ASSESSMENT OF NORTH CAROLINA COMMERCIAL FINFISHERIES, 2004-2007

By

North Carolina Division of Marine Fisheries

North Carolina Department of Environment
and Natural Resources

Division of Marine Fisheries
P.O. Box 769
Morehead City, NC 28557

Final Performance Report for Award Number NA 04 NMF4070216

December 2007

This project was conducted under Title III of the Interjurisdictional Fisheries Act and Funded, in part, by the U.S. Department of Commerce, National Marine Fisheries Service, under Grant Number NA 04 NMF4070216

TABLE OF CONTENTS

Fishery Section 4: Sink Net Fishery Assessment (Job 3)

Fishery Section 5: Flounder Pound Net Fishery Assessment (Job 4)

Fishery Section 6: Estuarine Gill Net Fishery Assessment (Job 5)

Species Section 7: Species Summarization

ASSESSMENT OF NORTH CAROLINA COMMERCIAL FINFISHERIES

Final Performance Report for Award Number NA04NMF4070216

September 2007

FISHERY SECTION 1

LONG HAUL SEINE FISHERY ASSESSMENT

JOB 1

by

Eric Fitzpatrick

ABSTRACT

The North Carolina long haul/swipe seine fishery is active throughout much of the estuarine waters of North Carolina from March-April until early November. Data from the 2004 through 2006 fishing seasons were collected and examined to determine species and size composition of the catches, catch size and proportion by species, and species composition of the bait or scrap component from catches. Target species included: Atlantic *croaker (Micropogonias undulatus*), spot (*Leiostomus xanthurus*), weakfish (*Cynoscion regalis*), and bluefish (*Pomatomus saltatrix*). A total of 37 (2004), 49 (2005), and 52 (2006) samples were collected from culled catches. Average combined CPUEs from samples taken at the fish house were 2,682 kgs/trip (2004), 1,936 kgs/trip (2005) and 1,898 kgs/trip (2006). Atlantic croaker, spot, weakfish, and occasionally bluefish and spotted sea trout (*Cynoscion nebulosus*) dominated the marketable portion of the catches each year. The long haul seine fishery contributed 1.4% to the state edible finfish landings. Percent contributions of scrapfish to the total long haul landings were 37.4%, 33.9%, and 34.6% for 2004, 2005, and 2006. The unmarketable quantity of edible finfish in the scrapfish component of long haul catches continues to be a management issue.

INTRODUCTION

In 1982, the North Carolina Division of Marine Fisheries (NCDMF) initiated a statewide sampling program for the dominant commercial finfisheries. The objective was to obtain biological and fisheries data on economically important fishes for use in management evaluations. This study, covering the 2004-2006 long haul seine fishing seasons, is a component of the statewide program. Landings mean catch weights, species composition, and bycatch quantities are presented. Species-specific information, such as size and CPUE trends, is presented in the Species Section of this report.

The North Carolina long haul seine fishery (including swipe nets) operates throughout much of estuarine North Carolina from Bogue Sound to northern Pamlico Sound and in most tributaries of Pamlico and Core sounds (Figure 1.1). The long haul seine (~1,000-1,500 yds) is towed between two boats. After pulling a distance, the boats come together to circle the net. The net is enclosed (bunted) and the fish removed. The whole operation of setting, pulling, and bunting the net often takes a full day, with fishing often beginning before sunrise; rarely are two hauls made on one day. Guthrie et al. (1973) and Cunningham et al. (1992) describe the long haul operation in detail. There appears to be a recent change in fishing behavior where fishermen use a monofilament gill net as a swipe net. As early as 1992 a change in fishing behavior was noted throughout the state. This is not a traditional haul seine but the data from these swipe gill nets does appear in the commercial landing data with the same codes as the traditional long hauls. This trend is most apparent in the northern area of the state during the winter (December-February) and is used to take anadromous species, as well as perch and catfish. It is most likely a response to the restrictions in place that require attendance and mesh sizes for gill nets in that area. These catches may occur during other times of the year (spring/summer) in other state waters.

The fishing season is March-April through early November, and the principal target species are Atlantic croaker (*Micropogonias undulatus*), spot (*Leiostomus xanthurus*), and weakfish (*Cynoscion regalis*), and occasionally bluefish (*Pomatomus saltatrix*) and spotted sea trout (*Cynoscion nebulosus*). The long haul fishery operating in Pamlico Sound has two major areas of activity, one in northern Pamlico Sound and the other in southern Pamlico Sound. These areas are divided geographically by Bluff Shoal, a 2.7 - 3.4 m deep shoal that bisects the Sound north to south and is surrounded by water 5.2 - 6.4 m deep (Figure 1.1). The two deep basins of Pamlico Sound on either side of Bluff Shoal have differences in species and size composition of their fish populations (Ross and Moye 1989).

The greatest concentration of fishing crews occurs in northern Pamlico Sound, behind the Outer Banks from Hatteras to Oregon Inlet and Roanoke Sound. During 2004 - 2006, three to eight crews worked during April-September in this area. A second center of long-hauling activity is in southern Pamlico Sound and Core Sound. Three to five crews based in Atlantic, Sea Level, Davis, and Cedar Island fish this area from April through early November. Historically, a crew worked out of Hobucken, NC (Pamlico County), but ceased fishing in 2003 due principally to net damage caused by cownose rays and difficulties in securing reliable crewmembers. The number of crews participating at any given time depends on the availability of finfish and market conditions. During 2004-2006 13 unique crews participated. There has been a marked decline in the number of crews during the entire study period (10-23 crews from 1988 - 1990, 5-15 crews from 1990 - 1993 and 2-7 crews from 2000 - 2002) (NCDMF 1992, NCDMF 1993, NCDMF 2002).

METHODS AND MATERIALS

During the fishing season, long haul catches were sampled at the fish house where the catch was landed. Samples could be dispersed between unculled and culled catches (sorted by market category), but only culled samples were taken during this period. For each commercially important (market) species, as many random samples (usually 23 kgs cartons) as possible were obtained from each market category. More cartons of the larger grades were sampled since they contained fewer fish. All fishes in a sample were identified and measured (FL or TL; mm). Additional organisms in the catch were noted. Total weight of the sample, as well as individual species component weights, was recorded. The total weights of the sampled catches and component species were obtained from the fishermen or fish dealers, generally by copying the trip tickets. The crew or vessel's captain provided information on area fished and types of gear used.

Sampling of bait or scrapfish was initiated in 1986. Scrapfish or bait were defined as those species not marketed for human consumption and that are either sold for bait or other uses, or discarded. Scrapfish were sampled by taking at least one-half fish basket samples (~12 kgs) of the scrapfish from each catch. Samples of scrapfish were sorted and weighed (kgs) by species, and all individuals measured to the nearest millimeter (TL or FL). If a particular species was too numerous, a random subsample of at least 30 individuals was measured, and the remaining fish counted. The total weight of the scrapfish was obtained, preferably from the trip ticket, and if not, it was estimated. Regulatory discards (sizes that must be discarded, whether dead or alive, because of legal restrictions) were also sampled according to these basic scrapfish sampling procedures.

Landings refer to commercial landings (kgs) data collected through the NCDMF mandatory dealer trip ticket reporting program, which was implemented in 1994. Landings prior to 1994 were obtained through the NCDMF and the National Marine Fisheries Service Cooperative Fisheries Statistics Program. Commercial landings data were partitioned by grouping county landings of long haul catches (including swipe nets) as follows:

North of Bluff Shoal: Dare and Hyde (April-August) counties;
South of Bluff Shoal: Hyde (September-October), Carteret, Craven, Pamlico, and Beaufort counties.

The seasonal splitting of Hyde County landings both north and south of Bluff Shoal was based on predominant fishing patterns of the fleet during the study period. Average catches and landings are discussed throughout the report. Average catch/trip (CPUE; kgs) is defined as the mean total catch or total catch/species of a trip. A trip consists of one haul made during a one-day trip. In order to better represent the catch and effort for a "traditional" haul seine only April through November were selected to create the data in Table 1.1b.

The quantity (weight or numbers) of scrapfish (total or by species) landed by the fishery was determined by applying the seasonal (4 month periods) weight ratio of marketable fish to scrapfish in the fish house samples to the reported seasonal marketable landings from the commercial statistics program. The estimated scrapfish (bait) quantity is for landed scrapfish and does not account for discards at sea. The reported commercial landings of scrapfish (unclassified for bait or industrial purposes) from the commercial statistics program were not used because of non-reporting of these landings by fish dealers. This ratio method of estimating scrapfish assumes marketable fish are accurately collected by the commercial statistics program.

RESULTS AND DISCUSSION

Seasonality and Total Catch

Results are presented using data from April through November for the years 2004-2006, 138 long haul seine catches were sampled, with 97 catches from north of Bluff Shoal and 41 catches from south of Bluff Shoal (Table 1.1a). Catches were sampled throughout the fishing season, generally May through October. Total catch weights ranged from 17.7 to 18,399.5 kgs/trip, with annual mean catches per trip of 2,681.5 kgs (2004), 1,936.1 kgs (2005) and 1,898.0 kgs (2006). Average CPUE obtained from biological samples for the three-year study period (2,373 kgs/trip) was 6% less than the average for the previous 16 years (2,530 kgs/trip). Catch per trip information from the NC Trip Ticket Program varied greatly from CPUEs obtained from fish house samples and also displayed an overall decrease in catch from 2004 to 2006 (Tables 1.1a-b). The NC Trip Ticket Program average catch per trip during the study period (169.8 kgs) was 85.8% lower than the average for the previous 13 years (1195.7 kgs) (1994-2006). This is most likely the result of the use of monofilament gill nets as a swipe net, which accounted for 20 – 30 % of the reported long haul landings during this reporting period, but could also be a result of fewer trips per year (compared to 1990s)

The long haul seine fishery contribution to the annual state marketable finfish landings (weight) was 1.4% (2004), 1.4% (2005), and 1.5% (2006). Annual landings (metric tons) and value (dollars) are shown in Table 1.2 for 2004-2006.

Annual landings (metric tons) and value (dollars) have generally declined since 1987 (Table 1.2). Total landings by the long haul seine fishery decreased 87% from 1990 to 2006 (5,675 kgs; 719 kgs), and marketable landings decreased 88% from 1990 to 2006 (3,743 kgs; 465 kgs) (Figure 1.2 and Table 1.2). While landings of marketable fish generally continue to decline through 2006, increased total landings in some years are largely attributable to increased catches of bait. Catch per unit effort also declined during the sampling period (2,373 kgs/trip), but just below the average from 1987-2006 (2,507 kgs/trip) (Figure 1.2).

Species Composition

Eight species, Atlantic croaker, Atlantic menhaden (*Brevoortia tyrannus*), bluefish, pigfish (*Orthopristis chrysoptera*), pinfish (*Lagodon rhomboides*), spot, spotted sea trout, and weakfish, accounted for 95% or more (weight and number) of the sampled catches. Target species accounted for the majority of the long haul seine landings

(Table 1.3). Species composition by year is shown in Tables 1.4a-1.4d. Long haul seine sampling indicates an overall decline for target marketable species, while spotted sea trout increased for 2006. Coupled with commercial landings, long haul seine data can help identify species-specific shifts in harvest trends (ex. spotted sea trout (2006)).

Spot represented 54.1 – 58.6% of the annual long haul seine landings in North Carolina from 2004 to 2006. Spot was ranked second in species captured in long haul seines in 2006. There was a 24.6% decrease in spot landings in long haul seine in 2006 from the 6-year average.

Atlantic croaker represented 2.5 – 3.5% of the annual long haul seine landings in North Carolina from 2004 to 2006. Atlantic croaker was ranked third in species captured in long haul seines in 2006. There was a 23.2% decrease in Atlantic croaker landings in long haul seine in 2006 from the 6-year average.

Bluefish represented 3.7 – 5.9% of the annual long haul seine landings in North Carolina from 2004 to 2006. Bluefish were ranked fourth in species captured in long haul seines in 2006. There was an 18.2% increase in bluefish landings in long haul seine in 2006 from the 6-year average.

Atlantic menhaden represented 3.9 – 15.5% of the annual long haul seine landings in North Carolina from 2004 to 2006. Atlantic menhaden were ranked fifth in species captured in long haul seines in 2006. There was a 70.5% decrease in Atlantic menhaden landings in long haul seine in 2006 from the 6-year average.

Weakfish represented 7.1 – 15.7% of the annual long haul seine landings in North Carolina from 2004 to 2006. Weakfish were ranked seventh in species captured in long haul seines in 2006. There was a dramatic (124.5%) decrease in weakfish landings in long haul seine in 2006 from the 6-year average.

Spotted sea trout represented 1.3 – 4.8% of the annual long haul seine landings in North Carolina from 2004 to 2006. Spotted sea trout were ranked eighth in species captured in long haul seines statewide in 2006. There was a 50.7% increase in spotted sea trout landings in long haul seine in 2006 from the 6-year average. Pinfish and pigfish ranked second and sixth by weight and number in long haul catches in North Carolina, but are considered non-target species and therefore not described in Table 1.3 (NCDMF 2004).

Scrapfish (bait)

The proportion of scrapfish in the catches ranged from 0% to 99.8%, with annual mean percentages by weight of 37.4% (2004), 33.9% (2005), and 34.6% (2006). (Table 1.5). These values are consistent with results from previous years. As noted in earlier reports (NCDMF 1997, NCDMF 1992), scrapfish proportions were generally highest in the southern area during the months of July and August.

Reported scrapfish (bait) landings from the trip ticket program continue to be under-reported when compared to estimates from the fish house sampling program. Estimates of scrapfish landings (weight), based on the weight ratio of market to bait in fish house samples, are shown in Table 1.2. These values were consistently higher than the reported bait landings (Table 1.3) from the commercial statistics program. Using these estimated scrapfish values (2004 - 2006), total long haul seine landings and CPUE (market plus bait) are shown in Figure 1.2. The bait contribution to long haul landings was fairly constant from 2004 - 2006 (Table 1.5).

The dominant species in the scrapfish each year were Atlantic croaker, spot, Atlantic menhaden, and pinfish, accounting for nearly 90% of the sampled scrapfish catches by weight and number (Tables 1.6 a-c).

Management Issues

A major management concern raised about the long haul seine fishery involves the harvest of small edible species in the bait component of the fishery. Management options which could be considered to minimize this harvest are: 1) seasonal closure during spring and early summer, when scrapfish proportions are highest; 2) closure in those areas with the highest scrapfish proportions (Core Sound secondary nursery areas); 3) closure of secondary nursery areas to long hauling but allow smaller swipe nets which do not catch the volume of fish that long hauls do; and 4) gear modifications that allow for the escapement of scrapfish. The NCDMF worked cooperatively with long haul crews in Core and Pamlico sounds to develop escape panels for long haul seines. Initial work resulted in the testing and voluntary use of a 1 9/16 inch mesh panel that effectively allows escapement of varying proportions (up to 60%) of unmarketable fish (by size). A rule (15A NCAC 03J .0109) was adopted, effective April 1999, that required the use of the escape panel south of Bluff Shoal. This rule was modified by the MFC in August 2003 to be more specific regarding escape panel use and installation. The overall quantity of the bait appears to have been reduced, even though the bait's relative contribution to the overall long haul landings has remained in the 30%-40% range. Continued outreach to the fishing industry concerning the need to minimize bycatch is needed to maximize the effectiveness of the escape panel rule.

Another ongoing debate concerning the long haul fishery deals with the difference in minimum sizes for weakfish between this fishery (10") and that for the recreational fishermen (12"). In 1996, the size limit of weakfish was raised to 12 inches for recreational fishermen and most commercial fisheries, except for the long haul seine and sciaenid pound net fisheries during April through November 15 as a compliance measure to Amendment 3 to the Atlantic States Marine Fisheries Commission (ASMFC) weakfish Fishery Management Plan (FMP). All the measures required in North Carolina allowed the state to meet the ASMFC mandated reductions in harvest. The commercial sector share came principally from the closure of the ocean waters south of Cape Hatteras to flynets, while the recreational sector had a reduced creel and increase in minimum size (12 in). However, the perception of inequality between the sectors is understandable, given the two different minimum size limits. The MFC responded to a petition in 2001 that requested that these fisheries' exemption to the 12-inch size limit be eliminated. Upon analysis of data gathered through the "Assessment of North Carolina Commercial Finfisheries" program it was determined that under existing restrictions the reduction in harvest numbers from 1991 to 2000 of age-0 and age-1 weakfish was 97%. Also the number of older age classes sampled in the fishery had increased. The number of crews and effort in the fishery was generally declining and there were limited areas in which the seines could be pulled. Based on the analysis presented the petitioner withdrew the request. The recreational sector continues to cite the difference in minimum sizes as unfair to the recreational fishermen.

Long haul gear is often deployed in submerged aquatic vegetation (SAV) grass bed along the sound side of the Outer Banks. The MFC, through the adoption of the Coastal Habitat Protection Plan (CHPP), included SAV as one of the six important fishery habitats that require protection or enhancement. The CHPP recommends undertaking additional studies to determine the impact of long hauling in these areas. The CHPP cites potential damage coming from the heavily leaded bottom line, as well as boat motor propellers scarring.

There is an increasing use of gill nets that are deployed like a seine. This gear is not a "traditional" long haul. However, the catch from this gear is being coded as such in the Division trip ticket database. Stock assessment biologists will have to account for this catch and determine which of the Division's fishery dependent samples most likely describe the species composition and biological characteristics. The data presented herein are not representative of this newer method. This swipe gill net data could be parsed out from the trip ticket program by using either fishermen identification or, as done to some extent in Table 1.1b, by excluding certain waters and or months. The Division will need to develop a protocol within the estuarine gill net fish house program to distinguish and target biological samples from this hybrid fishery.

LITERATURE CITED

Cunningham, P.R. Curry, R. Pratt, S. Stichter, K. West, L. Mercer, P. Phalen, S. Sherman, B. Burns, and S. Winslow. 1992. Watershed planning in the Albemarle-Pamlico Estuarine System. Report 5--Fishing Practices. Albemarle-Pamlico Estuarine Study, Raleigh, N.C., U.S. Env. Protection Agency and NC Dept. Environ. Health, Nat. Res., Rep. No. 92-05, 227 p.

Guthrie, J.F., R.L. Kroger, H.R. Gordy, and C.W. Lewis. 1973. The long haul fishery of North Carolina. Mar. Fish. Rev. 10254: 27-33.

North Carolina Division of Marine Fisheries. 1992. Assessment of North Carolina Commercial Finfisheries. Compl. Rep. NC Dept. Environ., Health, Nat. Resour., Div. Mar. Fish.

North Carolina Division of Marine Fisheries. 1993. Description of North Carolina's Coastal Fishery Resources. NC Dept. Environ., Health, Nat. Resour., Div. Mar. Fish.

North Carolina Division of Marine Fisheries. 2004. Assessment of North Carolina Commercial Finfisheries. Compl. Rep. Proj. NA 03 NMF4070160, NC Dept. Environ., Health, Nat. Resour., Div. Mar. Fish.

North Carolina Division of Marine Fisheries. 1997. Assessment of North Carolina Commercial Finfisheries. Compl. Rep. Proj. 2-IJ-16, NC Dept. Environ., Health, Nat. Resour., Div. Mar. Fish., 456 p.

North Carolina Division of Marine Fisheries. 1992. Assessment of North Carolina Commercial Finfisheries. Compl. Rep. Proj. 2-IJ-16, NC Dept. Environ., Health, Nat. Resour., Div. Mar. Fish.

Ross, J.L., and D.W. Moye.1989. Assessment of North Carolina commercial finfisheries. NC Dept. Nat. Resour. and Community Develop., Div. Mar. Fish. Compl. Rep. Proj. 2-419-R, 293 p.

Table 1.1.a. Monthly summary of long haul seine catches north and south of Bluff shoal, and combined areas of Pamlico Sound from 2004 through 2006; n=number of catches sampled.

				Catch weight (kgs/trip)		Sample weight (kgs/trip)	
Year	Month	AREA	n	Mean	Range	Mean	Range
2004	Apr	North	1	2,239.3	2,239.3 - 2,239.3	97.9	97.9 - 97.9
		South	2	700.5	556.7 - 844.2	55.1	42.3 - 68.0
		Combined	3	1,213.4	556.7 - 2,239.3	69.4	42.3 - 97.9
	May	North	1	1,337.6	1,337.6 - 1,337.6	83.7	83.7 - 83.7
		South	2	2,140.5	365.1 - 3,915.8	72.8	66.2 - 79.3
		Combined	3	1,872.8	365.1 - 3,915.8	76.4	66.2 - 83.7
	Jun	North	5	5,439.0	1,711.4 - 10,397.2	136.3	106.8 - 155.1
		South	2	2,826.5	1,641.8 - 4,011.2	127.6	106.7 - 148.5
		Combined	7	4,692.6	1,641.8 - 10,397.2	133.8	106.7 - 155.1
	Jul	North	7	1,327.2	97.6 - 2,534.2	90.5	34.2 - 144.9
		South	2	3,316.8	2,718.5 - 3,915.1	103.8	96.2 - 111.3
		Combined	9	1,769.4	97.6 - 3,915.1	93.5	34.2 - 144.9
	Aug	North	5	1,655.0	183 - 2,331.4	96.2	5.0 - 127.1
		South	2	1,730.2	751.5 - 2,708.8	106.5	76.3 - 136.7
		Combined	7	1,676.4	183 - 2,708.8	99.1	51.0 - 136.7
	Sep	North	1	132.3	132.3 - 132.3	34.8	34.8 - 34.8
		South	4	3,031.8	2,405.5 - 3,313.7	139.2	117.2 - 160.6
		Combined	5	2,451.9	132.3-3,313.7	118.3	34.8 - 160.6
	Oct	North	-	-	-	-	-
		South	2	8,166.5	2,584.4 - 13,748.6	71.1	65.1 - 77.1
		Combined	2	8,166.5	2,584.4 - 13,748.6	71.1	65.1 - 77.1
	Nov	North	1	856.1	856.1- 856.1	179.1	179.1 - 179.1
		South	-	-	-	-	-
		Combined	1	856.1	856.1 - 856.1	179.1	179.1 - 179.1
2005	Apr	North	2	621.4	382.4 - 860.5	84.5	76.5 - 92.4
		South	1	1,367.9	1,367.9 - 1,367.9	106.6	106.6 - 106.6
		Combined	3	870.3	382.4 - 1,367.9	91.8	76.5 - 106.6
	May	North	6	2,862.0	522.7 - 9,857.9	79.8	26 - 110.2
		South	1	631.1	631.1- 631.1	51.3	51.3 - 51.3
		Combined	7	2,543.3	522.7 - 9,857.9	75.7	26 - 110.2
	Jun	North	9	1,891.2	243.5 - 5,184.3	68.8	23.2 - 117.7
		South	3	1,592.0	1,023.1 - 2,568	98.2	70.8 - 119.3
		Combined	12	1,816.4	243.5 - 5,184.3	76.2	23.2 - 119.3

Table 1.1a. (Continued)

Year	Month	AREA	n	Catch weight (kgs/trip) Mean	Range	Sample weight (kgs/trip) Mean	Range
	Jul	North	5	2,675.3	1,112.6 - 4,731.9	104.5	63.9 - 155.9
		South	2	2,999.3	2,619.5 - 3,379.1	98.1	68.3 - 127.8
		Combined	7	2,767.9	1,112.6 - 4,731.9	102.7	63.9 - 155.9
	Aug	North	6	823.3	128.3 - 1,825.2	83.2	22.7 - 172.3
		South	4	1,606.8	105.3 - 2,888.2	96.2	50.1 - 179.4
		Combined	10	1,136.7	105.3 - 2,888.2	88.4	22.7 - 179.4
	Sep	North	1	5,215.9	5,215.9 - 5,215.9	217.4	217.4 - 217.4
		South	-	-	-	-	-
		Combined	1	5,215.9	5,215.9 - 5,215.9	217.4	217.4 - 217.4
	Oct	North	6	1,675.8	189.5 - 3,310.5	95.8	57.4 - 129.7
		South	1	5,606.5	5,606.5 - 5,606.5	113.6	113.6 - 113.6
		Combined	7	2,237.4	189.5 - 5,606.5	98.3	57.4 - 129.7
	Nov	North	2	520.2	405 - 635.5	57.7	22.7 - 92 .6
		South	-	-	-	-	-
		Combined	2	520.2	405 - 635.5	57.7	22.7 - 92.6
2006	Apr	North	1	1,282.3	1,282.3 - 1,282.3	71.9	71.9 - 71.9
		South	-	-	-	-	-
		Combined	1	1,282.3	1,282.3 - 1,282.3	71.9	71.9 - 71.9
	May	North	4	2,862.5	260.6 - 6,996.2	76.3	32.2 - 159.2
		South	3	1,356.4	996.4 - 1,610.2	85.8	56 - 121.1
		Combined	7	2,217.0	260.6 - 6,996.2	80.4	32.2 - 159.2
	Jun	North	7	1,440.2	90.8 - 3,026.8	91.8	15.7 - 207.1
		South	2	1,157.3	704.4 - 1,610.1	114.7	72.4 - 157
		Combined	9	1,377.3	90.8 - 3,026.8	96.9	15.7 - 207.1
	Jul	North	7	1,077.2	68.1 - 1,413.3	100.4	61 - 158.9
		South	1	1,711.9	1711.9 - 1,711.9	187.9	187.9 - 187.9
		Combined	8	1,156.5	68.1 - 1,711.9	111.3	61 - 187.9
	Aug	North	8	1,248.8	319 - 2,682.3	99.3	39.6 - 242.4
		South	3	1,146.0	372.2 - 2,472.5	108.6	71.5 - 159.7
		Combined	11	1,220.8	319 - 2,682.3	101.8	39.6 - 242.4
	Sep	North	6	2,098.2	865.6 - 4,234.5	165.5	60.5 - 270.1
		South	1	1,739.8	1739.8 - 1,739.8	118.3	118.3 - 118.3
		Combined	7	2,047.0	865.6 - 4,234.5	158.8	60.5 - 270.1
	Oct	North	4	1,161.1	91.7 - 2,481.9	127.1	72.7 - 245.5
		South	3	9,217.7	3736.3 - 18,399.5	113.8	58.2 - 210.8
		Combined	7	4,613.9	91.7 - 18,399.5	121.4	58.2 - 245.5

Table 1.1.a. (Continued)

Year	Month	AREA	n	Catch weight (kgs/trip) Mean	Range	Sample weight (kgs/trip) Mean	Range
2006	Nov	North	2	94.7	17.7 - 171.7	59.3	17.7 - 100.9
		South	-	-	-	-	-
		Combined	2	94.7	17.7 - 171.7	59.3	17.7 - 100.9
2004	Total	North	21	2348.8	97.6 - 10,397.2	104.4	34.2 - 179.1
		South	16	3118.0	365.1 - 13,748.6	101.9	42.3 - 160.6
		Combined	37	2681.5	97.6 - 13,748.6	103.3	34.2 - 179.1
2005	Total	North	37	1893.6	128.3 - 9,857.9	86.4	22.7 - 217.4
		South	12	2067.3	105.3 - 5,606.5	95.6	50.1 - 179.4
		Combined	49	1936.1	105.3 - 9,857.9	88.6	22.7 - 217.4
2006	Total	North	39	1481.2	17.7 - 6,996.2	106.1	15.7 - 270.1
		South	13	3148.2	372.2 - 18,399.5	112.3	56.0 - 210.8
		Combined	52	1898.0	17.7 - 18,399.5	107.6	15.7 - 270.1

Table 1.1.b. Monthly summary of long haul seine catches from the mandatory North Carolina Trip Ticket Program, 2004-2006.

			Catch weight (kgs)		
Year	Month	n	Mean	Min	Max
2004	April	22	245.7	0.5	3,362.0
	May	30	208.1	0.5	8,482.1
	June	88	277.6	0.5	21,336.9
	July	65	158.9	0.5	6,096.2
	August	44	93.0	0.5	1,088.6
	September	56	175.7	0.5	7,418.5
	October	75	398.7	0.5	20,865.1
	November	10	51.0	0.5	741.6
	Total	390	201.1	0.5	8,673.9
2005	April	20	82.6	0.5	1,202.0
	May	44	166.5	0.5	8,822.3
	June	51	237.1	0.5	6,568.0
	July	50	192.4	0.5	4,953.2
	August	52	169.2	0.5	4,245.6
	September	44	154.1	0.5	3,628.7
	October	51	274.9	0.5	19,912.6
	November	5	242.8	0.5	5,692.6
	Total	317	189.9	0.5	6,878.1
2006	April	8	106.5	0.5	1,059.1
	May	27	117.4	0.5	2,967.8
	June	49	75.6	0.5	975.2
	July	57	97.2	0.5	1,519.5
	August	106	96.0	0.5	2,118.3
	September	82	161.5	0.5	8,019.5
	October	89	263.3	0.5	15,910.1
	November	8	30.9	0.5	305.3
	Total	426	118.5	0.5	4,109.4

Table 1.2. North Carolina long haul seine commercial landings (weight - metric tons, numbers - 1000s individuals) and landings per trip (CPUE weight - kgs, CPUE number - individuals), by type, 1987-2006.

	Weight						Numbers[2]					
	Total		Market		Bait[1]		Total		Market		Bait[1]	
Year	Landed (Metric tons)	CPUE (Kgs)	Landed (Metric tons)	CPUE (Kgs)	Landed (Metric tons)	CPUE (Kgs)	Landed (1000s)	CPUE (Ind.)	Landed (1000s)	CPUE (Ind.)	Landed (1000s)	CPUE (Ind.)
1987	3,965	2,901	2,447	1,890	1,518	1,000	37,829	25,649	17,237	14,538	20,254	11,111
1988	5,016	3,139	3,232	1,985	1,784	1,147	36,173	24,420	17,965	11,676	18,209	12,744
1989	4,655	2,552	2,991	1,520	1,664	1,032	38,222	21,841	17,885	8,941	20,338	12,900
1990	5,675	3,667	3,743	2,328	1,933	1,339	48,769	30,431	22,620	13,694	26,149	16,737
1991	4,544	2,436	2,446	1,326	2,098	1,110	43,382	23,657	12,676	7,800	30,706	15,857
1992	2,477	1,804	1,848	1,099	628	706	20,239	16,152	12,081	7,327	8,154	8,825
1993	2,292	1,837	1,313	1,013	979	808	19,935	16,544	8,291	6,444	11,644	10,100
1994	1,944	2,618	944	1,400	1,000	1,218	19,357	28,484	6,477	10,552	12,880	17,932
1995	1,785	2,353	1,035	1,465	750	888	13,090	15,958	3,985	4,701	9,105	11,257
1996	1,437	1,601	931	1,067	506	534	10,356	9,222	4,827	3,601	5,529	5,621
1997	2,212	2,248	1,136	1,479	1,076	769	17,972	16,526	4,853	5,696	13,119	10,830
1998	1,482	1,390	853	782	628	609	10,071	10,111	2,828	2,687	7,243	7,424
1999	1,038	1,507	595	913	443	593	7,350	10,417	1,667	2,539	5,683	7,877
2000	984	2,654	718	1,913	266	741	6,305	17,959	2,727	7,328	3,578	10,632
2001	1,426	3,928	853	2,260	573	1,667	9,366	27,601	3,236	8,861	6,130	18,739
2002	923	2,580	575	1,591	348	989	5,648	16,459	1,943	5,678	3,704	10,781
2003	1,086	3,796	594	2.201	493	1,595	8,268	30,550	2,241	8,334	6,027	22,216
2004	1,003	2,923	641	1,900	362	1,024	7,239	21,983	2,316	6,706	4,923	15,277
2005	823	1,968	481	1,275	341	693	5,874	13,167	1,761	4,371	4,113	8,796
2006	719	2,228	465	1,515	254	712	4,706	13,570	1,403	4,080	3,303	9,490

1. Bait 1987-2006 estimated from weight ratio of market to bait in fish house samples.
2. Mean weights (kgs) of individual fish used to estimate number.

Table 1.3. North Carolina long haul seine reported commercial landings (metric tons) and value (dollars) for selected species, 2004-2006, including the relative contribution (% area) of the species to the fishery: North and south of Bluff Shoal and both areas combined (State).

	2004		2005		2006	
Species/Area	Metric tons	% area	Metric tons	% area	Metric tons	% area
Atlantic Croaker						
North	13.6	13.7	13.1	9.2	14.7	7.7
South	2.1	0.4	1.5	0.4	1.6	0.6
State	15.7	2.5	14.6	3.0	16.3	3.5
Value	$8,553		$7,520		$8,290	
Bluefish						
North	2.2	2.2	11.2	7.9	15.6	8.2
South	21.4	3.9	14.0	4.1	11.9	4.3
State	23.6	3.7	25.1	5.2	27.5	5.9
Value	$10,197		$14,193		$14,943	
Butterfish						
North	0.0	.	0.0	.	0.0	0.0
South	1.7	0.3	1.5	0.5	1.1	0.4
State	1.7	0.3	1.5	0.3	1.1	0.2
Value	$1,429		$1,799		$1,335	
Flounders						
North	0.0	0.0	0.0	0.0	0.9	0.5
South	0.3	0.1	0.3	0.1	0.1	0.0
State	0.3	0.1	0.4	0.1	1.0	0.2
Value	$1,092		$1,385		$4,602	
Harvestfish						
North	0.0	0.0	0.0	0.0	0.0	0.0
South	0.8	0.1	1.1	0.3	2.6	1.0
State	0.8	0.1	1.1	0.2	2.7	0.6
Value	$1,740		$2,767		$7,353	
Spanish Mackerel						
North	0.0	0.0	0.1	0.0	0.1	0.1
South	0.2	0.0	0.7	0.2	0.1	0.0
State	0.2	0.0	0.8	0.2	0.2	0.0
Value	$422		$2,138		$598	

Table 1.3. (Continued)

Species/Area	2004 Metric tons	2004 % area	2005 Metric tons	2005 % area	2006 Metric tons	2006 % area
Spot						
North	63.2	63.7	76.6	53.9	80.0	42.1
South	286.9	53.0	183.7	54.1	194.2	69.9
State	350.1	54.6	260.2	54.1	274.2	58.6
Value	$357,134		$301,244		$438,498	
Spotted Sea trout						
North	3.2	3.2	2.3	1.6	12.9	6.8
South	4.9	0.9	4.1	1.2	9.5	3.4
State	8.1	1.3	6.4	1.3	22.5	4.8
Value	$23,085		$19,262		$66,561	
Weakfish						
North	3.6	3.6	4.4	3.1	2.0	1.0
South	97.0	17.9	42.2	12.4	31.4	11.3
State	100.6	15.7	46.7	9.7	33.3	7.1
Value	$144,764		$81,897		$61,055	
Bait (Ind.)						
North	1.1	1.1	4.7	3.3	17.3	9.1
South	98.2	18.1	67.2	19.8	1.0	0.4
State	99.3	15.5	71.9	14.9	18.3	3.9
Value	$14,718		$15,854		$5,644	
Total Fish						
North	99.2	100.0	141.9	100.0	189.9	100.0
South	541.4	100.0	339.4	100.0	277.8	100.0
State	640.6	100.0	481.3	100.0	467.7	100.0
Value	$607,573		$497,884		$671,742	

Table 1.4a. Species composition of long haul seine catches, Pamlico Sound Area, 2004.

Species	Weight (kgs) Mean	Weight (kgs) Percent	Number Mean	Number Percent	Mean fish weight (kgs)	Percent occur*
Leiostomus xanthurus	1,445.6	53.9	12,282.0	51.2	0.1	100.0
Cynoscion regalis	334.4	12.5	1,464.0	6.1	0.2	86.5
Lagodon rhomboides	279.7	10.4	5,014.0	20.9	0.1	86.5
Micropogonias undulatus	201.8	7.5	2,110.0	8.8	0.1	89.2
Brevoortia tyrannus	177.7	6.6	1,534.0	6.4	0.1	51.4
Pomatomus saltatrix	85.4	3.2	327.0	1.4	0.3	89.2
Orthopristis chrysoptera	56.0	2.1	556.0	2.3	0.1	86.5
Menticirrhus americanus	26.2	1.0	146.0	0.6	0.2	54.1
Cynoscion nebulosus	17.9	0.7	31.0	0.1	0.6	81.1
Peprilus triacanthus	14.2	0.5	172.0	0.7	0.1	18.9
Archosargus probatocephalus	10.5	0.4	7.0	0.0	1.6	48.6
Dasyatis sabina	6.1	0.2	77.0	0.3	0.1	8.1
Bairdiella chrysoura	5.3	0.2	96.0	0.4	0.1	18.9
Mugil cephalus	2.9	0.1	9.0	0.0	0.3	16.2
Tylosurus crocodilus	1.9	0.1	2.0	0.0	1.0	13.5
Peprilus alepidotus	1.7	0.1	18.0	0.1	0.1	18.9
Chaetodipterus faber	1.4	0.1	27.0	0.1	0.1	16.2
Prionotus evolans	1.4	0.1	21.0	0.1	0.1	16.2
Menticirrhus spp.	1.3	0.1	7.0	0.0	0.2	8.1
Synodus foetens	1.1	0.0	6.0	0.0	0.2	8.1
Chilomycterus schoepfi	1.1	0.0	7.0	0.0	0.2	29.7
Alosa mediocris	1.0	0.0	3.0	0.0	0.4	2.7
Pogonias cromis	1.0	0.0	1.0	0.0	1.0	24.3
Selene vomer	0.7	0.0	31.0	0.1	0.0	18.9
Callinectes sapidus	0.6	0.0	7.0	0.0	0.1	13.5
Rachycentron canadum	0.5	0.0	0.0	0.0	4.9	10.8
Dasyatis americana	0.5	0.0	4.0	0.0	0.1	16.2
Paralichthys lethostigma	0.4	0.0	0.0	0.0	0.9	18.9
Paralichthys spp.	0.4	0.0	1.0	0.0	0.8	16.2
Paralichthys albigutta	0.4	0.0	2.0	0.0	0.2	8.1
Scomberomorus maculatus	0.4	0.0	0.0	0.0	0.9	10.8
Trachinotus carolinus	0.4	0.0	1.0	0.0	0.3	16.2
Sciaenops ocellatus	0.3	0.0	0.0	0.0	3.5	5.4
Alosa aestivalis	0.2	0.0	3.0	0.0	0.1	2.7
Aluterus schoepfi	0.2	0.0	12.0	0.0	0.0	2.7
Prionotus carolinus	0.2	0.0	4.0	0.0	0.0	8.1
Caranx hippos	0.2	0.0	2.0	0.0	0.1	5.4
Alosa sapidissima	0.1	0.0	0.0	0.0	1.7	2.7
Lobotes surinamensis	0.1	0.0	0.0	0.0	3.1	2.7
Opisthonema oglinum	0.1	0.0	5.0	0.0	0.0	8.1

Table 1.4b. Species composition of long haul seine catches, Pamlico Sound Area,2005.

	Weight (kgs)		Number		Mean fish weight	
Species	Mean	Percent	Mean	Percent	(kgs)	Percent occur
Leiostomus xanthurus	796.6	41.1	5,572.0	36.0	0.1	95.9
Brevoortia tyrannus	389.4	20.1	3,599.0	23.2	0.1	34.7
Lagodon rhomboides	225.2	11.6	2,962.0	19.1	0.1	81.6
Micropogonias undulatus	180.7	9.3	1,729.0	11.2	0.1	79.6
Pomatomus saltatrix	93.5	4.8	229.0	1.5	0.4	93.9
Cynoscion regalis	82.9	4.3	288.0	1.9	0.3	89.8
Orthopristis chrysoptera	79.3	4.1	631.0	4.1	0.1	71.4
Cynoscion nebulosus	29.5	1.5	51.0	0.3	0.6	75.5
Menticirrhus americanus	12.6	0.7	64.0	0.4	0.2	44.9
Unclassified fish	9.3	0.5	66.0	0.4	0.1	2.0
Archosargus probatocephalus	7.7	0.4	3.0	0.0	2.5	44.9
Bairdiella chrysoura	6.0	0.3	88.0	0.6	0.1	38.8
Menticirrhus spp.	4.1	0.2	18.0	0.1	0.2	16.3
Tylosurus crocodilus	3.2	0.2	2.0	0.0	1.3	12.2
Chilomycterus schoepfi	3.2	0.2	15.0	0.1	0.2	40.8
Opisthonema oglinum	2.9	0.2	85.0	0.5	0.0	16.3
Peprilus alepidotus	2.1	0.1	16.0	0.1	0.1	22.4
Scomberomorus maculatus	1.6	0.1	2.0	0.0	0.7	26.5
Sciaenops ocellatus	1.0	0.1	0.0	0.0	2.5	12.2
Chaetodipterus faber	0.9	0.0	9.0	0.1	0.1	14.3
Peprilus triacanthus	0.6	0.0	4.0	0.0	0.2	14.3
Callinectes sapidus	0.6	0.0	11.0	0.1	0.1	22.4
Selene vomer	0.5	0.0	18.0	0.1	0.0	10.2
Dasyatis sabina	0.3	0.0	4.0	0.0	0.1	26.5
Prionotus evolans	0.3	0.0	4.0	0.0	0.1	8.2
Paralichthys lethostigma	0.3	0.0	1.0	0.0	0.6	12.2
Pogonias cromis	0.3	0.0	0.0	0.0	1.6	10.2
Prionotus spp.	0.2	0.0	2.0	0.0	0.1	2.0
Alosa mediocris	0.2	0.0	1.0	0.0	0.2	4.1
Trachinotus carolinus	0.2	0.0	0.0	0.0	0.7	14.3
Paralichthys dentatus	0.2	0.0	2.0	0.0	0.1	14.3
Monacanthus hispidus	0.1	0.0	2.0	0.0	0.0	4.1
Dasyatis americana	0.1	0.0	0.0	0.0	0.2	8.2
Paralichthys spp.	0.1	0.0	0.0	0.0	0.8	4.1
Synodus foetens	0.1	0.0	0.0	0.0	0.1	2.0
Echeneis naucrates	0.1	0.0	0.0	0.0	0.4	4.1

Table 1.4c. Species composition of long haul seine catches, Pamlico Sound Area, 2006.

Species	Weight (kgs) Mean	Weight (kgs) Percent	Number Mean	Number Percent	Mean fish weight (kgs)	Percent occur*
Leiostomus xanthurus	916.7	48.5	7,067.0	45.6	0.1	98.1
Lagodon rhomboides	276.4	14.6	3,340.0	21.6	0.1	86.5
Micropogonias undulatus	234.4	12.4	2,350.0	15.2	0.1	82.7
Pomatomus saltatrix	100.0	5.3	270.0	1.7	0.4	96.2
Brevoortia tyrannus	95.1	5.0	647.0	4.2	0.1	40.4
Orthopristis chrysoptera	61.6	3.3	567.0	3.7	0.1	78.8
Cynoscion regalis	56.2	3.0	238.0	1.5	0.2	82.7
Cynoscion nebulosus	48.3	2.6	71.0	0.5	0.7	86.5
Unclassified fish	23.6	1.2	196.0	1.3	0.1	5.8
Menticirrhus americanus	16.3	0.9	104.0	0.7	0.2	42.3
Archosargus probatocephalus	10.7	0.6	6.0	0.0	1.9	51.9
Bairdiella chrysoura	10.5	0.6	137.0	0.9	0.1	48.1
Peprilus alepidotus	7.6	0.4	86.0	0.6	0.1	19.2
Opisthonema oglinum	5.7	0.3	284.0	1.8	0.0	7.7
Pogonias cromis	4.5	0.2	9.0	0.1	0.5	53.8
Trachinotus carolinus	3.9	0.2	9.0	0.1	0.4	21.2
Sciaenops ocellatus	2.9	0.2	1.0	0.0	2.4	30.8
Chaetodipterus faber	2.9	0.2	20.0	0.1	0.1	26.9
Tylosurus crocodilus	2.4	0.1	2.0	0.0	1.5	15.4
Chilomycterus schoepfi	2.4	0.1	13.0	0.1	0.2	30.8
Menticirrhus spp.	2.3	0.1	12.0	0.1	0.2	15.4
Prionotus carolinus	0.9	0.0	9.0	0.1	0.1	5.8
Mugil cephalus	0.8	0.0	1.0	0.0	0.6	3.8
Scomberomorus maculatus	0.7	0.0	4.0	0.0	0.2	21.2
Mugil spp.	0.5	0.0	1.0	0.0	0.6	1.9
Paralichthys lethostigma	0.4	0.0	2.0	0.0	0.2	19.2
Larimus fasciatus	0.3	0.0	3.0	0.0	0.1	1.9
Callinectes sapidus	0.3	0.0	2.0	0.0	0.2	1.9
Dasyatidae	0.3	0.0	3.0	0.0	0.1	9.6
Selene vomer	0.2	0.0	9.0	0.1	0.0	9.6
Opsanus tau	0.2	0.0	1.0	0.0	0.2	3.8
Echeneidae	0.2	0.0	1.0	0.0	0.1	1.9
Peprilus triacanthus	0.2	0.0	5.0	0.0	0.0	13.5
Sphoeroides maculatus	0.1	0.0	2.0	0.0	0.1	13.5
Prionotus scitulus	0.1	0.0	7.0	0.0	0.0	3.8
Paralichthys spp.	0.1	0.0	0.0	0.0	0.8	5.8

Table 1.4d. Observed species in long haul seine catches, 2004-2006.

Species	2004	2005	2006
Alosa mediocris			
Stenotomus caprinus	x		
Menticirrhus saxatilis	x		
Paralichthys albigutta		x	x
Monacanthus hispidus			x
Dasyatis americana			x
Rachycentron canadum		x	x
Trichiurus lepturus	x		
Paralichthys dentatus			x
Sphoeroides maculatus		x	
Alectis ciliaris	x		
Mustelus canis	x	x	x
Raja eglanteria	x	x	x
Gymnura spp.	x		
Rhinoptera bonasus	x		x
Anchoa hepsetus	x		
Echeneis naucrates	x		
Seriola zonata	x		
Trichiurus lepturus	x		x
Seriola zonata		x	
Opsanus tau		x	
Penaeus aztecus		x	x
Mugil spp.		x	
Mugil cephalus		x	
Caranx hippos		x	
Scomberomorus cavalla		x	
Prionotus carolinus		x	
Penaeus duorarum		x	
Sphyrna tiburo		x	x
Gymnura spp.		x	
Aetobatis narinari		x	
Rhinoptera bonasus		x	
Dorosoma cepedianum		x	
Ancylopsetta quadrocellata		x	
Prionotus evolans			x
Lolliguncula brevis			x
Chondrichthyes elasmobranchi			x
Dasyatis sabina			x
Anguilla rostrata			x
Caranx hippos			x
Citharichthys spilopterus			x
Paralichthys oblongus			x
Aluterus schoepfi			x

Table 1.5. Monthly, area, and overall mean weights for total catch, marketable, and scrapfish portions; range of percent scrapfish in long haul catches from Pamlico Sound area (North = north of Bluff Shoal, South = south of Bluff Shoal, Combined = combined areas), 2004-2006, n = number of catches sampled.

					Mean weight (kgs)			Percent scrap	
Year	Month	AREA	n	Mean catch weight (kgs)	Marketable	Scrap	Discard	Mean	Range
2004	Apr	North	1	2,239.3	1,586.1	653.2	136.1	29.2	29.2 - 29.2
		South	2	700.5	632.4	68.1	0.0	8.1	0 - 16.1
		Combined	3	1,213.4	950.3	263.1	45.4	15.1	0 - 29.2
	May	North	1	1,337.6	466.7	870.9	40.8	65.1	65.1 - 65.1
		South	2	2,140.5	1,229.2	911.3	544.3	24.3	2.2 - 46.3
		Combined	3	1,872.8	975.0	897.8	376.5	37.9	2.2 - 65.1
	Jun	North	5	5,439.0	3,747.1	1,691.9	544.3	22.2	6.4 - 65.4
		South	2	2,826.5	1606.3	1,220.2	0.0	50.8	32.6 - 69.1
		Combined	7	4,692.6	3,135.4	1,557.1	388.8	30.4	6.4 - 69.1
	Jul	North	7	1,327.2	768.0	559.2	45.4	30.1	0 - 77.4
		South	2	3,316.8	1,171.3	2,145.6	158.9	67.1	53.8 - 80.4
		Combined	9	1,769.4	857.6	911.7	70.6	38.3	0 - 80.4
	Aug	North	5	1,655.0	880.2	774.8	81.6	38.6	0 - 66
		South	2	1,730.2	723.2	1,007.0	17.0	60.7	56.3 - 65.2
		Combined	7	1,676.4	835.3	841.1	63.2	44.9	0 - 66
	Sep	North	1	132.3	132.3	0.0	0.0	0.0	0 - 0
		South	4	3,031.8	1,433.0	1,598.8	20.5	53.8	41.9 - 70.1
		Combined	5	2,451.9	1,172.9	1,279.0	16.4	43.1	0 - 70.1
	Oct	North	-	-	-	-	-	-	-
		South	2	8,166.5	6,873.8	1,292.8	11.4	18.0	14.8 - 21.1
		Combined	2	8,166.5	6,873.8	1,292.8	11.4	18.0	14.8 - 21.1
	Nov	North	1	856.1	856.1	0.0	0.0	0.0	0 - 0
		South	-	-	-	-	-	-	-
		Combined	1	856.1	856.1	0.0	0.0	0.0	0 - 0
2005	Apr	North	2	621.4	460.4	161.0	2.3	35.5	10.5 - 60.5
		South	1	1,367.9	986.9	381.0	0.0	27.9	27.9 - 27.9
		Combined	3	870.3	635.9	234.3	1.5	33.0	10.5 - 60.5
	May	North	6	2,862.0	649.2	2212.8	5.7	51.1	0 - 99.8
		South	1	631.1	41.4	589.7	0.0	93.4	93.4 - 93.4
		Combined	7	2,543.3	562.4	1,980.9	4.9	57.2	0 - 99.8
	Jun	North	9	1,891.2	1,107.0	784.2	0.0	21.6	0 - 95.9
		South	3	1,592.0	482.2	1,109.8	30.2	68.4	47.9 - 86.5
		Combined	12	1,816.4	950.8	865.6	7.6	33.3	0 - 95.9
	Jul	North	5	2,675.3	1,924.1	751.1	1.9	33.7	14.6 - 68.5
		South	2	2,999.3	522.7	2,476.7	4.5	83.1	78.9 - 87.3
		Combined	7	2,767.9	1,523.7	1,244.1	2.6	47.8	14.6 - 87.3

Table 1.5. (Continued)

Year	Month	AREA	n	Mean catch weight (kgs)	Mean weight (kgs) Marketable	Scrap	Discard	Percent scrap Mean	Range
	Aug	North	6	823.3	657.0	166.3	0.0	22.2	0 - 51.4
		South	4	1,606.8	935.5	671.3	34.0	48.0	28.5 - 75.2
		Combined	10	1,136.7	768.4	368.3	13.6	32.5	0 - 75.2
	Sep	North	1	5,215.9	4,762.3	453.6	0.0	8.7	8.7 - 8.7
		South	-	-	-	-	-	-	-
		Combined	1	5,215.9	4,762.3	453.6	0.0	8.7	8.7 - 8.7
	Oct	North	6	1,675.8	1,454.7	221.1	0.3	12.1	0 - 24.4
		South	1	5,606.5	4,472.5	1,134.0	0.0	20.2	20.2 - 20.2
		Combined	7	2,237.4	1,885.8	351.5	0.3	13.3	0 - 24.4
	Nov	North	2	520.2	520.2	0.0	56.7	0.0	0 - 0
		South	-	-	-	-	-	-	-
		Combined	2	520.2	520.2	0.0	56.7	0.0	0 - 0
2006	Apr	North	1	1,282.3	465.8	816.5	45.4	63.7	63.7 - 63.7
		South	-	-	-	-	-	-	-
		Combined	1	1,282.3	465.8	816.5	45.4	63.7	63.7 - 63.7
	May	North	4	2,862.5	1,921.3	941.2	0.0	33.0	0 - 61.9
		South	3	1,356.4	555.0	801.3	22.7	54.9	22.8 - 74.4
		Combined	7	2,217.0	1,335.7	881.3	9.7	42.4	0 - 74.4
	Jun	North	7	1,440.2	826.2	614.0	0.0	29.5	0 - 52.9
		South	2	1,157.3	533.6	623.7	0.0	56.8	49.3 - 64.4
		Combined	9	1,377.3	761.2	616.1	0.0	35.5	0 - 64.4
	Jul	North	7	1,077.2	789.5	287.7	0.6	23.0	0 - 69.4
		South	1	1,711.9	949.9	762.0	0.0	44.5	44.5 - 44.5
		Combined	8	1,156.5	809.5	347.0	0.6	25.7	0 - 69.4
	Aug	North	8	1,248.8	753.0	495.8	0.0	37.3	0 - 56.3
		South	3	1,146.0	435.4	710.6	3.8	52.2	38.2 - 69.7
		Combined	11	1,220.8	666.4	554.4	1.0	41.4	0 - 69.7
	Sep	North	6	2,098.2	1,384.5	713.7	0.0	36.0	25.7 - 56.2
		South	1	1,739.8	1,014.1	725.7	0.0	41.7	41.7 - 41.7
		Combined	7	2,047.0	1,331.6	715.4	0.0	36.9	25.7 - 56.2
	Oct	North	4	1,161.1	826.6	334.6	0.0	17.6	0 - 36.6
		South	3	9,217.7	6,771.2	2,446.4	0.4	42.8	11.3 - 67.7
		Combined	7	4,613.9	3,374.3	1,239.6	0.2	28.4	0 - 67.7

Table 1.5. (Continued)

Year	Month	AREA	n	Mean catch weight (kgs)	Mean weight (kgs) Marketable	Scrap	Discard	Percent scrap Mean	Range
	Nov	North	2	94.7	94.7	0.0	0.0	0.0	0 - 0
		South	-	-	-	-	-	-	-
		Combined	2	94.7	94.7	0.0	0.0	0.0	0 - 0
2004	Total	North	21	2,348.8	1,502.6	846.3	172.6	29.0	0 - 77.4
		South	16	3,118.0	1,887.8	1,230.3	96.6	42.1	0 - 80.4
		Combined	37	2,681.5	1,669.1	1,012.3	139.7	34.7	0 - 80.4
2005	Total	North	37	1,893.6	1,158.7	734.9	4.4	25.8	0 - 99.8
		South	12	2,067.3	977.9	1,089.4	19.6	58.7	20.2 - 93.4
		Combined	49	1,936.1	1,114.4	821.7	8.1	33.9	0 - 99.8
2006	Total	North	39	1,481.2	956.1	525.1	1.3	29.4	0 - 69.4
		South	13	3,148.2	2,024.3	1,123.9	6.2	50.0	11.3 - 74.4
		Combined	52	1,898.0	1,223.1	674.8	2.5	34.6	0 - 74.4

Table 1.6a. Species composition of scrapfish in long haul seine catches, Pamlico Sound Area, 2004.

Species	Weight (kgs) Mean	Weight (kgs) Percent	Number Mean	Number Percent	Mean fish weight (kgs)
Leiostomus xanthurus	420.1	36.1	7,740.0	42.0	0.1
Lagodon rhomboides	307.8	26.5	5,747.0	31.2	0.1
Brevoortia tyrannus	198.4	17.1	1,712.0	9.3	0.1
Micropogonias undulatus	136.7	11.8	2,013.0	10.9	0.1
Orthopristis chrysoptera	32.8	2.8	444.0	2.4	0.1
Pomatomus saltatrix	29.3	2.5	225.0	1.2	0.1
Peprilus triacanthus	12.4	1.1	173.0	0.9	0.1
Cynoscion regalis	7.7	0.7	71.0	0.4	0.1
Bairdiella chrysoura	6.1	0.5	111.0	0.6	0.1
Menticirrhus americanus	2.2	0.2	32.0	0.2	0.1
Prionotus evolans	1.6	0.1	24.0	0.1	0.1
Synodus foetens	1.3	0.1	7.0	0.0	0.2
Chilomycterus schoepfi	1.2	0.1	8.0	0.0	0.2
Alosa mediocris	1.2	0.1	3.0	0.0	0.4
Selene vomer	0.8	0.1	36.0	0.2	0.0
Callinectes sapidus	0.7	0.1	8.0	0.0	0.1
Chaetodipterus faber	0.7	0.1	29.0	0.2	0.0
Dasyatis americana	0.5	0.0	4.0	0.0	0.1
Paralichthys albigutta	0.5	0.0	2.0	0.0	0.2
Peprilus alepidotus	0.3	0.0	8.0	0.0	0.0
Alosa aestivalis	0.3	0.0	3.0	0.0	0.1
Aluterus schoepfi	0.3	0.0	14.0	0.1	0.0
Prionotus carolinus	0.2	0.0	5.0	0.0	0.0
Caranx hippos	0.2	0.0	2.0	0.0	0.1
Opisthonema oglinum	0.1	0.0	6.0	0.0	0.0
Stenotomus caprinus	0.0	0.0	1.0	0.0	0.1

Table 1.6c. Species composition of scrapfish in long haul seine catches, Pamlico Sound Area, 2005.

Species	Weight (kgs) Mean	Weight (kgs) Percent	Number Mean	Number Percent	Mean fish weight (kgs)
Brevoortia tyrannus	477.0	47.9	4,409.0	37.1	0.1
Lagodon rhomboides	167.2	16.8	2,876.0	24.2	0.1
Leiostomus xanthurus	151.3	15.2	2,184.0	18.4	0.1
Micropogonias undulatus	110.3	11.1	1,552.0	13.1	0.1
Orthopristis chrysoptera	36.1	3.6	395.0	3.3	0.1
Pomatomus saltatrix	31.0	3.1	126.0	1.1	0.2
Bairdiella chrysoura	7.3	0.7	108.0	0.9	0.1
Chilomycterus schoepfi	3.9	0.4	19.0	0.2	0.2
Opisthonema oglinum	3.6	0.4	104.0	0.9	0.0
Menticirrhus americanus	1.9	0.2	19.0	0.2	0.1
Chaetodipterus faber	1.0	0.1	11.0	0.1	0.1
Callinectes sapidus	0.7	0.1	14.0	0.1	0.1
Cynoscion nebulosus	0.6	0.1	3.0	0.0	0.2
Selene vomer	0.6	0.1	22.0	0.2	0.0
Dasyatis sabina	0.4	0.0	5.0	0.0	0.1
Prionotus evolans	0.4	0.0	5.0	0.0	0.1
Peprilus alepidotus	0.4	0.0	6.0	0.1	0.1
Cynoscion regalis	0.3	0.0	3.0	0.0	0.1
Prionotus spp.	0.2	0.0	3.0	0.0	0.1
Alosa mediocris	0.2	0.0	1.0	0.0	0.2
Paralichthys dentatus	0.2	0.0	3.0	0.0	0.1
Monacanthus hispidus	0.1	0.0	3.0	0.0	0.0
Dasyatis americana	0.1	0.0	1.0	0.0	0.2
Synodus foetens	0.1	0.0	1.0	0.0	0.1
Scomberomorus maculatus	0.1	0.0	0.0	0.0	0.2
Echeneis naucrates	0.1	0.0	0.0	0.0	0.4
Seriola zonata	0.1	0.0	3.0	0.0	0.0
Opsanus tau	0.0	0.0	1.0	0.0	0.1
Penaeus aztecus	0.0	0.0	1.0	0.0	0.0
Caranx hippos	0.0	0.0	0.0	0.0	0.1
Prionotus carolinus	0.0	0.0	1.0	0.0	0.0

Table 1.6d. Species composition of scrapfish in long haul seine catches, Pamlico Sound Area, 2006.

Species	Weight (kgs) Mean	Weight (kgs) Percent	Number Mean	Number Percent	Mean fish weight (kgs)
Lagodon rhomboides	240.3	28.8	3,556.0	32.1	0.1
Leiostomus xanthurus	206.4	24.7	3,116.0	28.1	0.1
Micropogonias undulatus	163.2	19.6	2,164.0	19.5	0.1
Brevoortia tyrannus	120.7	14.5	822.0	7.4	0.1
Orthopristis chrysoptera	34.2	4.1	464.0	4.2	0.1
Pomatomus saltatrix	29.5	3.5	182.0	1.6	0.2
Bairdiella chrysoura	13.6	1.6	178.0	1.6	0.1
Opisthonema oglinum	7.4	0.9	369.0	3.3	0.0
Cynoscion regalis	4.6	0.6	35.0	0.3	0.1
Peprilus alepidotus	3.1	0.4	60.0	0.5	0.1
Chilomycterus schoepfi	3.1	0.4	17.0	0.2	0.2
Menticirrhus americanus	3.0	0.4	44.0	0.4	0.1
Chaetodipterus faber	1.6	0.2	23.0	0.2	0.1
Prionotus carolinus	1.2	0.1	12.0	0.1	0.1
Larimus fasciatus	0.4	0.1	4.0	0.0	0.1
Callinectes sapidus	0.4	0.0	3.0	0.0	0.2
Dasyatidae	0.3	0.0	4.0	0.0	0.1
Selene vomer	0.3	0.0	12.0	0.1	0.0
Opsanus tau	0.3	0.0	1.0	0.0	0.2
Echeneidae	0.2	0.0	2.0	0.0	0.1
Scomberomorus maculatus	0.2	0.0	4.0	0.0	0.1
Prionotus scitulus	0.2	0.0	9.0	0.1	0.0
Peprilus triacanthus	0.2	0.0	6.0	0.1	0.0
Sphoeroides maculatus	0.2	0.0	2.0	0.0	0.1
Paralichthys lethostigma	0.1	0.0	2.0	0.0	0.1
Caranx crysos	0.1	0.0	1.0	0.0	0.1
Paralichthys albigutta	0.0	0.0	1.0	0.0	0.1
Prionotus evolans	0.0	0.0	1.0	0.0	0.0
Paralichthys dentatus	0.0	0.0	1.0	0.0	0.0

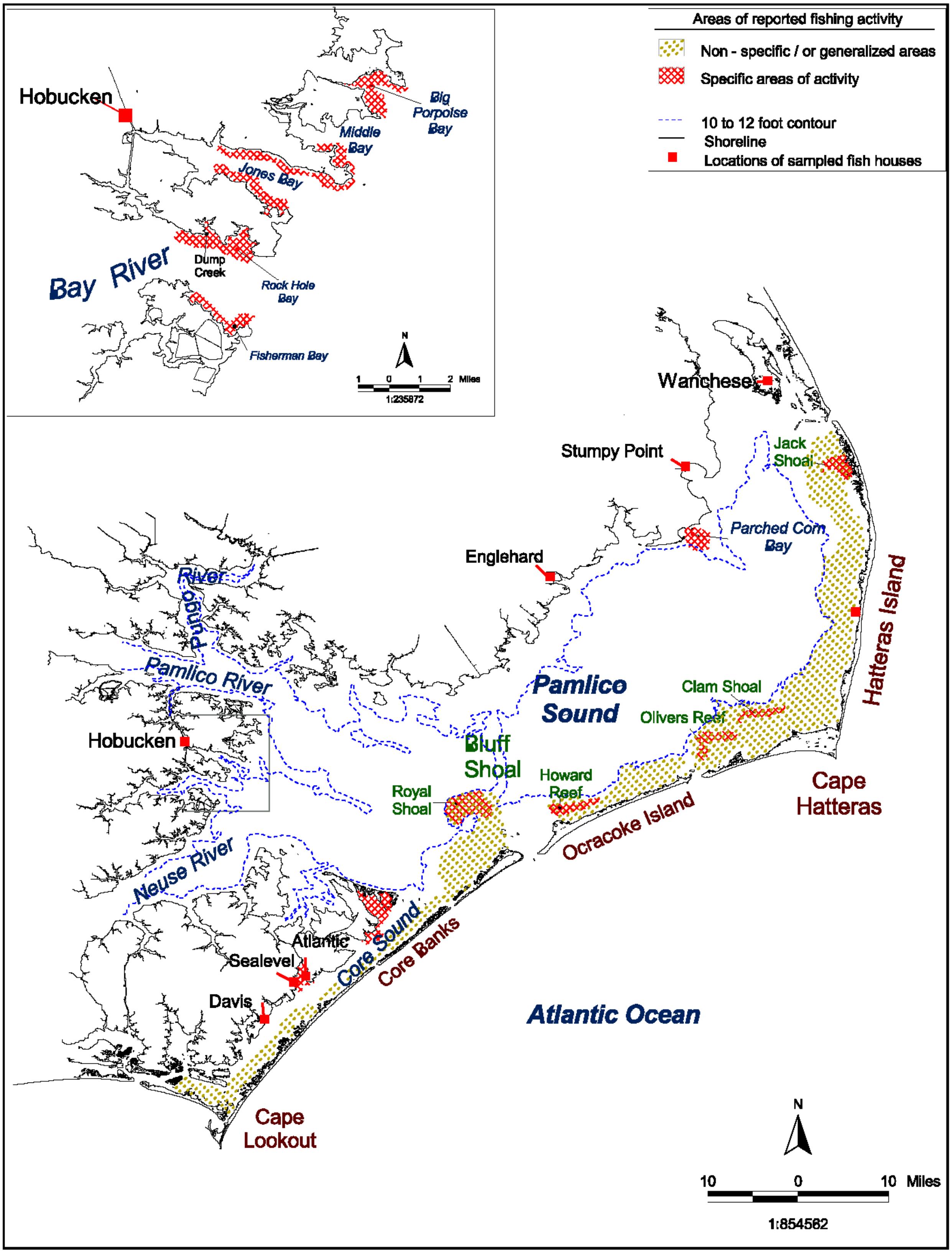
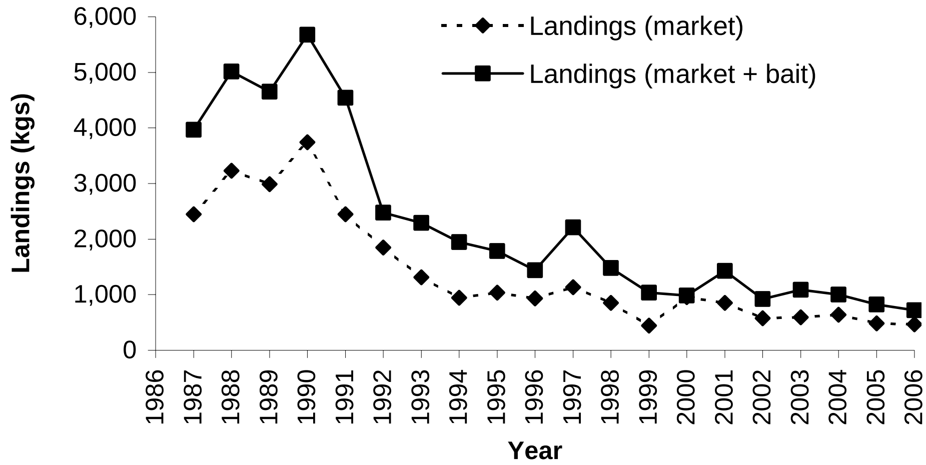


Figure 1.1.Locations for long haul catches sampled from 2004 through 2006.



