly quota and monitoring reports as shown in the annual Interstate Fishery Management Plan for Spiny Dogfish (ASMFC 2004, 2006a, 2007a, and 2007b).

Table 3. Spiny dogfish percent annual landings by state for fishing years 2003/04 through 2006/07. Data taken from NERO weekly quota and monitoring reports as shown in the annual Interstate Fishery Management Plan for Spiny Dogfish (ASMFC 2004, 2006a, 2007a, and 2007b).

Fishing year (May 1 - Apr 30)	NC	ME	NH	MA	RI	CT	NY	NJ	DE	MD	VA
2003-04	15.39	0.00	6.37	71.80	4.70	0.02	1.37	0.00	0.00	0.17	0.17
2004-05	0.06	0.20	0.02	73.85	8.88	2.32	2.59	0.23	0.00	0.03	11.82
2005-06	0.38	1.21	6.16	79.70	6.75	3.69	1.77	0.02	0.01	0.21	0.09
2006-07	2.04	2.89	7.64	46.82	8.19	0.99	0.18	0.06	0.00	0.15	31.04
May 2003-Apr 2007 combined	4.27	1.64	6.15	61.60	7.28	1.46	1.03	0.06	0.00	0.15	16.37

Table 4. Spiny dogfish percent annual landings combined for the reference period (1990-1997) and fishing years after inception of the ASMFC Interstate Fishery Management Plan for Spiny Dogfish (ASMFC 2002, 2004, 2006a, 2007a, and 2007b) ranked in order of highest to lowest by state.

1990-1997				
Rank	Reference period		2003/04-2006/07	
	State	Percent	State	Percent
1	MA	51.06	MA	61.60
2	NC	15.28	VA	16.37
3	NJ	8.56	RI	7.28
4	MD	7.39	NH	6.15
5	VA	4.38	NC	4.27
6	ME	4.22	ME	2.58
7	RI	3.47	CT	1.46
8	NH	3.34	NY	1.03
9	NY	1.83	MD	0.14
10	CT	0.44	NJ	0.06
11	DE	0.02	DE	0.00

The ASMFC Interstate FMP for Spiny Dogfish introduced a quota payback provision, which intended to deduct overages from the same period the following fishing year. A quota overage occurred during the 2006/07 fishing year. Landings by state showed that the northern states harvested more than their arranged allotment (58%) but the landings occurred in Period II. So although the payback provision specified it must come from the same period in which the overage occurred, states that were not allotted landings for Period II created the overage. In May 2007 the Board recommended that the 384,737-pound overage be removed both from Period II and from the northern state allocation. By separating the quota into periods and region it is difficult to determine how to equitably deal with overages on a state level because of both the geographical and seasonal division associated with the quota.

The current system that separates the quota into regions and seasons is not working because spiny dogfish are found in both areas and periods at the same time. The two key problems with the ASMFC Interstate FMP that may be resolved with state by state allocation of the spiny dogfish resource, which include: 1) equitable allocation; and 2) quota overage or transfer provisions. State by state allocation of the spiny dogfish resource would allow a more equitable distribution of the spiny dogfish resource closer to the historical reference period before the regulatory changes. State by state allocation of spiny dogfish harvest would also allow managers to more specifically determine where quota paybacks or transfers need to occur. The ASMFC Spiny Dogfish and Coastal Shark Management Board did select an adaptive management approach in the FMP, which allows them to consider changes to the management strategy before the start of a new fishing year (ASMFC 2002). One of the measures allowed for consideration under the adaptive management strategy is state-by-state allocation of the coastwide quota. Since the spiny dogfish population is not considered overfished and overfishing is not occurring it may in the best interest of all states to consider a more equitable allocation of the resource as the annual quota allowance increases.

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## NORTH CAROLINA SPINY DOGFISH COMMERCIAL FISHERY 2000 - 2007

### INTRODUCTION

Spiny dogfish are managed in federal waters under the joint Mid-Atlantic Fishery Management Council/New England Fishery Management Council Fishery Management Plan (Council FMP). This FMP charges the Councils with making recommendations to the National Marine Fisheries Service (NMFS) for management of spiny dogfish. The NMFS considers recommendations from the Councils when implementing management measures for spiny dogfish. In state waters, spiny dogfish are managed under the Atlantic States Marine Fisheries Commission (ASMFC) Interstate Fishery Management Plan for Spiny Dogfish (ASMFC FMP). The ASMFC Spiny Dogfish Management Board is responsible for approving state waters management measures and states are required to comply with approved management measures by the FMP.