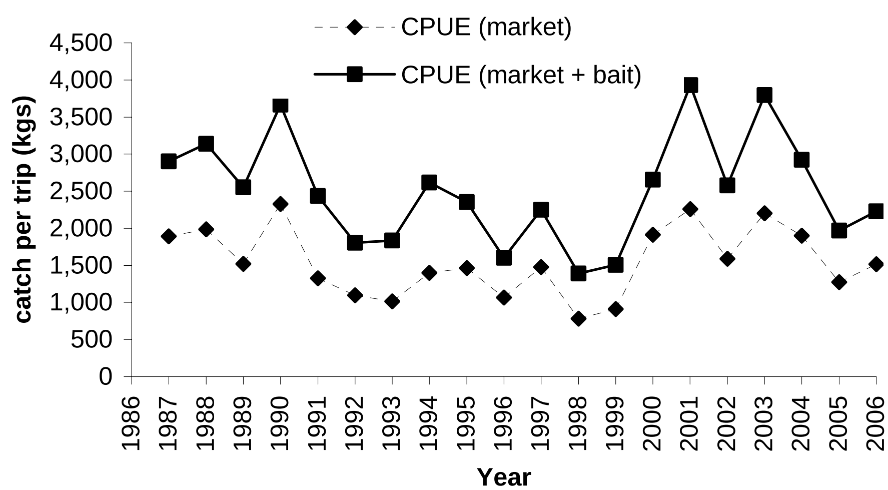


Figure 1.2. North Carolina long haul seine annual commercial landings (metric tons) and weighted mean CPUE (landed catch per trip, kgs), 1986-2006. Bait quantity obtained from ratio of market to bait in fish house samples, initiated in 1986.

ASSESSMENT OF NORTH CAROLINA COMMERCIAL FINFISHERIES

Final Performance Report for Award Number NA04NMF4070216

November 2007

FISHERY SECTION 3

WINTER TRAWL FISHERY ASSESSMENT

JOB 2

by

Chris Batsavage

ABSTRACT

The North Carolina winter trawl fishery is an important multi-species, multi-gear fishery prosecuted in the Atlantic Ocean from southeast New England to Cape Lookout, North Carolina. The fishery has historically consisted of three components: the flynet fishery, which employs a two-seam otter trawl used to catch sciaenids and other non-demersal species; the near shore flounder trawl fishery, which targets summer flounder (*Paralichthys dentatus*) and the deepwater trawl fishery, which targets summer flounder, black sea bass (*Centropristis striata*), and scup (*Stenotomus chrysops*). The fishery was divided into these three components for analytical purposes. The winter trawl fishery was sampled during the 2004-07 fishing seasons to determine species composition, scrap composition, seasonality, and the fishery's contribution to the landings of economically important finfishes. The winter trawl fishery contributed 34%-37% to the state's edible finfish landings and 30%-36% of the ex-vessel value of North Carolina's edible landings from 2004-07. A total of 378 catches was sampled during the study period, beginning in October 2004 and ending in early May 2007. Atlantic croaker (*Micropogonias undulatus*) dominated sampled flynet catches, summer flounder comprised the majority of the sampled near shore and deepwater flounder trawl catches and black sea bass, scup and Atlantic croaker comprised the majority of the deepwater flynet and combination net catches sampled. The scrap component of the flynet fishery comprised 3.9%-5.9% of the landings from sampled flynet catches. Changing coastwide commercial quotas for targeted species and future gear restrictions to reduce sea turtle bycatch are management issues affecting the winter trawl fishery in North Carolina.

INTRODUCTION

The North Carolina winter trawl fishery is a multispecies, multigear fishery that operates from October through May. Fishing effort shifts to one of several target species depending on seasonal and geographic distribution, catchability, fishery regulations, and marketability. Target species include summer flounder (*Paralichthys dentatus*), Atlantic croaker (*Micropogonias undulatus*), weakfish (*Cynoscion regalis*), butterfish (*Peprilus triacanthis*), bluefish (*Pomatomus saltatrix*), black sea bass (*Centropristis striata*), scup (*Stenotomus chrysops*), striped bass (*Morone saxatilis*), and kingfishes (*Menticirrhus* spp.). Fishing grounds extend from the canyon areas from southeast New England to the Hudson Canyon off New York and New Jersey, and south to Cape Lookout, NC, and from the beach to the 50 fathom curve (Figure 3.1).

Winter trawl catches are landed at North Carolina ports from Wanchese to Morehead City-Beaufort. The number of ports and fish houses offloading vessels in the winter trawl fishery is significantly less than earlier years (Ross 1991, Monaghan and Francesconi 1997, Monaghan 2001). The primary processing facilities are located in Wanchese, where 15-25 vessels offload at five fish houses. Morehead City-Beaufort is the second largest port with three fish houses servicing 12-15 trawlers. Ports on the western shore of Pamlico Sound (Lowland, Hobucken, Engelhard and Oriental) include 5 fish houses that offload fish for 31-40 trawlers. Due to the extensive geographic range of fishing grounds used by the North Carolina winter trawl fleet, catches were historically often landed at ports in other states, particularly Hampton, VA, Cape May, NJ, and New Bedford, MA. Restrictive quotas and permitting requirements now compel the fleet to primarily land at North Carolina ports.

The flynet fishery is comprised of North Carolina trawlers that fish for weakfish, Atlantic croaker, bluefish, butterfish, striped bass, and kingfishes. Flynet fishing generally takes place in depths less than 36 m (20 fathoms) from Oregon Inlet to Cape Hatteras from October through April. Flynets are high profile trawls used for fish that school higher in the water column than typical groundfish. Flynets are bottom-tending, range from 24.4-36.6 m (80-120 ft) across, with wing mesh sizes of 41-163 cm (16-64 in), and open approximately 25 ft high. Tailbag mesh sizes used in flynets are 8.9 cm (3.5 in) square hung or 9.5 cm (3.75 in) diamond hung. High volume catches are not uncommon in this fishery with 30 minute tows at times yielding up to 100,000 lbs.

The near shore flounder fishery is the southern segment of the mid-Atlantic summer flounder trawl fishery. Many of the vessels that enter the North Carolina winter trawl fishery participate in this component. Vessels begin landing fish caught off the Delmarva Peninsula in North Carolina ports by November. Although fishing effort had historically moved to the near shore waters of the Outer Banks by mid-November and December, effort remained concentrated in the northern waters off the Delmarva Peninsula in recent years. The predominant gear used in the near shore flounder fishery is the flounder trawl, constructed with a 15.2-19.8 m (50-65 ft) headrope with 14.0-15.2 cm (5.5-6.0 in) mesh in the wings and body, and 14.0-16.5 cm (5.5-6.5 in) mesh in the tailbag. Long ground lines including up to 91.4 m (300 ft) of stranded-wire cable with cookies (rubber discs), 22.9 m (75 ft) of chain, and 30.5 m (100 ft) of cable act as leads directing fish into the relatively small net. Combination nets are higher profile nets, with 20-25 cm (8-10 in) mesh in the wings tapering to 14.0-15.2 cm (5.5-6.0 in) mesh in the tailbags, and were historically used when seeking summer flounder as well as weakfish, butterfish, and long-finned squid (*Loligo pealii*).

The deepwater component of the winter trawl fishery was traditionally conducted primarily by vessels from Wanchese when near shore flounder fishing declines in late December or early January. Vessels from all the ports offloading winter trawlers now participate in this fishery with some effort occurring in November and December. Fishing occurs from off Kitty Hawk, NC to Norfolk Canyon and north along the Continental shelf edge from Virginia to southern New England for summer flounder, scup, and black sea bass (Figure 3.1). Different trawl gear is used depending on the species targeted: flounder trawls are used to target summer flounder; flynets and combination nets are used to target black sea bass and scup; flynets are employed when Atlantic croaker or bluefish move into the deeper waters (depths greater than 36 m or 20 fathoms).

More than one gear is often used on a single trip. That is, it is not uncommon for a crew to utilize a flounder trawl to target summer flounder for the majority of a trip, then utilize a flynet to target bluefish, croaker, or striped bass, and/or a combination net to target scup or black sea bass, all within the same 1-10 day fishing “trip”. Minimum mesh size restrictions for the different species targeted by the winter trawl fishery makes the use of multiple trawls a necessity. Therefore, biological samples are described by gear and not fishing trip.

The North Carolina Division of Marine Fisheries (NCDMF) initiated a comprehensive sampling program of the winter trawl fishery in 1982. The objective was to obtain biological and fisheries data on economically important fishes for use in reaching management decisions. Species composition, relative abundance, distribution, and seasonality are presented for the winter trawl fishery for 2004-07.

METHODS AND MATERIALS

Winter trawl catches were sampled while being offloaded at fish houses in Wanchese, Morehead City-Beaufort, Oriental, Lowland, Hobucken and Engelhard. When available, the vessel’s captain or a crew member was interviewed to obtain information on area and depth fished, number and duration of tows, days on the fishing grounds, and gear(s) used, including head rope length, body mesh size, and tail bag mesh size. Eight or more catches were sampled per month during the season, when possible.

To ensure adequate coverage of all sizes and species in the catches, and since some culling already has taken place at sea, stratified random samples of the graded catch were taken. The process involved randomly sampling one or more 22.7kg (50 lb) carton of each species market category or grade (small, medium, large, jumbo, etc.). More cartons of the larger grades were sampled since they contained fewer fish. Each sample was weighed to the nearest 0.1 kg, individual fish measured to the nearest millimeter (FL or TL), and the total number of individuals recorded. If the individuals in a carton were too numerous to measure, at least 30 were measured, and the remainder counted. The total catch weight of each market category for each species was obtained from the fish dealer's records. In cases where the weight of a particular species' market grade was included on the trip ticket, but the species was not sampled, an estimate of the number of fish landed for the grade was made using mean weight per individual from a sample of that species and grade from another recent catch, and usually from the same area. These data were labeled as calculated estimates of numbers by staff.

Scrapfish was defined as the part of the catch not marketed for human consumption, but is instead sold for crab or fish pot bait, industrial uses, or discarded. All observed species in the scrapfish category were recorded whether they were marketable or discarded at the fish house. A 12 to 23 kg basket of scrapfish was sampled by staff if scrapfish were a significant (>50 kg) portion of a catch. Generally, small amounts of scrapfish (<50 kg) were considered negligible and not measured, weighed, or counted, but recorded as observed species.

Scrapfish were sorted and weighed (kg) by species, and all individuals measured to the nearest millimeter (TL or FL). If a particular species was too numerous, a random subsample of at least 30 individuals was measured, and the remaining fish counted. However, if a species had two or more distinct size classes, then each size class was treated as a separate sub-sample. The total weight of the scrap was obtained from the trip ticket if possible; otherwise it was estimated by counting cartons of scrap or estimated by subtracting the weight of marketable fish from the captain's estimate of the entire catch. The quantity (weight or numbers) of scrapfish (total or by species) landed by the fishery was determined by applying the monthly ratio of marketable fish to scrapfish from fish house samples to the reported monthly marketable landings from the Cooperative Fisheries Statistics Program and the North Carolina Trip Ticket Program (NCTTP). The estimated scrapfish (bait) quantity is for landed scrapfish and does not account for discards at sea. The reported commercial landings of scrapfish (unclassified for bait or industrial purposes) from the commercial statistics program were not used because of non-reporting of these landings by fish dealers. This ratio method of estimating scrapfish assumes that marketable fish landings are accurately compiled by the Cooperative Fisheries Statistics Program and/or the NCTTP.

Landed catches from the winter trawl fishery were analyzed by fishing seasons, that is, October 2004-April 2005 (2004-05), October 2005-April 2006 (2005-06) October 2006-May 2007 (2006-07). Analyses of catches and trends in the winter trawl fishery were partitioned into the three component fisheries described by Ross et al. (1986). These included the near shore flounder fishery, the flynet fishery, and the deepwater fishery.

Landings reported refer to commercial landings data derived from the North Carolina General Canvas Data and the North Carolina Trip Ticket Program (NCTTP) compiled through the NCDMF and the National Marine Fisheries Service (NMFS) Cooperative Fisheries Statistics Program. Landings from the 2004-07 seasons are presented, and are compared to landings reported throughout the 1982-83 to 2003-04 study periods.

RESULTS AND DISCUSSION

The winter trawl fishery contributed 37%, 34% and 35% to the State's edible finfish landings in 2004-05, 2005-06 and 2006-07, respectively. These landings represented 36%, 32% and 30% of the ex-vessel value of North Carolina's edible landings for the respective seasons. Flynet landings represented 57%-67% of the winter trawl landings, while flounder trawls represented 72%-80% of the value for the 2004-07 seasons (Tables 3.1a-c). Although the landings are divided by counties north and south of Cape Hatteras in tables 3.1a-c, all of the flynet landings and most of the flounder trawl landings are from north of Cape Hatteras due to the flynet closure south of Cape Hatteras, and the distribution of summer flounder, scup and black sea bass during the winter trawl season. The contribution of winter trawl catches to edible finfish landings is larger in recent seasons when compared with the 1994-95 to 1999-00 seasons, where contributions ranged from 16% to 24% (Monaghan and Francesconi 1997, Monaghan 2001). This increase was a result of the magnitude of flynet landings of Atlantic croaker, as well as increases in summer flounder, black sea bass, and scup quotas. However, the quotas for these species have decreased the last two years. The increased contribution of winter trawl catches is also magnified by significant decreases in landings by fisheries (ocean gill nets, flounder pound nets) that occur during the same season as winter trawls.

Atlantic croaker was the most prominent species in winter trawls as they contributed 52%-64% to the overall winter trawl landings for the 2004-07 seasons; landings of Atlantic croaker ranged from 3,006 mt in 2005-06 to 3,304 mt in 2006-07 (Tables 3.1a). The magnitude of the catches of Atlantic croaker caught by the winter trawl fishery has increased markedly since 1991-92 (164 mt), with peak landings reported in 2002-03 (4,333 mt), and 2003-04 (3,939 mt) (Monaghan and Francesconi 1997, Burns 2004b). Flounder (primarily summer flounder) was the second most prominent species landed as they contributed 29%-35% to overall winter trawl landings for the 2004-07 seasons, which was similar to the 2000-01 to 2003-04 contributions (Burns 2004b) (Table 3.1a).

It should be noted that striped bass landings and catches were constrained by striped bass season windows and trip limits implemented by the NCDMF in order to allocate the striped bass quota. The NCDMF Director opened the winter trawl fishery for striped bass in 2005 for a five day landing window from January 31 to February 4. The landings window for the 2006 striped bass season ranged between 7 to 15 days from January 31 to March 16. In 2007, the striped bass season was open for two landings windows from February 15 to March 16. Each trawler could land 50 striped bass per window. Boats fishing in the deep-water fishery offshore would often take the time and effort to target striped bass from the inshore waters en route home, either with a flynet or flounder trawl.

Trends in landings by target species are more easily discernable when landings by flynets (Table 3.1b) and flounder trawls (Table 3.1c) are expressed independently from landings by winter trawls (Table 3.1a). The contribution of Atlantic croaker to total flynet landings increased from 88% in 2004-05 to 94% in 2006-07. This was similar to the contributions of Atlantic croaker from 2001-02 to 2003-04 (Burns 2004b). The increased contribution of Atlantic croaker in the flynet fishery in recent years was due to the expansion of the Atlantic croaker population since the early 1990s, which resulted in an increase in the number of trips that targeted Atlantic croaker, as well as increased landings per trip of Atlantic croaker. There are some discrepancies in flynet and flounder trawl landings for species such as black sea bass, scup and striped bass. Flounder trawl is the dominant gear landing these species when landings are separated by gear (Tables 3.1b-c). However, flynets (deepwater and near shore) are the dominant gear types landing these species. Multiple gears are often used on a single winter trawl trip. The likely cause for these discrepancies is all of the landings from these trips were recorded as flounder trawl on the trip ticket because the majority of the fish landed on many of these trips were from a flounder trawl.

The contribution of Atlantic croaker in the flynet landings was further inflated by decreased catches of weakfish and bluefish. Weakfish contributions to flynet landings have decreased steadily and severely since highs experienced in 1982-83 (30%; 3,054 mt), and the decline continued in recent years as they contributed 0.5% in 2004-05, 0.6% in 2005-06 and 0.3% in 2006-07 (Monaghan and Francesconi 1997) (Table 3.1b). Bluefish contributions to flynet landings were 2.0%-2.5% in 2004-05 and 2005-06, but decreased to 0.8% in 2006-07 (Table 3.1b). Bluefish landings by winter trawls declined drastically from a high of 17% in 1982-83 to 3-9% during 1983-84 to 1992-93, and further declined since 1992-93 (0.4-3%) (Monaghan and Francesconi 1997, Monaghan 2001, Burns 2004a).

FLYNET FISHERY

Catch Rates and Landings

From October 2004 through April 2005, 30 flynet catches were sampled with catches ranging from 333 to 50,486 kg/trip and averaged 21,506 kg/trip (Table 3.2a). From October 2005 through April 2006, 30 flynet catches were sampled with catches ranging from 455 to 63,255 kg/trip and averaged 22,429 kg/trip (Table 3.2b). From October 2006 through April 2007, 39 flynet catches were sampled with catches ranging from 13.6 to 59,914 kg/trip and averaged 1,651 kg/trip. (Table 3.2c) The low average catch sampled during the 2006-07 season was a result of a higher number of boats sampled that were targeting striped bass. Most of the catches sampled during the 2004-05 and 2005-06 seasons were targeting Atlantic croaker. Fishing historically occurred from the Virginia/North Carolina line south to Cape Lookout (Figure 3.1), primarily from mid-October through early-April. Due to a prohibition on the use of flynets south of Cape Hatteras, effective April 1, 1995, all of the catches sampled since then were from fish caught north of Cape Hatteras. Flynets contributed 20% of the State's edible finfish landings in 2004-05, 22% in 2005-06 and 24% in 2006-07.

Species Composition

The dominance of Atlantic croaker, by weight, in the winter trawl fishery continued during the last three seasons, as their contribution ranged from 90% of the total flynet catches sampled in 2004-05 to 95% of the total flynet catches sampled in 2005-06 (Tables 3.3a-c). Bluefish declined from 5.5%, by weight, of the catch in 2004-05 to only 0.5% of the catch in 2006-07. In contrast, striped bass increased from only 0.1% of the catch in 2004-05 to 1.9% of the catch in 2006-07. This increase was largely a result of sampling more catches in 2006-07 that targeted striped bass (43.6% of the flynet catches) than in 2004-05 (6.7% of the flynet catches) (Tables 3.3a-c). This corresponds with the increase in overall winter trawl landings of striped bass in 2006-07 (Table 3.1a).

Weakfish comprised only 0.3%-0.9%, by weight, of the sampled flynet catches (Tables 3.3a-c) and was similar to the 0.5% low reported for 2002-03 and 2003-2004 (Burns 2004a Burns 2004b). This represented a continued lack of abundance of weakfish in the catches sampled, and paralleled the decrease in winter trawl landings of weakfish (Table 3.1a). Other species of importance included sheepshead, southern kingfish, butterfish and *Loligo* squid.

The dominance of Atlantic croaker over weakfish in winter trawl landings was initially due to the closure of the flynet fishery south of Cape Hatteras in 1995, which had historically targeted weakfish. Varying minimum size limits for weakfish among the east coast states resulted in decreased marketability, and contributed to ongoing low landings of weakfish. However in more recent years, the dominance of Atlantic croaker in the flynet catch composition was supported by the continued reduced availability of weakfish, coupled with high abundance and a good market for Atlantic croaker.

Scrapfish

Flynets accounted for all of the scrapfish sampled from the winter trawl fishery during the last three seasons. The mean scrap catch per sampled trip in 2004-05 was 1,217 kg/trip, and comprised 4.6% of the landings from sampled flynet catches (Table 3.4). The mean scrap catch per sampled trip in 2005-06 was 973 kg/trip, and comprised 3.9% of the landings from sampled flynet catches. During the 2006-07 season, the mean scrap catch per sampled trip was 1,445 kg/trip, and comprised 5.9% of the landings from sampled flynet catches. Scrap estimates for the last three seasons were consistent with scrap estimates since 1997-98 (4.0%-7.7%) (Monaghan 2001, Burns 2004a, Burns 2004b). Recent estimates of scrap north of Cape Hatteras were much lower than historical scrap estimates, which were as high as 24-44% during 1988-1991 (Ross 1992). A regulation (15A NCAC 3M .0102) that limited the scrapfish catch to 5,000 lbs per vessel per day, effective in 1991, also reduced the dock side landings of scrap in the fishery.

Species composition of the scrap in flynets continued to be dominated by Atlantic croaker, and their contribution by weight ranged from 59% of the 2005-06 sampled scrap catches to 81% of the 2004-05 sampled scrap catches (Table 3.5). This was slightly lower than the 2002-03 and 2003-04 seasons (87% and 84%, respectively) (Burns 2004a, Burns 2004b). Weakfish increased from 6% of the sampled scrap catches in 2004-05 to 19% of the sampled scrap catches in 2005-06; this was the highest scrap component for weakfish since the prohibition of flynets south of Cape Hatteras. Weakfish comprised 8% of the scrap component in 2006-07. Other species that were commonly found in the scrap component included smooth dogfish (*Mustelus canis*), spiny dogfish (*Squalus acanthias*), spot, butterfish, sea robins (*Prionotus* spp.), Atlantic menhaden (*Brevoortia tyrannus*) and bluefish (Table 3.5).

Management Issues

Several management issues have historically been associated with the flynet fishery. These were detailed in a previous report (Monaghan and Francesconi 1997). The most significant issue was the historical catch of sub-adult sciaenids by flynets. This problem was addressed by the closure of the flynet fishery south of Cape Hatteras, when flynets were not allowed south of Cape Hatteras after the 1994-95 season. In addition, increased minimum fish and mesh sizes also assisted in decreasing the catch of sub-adult fish.

While the reported scrapfish landings have declined starting with the 1988-89 fishing season, sampling revealed that scrap landings increased through the 1990-91 fishing season, but declined through 1993. The increase in reported scrap landings since the 1993-94 season was attributed to the increased targeting of Atlantic croaker, which has no minimum size, to compensate for the loss of weakfish available for legal harvest (Ross et al 1987). Even though the targeting of Atlantic croaker has continued markedly since the decline of weakfish availability, a good market for Atlantic croaker, as well as the 5,000 lb. trip limit, have kept the scrap component of this fishery from relapsing to historical highs.

The National Marine Fisheries Service published a proposed rule on February 15, 2007 that considers requiring the use of turtle excluder devices (TEDs) in flynets (DOC 2007). NMFS has identified trawl gear as a priority for reducing sea turtle bycatch. Observer data from flounder trawl and flynet trips from 1994 to 2004 reported that sea turtle interactions were observed in flynets with 35% of the loggerhead sea turtle (*Caretta caretta*) interactions from flynets targeting Atlantic croaker and weakfish (Murray 2006). The highest loggerhead sea turtle bycatch rates calculated by Murray (2006) occurred in water depths less than 50 m, with many interactions off the Outer Banks in the winter—an area and time when the inshore flynet fishery is active. TEDs for the flynet fishery, which must be installed in a trawl with a large opening and must withstand large catches of fish, have been in design since 1999 (DOC 2007). If TEDs are not a viable option for the flynet fishery, tow time restrictions and time/area closures will be considered (DOC 2007). Because a final rule has not been published, it is currently unknown to what degree these proposed sea turtle conservation requirements will ultimately impact the inshore flynet fishery.

NEAR SHORE FLOUNDER FISHERY

Catch Rates and Landings

From November 2004 through April 2005, a total of 19 near shore flounder trawl catches were sampled with catches that ranged from 162 to 6,735 kg/trip and averaged 2,896 kg/trip (Table 3.2a). From November 2005 through March 2006, a total of 15 near shore flounder trawl catches were sampled with catches that ranged from 82 to 4,942 kg/trip and averaged 3,179 kg/trip (Table 3.2b). From December 2006 through March 2007, a total of 31 near shore flounder trawl catches were sampled with catches that ranged from 30 to 5,260 kg/trip and averaged 3,562 kg/trip (Table 3.2c). Sampling and catches were constrained by flounder seasons, landings windows and trip limits implemented by the NCDMF in order to avoid exceeding the summer flounder quota. With the exception of one near shore flounder trawl catch sampled from off Ocracoke, all catches sampled were from north of Cape Hatteras (Figure 3.1). Historically, December had been the peak sampling month for the near shore flounder trawl fishery, and this was generally the case during the 2004-05 and 2005-06 seasons. However, the majority of the near shore flounder trawl samples during the 2006-07 season occurred in February (Table 3.2c). An unseasonably warm winter resulted in summer flounder being available in the near shore waters off the Chesapeake Bay and Cape Henry, VA (Figure 3.1). The number of near shore flounder catches sampled has decreased significantly during the last several years as a result of flounder trawlers shifting their effort to the deepwater component of this fishery (Monaghan 2001, Burns 2004a, Burns 2004b).

The contribution of flounder trawl landings (both from the near shore fishery and the portion of deepwater fishery that used flounder trawls) to the State's edible finfish landings was 16% in 2004-05, and 12% in 2005-06 and 2006-07. Landings of paralichthid flounders (primarily summer flounder) contributed 80%-88% of landings by flounder trawls for 2004-07 (Table 3.1c).

Species Composition

Summer flounder comprised 95% in 2004-05 and 93% of the weight of the catches sampled in 2005-06 and 2006-07 (Table 3.6a-c). Other species that were important economically included bluefish, *Loligo* squid, sea scallops (*Placopecten magellanicus*), goosefish (*Lophius americanus*), black sea bass, Atlantic croaker, striped bass and weakfish.

Scrapfish

The scrap component was very minimal in this fishery and no samples were obtained during the 2004-07 fishing seasons.

Management Issues

Summer flounder are managed by a joint Mid-Atlantic Fishery Management Council (MAFMC) and Atlantic States Marine Fisheries Commission (ASMFC) FMP. The flounder component of both the deepwater and near shore flounder fisheries is managed by a series of rules including quotas, minimum mesh and fish sizes, a moratorium on new entrants, and permit requirements under the summer flounder FMP. The summer flounder quota, first implemented in 1993, is a coastwide commercial quota allocated to the states from Maine to North Carolina based on each state's 1980-89 landings of summer flounder. The North Carolina share is 27.44% of the coastwide commercial quota, which is the largest of the state allocations. North Carolina manages its summer flounder quota by trip limits, seasonal allocations, and a permitting system.

The federal Magnuson-Stevens Fishery Conservation and Management Act, which was amended in 2006, requires the coastwide stock of summer flounder to be rebuilt by January 1, 2013. The 2007 summer flounder stock assessment update indicated that the summer flounder stock is overfished and overfishing is occurring (SDWG 2007). The total allowable landings (TAL) of summer flounder have decreased every year since 2005 to achieve the stock rebuilding target and to offset the persistent overfishing by the commercial and recreational fisheries. Further reductions in the TAL are expected in 2008. Lower commercial quotas allocated to the states will require lower trip limits to distribute the catch among the permitted fleet and to avoid exceeding the quota. Trip limits that are too low will impact the North Carolina trawl fleet because large (≥5,000 lb/trip) trip limits are necessary to offset fishing expenses.

Incidental catches of endangered and threatened sea turtles prompted joint action by the NMFS and NCDMF in 1990. Cooperative research between the two agencies resulted in the development of TEDs for use in the trawl fishery for summer flounder. Subsequently, TEDs have been required in the trawl fishery for summer flounder south of Cape Charles, VA year round (Summer Flounder Fishery-Sea Turtle Protection Area), except for trawlers north of 35º 46.1 N lat. (Oregon Inlet), which are exempt from this requirement from January 15 through March 15 each year (DOC 1996).

The National Marine Fisheries Service published a proposed rule on February 15, 2007 that considers moving the northern boundary of the Summer Flounder Fishery-Sea Turtle Protection Area to a location north of Cape Charles, VA and requiring a larger escape opening for sea turtles in the TEDs (DOC 2007). Observers have documented sea turtle interactions in flounder trawls in locations and times when TEDs are not required (Murray 2006). NMFS has determined that the escape opening for flounder trawl TEDs is too small to allow the escapement of larger loggerhead and green sea turtles (*Chelonia mydas*) and leatherback sea turtles (*Dermochelys coriacea*). Many fishermen who participate in the summer flounder trawl fishery dislike the TEDs currently required for flounder trawls because they result in reduced catches of summer flounder. As a result, some fishermen fish north of Cape Charles, VA or north of Oregon Inlet during the exempted period to avoid using TEDs. Because a final rule has not been published, it is currently unknown to what degree these proposed sea turtle conservation requirements will ultimately impact the near shore flounder trawl fishery.

DEEPWATER FISHERY

Catch Rates and Landings

From November 2004 through April 2005, a total of 78 deepwater trawl catches were sampled with catches that ranged from 1,887 to 22,005 kg/trip and averaged 6,862 kg/trip (Table 3.2a). From November 2005 through April 2006, a total of 64 deepwater trawl catches were sampled with catches that ranged from 2,030 to 17,053 kg/trip and averaged 7,035 kg/trip (Table 3.2b). From November 2006 through March 2007, a total of 72 deepwater trawl catches were sampled with catches that ranged from 421 to 26,956 kg/trip and averaged 4,928 kg/trip (Table 3.2c). Deepwater trawl catches have historically been described as a canyon fishery that targeted summer flounder, bluefish, black sea bass, and scup during the coldest days of the year (January-April). However, the fishery has recently changed such that summer flounder and Atlantic croaker are targeted in the deep waters offshore during November and December, and summer flounder, black sea bass, scup, bluefish, and Atlantic croaker are targeted from

January-April. The late winter fishery diminished from the late 1990s to 2001 due to reduced abundance of scup and black sea bass, and restrictive quotas and trip limits for summer flounder, scup, and black sea bass. Since 2001, trip limits implemented by NCDMF slowed taking of the quota and allowed the fleet to follow the fish into the offshore portion for the fishery.

Species Composition

The deepwater fishery is best described by the type of net utilized and target species: a deep water flynet targets Atlantic croaker, bluefish, black sea bass or scup in deeper waters (>20 fathoms); a deep water flounder trawl targets summer flounder that have migrated further offshore; and a deepwater combination net or “roller rig” is used to target scup and black sea bass in the rocky canyons of the Atlantic Ocean. Most of the catches sampled use deepwater flynets instead of combination nets to target black sea bass and scup, so the species compositions from combination nets were combined with deepwater flynet species compositions.

The majority of the deepwater fishing effort, as well as samples, were from catches that targeted summer flounder. Summer flounder catches in the deepwater flounder trawl fishery ranged from 93% (by weight) of the total deepwater flounder trawl catches sampled in 2004-05 to 97% of the total deepwater flounder trawl catches sampled in 2006-07 (Tables 3.7a-c). Other species that were economically important included goosefish black sea bass, scup, bluefish, *Loligo* squid and sea scallops (*Placopecten magellanicus*) (Tables 3.7a-c).

Catches sampled from the deepwater flynet fishery were dominated by catches of scup and black sea bass in 2004-05 and 2005-06, collectively comprising 97% and 93% of the total weight of the catches sampled, respectively (Table 3.8a-b). Atlantic croaker comprised the majority of deepwater flynet catches sampled in 2006-07; however, this was the result of one large catch from offshore Oregon Inlet (Table 3.8c). Scup and black sea bass were also significant components of the deepwater flynet catches sampled in 2006-07. Other species that were important economically included bluefish, *Loligo* squid, weakfish and summer flounder.

Scrapfish

The scrap component was very minimal in this fishery and no samples were obtained during the 2004-07 fishing seasons.

Management Issues

The deepwater trawl fishery operates in the Exclusive Economic Zone (EEZ), targeting species such as summer flounder, black sea bass, scup, and bluefish that are under the jurisdiction of MAFMC and ASMFC FMPs. The deepwater component of the summer flounder trawl fishery falls under the same management as the near shore flounder fishery. The fishery also harvests Atlantic mackerel (*Scomber scombrus*), squid and butterfish, which are managed by a MAFMC FMP. Since the deepwater trawl component of the winter trawl fishery captures fish outside of North Carolina waters, management issues are mainly related to compliance with regional and federal FMPs.

Black sea bass are managed by a joint Mid-Atlantic Fishery Management Council (MAFMC) and Atlantic States Marine Fisheries Commission (ASMFC) FMP. The black sea bass component of the winter trawl fishery is managed by rules implemented to meet FMP requirements, including an annual quota, minimum fish sizes, minimum tailbag mesh size and possession limits. Amendment 13, approved by the ASMFC in May 2002, implemented a federal coastwide, annual quota to be managed using a state-by-state allocation system through 2007 (MAMFC and ASMFC 2002). The North Carolina commercial black sea bass fishery north of Cape Hatteras receives 11% of the annual commercial quota. Allocation by the states from Maine to North Carolina, rather than a coastwide quota, is better for southern states due to possible inequities of the quota being landed by northern states. Addendum XIX to the ASMFC Summer Flounder, Scup and Black Sea Bass FMP extended the state-by-state commercial black sea bass allocation strategy indefinitely (ASMFC 2007). The TAL for black sea bass has decreased every year since 2005 because the stock is considered overfished. Further reductions in the TAL are expected for 2008.

Scup are managed by a joint Mid-Atlantic Fishery Management Council (MAFMC) and Atlantic States Marine Fisheries Commission (ASMFC) FMP. The scup component of the winter trawl fishery is managed by rules implemented to meet FMP requirements, including an annual coastwide quota divided into four month seasons, minimum fish sizes, a minimum tailbag mesh size and possession limits. The possession limits increased during the first season of the year (Winter I) as a result of increased commercial quotas and to reduce regulatory discards. As a result scup landings by the North Carolina winter trawl fishery increased to 230 mt in 2003-04 but have declined during the 2004-07 seasons because of the lower ex-vessel price for scup and the high travel expenses required by the fleet to target scup (Burns 2004b) (Table 3.1a). The TAL for scup has decreased in 2006 and 2007 because the stock is considered overfished, but the trip limit for Winter I, when the majority of the North Carolina landings occur, has remained the same. Further reductions in the TAL are expected for 2008.

Although a minor component of the deepwater fishery, bluefish are managed under a federal FMP. Amendment 1 of the FMP established a state-by-state quota system where each state is required to close its waters to fishing when its share of the commercial quota is landed. Management Plans for squid, Atlantic mackerel and butterfish have little effect on the North Carolina deepwater trawl fishery.

The National Marine Fisheries Service published a proposed rule on February 15, 2007 that considers amending TED requirements for flounder trawls and flynets, as detailed in the Management Issues sections for flynets and near shore flounder trawls (DOC 2007). Only two observed loggerhead sea turtle interactions occurred in water depths greater than 31 m, and the highest bycatch rates of sea turtles occurred off the Outer Banks in the winter (Murray 2006). However, the deepwater component of the winter trawl fishery is prosecuted in water depths deeper than where most of the sea turtle interactions occurred and further north than the high bycatch rates of sea turtles. Because a final rule has not been published, it is currently unknown to what degree these proposed sea turtle conservation requirements will ultimately impact the deep water component of the winter trawl fishery.

LITERATURE CITED

ASMFC (Atlantic States Marine Fisheries Commission)
2007. Addendum XIX to the summer flounder, scup and black sea bass fishery management plan. August 2007. 16 p.

Burns, B.L.
2004a. Winter trawl fishery assessment *in* Assessment of North Carolina commercial finfisheries 2001-2003, Completion Report NA 06 FI 0321, North Carolina Department of Natural Resources and Community Development, Division of Marine Fisheries, Morehead City, NC, USA, 27p.

Burns, B.L.
2004b. Winter trawl fishery assessment *in* Assessment of North Carolina commercial finfisheries 2003-2004, Completion Report NA 03 NMF4070160, North Carolina Department of Natural Resources and Community Development, Division of Marine Fisheries, Morehead City, NC, USA, 30p.

DOC (Department of Commerce)
1996. Sea turtle conservation; restrictions applicable to fishery activities; summer flounder fishery-sea turtle protection area. Federal Register, Vol. 61, No. 16, 1,846 pp, January 24, 1996.

DOC (Department of Commerce)
2007. Endangered and threatened wildlife; sea turtle conservation requirements. Federal Register, Vol. 72, No. 31, 7,382, February 15, 2007.

MAFMC and ASMFC (Mid Atlantic Fishery Management Council and Atlantic States Marine Fisheries Commission)

2002. Amendment 13 to the summer flounder, scup and black sea bass fishery management plan, Volume 1. A publication of the MAFMC pursuant to NOAA. Award No. NA57FC0002. 518 p.

Monaghan, J.P., Jr. and James J. Francesconi.
1997. Winter trawl fishery assessment *in* Assessment of North Carolina commercial finfisheries 1994-1996, Completion Report for Project 2-IJ-32, North Carolina Department of Environment and Natural Resources, Division of Marine Fisheries, Morehead City, NC, USA, 47 p.

Monaghan, J.P., Jr.
2001. Winter trawl fishery assessment *in* Assessment of North Carolina commercial finfisheries 1997-2000, Completion Report for Project NA 76 FI 0286, North Carolina Department of Environment and Natural Resources, Division of Marine Fisheries, Morehead City, NC, USA, 25 p.

Murray, K.T.
2006. Estimated average annual bycatch of loggerhead sea turtles (*Caretta, caretta*) in U.S. Mid-Atlantic bottom otter trawl gear, 1996-2004. U.S. Department of Commerce, Northeast Fisheries Science Center Reference Document 06-19, 26 p.

Ross, J.L., D.A. DeVries, J.R. Hawkins, III, and J.B. Sullivan.
1987. Assessment of North Carolina commercial finfisheries. North Carolina Department of Natural Resources and Community Development, Division of Marine Fisheries, Morehead City, NC, USA, 79 p.

Ross, J.L.
1991. Assessment of North Carolina winter trawl fishery, September 1985-April 1988. Special Scientific Report No. 54. North Carolina Department of Environment, Health and Natural Resources, Division of Marine Fisheries, Morehead City, NC USA, 79 p + appendices.

Ross, J.L.
1992. Winter trawl fishery assessment *in* Assessment of North Carolina commercial finfisheries 1988-1990, Completion Report for Project 2-IJ-16, North Carolina Department of Natural Resources and Community Development, Division of Marine Fisheries, Morehead City, NC, USA, 68 p

SDWG (Southern Demersal Working Group)
2007. Stock assessment of summer flounder for 2007. 15 p.

Table 3.1a. North Carolina winter trawl reported commercial landings (metric tons), by gear and value ($1,000s) for selected species, including the relative contribution (% area) of the species to the fishery: North = landed north of Cape Hatteras; South = south of Cape Hatteras; Combined = areas combined, 2004-05 to 2006-07.

	Winter Trawl					
	2004-05		2005-06		2006-07	
Species/Area	Metric tons	% Area	Metric tons	% Area	Metric tons	% Area
Atlantic Croaker						
North	3,120.5	64.5	2,974.7	66.8	3,288.0	74.8
South	156.1	10.8	31.7	4.5	15.5	2.1
Combined	3,276.7	52.2	3,006.4	58.3	3,303.5	64.3
Value	$1,974.6		$2,049.9		$2,391.6	
Atlantic Mackerel						
North	0.1	<0.1	3.2	0.1	0.3	<0.1
South	-	-	-	-	<0.1	<0.1
Combined	0.1	<0.1	3.2	0.1	0.3	<0.1
Value	$0.1		$1.7		$0.2	
Atlantic Menhaden						
North	2.2	<0.1	1.1	<0.1	29.1	0.7
South	4.8	0.3	-	-	-	-
Combined	7.0	0.1	1.1	<0.1	29.1	0.6
Value	$1.5		$0.4		$9.7	
Black Sea Bass						
North	108.3	2.2	117.4	2.6	72.4	1.6
South	51.6	3.6	23.9	3.4	13.6	1.8
Combined	159.9	2.5	141.3	2.7	86.0	1.7
Value	$785.1		$819.4		$490.6	
Bluefish						
North	84.7	1.7	94.1	2.1	34.4	0.8
South	18.3	1.3	5.2	0.7	2.8	0.4
Combined	103.0	1.6	99.4	1.9	37.2	0.7
Value	$61.8		$64.7		$20.0	
Butterfish						
North	6.2	<0.1	7.0	0.2	7.0	0.2
South	0.1	<0.1	0.1	<0.1	0.8	0.1
Combined	6.3	0.1	7.1	0.1	7.9	0.2
Value	$5.6		$8.2		$9.2	
Flounder						
North	1,085.9	22.4	964.4	21.7	817.0	18.6
South	1,117.0	77.6	623.6	88.5	678.2	91.1
Combined	2,202.9	35.1	1,587.9	30.8	1,495.1	29.1
Value	$8,637.8		$7,317.6		$7,005.2	
Harvestfish						
North	-	-	-	-	0.1	<0.1
South	-	-	-	-	-	-
Combined	-	-	-	-	0.1	<0.1
Value	-		-		$0.2	
Herrings						
North	-	-	-	-	-	-
South	-	-	-	-	-	-
Combined	-	-	-	-	-	-
Value	-		-		-	

Table 3.1a. (Continued).

	Winter Trawl					
	2004-05		2005-06		2006-07	
Species/Area	Metric tons	% Area	Metric tons	% Area	Metric tons	% Area
Kingfishes						
North	1.7	<0.1	4.1	0.1	8.4	0.2
South	<0.1	<0.1	-	-	0.5	0.1
Combined	1.7	<0.1	4.1	0.1	8.9	0.2
Value	$3.2		$8.6		$19.1	
Red Drum						
North	-	-	<0.1	<0.1	<0.1	<0.1
South	-	-	-	-	<0.1	<0.1
Combined	-	-	<0.1	<0.1	<0.1	<0.1
Value	-		$<0.1		$0.1	
Scup						
North	96.6	2.0	53.3	1.2	25.9	0.6
South	62.9	4.4	9.1	1.3	3.5	0.5
Combined	159.5	2.5	62.4	1.2	29.4	0.6
Value	$156.5		$95.6		$44.2	
Spot						
North	0.3	<0.1	0.4	<0.1	0.1	<0.1
South	<0.1	<0.1	-	-	-	-
Combined	0.3	<0.1	0.4	<0.1	0.1	<0.1
Value	$0.3		$0.5		$0.1	
Spotted Sea Trout						
North	<0.1	<0.1	<0.1	<0.1	0.2	<0.1
South	<0.1	<0.1	<0.1	<0.1	0.3	<0.1
Combined	<0.1	<0.1	<0.1	<0.1	0.5	<0.1
Value	$0.1		<$0.1		$1.5	
Squids						
North	235.1	4.9	156.9	3.5	15.3	0.3
South	6.8	0.5	4.6	0.7	4.4	0.6
Combined	241.9	3.9	161.6	3.1	19.7	0.4
Value	$122.0		$107.3		$21.6	
Striped Bass						
North	15.4	0.3	7.9	0.2	30.7	0.7
South	1.7	0.1	0.2	<0.1	13.9	1.9
Combined	17.1	0.3	8.1	0.2	44.6	0.9
Value	$70.7		$43.4		$23.6	
Weakfish						
North	27.4	0.6	22.1	0.5	14.9	0.3
South	1.4	0.1	0.2	<0.1	2.2	0.3
Combined	28.9	0.5	22.4	0.4	17.2	0.3
Value	$46.8		$42.0		$35.3	
Bait-Unclassified						
North	1.6	<0.1	2.9	0.1	-	-
South	-	-	-	-	-	-
Combined	1.6	<0.1	2.9	0.1	-	-
Value	$0.3		$0.4		-	
All Other						
North	54.2	1.1	40.5	0.9	52.0	1.2
South	19.4	1.3	6.4	0.9	8.5	1.1
Combined	73.6	1.2	46.9	0.9	60.5	1.2
Value	$201.6		$110.2		$107.7	
Total Fish						
North	4,840.1	77.1	4,450.2	86.3	4,395.8	85.5
South	1,440.1	22.9	704.9	13.7	744.2	14.5
Combined	6,280.3		5,155.0		5,140.0	
Value	$12067.8		$10670.1		$10392.1	

Note: (-) denotes no landings reported; landings and values are listed by seasons, September through May.

Table 3.1b. North Carolina flynet reported commercial landings (metric tons), by gear and value ($1,000s) for selected species, including the relative contribution (% area) of the species to the fishery: North = landed north of Cape Hatteras; South = south of Cape Hatteras; Combined = areas combined, 2004-05 to 2006-07.

	Flynet					
	2004-05		2005-06		2006-07	
Species/Area	Metric tons	% Area	Metric tons	% Area	Metric tons	% Area
Atlantic Croaker						
North	2,985.5	87.4	2,962.9	89.9	3,241.0	93.9
South	150.3	97.3	26.2	99.2	4.7	61.0
Combined	3,135.8	87.9	2,989.1	90.0	3,245.7	93.8
Value	$1,887.2		$2,039.0		$2,348.8	
Atlantic Mackerel						
North	0.1	<0.1	-	-	-	-
South	-	-	-	-	-	-
Combined	0.1	<0.1	-	-	-	-
Value	<$0.1		-		-	
Atlantic Menhaden						
North	2.2	0.1	1.1	<0.1	29.1	0.8
South	-	-	-	-	-	-
Combined	2.2	0.1	1.1	<0.1	29.1	0.8
Value	$0.5		$0.4		$9.7	
Black Sea Bass						
North	15.6	0.5	42.0	1.3	43.0	1.2
South	-	-	-	-	0.7	9.1
Combined	15.6	0.4	42.0	1.3	43.8	1.3
Value	$74.6		$224.9		$242.1	
Bluefish						
North	67.7	2.0	82.7	2.5	28.7	0.8
South	2.0	1.3	<0.1	<0.1	<0.1	
Combined	69.7	2.0	82.7	2.5	28.7	0.8
Value	$42.7		$54.0		$14.4	
Butterfish						
North	4.7	0.1	6.5	0.2	7.0	0.2
South	-	-	-	-	0.1	1.3
Combined	4.7	0.1	6.5	0.2	7.1	0.2
Value	$4.1		$7.6		$8.3	
Flounder						
North	39.1	1.1	3.9	0.1	11.7	0.3
South	-	-	<0.1	<0.1	0.1	1.3
Combined	39.1	1.1	3.9	0.1	11.8	0.3
Value	$149.7		$17.6		$55.4	
Harvestfish						
North	-	-	-	-	0.1	<0.1
South	-	-	-	-	-	-
Combined	-	-	-	-	0.1	<0.1
Value	-		-		$0.2	
Herrings						
North	-	-	-	-	-	-
South	-	-	-	-	-	-
Combined	-	-	-	-	-	-
Value	-		-		-	

Table 3.1b. (Continued).

	Flynet					
	2004-05		2005-06		2006-07	
Species/Area	Metric tons	% Area	Metric tons	% Area	Metric tons	% Area
Kingfishes						
North	1.6	<0.1	3.8	0.1	8.1	0.2
South	-	-	-	-	0.1	1.3
Combined	1.6	<0.1	3.8	0.1	8.2	0.2
Value	$3.0		$7.9		$17.7	
Red Drum						
North	-	-	<0.1	<0.1	<0.1	<0.1
South	-	-	-	-	-	-
Combined	-	-	<0.1	<0.1	<0.1	<0.1
Value	-		<$0.1		<$0.1	
Scup						
North	12.6	0.4	<0.1	<0.1	23.2	0.7
South	-	-	-	-	0.5	6.5
Combined	12.6	0.4	<0.1	<0.1	23.7	0.7
Value	$13.7		$<0.1		$37.0	
Spot						
North	0.2	<0.1	0.4	<0.1	0.1	<0.1
South	-	-	-	-	-	-
Combined	0.2	<0.1	0.4	<0.1	0.1	<0.1
Value	$0.2		$0.5		$0.1	
Spotted Sea Trout						
North	<0.1	<0.1	-	-	-	-
South	-	-	-	-	-	-
Combined	<0.1	<0.1	-	-	-	-
Value	$0.1		-		-	
Squids						
North	227.7	6.7	149.5	4.5	12.1	0.4
South	-	-	-	-	0.1	1.3
Combined	227.7	6.4	149.5	4.5	12.2	0.4
Value	$105.6		$92.7		$12.3	
Striped Bass						
North	15.1	0.4	5.1	0.2	8.7	0.3
South	0.7	0.5	0.2	0.8	1.2	15.6
Combined	15.7	0.4	5.2	0.2	9.8	0.3
Value	$65.2		$28.9		$53.2	
Weakfish						
North	18.2	0.5	20.2	0.6	11.7	0.3
South	1.3	0.8	<0.1	<0.1	0.1	1.3
Combined	19.6	0.5	20.3	0.6	11.8	0.3
Value	$32.8		$37.5		$23.4	
Bait-Unclassified						
North	1.6	<0.1	-	-	-	-
South	-	-	-	-	-	-
Combined	1.6	<0.1	-	-	-	-
Value	$0.3		-		-	
All Other						
North	23.0	0.7	18.4	0.6	26.6	0.8
South	0.1	0.1	-	-	0.1	1.3
Combined	23.0	0.6	18.4	0.6	26.7	0.8
Value	$17.7		$17.7		$23.4	
Total Fish						
North	3,414.8	95.7	3,296.4	99.2	3,451.0	99.8
South	154.4	4.3	26.4	0.8	7.7	0.2
Combined	3,569.2		3,322.8		3,458.7	
Value	$2,397.6		$2,528.7		$2,846.1	

Note: (-) denotes no landings reported; landings and values are listed by seasons, September through May.

Table 3.1c. North Carolina flounder trawl reported commercial landings (metric tons), by gear and value ($1,000s) for selected species, including the relative contribution (% area) of the species to the fishery: North = landed north of Cape Hatteras; South = south of Cape Hatteras; Combined = areas combined, 2004-05 to 2006-07.

		Flounder Trawl				
	2004-05		2005-06		2006-07	
Species/Area	Metric tons	% Area	Metric tons	% Area	Metric tons	% Area
Atlantic Croaker						
North	135.0	9.5	11.9	1.0	47.0	5.0
South	5.8	0.5	5.5	0.8	10.7	1.5
Combined	140.8	5.2	17.4	0.9	57.8	3.4
Value	$87.4		$11.0		$42.7	
Atlantic Mackerel						
North	<0.1	<0.1	3.2	0.3	0.3	<0.1
South	-	-	-	-	<0.1	<0.1
Combined	<0.1	<0.1	3.2	0.2	0.3	<0.1
Value	$<0.1		$1.7		$0.2	
Atlantic Menhaden						
North	-	-	-	-	-	-
South	4.8	0.4	-	-	-	-
Combined	4.8	0.2	-	-	-	-
Value	$1.1		-		-	
Black Sea Bass						
North	92.7	6.5	75.5	6.5	29.4	3.1
South	51.6	4.0	23.9	3.5	12.9	1.8
Combined	144.4	5.3	99.3	5.4	42.2	2.5
Value	$710.5		$594.5		$248.5	
Bluefish						
North	17.0	1.2	11.5	1.0	5.7	0.6
South	16.4	1.3	5.2	0.8	2.8	0.4
Combined	33.3	1.2	16.7	0.9	8.5	0.5
Value	$19.0		$10.7		$5.6	
Butterfish						
North	1.5	0.1	0.5	<0.1	0.1	<0.1
South	0.1	<0.1	0.1	<0.1	0.7	<0.1
Combined	1.6	0.1	0.6	<0.1	0.8	<0.1
Value	$1.4		$0.7		$0.9	
Flounder						
North	1,046.8	73.4	960.5	83.3	805.2	85.2
South	1,117.0	86.9	623.5	91.9	678.1	92.1
Combined	2,163.8	79.8	1,584.0	86.5	1,483.3	88.2
Value	$8,488.0		$7,300.0		$6,949.9	
Harvestfish						
North	-	-	-	-	-	-
South	-	-	-	-	-	-
Combined	-	-	-	-	-	-
Value	-		-		-	
Herrings						
North	-	-	-	-	-	-
South	-	-	-	-	-	-
Combined	-	-	-	-	-	-
Value	-		-		-	

Table 3.1c. (Continued).

	Flounder Trawl					
	2004-05		2005-06		2006-07	
Species/Area	Metric tons	% Area	Metric tons	% Area	Metric tons	% Area
Kingfishes						
North		0.1	0.3	<0.1	0.2	<0.1
South		<0.1	-	-	0.4	0.1
Combined		0.1	0.3	<0.1	0.6	<0.1
Value		$0.2	$0.6		$1.3	
Red Drum						
North	-	-	-	-	-	-
South	-	-	-	-	<0.1	<0.1
Combined	-	-	-	-	<0.1	<0.1
Value	-		-		$<0.1	
Scup						
North	84.0	5.9	53.4	4.6	2.7	0.3
South	62.9	4.9	9.1	1.3	3.0	0.4
Combined	146.9	5.4	62.4	3.4	5.7	0.3
Value	$142.8		$95.6		$7.2	
Spot						
North	<0.1	<0.1	-	-	-	-
South	<0.1	<0.1	-	-	-	-
Combined	<0.1	<0.1	-	-	-	-
Value	<$0.1		-		-	
Spotted Sea Trout						
North	-	-	-	-	0.2	<0.1
South	<0.1	<0.1	<0.1	<0.1	0.3	<0.1
Combined	<0.1	<0.1	<0.1	<0.1	0.5	<0.1
Value	<$0.1		<$0.1		$1.5	
Squids						
North	7.3	0.5	7.5	0.7	3.2	0.3
South	6.8	0.5	4.6	0.7	4.3	0.6
Combined	14.1	0.5	12.0	0.7	7.5	0.4
Value	$16.4		$14.5		$9.3	
Striped Bass						
North	0.3	<0.1	2.8	0.2	22.1	2.3
South	1.0	0.1	-	-	12.7	1.7
Combined	1.3	<0.1	2.8	0.2	34.8	2.1
Value	$5.4		$14.5		$182.7	
Weakfish						
North	9.2	0.6	1.9	0.2	3.3	0.3
South	0.1	<0.1	0.2	<0.1	2.1	0.3
Combined	9.3	0.3	2.1	0.1	5.4	0.3
Value	$14.0		$4.5		$11.9	
Bait-Unclassified						
North	-	-	2.9	0.3	-	-
South	-	-	-	-	-	-
Combined	-	-	2.9	0.2	-	-
Value	-		$0.4		-	
All Other						
North	31.2	2.2	22.0	1.9	25.5	2.7
South	19.3	1.5	6.4	0.9	8.4	1.1
Combined	50.5	1.9	28.5	1.6	33.9	2.0
Value	$183.9		$92.6		$84.4	
Total Fish						
North	1,425.3	52.6	1,153.7	63.0	944.8	56.2
South	1,285.8	47.4	678.5	37.0	736.5	43.8
Combined	2,711.1		1,832.2		1,681.3	
Value	$9,670.2		$8,141.4		$7,546.0	

Note: (-) denotes no landings reported; landings and values are listed by seasons, September through May.

Table 3.2a. Monthly summary of sampling of the winter trawl fishery from October 2004 to April 2005, by area fished (N=north of Cape Hatteras) and gear (Flynet=flynets <20 fathoms; Flounder = near shore flounder trawls <20 fathoms; Deepwater=flounder trawls, flynets and combination nets >20 fathoms). N=number of catches sampled + catches where trip tickets were obtained by not sampled; n=number of catches sampled.

					Catch weight (kg)			Sample weight (kg)	
Year	Month	Area	Gear	N	Mean	Range	n	Mean	Range
2004	Oct.	N	Flynet	2	11,197.4	7,767.4-16,067.4	2	200.0	151.7-248.3
	Nov.	N	Flynet	5	21,202.6	2,028.3-32,366.9	4	339.4	151.2-694.3
		N	Flounder	1	3,594.3		1	294.8	
		N	Deepwater	6	4,713.9	4,492.0-5,088.5	6	337.7	204.1-627.1
	Dec.	N	Flynet	5	22,313.1	3,695.0-47,614.2	4	187.0	154.2-275.0
		C	Flounder	1	1,283.7		1	136.1	
		N	Flounder	11	4,187.2	2,131.4-6,735.4	11	316.3	113.4-529.7
		N	Deepwater	5	5,832.6	3,018.2-7,153.7	5	376.7	208.4-555.7
2005	Jan.	N	Flynet	3	31,509.5	19,066.7-48,135.5	3	264.8	162.1-385.8
		N	Flounder	1	1,115.4		1	45.4	
		N	Deepwater	15	7,173.7	5,662.7-8,746.7	15	602.5	334.8-1,025.5
	Feb.	N	Flynet	8	14,163.1	332.5-28,356.8	8	274.9	93.6-740.1
		N	Flounder	1	300.3		1	208.7	
		N	Deepwater	15	7,014.0	3689.5-9191.7	14	472.3	281.7-932.1
	Mar.	N	Flynet	5	34,298.3	20,389.0-50,486.4	5	168.5	134.3-215.9
		N	Deepwater	29	7,496.0	2,534.7-22,004.5	29	456.4	199.5-968.8
	Apr.	N	Flynet	2	12,226.9	859.5-23,594.2	2	125.2	0.8-249.6
			Flounder	4	668.5	162.3-1,702.5	4	178.0	74.9-257.5
		N	Deepwater	8	5,949.3	1,886.9-14,838.0	8	367.3	121.8-499.0
2004-05			Flynet	30	21,506.4	332.5-50,486.4	28	235.4	0.8-740.1
Overall			Flounder	19	2,896.1	162.3-6,735.4	19	256.7	45.4-529.7
			Deepwater	78	6,862.1	1,886.9-22,004.5	77	464.1	121.8-1,025.5

Table 3.2b. Monthly summary of sampling of the winter trawl fishery from October 2005 to April 2006, by area fished (N=north of Cape Hatteras) and gear (Flynet=flynets <20 fathoms; Flounder=near shore flounder trawls <20 fathoms; Deepwater=flounder trawls, flynets and combination nets >20 fathoms). N=number of catches sampled + catches where trip tickets were obtained by not sampled; n=number of catches sampled.

					Catch weight (kg)			Sample weight (kg)	
Year	Month	Area	Gear	N	Mean	Range	n	Mean	Range
2005	Oct.	N	Flynet	2	21,403.0	17,521.2-25,284.7	2	193.1	158.7-227.5
	Nov.	N	Flynet	5	17,016.3	5,362.9-27,108.2	5	292.6	181.5-558.7
		N	Flounder	8	3,520.3	995.7-4,942.9	8	294.1	220.4-418.3
	Dec.	N	Flynet	5	35,996.9	7,716.0-63,255.3	5	191.2	170.5-250.9
		N	Flounder	6	3,240.8	2,361.6-3,918.1	6	462.1	339.2-653.5
		N	Deepwater	1	4,067.8		1	450.8	
2006	Jan.	N	Flynet	4	26,379.6	10,779.5-38,742.6	4	163.2	90.7-221.0
		N	Deepwater	19	7,062.8	6,340.7-9,117.2	19	464.6	204.1-903.8
	Feb.	N	Flynet	9	14,489.3	504.4-45,099.2	9	237.4	177.4-339.8
		N	Deepwater	16	6,986.3	5,631.0-9,763.4	16	469.4	278.5-696.6
	Mar.	N	Flynet	5	25,819.9	455.4-36,101.7	5	303.6	153.8-563.8
		N	Flounder	1	82.1		1	82.1	
		N	Deepwater	23	7,325.6	5,058.5-14,722.1	23	502.5	340.2-708.6
	Apr.	N	Deepwater	5	6,343.50	2,030.3-17,053.0	5	482.4	272.2-977.5
2005-06			Flynet	30	22,429.8	455.4-63,255.3	30	237.1	90.7-558.7
Overall			Flounder	15	3,179.3	82.1-4,942.9	15	347.2	82.1-653.5
			Deepwater	64	7,035.1	2,030.3-17,053.0	64	480.6	204.1-977.5

Table 3.2c. Monthly summary of sampling of the winter trawl fishery from October 2006 to May 2007, by area fished (N=north of Cape Hatteras) and gear (Flynet=flynets <20 fathoms; Flounder=near shore flounder trawls <20 fathoms; Deepwater=flounder trawls, flynets and combination nets >20 fathoms). N=number of catches sampled + catches where trip tickets were obtained by not sampled; n=number of catches sampled.

					Catch weight (kg)			Sample weight (kg)	
Year	Month	Area	Gear	N	Mean	Range	n	Mean	Range
2006	Oct.	N	Flynet	1	9,201.0		1	187.8	
	Nov.	N	Flynet	4	20,052.1	15,767.4-25,431.2	4	199.2	166.4-270.4
		N	Deepwater	2	15,624.6	4,293.4-26,955.8	2	285.5	185.1-385.9
	Dec.	N	Flynet	5	21,406.1	13.6-59,685.5	5	128.7	13.6-236.0
		N	Flounder	3	3,959.7	1,965.4-5,259.9	3	188.5	60.4-272.2
		N	Deepwater	11	4,526.5	3,319.3-4,989.0	11	403.2	201.3-536.7
2007	Jan.	N	Flynet	4	26,501.3	3,741.5-41,153.7	4	154.4	107.3-196.4
		N	Flounder	7	3,077.0	29.5-4,537.2	7	425.1	22.7-1,153.3
		N	Deepwater	20	4,512.6	2,811.4-6,921.0	20	437.1	86.2-1,076.5
	Feb.	N	Flynet	7	11,320.7	186.9-30,743.4	7	301.5	98.6-633.6
		N	Flounder	18	3,801.0	59.4-5,105.6	18	552.9	59.4-1,105.7
		N	Deepwater	16	4,341.0	421.0-7,083.9	16	396.9	68.1-692.5
	Mar.	N	Flynet	18	8,372.2	60.3-59,913.9	18	406.0	60.3-1,002.0
		N	Flounder	3	2,866.2	969.2-4,960.4	3	624.6	430.9-959.0
		N	Deepwater	20	4,673.0	4,463.4-5,154.2	20	449.6	210.9-719.6
	Apr.	N	Deepwater	2	9,526.5	8,438.1-10,615.0	2	715.2	613.6-816.9
	May	N	Deepwater	1	1,542.0		1	351.5	
2006-07			Flynet	39	1,651.1	13.6-59,913.9	39	299.1	13.6-1,002.0
Overall			Flounder	31	3,562.4	29.5-5,259.9	31	495.7	22.7-1,105.7
			Deepwater	72	4,927.8	421.0-26,955.8	72	428.8	68.1-1,076.5

Table 3.3a. Overall species composition and mean catch per trip of North Carolina flynet catches (n=30) sampled from October 2004 to April 2005.

Species	Weight (kg) Mean	Weight (kg) Percent	Number Mean	Number Percent	Mean fish weight (kg)	Percent freq. occur.
Micropogonias undulatus	19,353.3	90.0	67,150	96.7	0.288	86.7
Pomatomus saltatrix	1,186.3	5.5	494	0.7	2.402	50.0
Archosargus probatocephalus	541.1	2.5	157	0.2	3.458	16.7
Peprilus triacanthus	82.1	0.4	603	0.9	0.136	60.0
Cynoscion regalis	73.7	0.3	305	0.4	0.242	80.0
Mustelus canis	61.3	0.3	42	0.1	1.453	23.3
Pogonias cromis	32.1	0.1	4	0.0	8.881	20.0
Morone saxatilis	26.5	0.1	3	0.0	7.965	6.7
Loligo pealii	24.3	0.1	156	0.2	0.156	36.7
Paralichtys dentatus	24.2	0.1	50	0.1	0.485	36.7
Leiostomus xanthurus	18.6	0.1	213	0.3	0.087	46.7
Raja eglanteria	13.9	0.1	12	0.0	1.193	13.3
Brevoortia tyrannus	12.3	0.1	38	0.1	0.327	16.7
Alopias vulpinus	10.9	0.1	0	0.0	65.120	10.0

Observed Species*

Menticirrhus americanus	*Busycotypus canaliculatus*	*Echinodermata*
Squalus acanthias	*Scomberomorus cavalla*	*Etrumeus teres*
Prionotus evolans	*Prionotus carolinus*	*Symphurus plagiusa*
Menticirrhus saxatilis	*Orthopristis chrysoptera*	*Stenotomus chrysops*
Rachycentron canadum	*Alosa mediocris*	*Paralicthys oblongus*
Urophycis regia	*Centropristis striata*	*Stephanolepis hispidus*
Stenotomus caprinus	*Chaetodipterus faber*	*Limulus polyphemus*
Scophthalmus aquosus	*Balistes capriscus*	*Myliobatis freminvillei*
Menticirrhus spp.	*Euthynnus alletteratus*	
Clupea harengus	*Cynoscion nebulosus*	
Sphoeroides maculatus	*Trachinotus carolinus*	

* Observed species are those species that contributed less than 0.1%, by weight, of the sampled catch.

Table 3.3b. Overall species composition and mean catch per trip of North Carolina flynet catches (n=30) sampled from October 2005 to March 2006.

Species	Weight (kg) Mean	Weight (kg) Percent	Number Mean	Number Percent	Mean fish weight (kg)	Percent freq. occur.
Micropogonias undulatus	21,324.5	95.1	77,459	95.8	0.275	86.7
Pomatomus saltatrix	325.8	1.5	195	0.2	1.667	43.3
Cynoscion regalis	197.5	0.9	1,159	1.4	0.170	73.3
Archosargus probatocephalus	123.4	0.6	34	0.0	3.644	10.0
Peprilus triacanthus	72.5	0.3	521	0.6	0.139	56.7
Morone saxatilis	67.8	0.3	7	0.0	9.915	16.7
Unclassified fish	51.4	0.2	-	-	-	6.7
Leiostomus xanthurus	50.7	0.2	763	0.9	0.066	53.3
Loligo pealii	30.7	0.1	192	0.2	0.161	63.3
Paralichtys dentatus	29.3	0.1	49	0.1	0.602	36.7
Menticirrhus americanus	29.0	0.1	128	0.2	0.227	43.3
Squalus acanthias	28.0	0.1	17	0.0	1.677	26.7
Mustelus canis	23.7	0.1	16	0.0	1.462	26.7
Brevoortia tyrannus	20.3	0.1	63	0.1	0.323	30.0

Observed Species*

Alopias vulpinus	*Prionotus carolinus*	*Squatina dumeril*
Pogonias cromis	*Stenotomus caprinus*	*Balistes spp.*
Rachycentron canadum	*Alosa aestivalis*	*Lophius americanus*
Prionotus evolans	*Scophthalmus aquosus*	*Paralichthys lethostigma*
Menticirrhus saxatilis	*Libinia* spp.	*Centropristis striata*
Urophycis regia	*Seriola dumerili*	*Chaetodipterus faber*
Lagodon rhomboides	*Raja eglanteria*	*Aluterus schoepfii*
Sphoeroides maculatus	*Trichiurus lepturus*	*Limulus polyphemus*
Stenotomus chrysops	*Scomberomorus cavalla*	
Rhinoptera bonasus	*Menticirrhus* spp.	

* Observed species are those species that contributed less than 0.1%, by weight, of the sampled catch.

Table 3.3c. Overall species composition and mean catch per trip of North Carolina flynet catches (n=39) sampled from October 2006 to March 2007.

Species	Weight (kg) Mean	Weight (kg) Percent	Number Mean	Number Percent	Mean fish weight (kg)	Percent freq. occur.
Micropogonias undulatus	12,825.0	93.9	45,127	93.2	0.284	61.5
Morone saxatilis	260.6	1.9	26	0.1	9.853	43.6
Cynoscion regalis	125.7	0.9	489	1.0	0.257	76.9
Peprilus triacanthus	119.5	0.9	1,183	2.4	0.101	35.9
Pomatomus saltatrix	70.8	0.5	137	0.3	0.517	38.5
Prionotus carolinus	43.2	0.3	458	0.9	0.094	5.1
Menticirrhus americanus	33.5	0.2	132	0.3	0.254	25.6
Trichiurus lepturus	31.3	0.2	43	0.1	0.728	15.4
Pogonias cromis	23.2	0.2	2	0.0	10.513	10.3
Prionotus evolans	20.9	0.2	263	0.5	0.080	23.1
Brevoortia tyrannus	19.6	0.1	77	0.2	0.254	17.9
Archosargus probatocephalus	12.3	0.1	3	0.0	3.570	7.7
Paralichtys dentatus	12.3	0.1	16	0.0	0.796	23.1
Loligo pealii	11.8	0.1	80	0.2	0.148	30.8
Leiostomus xanthurus	8.2	0.1	112	0.2	0.074	28.2

Observed Species*

Mustelus canis	*Stenotomus chrysops*	*Congridae*
Menticirrhus saxatilis	*Bairdiella chrysoura*	*Centropristis striata*
Chaetodipterus faber	*Loligo* spp.	*Sciaenops ocellatus*
Prionotus spp.	*Alosa aestivalis*	*Anchoa hepsetus*
Urophycis regia	*Scomberomorus cavalla*	*Orthopristis chrysoptera*
Lagodon rhomboides	*Cynoscion nebulosus*	*Rhizoprionodon terraenovae*
Unclassified fish	*Sphoeroides maculatus*	*Balistes spp.*
Menticirrhus spp.	*Scophthalmus aquosus*	*Scomberomorus maculatus*
Synodus foetens	*Carnx crysos*	*Squalus acanthias*
Stenotomus caprinus	*Aluterus schoepfii*	*Limulus polyphemus*
Lophius americanus	*Etrumeus teres*	*Rajiformes*
Alopias vulpinus	*Prionotus scitulus*	*Gymnura altavela*
Raja eglanteria	*Merluccius bilinearis*	*Rhinoptera bonasus*

* Observed species are those species that contributed less than 0.1%, by weight, of the sampled catch.

Table 3.4. Scrap component of flynet catches from October 2004 to March 2007 by area fished (North=North of Cape Hatteras), including: number of catches in which scrap weight was obtained (n), mean total weight (Mean TW), mean weight of marketed fish (Mean Market), mean total weight of scrap (Mean Scrap) and percent of scrap (% Scrap) in these catches. All weights are in KG.

Season	Area	N	Mean TW	Mean Market	Mean Scrap	% Scrap
2004-2005	North	19	26,316.8	25,100.2	1,216.6	4.6
2005-2006	North	23	24,656.8	23,684.2	972.6	3.9
2006-2007	North	21	24,559.6	23,114.9	1,444.7	5.9

Table 3.5. Overall species composition (top 99%) and mean catch per trip of scrap sampled from North Carolina flynet catches, 2004-2007. All catches were caught north of Cape Hatteras.

	Weight (kg)		Number		Mean fish	Percent
Species	Mean	Percent	Mean	Percent	weight (kg)	freq. occur
2004-2005 (n=19)						
Micropogonias undulatus	982.7	80.8	5,035	80.4	0.195	94.7
Cynoscion regalis	68.3	5.6	352	5.6	0.194	63.2
Mustelus canis	33.0	2.7	38	0.6	0.863	15.8
Leiostomus xanthurus	24.9	2.0	321	5.1	0.078	52.6
Raja eglanteria	22.0	1.8	18	0.3	1.193	10.5
Brevoortia tyrannus	19.4	1.6	59	0.9	0.327	21.1
Squalus acanthias	13.8	1.1	8	0.1	1.716	10.5
Prionotus evolans	10.8	0.9	95	1.5	0.114	47.7
Pomatomus saltatrix	10.4	0.9	47	0.8	0.220	26.3
Paralichthys dentatus	6.7	0.6	44	0.7	0.153	36.8
Urophycis regia	4.6	0.4	34	0.5	0.134	21.1
Menticirrhus saxatilis	4.0	0.3	36	0.6	0.109	26.3
Stenotomus caprinus	3.8	0.3	88	1.4	0.043	15.8
2005-2006 (n=21)						
Micropogonias undulatus	587.0	59.2	4,144	56.2	0.143	100.0
Cynoscion regalis	188.0	19.0	1,445	19.7	0.130	71.4
Leiostomus xanthurus	69.5	7.0	1,077	14.7	0.064	61.9
Squalus acanthias	39.9	4.0	24	0.3	1.667	19.0
Brevoortia tyrannus	29.1	2.9	90	1.2	0.323	42.9
Mustelus canis	14.2	1.4	12	0.2	1.205	14.3
Menticirrhus americanus	12.3	1.2	90	1.2	0.136	28.6
Prionotus evolans	8.7	0.9	45	0.6	0.194	23.8
Paralichthys dentatus	6.0	0.6	28	0.4	0.218	19.0
Urophycis regia	5.1	0.5	31	0.4	0.164	14.3
Pomatomus saltatrix	4.7	0.5	25	0.3	0.189	23.8
Lagodon rhomboides	4.3	0.4	76	1.0	0.057	23.8
Sphoeroides maculatus	2.7	0.3	25	0.3	0.106	19.0
Peprilus triacanthus	2.5	0.3	38	0.5	0.067	23.8
Menticirrhus saxatilis	2.2	0.2	23	0.3	0.098	19.0
Stenotomus chrysops	2.1	0.2	46	0.6	0.045	9.5
Loligo pealii	1.6	0.2	28	0.4	0.059	14.3
Rhinoptera bonasus	1.6	0.2	2	0.0	0.840	4.8

Table 3.5. (Continued).

Species	Weight (kg) Mean	Weight (kg) Percent	Number Mean	Number Percent	Mean fish weight (kg)	Percent freq. occur
(2006-2007) n=20						
Micropogonias undulatus	1,032.8	68.3	7,981	65.1	0.129	100.0
Cynoscion regalis	118.6	7.8	713	5.8	0.166	85.0
Prionotus carolinus	84.3	5.6	893	7.3	0.094	10.0
Trichiurus lepturus	54.4	3.6	78	0.6	0.700	20.0
Prionotus evolans	40.8	2.7	513	4.2	0.080	40.0
Peprilus triacanthus	39.0	2.6	956	7.8	0.041	30.0
Brevoortia tyrannus	38.3	2.5	150	1.2	0.254	30.0
Pomatomus saltatrix	23.5	1.6	95	0.8	0.248	25.0
Leiostomus xanthurus	22.0	1.5	279	2.3	0.079	55.0
Mustelus canis	12.2	0.8	31	0.2	0.397	20.0
Prionotus spp.	7.2	0.5	96	0.8	0.075	5.0
Chaetodipterus faber	5.6	0.4	26	0.2	0.215	15.0
Urophycis regia	5.0	0.3	23	0.2	0.221	30.0
Lagodon rhomboides	4.6	0.3	159	1.3	0.029	5.0
Loligo pealii	3.2	0.2	35	0.3	0.090	25.0
Tylosurus crocodilis	3.0	0.2	3	0.0	0.905	5.0
Synodus foetens	2.3	0.2	6	0.1	0.360	5.0

Table 3.6a. Overall species composition and mean catch per trip of the North Carolina near shore flounder trawl catches (n=19) sampled from November 2004 to April 2005.

	Weight (kg)		Number		Mean fish	Percent
Species	Mean	Percent	Mean	Percent	weight (kg)	freq. occur.
Parlichthys dentatus	2,739.6	94.6	3,039	94.3	0.901	89.5
Pomatomus saltatrix	38.8	1.3	21	0.6	1.885	36.8
Cynoscion regalis	36.9	1.3	39	1.2	0.937	10.5
Micropogonias undulatus	22.4	0.8	44	1.4	0.506	31.6
Morone saxatilis	15.8	0.5	3	0.1	6.006	5.3
Lophius americanus	13.2	0.5	17	0.5	0.801	36.8
Busycon spp.	8.4	0.3	-	-	-	5.3
Loligo pealii	6.1	0.2	47	1.5	0.130	31.6
Centropristis striata	5.0	0.2	5	0.2	0.917	31.6
Placopecten magellanicus	3.6	0.1	-	-	-	10.5
Paralichthys lethostigma	2.9	0.1	0	0	6.111	15.8

Observed Species*

Sphoeroides maculatus	*Caulolatilus microps*
Paralichthys albigutta	*Glyptocephalus cynoglossus*
Chaetodipterus faber	*Raja eglanteria*
Menticirrhus saxatilis	*Leucoraga garmani*
Balistes capriscus	*Urophycis earllii*
Octopus	*Prionotus carolinus*
Menticirrhus americanus	*Prionotus scitulus*
Menticirrhus spp.	*Scophthalmus aquosus*
Pogonias cromis	

* Observed species are those species that contributed less than 0.1%, by weight, of the sampled catch.

Table 3.6b. Overall species composition and mean catch per trip of the North Carolina near shore flounder trawl catches (n=15) sampled from November 2005 to March 2006.

Species	Weight (kg) Mean	Weight (kg) Percent	Number Mean	Number Percent	Mean fish weight (kg)	Percent freq. occur.
Parlichthys dentatus	2,968.8	93.4	3,443	92.2	0.862	93.3
Pomatomus saltatrix	62.7	2.0	17	0.5	3.657	33.3
Placopecten magellanicus	21.3	0.7	-	-	-	13.3
Busycon carica	18.4	0.6	17	0.4	1.109	6.7
Micropogonias undulatus	17.0	0.5	34	0.9	0.496	40.0
Loligo pealii	15.2	0.5	187	5.0	0.081	60.0
Chaetodipterus faber	14.0	0.4	5	0.1	3.014	40.0
Neogastropoda stenoglossa	12.8	0.4	-	-	-	13.3
Limulus polyphemus	11.2	0.4	8	0.2	1.361	6.7
Archosargus probatocephalus	10.1	0.3	3	0.1	3.589	13.3
Morone saxatilis	5.5	0.2	1	0.0	10.263	6.7
Busycon spp.	4.6	0.1	-	-	-	13.3
Lophius americanus	4.3	0.1	4	0.1	1.194	26.7
Cynoscion regalis	4.1	0.1	5	0.1	0.875	26.7
Mustelus canis	2.9	0.1	2	0.0	1.724	6.7
Pogonias cromis	2.3	0.1	0	0.0	17.000	6.7

Observed Species*

Busycotypus canaliculatus	*Squalus acanthias*
Paralichthys lethostigma	*Urophycis floridana*
Centropristis striata	*Orthopristis chrysoptera*
Tautoga onitis	*Lagodon rhomboides*
Balistes capriscus	*Menticirrhus americanus*
Menticirrhus spp.	*Peprilus triacanthus*
Octopus	*Paralichthys albigutta*
Leiostomus xanthurus	*Scophthalmus aquosus*
Menticirrhus saxatilis	

* Observed species are those species that contributed less than 0.1%, by weight, of the sampled catch.

Table 3.6c. Overall species composition and mean catch per trip of the North Carolina near shore flounder trawl catches (n=31) sampled from December 2006 to March 2007.

Species	Weight (kg) Mean	Weight (kg) Percent	Number Mean	Number Percent	Mean fish weight (kg)	Percent freq. occur.
Parlichthys dentatus	3,317.1	93.1	3,371	95.8	0.984	83.9
Morone saxatilis	140.0	3.9	15	0.4	9.515	35.5
Lophius americanus	35.8	1.0	39	1.1	0.911	51.6
Cynoscion regalis	23.2	0.7	39	1.1	0.597	41.9
Limulus polyphemus	21.2	0.6	14	0.4	1.561	6.5
Cynoscion nebulosus	6.8	0.2	5	0.1	1.410	35.5
Micropogonias undulatus	6.3	0.2	16	0.5	0.394	45.2
Pogonias cromis	3.6	0.1	2	0.1	1.909	12.9
Loligo pealii	1.9	0.1	11	0.3	0.173	29.0

Observed Species*

Busycon carica	*Peprilus triacanthus*
Paralichthys lethostigma	*Busycon spp.*
Menticirrhus americanus	*Octopus vulgaris*
Stenotomus chrysops	*Raja eglanteria*
Menticirrhus spp.	*Urophycis* spp.
Centropristis striata	*Prionotus* spp.
Sciaenops ocellatus	*Archosargus probatocephalus*
Pomatomus saltatrix	*Menticirrhus saxatilis*
Busycotypus canaliculatus	*Mugil* spp.
Balistes capriscus	*Scophthalmus aquosus*
Octopus	

* Observed species are those species that contributed less than 0.1%, by weight, of the sampled catch.

Table 3.7a. Overall species composition and mean catch per trip of North Carolina deepwater flounder trawl catches sampled (n=78) from November 2004 to April 2005.

	Weight (kg)		Number		Mean fish	Percent
Species	Mean	Percent	Mean	Percent	weight (kg)	freq. occur.
Parlichthys dentatus	5,541.4	93.2	5,675	89.6	0.976	100.0
Centropristis striata	185.2	3.1	238	3.8	0.779	66.7
Pomatomus saltatrix	74.6	1.3	32	0.5	2.347	38.5
Lophius americanus	54.1	0.9	73	1.1	0.745	70.5
Loligo pealii	40.3	0.7	286	4.5	0.141	46.2
Stenotomus spp.	21.3	0.4	-	-	-	6.4
Placopecten magellanicus	14.3	0.2	-	-	-	24.4
Stenotomus chrysops	9.2	0.2	18	0.3	0.517	25.6
Glyptocephalus cynoglossus	3.3	0.1	7	0.1	0.450	30.8

Observed Species*

Caulolatilus microps	*Squalus acanthias*
Cynoscion regalis	*Raja eglanteria*
Micropogonias undulatus	*Leucoraga erinacea*
Peprilus triacanthus	*Leucoraga garmani*
Paralichthys oblongus	*Leucoraga radiata*
Balistes capriscus	*Urophycis chuss*
Sparidae	*Urophycis regia*
Busycon carica	*Antigonia capros*
Lopholatilus chamaeleonticeps	*Prionotus evolans*
Zenopsis conchifera	*Prionotus scitulus*
Merluccius bilinearis	*Tautoga onitis*
Cancer irroratus	*Scomber scombrus*

* Observed species are those species that contributed less than 0.1%, by weight, of the sampled catch.

Table 3.7b. Overall species composition and mean catch per trip of North Carolina deepwater flounder trawl catches sampled (n=63) from December 2005 to April 2006.

Species	Weight (kg) Mean	Weight (kg) Percent	Number Mean	Number Percent	Mean fish weight (kg)	Percent freq. occur.
Parlichthys dentatus	6,207.3	94.0	6,775	90.9	0.916	100.0
Stenostomus chrysops	153.6	2.3	234	3.1	0.657	31.7
Centropristis striata	110.8	1.7	139	1.9	0.799	66.7
Lophius americanus	45.5	0.7	56	0.7	0.820	60.3
Pomatomus saltatrix	27.8	0.4	11	0.1	2.542	39.7
Loligo pealii	35.4	0.5	211	2.8	0.167	63.5
Placopecten magellanicus	8.8	0.1	-	-	-	20.6
Glyptocephalus cynoglossus	6.8	0.1	17	0.2	0.402	23.8
Micropogonias undulatus	4.9	0.1	11	0.1	0.455	1.6

Observed Species*

Cynoscion regalis	*Cancridae*
Sparidae	*Squalus acanthias*
Paralichthys oblongus	*Raja eglanteria*
Busycon spp.	*Leucoraga erinacea*
Congridae	*Leucoraga ocellata*
Stenotomus spp.	*Leucoraga garmani*
Pollachius virens	*Leucoraga radiata*
Euthynnus alletteratus	*Urophycis regia*
Lopholatilus chamaeleonticeps	*Merluccius bilinearis*
Alosa sapidissima	*Prionotus carolinus*
Peprilus triacanthus	*Prionotus scitulus*
Scomber scombrus	*Pogonias cromis*

* Observed species are those species that contributed less than 0.1%, by weight, of the sampled catch.

Table 3.7c. Overall species composition and mean catch per trip of North Carolina deepwater flounder trawl catches sampled (n=67) from November 2006 to March 2007.

	Weight (kg)		Number		Mean fish	Percent
Species	Mean	Percent	Mean	Percent	weight (kg)	freq. occur.
Parlichthys dentatus	4,305.5	96.7	4,658	94.6	0.924	100.0
Lophius americanus	42.2	0.9	57	1.2	0.745	73.1
Centropristis striata	30.6	0.7	40	0.8	0.768	68.7
Loligo pealii	24.1	0.6	128	2.6	0.188	70.1
Pomatomus saltatrix	15.3	0.3	8	0.2	1.917	25.4
Loligo spp.	12.7	0.3	79	1.6	0.162	35.8
Stenotomus chrysops	12.4	0.3	23	0.5	0.537	41.8
Limulus polyphemus	9.9	0.2	7	0.1	1.361	1.5
Placopecten magellanicus	6.7	0.2	-	-	-	11.9

Observed Species*

Carcharhinus plumbeus	*Cancer irroratus*
Neogastropoda stenoglossa	*Squalus acanthias*
Cynoscion regalis	*Raja eglanteria*
Busycon spp.	*Leucoraga radiata*
Glyptocephalus cynoglossus	*Alosa mediocris*
Micropogonias undulatus	*Clupea harengus*
Caulolatilus microps	*Brevooritia tyrannus*
Merluccius bilinearis	*Etrumeus teres*
Paralichthys oblongus	*Zenopsis conchifera*
Balistes capriscus	*Prionotus carolinus*
Urophycis chuss	*Prionotus evolans*
Peprilus triacanthus	*Prionotus scitulus*
Homarus americanus	*Tautogolbarus adspersus*

* Observed species are those species that contributed less than 0.1%, by weight, of the sampled catch.

Table 3.8a. Overall species composition and mean catch per trip of North Carolina deepwater flynets and combination net catches (n=15) from January to April 2005.

Species	Weight (kg) Mean	Weight (kg) Percent	Number Mean	Number Percent	Mean fish weight (kg)	Percent freq. occur.
Stenotomus chrysops	3,034.2	66.9	6,490	72.3	0.467	80.0
Centropristis striata	1,368.8	30.2	1,735	19.3	0.789	100.0
Pomatomus saltatrix	52.3	1.2	27	0.3	1.910	33.3
Loligo pealii	69.5	1.5	678	7.6	0.102	46.7
Scomber scombrus	6.1	0.1	15	0.2	0.420	13.3
Peprilus triacanthus	2.8	0.1	19	0.2	0.148	26.7
Merluccius bilinearis	2.5	0.1	15	0.2	0.169	13.3
Observed Species*						
Cynoscion regalis						
Congridae						
Zenopsis ocellata						
Prionotus spp.						
Prionotus carolinus						

* Observed species are those species that contributed less than 0.1%, by weight, of the sampled catch.

Table 3.8b. Overall species composition and mean catch per trip of North Carolina deepwater flynets and combination net catches (n=9) from January to April 2006.

	Weight (kg)		Number		Mean fish	Percent
Species	Mean	Percent	Mean	Percent	weight (kg)	freq. occur.
Centropristis striata	1,974.0	52.2	2,929	48.1	0.674	100.0
Stenotomus chrysops	1,527.8	40.4	2,621	43	0.583	44.4
Pomatomus saltatrix	131.3	3.5	175	2.9	0.749	33.3
Cynoscion regalis	79.2	2.1	43	0.7	1.851	66.7
Loligo pealii	49.9	1.3	289	4.7	0.173	55.6
Lophius americanus	15.1	0.4	27	0.4	0.560	11.1
Parlichthys dentatus	5.0	0.1	4	0.1	1.227	11.1
Observed Species*						
Caulolatilus microps						
Peprilus triacanthus						

* Observed species are those species that contributed less than 0.1%, by weight, of the sampled catch.

Table 3.8c. Overall species composition and mean catch per trip of North Carolina deepwater flynets and combination net catches (n=12) from November 2006 to May 2007.

	Weight (kg)		Number		Mean fish	Percent
Species	Mean	Percent	Mean	Percent	weight (kg)	freq. occur.
Micropogonias undulatus	2,181.1	46.4	7,513	65.9	0.290	8.3
Centropristis striata	1,521.0	32.3	1,907	16.7	0.798	83.3
Stenotomus chrysops	653.8	13.9	1,074	9.4	0.609	50.0
Pomatomus saltatrix	117.4	2.5	98	0.9	1.201	41.7
Loligo pealii	80.4	1.7	381	2.3	0.210	58.3
Parlichthys dentatus	73.3	1.6	91	0.8	0.802	33.3
Cynoscion regalis	21.1	0.4	54	0.5	0.394	16.7
Peprilus triacanthus	14.6	0.3	121	1.1	0.121	25.0
Leiostomus xanthurus	11.3	0.2	104	0.9	0.109	8.3
Lophius americanus	6.3	0.1	7	0.1	0.839	25.0
Mustelus canis	5.1	0.1	8	0.1	0.623	8.3
Tylosurus crocodilus	4.9	0.1	5	0.0	0.905	8.3

Observed Species*

Rachycentron canadum	*Paralichthys albigutta*
Selene setapinnis	*Tautoga onitis*
Scomber scombrus	*Ophidiidae*
Archosargus probatocephalus	*Stenotomus caprinus*
Rhinoptera bonasus	*Raja eglanteria*
Chaetodipterus faber	*Merluccius bilinearis*
Pogonias cromis	*Prionotus evolans*
Sarda sarda	*Prionotus scitulus*
Caranx crysos	*Paralichthys oblongus*
Caulolatilus microps	*Sphoeroides maculatus*
Balistes spp.	

* Observed species are those species that contributed less than 0.1%, by weight, of the sampled catch.

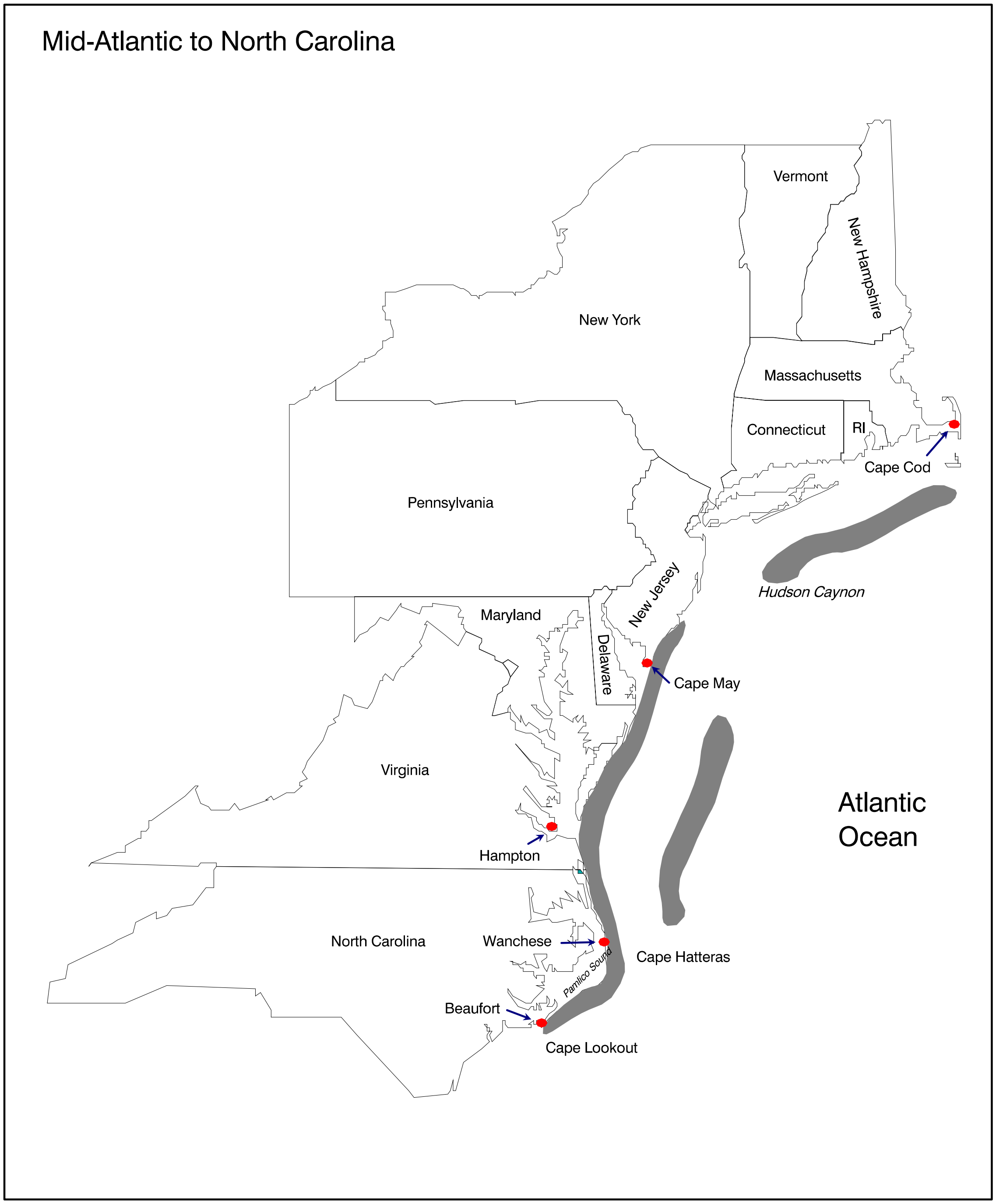


Figure 3.1. Primary fishing grounds (shaded areas) of North Carolina's winter trawl fishery. Fishing depths range from 5 to 90 fathoms.

ASSESSMENT OF NORTH CAROLINA COMMERCIAL FINFISHERIES

Final Performance Report for Award Number NA04NMF4070216

November 2007

FISHERY SECTION 4

SINK NET FISHERY ASSESSMENT

JOB 3

by

Beth Burns

ABSTRACT

The sink net fishery is a multi-species ocean gill net fishery that harvests fish off North Carolina, year-round, with effort shifting depending on available species distribution and marketability. The primary species targeted by this fishery are weakfish (*Cynoscion regalis*), bluefish (*Pomatomus saltatrix*), and Atlantic croaker (*Micropogonias undulatus*). Significant effort on spiny dogfish (*Squalus acanthias*) and monkfish (*Lophius americanus*) occurred in the 1990s but has been reduced because of current regulations. Several subfisheries of the ocean gill net fishery were sampled: the traditional sink net fishery, which targets weakfish, bluefish and Atlantic croaker during the fall and winter months; a summer sink net fishery which targets Spanish mackerel; a small mesh anchored gill net fishery where nets are set overnight near shore for kingfishes (*Menticirrhus* spp.), spot (*Leiostomus xanthurus*), weakfish, bluefish and Spanish mackerel (*Scomberomorus maculatus*), a large mesh anchored gill net fishery that targets monkfish; and a runaround gill net fishery that targets striped mullet. Ocean gill net catches were sampled throughout the fishing season (2004-2005, 2005-2006, 2006-2007) from the Virginia border to the South Carolina border. Catches were analyzed by gear types, areas fished, species compositions, and fishing seasons to characterize the catch. Mean catch weights of traditional winter sink net samples averaged 1,646 kg/trip. Bluefish and Atlantic croaker were the dominant species in the catches sampled. Mean catch weights of summer sink net samples averaged 239 kg/trip and were primarily composed of Spanish mackerel. Mean catch weights of anchored gill net samples averaged 366 kg/trip. Monkfish was the dominant species in the large mesh anchored gill net fishery and kingfishes and spot dominated the small mesh anchored gill net fishery. Mean catch weights of runaround gill nets was 400 kg/trip and striped mullet predominated the catch. Mean total landings by ocean gill nets from 2000-01 to 2003-04 (5,009 mt) was 40% lower than the mean total landings from 1995-00 (8,349 mt) because regulations ended a directed spiny dogfish fishery. Total landings continued to decline with 2004-05 to 2006-07 landings 25% lower than 2000-01 to 2003-04. The decline in recent years was attributable to continued decreases in landings of monkfish and weakfish, and decreased landings of bluefish in 2006-07.

INTRODUCTION

The “traditional” sink net fishery is a multi-species gill net fishery that harvests fish in the ocean off North Carolina, year-round, with effort shifting depending on species availability and marketability. The primary species traditionally targeted by this fishery during the fall and winter months are weakfish (*Cynoscion regalis*), bluefish (*Pomatomus saltatrix*), and Atlantic croaker (*Micropogonias undulatus*), and a summer fishery targets Spanish mackerel (*Scomberomorus maculatus*). Effort was directed toward spiny dogfish (*Squalus acanthias*) and monkfish (*Lophius americanus*) in the 1990s. This effort has been significantly reduced because of regulations (MAFMC and NEFMC 1998, ASMFC 2002, Department of Commerce (DOC) 1998, DOC 2002). “Traditional” sink nets are heavily weighted monofilament gill nets designed to fish just above the bottom. Most nets are 3.7-4.6 m (12-15 ft) deep. Large buoys or “high flyers” are attached to both ends of the net by enough line to allow the net to sink freely. Anchors are not generally employed, as vessels remain in the general vicinity while the nets are fishing, and the nets are retrieved at the end of the day (Ross 1989). The use of anchored gill nets became more prevalent in the 1990s, representing a necessary change in fishing techniques when nets are required to fish overnight or under rough weather conditions for spiny dogfish, monkfish and in the near shore anchored gill net fishery.

The traditional sink net fishery of North Carolina’s Outer Banks is a fishery that had its beginnings off Hatteras in the 1920s. At that time several crews fished between Cape Hatteras and Hatteras Inlet during the winter months in 7.6-7.9 m (25-26 ft) round stern boats with displacement hulls, where they set 274-365 m (300-400 yd) of 63-76 mm (2.5-3 in) stretch mesh cotton gill net for weakfish and Atlantic croaker (Ross 1989). During the 1930s as many as 35 boats fished out of Hatteras, including three or four 10.7-12.2 m (35-40 ft) vessels locally built specifically for this fishery. These boats were low-sided, round stern craft without cabins to allow fouled nets to be lifted up and over the boat. After World War II, fishing was good for a few years, but landings declined as prices decreased. Little sink netting occurred in the 1950s and 1960s because of the lack of weakfish and Atlantic croaker (Ross and Moye 1989).

The resurgence of sink netting off Cape Hatteras began in the late 1970s and was enhanced by the increased abundance of weakfish and bluefish, as well as the availability of hydraulic net reels. The use of net reels was initially suggested by Sea Grant agents to assist fishermen with their striped bass (*Morone saxatilis*) nets to reduce crew size and speed up the net handling process. Vessels most commonly used in the current fishery are 10.7-13.7 m (35-45 ft) with low sides and large cockpits to hold fish on the deck, such as New England lobster type boats, Chesapeake Bay rigs, and Wanchese-built craft. Most of the vessels need to be versatile enough to be used for other fishing seasons such as offshore for tuna (*Thunnus* spp.), king mackerel (*Scomberomorus cavalla*), and black sea bass/snapper/grouper fishing, or inshore for gill netting, long haul seining and crabbing (Ross 1989).

Fishing grounds extend from the Virginia/North Carolina border to the North Carolina/South Carolina border with the primary fishing areas from Oregon Inlet to Drum Inlet (Figure 4.1). The duration and extent of the traditional fall and winter ocean sink net fishing season is weather dependent with warm winters resulting in smaller catches and a shorter fishing season due to fish remaining north of the fishing grounds. Warmer falls in recent years has extended the summer fishing season with many fishermen targeting Spanish mackerel through the month of September, with most of the effort occurring from Cape Hatteras to Southport.

The sink net fleet lands their catches in ports from Wanchese to Southport. The fleet historically was concentrated in Wanchese and Hatteras from December through April, but warmer climatic conditions have forced the fleet to fish predominantly out of Wanchese in recent years. Throughout the season, additional vessels out of Ocracoke use Ocracoke Inlet, and boats from Swan Quarter and Engelhard use either Ocracoke or Hatteras inlets. The central and southern fleets extend from Cape Lookout to Southport. Boats from Morehead City, Beaufort and Harkers Island fish in the Cape Lookout area, and boats from the southern counties (Onslow, Pender, New Hanover, and Brunswick) fish from Sneads Ferry to the South Carolina border (Figure 4.1).

Vessels fishing out of Oregon Inlet targeting Atlantic croaker and weakfish primarily fish from Oregon Inlet to Avon Rocks and secondarily from Oregon Inlet to Kitty Hawk in depths ranging from 5-27 m. Vessels that target bluefish cover a much broader area, from just off of the Hatteras Island beaches to Wimble Shoals to as far as 56 km offshore of Oregon Inlet, in depths from 2-90 m. Vessels out of Hatteras Inlet fish for weakfish, Atlantic croaker, bluefish and kingfishes in depths from 3-27 m primarily in the Hatteras Bight, but frequently fish as far north as Avon Rocks and south to Ocracoke Inlet. Vessels from Bardens and Beaufort inlets fish for Atlantic croaker, weakfish, kingfishes (*Menticirrhus* spp.) and spot (*Leiostomus xanthurus*) from Drum Inlet, south to Cape Lookout shoals and west to Bogue Inlet in depths from 7-16 m. Vessels from the southern counties fish primarily for kingfishes, spot and weakfish in depths from the surf zone to approximately 9 m from Sneads Ferry to the South Carolina border.

Net sizes most prevalent in the fishery are 64-76 mm (2.5-3 in) stretched mesh for spot and kingfishes, 73-89 mm (2.9-3.5 in) stretched mesh for weakfish and medium bluefish, 102-111 mm (4-4.38 in) stretched mesh for Atlantic croaker, and 114-152 mm (4.5-6 in) stretched mesh for large bluefish and weakfish. The mesh sizes for Atlantic croaker and weakfish have increased over the years because the larger fish yield a better price and are easier to pick from the net than fish from smaller mesh that are less profitable and more labor intensive to remove from the nets.

A significant spiny dogfish fishery occurred from 1991 to 2000, however the federal spiny dogfish FMP established low annual quotas and trip limits which ended the directed fishery in

North Carolina (MAFMC and NEFMC 1998). No landings occurred in North Carolina when the plan was implemented in April 2000, and limited landings have occurred in recent years since trip limits and quotas were initiated in May 2003. When the fishery was active it occurred from November to April with peak catches occurring in February and March. Net sizes ranging from 127-165 mm (5-6.5 in) stretched mesh were used to meet the market demand for large fish. The fishery primarily occurred from Oregon Inlet to Ocracoke Inlet and secondarily from Cape Lookout to Bogue Inlet.

The monkfish fishery uses large mesh gill nets that are predominantly 305 mm (12 in) stretched mesh from Currituck Beach to Wimble Shoals. Vessels targeting monkfish historically fished from offshore Oregon Inlet to offshore Currituck Beach in depths up to 70 m. However large mesh gill net restrictions in federal waters restricted fishing to near shore waters from March 15 to April 15 in depths from 15-20 m (DOC 2002). During this time, fishermen harvesting monkfish in state waters using gill nets greater than seven inches stretched mesh must hold a valid NC Monkfish Large Mesh Gill Net Permit and limit fishing activity to a mile wide area extending two miles seaward of the coastline from the NC/VA state line southward to Wimble Shoals. These restrictions have resulted in significant decreases in monkfish landings.

The small mesh anchored gill net fishery uses 64-76 mm (2.5-3 in) stretched mesh gill nets that are left overnight and fished daily for a variety of species including kingfishes, weakfish, butterfish (*Peprilus triacanthus*), spot, bluefish and Spanish mackerel (*Scomberomorus maculatus*). Small mesh anchored gill net fishing historically occurred southwest of Morehead City to the South Carolina border, but effort has increased from Oregon Inlet to Ocracoke Inlet. Anchored gill net catches differ from sink net catches in that they are not as common, the catch composition is more diverse and fishing effort is highest during the earliest and latest months of the traditional sink net season, but does occur year-round. There is also a spot fishery that uses anchored gill nets near shore during September and October statewide, but is particularly active in the southernmost portions of the state between Wilmington and Southport. These nets are often fished in conjunction with beach haul seines, so increased landings in the fall months are likely a combination of these two gears collectively landed as “sink net catches”.

Runaround gill nets, also referred to as strike nets, are set to encircle or “wrap up” a school of fish. Runaround nets are primarily used to target striped mullet (*Mugil cephalus*) during the fall and winter months. Net sizes range from 83-102 mm (3.2-4 in) stretched mesh. Fishing primarily occurred in the southern region of the coast, west of Cape Lookout (Figure 4.1).

The North Carolina Division of Marine Fisheries (NCDMF) initiated a statewide sampling program covering the dominant commercial finfisheries in 1982. The objective was to obtain biological and fisheries data on economically important finfishes for use in reaching management decisions. The objectives of this report are to present the species composition, relative abundance, distribution and seasonal variations of the 2004 to 2007 ocean gill net catches. Catch-per-unit effort and landings data are presented and compared with species and fishery specific data from the 1995-96 to 2003-04 fishing seasons.

METHODS AND MATERIALS

Sink nets, anchored gill net, and runaround gill net catches were sampled as they were prosecuted and analyzed on a seasonal basis from 2004 to 2007. Samples were taken at fish packing houses while the catches were being off loaded. For all gear types, the captain or crew members were interviewed, when available, to obtain information including area and depth fished, days at sea, gear(s) used including mesh size and length of gill nets. Catches were sampled weekly when available in the three regions along the coast: Northern (Virginia border to Cape Hatteras), Central (Cape Hatteras to Cape Lookout) and southern (Cape Lookout to South Carolina border). The number of samples collected in each region depended on fishing activity. A minimum of two catches per month for each region was sampled when fishing activity took place.

Random samples of culled catches were taken to ensure adequate coverage of all species in the catches. This process involved randomly sampling one or more 22.7 kg (50 lb.) cartons of each species' market category or grade (small, medium, large, jumbo, etc.). More cartons of larger grades were sampled since they contain fewer fish. Each sample was weighed to the nearest 0.1 kg, individual fish measured to the nearest millimeter (FL or TL) and weighed to the nearest 0.1 kg, and the total number of fish recorded. If the individuals in the carton were too numerous to measure, at least 30 were measured and the remainder counted. Market categories of species totaling less than 22.7 kg were also weighed and measured to get a representative sample of the entire catch. The total catch weight of each market category for each species was obtained from the fish house dealer's records. In cases where the weight of particular species' market grades were included on the trip ticket but were not sampled, an estimate of the number of fish landed for the grade was made by using the mean weight per individual from samples of that species and grade from the same month from the same area. Species numerical abundance was calculated by determining the number of individuals/market grade and then summing all the market grades for each species. Catches were analyzed by gear type (sink nets, anchored gill nets, and runaround gill nets), by region (Northern, Central and Southern) and by "fishing season", i.e. June 2004-May 2005 (2004-05), June 2005-May 2006 (2005-06) and June 2006-May 2007 (2006-07).

Landings refer to the commercial landings in metric tons (mt) derived from the NCDMF mandatory dealer trip ticket reporting program, which was implemented in 1994. Any historical landings prior to 1994 were derived from the National Marine Fisheries Service (NMFS) Cooperative Fisheries Statistics Program.

RESULTS AND DISCUSSION

Sink Net Catch Rates

Traditional Winter Sink Nets

A total of 122 winter sink net catches was sampled in the 2004-05 season, of which 62% (n= 76) were from north of Cape Hatteras (Table 4.1a). Catches ranged from 35 to 8,771 kg/trip and averaged 1,758 kg/trip. A total of 117 sink net catches was sampled during the 2005-06 season, of which 69% (n= 81) were from north of Cape Hatteras (Table 4.1b). Catches ranged from 12 to 10,706 kg/trip and averaged 2,035 kg/trip. A total of 131 sink net catches were sampled during the 2006-07 season, of which 54% (n= 71) of the catches were from north of Cape Hatteras, and 44% (n=58) were from Cape Hatteras-Cape Lookout (Table 4.1c). Catches ranged from 16 to 11,313 kg/trip and averaged 1,194 kg/trip.

Mean catch rates for the traditional winter sink net fishery fluctuated from highs in 1999-00 (2,091 kg/trip) to lows in 1991-92 (845 kg/trip). Historical mean catch rates for the traditional winter sink net fishery for 1982-1989 ranged from 1,151 to 1,784 kg/trip, but decreased to 948 kg/trip in 1990-91 and 845 kg/trip in 1991-92 (Ross 1989, NCDMF 1992). Mean catch rates since the 1992-93 season displayed an increasing trend with peak mean catches during the 1999-00 (2,091 kg/trip) and 2000-01 (2,030 kg/trip) seasons (NCDMF 1996, NCDMF 1997, NCDMF 2001). Seasonal mean catch decreased to 1,507 kg/trip during 2001-02, and averaged 1,721 kg/trip during 2000-2003 (NCDMF 2004). Catch weights were 1,758 kg/trip in 2004-05, but increased to 2,035 kg/trip in 2005-06; reaching levels similar to highs recorded in 2000-01. However, the mean catch declined the following season to only 1,194 kg/trip during 2006-07, and the 2004-2007 average catch decreased to 1,662 kg/trip.

Average individual catches sampled north of Cape Hatteras decreased from 2,366 kg/trip in 2004-05 to 1,848 kg/trip in 2006-07 and ranged from 39 to 11,313 kg (Tables 4.1a-c). Average individual catches between Cape Hatteras and Cape Lookout steadily decreased from 779 kg/trip in 2004-05 to 431 kg/trip in 2006-07 and ranged from 12 to 5,823 kg. Average individual catches west of Cape Lookout greatly decreased from 667 kg/trip in 2004-05 to 148-149 kg/trip in 2005-06 & 2006-07. Individual catches sampled over these seasons ranged from 12 to 11,313 kg/trip (Tables 4.1a-c).

Summer Sink Nets

A total of 9 summer sink net catches was sampled in July-September 2006, 89% were from Cape Hatteras to Cape Lookout (Table 4.2). Catches ranged from 34 to 1,083 kg/trip and averaged 334 kg/trip. A total of 6 summer sink net catches was sampled during June 2007, with 50% from Cape Hatteras to Cape Lookout, and 33% from west of Cape Lookout. Catches sampled ranged from 36 kg to 131 kg, and average 96 kg/trip (Table 4.2). The small sample sizes preclude any analyses of catch trends.

Anchored Gill Net Catch Rates

A total of 56 anchored gill net catches was sampled in the 2004-05 season, of which 77% (n= 43) were from west of Cape Lookout (Table 4.3a). Catches ranged from 23 to 917 kg/trip and averaged 236 kg/trip. A total of 67 anchored gill net catches was sampled during the 2005-06 season, of which 39% (n=26) were from west of Cape Lookout, 33% (n=22) were from north of Cape Hatteras, and 28% (n=19) from Cape Hatteras to Cape Lookout (Table 4.3b). Catches ranged from 18 to 3,924 kg/trip and averaged 553 kg/trip. A total of 60 anchored gill net catches was sampled in the 2006-07 season, of which 37% (n= 22) were from Cape Hatteras to Cape Lookout, 33% (n=20) were from north of Cape Hatteras, and 30% (n=18) were from west of Cape Lookout (Table 4.3c). Catches ranged from 15 to 1,434 kg/trip and averaged 280 kg/trip. Effort had historically been highest north of Cape Hatteras, but since the end of a spiny dogfish fishery in 2000 (NCDMF 2001), effort by anchored gill nets shifted such that the southern (west of Cape Lookout) area predominated through 2004-2005. However another shift in effort has occurred in recent years, such that anchored gill nets are equally prevalent in all areas north and south of Cape Hatteras to west of Cape Lookout.

Individual catches north of Cape Hatteras seasonally averaged 410 kg/trip in the 2004-05 season, to 968 kg/trip in the 2005-06, and 361 kg/trip in 2006-07 and ranged from 55 to 3,924 kg/trip (Tables 4.3 a-c). Individual catches from samples collected between Cape Hatteras and Cape Lookout seasonally averaged 231-544 kg/trip and ranged from 15-2,691 kg/trip (Tables 4.3 a-c). Individual catches west of Cape Lookout seasonally averaged 191 kg/trip in 2004-05 to 248 kg/trip during the 2006-07 season and ranged from 23 to 894 kg/trip (Tables 4.3a-c). Mean catches in the Northern and Central regions significantly decreased since the 1999-00 season because the spiny dogfish fishery ended in 2000 (NCDMF 2001).

Runaround Gill Net Catch Rates

A total of 8 runaround gill net catches was sampled during 2004-2006, all samples were from west of Cape Lookout (Table 4.4). Catches ranged from 35-904 kg/trip and averaged 400 kg/trip. Mean catch was highest during the month of October.

Trends in Total Landings

Total finfish landings by North Carolina ocean gill nets steadily increased from 1982-83 to 1987-88, declined significantly from 1988-89 to 1990-91 (NCDMF 2001) and increased from 1991-92 to 1995-96 when landings peaked at 10,101 mt, and have since generally declined (Table 4.5). The mean total landings from 1991-92 to 1999-00 were 80% higher than the mean total landings from 1982-83 to 1990-91 as a result of very high landings of spiny dogfish. Mean total landings from 2000-01 to 2002-03 decreased by 35% from the 1990s because of the large scale directed spiny dogfish fishery ended in April 2000 (NCDMF 2004), although it should be mentioned that the fishery has been allowed on a very small scale since May 2003.

Landings reported in the 1980s were largely driven by exceptional catches of weakfish, but as weakfish landings remained suppressed in the 1990s, overall landings were balanced by continued good landings of bluefish and a noticeable increase in Atlantic croaker landings. Many crews switched back to traditional winter sink netting after the anchored gill net fishery for spiny dogfish ended. Additional crews left the sink net fishery entirely to participate in the shark long line fishery, commercial king mackerel fishing or charter fishing.

Since 1982, bluefish landings by ocean gill nets peaked at 1,461 mt during 2000-01 (NCDMF 2004; Table 4.5). Since the high in 2000-01, bluefish landings have fluctuated from 872 mt in 2001-02 to 1,377 mt in 2003-04. During 2004-2007, bluefish landings by ocean gill nets have increased from 1,092 mt in 2004-05 to 1,197mt in 2005-06, but decreased to 664 kg/trip in 2006-07. Dare and Hyde counties accounted for 79-99% of the total landings of North Carolina's ocean gill net bluefish landings since 1982, and >98% since 2001.

Total landings of Atlantic croaker by ocean gill nets in 2000-01, 2001-02, and 2004-05 were among the highest since the NCDMF began sampling the fishery in 1982 with landings ranging from 2,082 to 2,242 mt. Peak Atlantic croaker landings occurred from 1984-85 to 1987-88 (mean weight = 1,246 mt) (NCDMF 2004) and from 1995-96 to 2005-06 (mean weight = 1,853 mt) (Table 4.5). A period of low landings from 1988-89 to 1994-95 (mean weight = 513 mt) occurred between the two peak periods (NCDMF 2004). Carteret County was responsible for 56-84% of the total Atlantic croaker landings from 1982-83 to 1988-89, while the southern counties comprised 32-36% of the total landings during the 1989-90 and 1990-91 seasons. In recent years, Dare and Hyde counties dominated total Atlantic croaker landings from 2000-01 to 2006-07, ranging from 95% to nearly 100% of total landings (Table 4.5).

Ocean gill net landings of weakfish continued to decline from 2000-01 to 2006-07 with only 31 mt landed in 2006-07 (Table 4.5). Mean total landings of weakfish from 1982-83 to 1992-93 was 1,667 mt (NCDMF 2004) but was only 480 mt from 1995-96 to 2006-07. Dare and Hyde counties contributed 73-96% of the total ocean gill net landings of weakfish for most of the years sampled. During the 1989-90 and 1990-91 seasons, only 45-59% of the weakfish landings came from these two counties, while 31-35% came from the southern counties

(NCDMF 2004). Only 53-55% of the total weakfish landings came from Dare and Hyde counties from 1996-97 to 1998-99 while 41-43% of the landings came from Carteret County (Table 4.5). Total weakfish landings from 1999-00 to 2002-03 were again concentrated in Dare and Hyde counties with 92-97% of the total landings coming from these two counties. During 2003-04 to 2005-06, the contribution from Dare/Hyde counties decreased to 59-72%. Most noteable was the change in distribution during the 2006-2007 season when Dare/Hyde accounted for only 40% of the weakfish landings, and for the first time, 49% of the landings were from southern counties (Onslow, Pender, New Hanover, Brunswick).

Ocean gill net landings of dogfish sharks (smooth, *Mustelus canis*, and spiny) were negligible until a directed fishery for spiny dogfish began in North Carolina during the 1991-92 season. Landings peaked during the 1996-97 season at 4,791 mt and averaged 3,537 mt from 1991-92 to 1999-00 (NCDMF 2004). Dare and Hyde counties accounted for 85-100% of the total dogfish landings, but a small directed fishery in Carteret County contributed 6-10% of the dogfish landings from 1996-97 to 1999-00 (Table 4.5). Dogfish landings were still an important component of the ocean gill net fishery through 1999 despite decreased landings that averaged 2,372 mt in 1997-98 and 1998-99. Most of the dogfish landed from 2000-01 to 2006-07 were smooth dogfish since the directed spiny dogfish fishery was prohibited (except for January-February 2004). Since May 2003, the fishery has been quota managed with harvest periods and trip limits, and landings averaged 299 mt from 2004-2007. Dare and Hyde counties accounted for 96-98% of the landings, and the southern area, west of Cape Lookout accounted for 2-4% of the landings.

Total ocean gill net landings from Dare and Hyde counties increased from 50-68% during the 1982-83 to 1989-90 seasons to 73-89% during the 1995-96 to 2006-07 seasons (NCDMF 2004, Table 4.5). Ocean gill net landings from Carteret County decreased from 25-41% during the 1982-83 to 1988-89 seasons (NCDMF 2004). Ocean gill net landings from Carteret County continued to decrease from 19% during 1997-98 to only 3% in 2006-07 (Table 4.5). Significant changes in the contribution of ocean gill net landings by county began with the expansion of the spiny dogfish fishery. However, the increasing proportion of landings from Dare and Hyde counties and the decreasing proportion of landings from Carteret County continued after the spiny dogfish fishery ended. Disregarding dogfish, changes in landings by county are a reflection of increased landings of Atlantic croaker and bluefish in Dare and Hyde counties, and the decreased landings of Atlantic croaker and weakfish in Carteret County (Table 4.5)

Sink Net Species Composition

Traditional Winter Sink Nets

Bluefish and Atlantic croaker were the dominant species by weight in the traditional winter sink net catches from 2004-05 to 2006-07, ranging from 79-91% of the catches sampled

(Tables 4.6 a-c). In 2004-05 Bluefish accounted for 47% of the weight and 13% of the number of fish in the catches sampled. Atlantic croaker accounted for 42% of the weight and 69% of the number of fish in the catches sampled, and together they comprised 90% of the weight of the fish in the catches sampled (Table 4.6a). Bluefish accounted for 56% of the weight and 16% of the number of fish in the catches sampled in 2005-06 (Table 4.6b). Atlantic croaker accounted for 35% of the weight and 65% of the number of fish in the catches sampled. Together, bluefish and Atlantic croaker accounted for 91% of the weight, and 81% of the number of the 2005-06 catches sampled. In 2006-07, Atlantic croaker accounted for 42% of the weight and 68% of the number of fish in the catches sampled. Bluefish accounted for 37% of the weight and <10% of the number of fish in the 2006-07 catches sampled. Collectively, bluefish, Atlantic croaker and spiny dogfish accounted for 91% of the weight, and 81% of the number of catches sampled (Table 4.6c).

Weakfish landings continued to decline and comprise an even smaller component of the winter sink net catches than in the past, as they contributed only 2.5, 2.3, and 1.9 % (by weight) of the catches sampled from 2004-05 to 2006-07 (Tables 4.6a-c). Weakfish was the dominant species in sink net catches before 1995-96 with exceptions occurring during the 1989-90 and 1990-91 seasons when bluefish became the dominant species (Ross 1989, NCDMF 1992, NCDMF 1996, NCDMF 1997, NCDMF 2001). Reductions in the availability of weakfish forced the sink net fleet to increase effort on other species such as spiny dogfish, Atlantic croaker, bluefish and kingfishes.

Atlantic croaker was historically the third most important species by weight during most seasons, but their contribution increased notably since the mid 1990's. The contribution of Atlantic croaker to the catch weight composition increased from 0.1-8% from 1982-83 to 1990-91, to 15-43% since the 1995-96 season (Ross 1989, NCDMF 1992, NCDMF 1996, NCDMF 1997 NCDMF 2001, NCDMF 2004), and their contribution has remained 35-42% from 2004-05 to 2006-07.

Sink net catches north of Cape Hatteras and between Cape Hatteras and Cape Lookout were similar from 1987-88 to 1992-93 where weakfish and bluefish dominated the catches (NCDMF 1992, NCDMF 1996). However, significant changes in species compositions between these two regions have occurred since then. Bluefish dominated catches north of Cape Hatteras from 2004-05 to 2005-06 with mean catches ranging from 1,251 kg/trip in 2004-05 to 1,647 kg/trip in 2005-06 (Table 4.7). For the first time Atlantic croaker dominated the catches north of Cape Hatteras in 2006-07 with a mean catch weight of 931 kg/trip. Between Cape Hatteras and Cape Lookout, Atlantic croaker by weight accounted for 57% of the catches sampled in 2004-05 and 36% of the catches sampled in 2005-06. In 2005-06, Atlantic croaker, weakfish, and kingfish collectively accounted for 88% of the catches sampled. The 2006-07 season was similar to the 2003-04 catch composition, as spiny dogfish accounted for 70% by weight of the catches sampled. Most of the directed fishery for spiny dogfish was concentrated from Cape Hatteras to Ocracoke Inlet in 2006-07 (Figure 1).

Fewer sink net samples were collected west of Cape Lookout because fishing effort using this gear was much less than the other regions. Spot and bluefish were the dominant species sampled in this region during the 2004-05 and 2005-06 seasons (Table 4.7). Spot comprised 66% of the 2004-05 samples, while bluefish, spot, and kingfish collectively accounted for 89% of the 2005-06 samples. Striped bass accounted for 100% of the total weight of the samples in 2006-07, but only 2 samples were collected, each of them obviously targeted striped bass during a limited season.

Summer Sink Net Species Composition

The summer sink net fishery specifically targets Spanish mackerel in the ocean during the summer months. Spanish mackerel accounted for 73-88% of the catches sampled (Tables 4.8a-b), and mean catch weights were 293 kg/trip in 2006 and 71 kg/trip in 2007. Unfortunately, no samples were collected in the summer of 2005, and the total sample numbers for 2006 (n=9) & 2007 (n=6) were limited. Bluefish were the second most important species caught, by weight, as they comprised 10-21% of the total catch weights, and averaged 20-32 kg/trip.

Anchored Gill Net Species Composition

Anchored gill net catches sampled during the 2004-05 to 2006-07 seasons included both large mesh (305 mm stretched mesh) and small mesh (64-76 mm stretched mesh) trips. Monkfish accounted for 13%, 18% and 23% of the catch weights each year but only 2-3% of the number of fish sampled because the mean weight (2.0-3.3 kg, gutted weight) was much higher than the species landed in small mesh anchored gill nets (Tables 4.9 a-c). Kingfishes comprised 22-48% of the catch weights and 26-58% of the number of fish sampled. Southern kingfish were the dominant species, but northern and Gulf kingfish also contributed to the catch. Spot accounted for 8-12% of the catch weights, 13-24% of the number of fish sampled, and a mean catch of 20-47 kg/trip (Table 4.9a-c). Weakfish had historically comprised the majority of species caught between Cape Hatteras and Cape Lookout with catches averaging 328 kg/trip (NCDMF 2004), but were a minor component of recent catches, constituting 5-18% of the catch weights, 6-18% of the number of fish, and mean catch weights of only 13-102 kg/trip.

Both large and small mesh anchored gill net catches were sampled north of Cape Hatteras, but only small mesh catches were sampled south of Cape Hatteras because no trips targeting monkfish occurred south of Wimble Shoals (Figure 4.1). Monkfish dominated catches north of Cape Hatteras during the 2004-05 to 2006-07 seasons with mean catches ranging from 153 kg/trip in 2004-05 to 317 kg/trip in 2005-06 (Table 4.10). Monkfish catches are severely reduced from previously reported landings due to seasonal closures in state and Federal waters. A variety of species contributed to the total catch weights of the small mesh anchored gill net fishery north of Cape Hatteras, with no one species dominating the catch compositions. Weakfish, Atlantic croaker, bluefish and kingfishes cumulatively accounted for 58% by weight of the catches sampled in 2004-05, and together with Spanish mackerel accounted for 58% of the catch of samples in 2005-06. Spanish mackerel, kingfishes, bluefish and weakfish accounted for 46% of the catch weights in 2006-07.

The species composition of anchored gill net catches from Cape Hatteras to Cape Lookout was diverse and varied by season. The only season when weakfish was the dominant species by weight (39%) of the catches sampled was the 2004-05 season, Cape Hatteras to Cape Lookout, but only 2 catches were sampled. Kingfishes comprised 40% of the catch weight and averaged 217 kg/trip 2005-06. Smooth dogfish and kingfishes cumulatively accounted for 57% of the catch sampled in 2006-07. Smooth dogfish catch weights averaged 67 kg/trip, and kingfishes averaged 64 kg/trip.

Spot dominated catches west of Cape Lookout during the 2005-06 and 2006-07 seasons with mean catches ranging from 106 kg/trip in 2005-06 to 104 kg/trip in 2006-07 (Table 4.10). Kingfishes were also a significant species as they contributed 67% of the 2004-05 catch weights, and mean catches ranged from 73 kg/trip in 2005-06 to 127 kg/trip in 2004-05.

Runaround Gill Net Species Composition

Runaround gill nets are specifically utilized in the ocean during the fall and winter months to target striped mullet in areas south and west of Cape Lookout. Striped mullet comprised 74-99% by weight and 78-99% of the number of fish in the 2004-2006 samples (Table 4.11a-c). Mean catch weights ranged from 199 kg/trip (2004-05) to 774 kg/trip (2005). The number of samples obtained from this fishery are extremely limited, but were included herein to help characterize another type of ocean gill net that is prosecuted along the coast of North Carolina.

Scrapfish

The amount of unmarketable finfish landed by ocean gill nets was negligible. The size selectivity of gill nets and the targeting of key market species prevent an abundance of undersized and unmarketable fish. Unmarketable fish caught by ocean gill nets are often used as bait in the blue crab pot fishery. Crews are also known to withhold and offload bycatch species such as Atlantic menhaden (*Brevoortia tyrannus*) to other fishermen and local tackle shops for concurrent fisheries that have a need for bait such as commercial and recreational (charter and private) boats that target king mackerel and bluefin tuna (*Thunnus thynnus*).

Management Issues

Whereas mesh size restrictions or gear modifications may be necessary for some fisheries to ensure the escapement of undersized fish before they are landed, they may not be necessary for the ocean gill net fishery. With specified size limits, the fleet selects mesh sizes that target marketable sized fish. The sink net fleet has historically produced minimal discards or bait compared to other North Carolina fisheries. However, regulatory discards of protected species such as sturgeons (*Acipenser* sp.) and quota managed species such as striped bass and spiny dogfish has increased as more regulations are initiated.

The spiny dogfish fishery, unregulated since its development in the New England states during the late 1980s, is now under strict management measures. The directed fishery of the 1990s resulted in very low mature female biomass and continued poor pup production (ASMFC 2002). Regulations in place since April 2000 established a 4 million pound coastwide quota and eliminated the directed fishery by establishing low trip limits, and was increased to 6 million pounds in 2006-07. Because the quota is reached quickly, North Carolina has not had significant spiny dogfish landings since the 1999-00 season. Spiny dogfish are a common bycatch in sink net trips that target Atlantic croaker, bluefish and weakfish, but the short soak times of these nets combined with the low water temperatures should result in low levels of discard mortality.

The federal monkfish fishery management plan established annual quotas, limited entry into the directed fishery, days at sea allocations and trip limits, but still allows the traditional incidental catch to occur (NEFMC and MAFMC 1998). State regulations prohibit the use of large mesh gill nets greater than 178 mm (7 in) stretched mesh from April 15 to December 15 (Rule 15A NCAC 3J .0202 (7)) (NCMFC 2003). Large mesh gill net restrictions to protect harbor porpoise in state and federal waters and sea turtles in federal waters has limited the directed monkfish gill net fishery to a one month period (March 15 to April 15) in state waters only (DOC 1998, DOC 2002). The federal Bottlenose Dolphin Take Reduction Plan resulted in final rules that ended the directed monkfish fishery in North Carolina (FR Vol. 71, No. 80, 4/26/06), but a very limited fishery has been allowed to occur in state waters through a NC Monkfish Large Mesh Gill Net Permit system implemented and enforced by NCDMF.

Effort by the ocean gill net fishery has shifted depending on species availability and regulations. Current target species of the fleet include bluefish, Atlantic croaker, weakfish, kingfishes, spot, monkfish and Spanish mackerel. Spreading the fishing effort over a number of species is a way to alleviate saturating markets with just a few species of fish, which reduces the price to the fishermen for their catch. As fishery regulations limited the harvest of spiny dogfish and monkfish, effort reverted back to the traditional three species (bluefish, Atlantic croaker, and weakfish). However, severe reductions in weakfish availability have resulted in a shift in effort to two target species, bluefish and Atlantic croaker. A portion of the fleet invested in long line gear to target coastal sharks, but this fishery is regulated by a strict quota system that severely limits this fishery. Therefore, when shark fishing is closed, most of these boats revert to some form of gill netting. Additional crews have opted to extend their charter fishing and commercial fishing for king mackerel and tuna.

Global warming has had a direct influence on fishing effort, seasons, and areas fished. The traditional winter sink net season and area have been constricted such that the season does not get started until late November or December and effort remains concentrated north of Cape Hatteras. Historically, fishing effort followed the fish migration north and south along the coast; north of Cape Hatteras early and late in the season, and concentrated in the vicinity of Hatteras during the coldest winter months. In recent years, the fish do not seem to be migrating south of Cape Hatteras, but rather concentrated from Oregon Inlet to Avon. As a result, the traditional winter sink net fishing effort has been concentrated in the port of Wanchese in recent years.

LITERATURE CITED

ASMFC (Atlantic States Marine Fisheries Commission)
2002. Interstate Fishery Management Plan for Spiny Dogfish, November 2002, 107p.

DOC (Department of Commerce)
1998. Taking of Marine Mammals Incidental to Commercial Fishing Operations; Harbor Porpoise Take Reduction Plan Regulations. 63 Fed. Reg. 66,464 December 2,1998.

DOC (Department of Commerce)
2002. Sea Turtle Conservation; Restrictions to Fishing Activities. 67 Fed. Reg. 71,895 December 3, 2002.

MAFMC and NEFMC (Mid Atlantic and New England Fishery Management Councils)
1998. Spiny Dogfish Fishery Management Plan, August 1998. NOAA Award No. NA57FC0002, 225p.

NCDMF (North Carolina Division of Marine Fisheries)
1992. Assessment of North Carolina Commercial Finfisheries. NC Dept. Env. Health and Nat. Resour., Compl. Rep. Proj. 2-IJ-16, 456p.

NCDMF (North Carolina Division of Marine Fisheries)
1996. Assessment of North Carolina Commercial Finfisheries. NC Dept. Env. Health and Nat. Resour., Compl. Rep. Proj. 2-IJ-32, 376p.

NCDMF (North Carolina Division of Marine Fisheries)
1997. Assessment of North Carolina Commercial Finfisheries. NC Dept. Env. Health and Nat. Resour., Compl. Rep. Proj. 2-IJ-51 354p.

NCDMF (North Carolina Division of Marine Fisheries)
2001. Assessment of North Carolina Commercial Finfisheries. NC Dept. Env. and Nat. Resour., Compl. Rep. Proj. NA 76 FI 0286, 1-3 365p.

NCDMF (North Carolina Division of Marine Fisheries)
2004. Assessment of North Carolina Commercial Finfisheries. NC Dept Env and Nat. Resour., compl. Rep. Proj NA06FI0321, 1-3.

NCMFC (North Carolina Marine Fisheries Commission)
2003. North Carolina Fisheries Rules for Coastal Waters 2003. NC Dept. Env. and Nat. Resour. 297 pp.

NEFMC and MAFMC (New England and Mid Atlantic Fishery Management Councils)
1998. Monkfish Management Plan, September 1998, 491p.

NOAA (National Oceanic and Atmospheric Administration), Department of Commerce.
2006. Taking of Marine Mammals Incidental to Commercial Fishing Operations; Bottlenose Dolphin Take Reduction Plan Regulations; Sea Turtle Conservation; Restrictions to Fishing Activities; Final Rule. FR. Vol. 71, No. 80, April 26, 2006.

Ross, J.L.
1989. Assessment of the Sink Net Fishery Along North Carolina's Outer Banks, Fall 1982 Through Spring 1987, With Notes on Other Coastal Gill Net Fisheries. NC Dept. Env. Health and Nat. Resour., Special Scientific Report No. 50, 55 p.

Ross, J.L. and D.W. Moye
1989. Assessment of North Carolina Finfisheries: 1985-1987 Fishing Seasons. NC Dept. Nat. Resour. And Community Devel., Div. Mar. Fish., Compl. Rep. Proj. 2-419-R, 293p.

Table 4.1a. Monthly summary of sampling of traditional winter sink nets during October 2004 though April 2005 by area fished (N (Northern) = north of Cape Hatteras; C (Central) = Cape Hatteras to Cape Lookout; S (Southern) = west of Cape Lookout); N = number of catches sampled + catches for which only trip tickets were obtained; n = number of catches sampled.