The Council FMP was implemented January 2000 and the ASMFC FMP was approved in November 2002. Both FMPs specify a May 1 through April 30 fishing year and require that a harvest quota and associated trip limits be established for each fishing year. All commercial landings count toward both the NMFS and the ASMFC quota, regardless of whether the fish are harvested in federal or state waters. The ASMFC FMP has a payback provision for over harvest of quota, while the Council FMP does not require payback of over harvest.

### MANAGEMENT MEASURES

NMFS has set the federal waters spiny dogfish quota at four million pounds since the 2000 implementation of the FMP. From May 2003 to October 2006, the ASMFC quota was also set at four million pounds. During this period, both NMFS and ASMFC established trip limits of 300 pounds or 600 pounds, except for a brief period during the winter of 2004. That year, ASMFC established state-specific quota shares with no specified trip limit. Most states kept their trip limit at 300 pounds in order to be consistent with the federal waters trip limit. However, North Carolina and Virginia established state waters trip limits of 4,000-pounds. North Carolina's 500,000-pound quota allocation was harvested in less than two weeks as a result of the increased trip limit. In 2004, Virginia fishermen only landed 10 per cent of their 500,000 pound quota allocation. Their quota was not landed because cooler waters had forced most spiny dogfish to migrate from Virginia fishing grounds by the time that state quota allocations were implemented. Only 41 to 66 per cent of the coastwide four million pound quotas were harvested during the 2003-2004, 2004-2005 and the 2005-2006 fishing years because of low trip limits.

## SPINY DOGFISH CAP

Marine Fisheries Commission Chairman Jimmy Johnson appointed a Spiny Dogfish Compliance Advisory Panel (CAP) in July 2005 for the purpose of reviewing the impact of the Spiny Dogfish FMPs and related management measures on North Carolina fishermen. The CAP met six times between August 2005 and November 2006. At the November 2006 meeting, the CAP agreed that North Carolina spiny dogfish fishermen would be better served by the state working within the ASMFC system rather than going out of compliance with the FMP. However, no vote was taken on the compliance recommendation for lack of a quorum. Follow up meetings were scheduled for December 2006 and January 2007 but were cancelled when it was learned that a quorum would not be present at the meetings.

## RECENT MANAGEMENT MEASURES

Data from the 2006 NMFS Spring Trawl Survey were used to update the Spiny Dogfish Stock Assessment during the summer of 2006. The updated assessment indicated that the stock was no longer overfished and overfishing was not occurring. As a result of the updated assessment, the ASMFC Spiny Dogfish Management Board took action at their October meeting to increase the quota for the 2006-2007 fishing year from four million pounds to six million pounds. States were allowed to set trip limits which they felt were appropriate for their fisheries. Most states did not change their 600-pound trip limit, however, Virginia and North Carolina increased their trip limits to 4,000 pounds.

At the October 2006 meeting, the ASMFC Board set the quota for the 2007-2008 fishing year at six million pounds. The Management Board also authorized states to set trip limits up to 3,000 pounds. North Carolina established a 3,000-pound trip limit for spiny dogfish in state waters by Proclamation FF-43-2007 effective June 3, 2007.

## WINTER 2007 FISHERY

North Carolina fishermen anticipated that they would have increased opportunity to land spiny dogfish as a result of the ASMFC quota increase. Their expectations were based on historically low effort and landings in Virginia. During the period 1988-2001, average annual North Carolina spiny dogfish landings were 4.9 million pounds while Virginia average annual landings were 1.4 million pounds or 29 per cent of North Carolina landings. For the 2006-2007 fishing year, North Carolina landings were 128,543 pounds while Virginia landings at 1,952,566 pounds were 15 times greater than North Carolina landings. North Carolina's low spiny dogfish landings during the 2006-2007 fishing year, when compared to Virginia's much higher landings, were the result of limited market opportunities due to a combination of the following:

Above average water temperatures delayed the arrival of migrating spiny dogfish in North Carolina waters by approximately six weeks. During this time, Virginia fishermen began to target spiny dogfish in state waters.

Spiny dogfish were plentiful in Virginia waters and local fishermen, working under a 4,000-pound trip limit, were able to provide sufficient quantities of dogfish to meet the needs of the two New England processors.

The New England processors indicated throughout the season that they intended to purchase fish from North Carolina. However, high fuel costs and the additional shipping distance from Wanchese or Hatteras rather than Linhaven or Chincoteague, Virginia to the processing facilities made it less profitable to use fish from North Carolina rather than fish from Virginia.