				Catch weight (kg)			Sample weight (kg)	
Year	Month	Area	N	Mean	Range	n	Mean	Range
2004	Oct.	S	3	1,533.9	1,021-1,898	3	44.7	23-63
	Nov.	N	5	1,382.0	413-2,634	5	102.5	68-148
		C	2	606.1	327-885	2	156.4	64-249
		S	5	439.5	96-687	5	82.7	23-180
	Dec.	N	16	2,219	399-4,680	16	207.0	71-411
		C	7	798.2	222-1,478	7	74.6	40-96
2005	Jan.	N	14	2,747.1	103-8,771	14	225.9	99-516
		C	17	356.6	24-2,262	17	61.6	15-251
		S	3	178.9	85-237	3	178.9	85-237
	Feb.	N	9	3,009.7	775-5,970	9	246.1	77-450
		C	5	2,416.6	644-5,823	5	81.6	68-91
	Mar.	N	19	2,936.8	964-5,972	19	196.5	68-413
	Apr.	N	13	1237.0	54-5,264	13	134.4	43-359
		C	4	580.4	158-925	4	51.0	19-93
	Total	N	76 (62.3%)	2,366.4	54-8,771	76 (62.3%)	193.2	43-516
		C	35 (28.7%)	779.0	24-5,823	35 (28.7%)	71.3	15-251
		S	11 (9.0%)	666.9	35-1,898	11 (9.0%)	98.5	21-237
	Overall		122	1,757.8	35-8,771	122	149.7	15-516

Table 4.1b. Monthly summary of sampling of traditional winter sink nets during November 2005 though May 2006 by area fished (N (Northern) = north of Cape Hatteras; C (Central) = Cape Hatteras to Cape Lookout; S (Southern) = west of Cape Lookout); N = number of catches sampled + catches for which only trip tickets were obtained; n = number of catches sampled.

				Catch weight (kg)			Sample weight (kg)	
Year	Month	Area	N	Mean	Range	n	Mean	Range
2005	Nov.	N	1	595.0		1	106.5	
		S	2	212.3	145-280	2	61.15	48-75
	Dec.	N	22	3,032.6	1,082-8,847	22	192.8	30-639
		S	1	19.5		1	19.5	
2006	Jan.	N	11	2,686.0	826-4,452	8	231.7	72-481
		C	8	1,205.0	64-2,908	8	65.9	40-98
	Feb.	N	20	2,821.4	693-5,608	20	248.7	68-925
		C	14	360.6	12-1,535	14	47.0	12-138
	Mar.	N	20	2,776.9	313-10,706	20	266.6	23-544
		C	7	419.1	30-701	7	44.2	30-77
	Apr.	N	7	1,320.0	96-2,947	7	305.8	73-630
		C	1	1,237.2		1	137.7	
	May	C	3	251.7	123-378	3	49.0	44-57
	Total	N	81	2,692.2	96-10,706	81	238.8	23-925
			(69.2%)			(69.2%)		
		C	33	594.4	12-2,908	33	53.9	12-138
			(28.2%)			(28.2%)		
		S	3	148.0	20-280	3	47.3	20-75
			(2.6%)			(2.6%)		
	Overall		117	2,035.2	12-10,706	117	181.7	12-925

Table 4.1c. Monthly summary of sampling of traditional winter sink nets during November 2006 through May 2007 by area fished (N (Northern) = north of Cape Hatteras; C (Central) = Cape Hatteras to Cape Lookout; S (Southern) = west of Cape Lookout); N = number of catches sampled + catches for which only trip tickets were obtained; n = number of catches sampled.

				Catch weight (kg)			Sample weight (kg)	
Year	Month	Area	N	Mean	Range	n	Mean	Range
2006	Nov.	N	3	1,093.6	741-1,569	3	102.3	71-159
		C	4	165.1	65-345	4	27.6	17-48
	Dec.	N	8	1,628.8	39-3,542	8	106.9	22-230
		C	4	139.1	38-208	4	114.5	38-208
		S	2	148.8	141-157	2	148.8	141-157
2007	Jan.	N	25	2,002.1	76-11,313	25	103.3	45-368
		C	12	185.4	16-643	12	53.9	16-203
	Feb.	N	14	1,774.1	357-4,518	14	97.8	29-240
		C	34	608.5	35-1,821	34	102.9	21-553
	Mar.	N	15	1,726.4	91-4,609	15	122.9	40-483
		C	3	255.9	28-480	3	85.2	6-217
	Apr.	N	6	2,345.5	648-4,711	6	252.8	147-400
	May	C	1	77.0		1	34.9	
	Total	N	71 (54.2%)	1,847.5	39-11,313	71 (54.2%)	119.3	22-483
		C	58 (44.3%)	430.6	16-1,821	58 (44.3%)	86.3	6-553
		S	2 (1.5%)	148.8	141-157	2 (1.5%)	148.8	141-157
	Overall		131	1,194.2	16-11,313	131	105.1	6-553

Table 4.2. Monthly summary of sampling of summer sink nets during July through September 2006, and June 2007 by area fished (N (Northern) = north of Cape Hatteras; C (Central) = Cape Hatteras to Cape Lookout; S (Southern) = west of Cape Lookout); N = number of catches sampled + catches for which only trip tickets were obtained; n = number of catches sampled.

				Catch weight (kg)			Sample weight (kg)	
Year	Month	Area	N	Mean	Range	n	Mean	Range
2006	Jul.	C	4	145.7	46-249	4	47.1	17-67
	Aug.	C	4	335.1	34-718	4	80.0	23-103
	Sep.	N	1	1,082.7		1	170.1	
	Total	N	1	1,082.7		1	170.1	
			(11.1%)			(11.1%)		
		C	8	240.4	34-718	8	63.6	17-103
			(88.9%)			(88.9%)		
	Overall		9	334.0	34-1,083	9	75.4	17-170

				Catch weight (kg)			Sample weight (kg)	
Year	Month	Area	N	Mean	Range	n	Mean	Range
2007	Jun.	N	1	181.3		1	17.2	
			(16.7%)			(16.7%)		
		C	3	73.8	36-131	3	31.6	27-37
			(50.0%)			(50.0%)		
		S	2	88.9	52-126	2	43.1	41-45
			(33.3%)			(33.3%)		
	Overall		6	96.8	36-131	6	33.0	27-45

Table 4.3a. Monthly summary of sampling of anchored gill nets during June 2004 though May 2005 by area fished (N (Northern) = north of Cape Hatteras; C (Central) = Cape Hatteras to Cape Lookout; S (Southern) = west of Cape Lookout); N = number of catches sampled + catches for which only trip tickets were obtained; n = number of catches sampled.

				Catch weight (kg)			Sample weight (kg)	
Year	Month	Area	N	Mean	Range	n	Mean	Range
2004	Jun	S	2	163.1	121-205	2	108.2	46-170
	Jul.	S	1	86.6			48.1	
	Oct.	S	6	102.3	32-167	6	27.8	23-47
	Nov.	S	4	243.8	43-423	4	64.6	23-108
	Dec.	S	2	161.1	129-193	2	51.6	23-80
2005	Jan.	S	5	64.8	23-105	5	26.4	23-38
	Feb.	S	8	357.9	40-812	8	22.7	23-23
	Mar.	N	1	365.2		1	139.3	
		S	2	71.3	66-77	2	20.8	19-23
	Apr.	N	5	442.6	125-917	5	89.0	51-163
		S	10	238.3	40-675	10	35.3	23-49
	May	N	5	386.6	195-650	5	51.0	45-68
		C	2	248.5	216-281	2	53.7	45-62
		S	3	58.1	40-74	3	36.8	30-46
	Total	N	11	410.1	125-917	11	76.3	45-163
			(19.6%)			(19.6%)		
		C	2	248.5	216-281	2	53.7	45-62
			(3.6%)			(3.6%)		
		S	43	190.9	23-812	43	37.5	19-170
			(76.8%)			(76.8%)		
	Overall		56	236.1	23-917	56	45.7	19-170

Table 4.3b. Monthly summary of sampling of anchored gill nets during June 2005 though May 2006 by area fished (N (Northern) = north of Cape Hatteras; C (Central) = Cape Hatteras to Cape Lookout; S (Southern) = west of Cape Lookout); N = number of catches sampled + catches for which only trip tickets were obtained; n = number of catches sampled.

				Catch weight (kg)			Sample weight (kg)	
Year	Month	Area	N	Mean	Range	n	Mean	Range
2005	Jun.	N	1	370.1		1	50.7	
	Aug.	S	3	100.2	63-159	3	52.2	46-63
	Sep.	N	3	277.1	189-373	3	89.9	73-115
	Oct.	N	3	1,137.1	635-1,650	3	151.2	110-195
		S	6	362.2	61-894	6	38.8	23-52
	Nov.	N	1	959.6		1	88.2	
		S	4	302.8	131-701	4	28.3	23-44
2006	Jan.	S	1	28.6		1	22.7	
	Feb.	C	9	602.3	18-2,691	9	67.1	13-149
		S	5	97.2	35-169	5	20.0	9-23
	Mar.	N	1	180.1		1	180.1	
		C	4	821.2	258-1,582	4	92.2	72-107
		S	3	121.9	84-159	3	22.7	23-23
	Apr.	N	10	1,323.9	200-3,924	10	113.0	5-264
		C	4	340.0	196-476	4	46.0	24-66
		S	4	207.0	74-279	4	28.6	23-46
	May	N	3	765	598-935	3	101.4	84-130
		C	2	136.1	51-222	2	38.2	23-53
	Total	N	22	967.5	180-3,924	22	112.6	5-264
			(32.8%)			(32.8%)		
		C	19	544.0	18-2,691	19	64.9	13-149
			(28.4%)			(28.4%)		
		S	26	207.4	29-894	26	31.1	9-63
			(38.8%)			(38.8%)		
	Overall		67	552.5	18-3,924	67	67.4	5-264

Table 4.3c. Monthly summary of sampling of anchored gill nets during September 2006 though May 2007 by area fished (N (Northern) = north of Cape Hatteras; C (Central) = Cape Hatteras to Cape Lookout; S (Southern) = west of Cape Lookout); N = number of catches sampled + catches for which only trip tickets were obtained; n = number of catches sampled.

				Catch weight (kg)			Sample weight (kg)	
Year	Month	Area	N	Mean	Range	n	Mean	Range
2006	Sep	N	3	602.2	153-1,434	3	105.8	56-99
		C	2	20.4	19-22	2	12.0	11-12
		S	3	225.8	181-252	3	51.5	40-61
	Oct	N	1	113.8		1	27.1	
		C	1	214.1			107.7	
		S	3	565.0	304-958	3	57.0	45-68
	Dec	C	5	101.5	59-134	5	101.5	59-134
		S	1	643.5		1	129.3	
2007	Jan	C	1	581.0		1	95.6	
	Feb	S	3	197.4	79-353	3	28.5	23-31
	Mar	N	5	115.5	55-196	5	99.4	44-159
		C	4	537.9	316-877	4	142.1	60-307
		S	2	60.9	31-91	2	22.7	23-23
	Apr	N	8	447.3	75-714	8	104.6	23-344
		C	7	162.1	25-296	7	32.1	8-53
		S	4	157.9	56-402	4	32.8	23-45
	May	N	3	375.8	89-951	3	38.5	25-61
		C	2	228.1	15-442	2	53.9	14-94
		S	2	54.6	37-72	2	36.3	35-37
	Total	N	20 (33.3%)	360.6	55-1,434	20 (33.3%)	84.4	23-344
		C	22 (36.7%)	231.2	15-877	22 (36.7%)	74.5	8-307
		S	18 (30.0%)	248.4	31-644	18 (30.0%)	43.9	23-129
	Overall		60	279.5	15-1,434	60	68.8	8-344

Table 4.4 Monthly summary of sampling of runaround gill nets during November 2004 through November 2006 by area fished: S (Southern) = west of Cape Lookout); N = number of catches sampled + catches for which only trip tickets were obtained; n = number of catches sampled.

				Catch weight (kg)			Sample weight (kg)	
Year	Month	Area	N	Mean	Range	n	Mean	Range
2004	Nov.	S	3	389.3	172-603	3	96.2	84-114
2005	Jan.	S	1	135.4		1	135.4	
	Feb.	S	1	35.4		1	21.0	
2005	Oct.	S	1	904.1		1	276.8	
2006	Oct.	S	1	674.9		1	90.8	
	Nov.	S	1	281.3		1	78.1	
	Overall		8	399.9	35-904	8	111.3	21-277

Table 4.5 Seasonal commercial landings (weight; mt) in North Carolina from gill nets fished in the ocean from 1995-2006 (season = June-May) for North Carolina, Dare/Hyde counties, Carteret County, and the southern counties combined (Onslow, Pender, New Hanover, Brunswick), including the total value (1,000's of dollars) of the landings and relative contribution of each area grouping (percent).

	June 1995-May 1996		June 1996–May 1997		June 1997-May 1998	
	Landed (metric tons)	Value/ percent	Landed (metric tons)	Value/ percent	Landed (metric tons)	Value/ percent
Anglerfish (Monkfish)	162.7	$321.0	280.3	$386.4	283.1	$427.5
Dare/Hyde	154.1	95.3	248.8	90.9	279.2	98.8
Carteret	<0.1	<0.1				
Southern	<0.1	<0.1			<0.1	<0.1
Other	8.6	4.7	31.5	9.1	3.8	1.2
Atlantic croaker	1,654.5	$1,503.2	1,396.4	$1,420.2	2,415.2	$1,831.2
Dare/Hyde	1,426.2	90.7	1,151.0	86.9	1,957.7	81.6
Carteret	212.7	8.4	208.8	10.5	446.8	18.0
Southern	2.5	0.1	1.1	0.1	6.7	0.2
Other	13.0	0.8	35.4	2.6	3.9	0.2
Bluefish	1,078.1	$660.1	1,226.0	$779.3	1,317.4	$797.2
Dare/Hyde	1,042.0	97.1	1,163.4	95.5	1,223.6	94.0
Carteret	14.8	1.0	19.2	1.2	56.4	3.4
Southern	12.0	0.9	17.5	1.2	27.2	1.9
Other	9.3	0.9	26.0	2.1	10.2	0.8
Butterfish	53.0	$51.0	33.1	$33.07	20.4	$20.1
Dare/Hyde	30.3	57.4	9.2	27.9	10.0	49.2
Carteret	21.5	40.4	23.0	69.4	9.2	45.2
Southern	1.1	2.0	0.7	2.1	1.1	5.5
Other	<0.1	0.2	0.2	0.6	<0.1	0.2
Dogfish sharks	4,496.2	$1,620.6	4,790.7	$1,520.8	2,784.2	$827.9
Dare/Hyde	4,426.5	98.5	4,176.8	87.5	2,378.5	85.6
Carteret	3.1	0.1	413.1	8.3	268.8	9.6
Southern	17.9	0.4	38.7	0.8	66.4	2.3
Other	48.8	1.1	162.1	3.4	70.6	2.4
Kingfishes	221.9	$364.4	158.6	$348.4	158.0	$358.4
Dare/Hyde	34.2	17.8	29.3	18.7	21.5	13.5
Carteret	142.9	61.1	32.9	20.7	66.4	41.7
Southern	44.7	21.0	96.4	60.6	69.9	44.6
Other	0.1	0.1	<0.1	<0.1	0.3	0.2
Spot	463.5	$320.4	261.1	$220.0	208.6	$201.6
Dare/Hyde	64.2	13.9	43.2	16.6	31.9	15.3
Carteret	126.5	27.6	81.5	31.2	27.5	13.2
Southern	272.8	58.5	135.5	51.8	148.7	71.3
Other	<0.1	<0.1	0.9	0.3	0.4	0.2
Spotted seatrout	15.0	$36.1	2.7	$6.7	9.4	$25.4
Dare/Hyde	9.3	63.3	1.5	57.4	1.1	11.6
Carteret	3.4	21.1	0.8	25.2	6.8	72.7
Southern	0.8	5.5	0.4	13.9	1.1	12.2
Other	1.5	10.1	0.1	3.6	0.3	3.5

Table 4.5 (continued)

	June 1995-May 1996		June1996 – May 1997		June 1997-May 1998	
	Landed (metric tons)	Value/ percent	Landed (metric tons)	Value/ percent	Landed (metric tons)	Value/ percent
Striped bass	59.1	$175.6	43.2	$117.1	47.5	$125.7
Dare/Hyde	59.0	99.7	41.8	96.8	46.8	98.6
Carteret	<0.1	<0.1	0.5	1.2	0.5	1.1
Southern	<0.1	0.1	<0.1	<0.1		
Other	0.1	0.2	0.8	1.9	0.1	0.3
Weakfish	1,305.2	$1,688.3	678.1	$812.7	949.1	$1,084.0
Dare/Hyde	975.0	78.3	342.7	53.9	505.1	56.0
Carteret	281.3	18.4	311.6	42.5	417.4	41.2
Southern	32.4	2.0	17.3	2.5	19.5	2.0
Other	16.5	1.2	6.6	1.0	7.2	0.8
All others	570.0	$696.7	600.2	$596.5	702.3	$1,017.1
Dare/Hyde	438.9	69.7	479.6	77.7	479.0	68.7
Carteret	69.7	15.9	59.2	11.1	107.0	16.1
Southern	58.9	14.2	53.0	9.9	114.6	15.0
Other	2.5	0.3	8.4	1.3	1.7	0.2
Bait	22.2	$4.8	62.5	$13.3	58.7	$12.3
Dare/Hyde	10.9	51.6	25.2	39.5	12.8	23.4
Carteret	2.2	9.3	24.9	41.0	32.3	53.1
Southern	8.5	36.1	8.6	13.6	13.1	22.5
Other	0.6	3.1	3.9	5.9	0.5	0.9
Total	10,101.4	$7,442.2	9,532.9	$6,254.4	8,953.7	$6,728.4
Dare/Hyde	8,670.6	81.3	7,712.4	76.7	6,947.2	72.8
Carteret	878.0	12.0	1,175.4	13.9	1,439.0	18.7
Southern	451.6	5.6	369.2	6.9	468.3	7.8
Other	101.2	1.1	275.8	2.6	99.1	0.7

Table 4.5 (continued)

	June 1998-May 1999		June 1999– May 2000		June 2000-May 2001	
	Landed (metric tons)	Value/ percent	Landed (metric tons)	Value/ percent	Landed (metric tons)	Value/ percent
Anglerfish (Monkfish)	227.8	$579.7	306.1	$859.4	61.0	$161.4
Dare/Hyde	227.8	100.0	306.1	100.0	60.2	98.6
Carteret					<0.1	<0.1
Southern						
Other					0.8	1.3
Atlantic croaker	2,002.1	$1,499.3	1,535.2	$1,105.8	2,241.6	$1,409
Dare/Hyde	1917.7	96.9	1,528.2	99.7	2,116.2	.4
Carteret	82.8	3.1	5.9	0.2	74.0	94.8
Southern	1.1	<0.1	0.5	<0.1	0.4	2.9
Other	0.5	<0.1	0.6	<0.1	51.0	<0.1
Bluefish	1,094.0	$754.9	1,168.9	$855	1,461.1	$903.6
Dare/Hyde	1,055.1	97.4	1,153.6	846.2	1,433.3	98.1
Carteret	28.1	1.8	5.0	3.0	9.9	0.7
Southern	10.9	0.7	10.1	6.0	10.9	0.8
Other	<0.1	<0.1	0.1	<0.1	6.9	0.5
Butterfish	22.4	$22.7	30.9	$31.4	28.2	$30.2
Dare/Hyde	10.3	45.5	28.4	91.7	17.5	62.8
Carteret	11.8	53.1	2.1	6.9	10.1	35.4
Southern	0.3	1.4	0.4	1.4	0.5	1.7
Other			<0.1		<0.1	0.1
Dogfish sharks	1,959.2	$632.1	1,758.5	$671.7	165.1	$89.1
Dare/Hyde	1,718.6	87.7	1,657.2	93.8	163.3	99.1
Carteret	202.6	9.9	89.8	5.5		
Southern	38.0	2.3	11.5	0.7	1.8	0.9
Other						
Kingfishes	128.8	$291.8	136.6	$292.4	140.5	$307.8
Dare/Hyde	16.7	13.0	9.4	6.8	21.6	15.5
Carteret	44.5	34.8	46.8	34.7	33.1	23.1
Southern	67.6	52.2	80.3	58.4	85.7	61.3
Other			<0.1	0.1	0.1	0.1
Spot	340.4	$314.0	280.4	$278.4	391.0	$356.8
Dare/Hyde	62.7	18.5	60.3	21.6	19.6	5.1
Carteret	108.7	32.0	43.2	15.1	129.8	33.1
Southern	168.7	49.5	174.5	62.5	235.3	60.2
Other	0.3	0.1	2.4	0.8	6.3	1.6
Spotted seatrout	2.9	$7.9	6.62	$17.66	4.6	$12.8
Dare/Hyde	1.1	38.5	2.74	42.7	2.1	46.0
Carteret	1.6	54.7	3.47	51.1	1.6	35.3
Southern	0.2	6.8	0.41	6.2	0.9	18.5
Other			<0.1	0.1	<0.1	0.2
Striped bass	150.0	$406.9	0.93	$2.34	53.3	$144.1
Dare/Hyde	149.9	99.9	0.92	98.6	46.5	88.1
Carteret	0.2	0.1			5.5	9.7
Southern			<0.1	1.4	<0.1	<0.1
Other					1.3	2.2

Table 4.5 (continued)

	June 1998-May 1999		June 1999 – May 2000		June 2000-May 2001	
	Landed (metric tons)	Value/ percent	Landed (metric tons)	Value/ percent	Landed (metric tons)	Value/ percent
Weakfish	701.2	$802.9	378.7	$511.2	630.6	$745.9
Dare/Hyde	359.9	54.9	345.1	92.4	607.0	96.3
Carteret	323.1	42.6	18.3	4.0	13.6	2.0
Southern	18.3	2.5	13.8	3.3	7.1	1.2
Other	<0.1	<0.1	1.4	0.4	2.9	0.5
All others	446.4	$507.5	410.7	$512.4	569.9	$799.7
Dare/Hyde	315.1	74.0	309.0	77.9	409.1	77.5
Carteret	73.4	15.7	35.4	8.4	98.8	15.2
Southern	57.6	10.3	63.2	13.5	58.3	7.1
Other	0.3	<0.1	3.2	0.2	3.7	0.1
Bait	53.5	$11.4	13.97	$3.94	13.6	$3.7
Dare/Hyde	21.2	39.3	6.1	47.4	2.9	20.8
Carteret	15.3	28.4	0.3	1.6	0.4	3.9
Southern	16.7	31.8	7.5	50.7	10.3	75.2
Other	0.3	0.5	0.1	0.3	<0.1	0.1
Total	7,128.8	$5,831.1	6,027.5	$5,141.8	5,760.3	$4,964.4
Dare/Hyde	5,855.9	79.9	5407.1	86.2	4,899.3	81.1
Carteret	892.1	13.1	250.2	5.1	376.8	8.1
Southern	379.5	7.0	362.4	8.7	411.3	9.7
Other	1.4	<0.1	7.8	0.1	72.9	1.1

Table 4.5 (continued)

	June 2001-May 2002		June 2002– May 2003		June 2003-May 2004	
	Landed (metric tons)	Value/ percent	Landed (metric tons)	Value/ percent	Landed (metric tons)	Value/ percent
Anglerfish (Monkfish)	78.0	$157.9	100.8	$233.3	138.4	$296.3
Dare/Hyde	49.6	63.9	74.4	69.2	121.6	87.8
Carteret						
Southern	<0.1	<0.1				
Other	28.3	36.1	26.4	30.8	16.7	12.2
Atlantic croaker	2,121.2	$1,578.1	1,911.5	$918.6	1,660.5	$1,110.3
Dare/Hyde	2,086.5	98.7	1,907.4	99.8	1,655.6	99.8
Carteret	31.6	1.1	1.7	0.1	3.4	0.1
Southern	0.5	<0.1	1.4	0.1	1.3	0.1
Other	2.5	0.1	1.0	<0.1	0.2	<0.1
Bluefish	871.9	$630.5	1,124.7	$595.4	1,376.8	$692.0
Dare/Hyde	850.1	98.3	1,105.2	98.3	1,354.5	98.5
Carteret	10.6	0.8	9.2	0.8	9.4	0.6
Southern	11.1	0.9	9.5	0.8	10.8	0.7
Other	0.1	<0.1	0.8	0.1	2.1	0.1
Butterfish	23.7	$24.5	15.2	$18.6	27.3	$30.4
Dare/Hyde	17.9	74.2	11.9	80.3	12.1	43.7
Carteret	5.4	23.5	2.9	17.5	14.4	52.8
Southern	0.5	2.3	0.3	2.0	0.7	3.3
Other			<0.1	0.3	<0.1	0.2
Dogfish sharks	185.8	$116.2	149.1	$96.6	506.0	$185.6
Dare/Hyde	184.1	99.0	149.1	100.0	496.2	98.3
Carteret					1.5	0.4
Southern	1.8	1.0	<0.1	<0.1	8.1	1.3
Other					0.3	<0.1
Kingfishes	164.0	$357.0	235.1	$509.1	205.2	$412.9
Dare/Hyde	53.1	31.9	36.8	15.7	27.7	12.9
Carteret	37.6	23.3	39.9	16.8	29.8	15.1
Southern	73.2	44.7	158.0	67.3	147.4	71.8
Other	0.1	0.1	0.3	0.1	0.3	0.2
Spot	469.5	$434.9	262.8	$248.1	221.6	$219.3
Dare/Hyde	30.1	6.4	26.9	10.5	25.5	11.5
Carteret	180.2	38.3	67.1	25.6	53.7	24.2
Southern	256.5	54.7	167.4	63.4	130.7	58.9
Other	2.8	0.6	1.4	0.5	11.8	5.3
Spotted seatrout	1.3	$3.6	2.5	$6.6	4.1	$12.1
Dare/Hyde	0.6	45.5	1.2	48.5	2.1	51.4
Carteret	0.4	31.9	1.1	42.1	0.5	12.6
Southern	0.2	16.8	0.2	8.7	0.5	11.7
Other	0.1	5.8	<0.1	0.7	1.0	24.3
Striped bass	51.7	$137.8	42.3	$117.0	91.2	$259.8
Dare/Hyde	46.9	90.8	33.4	79.2	76.9	84.0
Carteret	4.6	8.9	9.0	20.8	10.5	11.8
Southern	0.2	0.3			<0.1	<0.1
Other					3.8	4.2

Table 4.5 (continued)

	June 2001-May 2002		June 2002– May 2003		June 2003-May 2004	
	Landed (metric tons)	Value/ percent	Landed (metric tons)	Value/ percent	Landed (metric tons)	Value/ percent
Weakfish	493.7	$630.6	176.1	$245.1	143.4	$232.0
Dare/Hyde	475.3	96.7	161.3	92.6	99.2	72.2
Carteret	9.1	1.6	5.7	2.7	17.6	10.7
Southern	8.2	1.6	8.9	4.6	25.9	16.7
Other	1.1	0.2	0.2	0.1	0.6	0.4
All others	501.4	$661.2	525.9	$821.5	382.9	$561.2
Dare/Hyde	348.7	75.7	393.5	82.7	262.6	77.8
Carteret	89.3	16.6	75.8	10.9	55.5	12.8
Southern	59.6	7.4	51.3	6.0	48.8	6.4
Other	3.8	0.3	5.3	0.3	16.0	3.0
Bait	2.2	$0.5	3.5	$0.4	3.8	$0.8
Dare/Hyde	0.8	33.5	0.3	6.3	0.5	12.9
Carteret						
Southern	1.4	64.2	2.5	69.4	2.5	60.9
Other	<0.1	2.3	0.7	24.3	0.8	26.2
Total	4,964.4	$4,732.8	4,549.3	$3,810.0	4,761.1	$4,012.6
Dare/Hyde	4,143.6	80.1	3,901.2	75.7	4,134.4	78.6
Carteret	368.9	8.7	212.4	7.4	196.4	6.6
Southern	413.1	9.8	399.5	14.9	376.8	12.7
Other	38.8	1.4	36.2	2.0	53.6	2.0

Table 4.5 (continued)

	June 2004-May 2005		June 2005– May 2006		June 2006-May 2007	
	Landed (metric tons)	Value/ percent	Landed (metric tons)	Value/ percent	Landed (metric tons)	Value/ percent
Anglerfish (Monkfish)	14.6	$36.5	44.4	$116.4	47.5	$114.9
Dare/Hyde	14.6	99.7	44.4	100.0	47.5	100.0
Carteret	<0.1	0.3	<0.1	<0.1		
Southern						
Other						
Atlantic croaker	2,081.7	$1,454.6	1,364.4	$1,110.2	1,082.3	$912.7
Dare/Hyde	2,021.8	97.3	1,328.0	97.5	1,080.6	99.9
Carteret	0.1	<0.1	0.8	<0.1	0.2	<0.1
Southern	1.5	<0.1	0.3	<0.1	1.4	0.1
Other	58.3	2.7	35.4	2.5	0.1	<0.1
Bluefish	1,092.4	$635.3	1,197.0	$787.5	664.3	$441.7
Dare/Hyde	1,063.5	97.9	1,170.2	98.1	649.2	98.3
Carteret	15.1	1.2	8.2	0.5	7.1	0.8
Southern	11.4	0.7	8.2	0.5	6.8	0.7
Other	2.4	0.2	10.5	0.9	1.2	0.1
Butterfish	27.2	$26.0	21.0	$25.2	27.9	$32.7
Dare/Hyde	17.2	67.2	17.9	85.7	25.4	90.9
Carteret	8.8	28.8	1.8	8.3	0.5	1.6
Southern	1.0	3.1	0.5	2.4	2.0	7.3
Other	0.2	0.8	0.8	3.6	<0.1	0.2
Dogfish sharks	306.7	$185.8	297.3	$189.8	319.9	$182.9
Dare/Hyde	293.1	95.8	290.0	97.9	312.5	97.5
Carteret			0.3	0.1		
Southern	11.5	3.6	7.1	2.1	7.3	2.5
Other	2.1	0.6				
Kingfishes	129.2	$256.3	162.2	$350.4	202.8	$439.9
Dare/Hyde	30.8	24.2	97.5	60.3	116.3	57.3
Carteret	11.7	8.9	16.8	10.2	3.9	1.9
Southern	86.3	66.7	43.9	27.0	82.5	40.7
Other	0.4	0.3	4.0	2.5	0.2	0.1
Spot	241.0	$244.9	102.0	$119.6	96.0	$154.5
Dare/Hyde	27.3	11.1	9.2	9.5	5.1	5.0
Carteret	78.3	32.6	31.1	30.6	13.2	14.0
Southern	131.0	54.4	54.6	52.9	74.5	77.8
Other	4.4	1.8	7.2	7.0	3.2	3.3
Spotted seatrout	2.2	$6.4	3.3	$9.4	4.0	$11.8
Dare/Hyde	1.0	46.1	0.6	16.7	1.3	32.4
Carteret	0.8	33.5	1.5	46.8	0.9	19.7
Southern	0.3	11.7	0.2	6.1	0.4	8.1
Other	0.2	8.6	1.0	30.4	1.6	39.8
Striped bass	106.0	$445.9	0.5	$2.2	148.0	$811.2
Dare/Hyde	89.6	84.7	0.3	63.3	133.7	90.6
Carteret	9.5	8.8	0.2	36.7	1.7	1.1
Southern	<0.1	<0.1			0.2	0.1
Other	6.9	6.5			12.4	8.2

Table 4.5 (continued)

	June 2004-May 2005		June 2005– May 2006		June 2006-May 2007	
	Landed (metric tons)	Value/ percent	Landed (metric tons)	Value/ percent	Landed (metric tons)	Value/ percent
Weakfish	62.1	$114.5	78.5	$144.6	30.8	$61.9
Dare/Hyde	34.1	58.7	56.8	71.9	12.2	40.2
Carteret	11.0	15.8	9.8	12.3	3.7	10.9
Southern	16.3	24.3	5.4	7.7	14.8	48.7
Other	0.7	1.1	6.5	8.1	<0.1	0.2
All others	345.2	$688.8	450.5	$1,007.2	450.5	$991.2
Dare/Hyde	264.6	88.3	367.1	90.4	353.9	86.7
Carteret	37.5	6.2	46.0	5.7	47.5	6.6
Southern	32.3	4.1	17.1	1.7	41.1	5.6
Other	10.8	1.3	20.2	2.2	8.0	1.1
Bait	12.1	$2.5	3.6	$0.6	4.2	$0.6
Dare/Hyde	0.3	4.2	<0.1	0.7		
Carteret						
Southern	11.4	90.3	3.6	98.9	4.2	98.9
Other	0.4	5.6	<0.1	0.4	<0.1	1.1
Total	4,420.4	$4,097.2	3,724.7	$3,862.9	3,078.2	$4,156.0
Dare/Hyde	3,857.9	83.3	3,381.8	88.5	2,737.7	85.5
Carteret	172.8	5.4	116.4	4.1	78.5	2.8
Southern	302.9	9.2	140.9	5.1	235.3	9.6
Other	86.8	2.1	85.6	2.3	26.7	2.1

Table 4.6a. Species composition and mean catch per trip of traditional winter sink net catches (n=122) sampled from October 2004 through April 2005.

Species	Weight (kg) Mean	Weight (kg) Percent	Number Mean	Number Percent	Mean fish weight (kg)	Percent freq. occur.
Pomatomus saltatrix	829.3	47.2	36,059	13.1	2.806	54.9
Micropogonias undulatus	744.9	42.4	188,307	68.6	0.483	38.5
Cynoscion regalis	43.2	2.5	3,913	1.4	1.346	36.1
Leiostomus xanthurus	39.9	2.3	18,026	6.6	0.270	11.5
Mustelus canis	24.2	1.4	1,853	0.7	1.590	27.0
Menticirrhus americanus	16.6	0.9	7,559	2.8	0.267	11.5
Euthynnus alletteratus	15.5	0.9	452	0.2	4.180	28.7
Morone saxatilis	14.0	0.8	169	<0.1	10.130	11.5
Peprilus triacanthus	9.5	0.5	13,392	4.9	0.087	20.5
Brevoortia tyrannus	8.9	0.5	3,947	1.4	0.276	18.9
Scomberomorus cavalla	6.9	0.4	176	<0.1	4.809	1.6
Lophius americanus	1.0	<0.1	38	<0.1	3.153	6.6
Isurus oxyrinchus	0.7	<0.1	5	<0.1	18.140	1.6
Menticirrhus spp.	0.7	<0.1	325	0.1	0.254	4.1
Pogonias cromis	0.5	<0.1	3	<0.1	22.233	0.8
Caulolatilus microps	0.3	<0.1	24	<0.1	1.402	2.5
Menticirrhus littoralis	0.3	<0.1	46	<0.1	0.715	1.6
Alopias vulpinus	0.3	<0.1	1	<0.1	30.800	0.8
Mugil cephalus	0.2	<0.1	43	<0.1	0.528	0.8
Scomberomorus maculatus	0.2	<0.1	10	<0.1	1.910	0.8
Menticirrhus saxatilis	0.1	<0.1	61	<0.1	0.280	3.3
Trachinotus carolinus	0.1	<0.1	88	<0.1	0.181	1.6
Carcharhinidae	0.1	<0.1	5	<0.1	3.080	0.8
Thunnus atlanticus	0.1	<0.1	2	<0.1	5.650	0.8
Alosa mediocris	0.1	<0.1	16	<0.1	0.638	0.8
Rachycentron canadum	0.1	<0.1	1	<0.1	10.400	0.8
Cynoscion nebulosus	0.1	<0.1	15	<0.1	0.619	2.5
Scomber scombrus	0.1	<0.1	29	<0.1	0.248	1.6
Katsuwonus pelamis	<0.1	<0.1	2	<0.1	2.500	1.6
Caranx crysos	<0.1	<0.1	1	<0.1	4.100	0.8
Paralichthys lethostigma	<0.1	<0.1	1	<0.1	0.900	0.8
Orthopristis chrysoptera	<0.1	<0.1	4	<0.1	0.183	0.8
Observed species:						
Penaeus setiferus	.	.	.	.	.	.
Charcharodon carcharias	.	.	.	.	.	.
Squalus acanthias	.	.	.	.	.	.
Prionotus evolans	.	.	.	.	.	.
Sphoeroides maculatus	.	.	.	.	.	.

Table 4.6b. Species composition and mean catch per trip of traditional winter sink net catches (n=117) sampled from November 2005 through May 2006.

Species	Weight (kg) Mean	Weight (kg) Percent	Number Mean	Number Percent	Mean fish weight (kg)	Percent freq. occur.
Pomatomus saltatrix	1,141.9	56.1	397	15.5	2.879	58.1
Micropogonias undulatus	705.2	34.7	1,671	65.4	0.422	44.4
Mustelus canis	58.0	2.9	40	1.6	1.443	38.5
Cynoscion regalis	47.5	2.3	139	5.5	0.341	45.3
Menticirrhus americanus	38.8	1.9	144	5.7	0.269	24.8
Brevoortia tyrannus	8.2	0.4	25	1.0	0.323	21.4
Euthynnus alletteratus	7.7	0.4	2	0.1	3.916	28.2
Menticirrhus spp.	7.7	0.4	28	1.1	0.275	6.0
Peprilus triacanthus	6.8	0.3	86	3.4	0.079	39.3
Scomberomorus maculatus	4.7	0.2	5	0.2	0.991	2.6
Leiostomus xanthurus	1.8	<0.1	10	0.4	0.181	14.5
Isurus oxyrinchus	1.5	<0.1	<1	<0.1	22.012	5.1
Caulolatilus microps	1.3	<0.1	1	<0.1	1.734	6.8
Unclassified finfish	0.8	<0.1	.	.	.	0.9
Rhizoprionodon terraenovae	0.6	<0.1	<1	<0.1	1.940	6.8
Carcharhinidae	0.5	<0.1	<1	<0.1	3.200	0.9
Peprilus paru	0.5	<0.1	4	0.2	0.114	2.6
Chondrichthyes	0.4	<0.1	<1	<0.1	15.633	3.4
Menticirrhus saxatilis	0.3	<0.1	1	<0.1	0.312	3.4
Alopias vulpinus	0.2	<0.1	<1	<0.1	9.667	2.6
Lophius americanus	0.2	<0.1	<1	<0.1	1.558	12.0
Rachycentron canadum	0.1	<0.1	<1	<0.1	16.800	0.9
Tylosurus crocodilus	0.1	<0.1	<1	<0.1	2.000	0.9
Pogonias cromis	0.1	<0.1	<1	<0.1	0.293	4.3
Archosargus probatocephalus	0.1	<0.1	<1	<0.1	1.133	2.6
Orthopristis chrysoptera	0.1	<0.1	<1	<0.1	0.127	0.9
Sarda sarda	0.1	<0.1	<1	<0.1	6.400	0.9
Cynoscion nebulosus	<0.1	<0.1	<1	<0.1	0.370	0.9
Chaetodipterus faber	<0.1	<0.1	<1	<0.1	1.600	0.9
Centropristis striata	<0.1	<0.1	<1	<0.1	0.329	1.7
Carcharhinus limbatus	<0.1	<0.1	<1	<0.1	1.800	0.9
Menticirrhus littoralis	<0.1	<0.1	<1	<0.1	0.500	0.9
Scomber scombrus	<0.1	<0.1	<1	<0.1	0.250	1.7
Paralichthys spp.	<0.1	<0.1	<1	<0.1	0.450	0.9
Urophycis regia	<0.1	<0.1	<1	<0.1	0.500	0.9
Observed species:						
Penaeus setiferus	.	.	.	.	.	.
Squalus acanthias	.	.	.	.	.	.
Etrumeus teres	.	.	.	.	.	.
Morone saxatilis	.	.	.	.	.	.
Bairdiella chrysoura	.	.	.	.	.	.
Bothidae	.	.	.	.	.	.
Paralichthys dentatus	.	.	.	.	.	.

Table 4.6c. Species composition and mean catch per trip of traditional winter sink net catches (n=131) sampled from November 2006 through May 2007.

Species	Weight (kg) Mean	Weight (kg) Percent	Number Mean	Number Percent	Mean fish weight (kg)	Percent freq. occur.
Micropogonias undulatus	505.8	42.4	1,189	68.2	0.426	46.6
Pomatomus saltatrix	437.2	36.6	165	9.5	2.654	45.8
Squalus acanthias	144.5	12.1	54	3.1	2.699	22.1
Menticirrhus americanus	24.9	2.1	98	5.6	0.253	19.1
Cynoscion regalis	22.9	1.9	40	2.3	0.571	30.5
Mustelus canis	17.3	1.5	12	0.7	1.445	35.1
Morone saxatilis	12.1	1.0	1	<0.1	11.577	11.5
Peprilus triacanthus	11.3	1.0	148	8.5	0.076	36.6
Menticirrhus spp.	4.4	0.4	18	1.1	0.240	4.6
Brevoortia tyrannus	4.2	0.4	10	0.6	0.416	18.3
Euthynnus alletteratus	2.5	0.2	1	<0.1	3.784	20.6
Alosa mediocris	1.9	0.2	2	0.1	0.874	1.5
Rhizoprionodon terraenovae	1.3	0.1	1	<0.1	1.656	3.1
Alopias vulpinus	1.1	<0.1	<1	<0.1	8.524	7.6
Isurus oxyrinchus	0.8	<0.1	<1	<0.1	108.900	0.8
Scomberomorus maculatus	0.5	<0.1	<1	<0.1	1.104	0.8
Trichiurus lepturus	0.5	<0.1	<1	<0.1	1.432	2.3
Sciaenops ocellatus	0.2	<0.1	<1	<0.1	2.555	3.1
Menticirrhus saxatilis	0.2	<0.1	1	<0.1	0.334	3.1
Leiostomus xanthurus	0.2	<0.1	1	<0.1	0.210	7.6
Lophius americanus	0.1	<0.1	<1	<0.1	1.935	7.6
Peprilus paru	0.1	<0.1	1	<0.1	0.103	0.8
Alosa sapidissima	<0.1	<0.1	<1	<0.1	1.203	1.5
Sarda sarda	<0.1	<0.1	<1	<0.1	2.730	1.5
Condrichthyes	<0.1	<0.1	<1	<0.1	0.097	1.5
Cynoscion nebulosus	<0.1	<0.1	<1	<0.1	0.315	0.8
Caulolatilus microps	<0.1	<0.1	<1	<0.1	1.950	0.8
Scomber scombrus	<0.1	<0.1	<1	<0.1	0.500	1.5
Paralichthys spp.	<0.1	<0.1	<1	<0.1	0.900	0.8
Observed species:						
Penaeus spp.	.	.	.	.	.	.
Penaeus setiferus	.	.	.	.	.	.
Alosa spp.	.	.	.	.	.	.
Pogonias cromis	.	.	.	.	.	.

Table 4.7. Species composition, mean weight (kg) and mean number of fish per trip of the top 99% (by weight) of the traditional winter sink net catches, partitioned by area fished, from October 2004 through May 2007; n= number of catches sampled.

Species	Mean wt.	%	Mean no. fish	Mean fish weight (kg.)	Species	Mean wt.	%	Mean no. fish	Mean fish weight (kg.)	Species	Mean wt.	%	Mean no. fish	Mean fish weight (kg.)
	NORTH OF CAPE HATTERAS					CAPE HATTERAS TO CAPE LOOKOUT					WEST OF CAPE LOOKOUT			
2004-05 (n = 76)					**2004-05 (n = 35)**					**2004-05 (n =11)**				
Pomatomus saltatrix	1,250.9	52.9	372	3.360	*Micropogonias undulatus*	444.1	57.0	1,036	0.429	*Leiostomus xanthurus*	439.3	65.9	1632	0.269
Micropogonias undulatus	991.2	41.9	2,000	0.496	*Pomatomus saltatrix*	173.9	22.3	221	0.787	*Euthynnus alletteratus*	60.9	9.1	11	5.569
Cynoscion regalis	57.2	2.4	14	4.061	*Menticirrhus americanus*	52.9	6.8	201	0.263	*Morone saxatilis*	48.8	7.3	4	11.419
Mustelus canis	37.0	1.6	23	1.598	*Scomberomorus cavalla*	24.2	3.1	5	4.809	*Peprilus triacanthus*	40.4	6.1	419	0.096
Euthynnus alletteratus	13.0	0.6	4	3.649	*Cynoscion regalis*	21.6	2.8	68	0.317	*Brevoortia tyrannus*	36.9	5.5	174	0.212
					Peprilus triacanthus	20.2	2.6	249	0.081	*Menticirrhus americanus*	15.3	2.3	47	0.325
					Morone saxatilis	16.3	2.1	1	10.954	*Cynoscion regalis*	14.9	2.2	42	0.358
					Brevoortia tyrannus	8.8	1.1	36	0.242	*Menticirrhus littoralis*	3.0	0.5	4	0.715
					Euthynnus alletteratus	6.6	0.8	2	3.789	*Mugil cephalus*	2.1	0.3	4	0.528
					Mustelus canis	3.8	0.5	3	1.439					
2005-06 (n = 81)					**2005-06 (n = 33)**					**2005-06 (n = 3)**				
Pomatomus saltatrix	1,647.0	61.2	568	2.900	*Micropogonias undulatus*	213.6	35.9	537	0.398	*Pomatomus saltatrix*	57.4	38.8	114	0.504
Micropogonias undulatus	931.6	34.6	2,195	0.424	*Cynoscion regalis*	148.8	25.0	458	0.325	*Leiostomus xanthurus*	47.9	32.4	265	0.181
Mustelus canis	81.9	3.0	57	1.432	*Menticirrhus americanus*	134.9	22.7	504	0.268	*Menticirrhus americanus*	26.3	17.8	83	0.318
Euthynnus alletteratus	9.1	0.3	2	3.958	*Menticirrhus spp.*	27.2	4.6	99	0.274	*Cynoscion regalis*	9.4	6.4	25	0.381
					Peprilus triacanthus	22.5	3.8	292	0.077	*Peprilus triacanthus*	6.5	4.4	78	0.083
					Scomberomorus maculatus	16.8	2.8	17	0.991					
					Brevoortia tyrannus	6.9	1.2	40	0.173					
					Euthynnus alletteratus	5.1	0.9	1	3.739					
					Mustelis canis	4.5	0.8	2	2.171					
					Gnathosomata ii	2.7	0.5	.	.					
					Rhizoprionodon terraenovae	2.1	0.4	1	1.924					
					Carcharhinidae	1.8	0.3	1	3.200					
					Peprilus paru	1.8	0.3	16	0.114					

Table 4.7. (continued)

Species	Mean wt.	%	Mean no. fish	Mean fish weight (kg.)	Species	Mean wt.	%	Mean no. fish	Mean fish weight (kg.)	Species	Mean wt.	%	Mean no. fish	Mean fish weight (kg.)
	NORTH OF CAPE HATTERAS					CAPE HATTERAS TO CAPE LOOKOUT					WEST OF CAPE LOOKOUT			
2006-07 (n = 71)					**2006-07 (n = 58)**					**2006-07 (n = 2)**				
Micropogonias undulatus	930.7	50.4	2,174	0.428	*Squalus acanthias*	301.7	70.1	112	2.700	*Morone saxatilis*	148.8	100.0	13	11.446
Pomatomus saltatrix	801.9	43.4	294	2.729	*Menticirrhus americanus*	56.1	13.0	222	0.253					
Cynoscion regalis	40.0	2.2	67	0.595	*Peprilus triacanthus*	22.0	5.1	296	0.074					
Mustelus canis	28.1	1.5	20	1.400	*Morone saxatilis*	11.8	2.7	1	11.375					
Squalus acanthias	20.1	1.1	7	2.686	*Menticirrhus spp.*	9.9	2.3	41	0.240					
Morone saxatilis	8.5	0.5	1	11.882	*Pomatomus saltatrix*	5.8	1.4	12	0.471					
					Mustelus canis	4.6	1.1	2	1.893					
					Micropogonias undulatus	3.2	0.7	23	0.135					
					Euthynnus alletteratus	3.1	0.7	1	3.984					
					Rhizoprionodon terraenovae	2.9	0.7	2	1.647					
					Cynoscion regalis	2.8	0.7	8	0.339					
					Isurus oxyrinchus	1.9	0.4	0	108.900					
					Alopias vulpinus	1.8	0.4	0	7.664					

Table 4.8a. Species composition and mean catch per trip of summer sink net catches sampled (n=9) from July 2006 through September 2006.

Species	Weight (kg) Mean	Weight (kg) Percent	Number Mean	Number Percent	Mean fish weight (kg)	Percent freq. occur.
Scomberomorus maculatus	293.4	87.9	425	81.4	0.691	100.0
Pomatomus saltatrix	32.4	9.7	66	12.6	0.494	88.9
Euthynnus alletteratus	2.2	0.7	1	0.1	4.000	11.1
Peprilus triacanthus	1.9	0.6	17	3.2	0.115	66.7
Tylosurus crocodilus	1.4	0.4	1	0.2	1.752	22.2
Peprilus paru	1.2	0.4	11	2.1	0.105	55.6
Caranx crysos	0.3	0.1	1	0.2	0.337	33.3
Scomberomorus cavalla	0.3	<0.1	<1	<0.1	2.310	11.1
Menticirrhus americanus	0.2	<0.1	1	0.1	0.343	22.2
Cynoscion nebulosus	0.2	<0.1	<1	<0.1	0.960	11.1
Rhizoprionodon terraenovae	0.2	<0.1	<1	<0.1	1.800	11.1
Caranx ruber	0.1	<0.1	<1	<0.1	0.500	11.1
Trachinotus carolinus	0.1	<0.1	<1	<0.1	0.500	11.1
Menticirrhus spp.	0.1	<0.1	<1	<0.1	0.250	11.1

Table 4.8b. Species composition and mean catch per trip of summer sink net catches sampled (n=6) in June 2007.

Species	Weight (kg) Mean	Weight (kg) Percent	Number Mean	Number Percent	Mean fish weight (kg)	Percent freq. occur.
Scomberomorus maculatus	70.7	73.1	91	51.5	0.777	100.0
Pomatomus saltatrix	20.2	20.9	38	21.7	0.529	50.0
Peprilus paru	4.1	4.3	31	17.8	0.132	50.0
Peprilus triacanthus	1.3	1.3	15	8.7	0.084	50.0
Menticirrhus littoralis	0.3	0.3	1	0.4	0.490	16.7
Euthynnus alletteratus	0.1	<0.1	<1	<0.1	0.450	16.7
Observed species*:*						
Cynoscion regalis	.	.	.	.	.	.
Leiostomus xanthurus	.	.	.	.	.	.
Menticirrhus americanus	.	.	.	.	.	.

Table 4.9a. Species composition and mean catch per trip of anchored gill net catches sampled (n=56) from June 2004 through May 2005.

	Weight (kg)		Number		Mean fish	Percent
Species	Mean	Percent	Mean	Percent	weight (kg)	freq. occur.
Menticirrhus americanus	101.9	43.2	401	53.0	0.254	73.2
Lophius americanus	30.0	12.7	15	2.0	2.006	8.9
Cynoscion regalis	25.8	11.0	83	11.0	0.310	55.4
Leiostomus xanthurus	19.5	8.3	97	12.8	0.201	46.4
Micropogonias undulatus	17.2	7.3	52	6.9	0.331	19.6
Pomatomus saltatrix	10.8	4.6	24	3.2	0.443	30.4
Brevoortia tyrannus	10.6	4.5	11	1.5	0.943	10.7
Menticirrhus littoralis	8.6	3.6	29	3.9	0.293	37.5
Rhizoprionodon terraenovae	3.0	1.3	2	0.2	1.834	7.1
Peprilus triacanthus	2.5	1.0	28	3.7	0.089	26.8
Menticirrhus saxatilis	2.4	1.0	8	1.0	0.316	23.2
Scomberomorus maculatus	1.3	0.6	2	0.3	0.542	12.5
Limulus polyphemus	0.9	0.4	<1	<0.1	2.198	3.6
Cynoscion nebulosus	0.5	0.2	1	0.2	0.311	17.9
Paralichthys dentatus	0.2	0.1	<1	<0.1	2.728	3.6
Mustelus canis	0.2	<0.1	<1	<0.1	1.733	1.8
Pogonias cromis	0.2	<0.1	<1	<0.1	10.000	1.8
Cynoscion nothus	0.2	<0.1	1	<0.1	0.290	8.9
Menticirrhus spp.	0.2	<0.1	1	<0.1	0.246	5.4
Orthopristis chrysoptera	0.1	<0.1	1	<0.1	0.156	5.4
Paralichthys lethostigma	0.1	<0.1	<0.1	<0.1	5.460	1.8
Urophycis floridana	<0.1	<0.1	<0.1	<0.1	0.450	1.8
Centropristis striata	<0.1	<0.1	<0.1	<0.1	0.250	1.8
Caranx crysos	<0.1	<0.1	<0.1	<0.1	0.200	1.8
Mugil cephalus	<0.1	<0.1	<0.1	<0.1	0.500	1.8
Peprilus paru	<0.1	<0.1	<0.1	<0.1	0.200	1.8

Table 4.9b. Species composition and mean catch per trip of anchored gill net catches sampled (n=66) from June 2005 through May 2006.

Species	Weight (kg) Mean	Weight (kg) Percent	Number Mean	Number Percent	Mean fish weight (kg)	Percent freq. occur.
Menticirrhus americanus	103.8	18.7	398	23.0	0.261	68.2
Cynoscion regalis	101.9	18.4	313	18.1	0.326	69.7
Lophius americanus	101.6	18.3	37	2.1	2.750	16.7
Scomberomorus maculatus	58.8	10.6	68	4.0	0.859	24.2
Leiostomus xanthurus	46.7	8.4	256	14.8	0.182	51.5
Brevoortia tyrannus	38.2	6.9	200	11.5	0.191	22.7
Pomatomus saltatrix	20.8	3.7	50	2.9	0.415	47.0
Micropogonias undulatus	20.4	3.7	91	5.3	0.225	25.8
Peprilus triacanthus	16.4	3.0	242	14.0	0.068	48.5
Menticirrhus saxatilis	10.8	2.0	35	2.0	0.312	27.3
Pogonias cromis	9.9	1.8	2	0.1	4.713	19.7
Mustelus canis	8.5	1.5	5	0.3	1.698	28.8
Euthyunnus alletteratus	2.7	0.5	1	<0.1	3.391	13.6
Menticirrhus spp.	2.5	0.5	7	0.4	0.342	9.1
Scomeromorus cavalla	2.0	0.4	1	<0.1	2.596	9.1
Menticirrhus littoralis	1.5	0.3	5	0.3	0.320	22.7
Limulus polyphemus	1.5	0.3	1	<0.1	2.508	1.5
Peprilus paru	1.4	0.3	10	0.6	0.144	12.1
Alosa mediocris	1.3	0.2	1	<0.1	1.922	3.0
Cynoscion nebulosus	1.2	0.2	3	0.2	0.345	21.2
Tylosurus crocodilus	1.1	0.2	1	<0.1	1.857	1.5
Mugil cephalus	0.8	0.2	2	<0.1	0.505	4.5
Ictalurus spp.	0.7	0.1	1	<0.1	0.966	1.5
Archosargus probatocephalus	0.1	<0.1	<1	<0.1	0.844	4.5
Urophycis earlii	0.1	<0.1	1	<0.1	0.100	3.0
Carcharhinidae	0.1	<0.1	<1	<0.1	3.850	1.5
Rachycentron canadum	0.1	<0.1	<1	<0.1	5.900	1.5
Paralichthys lethostigma	0.1	<0.1	<1	<0.1	5.450	1.5
Trachinotus carolinus	0.1	<0.1	<1	<0.1	0.217	6.1
Sciaenops ocellatus	<0.1	<0.1	<1	<0.1	1.100	1.5
Paralichthys dentatus	<0.1	<0.1	<1	<0.1	0.900	1.5
Orthopristis chrysoptera	<0.1	<0.1	<1	<0.1	0.175	3.0
Caranx crysos	<0.1	<0.1	<1	<0.1	0.550	1.5
Scomber scombrus	<0.1	<0.1	<1	<0.1	0.270	1.5
Paralichthys spp.	<0.1	<0.1	<1	<0.1	0.500	1.5
Alosa spp.	<0.1	<0.1	<1	<0.1	0.290	1.5
Lagodon rhomboides	<0.1	<0.1	<1	<0.1	0.100	1.5
Bairdiella chrysoura	<0.1	<0.1	<1	<0.1	0.100	1.5
Observed species:						
Penaeus setiferus	.	.	.	.	.	.
Alosa aestivalis	.	.	.	.	.	.
Larimus fasciatus	.	.	.	.	.	.

Table 4.9c. Species composition and mean catch per trip of anchored gill net catches sampled (n=60) from September 2006 through May 2007.

	Weight (kg)		Number		Mean fish	Percent
Species	Mean	Percent	Mean	Percent	weight (kg)	freq. occur.
Lophius americanus	64.0	22.8	19	2.8	3.292	23.3
Menticirrhus americanus	53.4	19.1	209	29.9	0.256	48.3
Leiostomus xanthurus	33.1	11.8	169	24.2	0.196	43.3
Scomberomorus maculatus	32.1	11.5	34	4.9	0.933	23.3
Mustelus canis	25.3	9.0	14	2.0	1.772	25.0
Pomatomus saltatrix	16.9	6.1	43	6.2	0.394	41.7
Cynoscion regalis	13.1	4.7	39	5.6	0.334	43.3
Morone saxatilis	8.5	3.0	1	0.1	11.033	8.3
Peprilus triacanthus	6.5	2.3	93	13.3	0.070	35.0
Menticirrhus saxatilis	5.8	2.1	20	2.8	0.293	33.3
Menticirrhus littoralis	5.3	1.9	22	3.1	0.244	25.0
Mugil cephalus	2.6	0.9	3	0.5	0.757	1.7
Brevoortia tyrannus	2.4	0.9	14	2.0	0.177	10.0
Scomberomorus cavalla	2.2	0.8	1	<0.1	3.395	6.7
Pogonias cromis	2.1	0.7	<1	<0.1	6.950	5.0
Peprilus paru	1.4	0.5	10	1.5	0.134	10.0
Limulus polyphemus	1.2	0.4	1	0.1	1.637	3.3
Euthynnus alletteratus	1.1	0.4	<1	<0.1	3.437	8.3
Gnathosomata ii	0.6	0.3	1	<0.1	0.958	3.3
Menticirrhus spp.	0.6	0.2	2	0.3	0.261	10.0
Sarda sarda	0.3	<0.1	<1	<0.1	7.500	3.3
Archosargus probatocephalus	0.2	<0.1	<1	<0.1	1.273	6.7
Alosa mediocris	0.2	<0.1	1	0.1	0.326	3.3
Alopias vulpinus	0.2	<0.1	<1	<0.1	6.600	1.7
Sciaenops ocellatus	0.2	<0.1	<1	<0.1	2.180	1.7
Micropogonias undulatus	0.2	<0.1	1	<0.1	0.336	15.0
Cynoscion nebulosus	0.1	<0.1	<1	<0.1	0.614	8.3
Carcharhinidae	0.1	<0.1	<1	<0.1	7.700	3.3
Orthopristis chrysoptera	0.1	<0.1	1	<0.1	0.126	5.0
Rachycentron canadum	0.1	<0.1	<1	0.1	5.000	1.7
Alosa sapidissima	0.1	<0.1	<1	<0.1	1.533	1.7
Paralichthys dentatus	0.1	<0.1	<1	<0.1	2.250	3.3
Tylosurus crocodilus	0.1	<0.1	<1	<0.1	3.350	1.7
Trachinotus carolinus	0.1	<0.1	<1	<0.1	0.262	6.7
Lagodon rhomboides	0.1	<0.1	<1	<0.1	0.121	1.7
Chondrichthyes	<0.1	<0.1	<1	<0.1	0.250	3.3
Urophycis floridana	<0.1	<0.1	<1	<0.1	0.500	1.7
Centropristis striata	<0.1	<0.1	<1	<0.1	0.500	1.7
Paralichthys spp.	<0.1	<0.1	<1	<0.1	0.500	1.7
Observed species:						
Alosa spp.	.	.	.	.	.	.
Larimus fasciatus	.	.	.	.	.	.

Table 4.10. Species composition, mean weight (kg) and mean number of fish per trip of the top 99% (by weight) of the anchored gill net catches, partitioned by area fished, from October 2004 through May 2007; n= number of catches sampled.

Species	Mean wt.	%	Mean no. fish	Mean fish weight (kg.)	Species	Mean wt.	%	Mean no. fish	Mean fish weight (kg.)	Species	Mean wt.	%	Mean no. fish	Mean fish weight (kg.)
	NORTH OF CAPE HATTERAS					CAPE HATTERAS TO CAPE LOOKOUT					WEST OF CAPE LOOKOUT			
2004-05 (n = 11)					**2004-05 (n = 2)**					**2004-05 (n =43)**				
Lophius americanus	152.7	37.2	76	2.006	*Cynoscion regalis*	96.6	38.9	264	0.366	*Menticirrhus americanus*	114.9	60.2	452	0.254
Cynoscion regalis	88.3	21.5	308	0.286	*Menticirrhus americanus*	84.0	33.8	256	0.328	*Leiostomus xanthurus*	25.1	13.2	126	0.200
Micropogonias undulatus	73.2	17.9	182	0.401	*Menticirrhus saxatilis*	25.9	10.4	61	0.425	*Brevoortia tyrannus*	13.3	7.0	14	0.982
Menticirrhus americanus	54.3	13.2	226	0.240	*Pomatomus saltatrix*	25.0	10.0	19	1.349	*Menticirrhus littoralis*	10.9	5.7	37	0.292
Pomatomus saltatrix	23.1	5.6	64	0.363	*Peprilus triacanthus*	5.7	2.3	63	0.089	*Pomatomus saltatrix*	6.9	3.6	14	0.480
Peprilus triacanthus	6.7	1.6	87	0.077	*Menticirrhus littoralis*	5.6	2.2	18	0.314	*Cynoscion regalis*	6.6	3.4	17	0.378
Limulus polyphemus	4.8	1.2	2	2.198	*Leiostomus xanthurus*	4.8	1.9	11	0.452	*Rhizoprionodon terraenovae*	3.9	2.0	2	1.834
Brevoortia tyrannus	2.2	0.5	5	0.490						*Micropogonias undulatus*	3.6	1.9	21	0.173
Paralichthys dentatus	1.2	0.3	<1	2.728						*Scomberomorus maculatus*	1.8	0.9	3	0.542
										Menticirrhus saxatilis	1.6	0.8	6	0.275
										Peprilus triacanthus	1.2	0.6	11	0.111
2005-06 (n = 21)					**2005-06 (n = 19)**					**2005-06 (n = 26)**				
Lophius americanus	316.6	31.8	115	2.746	*Menticirrhus americanus*	192.1	35.3	703	0.273	*Leiostomus xanthurus*	105.8	51.0	544	0.194
Cynoscion regalis	229.7	23.1	718	0.320	*Brevoortia tyrannus*	129.0	23.7	682	0.189	*Menticirrhus americanus*	65.6	31.6	259	0.253
Scomberomorus maculatus	179.0	18.0	201	0.889	*Cynoscion regalis*	93.9	17.3	276	0.340	*Pomatomus saltatrix*	13.3	6.4	25	0.536
Menticirrhus americanus	71.3	7.2	296	0.241	*Peprilus triacanthus*	53.2	9.8	803	0.066	*Scomberomorus maculatus*	4.7	2.3	11	0.422
Pomatomus saltatrix	46.3	4.6	122	0.379	*Micropogonias undulatus*	22.3	4.1	154	0.144	*Cynoscion regalis*	4.6	2.2	12	0.383
Micropogonias undulatus	43.9	4.4	146	0.302	*Menticirrhus saxatilis*	17.4	3.2	57	0.308	*Menticirrhus saxatilis*	3.9	1.9	12	0.335
Pogonias cromis	30.2	3.0	2	14.082	*Mustelus canis*	9.4	1.7	4	2.213	*Menticirrhus littoralis*	2.5	1.2	7	0.352
Mustelus canis	18.3	1.8	12	1.532	*Menticirrhus spp.*	7.4	1.4	22	0.333	*Mugil cephalus*	2.1	1.0	4	0.505
Leiostomus xanthurus	13.6	1.4	117	0.116	*Euthynnus alletteratus*	5.6	1.0	1	4.740	*Ictalurus spp.*	1.7	0.8	2	0.966
Menticirrhus saxatilis	13.4	1.3	43	0.310	*Alosa mediocris*	4.4	0.8	2	1.922	*Cynoscion nebulosus*	0.9	0.5	2	0.502
Scomberomorus cavalla	6.3	0.6	2	2.596	*Lophius americanus*	3.0	0.6	1	3.363	*Menticirrhus spp.*	0.9	0.5	2	0.402
Limulus polyphemus	4.7	0.5	2	2.508	*Pomatomus saltatrix*	2.9	0.5	5	0.549					
Peprilus paru	4.5	0.5	31	0.144										
Euthynnus alletteratus	3.5	0.4	1	2.395										
Tylosurus crocodilus	3.4	0.3	2	1.857										
Peprilus triacanthus	3.3	0.3	34	0.097										

Table 4.10. (continued)

NORTH OF CAPE HATTERAS

Species	Mean wt.	%	Mean no. fish	Mean fish weight (kg.)
2006-07 (n = 20)				
Lophius americanus	177.8	48.9	52	3.447
Scomberomorus maculatus	85.3	23.5	86	0.988
Menticirrhus americanus	36.9	10.2	148	0.249
Pomatomus saltatrix	21.0	5.8	73	0.286
Menticirrhus littoralis	13.4	3.7	56	0.239
Menticirrhus saxatilis	5.6	1.6	21	0.262
Cynoscion regalis	4.9	1.4	17	0.286
Brevoortia tyrannus	4.5	1.3	26	0.177
Peprilus paru	3.3	0.9	23	0.144
Pogonias cromis	2.6	0.7	<1	17.367
Mustelus canis	2.1	0.6	2	1.382
Peprilus triacanthus	1.7	0.5	8	0.219
Leiostomus xanthurus	1.5	0.4	8	0.189

CAPE HATTERAS TO CAPE LOOKOUT

Species	Mean wt.	%	Mean no. fish	Mean fish weight (kg.)
2006-07 (n = 22)				
Mustelus canis	67.0	29.0	37	1.787
Menticirrhus americanus	55.0	23.8	216	0.255
Morone saxatilis	23.1	10.0	2	11.033
Peprilus triacanthus	14.8	6.4	232	0.064
Lophius americanus	13.0	5.6	6	2.115
Pomatomus saltatrix	11.0	4.7	25	0.446
Scomberomorus maculatus	8.2	3.6	13	0.627
Menticirrhus saxatilis	8.1	3.5	27	0.304
Scomberomorus cavalla	5.4	2.3	1	3.747
Leiostomus xanthurus	4.0	1.7	27	0.148
Cynoscion regalis	3.9	1.7	13	0.288
Pogonias cromis	3.3	1.4	1	4.867
Limulus polyphemus	3.2	1.4	2	1.637
Euthynnus alletteratus	3.1	1.3	1	3.437
Brevoortia tyrannus	2.5	1.1	14	0.177
Menticirrhus spp.	1.2	0.5	5	0.255
Peprilus paru	0.8	0.3	7	0.105
Alosa mediocris	0.6	0.3	2	0.326
Alopias vulpinus	0.6	0.3	<1	6.600
Gnathosomata ii	0.5	0.2	2	0.328

WEST OF CAPE LOOKOUT

Species	Mean wt.	%	Mean no. fish	Mean fish weight (kg.)
2006-07 (n = 18)				
Leiostomus xanthurus	103.8	41.8	522	0.199
Menticirrhus americanus	70.0	28.2	269	0.260
Cynoscion regalis	33.5	13.5	95	0.352
Pomatomus saltatrix	19.8	8.0	32	0.620
Mugil cephalus	8.5	3.4	11	0.757
Menticirrhus saxatilis	3.2	1.3	10	0.332
Scomberomorus maculatus	2.3	0.9	3	0.811
Menticirrhus littoralis	2.1	0.8	7	0.293
Peprilus triacanthus	1.7	0.7	17	0.097
Gnathosomata ii	1.3	0.5	.	.

Table 4.11a. Species composition and mean catch per trip of runaround gill net catches sampled from November 2004 through February 2005 (n=5).

	Weight (kg)		Number		Mean fish	Percent
Species	Mean	Percent	Mean	Percent	weight (kg)	freq. occur.
Mugil cephalus	198.9	74.3	248	77.6	0.802	80.0
Cynoscion nebulosus	63.9	23.9	65	20.3	0.987	80.0
Sciaenops ocellatus	2.4	0.9	1	0.3	2.388	20.0
Menticirrhus littoralis	1.4	0.5	3	1.0	0.425	20.0
Pomatomus saltatrix	0.6	0.2	1	0.3	0.725	20.0
Pogonias cromis	0.5	0.2	1	0.4	0.367	20.0
Paralichthys lethostigma	0.1	<0.1	<1	<0.1	0.620	20.0
Archosargus probatocephalus	<0.1	<0.1	<1	<0.1	0.150	20.0

Table 4.11b. Species composition and mean catch per trip of runaround gill net catches sampled October 2005 (n=1).

	Weight (kg)		Number		Mean fish	Percent
Species	Mean	Percent	Mean	Percent	weight (kg)	freq. occur.
Mugil cephalus	773.9	85.6	829	86.9	0.934	100.0
Cynoscion nebulosus	74.8	8.3	63	6.6	1.195	100.0
Pomatomus saltatrix	40.8	4.5	55	5.8	0.742	100.0
Sciaenops ocellatus	13.6	1.5	6	0.6	2.267	100.0
Trachinotus carolinus	1.0	0.1	1	0.1	1.000	100.0

Table 4.11c. Species composition and mean catch per trip of runaround gill net catches sampled October-November 2006 (n=2).

	Weight (kg)		Number		Mean fish	Percent
Species	Mean	Percent	Mean	Percent	weight (kg)	freq. occur.
Mugil cephalus	471.2	98.6	664	99.2	0.710	100.0
Sciaenops ocellatus	4.6	1.0	2	0.3	2.275	50.0
Pogonias cromis	1.1	0.2	2	0.3	0.575	50.0
Cynoscion nebulosus	0.9	0.2	1	0.2	0.900	50.0
Menticirrhus littoralis	0.3	<0.1	1	<0.1	0.500	50.0

Figure 4.1. Ocean gill net fishing grounds off North Carolina.

ASSESSMENT OF NORTH CAROLINA COMMERCIAL FINFISHERIES

Final Performance Report for Award Number NA04NMF4070216

November 2007

FISHERY SECTION 5

FLOUNDER POUND NET FISHERY ASSESSMENT

JOB 4

by

Chris Batsavage

ABSTRACT

The North Carolina pound net fishery for flounder targets paralichthid flounders. The pound net is a stationary gear, constructed of multifilament nylon webbing which intercepts maturing adult and subadult flounder as they migrate from estuarine waters to nearshore ocean waters. The fishery takes place in shallow waters (2-6 m) along the mainland and barrier island shorelines from Albemarle Sound, NC, south to Back Sound, near Cape Lookout, NC. A total of 158 catches were sampled from 2004 to 2006 to determine species composition, seasonality and the fishery's contribution to the landings of commercially important finfishes. Catches were sampled at the landing site during the fishing season, which was from September to November; the largest catches occurred during September and October. The flounder pound net fishery contributed 1.3%-1.7% of the weight and 2.6%-3.5% of the total value of state edible finfish landings from 2004 to 2006. Southern flounder (*Paralichthys lethostigma*) accounted for 84%-87% of the landed flounder pound net catch, by weight during this period. Harvestfish (*Peprilus alepidotus*), Butterfish (*Peprilus triacanthus*), Gulf flounder (*Paralichthys albigutta*), summer flounder (*Paralichthys dentatus*), black drum (*Pogonias cromis*), sheepshead (*Archosargus probatocephalus*) and Atlantic spadefish (*Chaetodipterus faber*) were economically important species also caught by this fishery. The North Carolina Southern Flounder Fishery Management Plan implemented regulations that impacted the flounder pound net fishery. Future regulations for southern flounder and sea turtles could further impact this fishery.

INTRODUCTION

The North Carolina pound net fishery for flounder targets paralichthid flounders. The fishery takes place in shallow waters (2-6m) along the mainland and barrier island shorelines from Albemarle Sound south to Back Sound, near Cape Lookout, and intercepts maturing adult and subadult flounder as they migrate from estuarine waters to nearshore ocean waters (Figure 5.1). Fish caught in mid-Albemarle Sound are landed in Columbia, while fish caught in eastern Albemarle Sound and Roanoke Island areas are landed in Manns Harbor and Wanchese. Ports on the Outer Banks are in the villages of Avon, Hatteras and Ocracoke. Cedar Island, Atlantic and Sea Level are landing sites for southeastern Pamlico and Core sounds, while Back Sound catches are landed at Harkers Island. The majority of the pound nets set for flounder in North Carolina are concentrated between Drum Inlet and Ocracoke Inlet in Core Sound and southeastern Pamlico Sound.

Pound nets are a stationary gear that directs fish into enclosures or “pounds” by means of leads. A typical flounder pound net consists of at least one lead, heart, and pound (Figure 5.2). A crew (2-4 fishermen) generally sets 3-4 pounds that are attached to gum tree stakes, and interconnected by leads. Nets are placed end to end in sets of 1 to over 20 pounds and leads. The leads usually begin in shallow water on a shoal or nearshore, with the water depth increasing towards the pound, although some nets are set in waters where there is no depth change. Fish follow the leads to the heart and are then directed into the pound by way of a mesh tunnel. The pound has a bottom and four sides. The tunnel is held approximately 20 cm (8 in) off the bottom of the pound by a steel frame. After flounder enter the pound they stay on the bottom and are hindered from exiting through the tunnel since the opening is raised off the bottom. The leads are constructed of large mesh, from 17.8-25.4 cm (7-10 in) stretched mesh, and are 137-549 m (150-600 yd) long depending on water depth and the proximity of the net to shoals. Nets that do not come off shoals have longer leads. Hearts are made of 10-13 cm (4-5 in) mesh, while pounds are constructed of 10 cm (4 in) mesh. Flounder pound nets are fitted with escape panels of 14 cm (5½ in) mesh in the offshore corners, sewn into the back and sides of the pound, and against the bottom of the net. The pounds or “cribs” range from 8-8.5 m (25-28 ft) square in shallower waters, such as Core Sound, to 9.8-10.6 m (32-35 ft) square in deeper waters behind Ocracoke and Hatteras. All pound nets are constructed from multifilament nylon webbing which is dipped in an anti fouling solution.

The fishing season generally begins in early September, when the first shift in wind direction to the northeast from the predominant summer direction of southwest occurs. Nets are set from late August into September in preparation for these shifts and are fished into November, after which time they are taken up. Pound nets are fished on a daily to weekly basis, depending on the weather, size of the catches, and market conditions (DeVries 1981). A skiff, 1.5-6 m (6-20 ft), is driven into the pound after shoving one of the sides down. When the nets are located a long distance from the landing site, or in deeper water, a larger vessel of 7.6-10.7 m (25-35 ft) may be used to tow the skiff to and from the fishing site. The bottom of the pound is gathered-up, working from the tunnel wall to the back wall of the pound until the fish are concentrated in the back of the pound. The fish are then either "rolled" in the skiff by pulling the gathered netting and fish into the skiff, baled out using "dip" nets, or are picked out by hand. The pound net fishery is very efficient in that only marketable fishes are landed and the unwanted bycatch is returned to the water alive. Stingrays, horseshoe crabs, undersized/oversized fish, out of season, or otherwise unmarketable fish are culled at the nets.

The North Carolina Division of Marine Fisheries (NCDMF) sampled the pound net fishery for flounder in Core Sound in 1976 (Wolff 1977) and again in 1979 (Devries 1981). The NCDMF resumed sampling in 1989 on a statewide basis, and it has continued since. This report describes sampling effort, species composition, catch per trip and landings for North Carolina's pound net fishery for flounder for the 2004-06 fishing seasons. Catch per unit effort and landings data are presented and compared with species and fishery specific data from 1989-2003.

METHODS AND MATERIALS

Flounder pound net catches were sampled at fish houses as early as late August through November and sometimes into December when effort continued and when the season was still open. Generally four or more catches were sampled each month. Since most flounder pound net catches were culled at the fishing site, the samples taken were random stratified (graded) samples. For each species, a representative number of random basket samples (22.7 kg) were obtained from each size category (jumbo, large, medium, small, etc.), with more samples for larger fish. Additional species were sampled or noted. Each sample was weighed to the nearest 0.1 kg, all individuals measured (TL or FL; mm) and the total number recorded. If the individuals in a fish box were too numerous to measure, at least 30 were measured, and the remainder counted. When available, crew members were interviewed to determine location of the pound nets and the number of nets fished for that trip.

Data on species composition and seasonality were applied to the North Carolina commercial landings database to separate pound net landings for the fishery directed at flounder from the pound net fisheries for herrings and sciaenids. The criteria for designating pound net landings to the fishery described in this section were those pound net landings from Beaufort, Carteret, Hyde and Tyrrell counties for September, and Beaufort, Carteret, Dare, Hyde and Tyrrell counties for the months October through December. Dare County landings were not included in September because of the pound fishery for sciaenids that occurs during September in Dare County. These selection criteria under report the total annual landings from flounder pound nets and the sciaenid pound net fishery has declined in recent years. However, these selection criteria capture the majority of flounder pound net landings and allows for comparisons to earlier years.

RESULTS AND DISCUSSION

Catch Rates and Landings

A total of 158 catches from the pound net fishery for flounder was sampled from 2004 to 2006 (Table 5.1). The majority of the samples were from Pamlico Sound (62%), and the remaining catches sampled were from the Albemarle/Croatan/Currituck sounds (27%), Core Sound (10%) and Back Sound (1%). Catches were sampled from August or September through November, with the largest catches sampled occurring in September and October. Many of the catches sampled in September were from the Albemarle Sound region, where catches are relatively large. Weights of sampled landed catches averaged 605 kg and ranged from 17 to 5,938 kg/trip. The number of nets fished per trip ranged from as few as one and as many as 25 pound nets fished per trip. The mean catch per pound net fished was 93 kg per pound net for the three year period (Table 5.1).

A total of 55 flounder pound net catches was sampled in 2004. Catches ranged from 24 to 3,658 kg/trip and averaged 568 kg/trip. A total of 255 pound nets was fished from the catches sampled and averaged 5 pound nets fished per trip sampled (Figure 5.3). Mean catch per pound net fish ranged from 29 kg/pound net fished in August to 174 kg/pound net fished in September and was 96 kg/pound net fished for the year (Table 5.1).

A total of 44 flounder pound net catches was sampled in 2005. Catches ranged from 52 to 2,232 kg/trip and averaged 583 kg/trip. The lower number of catches sampled was a result of travel restrictions in September and October and Hurricane Ophelia halting fishing operations in mid September. A total of 251 pound nets was fished from the catches sampled and averaged 8 pound nets fished per trip sampled (Figure 5.3). Mean catch per pound net fish ranged from 36 kg/pound net fished in November to 177 kg/pound net fished in September and was 98 kg/pound net fished for the year (Table 5.1).

A total of 59 flounder pound net catches was sampled in 2006. Catches ranged from 17 to 5,938 kg/trip and averaged 605 kg/trip. A total of 378 pound nets was fished from the catches sampled and averaged 9 pound nets fished per trip sampled (Figure 5.3). Mean catch per pound net fish ranged from 46 kg/pound net fished in November to 130 kg/pound net fished in September and was 90 kg/pound net fished for the year (Table 5.1).

The contribution, in weight, of the flounder pound net fishery to the annual State edible finfish landings was 1.7%, 1.3% and 1.8%, and the value of this fishery represented 3.1%, 2.6% and 3.5% of the total value of edible finfish landings for 2004, 2005 and 2006, respectively. The average price per kg of flounder was $3.82, $4.49 and $5.00 for these years.

Trends

Total finfish landings by North Carolina flounder pound nets have fluctuated over the years due to fishing effort and the effects of hurricanes impacting landings (Burns and Batsavage 2004). Landings increased in 1987 and remained relatively high through 1996, with peak landings in 1994 at 1,124 mt (Burns and Batsavage 2004). Total landings since 2003 have been lower than any other annual landings since 1982 (Table 5.2). Hurricanes, reduced fishing effort and fewer participants in the fishery are largely responsible for the low landings (Figure 5.3).

Landings of flounder by flounder pound nets generally parallel the trends in total landings. Flounder landings increased in 1986 and remained relatively high through 1996, with peak landings in 1993 at 987 mt (Burns and Batsavage 2004). Flounder landings have sharply decreased after 2002 and were lower than any years since 1982 (Table 5.2). The contribution of flounder landings to flounder pound net landings fluctuated over the study period from 63% (1987) to 91% (1992,1993, 2003), and averaged 82% from 1982-2006 (Burns and Batsavage 2004).

Seasonal total catch weights have fluctuated over the study period. Mean catch weights were high from 1994 to 1996 (702-719 kg), but steadily declined from 1998 to 2000 with catches similar to those in 1989-1993 (Monaghan and Watterson 2001, Burns 2004). The lowest catch weight recorded was 414 kg in 2000 but subsequently increased by 81% to the highest mean catch weight recorded in 2002 (748 kg) (Burns 2004). Mean catch weights declined again in 2003 (463 kg), but declines in catches were most likely influenced by decreased fishing effort consequential to Hurricane Isabel (Burns and Batsavage 2004). Catch rates from 2004 to 2006 were similar to catch rates from 1997 to 1999 (Table 5.1) (Monaghan and Watterson 2001).

Flounder catch weights correspond with trends in total catch weights, as flounder comprised 81-96% of the catches sampled since 1989 (Monaghan and Watterson 2001, Burns 2004, Burns and Batsavage 2004). However, an exception occurred in 2002 when black drum (*Pogonias cromis*) were unusually abundant (18%) and the contribution of flounder was only 71% (Burns 2004). Catch weights of flounder were highest in 1994-1996 (640-659 kg), and declined from 1998 to 2000 (Burns 2004). The mean catch of flounder from catches sampled was lowest in 1990 (314 kg) and highest in 1996 (659 kg) (Monaghan and Watterson 2001). The mean catch of flounder from catches sampled from 2004 to 2006 ranged from 514 kg in 2005 to 578 kg in 2006 (Table 5.3).

Species Composition
2004-2006

The pound net fishery for flounder, although targeting southern flounder (*Paralichthys lethostigma*), caught a wide variety of fishes during the study period (Tables 5.3a-c). Southern flounder dominated the catches from 2004 to 2006, accounting for 84%-87% of the landed catch, by weight. Other flounder species of importance captured by this gear included Gulf flounder (*Paralichthys albigutta*) (0.2%-0.4%) and summer flounder (*Paralichthys dentatus*) (0.1-0.2%). Non-flounder species of importance captured by flounder pound nets included harvestfish (*Peprilus alepidotus*), butterfish (*Peprilus triacanthus*), sheepshead (*Archosargus probatocephalus*), spadefish (*Chaetodipterus faber*), and black drum.

Scrapfish

The scrap component of this fishery is negligible and consists mainly of skates and stingrays that were not culled at the fishing net. Very few scrap samples were taken during the sampling period and none are reported in this document.

Management Issues

The number of pound nets set for flounder increased dramatically between the late 1980s and mid-1990s. A decline in the summer flounder winter trawl fishery in the mid 1980s and federal restrictions implemented for this fishery in 1993 resulted in an increased demand and value for flounder (NCDMF 2005). In addition, the increased price and demand for live or bled flounder caused a significant increase in the number of applications for new pound nets submitted to the NCDMF. However, in the mid 1990s there was a decline in both effort and landings in the flounder pound net fishery, which coincided with a dramatic increase in effort in the estuarine gill net fishery. Gill nets remain the dominant gear in the southern flounder fishery because of the relative mobility of the gear and the overhead costs and labor for this gear are less than the costs and labor for the flounder pound net fishery.

The North Carolina Marine Fisheries Commission (NCMFC) approved the North Carolina Southern Flounder Fishery Management Plan (FMP) in February 2005. The FMP implements management measures to rebuild the stock within 10 years and still allow the commercial and recreational fisheries to occur. The 2004 southern flounder stock assessment determined that the southern flounder stock in North Carolina is overfished and overfishing is occurring. Several management measures were implemented that have an impact on the flounder pound net fishery. These include increasing the minimum size limit for Paralicthid flounders in internal waters from 13 inches to 14 inches total length, a commercial seasonal closure in internal waters from December 1-31, maintaining the 200-

yard limit between gill nets and active pound nets statewide except in the Albemarle Sound, excluding tributaries, during August 15 – November 30 where the minimum distance is 500 yards, require the incorporation of escape panels with 14 cm (5½-inch) stretched mesh in all flounder pound nets statewide and continue the rule requiring a minimum distance of 1,000 yards between new and existing flounder pound nets (NCDMF 2005). The stock assessment for southern flounder will be updated in 2008. Further management measures may be needed if the status of the stock does not show improvement.

The NCMFC formed the Sea Turtle Advisory Committee (STAC) in response to problems with protected species interactions with fisheries in North Carolina (STAC 2006). The STAC was comprised of stakeholders concerned with the bycatch of protected species in the commercial and recreational fisheries. Pound nets (flounder pound nets in particular) were identified as a gear of primary concern because of known sea turtle interactions, potential sea turtle mortalities associated with this gear, long soak times for the gear to fish, the gear sometimes remains in the water after the season closes and information is needed on sea turtle interactions in pound net leads (STAC 2006). The most significant management recommendation for pound nets was for the State to apply for a Section 10 Incidental Take Permit through the Endangered Species Act for the pound net fishery. This permit is for activities that are lawful but are expected to incidentally take a listed species. The permit holders must develop and implement conservation plans that reduce and minimize impacts of the interactions. The permit also includes reporting requirements as well as other conditions such as tagging, handling guidelines and data analyses (STAC 2006). Flounder pound nets commonly catch live sea turtles, and the National Marine Fisheries (NMFS) staff relies on this gear as a primary source for the collection of sea turtles for tagging studies and biological data (NCDMF 2005). It is unknown if these recommendations will be enacted and how they might affect the flounder pound net fishery.

LITERATURE CITED

Burns, B.L.
2004. Flounder pound net fishery assessment in: Assessment of North Carolina Commercial Finfisheries, Completion Report, Project NA 03NMF4070160, North Carolina Department of Environment and Natural Resources, Division of Marine Fisheries, 19p.

Burns, B.L. and C.F. Batsavage.
2004. Flounder pound net fishery assessment in: Assessment of North Carolina Commercial Finfisheries, Completion Report, Project NA 06 FI 0321, 1-3, North Carolina Department of Environment and Natural Resources, Division of Marine Fisheries, 20p.

DeVries, D.A.
1981. Stock assessment of adult fishes in the Core Sound area. Completion Report, Project 2-326-R, North Carolina Department of Natural Resources and Community Development, Division of Marine Fisheries, 54p.

Monaghan, J.P., Jr. and J.C. Watterson
2001. Flounder pound net fishery assessment in: Assessment of North Carolina Commercial Finfisheries, Completion Report, Project NA 76 FI 0286, 1-3, North Carolina Department of Environment and Natural Resources, Division of Marine Fisheries, 27p.

NCDMF (North Carolina Division of Marine Fisheries)
2005. North Carolina southern flounder Fishery Management Plan. North Carolina Division of Marine Fisheries, Morehead City, NC. 335p.

STAC (Sea Turtle Advisory Committee)
2006. Sea turtle interactions with North Carolina fisheries review and recommendations to the North Carolina Marine Fisheries Commission. North Carolina Division of Marine Fisheries, Morehead City, NC. 72p.

Wolff, M.W.
1977. Preliminary stock assessment, North Carolina: Flounder (*Paralichthys* spp.). Completion Report, Project 2-294-R, North Carolina Department of Natural Resources and Community Development, Division of Marine Fisheries, 18p.

Table 5.1. Monthly summary of sampling of the North Carolina flounder pound net fishery, 2004-2006; n = number of catches sampled.

			Catch weight (kg)		Mean catch (kg) per pound net fished	Sample weight (kg)	
Year	Month	n	Mean	Range		Mean	Range
2004	Aug	2	119.3	95.3-143.3	28.7	50.9	45.4-55.8
	Sep	19	760.2	23.9-3,658.2	173.7	128.9	23.9-351.3
	Oct	20	476.1	57.3-1,881.2	59.2	103.8	18.1-255.5
	Nov	14	501.2	51.3-2,279.8	105.3	118.7	29.5-272.2
	All	55	567.7	23.9-3,658.2	95.8	114.3	18.1-351.3
2005	Sep	5	1,452.8	62.6-2,060.1	177.2	156.8	45.4-221.0
	Oct	27	554.3	52.3-2,232.2	117.3	139.2	46.1-333.8
	Nov	12	284.6	58.5-759.8	36.0	103.4	24.5-187.5
	All	44	582.9	52.3-2,232.2	98.0	131.4	24.5-333.8
2006	Sep	6	817.2	82.6-1,747.4	80.7	151.2	66.7-204.2
	Oct	35	754.8	51.2-5,938.4	129.9	163.1	46.4-388.3
	Nov	18	414.8	17.3-2,432.1	46.4	97.5	17.3-258.3
	All	59	657.4	17.3-5,938.4	89.8	141.9	17.3-388.3
2004-06	All	158	605.4	17.3-5,938.4	93.3	129.4	17.3-388.3

Table 5.2. North Carolina flounder pound net reported commercial landings (metric tons) and value (thousand dollars) for selected species, 2004-2006, including the relative contributions of the species to the fishery.

	2004			2005			2006		
Species	Metric tons	% of fishery	Value (X $1,000)	Metric tons	% of fishery	Value (X $1,000)	Metric tons	% of fishery	Value (X $1,000)
Atlantic croaker	0.1	<0.1	0.1	0.1	<0.1	0.1	0.4	0.1	0.3
Black Drum	5.9	1.9	2.9	1.3	0.6	0.8	15.4	5.3	10.0
Bluefish	1.1	0.3	0.5	0.5	0.2	0.3	0.2	0.1	0.1
Butterfish	18.7	5.9	15.8	2.4	1.1	2.8	1.2	0.4	1.4
Florida pompano	2.5	0.8	8.5	1.5	0.7	4.6	0.8	0.3	2.6
Flounders	262.1	83.2	1,002.4	183.6	83.5	824.6	253.2	87.3	1,266.8
Harvestfish	5.3	1.7	12.0	4.1	1.9	10.5	3.5	1.2	8.6
Red drum	0.5	0.2	1.5	3.9	1.8	11.6	2.7	0.9	8.1
Spanish mackerel	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Spot	1.1	0.3	1.2	0.7	0.3	0.8	0.1	0.0	0.2
Spotted seatrout	0.1	0.0	0.4	0.2	0.1	0.5	0.2	0.1	0.7
Striped bass	-	-	-	4.3	2.0	18.4	2.6	0.9	12.7
Weakfish	0.2	0.1	0.4	0.3	0.1	0.6	0.1	0.0	0.3
All others	17.4	5.5	10.2	16.9	7.7	10.8	9.8	3.4	9.6
Total fish	315.1	100.0	1,055.9	219.9	100.0	866.4	290.1	100.0	1,321.3

Table 5.3a. Overall species composition and mean catch per trip of North Carolina flounder pound net catches (n=55) September through November 2004.

Species	Weight (kg) Mean	Weight (kg) Percent	Number Mean	Number Percent	Mean fish weight (kg)	Percent freq. occur.
Paralichthys lethostigma	491.1	86.5	501	72.1	0.981	100.0
Paralichthys spp.	28.2	5.0	14	2.0	2.013	41.8
Chaetodipterus faber	10.9	1.9	13	1.9	0.831	21.8
Ameiurus catus	7.2	1.3	8	1.1	0.920	21.8
Peprilus alepidotus	6.3	1.1	64	9.2	0.099	16.4
Peprilus triacanthus	5.6	1.0	60	8.6	0.094	18.2
Pogonias cromis	4.5	0.8	4	0.6	1.112	49.1
Archosargus probatocephalus	3.4	0.6	2	0.3	1.512	40.0
Trachinotus carolinus	2.3	0.4	6	0.8	0.407	21.8
Paralichthys albigutta	2.3	0.4	3	0.5	0.707	30.9
Pomatomus saltatrix	1.7	0.3	2	0.3	0.946	9.1
Micropogonias undulatus	1.2	0.2	2	0.3	0.660	21.8
Paralichthys dentatus	0.7	0.1	1	0.1	0.811	20.0
Lobotes surinamensis	0.6	0.1	0	0.0	6.080	3.6
Scomberomorus maculatus	0.2	0.0	0	0.0	1.015	7.3
Mugil cephalus	0.2	0.0	0	0.0	0.813	3.6
Sciaenops ocellatus	0.2	0.0	0	0.0	1.061	5.5
Leiostomus xanthurus	0.2	0.0	0	0.1	0.450	10.9
Ictalurus spp.	0.2	0.0	0	0.0	0.868	5.5
Sphoeroides maculatus	0.1	0.0	1	0.1	0.177	5.5
Cynoscion nebulosus	0.1	0.0	0	0.0	0.774	12.7
Cynoscion regalis	0.1	0.0	0	0	0.568	9.1
Morone americana	0.0	0.0	0	0	0.272	14.5
Callinectes sapidus	0.1	0.0	1	0	0.140	10.9
Clupeidae	0.0	0.0	-	-	-	1.8
Trachinotus falcatus	0.0	0.0	0	0	0.900	1.8
Menticirrhus spp.	0.0	0.0	0	0	0.500	1.8
Observed Species						
Dorosoma cepedianum						
Ictalurus punctatus						
Morone saxatilis						

Table 5.3b. Overall species composition and mean catch per trip of North Carolina flounder pound net catches (n=44) September through November 2005.

Species	Weight (kg) Mean	Weight (kg) Percent	Number Mean	Number Percent	Mean fish weight (kg)	Percent freq. occur.
Paralichthys lethostigma	492.6	84.5	576	78.8	0.855	100.0
Archosargus probatocephalus	29.0	5.0	12	1.6	2.454	65.9
Paralichthys spp.	18.7	3.2	15	2.0	1.265	18.2
Chaetodipterus faber	9.0	1.5	7	0.9	1.325	38.6
Peprilus alepidotus	8.2	1.3	72	9.8	0.115	29.5
Sciaenops ocellatus	5.3	0.9	2	0.3	2.767	45.5
Peprilus triacanthus	5.0	0.9	35	4.7	0.144	13.6
Pogonias cromis	3.9	0.7	1	0.2	3.469	38.6
Morone saxatilis	2.4	0.4	1	0.2	2.170	13.6
Paralichthys albigutta	2.0	0.3	3	0.4	0.691	25.0
Ictalurus spp.	1.3	0.2	-	-	-	4.5
Paralichthys dentatus	1.0	0.2	1	0.2	0.854	20.5
Leiostomus xanthurus	1.0	0.2	2	0.3	0.406	15.9
Mugil cephalus	0.8	0.1	1	0.1	0.770	27.3
Trachinotus carolinus	0.7	0.1	2	0.2	0.429	27.3
Pomatomus saltatrix	0.6	0.2	1	0.1	0.938	13.6
Micropogonias undulatus	0.4	0.1	1	0.1	0.701	20.5
Lobotes surinamensis	0.3	0.0	0	0.0	11.300	4.5
Orthopristis chrysoptera	0.2	0.0	-	-	-	2.3
Cynoscion regalis	0.2	0.0	0	0.0	0.487	11.4
Lagodon rhomboides	0.1	0.0	-	-	-	2.3
Cynoscion nebulosus	0.1	0.0	0	0.0	0.900	9.1
Ictalurus punctatus	0.1	0.0	0	0.0	2.810	2.3
Ameiurus catus	0.0	0.0	0	0	0.677	2.3
Selene vomer	0.0	0.0	0	0	0.170	6.8
Sphoeroides maculatus	0.2	0.0	1	0.0	0.263	4.5
Morone americana	0.0	0.0	-	-	-	2.3
Observed Species						
Limulus polyphemus						
Raja spp.						
Megalops atlanticus						
Chilomycterus schoepfii						

Table 5.3c. Overall species composition and mean catch per trip of North Carolina flounder pound net catches (n=59) September through November 2006.

Species	Weight (kg) Mean	Weight (kg) Percent	Number Mean	Number Percent	Mean fish weight (kg)	Percent freq. occur.
Paralichthys lethostigma	551.1	83.8	584	75.9	0.944	100.0
Pogonias cromis	29.3	4.4	32	4.2	0.909	74.6
Paralichthys spp.	25.1	3.8	20	2.7	1.228	27.1
Archosargus probatocephalus	20.8	3.2	9	1.2	2.205	40.7
Peprilus alepidotus	9.9	1.5	94	12.3	0.105	33.9
Sciaenops ocellatus	3.9	0.6	1	0.2	2.802	44.1
Chaetodipterus faber	2.9	0.4	3	0.4	0.999	32.2
Morone saxatilis	2.9	0.4	2	0.3	1.482	15.3
Trachinotus carolinus	2.8	0.4	9	1.2	0.309	27.1
Ameiurus catus	1.8	0.3	1	0.2	1.261	6.8
Ictalurus spp.	1.6	0.2	3	0.4	0.522	8.5
Paralichthys albigutta	1.3	0.2	2	0.3	0.653	37.3
Limulus polyphemus	1.0	0.2	1	0.1	1.361	8.5
Mugil cephalus	1.0	0.2	1	0.1	0.916	28.8
Lobotes surinamensis	0.5	0.1	0	0.0	5.680	6.8
Paralichthys dentatus	0.4	0.1	1	0.1	0.591	8.5
Pomatomus saltatrix	0.3	0.0	0	0.0	0.843	16.9
Peprilus triacanthus	0.3	0.0	2	0.3	0.129	20.3
Cynoscion nebulosus	0.2	0.0	0	0.0	1.167	8.5
Scomberomorus maculatus	0.1	0.0	0	0.0	2.500	3.4
Cynoscion regalis	0.1	0.0	0	0.0	0.600	13.6
Selene vomer	0.1	0.0	2	0.2	0.045	5.1
Leiostomus xanthurus	0.0	0.0	0	0.0	0.261	5.1
Morone americana	0.0	0.0	0	0.0	0.490	5.1
Sphoeroides maculatus	0.0	0.0	0	0.0	0.362	6.8
Trachinotus falcatus	0.0	0.0	0	0.0	1.800	1.7
Micropogonias undulatus	0.1	0.0	1	0.1	0.450	5.1
Alectis ciliaris	0.0	0.0	0	0.0	0.100	1.7
Menticirrhus americanus	0.0	0.0	0	0.0	0.450	1.7
Dorosoma cepedianum	0.0	0.0	0	0.0	0.360	3.4
Observed Species						
Chilomycterus schoepfi						
Bairdiella chrysoura						

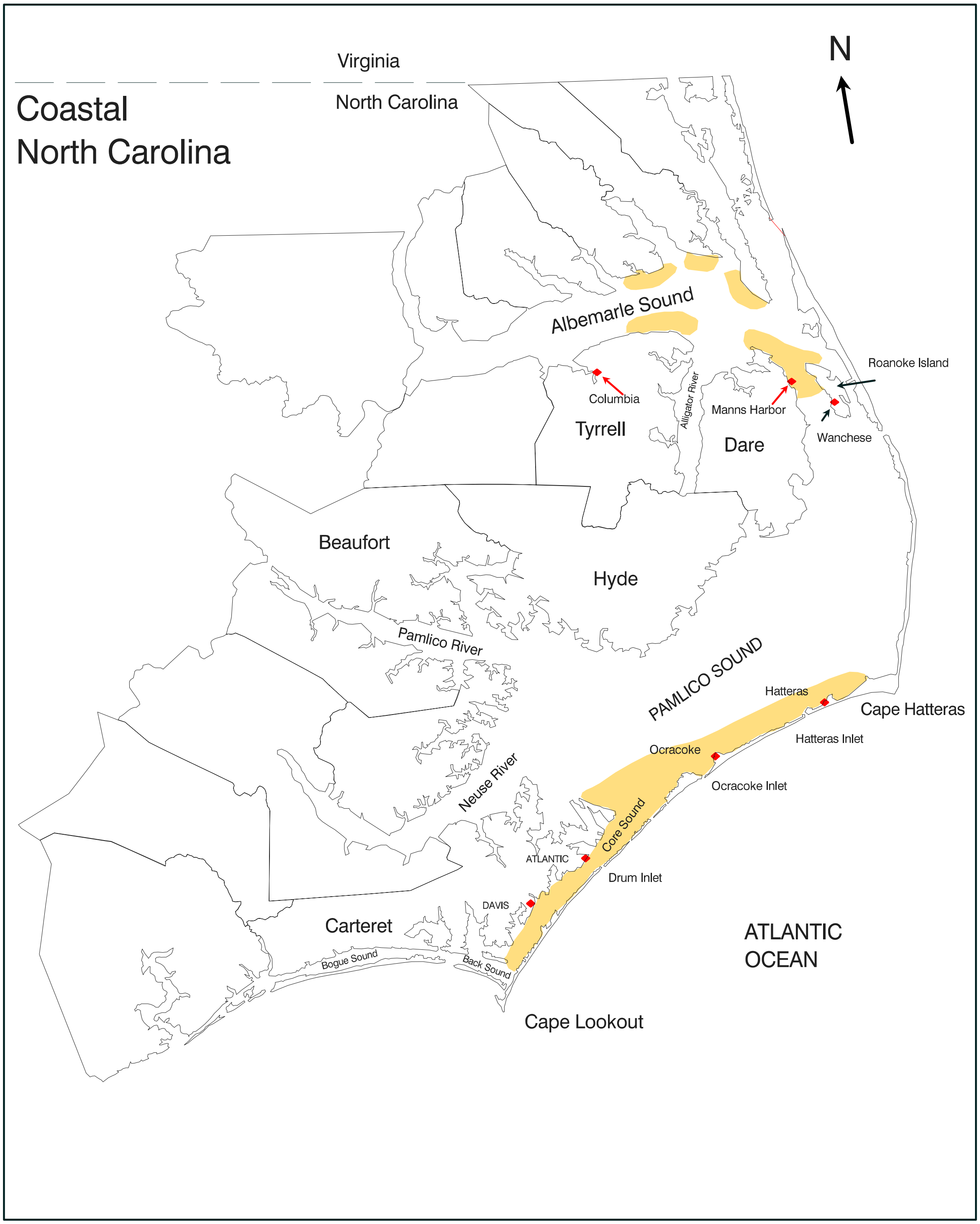


Figure 5.1 Fishing grounds (shaded areas) of North Carolina's flounder pound net fishery.

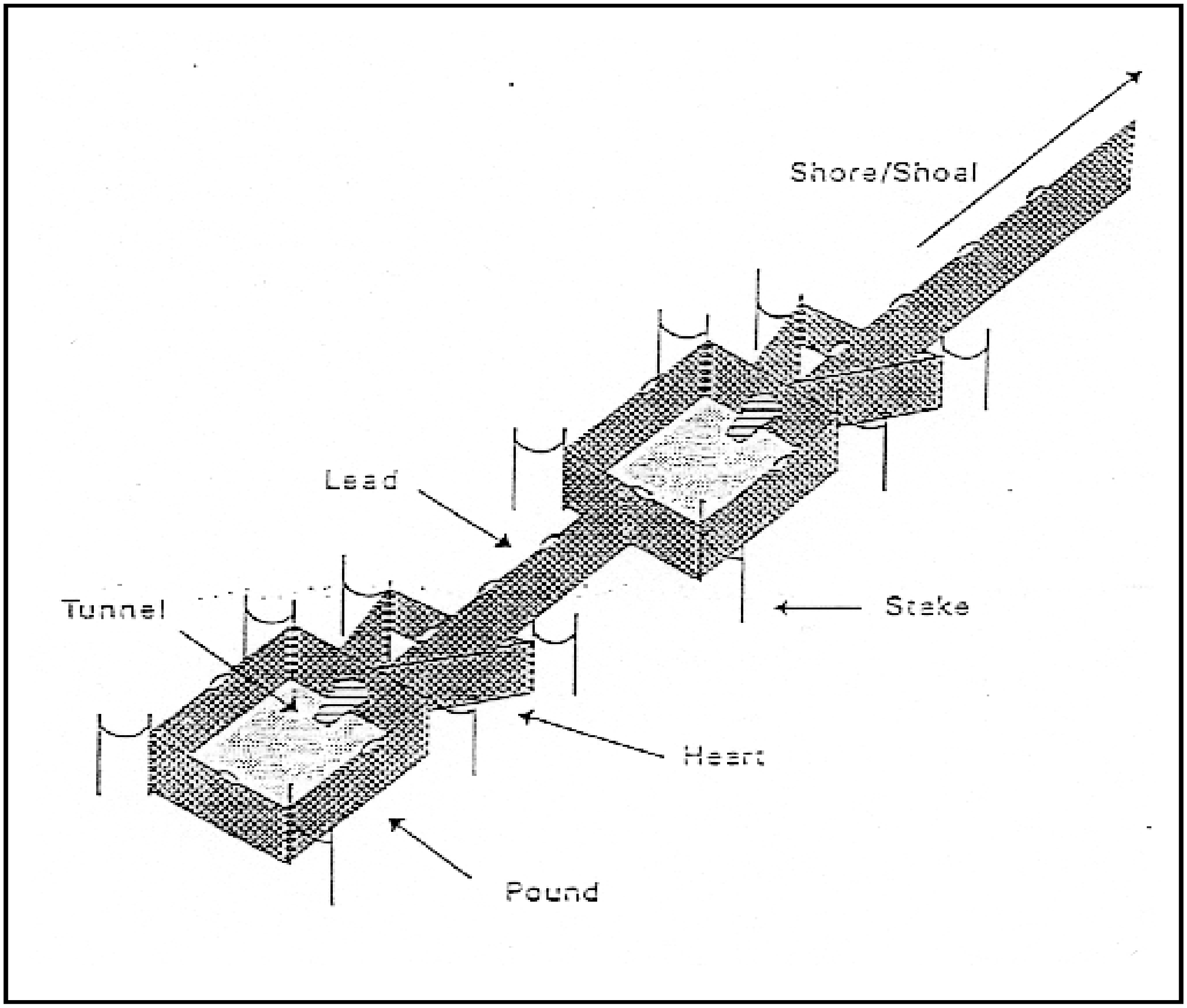


Figure 5.2. Characteristics of a generalized flounder pound net.

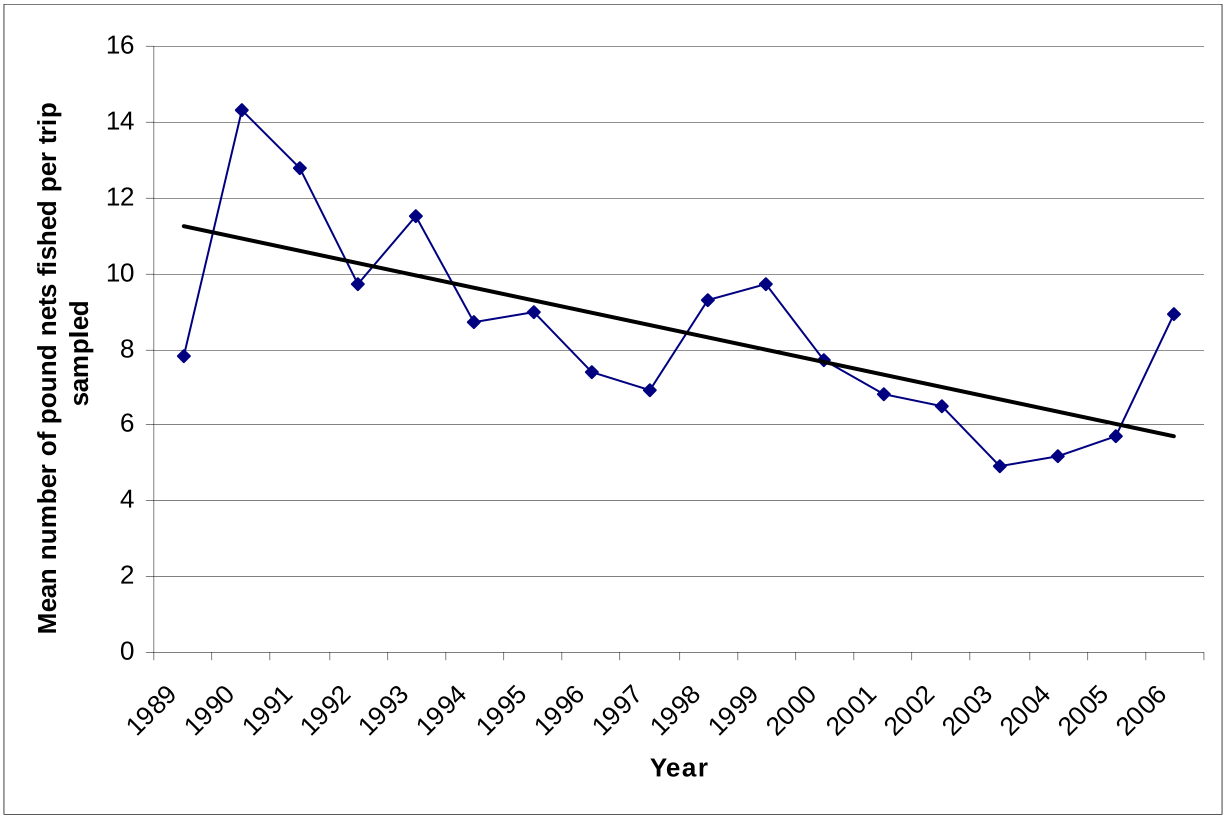


Figure 5.3. Average number of pound nets fished per trip sampled, 1989-2006.

ASSESSMENT OF NORTH CAROLINA COMMERCIAL FINFISHERIES

Final Performance Report for Award Number NA 04NMF4070216, 1

November 2007

FISHERY SECTION 6

ESTUARINE GILL NET FISHERY ASSESSMENT

Job 5

By

Eric Fitzpatrick

ABSTRACT

The estuarine gill net fishery in North Carolina is a year round multi-species fishery where netting used and species targeted varies by area and season. Estuarine gill nets are one of the dominant finfish gear types in the state based on the amount of gear utilized and number of people involved. The NCDMF has more than doubled sampling efforts of this fishery since 1997 with 2,145 catches sampled during 2004-2006. Unlike most commercial finfish gears, large quantities of gill nets are frequently used for part-time commercial and recreational purposes. Estuarine gill nets were the most widely used commercial finfish gear during the 2006 trip ticket report period, comprising 21.7% of the total trips reported. Three primary types of gill net are used: set, runaround, and drift nets. Set nets are the largest component and are further divided into large (≥ 5-inch stretch mesh) and small (<5-inch stretch mesh) mesh categories. Estuarine gill net landings contributed 14.1 – 15.3% by weight of the edible finfish landings in North Carolina (2004 – 2006). Southern flounder (*Paralichthys lethostigma*) was the top finifish landed in the state and was the primary component of the large mesh catches sampled. Southern flounder accounted for 19.5 – 26.5% of the total estuarine gill net landings in the state. Striped mullet (*Mugil cephalus*) was the second highest finfish species landed in all estuarine gill nets and comprised 20.7 – 24.2% of the overall estuarine gill net landings by weight in the entire state. Other common species in the gill net catches included: American shad (*Alosa sapidissima*), striped bass (*Morone saxatilis*), spot (*Leiostomus xanthurus*), bluefish (*Pomatomus saltatrix*), and white perch (*Morone americana*). The incidental capture of non-targeted, endangered, and undersized market species continues to be both a biological and economical concern in this fishery.

INTRODUCTION

The estuarine gill net fishery in North Carolina is a year round multi-species fishery where the netting used and the species targeted varies by area and season. Species commonly targeted by the estuarine gill net fishery include: American shad (*Alosa sapidissima*), Atlantic croaker (*Micropogonias undulatus*), southern flounder (*Paralichthys lethostigma*), red drum (*Sciaenops ocellatus*), spot (*Leiostomus xanthurus*), spotted sea trout (*Cynoscion nebulous*), striped mullet (*Mugil cephalus*), striped bass (*Morone saxatilis*), bluefish (*Pomatomus saltatrix*), white perch (*Morone americana*), and weakfish (*Cynoscion regalis*).

Unlike most other commercial finfish gears, gill nets are frequently used in North Carolina for part-time commercial and recreational purposes. The ubiquity of the gear makes it difficult to estimate the quantity used and the number of fishermen involved at any given time. Effort (in trips) for the commercial sector is available through a mandatory trip ticket reporting program implemented in 1994. Estuarine gill nets are the most widely used commercial finfish gear reported by the trip ticket program, comprising 21.7% of all the trips reported from 2004 - 2006. Estuarine gill net landings contributed 14.1 – 15.3% by weight of all edible finfish species landed by all gear types in North Carolina from 2004 to 2006.

Three primary types of gill nets exist in the North Carolina estuarine gill net fishery: set, runaround, and drift nets. Set nets are deployed and left from a few hours to a few days depending on water temperature and season. Set nets can be further divided into float and sink categories, depending on how they fish within the water column. Float nets fish the entire height of the water column, while sink nets fish a fixed distance off the bottom and do not extend into the upper portion of the water column if the water is deeper than the height of the net. Tie-downs and nets without floats are also implemented in some areas of the state to reduce the height of the net in the water column in order to avoid non-target species. Runaround gill nets, also referred to as drop or strike nets, are fished in one or two ways. For the first method, the net is attached to a point on the shore and deployed parallel with the terminal end finishing at another point along the shore to block a section of the shoreline. The boat is driven into the blocked section and the fish are frightened into the deeper water and caught in the net. The net is retrieved after several passes are made within the blocked area. For the second method, the net is set to encircle or wrap up a school of fish. Runaround nets are primarily used for striped mullet during the fall fishery. Drift nets are similar to the drop net but do not have enough weight attached to the lead line to remain stationary. The nets drift with the current. Drift nets are primarily used for American shad and river herring (blueback herrring (*Alosa aestivalis*) and alewife (*Alosa pseudoharengus*) during spawning runs.

An in depth characterization of the estuarine gill net fishing was undertaken in the red drum FMP 2007 amendment (Paramore 2007). As part of an analysis for estimating gill net discards 16 target fisheries were defined and described by number of trips, range of mesh sizes used, yards fished, soak times and depth fished. Trip ticket data collected from 2001 to 2006 was analyzed to determine the target species for each individual trip made. The species of highest abundance in landings (95% of cases) was considered the target species and was used to define the trip. After all analysis, 99% of all gill net trips fell into one of sixteen key species. Species with similar gear parameters for mesh size were grouped together into large ($\geq$ 5 inch) or small (<5 inch) stretch mesh gill net fisheries. Flounders, striped bass, red drum, American and Hickory shad (*Alosa mediocris*) and catfishes (*Ictaluridae spp.*) were defined as large mesh fisheries. Ten other species that were defined as small mesh fisheries include spot, striped mullet, spotted sea trout, bluefish, weakfish, Atlantic menhaden (*Brevoortia tyrannus*), Spanish mackerel (*Scomberomorus maculates*), white perch, river herring and sea mullet (*Menticirrhus* spp.).

The North Carolina Division of Marine Fisheries (NCDMF) initiated a statewide program to sample the dominant commercial finfisheries in 1982. The objective was to obtain biological and fisheries data on the economically important fishes to assist in management decisions. The objectives of this report are to present the species composition, relative abundance, distribution, and seasonality of the gill net catches from 2004 to 2006. A summary of sampled estuarine gill net catches is presented from January 2004 to December 2006. Catch-per-unit-effort (CPUE) and landings data are also presented with species and fishery specific data from the NCDMF trip ticket database from 2003.

MATERIALS AND METHODS

Sampling of the estuarine gill net fishery was initiated by the NCDMF in April 1991 to determine relative abundance, age, size, and composition of species taken in the Pamlico Sound area. Two modes of sampling were included in the project: at-sea sampling and fish house sampling as catches are unloaded to the seafood dealer. Most sampling was conducted at the fish house after fishermen landed and graded their catch. In 1994, at-sea and fish house sampling of estuarine gill nets was expanded to include all other areas within North Carolina.

For estuarine gill net samples the following trip information was collected: general location or waterbody, total length of nets (feet), soak time (minutes), specific net type (i.e. float, sink, etc.), mesh size (bar mesh, inches), net depth (float nets, recorded in feet), vertical fishing depth (sink nets, recorded in feet), twine size, average water depth (meters), and incidental species. For on the water samples, fish were categorized into market and discard groups (based on size limits and marketability). Each category (market or discard) was separated into species groups. Commercially important species from each category were counted, measured to the nearest mm (FL or TL), and weighed by species aggregates to the nearest 0.1 kg. Counts and total weights (kg) by species were obtained for the non-marketable species within the discard portion. Weights were estimated for discarded fish that were shaken free from the net during the gear retrieval process.

At the fish house random samples of the graded catch (cartons from each market category) were taken. All fish in the sample were identified and measured to the nearest mm (FL or TL). Total weight of the sample and the species component weights were recorded. Total weight of the species component from the sampled catch was obtained directly from the fishermen or the trip ticket. Estimates (number and weight) of the discard component were obtained from the fishermen.

Estuarine gill net catches were analyzed by location and mesh size. Area designations included the Albemarle area, Pamlico area, Rivers (Neuse, Pamlico, Pungo, and New rivers), and the Southern area (Figure 6.1). The Albemarle area included all inside waters designated as the Albemarle Sound Management Area (ASMA) from the Virginia-North Carolina line, including Currituck Sound, the Albemarle Sound and all tributaries, Croatan Sound, and Roanoke Sound to the south end of Roanoke Marshes across to Eagle Nest Bay, below Oregon Inlet. The Pamlico area included all water south of the ASMA line and Core Sound to Beaufort Inlet including the Newport River. The River area included the New, Neuse, Pamlico, and Pungo rivers. The Southern area designation included all inside waters on from the westside of Beaufort Inlet, including Bogue Sound, White Oak, Lockwood Folly and Shallotte rivers, Topsail Sound, and the Cape Fear River, to the North Carolina-South Carolina line. Mesh sizes were divided into large ($\geq$ 5-inch or $\geq$ 127-mm stretched mesh), small (< 5-inch or <127-mm stretched mesh), and multi (contained both large and small mesh sizes and the fish could not be divided into the appropriate mesh component). Samples that did not contain mesh size information were classified as unknown.

Landings were obtained from the NCDMF trip ticket database and categorized as large or other mesh size. Two mesh size categories (large $\geq$ 5 inch code 427 or small $\leq$ 5 inch code 426) have only been recorded on trip tickets since 2004. For earlier years an analysis that is based on target species weight is used to categorize a large mesh trip. Mesh sizes were also designated as large if the flounder in the catch contributed 50% or more by weight. Characterization studies show large mesh catches are predominantly composed of flounder. Catches that were not classified as large mesh were assumed to be small or multi mesh nets and designated as other mesh sizes. However, there is a potential that by using this criteria species such as American shad, red drum & striped bass can be assigned to small mesh trips.

RESULTS AND SPECIES TRENDS

Catch Rates and Landings

Estuarine gill nets are the dominant finfish gear type in the state based on the amount of gear utilized and number of people involved, and NCDMF has more than doubled sampling efforts since 1997. A total of 2,145 estuarine gill net catches were sampled, 2004 (n = 608), 2005 (n = 661) and 2006 (n = 876), during this reporting period (Table 6.1a). Samples from the Albemarle area (n = 347) contributed 16.2% of all samples collected, the Pamlico area (n = 1,001) contributed 46.7% of the samples, the Rivers area (n = 729) contributed 34.0% of the samples, and the Southern area (n = 68) contributed the remaining 3.1% of the samples. The number of estuarine gill net trips was highest in the months of March, April, September and October (Table 6.1b). There were a total of 44,777 small (other) mesh trips and 61,414 large mesh trips from 2004 to 2006. A total of 39.8% of the trips occurred in the Albemarle area, while 33.4% occurred in the Pamlico area, 18.1% in the Rivers area, and 8.7% in the Southern area. Biological sampling coverage for all estuarine gill net trips statewide was 2.0% combined. Annually coverage increased throughout the sampling period; 1.7% (2004), 1.9% (2005) and 2.5% (2006). Albemarle area landings for the large mesh fishery increased while other fisheries (small mesh) declined in throughout the sampling period. Landings and effort were steady for the large mesh fisheries in the Pamlico, Rivers and Southern areas. Landings for the other mesh fishery in the Pamlico area increased in 2005 while remaining relatively stable for the River and Southern areas.

Albemarle Area

Annual biological sampling coverage in the Albemarle area compared to total gill net trips taken in Albemarle area was 0.8% from 2004 to 2006 for both large and other mesh sizes combined. A total of 215 biological samples of large mesh estuarine gill nets was collected from January 2004 to December 2006 (Table 6.1a). The 2004-06 catch rates of the large mesh samples were between 2.3-490.9 (kg/trip) with gill nets between 300.0-3,700.0 yards in length, and soak times between 0.1-96.0 hours in duration. The highest landings and effort in large mesh gill nets in the Albemarle area occurred from September toNovember for the fall flounder fishery (Table 6.1b).

The catch rate from the 49 small (other) mesh samples was between 2.1-986.1 kg/trip with gill net lengths between 133.3-2,400.0 yds, and soak times between 0.1-48.0 hrs (Table 6.1a). Effort and landings from the small mesh gill net trips in the Albemarle area were highest in March and April concurrent to the perch fisheries occurring at that time (Table 6.1b). For the Albemarle fish house samples 23.9% were classified as unknown mesh sizes.

Pamlico Area

Annual biological sampling coverage in the Pamlico area compared to total gill net trips taken in Pamlico area was 2.8% from 2004 to 2006 for both large and other mesh sizes combined. A total of 547 biological samples of large mesh estuarine gill nets was collected from January 2004 to December 2006 (Table 6.1a). The catch rates of the large mesh samples were between 1.5-622.8 (kg/trip), with gill nets between 200.0-6,000.0 yards in length, and soak times between 8.0-72.0 hours in duration. CPUE and landings were highest in October for the flounder fishery (Table 6.1b). The catch from the 320 small mesh samples in 2004-06 was between 1.9-2,747.8 kg/trip with gill net lengths between 80.0-3,000.0 yds, and soak times between 0.1-48.0 hrs (Table 6.1a). Effort and landings were highest in October, when the striped mullet roe fishery occurs (Table 6.1b). For the Pamlico fish house samples 13.4% were classified as unknown mesh sizes.

Rivers Area

Annual biological sampling coverage in the Rivers area compared to total gill net trips taken in Rivers area was 3.8% from 2004 to 2006 for both large and other mesh sizes combined. A total of 376 biological samples of large mesh estuarine gill nets were collected from January 2004 to December 2006 (Table 6.1a). The catch rates of the large mesh samples were between 1.8-284.9 (kg/trip), with gill nets between 50.0-6,000.0 yards in length, and soak times between 0.1-72.0 hours in duration. Landings and trips were highest in October primarily for flounder (Table 6.1b). The catch from the 155 small mesh samples from 2004-06 were between 15.6-1,517.9 kg/trip with gill net lengths between 100.0-1,800.0 yds, and soak time between 0.3-48.0 hrs (Table 6.1a). Effort and landings for 2004-06 were highest in February and March for spotted sea trout (Table 6.1b). For the Rivers fish house samples 27.1% were classified as unknown mesh sizes.

Southern Area

Annual biological sampling coverage in the Southern area compared to total gill net trips taken in Southern area was 0.7% from 2004 to 2006 for both large and other mesh sizes combined. A total of 28 biological samples of large mesh estuarine gill nets were collected from January 2004 to December 2006 (Table 6.1a). The mean catch rates of the large mesh samples were between 4.6-102.1 (kg/trip), with gill nets between 300.0-2,000.0 yards in length, and soak times between 2.0-72.0 hours in duration. The peak landings for large mesh gill nets (flounder) in the Southern area in 2004-06 occurred in September and October (Table 6.1b). The catch from the 35 small mesh samples for 2004-2006 was 14.6-1,862.0 kg/trip with gill net lengths between 100.0-800.0 yds, and with soak times between 0.8-36.0 hrs (Table 6.1a). Effort was highest in October for all three years with spot being the primary target species (Table 6.1b). For the Southern fish house samples 7.3% were classified as unknown mesh sizes.

Catch -Per-Unit-Effort (CPUE) and Fishing Trips

The overall CPUE for the report period based on the biological sampling was 112.4 kg/trip, while trip ticket reported an overall CPUE of 80.6 kg/trip from 2004 to 2006 (Table 6.1b). Net lengths per trip from sampling were between 55.0-6,500.0 yds from 2004 to 2006 (Table 6.1a).

Trends – Trip Ticket

Based on trip ticket data, the dominant species in the estuarine gill net catches include, in order of highest landings: flounders (mostly southern flounder), striped mullet, Atlantic menhaden (bait), spot, bluefish, striped bass, shad, white perch and spotted trout. Other common species included: Spanish mackerel, red drum, catfish, weakfish, Atlantic croaker, river herring and black drum (*Pogonias cromis*).

Atlantic croaker represented 1.0 – 1.3% of the annual estuarine gill net landings in North Carolina from 2004 to 2006 (Table 6.2). Atlantic croakers were ranked fourteenth in species captured in estuarine gill nets statewide. There was a 35.5% decrease in Atlantic croaker landings in estuarine gill nets in 2006 from the 7-year average. Atlantic croakers were captured primarily in small mesh gill nets and compose a greater proportion of the catch captured in the Albemarle area than any other area in the state.

Black drum accounted for 0.4 - 1.2% of the annual estuarine gill net landings from 2004 to 2006 (Table 6.2). Black drum were ranked sixteenth in species captured in estuarine gill nets statewide. Landings were highest in the Pamlico area. Black drum landings decreased 15.6% for 2006 compared to the 7-year average.

Bluefish accounted for 4.1 – 5.8% of the estuarine gill net landings from 2004 to 2006 (Table 6.2). Bluefish were the fifth highest ranked species caught in 2004-06 in estuarine gill nets. This species comprised a greater proportion of the catch from the Pamlico area than from any other areas in the state. Landings in 2006 have decreased 28.8% compared to the 7-year average.

Catfishes contributed 2.3 – 3.6% of the annual estuarine gill nets landings from 2004 to 2006 (Table 6.2). Catfishes were the twelth highest ranked species caught in 2004-06 in estuarine gill nets. The Albemarle area dominated all other areas for landing catfish. Landings in 2006 have decreased 26.2% compared to the 7-year average.

Flounders (*Paralichthys* spp.) contributed the highest landings from gill nets in inside waters from 2004 to 2006. Flounder were captured primarily in large mesh nets and accounted for 23.6% of the statewide estuarine gill net landings from 2004 to 2006 (Table

6.2). Flounders contributed 21.3 – 35.7% in the Albemarle area, 17.1 – 23.7% in the Pamlico area, 20.3 – 28.8% in the rivers area and 17.0 – 26.5% in the Southern area estuarine gill net landings. Overall, there was an 8.2% decrease in flounder landings for 2006 when compared to the 7-year average.

Herrings contributed 0.6 – 1.2% to the annual estuarine gill net landings from 2004 to 2006 (Table 6.2). Herrings were the fifteenth ranked species caught in 2004-06 in estuarine gill nets. Herring contributed 1.8 – 3.2% of the estuarine gill net landings in the Albemarle area and there was an overall decline of 41.7% in 2006 compared to the 7-year average.

Red drum contributed 0.7 – 2.7% to the annual estuarine gill net landings from 2004 to 2006 (Table 6. 2). Red drum were the eleventh ranked species caught in 2004-06 in estuarine gill nets. The most dominant area in landings of red drum is the Pamlico. Red drum landings have increased 29.5% for 2006 when compared to the 7-year average.

Shad (American and hickory combined) contributed 2.8 – 3.9% to the annual estuarine gill net landings from 2004 to 2006 (Table 6.2). Shad were the seventh highest species caught in estuarine gill nets statewide. There was a significant increase in shad landings for 2003, but mean landings from 2004 to 2006 have declined 7.6% compared to the 7-year average. The most dominant area in landings of shad is the Albemarle area.

Spanish mackerel accounted for 1.4-2.7% of the total estuarine gill net landings from 2004 to 2006 (Table 6.2). Spanish mackerel was the tenth highest species caught in estuarine gill nets statewide. The Pamlico area contributed the most to the overall landings. Landings did drop significantly in 2003 from 2002, while 2006 landings decreased 30.4% compared to the 7-year average.

Spot contributed 6.3 – 12.0% to the annual estuarine gill net landings and were captured mostly in small mesh gill nets from 2004 to 2006 (Table 6.2). Spot were the fourth highest species landed in estuarine gill nets from 2004 to 2006. Usually landings for spot are highest in the Southern area, which was true before 2002. The Pamlico and Albemarle areas had the highest landings of spot for the 2004 – 2006. For 2004 and 2005, landings are higher than the 7-year average while landings for 2006 were 42.7% below the 7-year average.

Spotted sea trout contributed 1.4 – 3.7% to the annual estuarine gill net landings from 2004 to 2006 (Table 6.2). Spotted sea trout were the nineth highest species landed in estuarine gill nets from 2004 to 2006. The Pamlico followed closely by the Rivers area have the highest landings of spotted sea trout from 2004 to 2006. Spotted sea trout landings in estuarine gill nets in 2006 were 49.3% above the 7-year average.

Striped bass contributed 3.2 – 4.6% to the annual estuarine gill net landings from 2004 to 2006 and were captured primarily in large mesh gill nets (Table 6.2). Striped bass were the sixth highest species landed in estuarine gill nets from 2004 to 2006. The most dominant area in landings of striped bass is the Albemarle area. There has been a decline in landings for the past 7 years in the Albemarle and Pamlico areas and landings in 2006 were 25.8% below the 7-year average.

White perch contributed 0.3–0.5% to the annual estuarine gill net landings from 2004 to 2006 and was captured primarily in small mesh gill nets (Table 6.2). White perch were the eighth highest species captured in estuarine gill nets in 2006. The most dominant area in landings of white perch is the Albemarle area. White perch landings in estuarine gill nets in 2006 were 44.4% below the 7-year average.

Atlantic menhaden (bait) contributed 8.9-15.3% to the annual estuarine gill net landings from 2004 to 2006 (Table 6.2). Atlantic menhaden (bait) was the third highest species captured in estuarine gill nets in 2006. The most dominant area in landings of Atlantic menhaden is the Pamlico area. Atlantic menhaden landings in estuarine gill nets in 2006 were 22.5% below the 7-year average.

Striped mullet contributed 20.7 – 24.2% to the annual estuarine gill net landings from 2004 to 2006 and were captured primarily in small mesh gill nets (Table 6.2). Striped mullet were the second highest species captured in estuarine gill nets in 2006. The Pamlico area dominated the landings of striped mullet. There is a steady decline (20.4%) in the 2004-06 landings from the 7-year average.

Weakfish contributed 1.3 – 1.6% to the annual estuarine gill net landings from 2004 to 2006 (Table 6.2). Weakfish were the thirteenth highest species captured in estuarine gill nets in 2006. The highest landings of weakfish occurred in the Pamlico area. Landings declined 27.0% in 2006 compared to the 7-year average.

Based on trip ticket data, the dominant species in the estuarine large mesh gill net catches include, in order of highest landings: flounders (mostly southern flounder), Atlantic menhaden (bait), red drum, striped bass, shad and bluefish. Other common species included: spot, striped mullet, black drum (*Pogonias cromis*), spotted sea trout, spanish mackerel and croaker (Table 6.2).

Based on trip ticket data, the dominant species in the estuarine small mesh gill net catches include, in order of highest landings: striped mullet, spot, Atlantic menhaden (bait), bluefish, shad, white perch, spotted trout, weakfish and striped bass. Other common species included: flounder, catfish, croaker, red drum and black drum (Table 6.2).

Species Composition

Albemarle Area

Large Mesh

Southern flounder dominated the large mesh gill net catches in the Albemarle area from 2004 - 2006 (Tables 6.3a-c). In 2004, southern flounder contributed 75.0% by weight to the catch. Striped bass was the second largest contributor to the catch and comprised 6.2% by weight. In 2005, southern flounder dominated the catch (58.0%) by weight and striped bass was second (16.5%) by weight (Table 6.3b). In 2006, southern flounder dominated the catch (57.5%) by weight and American shad was second (16.4%) by weight (Table 6.3c).

Small Mesh

The species composition of small mesh gill net catches from the Albemarle area was dominated in 2004 and 2005 by striped mullet (79.9% and 57.4%) and spot (16% and 30.3%) (Tables 6.3a-b). In 2006, bluefish dominated the catch (44.2%) by weight and striped mullet was second (10.6%) by weight (Table 6.3c).

Pamlico Area

Large Mesh

Southern flounder dominated the large mesh gill net catches in the Pamlico area from 2004 - 2006 (Tables 6.3a-c). In 2004, southern flounder contributed 71.5% by weight to the catch. Bluefish was the second largest contributor to the catch and comprised 4.2% by weight. In 2005 southern flounder dominated the catch (64.0%) by weight and red drum was second (6.4%) by weight (Table 6.3b). In 2006, southern flounder dominated the catch (56.1%) by weight and bluefish was second (12.6%) by weight (Table 6.3c).

Small Mesh

The species composition of small mesh gill net catches from the Pamlico area was dominated in 2004 by striped mullet (54.6%) and spot (15.6%) (Tables 6.3a-c). In 2005 and 2006, striped mullet dominated the catch (24.6% and 58.7%) by weight and bluefish was second (24.4% and 9.8%) by weight (Tables 6.3b-c).