When the fishery was closed on February 24, 2007 as a result of the ASMFC quota having been met, spiny dogfish were abundant in both Virginia and North Carolina waters.

Even though North Carolina was instrumental in getting the ASMFC quota increased and the Division set the trip limit at a level (4,000 Pounds) that would have allowed for a profitable fishery, spiny dogfish distribution and limited market opportunities resulted in few fish being purchased from North Carolina fishermen.

## NORTH CAROLINA SPINY DOGFISH COMMERCIAL FISHERY (1990 – 2006)

Following is a summary of the spiny dogfish fishery, landings and management actions for the period 1990 through 2006. This summary consists of selected text from the Atlantic States Marine Fisheries Commission (ASMFC) Interstate Fisheries Management Plan for Spiny Dogfish (2002).

### DESCRIPTION OF THE FISHERY

United States fishermen have landed spiny dogfish along the Northeastern coast of the US since the 1880's (Bigelow and Schroeder 1953). The early domestic fishery utilized longlines and otter trawls but was of relatively minor importance to the US fishery due to low market demand. In fact, spiny dogfish were generally avoided by US fishermen and were only slightly exploited during the late 19th and most of the 20th century. However, spiny dogfish have been a popular foodfish in various European markets and have also been the target of the foreign fishing fleets throughout the world, including the east coast of North America (Soldat 1979).

Beginning in 1990, the US commercial fishery for spiny dogfish expanded dramatically. Landings increased six-fold from roughly 10 million pounds (4,500 mt) in 1989 to 60 million pounds (27,000 mt) in 1996 (Table 1). Spiny dogfish commercial landings declined to 45.2 million pounds (20,500 mt) in 1997. During the period of rapid expansion of the fishery (1990-1997), US commercial landings averaged about 40 million pounds (18,000 mt).

Cumulative removals during this eight-year period were roughly 340 million pounds (154,000 mt). In contrast, cumulative US landings for the period 1962-1989 (i.e., the previous 28 years) were only 118.6 million pounds (54,000 mt). Combined foreign landings from 1965-1977 were about 345 million pounds (156,000 mt). Thus, since 1990, the recently expanded US fishery has landed approximately the same weight of spiny dogfish in 8 years that the foreign fishery removed in the 13 years prior to the passage of the Fishery Conservation and Management Act. However, although the reported weight of landings was similar, the recent US fishery generated significant discards and the landings were comprised almost exclusively of mature females. In contrast, the foreign fishery prosecuted all sizes of spiny dogfish with minimal discarding (NEFSC 1998).

Spiny dogfish are landed in every state from Maine to North Carolina (Table 2). However, prior to 1990, Massachusetts was responsible for the majority of commercial spiny dogfish landings. Beginning in 1989 (as the US fishery expansion started), the states of New Jersey, Maryland and Maine began to increase in importance. By 1996, the expansion of the spiny dogfish fishery had occurred in virtually every state, especially in North Carolina (1992-2000). Overall, Massachusetts and North Carolina recorded the highest landings of spiny dogfish during the period 1988-2001, followed by New Jersey, Maryland, Maine, Virginia, Rhode Island, and New Hampshire (Table 3). More recently (i.e. during the period 1994-2000), Massachusetts, North Carolina, New Jersey, Maryland, and Virginia have accounted for the majority of the spiny dogfish landings (Table 2).

A total of 21.1 million pounds of spiny dogfish was landed during the calendar year 2000 based on NMFS dealer reports (Table 1). This annual total does not include dogfish reported as unclassified (not specified as either spiny or smooth dogfish). The federal spiny dogfish regulations were implemented on April 3, 2000. The quota specified for the fishing year that began May 1, 2000 (fishing year 2000), was allocated to two quota periods (May – October, November – April 2001). The commercial quota allocated to the first semi-annual period (2,316,000 pounds) was landed quickly and the fishery for federally permitted vessels was closed on August 1, 2000. Despite the federal closure, landings continued to be landed legally by vessels fishing exclusively within state waters. Prior to the start of the second semi-annual period, it was determined that landings from the first period exceeded the quota allocated to the second period (November 2000 – April 2001). As a result, the federal closure of the spiny dogfish fishery remained in

effect for the entire second quota period, and ASMFC enacted the Spiny Dogfish Emergency Action to close the fishery in state waters also. Because regulations in both state and federal waters were not in place at the start of the 2000 fishing year, spiny dogfish were landed in all months in 2000 with peak landings occurring during the months of January – March and June – August. In calendar year 2000, Massachusetts accounted for the largest share of the landings (27.3%), New Jersey (24.7%), North Carolina (16.8%), and New Hampshire (11.1%).