Rivers Area

Large Mesh

Southern flounder dominated the large mesh gill net catches in the rivers area from 2004 - 2006 (Tables 6.3a-c). In 2004, southern flounder contributed 45.5% by weight to the catch. American shad was the second largest contributor to the catch and comprised 30.7% by weight. In 2005, southern flounder dominated the catch (44.2%) by weight and American shad was second (27.6%) by weight (Table 6.3b). In 2006, southern flounder dominated the catch (46.9%) by weight and American shad was second (21.8%) by weight (Table 6.3c).

Small Mesh

The species composition of small mesh gill net catches from the rivers area was dominated in 2004 by striped mullet (77.3%) and hickory shad (13.9%) (Table 6.3). In 2005 and 2006, striped mullet dominated the catch (86.5% and 68.7%) by weight and spotted sea trout was second (4.4% and 19.0%) by weight (Tables 6.3b-c).

Southern Area

Large Mesh

Southern flounder dominated the large mesh gill net catches in the southern area from 2004 - 2006 (Tables 6.3a-c). In 2004, southern flounder contributed 86.2% by weight to the catch. Red drum was the second largest contributor to the catch and comprised 11.1% by weight. In 2005, southern flounder dominated the catch (67.3%) by weight and red drum was second (14.8%) by weight (Table 6.3b). In 2006, southern flounder dominated the catch (67.9%) by weight and red drum was second (13.5%) by weight (Table 6.3c).

Small Mesh

The species composition of small mesh gill net catches from the southern area was dominated in 2004 by striped mullet (99.0%) and spotted sea trout (0.5%) (Table 6.3a). In 2005 and 2006, striped mullet dominated the catch (57.6% and 86.4%) by weight and spot was second (28.4% and 8.3%) by weight (Tables 6.3b-c).

Scrapfish

There were no at-sea samples collected for scrapfish, so the quantity of bycatch in the catches is unavailable since most fishermen cull their catches on the water and only a small amount of unwanted or sublegal species are observed in fish house samples. However, bycatch species identified in the samples included: blue crabs (*Callinectes sapidus*), Atlantic menhaden, common carp (*Cyprinus carpio*), gizzard shad (*Dorosoma* *cepedianum*), longnose gar (*Lepisosteus osseus*), skates (Rajiiformes), Atlantic sturgeon (*Acipenser oxyrhynchus*), pinfish (*Lagodon rhomboides*), and bowfin (*Amia calva*). Percent occurrence for species in the scrapfish component of the catches sampled are presented in Table 6.4.

Management Issues

The large amount of gill nets used in North Carolina estuarine waters is an important management problem in North Carolina. Issues contributing to this problem are: 1) negative public perception that gill net fisheries are wasteful (bycatch of nontarget species and/or regulatory discards), 2) harvest of species that are overfished, 3) allocation of the resource between user groups, 4) lack of data on the size selectivity of meshes commonly used in gill net fisheries, 5) perception of increased effort of this gear in "recent" years (i.e.: magnitude of landings), 6) conflict over fishing grounds (i.e.: flounder pound nets, crab pots and recreational fishing), and 7) interactions with endangered and high profile species (i.e.: sea turtles, dolphin).

To address these issues the North Carolina Fisheries Director may, by proclamation, impose any or all of the following restrictions on the use of gill nets: area, season, mesh length, means/methods, net number and length. Additionally, through the development of state FMP's rules are implemented to address species-specific issues. These methods, proclamations, and rules, are currently used to prevent waste, protect specific fish stocks (i.e. striped bass and red drum), minimize conflict, and reduce the capture of non-target species. An overview of specific gill net management measures implemented inside North Carolina waters follows.

Gill net attendance requirements for small mesh (<5-inch stretch mesh) gill nets were first instituted in the Pamlico and Neuse rivers by proclamation in 1995. The red drum and southern flounder FMPs expanded these attendance areas and put them in rule (15A NCAC 3J .0103). Year round attendance is now required in the upper portions of the rivers (Pamlico, Pungo, Neuse and Trent rivers) and within 200 yards of the shore in the lower rivers. From May 1 through October 31 small mesh nets must also be attended in all primary and permanent secondary nursery areas, no trawl areas, and in large areas along the Outer and Core Banks. The attendance rule requires small mesh gill net fishermen to remain within 100 yards of their net at all times. Because of this requirement many fishermen set outside of the attendance area or wait until November 1 when attendance is no longer required for small mesh nets. The attendance measures have reduced the amount of small mesh effort in these areas. In 2007, the Red Drum FMP Advisory Committee has recommended to the North Carolina Marine Fisheries Commission (NCMFC) that the attendance period be extended to November 30, (May 1 to November 30), while exempting the requirement to attend within 200 yards from shore during October and November for the region of Core Sound south, require year-round attendance of small mesh nets in Primary

Nursery Areas and Permanent Secondary Nursery Areas north of the Wainwrights in Carteret County and exempting the Albemarle Sound Management Area and that large mesh gill nets must be set parallel to the shoreline and must be set at least 10 feet off the shoreline with neither end of the net touching the shore.

The 2005 southern flounder FMP (NCDMF 2004) measure implemented September 2005 include 3,000 yard limit for gill nets 5 ½ inch stretch mesh or greater (3J .0103 (i)), prohibit from 15 April – 15 December gill nets with mesh from 5 to less than 5 ½ inch stretch mesh (3J .0103 (a)) and by proclamation disallow southern flounder harvest for month of December.

The Albemarle Sound Management Area (ASMA) was designated a striped bass management unit in 1991 and includes the Albemarle Sound and all its Joint and Inland water tributaries (except for the Roanoke, Middle, Eastmost, and Cashie rivers), Currituck, Roanoke, and Croatan sounds and all their Joint and Inland water tributaries including Oregon Inlet north of a line from Roanoke Marshes Point across to the north point of Eagle Nest Bay. In the ASMA, gill net restrictions are in place by proclamation to reduce the incidental capture of striped bass in the multispecies anchored gill net fishery (NCDMF and WRC 2003). Gill nets are allowed throughout the ASMA in most of the joint and coastal waters with the exception of the Albemarle Sound west of a line from Black Walnut Point to the mouth of Kendricks Creek, which is closed from February to November. Parts of the Croatan and Roanoke Sound areas are allowed unattended small mesh (3¼ - 4 inch stretch) gill nets from January to mid-April with net lengths no longer than 800 yards. Small mesh (3¼ - 4 inch stretch) float or sink gill nets must be attended from mid-April-November. Currently large mesh ($\geq$ 5 1/4 inch stretch mesh) flounder gill nets are allowed year round with a net length limited to 3,000 yards and must use tie downs that fish no more than 4 foot from the bottom. Float or sink nets without tie-downs for the shad fishery are only allowed from mid-February to mid-April with a maximum length of 1,000 yards and mesh size $\geq$ 5 1/4 inch stretch.

The 2004 NC Estuarine Striped Bass management plan (NCDMF 2004) main objective for the Central/Southern Management Area (CSMA) was to maximize the reduction in striped bass discards while minimizing the effects to the flounder and shad fishery. The CSMA includes all internal waters of the state not defined by the ASMA. To achieve this objective large mesh ($\geq$5 inch stretch mesh) gill net set in the river areas (west of 76º 30’ longitude) by proclamation are required to tie-down there net to 4 feet and maintain a Minimum Distance From Shore (MDFS) of 50 yards in the upper river areas. Recreational Commercial Gear License (RCGL) large mesh nets may be set within 50 yards of shore if attended at all times. Restrictions are implemented after the commercial spring striped bass TAC is met through 31 December of each year (measures to be effective 2008).

In response to continued stock decline, the MFC through the 2007 North Carolina River Herring FMP, Amendment 1 implemented a no harvest (commercial or recreational) provision for the joint and coastal waters of the state (beginning with the 2007 season), with up to 7,500 pounds set aside for research at the NCDMF Director's discretion. The Wildlife Resource Commission (WRC) also implemented a no harvest provision in 2006 for all inland waters of the state for river herring greater than 6 inches. Changes to gill net regulations for the ASMA were approved September 2007 (NCDMF 2007). Albemarle Sound/Chowan River Herring Management Area (15A NCAC O3J .0209) currently has the following restrictions from January 1 – May 1: gill nets <3 ¼ inch stretched mesh prohibited, gill nets 3 ¼ inch stretch mesh restricted to 800 yds, the use of drift nets prohibited. Other restrictions include; gill nets <3 ¼ inch stretch mesh in canals and areas adjacent to canals leading to Lake Mattamuskeet prohibited and a minimum of 3 ¼ inch stretch mesh for drift gill nets in all other ares of the state.

There are a number of rules that address the issues of user group conflicts (Section .0100 general net rules). For example, gill nets cannot be set within 200 yards of any pound net with lead and either pound or heart in use, with the exception of Albemarle Sound (from August 15 through December 31 (3J .0103 (d)). This rule reduces conflict between fisherman using gill nets with those fisherman using pound nets. From March 1 through October 31 gill nets must be at least 150 yards from any railroad or highway bridge in the Intracoastal Waterway (3J .0103 (d)). Recreational users utilize the Intracoastal Waterway and boat traffic around railroads and highway bridges during this period is more predominant. Restricting gill nets within 150 yards of these structures eliminates any conflict between recreational and commercial users. Additionally, the NCDMF and NCMFC have established various methods to deal with user conflicts. People can either make a request to the Fisheries Director to address the issue (030 .0401 (b)) in certain public trust areas or they may request mediation among user groups to resolve the conflict.

Lethal interactions with federally protected endangered or threatened sea turtle species in commercial and recreational fisheries requires state and federal managers to implement management strategies such as seasonal closures, area closures, gear restrictions and monitoring programs. As sea turtle populations increase the number of interactions will likely increase, which can lead to further restrictions on local fisheries.

Such was the case for Pamlico Sound in 1999, when a significant increase in strandings in the southeastern portion of Pamlico Sound, coupled with observed incidental takes in the flounder gill net fishery, resulted in the National Marine Fisheries Service issuing an emergency closure of this area to large mesh ($\geq$ 5 inch stretched mesh) gill nets (Figure 6.2). The entire Pamlico Sound from N 35° 46'.300 south to N 35° 00'.000 and west to 76° 30'.000 has had restrictions in place for all gill net operations from September through December of each year. This area is referred to as the Pamlico Sound Gill net Restricted Area (PSGNRA). This has brought economic hardship during this time to the commercial fisherman in this area who depend upon the valuable southern flounder (*Paralicthys lethostigma)* fishery.

To maintain this fishery, the North Carolina Division of Marine Fisheries (NCDMF), in conjunction with the National Marine Fisheries Service (NMFS) applied for and received Section 10 permits. The incidental take permit (ITP) authorized protected species interactions, allowing the fishery to operate under certain restrictions. Although the fishery continues to operate in the shallow-water fishing grounds along the Outer Banks, and mainland side of Pamlico Sound, the deep-water fishing grounds are permanentally closed at this time (NCMFC 2006).

The NCMFC formed a Sea Turtle Advisory Committee (STAC) in 2003 to develop solutions for the reduction of sea turtle interactions in commercial and recreational (rod and reel) fishing gear, while maintaining economically viable fisheries, throughout the estuarine waters of North Carolina (NCMFC 2006). The STAC used the North Carolina Division of Marine Fisheries Trip Ticket Program and the Marine Recreational Fishery Statistics Survey to identify gears fishing in North Carolina estuaries. Data on sea turtle bycatch were largely restricted to the PSGNRA, although committee members were able to identify other fisheries known to take sea turtles. The STAC classified gears into one of the following three categories: gears of primary concern where interactions with sea turtles are frequent, gears of other concern where infrequent fatal and/or non-fatal interactions with sea turtles have been documented, and gears of no concern were defined as those gears for which sea turtle interactions are unlikely and/or the effort for the fishery is extremely low. Gill net fisheries categorized as gears of primary concern include only gill net set (≥ 5 inch stretch mesh while gears of other concern include set float nets, set sink nets, and set gill nets (≤ 5 inch stretch mesh) (NCMFC 2006).

In 2006, the NCMFC Sea Turtle Advisory Committee (STAC) made the following recommendations to the NCMFC: a minimal coverage of 2% of the total effort by area is mandatory for all large mesh gill nets throughout all estuarine waters, coverage should increase (~10%) in areas when/where sea turtle interactions are occurring, provide education to fisherman, implement state seasonal/area closures in problem areas and support continued efforts for gear modification and testing. With mandatory coverage, managers can make decisions based on real time information. In November 2007, observers documented 13 live and five dead green turtles as well as one live loggerhead sea turtle interaction in the PSGNRA. These observations resulted in an early seasonal closure of the large mesh flounder fishery in the PSGNRA to protect sea turtles (NCMFC 2006).

Improvements to biological sampling are needed for the small mesh fisheries (spot, striped mullet, spotted sea trout, bluefish, weakfish, Atlantic menhaden, Spanish mackerel, white perch, river herring and sea mullet). Small mesh trips represent approximately half of the overall trips taken in the state, but the majority of samples are from large mesh trips (~75%). Increased sampling of the top ten small mesh fisheries throughtout the state would greatly improve analysis and management strategies for these fisheries. Along with increased biological sampling, criteria used in identifying large and small mesh trips should be updated.

Future sea turtle management for the PSGNRA should be long term (>3 years) and should seek to minimize intensive monitoring. The large area covered by the management measures requires a large number of observer trips to achieve adequate coverage. A more efficient monitoring strategy could utilize stranding network data to identify “hot spots,” to trigger intensive observer monitoring in the vicinity of stranding events. This would provide a means of identifying causes related to future stranding events and allow for more efficient use of staff.

LITERATURE CITED

North Carolina Division of Marine Fisheries and Wildlife Resources Commission. 2003. North Carolina Estuarine Striped Bass Fishery Management Plan. Department of Environment and Natural Resources and Division of Inland Fisheries. 374 pp.

North Carolina Division of Marine Fisheries. 2001. North Carolina Red Drum Fishery Management Plan. Department of Environment and Natural Resources. 111 pp.

North Carolina Division of Marine Fisheries. 2004. North Carolina Estuarine Flounder Fishery Management Plan. Department of Environment and Natural Resources. 335 pp.

North Carolina Division of Marine Fisheries. 2007. North Carolina Estuarine River Herring Fishery Management Plan. Department of Environment and Natural Resources. 311 pp.

North Carolina Marine Fisheries Commission. 2006. Sea Turtle Interactions with North Carolina Fisheries Review and Recommendations. 65 pp.

North Carolina Marine Fisheries Commission. 2007. North Carolina Fisheries Rules for Coastal Waters 2007. Department of Environment and Natural Resources. Division of Marine Fisheries. 316 pp.

Paramore, L. 2007. Bycatch and Discards of Red Drum in the North Carolina Estuarine Gill Net Fishery. Issue paper for Red Drum FMP. North Carolina Department of the Environment and Natural Resources, Division of Marine Fisheries. 32 pp.

Price, B. 2004. Sea Turtle Bycatch Monitoring of the 2003 Fall Gill net Fisheries in Southeastern Pamlico Sound, North Carolina. Completion Report for Incidental Take Permit 1398. North Carolina Department of the Environment and Natural Resources, Division of Marine Fisheries. 26 pp.

Table 6.1a. Summary of sampled estuarine gill net catches (January 2004-December 2006) from Albemarle area (A), Pamlico area (P), Rivers area (R), and Southern area(S) by mesh size category (L = Large mesh size, M = Multiple (Large and small) mesh sizes, U = Unknown mesh size, and S = Small mesh size). n = number of samples, including trip tickets only, sn = number of samples that contain biological information. Data from NCDMF fishery dependent biological database.

						Catch weight (kg)		Sample weight (kg)		Net length (yd)		Set time (hr)	
Year	Month	Area	Mesh	n	sn	Mean	Range	Mean	Range	Mean	Range	Mean	Range
2004	Jan	A	U	1	1	572.9	572.9-572.9	56.2	56.2-56.2	-	-	-	-
		R	S	1	1	438.2	438.2-438.2	154.2	154.2-154.2	1,500.0	-	-	-
			U	5	5	747.5	104.9-1,750.0	53.9	46.5-68.1	-	-	-	-
		All		7	7	678.4	104.9-1,750.0	68.5	46.5-154.2	1,500.0	-	-	-
	Feb	A	L	1	1	57.8	57.8-57.8	48.3	48.3-48.3	800.0	-	96.0	-
			U	1	1	215.9	-	28.0	-	-	-	-	-
		P	L	1	1	79.2	-	73.3	-	1,000.0	-	24.0	-
			S	4	4	262.9	55.4-510.8	36.3	5.9-47.0	675.0	400.0-800.0	24.0	-
		R	L	5	5	69.0	30.8-148.3	39.6	30.8-51.4	860.0	450.0-1,350.0	20.0	12.0-24.0
			M	1	1	361.9	-	66.2	-	1,900.0	-	-	-
			S	8	8	319.7	15.6-1,209.7	44.3	15.6-80.0	742.9	500.0-1,000.0	21.0	12.0-24.0
			U	14	14	236.2	4.5-1,757.7	47.5	4.5-196.8	-	-	0.3	-
		S	M	2	2	8.7	8.1-9.4	8.7	8.1-9.4	500.0	-	24.0	-
		All		37	37	216.0	4.5-1,757.7	43.1	4.5-196.8	804.8	400.0-1,900.0	25.9	0.3-96.0
	Mar	A	L	4	4	71.0	37.6-145.2	41.2	27.7-53.0	425.0	300.0-600.0	24.0	12.0-48.0
			U	2	2	40.4	36.6-44.2	39.7	36.6-42.8	-	-	-	-
		P	L	3	3	39.0	15.1-53.7	34.3	10.1-53.7	1,100.0	800.0-1,500.0	24.0	
			S	6	6	181.7	22.0-872.8	54.6	14.6-140.6	766.7	500.0-1,200.0	21.0	12.0-24.0
		R	L	33	33	59.1	5.7-171.1	49.4	3.4-132.8	964.1	400.0-2,600.0	18.4	12.0-48.0
			M	1	1	40.6	-	40.6	-	700.0	-	2.0	-
			S	8	8	27.0	16.6-45.5	24.8	13.2-45.5	537.5	200.0-600.0	12.3	2.0-24.0
			U	22	22	120.9	4.3-416.9	42.4	4.3-148.1	-	-	-	-
		All		79	79	81.5	4.3-872.8	44.0	3.4-148.1	841.7	200.0-2,600.0	18.2	2.0-48.0

Table 6.1a. Continued.

						Catch weight (kg)		Sample weight (kg)		Net length (yd)		Set time (hr)	
Year	Month	Area	Mesh	n	sn	Mean	Range	Mean	Range	Mean	Range	Mean	Range
2004	Apr	A	L	4	4	45.6	19.3-76.3	45.6	19.3-76.3	466.7	400.0-600.0	24.0	-
			S	3	3	246.4	174.2-384.1	43.5	41.6-47.1	-	-	12.0	-
			U	1	1	6.6	-	6.6	-	-	-	-	-
		P	L	3	3	106.7	61.9-169.5	39.4	34.0-45.4	3,233.3	1,200.0-6,000.0	-	-
			M	4	4	107.9	37.0-196.8	50.5	31.3-82.0	983.3	900.0-1,100.0	24.0	-
			S	17	17	190.8	21.4-603.2	41.2	2.5-79.4	1,053.1	250.0-2,400.0	24.0	-
		R	L	8	8	73.0	17.8-220.4	66.2	17.8-220.4	716.3	300.0-1,000.0	18.0	12.0-24.0
			S	1	1	144.5	-	53.6	-	600.0	-	4.0	-
			U	5	5	195.8	39.2-687.2	56.2	39.2-72.1	-	-	-	-
		All		46	46	144.2	6.6-687.2	47.9	2.5-220.4	1,095.0	250.0-6,000.0	21.4	4.0-24.0
	May	P	L	11	11	63.5	11.3-161.5	42.9	11.3-86.7	2,381.8	800.0-6,000.0	25.2	12.0-48.0
			S	2	2	191.4	16.5-366.2	50.6	16.5-84.7	700.0	600.0-800.0	18.0	12.0-24.0
		R	L	6	6	41.1	16.3-130.6	27.2	16.3-54.4	1,075.0	600.0-1,600.0	12.0	0.0-24.0
			U	9	9	30.0	7.3-66.4	29.5	7.3-63.7	-	-	.	-
		S	L	1	1	37.2	-	37.2	-	1,400.0	-	12.0	-
		All		29	29	56.4	7.3-366.2	35.8	7.3-86.7	1,850.0	600.0-6,000.0	19.6	0.0-48.0
	Jun	A	L	4	4	35.1	15.2-82.6	23.7	15.2-40.4	1,550.0	1,000.0-3,000.0	24.0	-
			S	1	1	187.8	187.8-187.8	68.1	-	-	-	-	-
		P	L	17	17	38.8	8.6-103.5	31.2	8.6-59.9	1,688.2	800.0-2,500.0	16.2	12.0-24.0
			M	1	1	153.4	153.4-153.4	85.9	85.9-85.9	-	-	12.0	-
			S	10	10	344.9	32.1-940.3	69.6	22.7-138.4	925.0	400.0-1,600.0	4.4	1.0-10.0
			U	5	5	77.9	22.6-138.9	16.8	3.6-28.6	-	-	-	-
		R	L	1	1	8.5	8.5-8.5	8.5	-	800.0	-	12.0	-
			U	2	2	17.2	12.3-22.2	17.2	12.3-22.2	-	-	-	-
		S	S	2	2	59.4	38.1-80.7	22.7	22.7-22.7	400.0	-	-	-
		All		43	43	119.5	8.5-940.3	38.3	3.6-138.4	1,345.6	400.0-3,000.0	14.2	1.0-24.0
	Jul	A	L	6	6	32.5	21.4-59.9	20.0	10.0-29.4	1,087.5	525.0-1,800.0	24.0	12.0-48.0
			S	5	5	333.6	53.1-918.6	49.2	23.1-77.8	700.0	-	1.2	0.5-2.0
			U	3	3	550.2	142.9-1,027.8	53.5	26.4-68.0	-	-	-	-

Table 6.1a. Continued.

Year	Month	Area	Mesh	n	sn	Catch weight (kg) Mean	Catch weight (kg) Range	Sample weight (kg) Mean	Sample weight (kg) Range	Net length (yd) Mean	Net length (yd) Range	Set time (hr) Mean	Set time (hr) Range
2004	Jul	P	L	17	17	31.6	7.7-71.3	25.0	2.7-52.8	1494.1	500.0-2,800.0	20.8	12.0-72.0
			M	2	2	44.2	31.6-56.7	27.4	20.2-34.5	100.0	-	24.0	-
			S	5	5	212.7	141.1-326.1	59.3	22.7-94.2	960.0	400.0-1,600.0	6.0	-
			U	2	2	69.5	43.1-95.9	26.0	22.7-29.2	900.0	-	-	-
		R	L	5	5	22.0	7.7-49.3	21.3	7.7-45.4	800.0	-	11.5	10.0-12.0
			M	1	1	41.4	-	41.4	-	1,150.0	-	2.0	-
			S	6	6	141.0	15.9-465	40.0	15.9-61.7	533.3	500.0-600.0	2.5	2.0-4.0
			U	3	3	30.6	21.8-44.6	20.8	12.0-25.3	-	-	-	-
		S	L	1	1	39.1	-	24.1	-	600.0	-	24.0	-
		All		56	56	115.6	7.7-1,027.8	32.7	2.7-94.2	1,060.8	100.0-2,800.0	15.8	0.5-72.0
	Aug	A	L	9	9	33.2	9.9-103.5	20.6	8.2-56.0	1,112.50	500.0-2,000.0	18.0	12.0-24.0
			S	3	3	307.4	27.3-560.6	53.7	25.0-68.0	211.1	133.3-300.0	0.1	-
			U	1	1	383.3	-	45.5	-	-	-	-	-
		P	L	29	29	52.3	10.9-177.5	35.0	10.7-76.7	1,293.10	250.0-3,000.0	18.9	12.0-48.0
			S	9	9	279.8	37.7-630.5	55.3	22.7-97.4	644.4	400.0-1,200.0	9.1	0.5-12.0
			U	3	3	21.6	11.5-36.9	15.8	8.2-27.8	-	-	-	-
		R	L	5	5	47.9	25.0-80.0	47.9	25.0-80.0	1,060.0	500.0-1,200.0	12.0	-
			S	3	3	65.4	36.2-85.7	44.4	22.7-74.2	333.3	200.0-400.0	2.0	-
			U	1	1	16.6	-	16.6	-	-	-	-	-
		S	L	4	4	34.0	23.6-50.1	28.3	23.6-37.6	1,225.0	500.0-1,800.0	15.0	12.0-24.0
		All		67	67	93.9	9.9-630.5	36.6	8.2-97.4	1,049.70	133.3-3,000.0	16.0	0.1-48.0
	Sep	A	L	10	10	40.5	11.5-119.8	27.6	2.2-48.6	1,640.0	700.0-3,000.0	23.2	12.0-48.0
			S	1	1	753.1	-	117.5	-	-	-	-	-
			U	2	2	12.7	12.5-12.9	12.7	12.5-12.9	-	-	-	-
		P	L	22	22	59.2	10.5-276.7	39.0	8.6-128.5	1,535.2	500.0-6,000.0	16.7	12.0-48.0
			S	7	7	194.4	48.4-332.7	48.8	22.7-99.1	916.7	300.0-2,000.0	9.9	0.5-24.0
		R	L	6	6	48.7	15.9-112.6	30.7	9.4-58.7	1,600.0	600.0-2,200.0	14.4	12.0-24.0
			S	1	1	46.7	-	22.7	-	400.0	-	4.0	-
			U	2	2	151.9	133.8-170.0	47.6	45.4-49.8	-	-	-	-
		All		51	51	88.0	10.5-753.1	37.7	2.2-128.5	1,456.3	300.0-6,000.0	16.9	0.5-48.0

Table 6.1a. Continued.

Year	Month	Area	Mesh	n	sn	Catch weight (kg) Mean	Catch weight (kg) Range	Sample weight (kg) Mean	Sample weight (kg) Range	Net length (yd) Mean	Net length (yd) Range	Set time (hr) Mean	Set time (hr) Range
2004	Oct	A	L	21	20	56.2	10.4-180.9	31.7	10.4-71.7	1,504.8	500.0-3,200.0	28.0	12.0-72.0
			M	2	2	73.1	69.8-76.5	38.8	36.7-41.0	1,750.0	1,600.0-1,900.0	24.0	-
			S	3	3	393.4	34.1-986.1	44.2	26.8-60.9	600.0	400.0-800.0	24.1	0.2-48.0
			U	6	6	172.8	15.0-660.9	29.6	10.9-68.0	-	-	-	-
		P	L	17	17	64.0	9.9-174.3	44.2	5.8-110.3	1,292.3	400.0-1,800.0	15.0	12.0-24.0
			M	3	3	413.2	282.4-521.2	86.3	47.2-133.8	1,866.7	600.0-3,200.0	4.2	0.2-12.0
			S	9	9	402.1	27.0-1,392.1	51.3	22.7-90.8	461.1	150.0-800.0	4.4	0.2-12.0
			U	2	2	105.1	50.5-159.6	20.0	13.2-26.8	-	-	-	-
		R	L	19	19	57.0	5.0-284.9	35.5	5.0-72.1	1,247.9	300.0-2,000.0	12.7	12.0-24.0
			S	2	2	200.9	122.3-279.5	22.7	-	425.0	300.0-550.0	1.3	-
			U	6	6	114.3	12.3-293.5	22.9	12.3-44.5	-	-	-	-
		S	M	1	1	23.2	23.2-23.2	23.2	-	400.0	-	24.0	-
			S	4	4	225.3	14.6-453.7	32.7	14.6-48.1	400.0	200.0-600.0	-	-
		All		95	94	134.7	5.0-1,392.1	37.7	5.0-133.8	1,170.7	150.0-3,200.0	17.5	0.2-72.0
	Nov	A	L	20	20	95.5	16.8-227.8	48.5	16.8-114.1	2,140.0	1,000.0-3,700.0	41.1	24.0-72.0
			U	3	3	186.6	49.0-390.2	39.4	22.7-72.8	-	-	-	-
		P	L	5	5	48.7	12.3-71.8	30.6	12.3-45.2	1,440.0	600.0-4,000.0	24.0	12.0-36.0
			M	3	3	86.1	9.4-132.3	32.1	9.4-65.5	2,500.0	1,000.0-4,000.0	20.0	12.0-24.0
			S	12	12	263.8	16.0-795.6	64.9	16.0-138.8	529.2	150.0-1,800.0	7.0	0.1-24.0
			U	9	9	305.4	18.9-1,079.5	72.6	11.7-113.9	-	-	-	-
		R	L	10	10	24.6	5.2-44.4	20.4	5.2-44.4	916.7	500.0-1,600.0	12.0	-
			M	1	1	31.2	31.2-31.2	31.2	-	1,000.0	-	-	-
			S	7	7	101.9	48.9-141.6	34.6	22.7-49.1	407.1	200.0-600.0	6.7	3.0-12.0
			U	9	9	153.7	13.1-593.0	42.9	9.5-94.1	533.3	400.0-600.0	3.0	-
		S	S	5	5	665.2	51.2-1,862.0	93.7	31.9-158.7	360.0	100.0-600.0	-	-
		All		84	84	173.6	5.2-1,862.0	48.8	5.2-158.7	1,214.8	100.0-4,000.0	22.5	0-72.0

Table 6.1a. Continued.

Year	Month	Area	Mesh	n	sn	Catch weight (kg) Mean	Catch weight (kg) Range	Sample weight (kg) Mean	Sample weight (kg) Range	Net length (yd) Mean	Net length (yd) Range	Set time (hr) Mean	Set time (hr) Range
2004	Dec	A	S	1	1	22.8	-	22.8	-	500.0	-	24.0	-
			U	1	1	21.8	-	21.8	-	-	-	-	-
		R	L	2	2	51.4	36.3-66.4	39.5	30.4-48.5	800.0	-	24.0	12.0-36.0
			M	3	3	67.6	28.1-93.5	58.5	22.7-81.2	-	-	12.0	-
			S	3	3	151.7	44.0-259.9	54.5	28.1-68.1	450.0	400.0-550.0	4.3	2.5-6.0
			U	4	4	180.7	14.8-525.3	62.9	4.5-123.9	-	-	-	-
		S	S	1	1	64.0	-	52.2	-	300.0	-	-	-
		All		15	15	106.1	14.8-525.3	51.1	4.5-123.9	491.7	300.0-800.0	14.9	2.5-36.0
2004	All	A	L	79	78	58.9	9.9-227.8	34.3	2.2-114.1	1,510.70	300.0-3,700.0	28.7	12.0-96.0
			M	2	2	73.1	69.8-76.5	38.8	36.7-41.0	1,750.0	1,600.0-1,900.0	24.0	-
			S	17	17	322.0	22.8-986.1	51.7	22.8-117.5	454.2	133.3-800.0	11.1	0.1-48.0
			U	21	21	216.8	6.6-1,027.8	34.2	6.6-72.8	-	-	-	-
		P	L	125	125	52.5	7.7-276.7	36.0	2.7-128.5	1,560.1	250.0-6,000.0	18.7	12.0-72.0
			M	13	13	167.0	9.4-521.2	53.7	9.4-133.8	1,375.0	100.0-4,000.0	17.6	0.2-24.0
			S	81	81	258.6	16.0-1,392.1	53.7	2.5-140.6	777.2	150.0-2,400.0	13.5	0.1-24.0
			U	21	21	169.1	11.5-1,079.5	41.8	3.6-113.9	900.0	-	-	-
		R	L	100	100	52.1	5.0-284.9	40.2	3.4-220.4	1,020.1	300.0-2,600.0	15.7	0.0-48.0
			M	7	7	96.9	28.1-361.9	50.7	22.7-81.2	1,187.5	700.0-1,900.0	7.0	2.0-12.0
			S	40	40	150.4	15.6-1,209.7	40.2	13.2-154.2	544.9	200.0-1,500.0	8.9	1.3-24.0
			U	82	82	173.1	4.3-1,757.7	41.4	4.3-196.8	533.3	400.0-600.0	1.7	0.3-3.0
		S	L	6	6	35.4	23.6-50.1	29.1	23.6-37.6	1,150.0	500.0-1,800.0	16.0	2.0-24.0
			M	3	3	13.6	8.1-23.2	13.6	8.1-23.2	466.7	400.0-500.0	24.0	-
			S	12	12	367.5	14.6-1,862.0	58.1	14.6-158.7	375.0	100.0-600.0	-	-
		All		609	608	129.4	4.3-1,862.0	41.2	2.2-220.4	1,147.5	100.0-6,000.0	18.1	0.0-96.0

Table 6.1a. Continued.

Year	Month	Area	Mesh	n	sn	Catch weight (kg) Mean	Catch weight (kg) Range	Sample weight (kg) Mean	Sample weight (kg) Range	Net length (yd) Mean	Net length (yd) Range	Set time (hr) Mean	Set time (hr) Range
2005	Jan	A	L	1	1	49.4	-	49.4	-	2,200.0	-	12.0	-
		P	M	1	1	42.6	-	42.6	-	1,600.0	-	12.0	-
			S	6	6	83.2	13.3-351.1	33.9	12.1-90.7	1,150.0	600.0-2,300.0	12.0	0.0-24.0
			U	2	2	108.8	13.3-204.2	41.3	8.8-73.9	-	-	-	-
		R	L	1	1	13.6	13.6-13.6	5.6	5.6-5.6	600.0	-	24.0	-
			S	6	6	588.1	64.9-1,517.0	68.7	14.5-109.3	891.7	400.0-1,800.0	6.1	0.3-12.0
			U	1	1	14.4	-	14.4	-	-	-	-	-
		S	S	2	2	104.4	33.6-175.1	19.3	15.9-22.7	400.0	-	3.8	2.7-5.0
		All		20	20	228.7	13.3-1,517.0	42.5	5.6-109.3	1,010.0	400.0-2,300.0	10.6	0.0-24.0
	Feb	A	M	1	1	38.6	-	24.1	-	2,600.0	-	12.0	-
			S	1	1	21.0	-	17.3	-	580.0	-	-	-
			U	1	1	11.1	-	11.1	-	-	-	-	-
		P	S	1	1	9.5	-	9.5	-	600.0	-	0.3	-
			U	1	1	34.4	-	11.8	-	-	-	-	-
		R	L	14	14	41.0	3.3-133.4	29.5	3.3-90.5	921.4	400.0-1,600.0	21.4	12.0-48.0
			M	4	4	163.4	95.0-261.2	34.3	11.8-51.1	1,225.0	550.0-1,850.0	32.0	24.0-48.0
			S	11	11	264.2	51.6-490.3	92.6	45.4-175.8	672.7	200.0-1,500.0	4.4	0.5-12.0
		S	L	1	1	23.1	-	13.3	-	500.0	-	24.0	-
		All		35	35	122.1	3.3-490.3	47.3	3.3-175.8	893.3	200.0-2,600.0	16.7	0.3-48.0
	Mar	A	L	2	2	13.9	9.1-18.6	13.9	9.1-18.6	600.0	-	24.0	-
			U	2	2	40.2	31.8-48.6	19.3	6.8-31.8	-	-	-	-
		P	S	4	4	237.2	145.1-344.7	29.2	22.7-45.4	2,050.0	1,200.0-3,000.0	24.0	-
			U	2	2	52.7	48.5-56.8	27.2	6.0-48.5	-	-	-	-
		R	L	47	47	30.4	3.7-168.3	26.0	3.7-66.4	615.3	50.0-1,900.0	23.2	12.0-72.0
			M	2	2	18.2	5.1-31.2	18.2	5.1-31.2	950.0	600.0-1,300.0	24.0	-
			S	7	7	134.8	32.7-420.9	23.1	6.0-56.9	283.3	100.0-400.0	6.7	1.0-24.0
			U	9	9	78.6	3.7-364.1	35.7	3.7-165.5	-	-	-	-
		All		75	75	57.1	3.7-420.9	26.4	3.7-165.5	687.2	50.0-3,000.0	21.9	1.0-72.0

Table 6.1a. Continued.

Year	Month	Area	Mesh	n	sn	Catch weight (kg) Mean	Catch weight (kg) Range	Sample weight (kg) Mean	Sample weight (kg) Range	Net length (yd) Mean	Net length (yd) Range	Set time (hr) Mean	Set time (hr) Range
2005	Apr	A	L	3	3	83.6	25.7-154.7	33.4	17.7-56.8	733.3	500.0-1,000.0	24.0	-
			S	8	7	76.0	12.3-169.3	21.2	5.9-31.0	643.8	300.0-800.0	24.0	-
			U	4	4	55.1	14.5-149.2	15.3	4.5-25.8	-	-	-	-
		P	L	2	2	29.1	16.9-41.3	29.1	16.9-41.3	1,750.0	300.0-3,200.0	18.0	12.0-24.0
			M	6	6	87.6	54.7-141.4	34.9	7.6-55.8	2,333.3	800.0-6,500.0	21.0	12.0-24.0
			S	28	28	126.6	13.0-449.5	36.7	4.7-69.9	1,137.5	200.0-3,000.0	21.5	12.0-48.0
			U	7	7	36.6	15.7-82.1	13.2	2.9-40.4	1,400.0	-	48.0	-
		R	L	13	13	32.3	2.0-78.3	23.2	2.0-54.9	1,316.6	400.0-2,300.0	24.0	12.0-48.0
			M	1	1	114.0	-	36.4	-	1,300.0	-	12.0	-
			S	7	7	63.4	19.3-158.3	28.0	12.5-44.9	685.7	500.0-800.0	17.1	12.0-48.0
			U	4	4	46.5	29.1-65.2	32.4	15.9-56.9	-	-	-	-
		S	L	1	1	64.9	-	31.8	-	1,750.0	-	24.0	-
		All		84	83	79.7	2.0-449.5	28.8	2.0-69.9	1,186.7	200.0-6,500.0	22.0	12.0-48.0
	May	A	S	1	1	275.7	-	49.9	-	1,200.0	-	48.0	-
			U	2	2	59.8	42.6-77.1	5.7	4.5-6.8	-	-	24.0	-
		P	L	15	15	42.9	10.8-130.6	35.4	8.1-124.3	2,740.0	500.0-6,000.0	24.0	-
			S	21	21	235.5	18.6-837.5	47.8	10.3-103.8	1,209.5	300.0-3,000.0	21.5	0.2-24.0
			U	4	4	58.6	19.5-81.2	17.9	4.1-28.1	-	-	-	-
		R	L	2	2	39.7	21.1-58.3	39.7	21.1-58.3	1,700.0	1,400.0-2,000.0	18.0	12.0-24.0
			S	0	0	-	-	-	-	400.0	-	-	-
			U	1	1	122.5	-	59.7	-	-	-	-	-
		S	L	1	1	30.9	-	30.9	-	600.0	-	72.0	-
		All		47	47	137.3	10.8-837.5	39.1	4.1-124.3	1,758.5	300.0-6,000.0	24.3	0.2-72.0
	Jun	A	S	1	1	91.2	-	29.5	-	600.0	-	12.0	-
			U	2	2	79.6	48.5-110.7	18.1	13.6-22.7	-	-	-	-
		P	L	17	17	43.4	10.1-153.6	34.9	9.0-105.5	2,894.1	1,200.0-6,000.0	14.1	12.0-24.0
			S	7	7	160.9	51.3-310.1	52.9	26.3-117.6	1,442.9	1,200.0-2,000.0	10.8	2.3-24.0
			U	1	1	183.0	-	61.4	-	-	-	-	-
		R	L	1	1	37.6	-	37.6	-	2,400.0	-	12.0	-
			S	2	2	44.9	36.6-53.1	33.5	30.4-36.6	350.0	300.0-400.0	2.0	-

Table 6.1a. Continued.

Year	Month	Area	Mesh	n	sn	Catch weight (kg) Mean	Catch weight (kg) Range	Sample weight (kg) Mean	Sample weight (kg) Range	Net length (yd) Mean	Net length (yd) Range	Set time (hr) Mean	Set time (hr) Range
2005	Jun	S	L	4	4	17.9	4.6-23.6	17.7	4.6-23.6	1,337.5	600.0-2,000.0	15.0	12.0-24.0
			S	1	1	36.7	-	36.7	-	400.0	-	4.0	-
		All		36	36	70.4	4.6-310.1	36.2	4.6-117.6	2,083.3	300.0-6,000.0	12.7	2.0-24.0
	Jul	A	L	1	1	6.6	-	6.6	-	800.0	-	12.0	-
			S	2	2	104.5	3.5-205.5	16.6	3.5-29.6	550.0	500.0-600.0	12.0	-
		P	L	22	22	40.2	5.0-171.5	23.6	5.0-65.7	2,504.8	600.0-6,000.0	18.3	12.0-48.0
			S	5	5	83.4	3.2-226.8	23.0	3.2-40.1	430.0	150.0-800.0	5.7	2.3-12.0
		R	L	10	10	23.6	11.8-34.0	22.7	11.8-34.0	1,800.0	800.0-3,000.0	12.0	-
			M	1	1	32.1	-	32.1	-	1,300.0	-	12.0	-
			S	4	4	290.6	80.3-458.0	52.6	45.4-70.3	500.0	200.0-600.0	0.6	0.5-0.7
			U	1	1	20.3	-	20.3	-	-	-	-	-
		S	S	1	1	57.2	-	22.7	-	250.0	-	-	-
		All		47	47	64.4	3.2-458.0	25.3	3.2-70.3	1,736.4	150.0-6,000.0	13.8	0.5-48.0
	Aug	A	L	7	7	38.6	10.4-73.1	27.1	10.4-41.4	1,842.9	1,000.0-3,000.0	18.9	12.0-24.0
		P	L	24	24	47.6	7.8-140.6	30.6	7.8-61.6	2,591.7	600.0-6,000.0	16.2	12.0-48.0
			S	16	16	268.1	14.2-461.7	50.4	13.7-110.9	1,390.6	600.0-2,000.0	5.8	2.5-12.0
			U	1	1	296.7	-	123.4	-	-	-	4.0	-
		R	L	31	31	32.3	6.2-75.1	29.7	6.2-75.1	1,292.3	200.0-2,000.0	12.4	12.0-24.0
			M	1	1	72.6	-	72.6	-	1,000.0	-	12.0	-
			S	5	5	129.3	53.9-272.2	53.7	45.4-72.4	450.0	250.0-600.0	2.0	-
			U	8	8	156.4	11.4-459.5	34.1	11.4-45.7	-	-	-	-
		S	L	1	1	27.2	-	20.0	-	1,600.0	-	24.0	-
		All		94	94	95.7	6.2-461.7	36.3	6.2-123.4	1,697.5	200.0-6,000.0	12.7	2.0-48.0
	Sep	A	L	15	15	34.2	7.4-74.0	24.8	3.5-53.6	1,333.3	1000.0-2,000.0	18.5	12.0-24.0
			U	1	1	101.7	-	34.6	-	-	-	-	-
		P	L	27	27	60.8	3.3-358.3	39.1	3.3-143.0	1,828.8	400.0-5,400.0	20.2	12.0-48.0
			M	1	1	99.9	-	46.0	-	1,200.0	-	24.0	-
			S	6	6	189	8.0-567.0	44.8	8.0-73.9	480.0	300.0-700.0	8.1	0.2-12.0
			U	1	1	10.1	-	10.1	-	-	-	24.0	-

Table 6.1a. Continued.

Year	Month	Area	Mesh	n	sn	Catch weight (kg)		Sample weight (kg)		Net length (yd)		Set time (hr)	
						Mean	Range	Mean	Range	Mean	Range	Mean	Range
2005	Sep	S	L	1	1	31.7	-	31.7	-	1,200.0	-	12.0	-
		All		52	52	67.9	3.3-567.0	35.0	3.3-143.0	1,507.3	300.0-5,400.0	18.8	0.2-48.0
	Oct	A	L	13	12	47.7	11.4-96.7	29.8	13.2-75.5	1,459.0	500.0-2,400.0	24.9	12.0-48.0
			S	4	4	408.1	262.2-671.8	107.7	68.0-136.0	1,083.3	250.0-2,400.0	-	-
			U	2	2	276.5	193.2-359.8	47.9	45.4-50.4	-	-	-	-
		P	L	51	50	75.3	14.5-191.9	41.9	14.5-123.4	1,448.7	250.0-5,200.0	22.0	12.0-48.0
			M	4	4	98.4	68.1-148.0	42.0	24.3-54.7	1,406.5	800.0-2,600.0	24.0	-
			S	12	12	311.5	22.2-990.8	54.3	15.2-113.5	519.6	200.0-1,000.0	10.2	0.0-24.0
			U	6	6	132.6	47.6-413.7	46.3	21.4-68.1	-	-	24.0	-
		R	L	12	12	28.6	8.2-72.6	28.6	8.2-72.6	1,233.3	200.0-2,000.0	13.3	12.0-24.0
			M	1	1	36.4	-	36.4	-	1,600.0	-	12.0	-
			S	8	8	284.7	32.1-698.2	78.2	29.8-136.8	550.0	200.0-1,200.0	1.4	0.3-4.0
			U	3	3	1,198.9	85.8-1,880.8	99.5	62.6-121.2	-	-	-	-
		S	L	3	3	92.5	81.9-102.1	34.2	25.2-42.4	1,033.3	300.0-1,800.0	17.0	12.0-24.0
			S	4	4	148.5	40.8-432.2	47.1	22.7-91.7	245.0	180.0-400.0	3.5	2.0-5.0
		All		123	121	152.0	8.2-1,880.8	46.9	8.2-136.8	1,196.8	180.0-5,200.0	18.7	0.0-48.0
	Nov	A	L	16	13	74.4	2.3-220.2	35.0	10.3-65.3	1,833.3	100.0-3,000.0	33.3	0.5-48.0
			M	1	0	32.7	-	-	-	1,600.0	-	24.0	-
			U	4	4	73.3	5.6-204.9	39.2	5.6-76.6	-	-	-	-
		P	L	8	8	40.9	5.9-104.1	23.2	5.9-32.2	987.5	500.0-1,300.0	27.0	12.0-48.0
			M	8	8	91.6	57.2-220.4	44.4	24.9-84.7	1,275.0	600.0-2,200.0	27.0	12.0-48.0
			S	4	4	103.9	7.7-279.8	45.8	7.7-96.2	775.0	400.0-1,200.0	24.0	-
			U	1	1	57.8	-	48.3	-	-	-	-	-
		R	M	1	0	310.2	-	-	-	4,000.0	-	48.0	-
			S	3	3	894.9	67.6-1,570.9	61.9	22.2-95.3	683.3	250.0-1,200.0	0.5	-
			U	1	1	18.6	-	11.8	-	-	-	-	-
		S	L	1	1	28.5	-	28.5	-	300.0	-	48.0	-
			S	3	3	197.6	121.6-340.2	44.2	19.1-90.7	268.3	155.0-400.0	1.9	0.8-3.0
		All		51	46	131.1	2.3-1,570.9	37.9	5.6-96.2	1,305.8	100.0-4,000.0	27.2	0.5-48.0

Table 6.1a. Continued.

Year	Month	Area	Mesh	n	sn	Catch weight (kg) Mean	Catch weight (kg) Range	Sample weight (kg) Mean	Sample weight (kg) Range	Net length (yd) Mean	Net length (yd) Range	Set time (hr) Mean	Set time (hr) Range
2005	Dec	P	S	3	3	9.4	2.8-20.2	9.4	2.8-20.2	1,133.3	500.0-1500.0	28.0	12.0-48.0
		R	S	1	1	198.5	-	80.6	-	550.0	-	-	-
		S	S	1	1	56.9	-	19.0	-	400.0	-	3.0	-
		All		5	5	56.7	2.8-198.5	25.6	2.8-80.6	870.0	400.0-1,500.0	21.8	3.0-48.0
	All	A	L	58	54	50.5	2.3-220.2	28.8	3.5-75.5	1,504.7	100.0-3,000.0	24.0	0.5-48.0
			M	2	1	35.6	-	24.1	-	2,100.0	1,600.0-2,600.0	18.0	-
			S	17	16	166.9	3.5-671.8	44.3	3.5-136.0	742.5	250.0-2,400.0	24.0	12.0-48.0
			U	18	18	85.5	5.6-359.8	24.8	4.5-76.6	-	-	24.0	-
		P	L	166	165	55.9	3.3-358.3	35.0	3.3-143.0	2,060.6	250.0-6,000.0	19.9	12.0-48.0
			M	20	20	89.8	42.6-220.4	41.0	7.6-84.7	1,631.3	600.0-6,500.0	24.0	12.0-48.0
			S	113	113	186.7	2.8-990.8	42.4	2.8-117.6	1,093.5	150.0-3,000.0	16.1	0.0-48.0
			U	26	26	84.3	10.1-413.7	32.1	2.9-123.4	1,400.0	-	25.0	4.0-48.0
		R	L	131	131	31.6	2.0-168.3	27.1	2.0-90.5	1,039.5	50.0-3,000.0	18.8	12.0-72.0
			M	11	10	114.1	5.1-310.2	35.1	5.1-72.6	1,454.5	550.0-4,000.0	24.0	12.0-48.0
			S	54	54	275.6	19.3-1,570.9	59.8	6.0-175.8	585.2	100.0-1,800.0	6.2	0.3-48.0
			U	28	28	211.3	3.7-1,880.8	40.3	3.7-165.5	-	-	-	-
		S	L	13	13	42.7	4.6-102.1	25.4	4.6-42.4	1,107.7	300.0-2,000.0	24.2	12.0-72.0
			S	12	12	128.9	33.6-432.2	36.5	15.9-91.7	302.9	155.0-400.0	3.2	0.8-5.0
		All		669	661	104.7	2.0-1,880.8	36.3	2.0-175.8	1,349.8	50.0-6,500.0	18.6	0.0-72.0
2006	Jan	A	L	1	1	41.7	-	34.8	-	-	-	24.0	-
			M	2	2	47.1	33.0-61.3	34.2	33.0-35.4	1,150.0	-	24.0	-
			S	1	1	82.5	-	22.7	-	800.0	-	24.0	-
			U	1	1	37.2	-	22.2	-	-	-	24.0	-
		P	L	2	2	41.8	36.3-47.2	41.8	36.3-47.2	-	-	24.0	-
			M	1	1	31.9	-	24.2	-	1,800.0	-	24.0	-
			S	5	5	128.5	1.9-354.7	11.8	1.9-22.7	560.0	200.0-1,100.0	20.0	12.0-24.0
			U	1	1	196.9	-	27.5	-	-	-	-	-
		R	L	2	2	19.0	10.3-27.8	19.0	10.3-27.8	150.0	-	24.0	-
			S	4	4	255.7	35.9-647.4	103.7	23.6-278.4	437.5	250.0-550.0	4.0	-
			U	2	2	27.1	11.1-43.0	10.6	3.7-17.6	1,200.0	-	12.0	-

Table 6.1a. Continued.

Year	Month	Area	Mesh	n	sn	Catch weight (kg) Mean	Catch weight (kg) Range	Sample weight (kg) Mean	Sample weight (kg) Range	Net length (yd) Mean	Net length (yd) Range	Set time (hr) Mean	Set time (hr) Range
2006	Jan	All		22	22	105.7	1.9-647.4	37.1	1.9-278.4	684.4	150.0-1,800.0	20.0	4.0-24.0
	Feb	P	L	1	1	32.7	-	32.7	-	800.0	-	-	-
			S	4	4	77.6	40.8-104.8	29.6	26.0-35.6	1,050.0	400.0-1,800.0	15.3	1.0-24.0
			U	1	1	59.3	-	25.8	-	2,000.0	-	-	-
		R	L	17	17	34.3	5.4-133.8	28.0	5.4-78.1	617.2	150.0-1,100.0	31.8	12.0-72.0
			M	5	5	41.8	19.2-71.5	36.5	6.4-71.5	1,140.0	1,000.0-1,250.0	38.4	24.0-48.0
			U	4	4	15.3	4.1-32.3	11.3	4.1-32.3	-	-	-	-
		All		32	32	39.3	4.1-133.8	27.5	4.1-78.1	828.3	150.0-2,000.0	30.5	1.0-72.0
	Mar	A	L	6	6	113.2	48.1-202.2	35.4	24.1-64.5	1,033.3	800.0-1,400.0	52.0	48.0-72.0
			S	2	2	12.0	2.3-21.7	9.5	2.3-16.7	600.0	400.0-800.0	48.0	-
		P	L	2	2	52.5	12.5-92.5	26.4	12.5-40.3	1,550.0	1,500.0-1,600.0	30.0	12.0-48.0
			M	4	4	44.5	25.1-71.7	26.8	13.9-36.2	1,625.0	1,500.0-2,000.0	24.0	-
			S	3	3	52.5	20.9-84.8	27.9	20.9-33.7	800.0	600.0-1,000.0	16.0	12.0-24.0
		R	L	46	46	34.1	1.8-153.6	28.4	1.8-96.7	664.4	200.0-1,800.0	15.9	12.0-48.0
			M	4	4	67.5	27.3-110.9	27.6	20.1-41.7	696.7	120.0-1,250.0	28.3	5.0-48.0
			S	3	3	42.1	38.2-47.1	27.7	22.7-32.1	266.7	250.0-300.0	18.1	2.0-48.0
			U	15	15	59.6	12.6-239.5	41.2	1.2-173.3	-	-	-	-
		All		85	85	47.1	1.8-239.5	30.5	1.2-173.3	766.5	120.0-2,000.0	21.7	2.0-72.0
	Apr	A	L	4	4	75.1	8.6-165.1	29.1	7.6-59.1	1,000.0	-	54.0	48.0-72.0
			M	2	2	37.3	17.2-57.5	26.2	17.2-35.3	750.0	500.0-1,000.0	18.0	12.0-24.0
			S	3	3	18.3	2.1-39.0	17.3	2.1-37.2	1,033.3	800.0-1,500.0	16.7	12.0-24.0
			U	6	6	42.3	5.1-83.5	29.9	5.1-68.5	-	-	-	-
		P	L	11	11	35.1	1.6-103.6	27.4	1.6-61.4	2,236.4	600.0-3,000.0	22.9	12.0-24.0
			M	5	5	36.9	13.1-103.0	20.2	11.7-35.4	1,224.0	800.0-2,000.0	24.0	12.0-48.0
			S	28	28	84.9	2.7-257.3	22.9	2.7-54.8	1,085.7	200.0-2,100.0	21.4	10.0-48.0
		R	L	11	11	48.9	5.4-122.7	33.4	5.4-69.1	1,440.9	50.0-2,400.0	21.8	12.0-48.0
			S	1	1	44.8	-	44.8	-	400.0	-	1.3	-
			U	5	5	109.9	25.3-403.6	52.0	25.3-117.2	-	-	12.0	-
		All		76	76	62.7	1.6-403.6	27.8	1.6-117.2	1,322.6	50.0.0-3,000.0	23.1	1.3-72.0

Table 6.1a. Continued.

Year	Month	Area	Mesh	n	sn	Catch weight (kg) Mean	Catch weight (kg) Range	Sample weight (kg) Mean	Sample weight (kg) Range	Net length (yd) Mean	Net length (yd) Range	Set time (hr) Mean	Set time (hr) Range
2006	May	A	L	1	1	31.9	-	31.9	-	1,200.0	-	24.0	-
			S	6	6	96.8	4.8-190.2	15.2	4.8-43.2	1,033.3	800.0-1,200.0	22.0	12.0-24.0
			U	2	2	28.3	20.9-35.8	10.0	5.6-14.5	-	-	-	-
		P	L	18	18	41.4	12.3-101.5	35.1	6.4-75.7	2,872.2	300.0-6,000.0	22.0	12.0-24.0
			M	1	1	23.2	-	23.2	-	900.0	-	24.0	-
			S	17	17	86.9	7.8-340.6	33.7	7.7-86.3	982.4	200.0-2,000.0	15.1	1.0-24.0
			U	9	9	117.6	15.0-307.8	48.7	8.2-124.6	-	-	24.0	-
		R	L	19	19	31.1	9.6-95.1	28.7	9.6-68.5	1,173.7	700.0-6,000.0	20.9	12.0-24.0
			S	3	3	34.3	31.4-37.9	17.8	8.0-30.8	800.0	-	12.0	-
			U	1	1	30.4	-	25.8	-	-	-	-	-
		All		77	77	61.0	4.8-340.6	31.6	4.8-124.6	1,560.0	200.0-6,000.0	19.6	1.0-24.0
	Jun	A	L	4	4	22.3	5.5-40.1	17.2	5.5-34.6	800.0	400.0-1,200.0	12.0	-
			U	2	2	102.6	18.6-186.6	33.7	18.6-48.7	.	-	-	-
		P	L	28	28	44.4	8.9-179.2	32.2	6.8-90.3	1,980.8	400.0-5,800.0	15.8	8.0-48.0
			S	4	4	74.5	49.6-96.7	28.4	22.7-33.8	1,125.0	1,000.0-1,200.0	5.0	2.5-10.0
			U	3	3	74.8	4.8-206.9	22.8	2.1-53.6	-	-	-	-
		R	L	2	2	23.4	5.9-40.8	14.3	5.9-22.7	550.0	300.0-800.0	9.5	7.0-12.0
			S	2	2	511.8	483.1-540.6	37.0	24.1-49.9	500.0	400.0-600.0	-	-
			U	1	1	228.2	-	122.8	-	-	-	-	-
		All		46	46	73.0	4.8-540.6	31.4	2.1-122.8	1,613.2	300.0-5,800.0	13.8	2.5-48.0
	Jul	A	L	12	12	37.4	10.6-89.0	24.0	3.5-56.4	1,700.0	800.0-2,800.0	19.5	12.0-48.0
			M	1	1	47.4	-	18.3	-	1,000.0	-	48.0	-
			U	2	2	224.9	16.5-433.4	18.2	8.3-28.2	-	-	24.0	-
		P	L	43	43	35.8	5.9-150.5	27.4	3.2-98.4	1,790.7	600.0-4,000.0	19.7	8.0-72.0
			S	10	10	207.1	7.0-642.7	50.5	7.0-84.9	666.7	200.0-1,300.0	3.6	0.5-8.0
			U	5	5	115.0	6.4-310.7	35.7	6.4-59.6	1,000.0	-	18.0	12.0-24.0
		R	L	23	23	31.9	3.1-114.4	24.5	3.1-67.8	1,150.0	150.0-2,000.0	12.5	10.0-24.0
			S	3	3	160.8	55.8-310.3	43.0	22.7-57.0	333.3	200.0-400.0	0.9	0.3-1.5
			U	5	5	93.8	14.1-210.7	56.2	14.1-99.6	-	-	-	-
		S	L	1	1	72.2	-	26.3	-	1,800.0	-	24.0	-

Table 6.1a. Continued.

Year	Month	Area	Mesh	n	sn	Catch weight (kg) Mean	Catch weight (kg) Range	Sample weight (kg) Mean	Sample weight (kg) Range	Net length (yd) Mean	Net length (yd) Range	Set time (hr) Mean	Set time (hr) Range
2006	Jul	All		105	105	65.6	3.1-642.7	30.5	3.1-99.6	1,457.8	150.0-4,000.0	16.4	0.3-72.0
	Aug	A	L	11	11	24.3	8.1-47.3	18.3	4.4-31.4	1,652.7	1,000.0-2,400.0	13.1	12.0-24.0
			S	1	1	51.3	-	24.9	-	300.0	-	0.5	-
			U	4	4	19.5	12.7-38.2	14.7	8.6-23.1	-	-	-	-
		P	L	47	47	35.5	1.5-117.9	27.0	1.5-54.0	1,746.7	400.0-3,000.0	15.8	12.0-48.0
			M	1	1	15.6	-	15.6	-	1,400.0	-	-	-
			S	11	11	304.4	37.2-764.3	63.2	14.5-115.1	857.3	80.0-1,500.0	3.6	0.2-8.0
			U	3	3	149.0	25.6-352.4	31.6	25.6-41.0	1,700.0	-	12.0	-
		R	L	12	12	36.0	3.6-116.6	23.8	3.6-71.0	1,266.7	200.0-2,000.0	14.0	12.0-36.0
			S	7	7	296.2	84.3-725.8	47.6	45.4-53.7	600.0	200.0-800.0	0.9	0.3-2.0
			U	7	7	121.6	10.3-300.7	45.7	10.3-108.3	-	-	-	-
		All		104	104	88.8	1.5-764.3	31.7	1.5-115.1	1,453.8	80.0-3,000.0	12.3	0.2-48.0
	Sep	A	L	13	13	46.2	16.3-131.8	27.5	3.4-56.2	1,553.8	500.0-2,000.0	22.8	12.0-48.0
			S	1	1	131.2	-	23.6	-	800.0	-	10.0	-
			U	9	9	50.4	10.6-105.3	26.6	7.3-52.2	750.0	-	-	-
		P	L	58	58	71.0	6.9-622.8	36.4	2.5-95.6	1,586.2	365.0-3,000.0	22.5	12.0-72.0
			S	8	8	801.4	7.7-2,747.8	74.9	7.7-158.8	628.6	400.0-1,000.0	1.9	0.2-7.0
			U	1	1	89.9	-	12.9	-	-	-	-	-
		R	L	5	5	51.4	16.7-77.2	48.5	16.7-62.7	1,760.0	1,500.0-2,000.0	21.0	12.0-48.0
			S	8	8	123.5	31.4-271.6	54.1	4.1-120.7	462.5	200.0-1,000.0	2.2	0.5-5.0
			U	3	3	169.9	79.9-343.4	76.6	23.0-136.8	-	-	-	-
		S	L	4	4	44.2	31.3-60.3	41.2	31.3-60.3	925.0	600.0-1,100.0	24.0	-
			S	1	1	174.2	-	35.4	-	500.0	-	-	-
		All		111	111	125.3	6.9-2,747.8	40.1	2.5-158.8	1,373.9	200.0-3,000.0	18.5	0.2-72.0
	Oct	A	L	18	18	115.1	21.8-490.9	41.0	16.3-94.4	2,064.7	700.0-3,000.0	24.8	12.0-48.0
			U	4	4	494.2	253.1-1,042.4	68.6	15.0-164.3	-	-	-	-
		P	L	41	41	59.7	9.3-220.1	35.0	5.0-93.4	1,446.3	200.0-3,000.0	22.3	12.0-48.0
			M	1	1	102.6	-	102.6	-	1,600.0	-	12.0	-
			S	17	17	445.3	25.5-1,353.2	59.1	6.5-137.9	527.9	200.0-1,000.0	8.4	0.2-12.0
			U	9	9	875.9	33.6-3,706.8	65.9	8.6-152.2	-	-	12.0	-

Table 6.1a. Continued.

Year	Month	Area	Mesh	n	sn	Catch weight (kg) Mean	Catch weight (kg) Range	Sample weight (kg) Mean	Sample weight (kg) Range	Net length (yd) Mean	Net length (yd) Range	Set time (hr) Mean	Set time (hr) Range
2006	Oct	R	L	7	7	32.6	4.5-59.9	32.6	4.5-59.9	1,328.6	200.0-2,400.0	18.0	12.0-48.0
			M	5	5	58.2	19.1-84.1	58.2	19.1-84.1	1,326.0	730.0-2,100.0	10.3	1.0-24.0
			S	13	13	190.1	41.3-931.7	56.4	26.1-91.6	495.4	100.0-900.0	4.0	0.3-12.0
			U	8	8	452.2	15.0-2,682.6	63.9	15.0-115.5	200.0	-	12.0	-
		S	L	4	4	46.8	31.3-73.6	38.6	7.3-73.6	1,000.0	-	27.0	24.0-36.0
			S	6	6	225.0	21.4-456.4	67.8	21.4-114.9	450.0	200.0-800.0	13.2	1.5-36.0
		All		133	133	227.0	4.5-3,706.8	48.7	4.5-164.3	1,198.6	100.0-3,000.0	18.5	0.2-48.0
	Nov	A	L	13	13	65.8	5.0-127.2	26.7	5.0-51.0	2,292.3	1,500.0-3,000.0	31.2	0.1-72.0
			S	1	1	94.3	-	70.2	-	800.0	-	12.0	-
			U	7	7	120.6	18.5-306.1	37.4	9.5-88.4	-	-	-	-
		P	L	6	6	41.5	7.8-83.0	23.2	6.4-44.0	1,200.0	800.0-1,800.0	24.0	12.0-48.0
			M	1	1	44.4	-	20.8	-	4,000.0	-	12.0	-
			S	8	8	177.8	11.3-776.3	45.5	11.3-114.1	1,037.5	100.0-1,600.0	14.5	0.3-24.0
			U	5	5	123.8	23.8-246.1	62.5	7.0-127.2	-	-	-	-
		R	L	1	1	3.6	-	3.6	-	100.0	-	12.0	-
			M	1	1	39.3	-	39.3	-	1,150.0	-	12.0	-
			S	13	13	132.9	22.4-472.5	63.6	21.2-123.6	533.8	200.0-1,200.0	8.2	0.5-12.0
			U	2	2	42.0	33.0-51.1	22.4	11.9-33.0	-	-	12.0	-
		S	M	2	2	43.2	41.7-44.8	43.2	41.7-44.8	650.0	600.0-700.0	18.0	12.0-24.0
			S	4	4	355.9	105.6-919.2	83.6	60.4-127.2	288.8	200.0-380.0	-	-
		All		64	64	117.1	3.6-919.2	44.6	3.6-127.2	1,214.9	100.0-4,000.0	19.7	0.1-72.0
	Dec	P	S	11	11	109.2	5.1-465.5	48.9	5.1-167.4	800.0	300.0-1,600.0	14.0	1.0-24.0
			U	3	3	9.9	4.0-19.9	9.8	3.5-19.9	-	-	72.0	-
		R	M	1	1	31.5	-	31.5	-	1,150.0	-	12.0	-
			S	4	4	126.3	19.1-407.9	60.9	19.1-146.2	912.5	400.0-1,500.0	9.3	4.0-12.0
			U	2	2	151.6	7.9-295.2	26.9	7.9-45.9	-	-	-	-
		All		21	21	98.6	4.0-465.5	42.7	3.5-167.4	850.0	300.0-1,600.0	17.5	2.0-72.0

Table 6.1a. Continued.

Year	Month	Area	Mesh	n	sn	Catch weight (kg) Mean	Catch weight (kg) Range	Sample weight (kg) Mean	Sample weight (kg) Range	Net length (yd) Mean	Net length (yd) Range	Set time (hr) Mean	Set time (hr) Range
2006	All	A	L	83	83	64.9	5.0-490.9	28.9	3.4-94.4	1,707.2	400.0-3,000.0	26.0	0.1-72.0
			M	5	5	43.3	17.2-61.3	27.8	17.2-35.4	960.0	500.0-1,150.0	26.4	12.0-48.0
			S	15	15	67.9	2.1-190.2	20.2	2.1-70.2	880.0	300.0-1,500.0	21.6	0.5-48.0
			U	37	37	117.7	5.1-1,042.4	31.3	5.1-164.3	750.0	-	24.0	-
		P	L	257	257	49.1	1.5-622.8	31.7	1.5-98.4	1,776.9	200.0-6,000.0	20.2	8.0-72.0
			M	14	14	41.4	13.1-103.0	28.2	11.7-102.6	1,594.3	800.0-4,000.0	22.2	12.0-48.0
			S	126	126	216.6	1.9-2,747.8	42.0	1.9-167.4	862.1	80.0-2,100.0	13.3	0.2-48.0
			U	40	40	279.6	4.0-3,706.8	44.5	2.1-152.2	1,566.7	1,000.0-2,000.0	26.0	12.0-72.0
		R	L	145	145	34.6	1.8-153.6	28.2	1.8-96.7	962.7	50.0-6,000.0	18.5	7.0-72.0
			M	16	16	52.6	19.1-110.9	40.9	6.4-84.1	1,088.5	120.0-2,100.0	23.8	1.0-48.0
			S	61	61	173.3	19.1-931.7	55.2	4.1-278.4	529.2	100.0-1,500.0	5.5	0.3-48.0
			U	55	55	139.1	4.1-2,682.6	46.1	1.2-173.3	700.0	200.0-1,200.0	12.0	-
		S	L	9	9	48.5	31.3-73.6	38.4	7.3-73.6	1,055.6	600.0-1,800.0	25.7	24.0-36.0
			M	2	2	43.2	41.7-44.8	43.2	41.7-44.8	650.0	600.0-700.0	18.0	12.0-24.0
			S	11	11	268.0	21.4-919.2	70.6	21.4-127.2	395.9	200.0-800.0	13.2	1.5-36.0
		All		876	876	103.0	1.5-3,706.8	35.9	1.2-278.4	1,275.9	50.0-6,000.0	18.7	0.1-72.0

Table 6.1b. Summary of commercial estuarine gill net catches (2004-2006) from Albemarle area (A), Pamlico area (P), Rivers area (R), and Southern area (S) by mesh size category (L=large mesh size, O=other mesh size. Large mesh catches were determined as trips with flounder contributing 50% or greater by weight or coded as gear = 427 and catches not classified as large mesh were assumed to be small mesh and designated as other mesh size. Data from the NCDMF Trip Ticket Program.

Year	Month	Area	Mesh size	Number of trips	Total weight (kg)	CPUE (kg/trip)	Min CPUE (kg/trip)	Max CPUE (kg/trip)
2004	Jan	A	L	8	212.0	26.5	0.5	61.7
			O	1,156	82,307.9	71.2	1.8	1,942.7
			All	1,164	82,519.9	70.9	0.5	1,942.7
		P	O	89	11,631.5	130.7	0.9	2,170.1
		R	L	37	1,862.8	50.3	6.4	164.3
			O	160	42,805.0	267.5	1.4	3,079.0
			All	197	44,667.8	226.7	1.4	3,079.0
		S	L	2	25.7	12.8	12.3	13.4
			O	106	10,521.1	99.3	1.4	1,015.1
			All	108	10,546.7	97.7	1.4	1,015.1
			Overall	1,558	149,365.9	95.9	0.5	3,079.0
	Feb	A	L	83	4,609.9	55.5	2.7	200.7
			O	2,021	122,432.5	60.6	0.9	5,121.1
			All	2,104	127,042.4	60.4	0.9	5,121.1
		P	L	1	282.4	282.4	282.4	282.4
			O	193	37,448.9	194.0	0.9	1,806.9
			All	194	37,731.3	194.5	0.9	1,806.9
		R	L	10	205.9	20.6	6.8	49.5
			O	331	52,600.4	158.9	1.2	2,209.6
			All	341	52,806.3	154.9	1.2	2,209.6
		S	L	2	81.3	40.6	2.3	79.0
			O	137	6,976.7	50.9	0.9	629.7
			All	139	7,058.0	50.8	0.9	629.7
			Overall	2,778	224,637.9	80.9	0.9	2,209.6
	Mar	A	L	1,133	52,680.3	46.5	1.4	862.6
			O	2,291	208,337.6	90.9	0.2	6,151.7
			All	3,424	261,018.0	76.2	0.2	6,151.7
		P	L	35	2,339.0	66.8	5.9	881.7
			O	453	89,114.3	196.7	2.7	4,485.5
			All	488	91,453.3	187.4	2.7	4,485.5
		R	L	66	2,223.0	33.7	3.2	115.5
			O	804	64,376.5	80.1	0.9	1,038.3
			All	870	66,599.5	76.6	0.9	1,038.3

Table 6.1b. Continued.

Year	Month	Area	Mesh size	Number of trips	Total weight (kg)	CPUE (kg/trip)	Min CPUE (kg/trip)	Max CPUE (kg/trip)
2004	Mar	S	L	6	198.6	33.1	9.5	69.9
			O	174	12,632.3	72.6	3.2	340.5
			All	180	12,831.0	71.3	3.2	340.5
			Overall	4,962	431,901.8	87.0	0.2	4,485.5
	Apr	A	L	377	18,914.3	50.2	1.4	424.9
			O	872	84,947.7	97.4	0.2	1,648.0
			All	1,249	103,861.9	83.2	0.2	1,648.0
		P	L	164	10,399.1	63.4	2.7	301.9
			O	1,184	148,795.4	125.7	0.9	1,725.2
			All	1,348	159,194.6	118.1	0.9	1,725.2
		R	L	319	10,023.2	31.4	0.7	167.5
			O	398	38,195.4	96.0	2.3	688.3
			All	717	48,218.6	67.3	0.7	688.3
		S	L	62	1,406.7	22.7	0.7	100.8
			O	141	12,261.1	87.0	1.4	1,748.8
			All	203	13,667.8	67.3	0.7	1,748.8
			Overall	3,517	324,943.0	92.4	0.2	1,748.8
	May	A	L	284	13,946.4	49.1	0.5	854.9
			O	294	25,719.1	87.5	0.2	847.6
			All	578	39,665.5	68.6	0.2	854.9
		P	L	615	31,241.3	50.8	4.1	263.3
			O	466	57,973.8	124.4	1.8	2,559.0
			All	1,081	89,215.1	82.5	1.8	2,559.0
		R	L	694	25,093.7	36.2	1.8	313.7
			O	160	22,322.7	139.5	4.5	1,180.4
			All	854	47,416.4	55.5	1.8	1,180.4
		S	L	146	4,148.1	28.4	2.3	128.5
			O	126	6,983.2	55.4	1.6	387.3
			All	272	11,131.3	40.9	1.6	387.3
			Overall	2,785	187,428.3	67.3	1.6	2,559.0
	Jun	A	L	484	18,398.1	38.0	0.5	310.5
			O	197	17,499.9	88.8	0.5	722.8
			All	681	35,897.9	52.7	0.5	722.8
		P	L	1,069	49,081.0	45.9	0.5	370.0
			O	309	42,588.7	137.8	3.6	1,922.7
			All	1,378	91,669.7	66.5	0.5	1,922.7
		R	L	423	14,787.8	35.0	2.3	207.5
			O	141	19,426.5	137.8	2.3	670.3
			All	564	34,214.4	60.7	2.3	670.3
		S	L	171	5,214.1	30.5	1.8	480.8
			O	55	1,781.2	32.4	3.6	109.0
			All	226	6,995.3	31.0	1.8	480.8
			Overall	2,849	168,777.3	59.2	0.5	1,922.7

Table 6.1b. Continued.

Year	Month	Area	Mesh size	Number of trips	Total weight (kg)	CPUE (kg/trip)	Min CPUE (kg/trip)	Max CPUE (kg/trip)
2004	Jul	A	L	680	35,066.7	51.6	0.5	919.4
			O	168	21,521.4	128.1	0.2	1,028.8
			All	848	56,588.1	66.7	0.2	1,028.8
		P	L	806	34,282.9	42.5	1.8	943.0
			O	237	35,030.1	147.8	2.3	1,015.1
			All	1,043	69,312.9	66.5	1.8	1,015.1
		R	L	312	9,704.7	31.1	0.9	229.7
			O	93	12,996.8	139.8	3.2	701.6
			All	405	22,701.5	56.1	0.9	701.6
		S	L	133	4,488.0	33.7	3.4	281.0
			O	48	2,173.7	45.3	4.9	378.2
			All	181	6,661.7	36.8	3.4	378.2
			Overall	2,477	155,264.2	62.7	0.2	1,028.8
	Aug	A	L	809	42,899.7	53.0	0.5	1,005.6
			O	160	17,254.8	107.8	2.0	561.1
			All	969	60,154.5	62.1	0.5	1,005.6
		P	L	892	45,427.3	50.9	1.4	854.4
			O	240	43,825.0	182.6	0.5	2,020.3
			All	1,132	89,252.2	78.8	0.5	2,020.3
		R	L	418	18,390.9	44.0	3.2	173.9
			O	94	13,568.6	144.3	0.9	1,204.0
			All	512	31,959.5	62.4	0.9	1,204.0
		S	L	158	7,310.1	46.3	3.6	232.4
			O	63	3,514.0	55.8	1.8	590.2
			All	221	10,824.0	49.0	1.8	590.2
			Overall	2,834	192,190.3	67.8	0.5	2,020.3
	Sep	A	L	822	52,796.9	64.2	0.5	1,903.2
			O	164	14,749.4	89.9	0.2	659.7
			All	986	67,546.3	68.5	0.2	1,903.2
		P	L	1,149	66,096.9	57.5	0.9	1,256.2
			O	219	46,382.6	211.8	0.5	2,398.0
			All	1,368	112,479.5	82.2	0.5	2,398.0
		R	L	507	19,697.4	38.9	2.7	201.6
			O	91	19,298.2	212.1	0.6	1,587.6
			All	598	38,995.6	65.2	0.6	1,587.6
		S	L	215	10,825.9	50.4	1.3	521.6
			O	81	4,983.0	61.5	1.3	421.3
			All	296	15,808.9	53.4	1.3	521.6
			Overall	3,248	234,830.3	72.3	0.2	2,398.0
	Oct	A	L	972	59,226.7	60.9	1.4	1,259.9
			O	274	30,550.7	111.5	0.9	1,081.4
			All	1,246	89,777.4	72.1	0.9	1,259.9
		P	L	1,123	72,427.0	64.5	0.5	992.0
			O	852	179,429.2	210.6	0.5	2,811.2
			All	1,975	251,856.3	127.5	0.5	2,811.2

Table 6.1b. Continued.

Year	Month	Area	Mesh size	Number of trips	Total weight (kg)	CPUE (kg/trip)	Min CPUE (kg/trip)	Max CPUE (kg/trip)
2004	Oct	R	L	601	27,992.1	46.6	3.6	315.1
			O	156	24,576.6	157.5	6.8	2,113.8
			All	757	52,568.7	69.4	3.6	2,113.8
		S	L	216	10,164.2	47.1	2.7	573.4
			O	685	85,657.0	125.0	0.9	1,397.9
			All	901	95,821.3	106.3	0.9	1,397.9
			Overall	4,879	490,023.6	100.4	0.5	2,811.2
	Nov	A	L	925	68,638.2	74.2	1.4	1,225.8
			O	107	11,239.0	105.0	1.6	869.4
			All	1,032	79,877.2	77.4	1.4	1,225.8
		P	L	513	29,235.6	57.0	2.3	548.9
			O	673	85,162.9	126.5	0.5	2,912.4
			All	1,186	114,398.5	96.5	0.5	2,912.4
		R	L	318	14,677.0	46.2	3.2	436.3
			O	198	18,945.6	95.7	1.4	1,200.8
			All	516	33,622.6	65.2	1.4	1,200.8
		S	L	45	1,492.0	33.2	2.3	225.2
			O	356	52,182.5	146.6	4.5	1,391.1
			All	401	53,674.5	133.9	2.3	1,391.1
			Overall	3,135	281,572.8	89.8	0.5	2,912.4
	Dec	A	L	99	3,993.8	40.3	1.4	227.0
			O	149	17,077.7	114.6	0.9	1,110.0
			All	248	21,071.5	85.0	0.9	1,110.0
		P	L	81	5,875.0	72.5	1.8	1,096.0
			O	123	11,254.2	91.5	2.3	627.0
			All	204	17,129.2	84.0	1.8	1,096.0
		R	L	126	5,412.7	43.0	0.5	366.4
			O	81	6,068.5	74.9	4.1	285.6
			All	207	11,481.2	55.5	0.5	366.4
		S	L	7	169.4	24.2	1.8	58.8
			O	59	4,120.2	69.8	2.3	444.9
			All	66	4,289.6	65.0	1.8	444.9
			Overall	725	53,971.5	74.4	0.5	1,096.0
2004		Overall	L	18,118	913,665.9	50.4	0.5	1,903.2
			O	17,629	1,981,240.9	112.4	0.2	6,151.7
	Overall			35,747	2,894,906.8	81.0	0.2	6,151.7
2005	Jan	A	L	370	12,843.2	34.7	2.7	273.8
			O	940	63,026.7	67.0	0.9	2,785.7
			All	1,310	75,869.9	57.9	0.9	2,785.7
		P	L	75	4,030.8	53.7	3.2	490.3
			O	81	8,409.7	103.8	3.6	1,011.1
			All	156	12,440.5	79.7	3.2	1,011.1
		R	L	46	1,213.7	26.4	2.3	115.8
			O	174	17,815.6	102.4	4.1	1,519.1
			All	220	19,029.3	86.5	2.3	1,519.1

Table 6.1b. Continued.

Year	Month	Area	Mesh size	Number of trips	Total weight (kg)	CPUE (kg/trip)	Min CPUE (kg/trip)	Max CPUE (kg/trip)
2005	Jan	S	L	71	1,813.6	25.5	2.3	230.2
			O	71	5,554.0	78.2	3.6	347.3
			All	142	7,367.6	51.9	2.3	347.3
			Overall	1,828	114,707.3	62.8	0.9	2,785.7
	Feb	A	L	734	36,726.6	50.0	2.7	1,430.1
			O	1,118	118,198.0	105.7	0.9	2,097.5
			All	1,852	154,924.5	83.7	0.9	2,097.5
		P	L	44	7,345.3	166.9	1.4	838.1
			O	122	31,753.9	260.3	1.4	2,951.0
			All	166	39,099.2	235.5	1.4	2,951.0
		R	L	129	9,286.0	72.0	0.5	663.7
			O	306	37,069.3	121.1	4.5	844.4
			All	435	46,355.3	106.6	0.5	844.4
		S	L	35	790.0	22.6	1.8	50.4
			O	65	2,229.7	34.3	2.0	210.7
			All	100	3,019.7	30.2	1.8	210.7
			Overall	2,553	243,398.8	95.3	0.5	2,951.0
	Mar	A	L	1,078	71,859.1	66.7	2.7	1,988.5
			O	1,106	96,728.1	87.5	3.6	2,369.9
			All	2,184	168,587.2	77.2	2.7	2,369.9
		P	L	336	64,170.2	191.0	0.5	3,495.8
			O	324	190,893.6	589.2	2.3	6,900.8
			All	660	255,063.8	386.5	0.5	6,900.8
		R	L	535	21,396.1	40.0	1.4	1,160.9
			O	510	43,618.7	85.5	1.8	3,314.2
			All	1,045	65,014.8	62.2	1.4	3,314.2
		S	L	33	1,891.1	57.3	7.7	128.9
			O	102	4,291.6	42.1	1.8	171.2
			All	135	6,182.7	45.8	1.8	171.2
			Overall	4,024	494,848.5	123.0	0.5	6,900.8
	Apr	A	L	754	48,210.1	63.9	4.5	501.2
			O	837	111,557.6	133.3	2.7	1,493.2
			All	1,591	159,767.7	100.4	2.7	1,493.2
		P	L	165	10,126.2	61.4	1.8	398.6
			O	1,117	170,395.0	152.5	2.3	2,133.3
			All	1,282	180,521.1	140.8	1.8	2,133.3
		R	L	222	6,980.0	31.4	0.7	411.6
			O	252	18,794.4	74.6	1.4	595.2
			All	474	25,774.5	54.4	0.7	595.2
		S	L	61	1,966.0	32.2	1.8	132.1
			O	94	3,731.9	39.7	3.2	199.8
			All	155	5,697.9	36.8	1.8	199.8
			Overall	3,502	371,761.1	106.2	0.7	2,133.3

Table 6.1b. Continued.

Year	Month	Area	Mesh size	Number of trips	Total weight (kg)	CPUE (kg/trip)	Min CPUE (kg/trip)	Max CPUE (kg/trip)
2005	May	A	L	90	4,746.1	52.7	0.5	614.3
			O	566	85,726.2	151.5	3.6	1,057.4
			All	656	90,472.3	137.9	0.5	1,057.4
		P	L	434	17,251.6	39.8	0.5	345.5
			O	701	85,078.4	121.4	0.9	1,002.9
			All	1,135	102,329.9	90.2	0.5	1,002.9
		R	L	427	12,557.6	29.4	1.8	253.3
			O	133	10,597.9	79.7	1.1	667.8
			All	560	23,155.6	41.3	1.1	667.8
		S	L	147	3,933.0	26.8	3.6	85.4
			O	102	4,385.2	43.0	5.3	161.2
			All	249	8,318.2	33.4	3.6	161.2
			Overall	2,600	224,275.9	86.3	0.5	1,057.4
	Jun	A	L	246	9,514.2	38.7	1.8	257.0
			O	251	26,631.3	106.1	0.5	838.5
			All	497	36,145.5	72.7	0.5	838.5
		P	L	874	27,756.2	31.8	0.5	197.9
			O	354	47,382.6	133.8	2.7	892.1
			All	1,228	75,138.8	61.2	0.5	892.1
		R	L	418	11,927.5	28.5	0.5	143.9
			O	74	7,960.4	107.6	1.7	609.3
			All	492	19,887.8	40.4	0.5	609.3
		S	L	226	5,897.4	26.1	1.4	138.9
			O	62	1,894.1	30.6	0.9	104.2
			All	288	7,791.5	27.1	0.9	138.9
			Overall	2,505	138,963.7	55.5	0.5	892.1
	Jul	A	L	491	20,446.8	41.6	2.1	637.9
			O	123	13,108.8	106.6	3.2	1,327.0
			All	614	33,555.6	54.7	2.1	1,327.0
		P	L	741	21,945.2	29.6	1.4	304.2
			O	214	28,036.9	131.0	0.5	893.9
			All	955	49,982.1	52.3	0.5	893.9
		R	L	481	14,714.5	30.6	0.4	160.3
			O	70	14,657.6	209.4	13.6	887.1
			All	551	29,372.1	53.3	0.4	887.1
		S	L	159	3,825.8	24.1	1.6	119.9
			O	35	1,358.3	38.8	4.5	111.7
			All	194	5,184.1	26.7	1.6	119.9
			Overall	2,314	118,093.9	51.0	0.4	1,327.0
	Aug	A	L	847	36,953.4	43.6	1.1	444.5
			O	112	15,315.2	136.7	2.3	1,471.0
			All	959	52,268.6	54.5	0.4	1,471.0
		P	L	971	47,004.0	48.4	0.9	869.0
			O	407	89,241.1	219.3	0.9	1,792.4
			All	1,378	136,245.1	98.9	0.9	1,792.4

Table 6.1b. Continued.

Year	Month	Area	Mesh size	Number of trips	Total weight (kg)	CPUE (kg/trip)	Min CPUE (kg/trip)	Max CPUE (kg/trip)
2005	Aug	R	L	525	16,868.0	32.1	1.4	185.2
			O	122	13,790.4	113.0	4.5	1,089.6
			All	647	30,658.4	47.4	1.4	1,089.6
		S	L	166	5,270.8	31.8	2.3	265.6
			O	48	2,845.4	59.3	6.6	363.2
			All	214	8,116.1	37.9	2.3	363.2
			Overall	3,198	227,288.3	71.1	0.4	1,792.4
	Sep	A	L	846	45,888.8	54.2	0.7	738.7
			O	137	21,915.8	160.0	7.3	1,490.9
			All	983	67,804.6	69.0	0.7	1,490.9
		P	L	1,096	63,535.8	58.0	0.9	857.6
			O	207	30,886.8	149.2	0.5	2,585.5
			All	1,303	94,422.5	72.5	0.5	2,585.5
		R	L	365	11,707.4	32.1	1.5	164.3
			O	83	9,151.5	110.3	5.4	551.6
			All	448	20,858.9	46.6	1.5	551.6
		S	L	219	8,909.4	40.7	1.4	306.5
			O	98	5,124.0	52.3	1.4	431.3
			All	317	14,033.4	44.3	1.4	431.3
			Overall	3,051	197,119.4	64.6	0.5	2,585.5
	Oct	A	L	1,422	87,623.2	61.6	0.4	2,046.6
			O	256	89,060.0	347.9	0.5	7,706.2
			All	1,678	176,683.3	105.3	0.4	7,706.2
		P	L	1,432	92,837.0	64.8	0.5	1,566.3
			O	584	138,961.4	237.9	2.7	3,490.8
			All	2,016	231,798.4	115.0	0.5	3,490.8
		R	L	492	20,286.4	41.2	0.5	292.8
			O	148	23,282.5	157.3	1.6	1,119.1
			All	640	43,568.9	68.1	0.5	1,119.1
		S	L	208	10,188.3	49.0	1.4	291.9
			O	418	62,208.2	148.8	0.9	2,646.8
			All	626	72,396.5	115.6	0.9	2,646.8
			Overall	4,960	524,447.1	105.7	0.4	7,706.2
	Nov	A	L	1,461	99,209.4	67.9	1.8	577.5
			O	147	23,778.0	161.8	3.2	2,217.3
			All	1,608	122,987.4	76.5	1.8	2,217.3
		P	L	485	24,501.8	50.5	0.9	439.0
			O	681	69,712.8	102.4	0.5	2,283.2
			All	1,166	94,214.6	80.8	0.5	2,283.2
		R	L	202	6,839.9	33.9	1.4	154.8
			O	212	22,814.0	107.6	1.4	766.8
			All	414	29,653.9	71.6	1.4	766.8

Table 6.1b. Continued.

Year	Month	Area	Mesh size	Number of trips	Total weight (kg)	CPUE (kg/trip)	Min CPUE (kg/trip)	Max CPUE (kg/trip)
2005	Nov	S	L	65	3,055.7	47.0	5.9	336.4
			O	390	59,621.3	152.9	2.0	1,634.4
			All	455	62,676.9	137.8	2.0	1,634.4
			Overall	3,643	309,532.9	85.0	0.5	2,283.2
	Dec	A	L	7	241.5	34.5	0.5	77.6
			O	103	8,631.7	83.8	1.8	1,367.4
			All	110	8,873.2	80.7	0.5	1,367.4
		P	L	8	405.4	50.7	10.4	118.0
			O	212	13,028.9	61.5	1.4	725.0
			All	220	13,434.3	61.1	1.4	725.0
		R	L	18	477.4	26.5	2.3	81.7
			O	148	16,881.4	114.1	2.7	1,294.1
			All	166	17,358.8	104.6	2.3	1,294.1
		S	O	87	10,982.3	126.2	6.4	726.4
			Overall	583	50,648.6	86.9	0.5	1,367.4
2005		Overall	L	20,257	1,036,967.6	51.2	0.4	1,988.5
			O	14,504	1,978,118.0	136.4	0.5	7,706.2
	Overall			34,761	3,015,085.5	86.7	0.4	7,706.2
2006	Jan	A	L	907	42,714.2	47.1	3.2	619.7
			O	575	33,495.7	58.3	0.9	826.7
			All	1,482	76,209.9	51.4	0.9	826.7
		P	L	14	1,148.6	82.0	24.5	302.8
			O	148	7,346.2	49.6	3.6	276.0
			All	162	8,494.8	52.4	3.6	276.0
		R	L	25	869.0	34.8	0.5	113.0
			O	225	29,098.5	129.3	1.4	1,920.4
			All	250	29,967.5	119.9	0.5	1,920.4
		S	L	36	877.8	24.4	1.4	61.3
			O	107	7,403.1	69.2	2.6	415.0
			All	143	8,280.9	57.9	1.4	415.0
			Overall	2,037	122,953.1	60.4	0.5	1,920.4
	Feb	A	L	637	33,968.7	53.3	1.4	1,183.6
			O	571	37,146.3	65.1	2.3	1,293.9
			All	1,208	71,115.0	58.9	1.4	1,293.9
		P	L	20	896.0	44.8	0.5	171.6
			O	255	14,347.1	56.3	1.4	544.8
			All	275	15,243.0	55.4	0.5	544.8
		R	L	47	1,819.4	38.7	1.6	167.1
			O	320	36,242.2	113.3	2.3	1,430.1
			All	367	38,061.6	103.7	1.6	1,430.1
		S	L	45	784.3	17.4	1.4	59.5
			O	73	4,051.2	55.5	1.8	399.5
			All	118	4,835.5	41.0	1.4	399.5
			Overall	1,968	129,255.2	65.7	0.5	1,430.1

Table 6.1b. Continued.

Year	Month	Area	Mesh size	Number of trips	Total weight (kg)	CPUE (kg/trip)	Min CPUE (kg/trip)	Max CPUE (kg/trip)
2006	Mar	A	L	1,221	65,991.2	54.0	0.5	1,012.4
			O	649	46,387.7	71.5	3.2	867.1
			All	1,870	112,378.8	60.1	0.5	1,012.4
		P	L	303	18,066.7	59.6	0.9	607.0
			O	341	101,576.7	297.9	0.5	7,876.9
			All	644	119,643.4	185.8	0.5	7,876.9
		R	L	500	19,465.0	38.9	0.5	318.7
			O	346	33,024.5	95.4	1.6	1,913.6
			All	846	52,489.5	62.0	0.5	1,913.6
		S	L	41	1,941.0	47.3	3.6	146.2
			O	121	5,552.0	45.9	1.8	239.7
			All	162	7,493.0	46.3	1.8	239.7
			Overall	3,522	292,004.7	82.9	0.5	7,876.9
	Apr	A	L	802	53,384.0	66.6	1.8	1,019.7
			O	623	47,602.7	76.4	2.3	1,483.7
			All	1,425	100,986.6	70.9	1.8	1,483.7
		P	L	282	14,638.6	51.9	2.3	553.9
			O	745	70,905.3	95.2	0.5	1,341.6
			All	1,027	85,543.9	83.3	0.5	1,341.6
		R	L	430	16,180.0	37.6	1.4	192.0
			O	146	9,452.3	64.7	1.8	590.2
			All	576	25,632.4	44.5	1.4	590.2
		S	L	107	3,583.1	33.5	3.6	110.3
			O	63	2,302.3	36.5	1.8	102.2
			All	170	5,885.5	34.6	1.8	110.3
			Overall	3,198	218,048.3	68.2	0.5	1,483.7
	May	A	L	466	28,948.7	62.1	0.9	901.6
			O	214	26,019.4	121.6	0.5	3,695.6
			All	680	54,968.2	80.8	0.5	3,695.6
		P	L	754	36,920.9	49.0	0.5	697.3
			O	467	44,999.0	96.4	2.3	712.3
			All	1,221	81,920.0	67.1	0.5	712.3
		R	L	493	15,967.8	32.4	0.9	287.6
			O	77	6,076.3	78.9	3.2	1,135.0
			All	570	22,044.1	38.7	0.9	1,135.0
		S	L	214	6,090.9	28.5	3.2	135.1
			O	45	2,462.8	54.7	2.5	164.4
			All	259	8,553.6	33.0	2.5	164.4
			Overall	2,730	167,485.9	61.4	0.5	3,695.6
	Jun	A	L	576	24,907.5	43.2	1.8	273.8
			O	207	15,132.4	73.1	0.9	646.0
			All	783	40,039.9	51.1	0.9	646.0
		P	L	944	38,724.3	41.0	0.5	946.6
			O	263	30,787.0	117.1	2.3	959.8
			All	1,207	69,511.3	57.6	0.5	959.8

Table 6.1b. Continued.

Year	Month	Area	Mesh size	Number of trips	Total weight (kg)	CPUE (kg/trip)	Min CPUE (kg/trip)	Max CPUE (kg/trip)
2006	Jun	R	L	390	12,625.0	32.4	1.2	204.3
			O	64	3,977.1	62.1	1.8	342.8
			All	454	16,602.0	36.6	1.2	342.8
		S	L	201	5,126.5	25.5	0.5	165.7
			O	24	1,332.7	55.5	6.8	156.7
			All	225	6,459.3	28.7	0.5	165.7
			Overall	2,669	132,612.5	49.7	0.5	959.8
	Jul	A	L	747	36,951.1	49.5	1.4	2,684.0
			O	90	9,706.3	107.8	2.7	1,737.9
			All	837	46,657.4	55.7	1.4	2,684.0
		P	L	1,034	38,195.2	36.9	0.9	350.5
			O	248	28,343.4	114.3	0.5	754.1
			All	1,282	66,538.6	51.9	0.5	754.1
		R	L	494	17,639.8	35.7	1.8	152.5
			O	77	9,512.9	123.5	1.1	737.8
			All	571	27,152.7	47.6	1.1	737.8
		S	L	142	3,895.6	27.4	1.4	170.3
			O	23	657.8	28.6	2.5	59.0
			All	165	4,553.4	27.6	1.4	170.3
			Overall	2,855	144,902.0	50.8	0.5	2,684.0
	Aug	A	L	843	37,144.8	44.1	1.4	402.2
			O	174	13,326.2	76.6	1.2	572.0
			All	1,017	50,471.0	49.6	1.2	572.0
		P	L	974	37,991.4	39.0	0.5	458.1
			O	288	51,171.2	177.7	2.3	1,054.9
			All	1,262	89,162.5	70.7	0.5	1,054.9
		R	L	465	13,601.7	29.3	0.9	191.6
			O	172	23,266.1	135.3	5.0	1,332.5
			All	637	36,867.8	57.9	0.9	1,332.5
		S	L	165	6,291.8	38.1	2.7	733.2
			O	21	812.4	38.7	9.1	90.8
			All	186	7,104.2	38.2	2.7	733.2
			Overall	3,102	183,605.6	59.2	0.5	1,332.5
	Sep	A	L	1,126	65,715.6	58.4	0.9	709.6
			O	146	14,744.4	101.0	1.3	1,824.2
			All	1,272	80,460.0	63.3	0.9	1,824.2
		P	L	1,266	62,219.0	49.1	0.9	706.0
			O	382	56,864.6	148.9	0.5	2,334.0
			All	1,648	119,083.6	72.3	0.5	2,334.0
		R	L	653	26,988.3	41.3	2.7	363.5
			O	181	18,257.5	100.9	0.5	1,313.0
			All	834	45,245.8	54.3	0.5	1,313.0
		S	L	365	15,213.7	41.7	1.7	181.1

Table 6.1b. Continued.

Year	Month	Area	Mesh size	Number of trips	Total weight (kg)	CPUE (kg/trip)	Min CPUE (kg/trip)	Max CPUE (kg/trip)
2006	Sep	S	O	86	6,444.3	74.9	1.7	612.9
			All	451	21,658.1	48.0	1.7	612.9
			Overall	4,205	266,447.5	63.4	0.5	2,334.0
	Oct	A	L	1,532	125,926.9	82.2	0.5	1,249.9
			O	249	61,654.7	247.6	0.5	3,241.6
			All	1,781	187,581.6	105.3	0.5	3,241.6
		P	L	1,336	94,221.3	70.5	0.5	656.5
			O	926	203,048.4	219.3	0.5	4,826.9
			All	2,262	297,269.8	131.4	0.5	4,826.9
		R	L	453	20,563.9	45.4	0.9	280.6
			O	344	85,629.7	248.9	2.5	2,470.7
			All	797	106,193.6	133.2	0.9	2,470.7
		S	L	301	16,065.6	53.4	1.8	820.4
			O	427	44,885.4	105.1	1.1	1,394.2
			All	728	60,950.9	83.7	1.1	1,394.2
			Overall	5,568	651,996.0	117.1	0.5	4,826.9
	Nov	A	L	995	65,814.9	66.1	1.4	860.8
			O	209	17,169.6	82.2	2.3	874.0
			All	1,204	82,984.5	68.9	1.4	874.0
		P	L	340	17,190.5	50.6	2.3	505.8
			O	550	60,797.3	110.5	0.5	1,586.3
			All	890	77,987.8	87.6	0.5	1,586.3
		R	L	218	8,288.9	38.0	1.4	498.0
			O	256	44,022.6	172.0	3.6	3,290.6
			All	474	52,311.5	110.4	1.4	3,290.6
		S	L	63	3,720.3	59.1	3.2	611.1
			O	313	41,225.4	131.7	2.7	2,731.7
			All	376	44,945.7	119.5	2.7	2,731.7
			Overall	2,944	258,229.5	87.7	0.5	3,290.6
	Dec	A	L	24	3,575.3	149.0	5.0	1,641.2
			O	153	13,760.5	89.9	2.0	2,207.3
			All	177	17,335.8	97.9	2.0	2,207.3
		P	L	31	1,937.2	62.5	1.4	211.1
			O	393	31,276.7	79.6	1.8	769.5
			All	424	33,213.9	78.3	1.4	769.5
		R	L	14	439.9	31.4	0.7	91.5
			O	171	17,395.8	101.7	2.7	1,854.1
			All	185	17,835.7	96.4	0.7	1,854.1
		S	L	3	98.9	33.0	4.5	75.3
			O	96	10,640.0	110.8	2.3	674.6
			All	99	10,739.0	108.5	2.3	674.6
			Overall	885	79,124.4	89.4	0.7	2,207.3
2006		Overall	L	23,039	1,165,330.8	50.6	0.5	2,684.0
			O	12,644	1,481,333.9	117.2	0.5	7,876.9
	Overall			106,191	8,556,657.0	80.6	0.5	7,876.9

Table 6.2. North Carolina estuarine gill net reported commercial landings (metric tons) and value (dollars) for selected species, 2000-2006, including the relative contribution to the total harvest of the area (% area). Data from the NCDMF Trip Ticket Program.

	2000		2001		2002		2003		2004		2005		2006	
Species/Area	Metric tons	% area	Metric tons	% area	Metric tons	% area	Metric tons	% area	Metric tons	% area	Metric tons	% area	Metric tons	% area
Atlantic croaker														
Albemarle	19.1	1.5	22.5	1.7	10.4	0.7	24.2	1.8	20.3	2.0	12.3	1.1	14.8	1.6
Pamlico	16.6	1.2	33.9	2.3	40.9	3.6	13.3	1.2	13.0	1.1	16.3	1.3	11.0	1.0
Rivers	5.8	0.9	6.0	1.1	6.4	0.9	2.4	0.4	3.1	0.6	1.3	0.4	1.6	0.3
Southern	1.6	0.4	1.2	0.3	1.3	0.5	0.6	0.2	1.1	0.4	0.5	0.2	0.3	0.2
State	43.1	1.2	63.6	1.7	59.0	1.7	40.5	1.2	37.5	1.3	30.4	1.0	27.8	1.0
Value	$27,853	0.4	$36,323	0.6	$43,623	0.8	$18,102	0.3	$24,494	<0.1	$19,161	<0.1	$21,060	<0.1
Black drum														
Albemarle	5.3	0.4	4.0	0.3	55.9	3.9	10.2	0.8	1.4	0.1	1.1	0.1	4.1	0.4
Pamlico	18.5	1.4	13.9	0.9	10.6	0.9	28.4	2.5	12.5	1.1	8.8	0.7	14.4	1.4
Rivers	3.2	0.5	3.6	0.6	17.6	2.4	7.1	1.1	1.7	0.3	1.2	0.3	10.2	2.2
Southern	1.4	0.4	1.0	0.3	1.9	0.7	3.8	1.7	1.3	0.5	1.8	0.8	2.3	1.2
State	28.5	0.8	22.5	0.6	95.0	2.7	49.6	1.5	16.9	0.6	12.9	0.4	30.9	1.2
Value	$16,306	<0.1	$14,335	<0.1	$46,039	1.0	$27,295	1.0	$8,358	<0.1	$7,585	<0.1	$20,738	<0.1
Blue crab														
Albemarle	12.1	0.9	17.2	1.3	17.8	1.2	19.1	1.4	6.1	0.6	6.4	0.6	6.3	0.7
Pamlico	8.8	0.7	20.1	1.4	8.4	0.7	9.4	0.8	10.2	0.9	0.8	0.1	2.3	0.2
Rivers	2.0	0.3	1.5	0.3	2.4	0.3	2.2	0.3	2.5	0.5	1.7	0.5	1.4	0.3
Southern	0.4	0.1	0.4	0.1	0.2	0.1	0.9	0.4	0.3	0.1	0.3	0.1	1.3	0.7
State	23.2	0.6	39.2	1.1	28.7	0.8	31.6	0.9	19.2	0.7	9.3	0.3	11.2	0.4
Value	$64,223	1.0	$104,113	2.0	$77,208	1.0	$99,518	2.0	$39,617	<0.1	$16,983	<0.1	$24,401	<0.1

Table 6.2. Continued.

	2000		2001		2002		2003		2004		2005		2006	
Species/Area	Metric tons	% area	Metric tons	% area	Metric tons	% area	Metric tons	% area	Metric tons	% area	Metric tons	% area	Metric tons	% area
Bluefish														
Albemarle	5.3	0.4	28.3	2.2	16.5	1.2	46.0	3.4	22.1	2.2	31.5	2.7	18.8	2.0
Pamlico	89.7	6.8	168.9	11.5	96.6	8.6	176.5	15.6	104.8	9.2	135.3	10.5	86.4	8.1
Rivers	4.7	0.7	5.4	1.0	7.8	1.1	3.9	0.6	4.2	0.9	6.4	1.7	2.8	0.6
Southern	3.4	0.9	2.7	0.7	3.1	1.1	2.5	1.1	1.5	0.6	1.5	0.7	1.3	0.7
State	103.2	2.8	205.4	5.5	120.9	3.4	228.8	6.8	132.5	4.6	174.6	5.8	109.3	4.1
Value	$70,938	1.0	$101,239	2.0	$76,770	1.0	$109,986	2.0	$57,479	<0.1	$94,385	<0.1	$59,367	<0.1
Butterfish														
Albemarle	<0.1	<0.1	0.1	<0.1	0.9	0.1	0.1	<0.1	0.1	<0.1	0.5	<0.1	0.4	<0.1
Pamlico	2.4	0.2	3.3	0.2	2.7	0.2	1.8	0.2	1.8	0.2	2.5	0.2	3.6	0.3
Rivers	<0.1	<0.1	0.2	<0.1	0.1	<0.1	<0.1	<0.1	0.0	0.0	0.1	<0.1	0.1	<0.1
Southern	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.0	0.0	0.0	0.0	0.0	0.0
State	2.7	0.1	3.5	0.1	3.7	0.1	2.0	0.1	2.0	0.1	3.1	0.1	4.1	0.2
Value	$2,737	<0.1	$3,939	<0.1	$3,650	<0.1	$2,695	<0.1	$1,694	<0.1	$3,622	<0.1	$4,783	<0.1
Catfishes														
Albemarle	60.9	4.6	59.3	4.5	58.9	4.1	64.8	4.8	32.3	3.2	26.4	2.3	33.1	3.6
Pamlico	0.5	<0.1	0.4	<0.1	<0.1	<0.1	0.9	0.1	0.6	0.1	0.4	<0.1	0.2	<0.1
Rivers	9.0	1.3	10.9	2.0	12.0	1.7	11.2	1.7	11.8	2.4	12.7	3.4	9.8	2.1
Southern	1.2	0.3	0.9	0.2	0.8	0.3	0.9	0.4	1.5	0.6	1.4	0.7	1.7	0.9
State	71.6	1.9	71.5	1.9	72.0	2.0	77.9	2.3	46.3	1.6	40.9	1.4	44.8	1.7
Value	$46,679	1.0	$42,059	1.0	$40,838	1.0	$41,791	1.0	$21,755	<0.1	$17,070	<0.1	$18,123	<0.1
Flounders														
Albemarle	474.4	36.2	481.6	36.7	376.4	26.4	213.1	15.9	278.5	27.2	244.1	21.3	328.5	35.7
Pamlico	280.7	21.2	214.8	14.6	229.4	20.4	216.1	19.1	268.8	23.7	219.6	17.1	235.2	22.1
Rivers	160.8	24.0	141.6	25.7	181.8	25.1	193.6	28.9	140.0	28.8	86.8	23.4	95.5	20.3
Southern	39.8	10.4	28.8	7.6	37.3	13.4	47.6	20.6	42.4	17.0	36.4	17.2	41.4	21.6
State	955.8	25.9	866.8	23.4	825.0	23.2	670.4	19.9	729.7	25.2	586.8	19.5	700.6	26.5
Value	$3,646,160	52.0	$3,040,989	51.8	$2,632,756	47.4	$2,405,678	45.7	$2,466,749	0.5	$2,323,485	0.5	$3,199,429	0.5

Table 6.2. Continued.

	2000		2001		2002		2003		2004		2005		2006	
Species/Area	Metric tons	% area	Metric tons	% area	Metric tons	% area	Metric tons	% area	Metric tons	% area	Metric tons	% area	Metric tons	% area
Harvestfish														
Albemarle	0.4	<0.1	0.2	<0.1	0.5	<0.1	0.4	<0.1	0.0	0.0	0.0	0.0	0.0	0.0
Pamlico	2.0	0.2	1.5	0.1	0.6	0.1	1.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Rivers	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.0	0.0	0.0	0.0	0.0	0.0
Southern	0.4	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.0	0.0	0.0	0.0	0.0	0.0
State	2.8	0.1	1.7	<0.1	1.1	<0.1	1.4	<0.1	0.0	0.0	0.0	0.0	0.0	0.0
Value	$4,827	<0.1	$3,079	<0.1	$1,622	<0.1	$0	<0.1	$0	0.0	$0	0.0	$0	0.0
Herring														
Albemarle	37.8	2.9	32.3	2.5	29.9	2.1	29.9	2.2	32.8	3.2	35.0	3.1	16.2	1.8
Pamlico	3.6	0.3	6.9	0.5	2.1	0.2	6.8	0.6	1.6	0.1	0.1	<0.1	0.6	0.1
Rivers	0.1	<0.1	<0.1	<0.1	0.6	0.1	0.7	0.1	0.2	<0.1	0.1	<0.1	0.0	0.0
Southern	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.0	0.0	0.0	0.0	0.0	0.0
State	41.6	1.1	39.2	1.1	32.7	0.9	37.3	1.1	34.6	1.2	35.1	1.2	16.8	0.6
Value	$45,497	1.0	$35,441	1.0	$27,233	1.0	$37,764	1.0	$32,623	<0.1	$39,583	<0.1	$28,375	<0.1
Kingfishes														
Albemarle	0.4	<0.1	<0.1	0.1	1.9	0.1	6.5	0.5	2.3	0.2	2.2	0.2	5.4	0.6
Pamlico	8.6	0.6	17.8	1.2	15.2	1.3	10.3	0.9	9.7	0.9	9.0	0.7	14.6	1.4
Rivers	1.1	0.2	1.3	0.2	1.1	0.1	0.2	<0.1	0.6	0.1	0.4	0.1	4.9	1.0
Southern	1.0	0.3	0.4	0.1	0.2	0.1	0.6	0.2	0.7	0.3	0.4	0.2	0.4	0.2
State	11.0	0.3	21.1	0.6	18.3	0.5	17.5	0.5	13.3	0.5	12.1	0.4	25.3	1.0
Value	$22,949	0	$47,611	1.0	$39,180	1.0	$38,166	1.0	$25,476	<0.1	$24,394	<0.1	$54,940	<0.1
Red drum														
Albemarle	30.3	2.3	19.2	1.5	7.5	0.5	9	0.7	3.7	0.4	6.4	0.6	14.3	1.5
Pamlico	62	4.7	32.8	2.2	14.2	1.3	16.8	1.5	13.1	1.2	28.7	2.2	36.0	3.4
Rivers	8.4	1.2	5.8	1.1	7.8	1.1	6.7	1.0	1.6	0.3	10.8	2.9	12.5	2.7
Southern	4.5	1.2	2.8	0.7	2.8	1.0	5.2	2.2	3.1	1.3	6.0	2.8	7.5	3.9
State	105.1	2.9	60.6	1.6	32.3	0.9	37.6	1.1	21.5	0.7	51.9	1.7	70.2	2.7
Value	$252,447	4.0	$152,076	3.0	$78,241	1.0	$96,983	2.0	$61,129	<0.1	$153,748	<0.1	$212,979	<0.1

Table 6.2. Continued.

	2000		2001		2002		2003		2004		2005		2006	
Species/Area	Metric tons	% area	Metric tons	% area	Metric tons	% area	Metric tons	% area	Metric tons	% area	Metric tons	% area	Metric tons	% area
Shad														
Albemarle	55.2	4.2	39.4	3.0	73.4	5.2	123.8	9.2	75.9	7.4	55.8	4.9	49.4	5.4
Pamlico	8.0	0.6	4.7	0.3	5.8	0.5	5.1	0.4	0.9	0.1	2.9	0.2	2.1	0.2
Rivers	11.7	1.7	8.7	1.6	25.3	3.5	25.0	3.7	23.1	4.8	18.3	4.9	19.0	4.0
Southern	5.0	1.3	5.7	1.5	8.7	3.1	15.6	6.8	13.1	5.2	7.9	3.7	7.3	3.8
State	79.8	2.2	58.6	1.6	113.1	3.2	169.5	5.0	113.0	3.9	84.9	2.8	77.8	2.9
Value	$125,277	2.0	$80,813	1.0	$160,703	3.0	$238,838	5.0	$166,960	<0.1	$201,442	<0.1	$189,607	<0.1
Sheepshead														
Albemarle	3.4	0.3	1.4	0.1	1.1	0.1	3.0	0.2	1.7	0.2	0.9	0.1	1.5	0.2
Pamlico	12.3	0.9	8.8	0.6	5.1	0.5	6.2	0.6	7.3	0.6	5.3	0.4	5.4	0.5
Rivers	0.3	<0.1	<0.1	0.1	0.2	<0.1	<0.1	<0.1	0.1	0.0	0.1	0.0	0.2	0.0
Southern	0.5	0.1	0.4	0.1	0.5	0.2	0.7	0.3	0.5	0.2	0.8	0.4	0.5	0.2
State	16.5	0.4	10.9	0.3	6.8	0.2	10.1	0.3	9.6	0.3	7.1	0.2	7.6	0.3
Value	$13,084	<0.1	$8,634	<0.1	$5,397	<0.1	$7,787	<0.1	$7,833	<0.1	$6,304	<0.1	$8,223	<0.1
Spadefish														
Albemarle	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.9	0.1	1.7	0.2	0.8	0.1
Pamlico	2.5	0.2	1.5	0.1	1.7	0.1	1.5	0.1	4.1	0.4	2.5	0.2	2.4	0.2
Rivers	0.1	<0.1	<0.1	<0.1	0.2	<0.1	<0.1	<0.1	0.0	0.0	0.0	0.0	0.1	0.0
Southern	0.0	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.0	0.0	0.0	0.0	0.0	0.0
State	2.8	0.1	1.9	0.1	2.0	0.1	1.6	<0.1	5.0	0.2	4.3	0.1	3.2	0.1
Value	-	-	-	-	-	-	-	-	$2,429	<0.1	$2,304	<0.1	$2,497	<0.1
Spanish mackerel														
Albemarle	2.6	0.2	0.9	0.1	2.0	0.1	2.6	0.2	1.7	0.2	4.3	0.4	1.0	0.1
Pamlico	48.0	3.6	67.2	4.6	57.4	5.1	31.6	2.8	35.7	3.1	76.8	6.0	43.5	4.1
Rivers	18.7	2.8	16.2	2.9	33.3	4.6	2.6	0.4	3.5	0.7	0.8	0.2	0.9	0.2
Southern	4.3	1.1	0.4	0.1	0.8	0.3	0.4	0.2	0.1	0.0	0.2	0.1	0.1	0.0
State	73.7	2.0	84.7	2.3	93.5	2.6	37.2	1.1	41.0	1.4	82.1	2.7	45.5	1.7
Value	$123,468	2.0	$144,399	3.0	$178,555	3.0	$75,645	1.0	$102,639	<0.1	$230,157	<0.1	$129,238	<0.1

Table 6.2. Continued.

	2000		2001		2002		2003		2004		2005		2006	
Species/Area	Metric tons	% area	Metric tons	% area	Metric tons	% area	Metric tons	% area	Metric tons	% area	Metric tons	% area	Metric tons	% area
Spot														
Albemarle	14.8	1.1	17.4	1.3	135.2	9.5	97.1	7.2	58.1	5.7	121.9	10.6	30.9	3.4
Pamlico	93.3	7.0	85.0	5.8	66.2	5.9	102.2	9.0	139.4	12.3	117.1	9.1	71.6	6.7
Rivers	36.4	5.4	31.2	5.7	28.4	3.9	23.5	3.5	34.1	7.0	16.3	4.4	18.8	4.0
Southern	138.6	36.4	135.3	35.7	97.4	34.8	91.0	39.3	115.9	46.5	86.7	40.9	46.4	24.2
State	283.0	7.7	269.0	7.3	327.1	9.2	313.7	9.3	347.5	12.0	342.0	11.3	167.7	6.3
Value	$255,561	4.0	$246,486	4.0	$309,781	6.0	$308,165	6.0	$352,950	0.1	$396,520	0.1	$272,152	0.1
Spotted sea trout														
Albemarle	8.0	0.6	3.7	0.3	7.1	0.5	5.1	0.4	1.9	0.2	3.2	0.3	6.0	0.7
Pamlico	66.4	5.0	16.6	1.1	25.2	2.2	25.5	2.3	23.4	2.1	23.4	1.8	55.7	5.2
Rivers	46.7	7.0	7.2	1.3	24.1	3.3	23.5	3.5	14.2	2.9	11.9	3.2	31.3	6.7
Southern	4.5	1.2	6.4	1.7	4.0	1.4	5.5	2.4	2.1	0.9	4.4	2.1	5.6	2.9
State	125.5	3.4	33.9	0.9	60.4	1.7	59.6	1.8	41.5	1.4	42.9	1.4	98.7	3.7
Value	$342,451	5.0	$95,370	2.0	$161,700	3.0	$175,503	3.0	$120,687	<0.1	$127,379	<0.1	$286,860	<0.1
Striped bass														
Albemarle	88.1	6.7	92.5	7.1	90.4	6.4	136.1	10.1	119.5	11.7	96.0	8.4	74.6	8.1
Pamlico	4.1	0.3	4.1	0.3	11.2	1.0	12.2	1.1	3.8	0.3	3.6	0.3	3.6	0.3
Rivers	9.3	1.4	6.8	1.2	5.5	0.8	5.9	0.9	9.8	2.0	7.5	2.0	5.4	1.1
Southern	0.3	0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	1.1	0.4	1.2	0.6	0.5	0.3
State	101.8	2.8	103.4	2.8	107.2	3.0	154.2	4.6	134.1	4.6	108.3	3.6	84.1	3.2
Value	$258,998	4.0	$282,055	5.0	$284,466	5.0	$432,030	8.0	$360,966	0.1	$458,186	0.1	$448,961	0.1
Striped mullet														
Albemarle	210.7	16.1	222.0	16.9	258.1	18.1	186.3	13.9	126.1	12.3	214.2	18.7	116.9	12.7
Pamlico	398.2	30.0	306.0	20.9	325.3	28.9	189.9	16.8	261.2	23.0	227.0	17.7	266.6	25.1
Rivers	322.4	48.0	211.4	38.3	262.9	36.3	224.2	33.5	174.6	36.0	121.9	32.9	183.1	38.9
Southern	172.3	45.2	188.9	49.8	116.4	41.7	54.1	23.4	62.6	25.1	61.0	28.8	73.0	38.1
State	1,103.5	29.9	928.3	25.0	962.7	27.0	654.5	19.4	624.5	21.6	624.0	20.7	639.6	24.2
Value	$1,254,116	18.0	$1,029,201	18.0	$1,028,833	19.0	$687,226	13.0	$603,307	0.1	$660,952	0.1	$791,455	0.1

Table 6.2. Continued.

	2000		2001		2002		2003		2004		2005		2006	
Species/Area	Metric tons	% area	Metric tons	% area	Metric tons	% area	Metric tons	% area	Metric tons	% area	Metric tons	% area	Metric tons	% area
Weakfish														
Albemarle	10.7	0.8	5.4	0.4	9.5	0.7	5.2	0.4	4.7	0.5	7.7	0.7	6.9	0.7
Pamlico	66.7	5.0	38.9	2.6	28.4	2.5	24.6	2.2	35.1	3.1	38.0	3.0	25.6	2.4
Rivers	2.6	0.4	4.2	0.8	4.9	0.7	2.5	0.4	1.2	0.2	1.2	0.3	1.6	0.3
Southern	0.4	0.1	0.5	0.1	1.1	0.4	0.3	0.1	0.5	0.2	0.3	0.1	0.2	0.1
State	80.3	2.2	48.9	1.3	43.9	1.2	32.6	1.0	41.5	1.4	47.2	1.6	34.3	1.3
Value	$107,246	2.0	$56,683	1.0	$54,484	1.0	$46,727	1.0	$352,950	<0.1	$396,520	<0.1	$272,152	<0.1
White perch														
Albemarle	57.8	4.4	72.7	5.5	92.8	6.5	175.0	13.0	72.6	7.1	51.2	4.5	28.4	3.1
Pamlico	3.4	0.3	2.1	0.1	3.2	0.3	6.0	0.5	4.4	0.4	8.0	0.6	10.6	1.0
Rivers	6.7	1.0	6.0	1.1	4.8	0.7	3.8	0.6	4.3	0.9	10.1	2.7	11.4	2.4
Southern	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.0	0.0	0.0	0.0	0.0	0.0
State	68.0	1.8	80.8	2.2	100.8	2.8	184.7	5.5	81.3	2.8	69.3	2.3	50.4	1.9
Value	$105,017	2.0	$118,891	2.0	$129,557	2.0	$245,342	5.0	$120,687	<0.1	$127,379	<0.1	$286,860	<0.1
Menhaden/Bait														
Albemarle	85.7	6.5	112.5	8.6	116.8	8.2	119.6	8.9	96.4	9.4	143.0	12.5	108.1	11.7
Pamlico	75.7	5.7	349.4	23.8	152.4	13.5	210.2	18.6	134.3	11.8	289.0	22.5	120.6	11.3
Rivers	10.4	1.5	56.8	10.3	90.9	12.6	118.4	17.7	25.5	5.3	30.5	8.2	47.2	10.0
Southern	<0.1	<0.1	1.2	0.3	1.7	0.6	0.5	0.2	0.4	0.2	0.1	0.0	0.7	0.3
State	171.8	4.7	519.9	14.0	361.8	10.2	448.7	13.3	256.6	8.9	462.6	15.3	276.5	10.4
Value	$41,635	1.0	$114,548	2.0	$119,550	2.0	$88,939	2.0	$360,966	<0.1	$458,186	<0.1	$448,961	<0.1
Total														
Albemarle	1,309.9	35.5	1,311.1	35.4	1,423.2	40.0	1,343.0	39.8	1,025.0	35.4	1,147.9	38.1	921.2	34.8
Pamlico	1,326.8	36.0	1,467.0	39.6	1,127.3	31.7	1,129.9	33.5	1,135.3	39.2	1,284.7	42.6	1,063.6	40.2
Rivers	671.2	18.2	551.2	14.9	723.9	20.3	668.9	19.8	485.3	16.8	370.7	12.3	470.4	17.8
Southern	381.3	10.3	379.2	10.2	279.4	7.8	231.3	6.9	249.3	8.6	211.8	7.0	191.5	7.2
State	3,689.2	100.0	3,708.5	100.0	3,559.8	100.0	3,373.0	100.0	2,894.9	100.0	3,015.1	100.0	2,646.7	100.0
Value	$7,006,177		$5,870,318		$5,550,585		$5,258,841		$4,734,854		$5,158,200		$6,097,845	

Table 6.3a. Overall marketable species composition of gill net samples by area and gear configurations 2004. Data from NCDMF fishery dependent biological database.

	Weight (kg)		Number		
Species	Mean	Percent	Mean	Percent	Mean fish weight (kg)
2004					
Albemarle area					
Large mesh size n=79					
Paralichthys lethostigma	43.7	75.0	49.5	44.1	0.9
Paralichthys spp.	5.0	8.6	5.2	4.6	1.0
Morone saxatilis	3.6	6.2	0.7	0.6	5.5
Alosa sapidissima	2.3	3.9	1.3	1.2	1.8
Ameiurus catus	0.6	1.1	0.6	0.6	1.0
Cynoscion regalis	0.6	1.1	1.5	1.3	0.4
Archosargus probatocephalus	0.4	0.8	49.1	43.8	0.0
Sciaenops ocellatus	0.3	0.5	0.1	0.1	2.5
Leiostomus xanthurus	0.3	0.5	1.3	1.1	0.2
Callinectes sapidus	0.2	0.4	1.1	1.0	0.2
Alosa mediocris	0.2	0.4	0.2	0.2	1.1
Mugil cephalus	0.2	0.3	0.3	0.2	0.7
Pogonias cromis	0.2	0.3	0.2	0.2	0.9
Micropogonias undulatus	0.1	0.2	0.4	0.3	0.3
Pomatomus saltatrix	0.1	0.1	0.2	0.1	0.6
Ictalurus spp.	0.1	0.1	0.2	0.2	0.4
Cynoscion nebulosus	0.1	0.1	0.1	0.1	0.6
Menticirrhus americanus	<0.1	0.1	0.2	0.1	0.2
Cyprinus carpio	<0.1	0.1	<0.1	<0.1	3.2
Mugil spp.	<0.1	<0.1	-	-	-
Paralichthys dentatus	<0.1	<0.1	<0.1	<0.1	0.5
Paralichthys albigutta	<0.1	<0.1	<0.1	<0.1	1.1
Morone americana	<0.1	<0.1	0.1	0.1	0.1
Callinectes spp.	<0.1	<0.1	-	-	-
Menticirrhus spp.	<0.1	<0.1	<0.1	<0.1	0.5
Multi mesh size n= 2					
Paralichthys lethostigma	26.1	35.7	28.9	16.9	0.9
Leiostomus xanthurus	26.1	35.7	105.8	62.0	0.2
Mugil cephalus	18.8	25.7	29.8	17.5	0.6
Cynoscion regalis	1.6	2.2	4.0	2.3	0.4
Trachinotus carolinus	0.3	0.3	1.0	0.6	0.3
Micropogonias undulatus	0.3	0.3	1.0	0.6	0.3
Small mesh size n=17					
Mugil cephalus	256.5	79.9	492.9	64.8	0.5
Leiostomus xanthurus	51.3	16.0	233.0	30.6	0.2

Table 6.3a. Continued.

Species	Weight (kg) Mean	Weight (kg) Percent	Number Mean	Number Percent	Mean fish weight (kg)
Small mesh size n=17 (continued)					
Pomatomus saltatrix	3.3	1.0	4.8	0.6	0.7
Cynoscion nebulosus	1.8	0.6	2.9	0.4	0.6
Cynoscion regalis	1.4	0.4	3.2	0.4	0.4
Morone americana	0.4	0.1	2.6	0.3	0.2
Archosargus probatocephalus	0.1	<0.1	0.1	<0.1	1.8
Pogonias cromis	0.1	<0.1	0.1	<0.1	0.7
Paralichthys spp.	0.1	<0.1	0.1	<0.1	0.7
Ameiurus catus	<0.1	<0.1	0.1	<0.1	0.3
Perca flavescens	<0.1	<0.1	0.1	<0.1	0.3
Paralichthys lethostigma	<0.1	<0.1	0.1	<0.1	0.5
Menticirrhus americanus	<0.1	<0.1	0.1	<0.1	0.5
Dorosoma cepedianum	<0.1	<0.1	0.1	<0.1	0.4
Lagodon rhomboides	<0.1	<0.1	0.1	<0.1	0.3
Lepomis microlophus	<0.1	<0.1	0.1	<0.1	0.1
Unknown mesh size n=21					
Mugil cephalus	157.5	76.3	356.9	74.2	0.4
Paralichthys lethostigma	20.6	10.0	28.7	6.0	0.7
Leiostomus xanthurus	13.7	6.6	61.8	12.9	0.2
Morone americana	4.0	1.9	20.2	4.2	0.2
Morone saxatilis	4.0	1.9	0.6	0.1	6.4
Cynoscion regalis	2.2	1.1	5.5	1.1	0.4
Cynoscion nebulosus	1.3	0.6	2.0	0.4	0.6
Pomatomus saltatrix	1.2	0.6	1.9	0.4	0.6
Paralichthys spp.	0.9	0.4	0.7	0.1	1.3
Micropogonias undulatus	0.5	0.3	1.7	0.4	0.3
Menticirrhus spp.	0.3	0.1	0.4	0.1	0.7
Ameiurus catus	0.2	0.1	0.2	<0.1	1.0
Lophius americanus	0.1	<0.1	0.0	<0.1	1.8
Pogonias cromis	0.1	<0.1	0.2	<0.1	0.6
Archosargus probatocephalus	0.1	<0.1	<0.1	<0.1	1.4
Menticirrhus americanus	<0.1	<0.1	<0.1	<0.1	0.2
Pamlico Area					
Large mesh size n=125					
Paralichthys lethostigma	36.9	71.5	44.8	70.7	0.8
Paralichthys spp.	3.8	7.3	3.8	6.1	1.0
Pomatomus saltatrix	2.2	4.2	3.3	5.2	0.7

Table 6.3a. Continued.

Species	Weight (kg) Mean	Weight (kg) Percent	Number Mean	Number Percent	Mean fish weight (kg)
Pamlico Area					
Large mesh size n=125 (continued)					
Pogonias cromis	1.3	2.4	1.2	1.9	1.1
Sciaenops ocellatus	1.2	2.4	0.4	0.7	2.7
Paralichthys albigutta	0.6	1.2	0.8	1.3	0.8
Leiostomus xanthurus	0.6	1.2	2.7	4.2	0.2
Morone saxatilis	0.6	1.1	0.1	0.2	6.0
Cynoscion regalis	0.4	0.7	0.8	1.3	0.5
Micropogonias undulatus	0.4	0.7	1.0	1.5	0.4
Mugil cephalus	0.3	0.5	0.2	0.4	1.1
Cynoscion nebulosus	0.3	0.5	0.3	0.4	1.0
Busycon spp.	0.1	0.3	0.3	0.5	0.5
Alosa sapidissima	0.1	0.3	0.1	0.1	1.9
Paralichthys dentatus	0.1	0.1	0.1	0.2	0.6
Menticirrhus spp.	0.0	0.1	0.1	0.1	0.6
Alosa mediocris	<0.1	0.1	<0.1	0.1	1.0
Trachinotus carolinus	<0.1	0.1	<0.1	<0.1	1.1
Pollachius virens	<0.1	<0.1	<0.1	<0.1	3.2
Menticirrhus americanus	<0.1	<0.1	0.1	0.1	0.3
Mugil spp.	<0.1	<0.1	<0.1	0.1	0.5
Orthopristis chrysoptera	<0.1	<0.1	0.1	0.2	0.2
Tylosurus crocodilus	<0.1	<0.1	<0.1	<0.1	1.4
Lagodon rhomboides	<0.1	<0.1	<0.1	0.1	0.1
Multi mesh size n=13					
Mugil cephalus	68.4	41.1	78.8	30.5	0.9
Pomatomus saltatrix	28.8	17.3	40.4	15.6	0.7
Paralichthys lethostigma	23.1	13.9	23.3	9.0	1.0
Leiostomus xanthurus	21.1	12.7	81.6	31.6	0.3
Cynoscion regalis	5.9	3.5	11.6	4.5	0.5
Sciaenops ocellatus	4.7	2.8	1.7	0.6	2.8
Paralichthys spp.	3.6	2.1	3.8	1.5	0.9
Micropogonias undulatus	2.1	1.2	6.0	2.3	0.3
Cynoscion nebulosus	2.0	1.2	2.5	1.0	0.8
Archosargus probatocephalus	1.8	1.1	1.2	0.5	1.5
Paralichthys albigutta	1.8	1.1	3.2	1.2	0.6
Tylosurus crocodilus	0.9	0.5	0.5	0.2	1.9
Paralichthys dentatus	0.7	0.4	1.0	0.4	0.7
Scomberomorus maculatus	0.5	0.3	0.7	0.3	0.8
Menticirrhus americanus	0.4	0.2	0.8	0.3	0.5
Pogonias cromis	0.3	0.2	0.2	0.1	1.3
Chaetodipterus faber	0.2	0.1	0.5	0.2	0.5
Lagodon rhomboides	0.1	0.1	0.6	0.2	0.2

Table 6.3a. Continued.

Species	Weight (kg) Mean	Weight (kg) Percent	Number Mean	Number Percent	Mean fish weight (kg)
Pamlico Area (continued)					
Multi mesh size n=13 (continued)					
Urophycis chuss	0.1	<0.1	0.1	<0.1	0.9
Mugil spp.	0.1	<0.1	0.2	0.1	0.5
Menticirrhus saxatilis	0.1	<0.1	0.1	<0.1	0.7
Small mesh size n=81					
Mugil cephalus	135.9	54.6	174.1	37.5	0.8
Leiostomus xanthurus	38.9	15.6	171.2	36.9	0.2
Pomatomus saltatrix	29.7	11.9	41.5	8.9	0.7
Scomberomorus maculatus	15.4	6.2	18.5	4.0	0.8
Alosa mediocris	13.1	5.3	19.7	4.2	0.7
Cynoscion regalis	9.0	3.6	21.2	4.6	0.4
Cynoscion nebulosus	2.1	0.8	2.6	0.6	0.8
Menticirrhus americanus	1.7	0.7	5.5	1.2	0.3
Micropogonias undulatus	0.9	0.4	3.0	0.7	0.3
Morone saxatilis	0.4	0.2	0.1	0.0	2.8
Peprilus paru	0.3	0.1	2.4	0.5	0.1
Peprilus triacanthus	0.2	0.1	2.3	0.5	0.1
Menticirrhus saxatilis	0.2	0.1	0.5	0.1	0.5
Tylosurus crocodilus	0.2	0.1	0.1	<0.1	2.3
Sciaenops ocellatus	0.2	0.1	0.1	<0.1	2.4
Orthopristis chrysoptera	0.1	0.1	0.7	0.1	0.2
Archosargus probatocephalus	0.1	<0.1	<0.1	<0.1	2.9
Lophius americanus	0.1	<0.1	<0.1	<0.1	2.7
Paralichthys spp.	0.1	<0.1	0.1	<0.1	0.8
Menticirrhus spp.	<0.1	<0.1	0.1	<0.1	0.7
Paralichthys lethostigma	<0.1	<0.1	0.1	<0.1	0.6
Trachinotus falcatus	<0.1	<0.1	0.2	<0.1	0.1
Paralichthys dentatus	<0.1	<0.1	<0.1	<0.1	0.4
Pogonias cromis	<0.1	<0.1	<0.1	<0.1	0.5
Alosa sapidissima	<0.1	<0.1	<0.1	<0.1	0.9
Chaetodipterus faber	<0.1	<0.1	<0.1	<0.1	0.5
Paralichthys albigutta	<0.1	<0.1	<0.1	<0.1	0.7
Trachinotus carolinus	<0.1	<0.1	<0.1	<0.1	0.3
Unknown Mesh Size n=21					
Mugil cephalus	95.7	56.6	134.0	51.0	0.7
Cynoscion nebulosus	26.5	15.6	26.2	10.0	1.0
Leiostomus xanthurus	15.4	9.1	65.3	24.8	0.2
Mugil spp.	10.3	6.1	14.8	5.6	0.7
Paralichthys spp.	5.1	3.0	5.6	2.1	0.9
Paralichthys lethostigma	4.8	2.9	4.8	1.8	1.0

Table 6.3a. Continued.