**Table 1. Spiny Dogfish Landings (pounds) for the Northwest Atlantic Ocean.**

<u>YEAR</u>	<u>CANADA</u>	<u>US COMM</u>	<u>US REC*</u>	<u>US TOTAL</u>	<u>USSR</u>	<u>OTHER</u>	<u>TOTAL (STOCK)</u>
1962	0	518,081	n/a	518,081	0	0	518,081
1963	0	1,344,806	n/a	1,344,806	0	2,205	1,347,011
1964	0	1,609,358	n/a	1,609,358	0	35,274	1,644,632
1965	19,841	1,075,845	n/a	1,075,845	41,465	22,046	1,159,197
1966	85,979	1,274,259	n/a	1,274,259	20,698,989	0	22,059,227
1967	0	612,879	n/a	612,879	5,370,406	0	5,983,285
1968	0	38,327	n/a	38,327	9,709,058	0	9,747,385
1969	0	249,120	n/a	249,120	19,460,004	800,270	20,509,394
1970	41,887	233,688	n/a	233,688	10,855,450	1,578,494	12,709,519
1971	8,818	160,936	n/a	160,936	23,814,089	1,684,314	25,668,157
1972	6,614	152,117	n/a	152,117	51,371,589	1,518,969	53,049,289
1973	44,092	196,209	n/a	196,209	31,347,207	10,083,840	41,671,348
1974	79,366	279,984	n/a	279,984	45,070,842	8,970,517	54,400,709
1975	2,205	324,076	n/a	324,076	49,230,923	423,283	49,980,487
1976	6,614	1,212,530	n/a	1,212,530	36,774,933	235,892	38,229,969
1977	2,205	2,052,483	n/a	2,052,483	15,304,333	566,582	17,925,603
1978	185,186	1,825,409	n/a	1,825,409	1,272,054	99,207	3,381,856
1979	2,934,323	10,597,512	n/a	10,597,512	231,483	180,777	13,944,095
1980	1,477,082	9,027,837	n/a	9,027,837	773,815	546,741	11,825,475
1981	1,243,394	15,282,287	3,284,837	18,567,124	1,137,574	1,009,707	21,957,799
1982	2,100,984	11,929,091	154,946	12,084,037	59,524	742,950	14,987,495
1983	0	10,795,926	147,565	10,943,491	791,451	231,483	11,966,425
1984	8,818	9,810,470	200,888	10,011,358	641,539	220,460	10,882,175
1985	28,660	8,880,129	196,174	9,076,303	1,529,992	701,063	11,336,018
1986	46,297	6,058,241	403,073	6,461,314	471,784	339,508	7,318,903
1987	617,288	5,959,034	673,514	6,632,548	255,734	50,706	7,556,276
1988	0	6,734,774	792,385	7,527,159	1,265,440	160,936	8,953,535
1989	370,440	9,903,020	921,481	10,824,501	372,577	191,800	11,759,318
1990	2,901,780	32,474,444	392,750	32,867,194	844,362	22,046	36,635,382
1991	674,730	29,049,112	287,892	29,337,004	480,603	35,274	30,527,611
1992	1,913,940	37,164,817	534,798	37,699,615	57,320	90,389	39,761,264
1993	3,168,585	46,771,518	263,373	47,034,891	0	0	50,203,476
1994	4,013,100	41,440,740	340,692	41,781,432	0	0	45,794,532
1995	2,110,185	47,592,585	148,665	47,741,250	0	0	49,851,435
1996	952,560	59,359,721	56,887	59,416,608	0	0	60,369,168
1997	983,430	45,034,113	146,295	45,180,408	0	0	46,163,838
1998	2,383,605	47,428,917	133,518	47,562,435	0	0	49,946,040
1999	5,441,940	33,862,195	119,378	33,981,573	0	0	39,423,513
2000	5,865,300	21,104,504	22,242	21,126,746	0	0	26,992,046
2001	8,279,775	5,067,090	61,765	5,128,855	0	0	13,408,630

\* Recreational landings come from MRFSS, catch (type A + B1) in numbers of fish multiplied by 5.5 lbs (an average weight from SAW-26).

Source: Unpublished NMFS Weighout Data, NMFS South Atlantic General Canvas Data, SAW-26, and Canadian Department of Fisheries and Oceans.

**Table 2. US East Coast Commercial Spiny Dogfish Landings (pounds) by State, 1988-2001.**

YEAR	STATE											Grand Total
	ME	NH	MA	RI	CT	NY	NJ	DE	MD	VA	NC	
1988	481,481	507	5,827,932	573	.	86,243	10,141	.	23,523	3,373	301,768	6,735,542
1989	4,879,563	.	4,924,581	4,475	904	48,280	22,575	.	3,549	19,092	.	9,903,020
1990	6,365,961	185,185	17,806,526	1,300,860	24,295	18,166	4,544,004	.	2,181,812	6,636	41,446	32,474,890
1991	2,016,160	.	14,488,889	3,160,229	8,796	77,271	2,715,631	5,710	4,939,242	173,964	1,463,221	29,049,112
1992	1,719,400	402,183	18,375,750	2,027,601	22,310	155,666	2,534,590	.	3,063,294	229,101	8,634,923	37,164,817
1993	3,524,780	1,641,601	26,830,776	1,924,272	14,947	95,392	769,996	.	1,795,899	1,367,791	8,806,064	46,771,518
1994	1,813,347	2,597,792	23,209,664	529,255	170,000	237,087	1,129,854	.	1,428,630	447,450	8,873,801	40,436,880
1995	1,663,568	2,106,255	28,636,503	572,914	293,532	933,723	2,379,972	62,900	3,117,403	651,012	7,174,803	47,592,585
1996	911,048	1,079,523	26,812,018	1,128,583	705,865	1,245,749	4,632,137	.	7,151,026	2,483,038	13,210,735	59,359,721
1997	448,660	1,008,785	21,664,398	1,015,395	347,381	488,724	3,950,032	.	4,227,432	4,274,881	7,608,426	45,034,113
1998	273,752	1,893,425	24,911,195	1,769,038	267,287	1,456,519	6,305,288	1,905	2,398,994	3,190,135	4,961,379	47,428,917
1999	34,811	1,238,493	14,915,041	1,337,600	87,924	1,452,710	3,924,618	414	2,134,023	5,017,933	3,718,628	33,862,195
2000*	7,661	2,334,498	5,761,654	305,702	30,131	1,901,906	5,222,164	235	449,696	1,544,689	3,549,939	21,108,274
2001*	257	382,502	3,912,481	394,019	7,677	66,652	17,149	13	116	126,242	373	4,907,481

\* Landings were constrained by the implementation of the Federal Spiny Dogfish FMP and the ASMFC Emergency Action.

Source: Unpublished NMFS Weighout Data and North Carolina Trip Ticket Program.

**Table 3. Spiny Dogfish Average Annual Commercial Landings (pounds) by State, 1988-2001.**

State	Landings	Percent
Maine	1,724,318	5.23%
New Hampshire	1,062,196	3.22%
Massachusetts	17,005,529	51.55%
Rhode Island	1,105,037	3.35%
Connecticut	141,503	0.43%
New York	590,292	1.79%
New Jersey	2,725,582	8.26%
Delaware	5,084	0.02%
Maryland	2,351,046	7.13%
Virginia	1,395,381	4.23%
North Carolina	4,881,822	14.80%
All States	32,987,790	100.00%

Source: Unpublished NMFS Weighout Data and North Carolina Trip Ticket Program.

## **NORTH CAROLINA FISHERY**

Spiny dogfish can be found along the entire North Carolina coast from November to April. North Carolina's spiny dogfish fishery began during the early 1990's when sink gill net fishermen who traditionally targeted bluefish (*Pomatomus saltatrix*), weakfish (*Cynoscion regalis*), and Atlantic croaker (*Micropogonias undulatus*) switched to harvesting dogfish (Gearhart 2000). The North Carolina spiny dogfish fishery started in November and lasted until April and primary ports for the fleet were Wanchese and Hatteras (Figure 6). Approximately 25 boats primarily targeted spiny dogfish out of Hatteras and Oregon Inlet in the mid 1990's, but less than 15 boats remained by 1999 (Hickman et al. 2000). Local fishermen who would occasionally target spiny dogfish focused their effort on other species while other fishermen left the ocean gill net fishery altogether (Gearhart 2000; Batsavage and Burns 2001).

The peak catches occurred in February and March, which coincided with the beginning of the annual northward migration of the species (Batsavage 2001). The majority of the spiny dogfish fishery occurred from Oregon Inlet to Ocracoke Inlet. Spiny dogfish fishing also took place from Cape Lookout to Bogue Inlet in February and March, but fishing effort for spiny dogfish was low west of Bogue Inlet to the South Carolina border, despite their common presence (Thorpe and Beresoff 2000). North of Cape Hatteras the fishery operated one to twenty miles offshore. South of Cape Hatteras the fishery took place primarily within state waters (Thorpe and Beresoff 2000).

Gill nets accounted for 95% of the annual harvest in North Carolina (Table 10) (Batsavage 2001). There were two different gill net fisheries, the anchored nets and the drop net fishery. The anchored gill nets are set in the late afternoon and usually retrieved the next day. Soak times for anchor nets were usually from 12 to 22 hours, but due to weather conditions, the nets may soak for 2-3 days because fishermen could retrieve them sooner (Gearhart 2000; Batsavage 2001). In the drop net fishery, schools of fish are located with sonar, then the nets are deployed over the school of fish and retrieved several hours later. Soak times for drop sets average only 3 hours (Gearhart 2000). The nets are weighted to prevent drifting. The mesh and twine ranges for the spiny dogfish ocean sink gill net fisheries are 5 – 6 ½ inches stretched mesh and 0.62 - 1.05 mm twine. Mesh sizes between 5 ½ and 6 inch were most commonly used in the spiny dogfish fishery, but vessels usually carry more than one mesh size net to fish for two or three different target species during a trip (Gearhart 2000).

From 1989-1993, the coastwide landings data indicated that 88-95% of spiny dogfish were harvested in federal waters (> 3 miles) (MAFMC and NEFMC 1998). In the mid-1990s, fishing effort shifted into state waters (< 3 miles) off North Carolina. In 1994, North Carolina began a trip ticket program to record the number of trips, landings, and location of the fishery (i.e. state v. federal waters) (Batsavage 2001). Most of the spiny dogfish fishery occurred within 5 miles from shore, so the concentration of effort was along

the state-federal water boundary (Gearhart 2000; Batsavage 2001). This made it feasible for a particular fishing trip to have nets set in both state and federal waters on the same day. Likewise, it is possible that trips taking place just beyond 3 miles may be classified as "state waters" on the trip tickets. Therefore, it is difficult to distinguish whether many of the trips targeting spiny dogfish occurred in state or federal waters.

Trends in landings were very similar to the effort trends for the same period. Annual landings of spiny dogfish from the ocean gill net fishery peaked in 1996 at approximately 12.7 million pounds (Table 11). Landings sharply decreased each of the following years to only 3.3 million pounds in 2000. Annual landings in state waters from 1995-2000 averaged about 3.4 million pounds compared to just over 3.0 million pounds in federal waters. The proportion of spiny dogfish landed in state waters increased from 47-50% in 1995 and 1996 to 56-58% from 1997-2000 and remained relatively stable. The catch per unit effort (CPUE) declined similarly to landings and effort except for a slight increase in 2000. Although more pounds of spiny dogfish were landed in state waters, CPUE was greater in federal waters. The average CPUE in federal waters was 5,160 pounds, compared to 3,835 pounds in state waters.

The number of non-target ocean gill net trips that incidentally landed spiny dogfish showed the same trend as the directed trips with the number of trips peaking in 1996 and steadily declining during the following years (Table 12). From 1995-2000, 55% of the non-target trips landing spiny dogfish occurred in state waters. The proportion of trips incidentally landing spiny dogfish in state waters decreased from 51-48% in 1995 and 1996 to 58-60% from 1997-1999; only 50% of these non-target trips with spiny dogfish were in state waters in 2000.

Trends in landings exhibited a similar pattern between state and federal waters as the trips. The average landings of spiny dogfish caught as a bycatch in the ocean gill net fishery was approximately even between state and federal waters. Overall landings generally showed a slow declining trend from 1996-1999 with a slight increase in 2000. Incidental landings in state waters peaked in 1997 with over 97,000 pounds harvested. Incidental landings in federal waters peaked in 1996 at over 108,000 pounds and declined to less than 56,000 pounds in 1999. However, landings increased to over 91,000 pounds in 2000. From 1995-2000, the CPUE was higher in federal waters than state waters.

The overall CPUE from 1995-1999 also showed a slow declining trend with an increase of over 100 pounds per trip from 1999 to 2000. Although landings of incidentally caught spiny dogfish showed similar trends as the directed fishery, the mesh sizes and locations of the other fisheries limited these landings. Ocean gill net landings of Atlantic croaker (*Micropogonias undulatus*) and weakfish (*Cynoscion regalis*) were concentrated in the same area as directed spiny dogfish landings. However, the mesh sizes (3-4.5 in stretch mesh) used to target these species are smaller than the mesh sizes (5.5-6.5 in) used to target spiny dogfish (Gearhart 2000; Hickman et al. 2000; Newman et al. 2000; Batsavage and Burns 2001). Therefore, the spiny dogfish caught were generally smaller and fewer were caught per trip. The ocean gill net fishery for large bluefish (*Pomatomus saltatrix*) uses identical mesh sizes as the spiny dogfish fishery and occasionally possessed a significant amount of spiny dogfish in their catches. But much of the fishing effort occurred over 30 miles offshore of Oregon Inlet where spiny dogfish are not always present.

## **SOCIAL AND ECONOMIC CHARACTERIZATION OF THE FISHERY**

In order to reduce some of the fishing pressure on collapsed groundfish stocks, efforts were made in the late 1980's to create and promote markets for spiny dogfish, and to develop a directed spiny dogfish fishery. As a result, landings and ex-vessel values of spiny dogfish increased substantially throughout the early- and mid-1990's. Ex-vessel values increased from \$483,000 in 1988 and peaked at \$10,921,000 in 1996 before declining to \$4,383,000 in 2000. Implementation of a federal quota in May 2000 and subsequent ASMFC Emergency Action in August 2000 contributed to the reduced landings and ex-vessel value in 2000.

Average ex-vessel price fluctuated with an increasing trend throughout the late 1980's and into the mid-1990's, increasing from \$.07 per pound in 1988 to \$.19 per pound in 1995. After a slight decrease in price per pound in the late 1990's, average ex-vessel price reached a peak of \$.23 per pound in 2001. Presumably this increase was a result of reduced supply owing to the quota restriction. Massachusetts has dominated spiny dogfish landings and ex-vessel value coast-wide since 1988, followed by North Carolina and Maryland with additional significant contributions by Maine in the late 1980's, New Jersey in the 1990's, Virginia in the late 1990's, and New Hampshire in 2000.

## **PROCESSING SECTOR**

The processing sector was founded in New Bedford, MA. Processing of spiny dogfish must occur within 48 hours of harvest in order to maintain the quality of the product. Spiny dogfish processing requires skilled laborers and specialized equipment, and must maintain a critical volume in order to be profitable. Most processors of other species can not occasionally supplement with spiny dogfish. Some smaller spiny dogfish processors in Virginia, for example, were forced to close or diversify beginning in 2000 due to the restricted harvests. Consequently, spiny dogfish harvested south of Massachusetts are trucked to New Bedford for processing. During the peak harvest years, processors in New Bedford employed hundreds of laborers and deployed dozens of trucks to southern states to pick up spiny dogfish. Today, US spiny dogfish processing is limited to New Bedford, MA, and Portsmouth, NH.

## **FALL 2006 - WINTER 2007 MANAGEMENT ACTIONS AND FISHERY**

### **Atlantic States Marine Fisheries Commission (ASMFC) Actions**

All commercial landings count toward the ASMFC quota, regardless of where the fish are harvested, this also applies to the federal quota. Overages of the ASMFC quota are deducted from the corresponding period the following year. The federal FMP contains no provision for payback of quota overages.

The ASMFC quotas and trip limits were the same as the federal management measures (4 million pound annual quota and 300/600 pound trip limits) from May 2003 until October 2006.

In October 2006, the ASMFC increased the quota to 6 million pounds for the 2006/2007 and the 2007/2008 fishing years. No trip limit was specified for the remainder of the 2006/2007 fishing year. The ASMFC quota was projected to be totally harvested on February ??, 2007 and all states were required to close their fisheries. The Division closed the spiny dogfish season effective February ??, 2007 by Proclamation FF-??-2007.

For the 2007/2008 fishing year, states were give the option of establishing trip limits up to 3,000 pounds.

North Carolina and Virginia established 3,000 pound state waters trip limits for the 2007/2008 fishing year.

### **National Marine Fisheries Service (NMFS) Actions**

NMFS Spiny Dogfish Coastwide Weekly Landings Report For Week Ending April 28, 2007.

The report provides state by state landings for the 2006/2007 fishing year.

North Carolina spiny dogfish landings for the fishing year were 128,543 pounds.

Virginia landings for the fishing year were 1,952,566 pounds.

During the period 1988-2001, North Carolina average spiny dogfish landings were 4,881,822 pounds and Virginia landings averaged 1,395,381 pounds (Table 3).

Why is there such a great discrepancy between North Carolina and Virginia landings for the 2006/2007 fishing year and previous years? There was no demand for NC harvested spiny dogfish as a result of a combination of the following:

Although ASMFC increased the quota for the 2006/2007 fishing year to 6 million pounds, and some of the quota should have been available to NC fishermen, this did not happen because the FMPs do not allocate shares of the spiny dogfish quota to individual states.

Above average water temperatures during late fall delayed the arrival of migration of spiny dogfish in NC waters by approximately six weeks.

Virginia gill net fishermen targeted spiny dogfish, which were plentiful in state waters.

Working under a 4,000 pound trip limit, Virginia fishermen were able to harvest more than enough spiny dogfish to meet the needs of the two New England processors. The processors advised fishermen, dealers and the Division that they intended to purchase spiny dogfish from North Carolina fishermen, however few fish were purchased from our fishermen.

High fuel costs and the additional distance from the processing sector increased the price of shipping spiny dogfish to New England to the point that it was not profitable for the processors to use spiny dogfish harvested from NC waters.

In summary, North Carolina spiny dogfish landings were much lower than expected during the 2006/2007 fishing year because of a lack of a market for the product.

02/03	- 4
03/05	4
<del>06/05</del>	- 6
7/8	- 6
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20,000,000	

**Table 11. Number of trips targeting spiny dogfish and pounds landed in state and federal waters statewide, North of Cape Hatteras, and South of Cape Hatteras. Percentages of trips and pounds landed in state and federal waters in parentheses.**

Year	State waters			Federal waters			Overall		
	Trips	Pounds	CPUE (lbs./trip)	Trips	Pounds	CPUE (lbs./trip)	Trips	Pounds	CPUE (lbs./trip)
1995	694 (53%)	3,336,329 (47%)	4,807.40	612 (47%)	3,703,346 (53%)	6,051.20	1,306	7,039,675	5,390.30
1996	1,268 (55%)	6,350,268 (50%)	5,008.10	1,020 (45%)	6,371,853 (50%)	6,246.90	2,288	12,722,121	5,560.40
1997	1,178 (66%)	4,212,492 (58%)	3,576.00	616 (34%)	3,093,128 (42%)	5,021.30	1,794	7,305,620	4,072.30
1998	777 (64%)	2,589,465 (56%)	3,332.60	433 (36%)	2,059,320 (44%)	4,755.90	1,210	4,648,785	3,842.00
1999	626 (62%)	1,945,896 (56%)	3,108.50	378 (38%)	1,510,094 (44%)	3,995.00	1,004	3,455,990	3,442.20
2000	588 (66%)	1,868,113 (56%)	3,177.10	301 (34%)	1,471,544 (44%)	4,888.90	889	3,339,657	3,756.60
2001	0 (0%)	0 (0%)	0.0	0 (0%)	0 (0%)	0.0	0	0	0.0
<b>95-'00 Average</b>	855 (60%)	3,383,760 (53%)	3,835.0	560 (40%)	3,034,881 (47%)	5,159.9	1,415	6,418,641	4,344

Source: North Carolina Trip Ticket Data.

Table 12. Number of non-target trips that harvested spiny dogfish and pounds landed in state and federal waters statewide, North of Cape Hatteras, and South of Cape Hatteras. Percentages of trips and pounds landed in parentheses.

Year	State Waters			Federal Waters			Overall		
	Trips	Pounds	CPUE (lbs./trip)	Trips	Pounds	CPUE (lbs./trip)	Trips	Pounds	CPUE (lbs./trip)
1995	83 (51%)	15,261 (44%)	183.9	79 (49%)	19,258 (56%)	243.8	162	34,519	213.1
1996	258 (48%)	78,692 (42%)	305.0	275 (52%)	108,258 (58%)	393.7	533	186,950	350.8
1997	304 (58%)	97,661 (54%)	321.3	217 (42%)	83,909 (46%)	386.6	521	181,570	348.5
1998	274 (60%)	85,712 (56%)	312.8	186 (40%)	66,472 (44%)	357.4	460	152,184	330.8
1999	258 (60%)	78,510 (58%)	293.8	175 (40%)	55,590 (42%)	317.7	433	134,100	303.5
2000	189 (50%)	72,875 (44%)	385.6	187 (50%)	91,411 (56%)	488.8	376	164,286	436.9
2001	2 (67%)	360 (97%)	180.0	1 (33%)	13 (3%)	13.0	3	373	124.3
<b>95-'00 Average</b>	228 (55%)	71,452 (50%)	300.4	187 (45%)	70,816 (50%)	365	414	142,268	330.6

Source: North Carolina Trip Ticket Data.