Species	Weight (kg) Mean	Weight (kg) Percent	Number Mean	Number Percent	Mean fish weight (kg)
Pamlico Area (continued)					
Unknown mesh size n=21 (continued)					
Sciaenops ocellatus	3.5	2.1	1.4	0.5	2.4
Pomatomus saltatrix	2.6	1.5	3.4	1.3	0.8
Alopias vulpinus	1.6	1.0	0.1	0.1	11.3
Chaetodipterus faber	1.3	0.8	3.0	1.1	0.4
Cynoscion regalis	0.8	0.5	1.8	0.7	0.5
Micropogonias undulatus	0.5	0.3	1.6	0.6	0.3
Archosargus probatocephalus	0.3	0.1	0.2	0.1	1.3
Menticirrhus americanus	0.3	0.1	0.4	0.2	0.6
Pogonias cromis	0.2	0.1	0.2	0.1	1.0
Menticirrhus spp.	0.1	<0.1	0.1	0.0	0.7
Tautoga onitis	<0.1	<0.1	-	-	-
Rivers Area					
Large Mesh Size n=100					
Paralichthys lethostigma	23.4	45.4	39.7	68.1	0.6
Alosa sapidissima	15.8	30.7	8.7	14.9	1.8
Ameiurus catus	4.2	8.1	3.0	5.2	1.4
Morone saxatilis	3.5	6.9	1.2	2.0	3.0
Alosa mediocris	2.9	5.7	3.4	5.9	0.9
M. saxatilis x chrysops	0.3	0.6	0.2	0.3	1.9
Paralichthys spp.	0.2	0.5	0.1	0.2	1.7
Cynoscion nebulosus	0.2	0.4	0.2	0.3	1.2
Sciaenops ocellatus	0.2	0.4	0.1	0.2	1.5
Mugil cephalus	0.2	0.3	0.4	0.7	0.5
Micropogonias undulatus	0.1	0.2	0.3	0.4	0.4
Pogonias cromis	0.1	0.2	0.1	0.2	1.0
Ictalurus punctatus	0.1	0.2	0.1	0.1	1.9
Leiostomus xanthurus	0.1	0.2	0.4	0.8	0.2
Cynoscion regalis	0.1	0.1	0.1	0.2	0.4
Ameiurus nebulosus	0.1	0.1	<0.1	0.1	1.3
Morone americana	<0.1	<0.1	0.2	0.3	0.1
Archosargus probatocephalus	<0.1	<0.1	<0.1	<0.1	0.9
Menticirrhus spp.	<0.1	<0.1	<0.1	<0.1	0.7
Perca flavescens	<0.1	<0.1	<0.1	<0.1	0.6
Multi mesh size n=7					
Alosa mediocris	49.6	51.4	75.4	38.2	0.7
Paralichthys lethostigma	13.4	13.9	25.4	12.9	0.5
Mugil cephalus	12.7	13.1	31.3	15.8	0.4
Morone americana	10.6	11.0	58.6	29.7	0.2
Alosa sapidissima	4.5	4.6	2.6	1.3	1.7

Table 6.3a. Continued.

Species	Weight (kg) Mean	Weight (kg) Percent	Number Mean	Number Percent	Mean fish weight (kg)
River Area					
Multi mesh size n=7 (continued)					
Cynoscion nebulosus	2.6	2.7	2.3	1.2	1.1
Morone saxatilis	2.2	2.3	0.3	0.1	7.8
Ameiurus catus	0.5	0.5	0.4	0.2	1.1
Paralichthys spp.	0.3	0.3	0.4	0.2	0.6
Perca flavescens	0.1	0.1	0.3	0.1	0.3
Micropogonias undulatus	0.1	0.1	0.3	0.1	0.3
Leiostomus xanthurus	<0.1	<0.1	0.1	0.1	0.2
Small Mesh size n=40					
Mugil cephalus	115.0	77.3	259.2	45.5	0.4
Alosa mediocris	20.8	13.9	27.3	4.8	0.8
Cynoscion nebulosus	5.7	3.8	5.2	0.9	1.1
Morone americana	3.6	2.4	268.2	47.1	0.0
Mugil spp.	1.8	1.2	2.7	0.5	0.6
Leiostomus xanthurus	1.0	0.7	4.7	0.8	0.2
Alosa sapidissima	0.4	0.3	0.3	<0.1	1.5
Micropogonias undulatus	0.2	0.1	0.6	0.1	0.2
Ameiurus catus	0.1	0.1	0.3	<0.1	0.5
Paralichthys lethostigma	0.1	0.1	0.2	<0.1	0.6
Ameiurus nebulosus	0.1	0.1	0.2	<0.1	0.5
Perca flavescens	0.1	<0.1	0.2	<0.1	0.3
Ictalurus spp.	<0.1	<0.1	0.1	<0.1	0.5
Pogonias cromis	<0.1	<0.1	<0.1	<0.1	0.5
Paralichthys spp.	<0.1	<0.1	<0.1	<0.1	0.5
Unknown Mesh size n=82					
Mugil cephalus	112.9	70.0	302.2	81.6	0.4
Cynoscion nebulosus	16.0	9.9	17.0	4.6	0.9
Paralichthys lethostigma	12.6	7.8	21.1	5.7	0.6
Alosa sapidissima	4.7	2.9	2.6	0.7	1.8
Alosa mediocris	4.7	2.9	5.3	1.4	0.9
Morone saxatilis	3.4	2.1	1.0	0.3	3.3
Morone americana	1.8	1.1	15.4	4.2	0.1
Ameiurus catus	1.4	0.9	1.5	0.4	0.9
M. saxatilis x chrysops	1.2	0.8	0.6	0.2	2.0
Mugil spp.	0.9	0.6	1.4	0.4	0.7
Paralichthys spp.	0.6	0.4	0.5	0.1	1.3
Sciaenops ocellatus	0.3	0.2	0.2	0.0	1.4
Ictalurus spp.	0.2	0.1	0.5	0.1	0.4
Ameiurus nebulosus	0.1	0.1	0.4	0.1	0.4
Micropogonias undulatus	0.1	0.1	0.2	0.1	0.4

Table 6.3a. Continued.

Species	Weight (kg) Mean	Weight (kg) Percent	Number Mean	Number Percent	Mean fish weight (kg)
River Area					
Unknown Mesh size n=82 (continued)					
Leiostomus xanthurus	0.1	<0.1	0.3	0.1	0.2
Cynoscion regalis	<0.1	<0.1	0.1	<0.1	0.5
Pogonias cromis	<0.1	<0.1	<0.1	<0.1	0.8
Ictalurus punctatus	<0.1	<0.1	<0.1	<0.1	3.2
Archosargus probatocephalus	<0.1	<0.1	<0.1	<0.1	0.8
Menticirrhus americanus	<0.1	<0.1	<0.1	<0.1	1.1
Alosa pseudoharengus	<0.1	<0.1	<0.1	<0.1	0.3
Pomatomus saltatrix	<0.1	<0.1	<0.1	<0.1	0.5
Menticirrhus spp.	<0.1	<0.1	<0.1	<0.1	0.5
Southern Area					
Large Mesh size n=6					
Paralichthys lethostigma	30.5	86.2	37.6	92.6	0.8
Sciaenops ocellatus	3.9	11.1	2.0	4.9	2.0
Archosargus probatocephalus	0.5	1.5	0.5	1.2	1.1
Trachinotus carolinus	0.3	1.0	0.3	0.8	1.0
Pomatomus saltatrix	0.1	0.2	0.2	0.4	0.5
Multi Mesh size n=3					
Paralichthys lethostigma	6.3	52.5	9.0	67.5	0.7
Sciaenops ocellatus	4.0	33.3	2.0	15.0	2.0
Cynoscion nebulosus	1.4	11.4	2.0	15.0	0.7
Pogonias cromis	0.3	2.8	0.3	2.5	1.0
Small Mesh size n=12					
Mugil cephalus	356.5	99.0	510.2	98.6	0.7
Cynoscion nebulosus	1.8	0.5	1.7	0.3	1.1
Leiostomus xanthurus	1.2	0.3	5.2	1.0	0.2
Paralichthys lethostigma	0.4	0.1	0.3	<0.1	1.5
Sciaenops ocellatus	0.2	0.1	0.2	<0.1	1.2
Cynoscion regalis	<0.1	<0.1	0.1	<0.1	0.5
Menticirrhus americanus	<0.1	<0.1	0.1	<0.1	0.2

Table 6.3b. Overall marketable species composition of gill net samples by area and gear configurations 2005. Data from NCDMF fishery dependent biological database.

	Weight (kg)		Number		
Species	Mean	Percent	Mean	Percent	Mean fish weight (kg)
2005					
Albemarle Area					
Large Mesh size n=58					
Paralichthys lethostigma	29.3	58.0	34.5	65.8	0.8
Morone saxatilis	8.4	16.5	2.4	4.5	3.5
Paralichthys spp.	8.3	16.5	9.7	18.5	0.9
Lepisosteus osseus	0.7	1.5	-	-	-
Cynoscion regalis	0.7	1.4	1.6	3.0	0.4
Archosargus probatocephalus	0.6	1.2	0.3	0.5	2.3
Pomatomus saltatrix	0.5	1.0	1.0	1.9	0.5
Sciaenops ocellatus	0.3	0.7	0.2	0.3	2.2
Ameiurus catus	0.3	0.6	0.3	0.6	1.0
Alosa mediocris	0.2	0.4	0.3	0.5	0.7
Micropogonias undulatus	0.2	0.3	0.4	0.8	0.4
Menticirrhus americanus	0.2	0.3	0.6	1.2	0.3
Mugil cephalus	0.1	0.3	0.2	0.3	0.9
Cynoscion nebulosus	0.1	0.2	0.1	0.2	1.3
Ictalurus spp.	0.1	0.2	0.2	0.5	0.4
Pogonias cromis	0.1	0.2	0.1	0.1	1.4
Alosa sapidissima	0.1	0.2	0.1	0.1	1.8
Leiostomus xanthurus	0.1	0.2	0.4	0.7	0.2
Ictalurus punctatus	<0.1	0.1	0.0	0.0	2.8
Menticirrhus spp.	<0.1	0.1	0.1	0.1	0.6
Paralichthys dentatus	<0.1	<0.1	<0.1	0.1	0.7
Trachinotus carolinus	<0.1	<0.1	<0.1	<0.1	1.3
Morone americana	<0.1	<0.1	0.1	0.2	0.1
Peprilus paru	<0.1	<0.1	0.1	0.1	0.2
Multi Mesh size n=2					
Paralichthys spp.	11.4	31.9	11.5	24.0	1.0
Mugil cephalus	8.6	24.1	20.5	42.7	0.4
Morone saxatilis	7.3	20.3	2.0	4.2	3.6
Ameiurus catus	5.0	14.0	5.0	10.4	1.0
Alosa sapidissima	2.2	6.3	1.5	3.1	1.5
Alosa pseudoharengus	1.1	3.2	7.0	14.6	0.2
Morone americana	0.1	0.1	0.5	1.0	0.1
Small Mesh size n=17					
Mugil cephalus	95.9	57.4	106.7	30.9	0.9
Leiostomus xanthurus	50.6	30.3	197.8	57.2	0.3
Pomatomus saltatrix	11.8	7.0	20.0	5.8	0.6
Micropogonias undulatus	3.0	1.8	9.5	2.7	0.3
Cynoscion regalis	2.1	1.2	4.7	1.4	0.4

Table 6.3b. Continued.

Species	Weight (kg) Mean	Weight (kg) Percent	Number Mean	Number Percent	Mean fish weight (kg)
Albemarle Area					
Small Mesh size n=17 (contined)					
Menticirrhus spp.	1.1	0.6	1.7	0.5	0.6
Alosa sapidissima	0.9	0.5	0.6	0.2	1.5
Morone saxatilis	0.4	0.2	0.2	0.1	2.3
Paralichthys lethostigma	0.2	0.1	0.4	0.1	0.7
Cynoscion nebulosus	0.2	0.1	0.3	0.1	0.6
Peprilus triacanthus	0.2	0.1	1.5	0.4	0.1
Sciaenops ocellatus	0.2	0.1	0.1	<0.1	1.4
Alosa mediocris	0.1	0.1	0.2	0.1	0.8
Paralichthys spp.	0.1	0.1	0.2	0.1	0.6
Peprilus paru	0.1	0.1	0.5	0.2	0.2
Morone americana	0.1	<0.1	0.9	0.3	0.1
Menticirrhus americanus	0.1	<0.1	0.1	<0.1	0.5
Scomberomorus maculatus	<0.1	<0.1	0.1	<0.1	0.5
Unknown Mesh size n=18					
Mugil cephalus	41.1	48.1	48.1	28.8	0.9
Leiostomus xanthurus	18.3	21.4	79.8	47.8	0.2
Pomatomus saltatrix	5.5	6.4	7.4	4.5	0.7
Micropogonias undulatus	5.2	6.1	14.2	8.5	0.4
Alosa sapidissima	3.9	4.5	2.3	1.4	1.7
Paralichthys lethostigma	3.8	4.4	4.3	2.6	0.9
Morone saxatilis	2.9	3.4	1.8	1.1	1.7
Cynoscion regalis	2.0	2.4	4.6	2.8	0.4
Mugil spp.	1.4	1.6	3.1	1.9	0.4
Paralichthys spp.	0.6	0.6	0.4	0.2	1.4
Sciaenops ocellatus	0.4	0.5	0.3	0.2	1.6
Cynoscion nebulosus	0.2	0.2	0.3	0.2	0.7
Alosa mediocris	0.1	0.1	0.2	0.1	0.8
Archosargus probatocephalus	0.1	0.1	0.1	<0.1	0.9
Morone americana	<0.1	<0.1	0.3	0.2	0.1
Pamlico Area					
Large Mesh size n=166					
Paralichthys lethostigma	35.8	64.0	43.9	65.3	0.8
Paralichthys spp.	8.8	15.7	9.1	13.5	1.0
Sciaenops ocellatus	3.6	6.4	1.8	2.6	2.0
Archosargus probatocephalus	1.4	2.4	0.9	1.3	1.6
Chaetodipterus faber	0.9	1.7	1.6	2.4	0.6
Pomatomus saltatrix	0.9	1.7	1.4	2.1	0.7
Pogonias cromis	0.9	1.6	0.7	1.0	1.3
Leiostomus xanthurus	0.7	1.2	2.9	4.3	0.2

Table 6.3b. Continued.

Species	Weight (kg) Mean	Weight (kg) Percent	Number Mean	Number Percent	Mean fish weight (kg)
Pamlico Area					
Large Mesh size n=166 (continued)					
Busycon spp.	0.6	1.0	1.1	1.7	0.5
Cynoscion nebulosus	0.5	1.0	0.4	0.5	1.5
Cynoscion regalis	0.4	0.8	1.0	1.4	0.5
Paralichthys albigutta	0.3	0.6	0.5	0.7	0.7
Limulus polyphemus	0.3	0.6	0.2	0.3	1.4
Micropogonias undulatus	0.2	0.4	0.6	0.8	0.4
Trachinotus carolinus	0.1	0.3	0.1	0.2	1.1
Mugil cephalus	0.1	0.2	0.2	0.3	0.5
Lagodon rhomboides	0.1	0.1	0.5	0.8	0.2
Paralichthys dentatus	0.1	0.1	0.1	0.2	0.6
Menticirrhus spp.	0.1	0.1	0.1	0.1	0.6
Lobotes surinamensis	0.1	0.1	<0.1	<0.1	2.6
Menticirrhus americanus	0.1	0.1	0.2	0.3	0.3
Gnathosomata ii	<0.1	<0.1	-	-	-
Orthopristis chrysoptera	<0.1	<0.1	0.1	0.1	0.2
Scomberomorus maculatus	<0.1	<0.1	<0.1	<0.1	1.1
Peprilus paru	<0.1	<0.1	<0.1	0.1	0.2
Tylosurus crocodilus	<0.1	<0.1	<0.1	<0.1	0.9
Menticirrhus saxatilis	<0.1	<0.1	<0.1	<0.1	0.6
Multi Mesh size n=20					
Paralichthys lethostigma	25.0	27.8	27.8	16.4	0.9
Leiostomus xanthurus	22.3	24.8	86.6	51.2	0.3
Mugil cephalus	12.6	14.0	14.7	8.7	0.9
Pomatomus saltatrix	10.3	11.5	13.9	8.2	0.7
Paralichthys spp.	5.2	5.8	6.2	3.6	0.8
Cynoscion regalis	4.2	4.6	9.0	5.3	0.5
Cynoscion nebulosus	3.9	4.3	3.0	1.8	1.3
Sciaenops ocellatus	2.8	3.1	1.4	0.8	2.0
Pogonias cromis	1.0	1.1	0.8	0.4	1.3
Archosargus probatocephalus	0.8	0.9	0.5	0.3	1.7
Micropogonias undulatus	0.3	0.4	1.1	0.6	0.3
Morone saxatilis	0.3	0.3	0.1	0.0	5.9
Scomberomorus maculatus	0.3	0.3	0.4	0.2	0.7
Menticirrhus spp.	0.2	0.2	0.3	0.2	0.6
Peprilus triacanthus	0.2	0.2	1.5	0.9	0.1
Trachinotus carolinus	0.2	0.2	0.5	0.3	0.3
Lagodon rhomboides	0.1	0.2	1.0	0.6	0.1
Paralichthys dentatus	0.1	0.1	0.2	0.1	0.6
Caranx hippos	0.1	0.1	0.1	0.1	0.9
Menticirrhus americanus	0.1	0.1	0.2	0.1	0.4

Table 6.3b. Continued.

Species	Weight (kg) Mean	Weight (kg) Percent	Number Mean	Number Percent	Mean fish weight (kg)
Pamlico Area					
Multi Mesh size n=20 (continued)					
Morone americana	0.1	0.1	0.3	0.1	0.2
Paralichthys albigutta	0.1	0.1	0.1	<0.1	1.0
Lobotes surinamensis	<0.1	<0.1	0.1	<0.1	0.4
Small Mesh size n=113					
Mugil cephalus	46.0	24.6	57.5	15.2	0.8
Pomatomus saltatrix	45.6	24.4	72.7	19.2	0.6
Scomberomorus maculatus	34.2	18.3	51.7	13.7	0.7
Leiostomus xanthurus	29.3	15.7	127.6	33.7	0.2
Cynoscion regalis	10.1	5.4	22.5	5.9	0.5
Alosa mediocris	8.9	4.8	12.6	3.3	0.7
Cynoscion nebulosus	4.7	2.5	4.5	1.2	1.0
Menticirrhus americanus	1.2	0.6	3.2	0.9	0.4
Paralichthys lethostigma	1.0	0.5	1.4	0.4	0.7
Peprilus paru	0.9	0.5	7.7	2.0	0.1
Lagodon rhomboides	0.8	0.4	6.1	1.6	0.1
Micropogonias undulatus	0.8	0.4	2.7	0.7	0.3
Tylosurus crocodilus	0.6	0.3	0.3	0.1	1.8
Menticirrhus spp.	0.6	0.3	1.0	0.3	0.6
Sciaenops ocellatus	0.6	0.3	0.4	0.1	1.4
Peprilus triacanthus	0.4	0.2	3.6	1.0	0.1
Lophius americanus	0.3	0.2	0.1	0.0	3.3
Orthopristis chrysoptera	0.2	0.1	1.0	0.3	0.2
Pogonias cromis	0.2	0.1	0.3	0.1	0.6
Mugil spp.	0.1	0.1	0.2	0.1	0.4
Morone saxatilis	0.1	0.1	<0.1	<0.1	2.8
Morone americana	0.1	0.0	0.7	0.2	0.1
Rachycentron canadum	0.1	<0.1	<0.1	<0.1	6.4
Archosargus probatocephalus	0.1	<0.1	<0.1	<0.1	1.5
Callinectes sapidus	<0.1	<0.1	0.2	0.1	0.1
Paralichthys spp.	<0.1	<0.1	<0.1	<0.1	0.8
Menticirrhus saxatilis	<0.1	<0.1	<0.1	<0.1	0.4
Chaetodipterus faber	<0.1	<0.1	<0.1	<0.1	0.5
Trachinotus carolinus	<0.1	<0.1	<0.1	<0.1	0.4
Menticirrhus littoralis	<0.1	<0.1	<0.1	<0.1	0.5
Alosa sapidissima	<0.1	<0.1	<0.1	<0.1	0.7
Scomber scombrus	<0.1	<0.1	-	-	-
Paralichthys dentatus	<0.1	<0.1	<0.1	<0.1	0.5

Table 6.3b. Continued.

Species	Weight (kg) Mean	Weight (kg) Percent	Number Mean	Number Percent	Mean fish weight (kg)
Pamlico Area					
Unknown Mesh size n=26					
Mugil cephalus	16.3	19.4	19.9	12.1	0.8
Leiostomus xanthurus	13.6	16.2	60.2	36.8	0.2
Paralichthys lethostigma	9.5	11.2	10.6	6.4	0.9
Cynoscion nebulosus	7.3	8.7	6.5	3.9	1.1
Scomberomorus maculatus	7.1	8.4	11.4	6.9	0.6
Pomatomus saltatrix	6.0	7.1	10.6	6.5	0.6
Cynoscion regalis	4.5	5.4	11.1	6.8	0.4
Morone saxatilis	3.8	4.6	0.4	0.3	9.1
Paralichthys spp.	3.5	4.1	4.2	2.6	0.8
Sciaenops ocellatus	3.4	4.0	1.7	1.1	1.9
Alosa mediocris	2.8	3.4	4.1	2.5	0.7
Menticirrhus americanus	1.4	1.6	6.0	3.7	0.2
Pogonias cromis	1.0	1.1	3.6	2.2	0.3
Micropogonias undulatus	0.9	1.0	4.0	2.4	0.2
Tylosurus crocodilus	0.5	0.6	0.3	0.2	1.9
Mustelus canis	0.5	0.6	0.2	0.1	2.4
Alosa sapidissima	0.5	0.5	0.3	0.2	1.5
Archosargus probatocephalus	0.4	0.5	0.3	0.2	1.6
Peprilus paru	0.4	0.5	3.0	1.8	0.1
Peprilus triacanthus	0.3	0.4	3.4	2.1	0.1
Lagodon rhomboides	0.3	0.3	1.8	1.1	0.1
Mugil spp.	0.1	0.1	0.1	0.1	0.8
Paralichthys albigutta	0.1	0.1	0.1	<0.1	0.8
Menticirrhus spp.	0.1	0.1	0.1	<0.1	0.7
Trachinotus carolinus	<0.1	0.1	0.1	<0.1	0.6
Chaetodipterus faber	<0.1	<0.1	<0.1	<0.1	0.9
Morone americana	<0.1	<0.1	<0.1	<0.1	0.4
Rivers Area					
Large Mesh size n=131					
Paralichthys lethostigma	14.0	44.2	20.6	63.1	0.7
Alosa sapidissima	8.7	27.6	5.1	15.6	1.7
Morone saxatilis	2.5	8.1	1.0	2.9	2.6
Ameiurus catus	2.0	6.4	1.4	4.3	1.4
Sciaenops ocellatus	1.7	5.3	0.9	2.7	1.9
Alosa mediocris	1.2	3.7	1.5	4.6	0.8
Paralichthys spp.	0.5	1.7	0.7	2.1	0.7
Cynoscion nebulosus	0.3	0.9	0.2	0.7	1.3
M. saxatilis x chrysops	0.2	0.5	0.1	0.3	1.9
Pylodictis olivaris	0.1	0.4	0.1	0.2	1.8
Ictalurus spp.	0.1	0.3	0.2	0.7	0.4

Table 6.3b. Continued.

	Weight (kg)		Number		
Species	Mean	Percent	Mean	Percent	Mean fish weight (kg)
Rivers Area					
Large Mesh size n=131 (continued)					
Leiostomus xanthurus	0.1	0.2	0.4	1.4	0.2
Micropogonias undulatus	0.1	0.2	0.2	0.5	0.3
Ameiurus nebulosus	<0.1	0.1	0.1	0.2	0.5
Ictalurus punctatus	<0.1	0.1	<0.1	<0.1	1.8
Pomatomus saltatrix	<0.1	0.1	<0.1	0.1	0.8
Morone americana	<0.1	<0.1	<0.1	0.1	0.4
Perca flavescens	<0.1	<0.1	<0.1	<0.1	0.8
Cynoscion regalis	<0.1	<0.1	<0.1	0.1	0.4
Mugil cephalus	<0.1	<0.1	<0.1	<0.1	0.4
Menticirrhus americanus	<0.1	<0.1	<0.1	<0.1	0.2
Multi Mesh size n=11					
Alosa mediocris	52.0	45.5	68.6	37.0	0.8
Paralichthys spp.	23.2	20.3	17.4	9.4	1.3
Mugil cephalus	9.7	8.5	28.6	15.4	0.3
Leiostomus xanthurus	9.2	8.1	38.8	20.9	0.2
Cynoscion regalis	6.1	5.4	13.1	7.1	0.5
Paralichthys lethostigma	5.5	4.8	8.0	4.3	0.7
Alosa sapidissima	4.6	4.0	3.1	1.7	1.5
Sciaenops ocellatus	0.9	0.8	0.6	0.3	1.4
Cynoscion nebulosus	0.8	0.7	0.7	0.4	1.1
Morone americana	0.7	0.6	3.8	2.1	0.2
Morone saxatilis	0.3	0.3	0.2	0.1	1.9
Ameiurus catus	0.3	0.3	0.2	0.1	1.7
Micropogonias undulatus	0.3	0.2	1.1	0.6	0.2
Perca flavescens	0.2	0.2	0.7	0.4	0.3
Menticirrhus spp.	0.2	0.1	0.3	0.1	0.6
Ictalurus spp.	0.1	0.1	0.3	0.1	0.5
Small Mesh size n=55					
Mugil cephalus	234.1	86.5	429.6	81.6	0.5
Cynoscion nebulosus	11.9	4.4	13.1	2.5	0.9
Morone americana	8.7	3.2	44.8	8.5	0.2
Leiostomus xanthurus	6.2	2.3	22.9	4.3	0.3
Alosa mediocris	3.8	1.4	5.1	1.0	0.7
Sciaenops ocellatus	1.8	0.7	1.3	0.2	1.4
Ameiurus catus	1.5	0.6	4.4	0.8	0.3
Cynoscion regalis	0.9	0.3	1.8	0.4	0.5
Ameiurus nebulosus	0.3	0.1	0.9	0.2	0.4
Pomatomus saltatrix	0.3	0.1	0.5	0.1	0.6
Paralichthys spp.	0.3	0.1	0.4	0.1	0.7

Table 6.3b. Continued.

Species	Weight (kg) Mean	Weight (kg) Percent	Number Mean	Number Percent	Mean fish weight (kg)
Rivers Area					
Small Mesh size n=55 (continued)					
Micropogonias undulatus	0.1	0.1	0.7	0.1	0.2
Ictalurus spp.	0.1	<0.1	0.3	0.1	0.4
Paralichthys lethostigma	0.1	<0.1	0.1	<0.1	0.8
Alosa sapidissima	0.1	<0.1	0.1	<0.1	1.3
Mugil spp.	<0.1	<0.1	0.1	<0.1	0.5
Morone saxatilis	<0.1	<0.1	<0.1	<0.1	1.9
Perca flavescens	<0.1	<0.1	0.1	<0.1	0.5
M. saxatilis x chrysops	<0.1	<0.1	<0.1	<0.1	1.4
Pogonias cromis	<0.1	<0.1	<0.1	<0.1	0.3
Menticirrhus americanus	<0.1	<0.1	<0.1	<0.1	0.5
Orthopristis chrysoptera	<0.1	<0.1	<0.1	<0.1	0.2
Unknown Mesh size n=28					
Mugil cephalus	179.0	84.7	269.9	86.9	0.7
Paralichthys lethostigma	11.5	5.5	17.7	5.7	0.7
Morone saxatilis	6.9	3.3	2.4	0.8	2.8
Cynoscion nebulosus	4.1	2.0	3.4	1.1	1.2
Alosa sapidissima	3.0	1.4	1.7	0.6	1.7
Sciaenops ocellatus	2.0	1.0	1.2	0.4	1.7
Mugil spp.	1.5	0.7	3.5	1.1	0.4
Leiostomus xanthurus	1.4	0.7	6.2	2.0	0.2
Morone americana	0.3	0.2	1.9	0.6	0.2
Cynoscion regalis	0.3	0.2	1.0	0.3	0.3
Micropogonias undulatus	0.2	0.1	0.5	0.2	0.5
Alosa mediocris	0.2	0.1	0.3	0.1	0.7
Paralichthys spp.	0.2	0.1	0.3	0.1	0.6
Pogonias cromis	0.1	0.1	0.2	0.1	0.8
Ictalurus spp.	0.1	0.1	0.4	0.1	0.4
M. saxatilis x chrysops	0.1	0.1	0.1	<0.1	1.8
Ameiurus catus	0.1	<0.1	<0.1	<0.1	1.6
Centropristis striata	<0.1	<0.1	-	-	-
Perca flavescens	<0.1	<0.1	0.1	<0.1	0.3
Archosargus probatocephalus	<0.1	<0.1	-	-	-
Southern Area					
Large Mesh size n=13					
Paralichthys lethostigma	28.8	67.3	33.9	73.0	0.9
Sciaenops ocellatus	6.4	14.8	2.7	5.8	2.4
Paralichthys spp.	3.8	9.0	6.4	13.7	0.6
Cynoscion nebulosus	1.5	3.4	0.5	1.2	2.7
Pogonias cromis	0.9	2.0	0.8	1.8	1.0

Table 6.3b. Continued.

Species	Weight (kg) Mean	Weight (kg) Percent	Number Mean	Number Percent	Mean fish weight (kg)
Sound Area					
Large Mesh size n=13 (continued)					
Lobotes surinamensis	0.6	1.3	0.3	0.7	1.8
Archosargus probatocephalus	0.6	1.3	0.5	1.0	1.2
Leiostomus xanthurus	0.2	0.4	1.0	2.2	0.2
Trachinotus carolinus	0.1	0.2	0.2	0.3	0.7
Paralichthys albigutta	0.1	0.2	0.1	0.2	0.7
Orthopristis chrysoptera	<0.1	<0.1	0.1	0.2	0.2
Small Mesh size n=12					
Mugil cephalus	74.3	57.6	131.9	39.0	0.6
Leiostomus xanthurus	36.6	28.4	191.8	56.7	0.2
Mugil spp.	9.3	7.2	-	-	-
Cynoscion nebulosus	7.9	6.2	11.8	3.5	0.7
Menticirrhus americanus	0.3	0.2	0.9	0.3	0.3
Sciaenops ocellatus	0.2	0.1	0.2	<0.1	1.0
Pogonias cromis	0.1	0.1	0.7	0.2	0.2
Orthopristis chrysoptera	0.1	0.1	0.4	0.1	0.2
Micropogonias undulatus	0.1	<0.1	0.5	0.1	0.1
Pomatomus saltatrix	<0.1	<0.1	0.2	<0.1	0.2

Table 6.3c. Overall marketable species composition of gill net samples by area and gear configurations 2006. Data from NCDMF fishery dependent biological database.

	Weight (kg)		Number		
Species	Mean	Percent	Mean	Percent	Mean fish weight (kg)
2006					
Albemarle Area					
Large Mesh size n=83					
Paralichthys lethostigma	37.3	57.5	42.0	60.9	0.9
Alosa sapidissima	10.7	16.4	7.0	10.1	1.5
Paralichthys spp.	7.3	11.3	8.4	12.1	0.9
Sciaenops ocellatus	2.8	4.3	1.4	2.0	2.1
Morone saxatilis	2.3	3.6	0.8	1.1	3.1
Leiostomus xanthurus	0.7	1.1	2.5	3.6	0.3
Archosargus probatocephalus	0.6	0.9	0.4	0.6	1.5
Limulus polyphemus	0.4	0.6	0.3	0.4	1.5
Cynoscion regalis	0.4	0.6	0.9	1.3	0.4
Alosa mediocris	0.3	0.5	0.3	0.5	1.0
Pogonias cromis	0.3	0.5	0.4	0.6	0.8
Pomatomus saltatrix	0.3	0.5	0.6	0.9	0.5
Callinectes sapidus	0.3	0.4	1.8	2.5	0.2
Paralichthys albigutta	0.2	0.3	0.2	0.3	1.1
Ictalurus spp.	0.2	0.3	0.4	0.6	0.5
Micropogonias undulatus	0.1	0.2	0.5	0.7	0.3
Cynoscion nebulosus	0.1	0.2	0.2	0.3	0.7
Cyprinus carpio	0.1	0.2	<0.1	<0.1	10.9
Paralichthys dentatus	0.1	0.1	0.2	0.2	0.6
Menticirrhus americanus	0.1	0.1	0.3	0.4	<0.1
Chaetodipterus faber	<0.1	<0.1	<0.1	0.1	0.1
Morone americana	<0.1	<0.1	0.2	0.2	0.3
Menticirrhus spp.	<0.1	<0.1	0.0	0.1	0.3
Peprilus triacanthus	<0.1	<0.1	0.2	0.3	0.2
Trachinotus carolinus	<0.1	<0.1	<0.1	<0.1	0.5
Alosa spp.	<0.1	<0.1	-	-	0.1
Peprilus paru	<0.1	<0.1	<0.1	<0.1	1.0
Mugil cephalus	<0.1	<0.1	<0.1	<0.1	0.1
Multi Mesh size n=5					
Morone saxatilis	19.3	43.8	4.0	7.5	0.2
Alosa mediocris	5.6	12.8	12.6	23.7	0.3
Paralichthys spp.	4.2	9.5	2.6	4.9	4.8
Pomatomus saltatrix	3.4	7.8	6.2	11.7	0.4
Paralichthys lethostigma	2.1	4.8	3.4	6.4	1.6
Pogonias cromis	2.0	4.5	1.8	3.4	0.6
Cynoscion regalis	1.8	4.1	4.2	7.9	0.6
Leiostomus xanthurus	1.8	4.1	4.4	8.3	1.1

Table 6.3c. Continued.

	Weight (kg)		Number		
Species	Mean	Percent	Mean	Percent	Mean fish weight (kg)
Albemarle Area					
Small Mesh size n=15 (continued)					
Pomatomus saltatrix	30.5	44.2	57.9	39.0	0.5
Mugil cephalus	7.3	10.6	13.7	9.2	0.5
Cynoscion regalis	6.3	9.2	14.1	9.5	0.5
Micropogonias undulatus	5.9	8.6	20.9	14.1	0.3
Alosa mediocris	5.7	8.3	12.3	8.3	0.5
Leiostomus xanthurus	4.9	7.0	13.9	9.3	0.4
Cynoscion nebulosus	2.2	3.2	1.7	1.1	1.3
Ictalurus spp.	2.0	2.9	4.9	3.3	0.4
Morone saxatilis	1.5	2.2	0.4	0.3	3.8
Menticirrhus americanus	1.1	1.6	3.0	2.0	0.4
Peprilus triacanthus	0.4	0.6	4.4	3.0	0.1
Menticirrhus spp.	0.3	0.5	0.5	0.4	0.6
Sciaenops ocellatus	0.3	0.4	0.3	0.2	1.2
Mustelus canis	0.2	0.4	0.1	0.1	1.9
Pogonias cromis	0.1	0.1	0.1	0.1	0.7
Scomberomorus maculatus	0.1	0.1	0.1	0.1	0.5
Morone americana	0.1	0.1	0.1	0.1	0.4
Paralichthys lethostigma	<0.1	0.1	0.1	<0.1	0.7
Unknown Size mesh n=37					
Mugil cephalus	71.0	60.3	90.9	49.4	0.8
Leiostomus xanthurus	12.2	10.4	54.5	29.6	0.2
Paralichthys lethostigma	11.7	9.9	13.2	7.2	0.9
Morone saxatilis	4.9	4.2	1.3	0.7	3.8
Pomatomus saltatrix	4.3	3.6	6.7	3.7	0.6
Paralichthys spp.	4.1	3.5	3.4	1.9	1.2
Sciaenops ocellatus	2.3	1.9	1.0	0.5	2.3
Cynoscion nebulosus	1.3	1.1	1.7	0.9	0.8
Mugil spp.	1.2	1.0	2.8	1.5	0.4
Micropogonias undulatus	1.2	1.0	2.7	1.5	0.4
Cynoscion regalis	1.0	0.9	2.2	1.2	0.5
Archosargus probatocephalus	0.9	0.7	0.4	0.2	2.1
Pogonias cromis	0.7	0.6	0.9	0.5	0.9
Menticirrhus spp.	0.2	0.2	0.3	0.2	0.6
Ameiurus catus	0.1	0.1	0.1	0.1	0.9
Peprilus triacanthus	0.1	0.1	0.8	0.4	0.1
Ictalurus spp.	0.1	0.1	0.2	0.1	0.4
Limulus polyphemus	0.1	0.1	0.1	0.0	1.4
Chaetodipterus faber	0.1	0.1	0.0	0.0	2.7
Menticirrhus americanus	0.1	0.1	0.2	0.1	0.2
Alosa sapidissima	<0.1	<0.1	<0.1	<0.1	1.7

Table 6.3c. Continued.

	Weight (kg)		Number		
Species	Mean	Percent	Mean	Percent	Mean fish weight (kg)
Albemarle Area					
Unknown Size mesh n=37 (continued)					
Menticirrhus littoralis	0.0	0.0	0.1	0.1	0.3
Scomberomorus maculatus	0.0	0.0	0.1	0.1	0.4
Morone americana	0.0	0.0	0.2	0.1	0.1
Pamlico Area					
Large Mesh size n=257					
Paralichthys lethostigma	27.6	56.1	29.9	32.7	0.9
Pomatomus saltatrix	6.2	12.6	7.6	8.3	0.8
Paralichthys spp.	5.1	10.4	4.4	4.8	1.2
Sciaenops ocellatus	4.2	8.5	1.9	2.0	2.2
Archosargus probatocephalus	0.9	1.8	39.5	43.3	0.0
Limulus polyphemus	0.6	1.3	0.4	0.5	1.5
Pogonias cromis	0.6	1.2	0.6	0.7	1.0
Cynoscion nebulosus	0.6	1.2	0.7	0.7	0.9
Leiostomus xanthurus	0.5	0.9	1.7	1.9	0.3
Morone saxatilis	0.5	0.9	0.1	0.1	6.9
Busycon spp.	0.4	0.9	0.8	0.9	0.5
Paralichthys albigutta	0.4	0.7	0.5	0.5	0.8
Alosa sapidissima	0.3	0.7	0.2	0.2	1.6
Chaetodipterus faber	0.3	0.7	0.6	0.6	0.6
Cynoscion regalis	0.2	0.5	0.5	0.6	0.5
Lagodon rhomboides	0.1	0.2	0.8	0.8	0.1
Micropogonias undulatus	0.1	0.2	0.3	0.4	0.3
Paralichthys dentatus	0.1	0.2	0.1	0.1	0.7
Menticirrhus americanus	0.1	0.1	0.2	0.2	0.3
Alosa mediocris	0.1	0.1	0.1	0.1	1.1
Trachinotus carolinus	0.1	0.1	0.1	0.1	0.9
Carcharhinus limbatus	0.1	0.1	0.0	<0.1	5.4
Tylosurus crocodilus	<0.1	0.1	0.0	<0.1	1.6
Mugil cephalus	<0.1	0.1	0.0	<0.1	0.7
Mugil spp.	<0.1	<0.1	0.1	0.1	0.4
Rachycentron canadum	<0.1	<0.1	<0.1	<0.1	5.9
Loligo pealii	<0.1	<0.1	<0.1	<0.1	1.4
Busycon carica	<0.1	<0.1	0.1	0.1	0.4
Orthopristis chrysoptera	<0.1	<0.1	0.1	0.1	0.2
Menticirrhus spp.	<0.1	<0.1	<0.1	<0.1	0.7
Stenotomus chrysops	<0.1	<0.1	-	-	-
Peprilus paru	<0.1	<0.1	<0.1	<0.1	0.2
Scomberomorus maculatus	<0.1	<0.1	<0.1	<0.1	0.9
Morone americana	<0.1	<0.1	<0.1	<0.1	0.2
Menticirrhus saxatilis	<0.1	<0.1	<0.1	<0.1	0.3
Sphoeroides maculatus	<0.1	<0.1	<0.1	<0.1	0.5
Neogastropoda stenoglossa	<0.1	<0.1	<0.1	<0.1	0.2

Table 6.3c. Continued.

Species	Weight (kg) Mean	Weight (kg) Percent	Number Mean	Number Percent	Mean fish weight (kg)
Pamlico Area					
Multi Size mesh n=14					
Paralichthys lethostigma	6.6	15.9	8.1	12.0	0.8
Pomatomus saltatrix	6.5	15.6	12.6	18.6	0.5
Alosa mediocris	5.9	14.1	10.3	15.1	0.6
Morone saxatilis	4.5	10.8	0.8	1.2	5.7
Cynoscion nebulosus	3.8	9.2	3.4	5.0	1.1
Mugil cephalus	2.6	6.2	3.3	4.8	0.8
Pogonias cromis	2.3	5.5	6.1	9.0	0.4
Cynoscion regalis	2.0	4.9	4.7	6.9	0.4
Alosa sapidissima	1.9	4.5	1.4	2.0	1.4
Leiostomus xanthurus	1.5	3.6	6.6	9.8	0.2
Sciaenops ocellatus	1.5	3.6	0.6	0.8	2.6
Morone americana	1.2	2.9	6.2	9.1	0.2
Micropogonias undulatus	0.4	0.9	1.2	1.8	0.3
Paralichthys dentatus	0.2	0.5	0.4	0.5	0.6
Menticirrhus spp.	0.2	0.5	0.4	0.5	0.6
Paralichthys albigutta	0.2	0.5	0.5	0.7	0.4
Menticirrhus americanus	0.2	0.4	0.6	0.8	0.3
Alosa spp.	0.1	0.3	-	-	-
Peprilus paru	<0.1	0.1	0.3	0.4	0.2
Orthopristis chrysoptera	<0.1	0.1	0.1	0.2	0.2
Peprilus triacanthus	<0.1	0.1	0.2	0.3	0.1
Bairdiella chrysoura	<0.1	<0.1	0.1	0.2	0.1
Small Mesh size n=126					
Mugil cephalus	129.1	58.7	184.7	43.9	0.7
Pomatomus saltatrix	21.6	9.8	35.4	8.4	0.6
Leiostomus xanthurus	19.6	8.9	94.3	22.4	0.2
Scomberomorus maculatus	13.7	6.2	19.4	4.6	0.7
Cynoscion nebulosus	10.8	4.9	12.3	2.9	0.9
Cynoscion regalis	7.2	3.3	15.9	3.8	0.5
Alosa mediocris	5.2	2.4	8.6	2.1	0.6
Menticirrhus americanus	2.4	1.1	6.6	1.6	0.4
Peprilus triacanthus	1.8	0.8	16.4	3.9	0.1
Lagodon rhomboides	1.6	0.7	11.2	2.7	0.1
Tylosurus crocodilus	1.3	0.6	0.8	0.2	1.7
Peprilus paru	1.1	0.5	5.1	1.2	0.2
Micropogonias undulatus	1.1	0.5	5.4	1.3	0.2
Sciaenops ocellatus	1.0	0.5	0.5	0.1	1.9
Pogonias cromis	0.8	0.4	1.3	0.3	0.6
Menticirrhus spp.	0.7	0.3	1.2	0.3	0.6
Menticirrhus saxatilis	0.3	0.1	0.7	0.2	0.4
Rachycentron canadum	0.2	0.1	<0.1	<0.1	6.2
Paralichthys spp.	0.2	0.1	0.2	<0.1	1.1

Table 6.3c. Continued.

	Weight (kg)		Number		
Species	Mean	Percent	Mean	Percent	Mean fish weight (kg)
Pamlico Area					
Small Mesh size n=126 (continued)					
Alosa sapidissima	0.1	0.1	0.1	<0.1	1.3
Paralichthys lethostigma	0.1	0.1	0.1	<0.1	1.0
Orthopristis chrysoptera	<0.1	<0.1	0.1	<0.1	0.2
Morone americana	<0.1	<0.1	<0.1	<0.1	0.2
Sphoeroides maculatus	<0.1	<0.1	<0.1	<0.1	0.5
Archosargus probatocephalus	<0.1	<0.1	<0.1	<0.1	0.9
Mugil spp.	<0.1	<0.1	<0.1	<0.1	0.5
Trachinotus carolinus	<0.1	<0.1	<0.1	<0.1	0.3
Scomber scombrus	<0.1	<0.1	-	-	-
Brevoortia tyrannus	<0.1	<0.1	<0.1	<0.1	0.3
Unknown Mesh size n=40					
Mugil cephalus	198.7	71.0	279.2	65.3	0.7
Pomatomus saltatrix	12.2	4.4	15.5	3.6	0.8
Leiostomus xanthurus	11.3	4.0	48.1	11.3	0.2
Scomberomorus maculatus	10.7	3.8	13.2	3.1	0.8
Morone saxatilis	8.8	3.1	0.8	0.2	11.0
Cynoscion nebulosus	8.3	3.0	9.0	2.1	0.9
Paralichthys lethostigma	7.0	2.5	6.9	1.6	1.0
Micropogonias undulatus	5.8	2.1	19.9	4.6	0.3
Tylosurus crocodilus	4.7	1.7	2.4	0.6	2.0
Paralichthys spp.	2.4	0.9	2.8	0.6	0.9
Sciaenops ocellatus	2.2	0.8	1.0	0.2	2.2
Peprilus paru	1.6	0.6	10.7	2.5	0.1
Orthopristis chrysoptera	1.0	0.3	4.7	1.1	0.2
Cynoscion regalis	1.0	0.3	2.0	0.5	0.5
Alosa mediocris	0.6	0.2	0.7	0.2	0.9
Cyprinus carpio	0.6	0.2	0.2	<0.1	3.4
Pogonias cromis	0.4	0.2	1.0	0.2	0.5
Morone americana	0.4	0.1	4.7	1.1	0.1
Menticirrhus spp.	0.3	0.1	0.6	0.1	0.6
Peprilus triacanthus	0.3	0.1	2.8	0.7	0.1
Amia calva	0.3	0.1	0.2	<0.1	1.5
Archosargus probatocephalus	0.2	0.1	0.1	<0.1	2.1
Chaetodipterus faber	0.2	0.1	0.2	<0.1	1.0
Mugil spp.	0.2	0.1	0.4	0.1	0.5
Menticirrhus americanus	0.2	0.1	0.4	0.1	0.4
Alosa sapidissima	0.1	<0.1	0.1	<0.1	1.7
Trachinotus carolinus	0.1	<0.1	0.2	0.1	0.5
Paralichthys dentatus	0.1	<0.1	0.1	<0.1	0.8
Ictalurus spp.	<0.1	<0.1	0.1	<0.1	0.5
Lagodon rhomboides	<0.1	<0.1	0.1	<0.1	0.1

Table 6.3c. Continued.

Species	Weight (kg) Mean	Weight (kg) Percent	Number Mean	Number Percent	Mean fish weight (kg)
Rivers Area					
Large Mesh size n=145					
Paralichthys lethostigma	16.8	46.9	22.8	59.3	0.7
Alosa sapidissima	7.8	21.8	5.0	13.0	1.6
Morone saxatilis	2.5	7.0	0.9	2.4	2.7
Ameiurus catus	2.0	5.5	1.6	4.2	1.2
Sciaenops ocellatus	1.5	4.1	0.8	2.1	1.9
Alosa mediocris	1.2	3.3	1.6	4.2	0.7
Scomberomorus maculatus	1.0	2.8	1.1	2.9	0.9
Pogonias cromis	0.6	1.8	0.5	1.3	1.3
Paralichthys spp.	0.6	1.6	0.8	2.1	0.7
Cynoscion nebulosus	0.5	1.3	0.5	1.4	0.9
Ictalurus spp.	0.4	1.0	0.9	2.2	0.4
Pomatomus saltatrix	0.2	0.4	0.2	0.6	0.7
Morone americana	0.1	0.4	0.6	1.6	0.2
Cyprinus carpio	0.1	0.4	<0.1	0.1	6.2
Ictalurus punctatus	0.1	0.3	0.1	0.1	2.2
Pylodictis olivaris	0.1	0.2	<0.1	0.1	2.1
M. saxatilis x chrysops	0.1	0.2	0.1	0.1	1.5
Leiostomus xanthurus	0.1	0.2	0.3	0.9	0.2
Mugil cephalus	<0.1	0.1	0.1	0.3	0.5
Micropogonias undulatus	<0.1	0.1	0.2	0.4	0.3
Ameiurus natalis	<0.1	0.1	<0.1	0.1	1.4
Mugil spp.	<0.1	0.1	0.1	0.1	0.5
Cynoscion regalis	<0.1	0.1	0.1	0.2	0.4
Archosargus probatocephalus	<0.1	0.1	<0.1	<0.1	2.7
Paralichthys dentatus	<0.1	<0.1	<0.1	0.1	0.6
Menticirrhus americanus	<0.1	<0.1	<0.1	0.1	0.3
Ameiurus nebulosus	<0.1	<0.1	<0.1	<0.1	0.6
Perca flavescens	<0.1	<0.1	<0.1	<0.1	0.4
Multi Mesh size n=16					
Alosa sapidissima	13.7	25.8	9.6	10.8	1.4
Morone americana	8.3	15.7	25.4	28.4	0.3
Mugil cephalus	6.8	12.9	10.1	11.3	0.7
Paralichthys lethostigma	6.4	12.1	8.1	9.0	0.8
Alosa mediocris	5.8	11.0	9.6	10.8	0.6
Cynoscion nebulosus	5.0	9.5	4.6	5.1	1.1
Leiostomus xanthurus	3.3	6.2	14.1	15.7	0.2
Morone saxatilis	0.8	1.6	0.4	0.5	1.9
Sciaenops ocellatus	0.7	1.4	0.3	0.3	2.4
Peprilus triacanthus	0.5	1.0	4.9	5.5	0.1
Ameiurus catus	0.4	0.7	0.5	0.6	0.8
Pogonias cromis	0.4	0.7	0.3	0.3	1.1
Micropogonias undulatus	0.3	0.6	1.0	1.1	0.3

Table 6.3c. Continued.

Species	Weight (kg) Mean	Weight (kg) Percent	Number Mean	Number Percent	Mean fish weight (kg)
Rivers Area					
Multi Mesh size n=16 (continued)					
M. saxatilis x chrysops	0.3	0.6	0.2	0.2	1.6
Paralichthys spp.	0.1	0.2	0.2	0.2	0.6
Cynoscion regalis	<0.1	0.1	0.1	0.1	0.6
Small Mesh size (n=61					
Mugil cephalus	119.5	68.4	243.3	70.8	0.5
Cynoscion nebulosus	33.1	19.0	38.1	11.1	0.9
Leiostomus xanthurus	6.7	3.8	33.5	9.8	0.2
Scomberomorus maculatus	5.4	3.1	6.0	1.7	0.9
Morone americana	3.3	1.9	10.6	3.1	0.3
Pomatomus saltatrix	1.3	0.8	2.3	0.7	0.6
Mugil spp.	1.1	0.6	1.7	0.5	0.6
Ameiurus catus	1.0	0.6	2.0	0.6	0.5
Sciaenops ocellatus	0.7	0.4	0.3	0.1	2.1
Cynoscion regalis	0.5	0.3	1.2	0.3	0.5
Paralichthys lethostigma	0.5	0.3	0.7	0.2	0.7
Ictalurus spp.	0.4	0.3	1.1	0.3	0.4
Micropogonias undulatus	0.4	0.2	1.7	0.5	0.2
Pogonias cromis	0.3	0.2	0.6	0.2	0.5
Perca flavescens	0.1	0.1	0.4	0.1	0.3
Alosa mediocris	0.1	<0.1	0.1	<0.1	0.4
Paralichthys spp.	0.1	<0.1	0.1	<0.1	0.7
Ictalurus punctatus	<0.1	<0.1	<0.1	<0.1	2.0
Ameiurus nebulosus	<0.1	<0.1	0.1	<0.1	0.3
Menticirrhus spp.	<0.1	<0.1	<0.1	<0.1	0.5
Menticirrhus americanus	<0.1	<0.1	<0.1	<0.1	0.4
Unknown Mesh size n=55					
Mugil cephalus	71.8	43.8	113.5	43.2	0.6
Paralichthys lethostigma	27.3	16.6	34.9	13.3	0.8
Mugil spp.	16.9	10.3	37.9	14.4	0.4
Cynoscion nebulosus	16.1	9.8	21.9	8.3	0.7
Alosa sapidissima	5.9	3.6	3.7	1.4	1.6
Morone saxatilis	5.6	3.4	2.0	0.8	2.7
Sciaenops ocellatus	5.1	3.1	2.4	0.9	2.1
Leiostomus xanthurus	4.8	3.0	23.0	8.8	0.2
Morone americana	3.6	2.2	13.7	5.2	0.3
Paralichthys spp.	1.7	1.1	1.6	0.6	1.1
Alosa mediocris	1.2	0.7	1.4	0.5	0.8
Ameiurus catus	1.0	0.6	1.0	0.4	1.0
Pogonias cromis	0.7	0.4	1.0	0.4	0.7
Cynoscion regalis	0.6	0.4	1.6	0.6	0.4
Micropogonias undulatus	0.6	0.3	1.8	0.7	0.3

Table 6.3c. Continued.

Species	Weight (kg) Mean	Weight (kg) Percent	Number Mean	Number Percent	Mean fish weight (kg)
Rivers Area					
Unknown Mesh size n=55 (continued)					
M. saxatilis x chrysops	0.5	0.3	0.3	0.1	1.6
Pomatomus saltatrix	0.2	0.1	0.3	0.1	0.7
Ictalurus spp.	0.2	0.1	0.5	0.2	0.4
Ictalurus punctatus	0.1	0.1	<0.1	<0.1	2.5
Archosargus probatocephalus	0.1	0.1	0.1	<0.1	1.1
Menticirrhus americanus	0.1	<0.1	0.2	0.1	0.4
Ameiurus nebulosus	<0.1	<0.1	<0.1	<0.1	0.6
Menticirrhus spp.	<0.1	<0.1	<0.1	<0.1	0.7
Southern Area					
Large Mesh size n=9					
Paralichthys lethostigma	34.0	67.9	31.4	66.3	1.1
Sciaenops ocellatus	6.8	13.5	3.2	6.8	2.1
Paralichthys spp.	2.9	5.7	4.2	8.9	0.7
Busycon spp.	2.3	4.5	4.7	9.9	0.5
Pogonias cromis	1.7	3.5	1.8	3.8	1.0
Cynoscion nebulosus	1.0	1.9	0.4	0.9	2.2
Archosargus probatocephalus	0.8	1.6	0.4	0.9	1.8
Paralichthys albigutta	0.5	1.0	0.7	1.5	0.7
Cynoscion regalis	0.1	0.2	0.2	0.5	0.5
Micropogonias undulatus	0.1	0.2	0.2	0.5	0.5
Multi Mesh size n=2					
Mugil cephalus	17.5	39.3	25.5	57.3	0.7
Sciaenops ocellatus	17.3	38.8	7.5	16.9	2.3
Pogonias cromis	4.7	10.4	5.0	11.2	0.9
Cynoscion nebulosus	2.3	5.2	2.5	5.6	0.9
Paralichthys lethostigma	2.0	4.6	2.5	5.6	0.8
Pomatomus saltatrix	0.7	1.5	1.0	2.2	0.7
Leiostomus xanthurus	0.1	0.2	0.5	1.1	0.2
Small Mesh size n=11					
Mugil cephalus	247.5	86.4	293.1	68.5	0.8
Leiostomus xanthurus	23.8	8.3	115.1	26.9	0.2
Cynoscion nebulosus	13.3	4.6	14.0	3.3	1.0
Micropogonias undulatus	1.2	0.4	5.1	1.2	0.2
Pogonias cromis	0.6	0.2	0.4	0.1	1.7

Table 6.4. Percent occurrence of individuals in the bait component of gill net catches by area, and gear configuration for 2004-06.

Year/Area/Mesh size/Species	Percent occurrence	Year/Area/Mesh size/Species	Percent occurrence	Year/Area/Mesh size/Species	Percent occurrence
2004		***Large mesh size (continued)***		**Large Mesh size n=100 (continued)**	
Albemarle area		*Ancylopsetta quadrocellata*	0.8	*Callinectes sapidus*	31.0
Large mesh size n=79		*Archosargus probatocephalus*	0.8	*Dorosoma cepedianum*	31.0
Callinectes sapidus	15.2	*Astroscopus guttatus*	0.8	*Lepisosteus osseus*	19.0
Brevoortia tyrannus	5.1	*Dasyatis sabina*	0.8	*Paralichthys spp.*	13.0
Paralichthys spp.	3.8	*Limulus polyphemus*	0.8	*Sciaenops ocellatus*	10.0
Acipenser oxyrinchus	2.5	*Micropogonias undulatus*	0.8	*Cyprinus carpio*	9.0
Lepisosteus osseus	2.5	*Orthopristis chrysoptera*	0.8	*Leiostomus xanthurus*	9.0
Cyprinus carpio	1.3	*Paralichthys albigutta*	0.8	*Morone saxatilis*	9.0
Gnathosomata ii	1.3	*Sciaenops ocellatus*	0.8	*Paralichthys lethostigma*	9.0
Micropogonias undulatus	1.3			*Alosa mediocris*	6.0
Morone saxatilis	1.3	***Multi mesh size n=13***		*Ameiurus catus*	6.0
Penaeus setiferus	1.3	*Brevoortia tyrannus*	15.4	*Moxostoma spp.*	6.0
		Alopias vulpinus	7.7	*Micropogonias undulatus*	5.0
Small mesh size n=17				*Amia calva*	4.0
Dorosoma cepedianum	5.9	***Small mesh size n=81***		*Elops saurus*	4.0
		Brevoortia tyrannus	8.6	*Ictalurus spp.*	4.0
Unknown mesh size n=17		*Alosa mediocris*	2.5	*Alosa sapidissima*	3.0
Dorosoma cepedianum	4.8	*Alosa pseudoharengus*	1.2	*Moxostoma anisurum*	3.0
Pogonias cromis	4.8	*Callinectes sapidus*	1.2	*Cynoscion regalis*	2.0
		Rachycentron canadum	1.2	*Alosa pseudoharengus*	1.0
Pamlico area		*Scomber scombrus*	1.2	*Archosargus probatocephalus*	1.0
Large mesh size n=125		*Trinectes maculatus*	1.2	*Bairdiella chrysoura*	1.0
Rhinoptera bonasus	4.8			*Chrysemys scripta*	1.0
Callinectes sapidus	4.0	**Unknown Mesh size n=21**		*Cynoscion nebulosus*	1.0
Brevoortia tyrannus	2.4	*Brevoortia tyrannus*	4.8	*Dasyatis spp.*	1.0
Busycon spp.	1.6			*M. saxatilis x chrysops*	1.0
Leiostomus xanthurus	1.6	**Rivers Area**		*Morone americana*	1.0
Paralichthys lethostigma	1.6	**Large Mesh size n=100**		*Pogonias cromis*	1.0
		Brevoortia tyrannus	40.0	*Rhinoptera bonasus*	1.0

Table 6.4. Continued.

Year/Area/Mesh size/Species	Percent occurrence	Year/Area/Mesh size/Species	Percent occurrence	Year/Area/Mesh size/Species	Percent occurrence
2004		**Unknown Mesh size n=82**		**Small Mesh size n=17**	
Rivers Area		*Brevoortia tyrannus*	7.3	*Brevoortia tyrannus*	17.7
Multi Mesh size n=7		*Dorosoma cepedianum*	3.7	*Leiostomus xanthurus*	5.9
Brevoortia tyrannus	42.9	*Callinectes sapidus*	2.4		
Callinectes sapidus	14.3	*Cyprinus carpio*	2.4	**Unknown Mesh size n=18**	
Dasyatis spp.	14.3	*Gnathosomata ii*	2.4	*Brevoortia tyrannus*	22.2
Ictalurus spp.	14.3	*Amia calva*	1.2	*Amia calva*	5.6
Lepisosteus osseus	14.3	*Catostomidae*	1.2		
		Micropogonias undulatus	1.2	**Pamlico Area**	
Multi Mesh size n=7		*Peprilus triacanthus*	1.2	**Large Mesh size n=166**	
Brevoortia tyrannus	27.5			*Callinectes sapidus*	1.8
Dorosoma cepedianum	25.0	**2005**		*Alosa mediocris*	0.6
Callinectes sapidus	15.0	**Albemarle Area**		*Brevoortia tyrannus*	0.6
Lepisosteus osseus	15.0	**Large Mesh size n=58**		*Cynoscion regalis*	0.6
Moxostoma spp.	12.5	*Brevoortia tyrannus*	13.8	*Leiostomus xanthurus*	0.6
Cyprinus carpio	7.5	*Callinectes sapidus*	13.8	*Menticirrhus americanus*	0.6
Micropterus salmoides	7.5	*Paralichthys spp.*	10.3	*Micropogonias undulatus*	0.6
Morone saxatilis	7.5	*Acipenser oxyrinchus*	8.6	*Pomatomus saltatrix*	0.6
Sciaenops ocellatus	7.5	*Cynoscion regalis*	5.2		
Chrysemys scripta	5.0	*Cyprinus carpio*	1.7	**Multi Mesh size n=20**	
Elops saurus	5.0	*Lepisosteus osseus*	1.7	*Brevoortia tyrannus*	5.0
Ictalurus spp.	5.0	*Limulus polyphemus*	1.7	*Callinectes sapidus*	5.0
Lepomis gibbosus	5.0	*Morone saxatilis*	1.7	*Gnathosomata ii*	5.0
Alosa mediocris	2.5	*Pomatomus saltatrix*	1.7		
Ameiurus nebulosus	2.5	*Rhinoptera bonasus*	1.7	**Small Mesh size n=113**	
Morone americana	2.5			*Brevoortia tyrannus*	13.3
Paralichthys spp.	2.5	**Multi Mesh size n=2**		*Alosa mediocris*	2.7
Perca flavescens	2.5	*Acipenser oxyrinchus*	50.0	*Pomatomus saltatrix*	2.7
		Brevoortia tyrannus	50.0	*Dorosoma cepedianum*	1.8
		Dorosoma cepedianum	50.0	*Sciaenops ocellatus*	1.8

Table 6.4. Continued.

Year/Area/Mesh size/Species	Percent occurrence	Year/Area/Mesh size/Species	Percent occurrence	Year/Area/Mesh size/Species	Percent occurrence
2005		**Large Mesh size n=131**		**Small Mesh size n=55**	
Pamlico Area		*Brevoortia tyrannus*	42.8	*Dorosoma cepedianum*	23.6
Small Mesh size n=113		*Dorosoma cepedianum*	19.1	*Brevoortia tyrannus*	21.8
(continued		*Callinectes sapidus*	15.3	*Alosa mediocris*	7.3
Ictalurus spp.	0.9	*Paralichthys spp.*	14.5	*Callinectes sapidus*	5.5
Mustelus canis	0.9	*Alosa mediocris*	12.2	*Cyprinus carpio*	5.5
Pogonias cromis	0.9	*Cyprinus carpio*	9.2	*Lepisosteus osseus*	5.5
Squalus acanthias	0.9	*Lepisosteus osseus*	9.2	*Pomatomus saltatrix*	5.5
		Morone saxatilis	9.2	*Sciaenops ocellatus*	5.5
Unknown Mesh size n=26		*Rhinoptera bonasus*	4.6	*Gnathosomata ii*	3.6
Brevoortia tyrannus	3.9	*Moxostoma spp.*	3.8	*Leiostomus xanthurus*	3.6
		Micropogonias undulatus	3.1	*Alosa pseudoharengus*	1.8
Rivers Area		*Paralichthys lethostigma*	3.1	*Amia calva*	1.8
Multi Mesh size n=11		*Sciaenops ocellatus*	3.1	*Elops saurus*	1.8
Brevoortia tyrannus	36.4	*Leiostomus xanthurus*	2.3	*Esox niger*	1.8
Callinectes sapidus	27.3	*Acipenser oxyrinchus*	1.5	*Lepomis gibbosus*	1.8
Cyprinus carpio	27.3	*Ameiurus catus*	1.5	*Micropogonias undulatus*	1.8
Dorosoma cepedianum	27.3	*Bairdiella chrysoura*	1.5	*Morone saxatilis*	1.8
Lepisosteus osseus	27.3	*Gnathosomata ii*	1.5	*Moxostoma spp.*	1.8
Paralichthys spp.	27.3	*M. saxatilis x chrysops*	1.5	*Notemigonius crysoleucas*	1.8
Alosa mediocris	18.2	*Morone americana*	1.5	*Paralichthys spp.*	1.8
Cynoscion regalis	18.2	*Amia calva*	0.8		
Moxostoma spp.	18.2	*Cynoscion nebulosus*	0.8	**2006**	
Acipenser oxyrinchus	9.1	*Cynoscion regalis*	0.8	**Albemarle Area**	
Elops saurus	9.1	*Dasyatidae*	0.8	**Large Mesh size n=83**	
		Ictalurus spp.	0.8	*Callinectes sapidus*	19.3
Unknown Mesh size n=28		*Moxostoma anisurum*	0.8	*Brevoortia tyrannus*	8.4
Brevoortia tyrannus	3.6	*Pomatomus saltatrix*	0.8	*Dorosoma cepedianum*	1.2
Gnathosomata ii	3.6			*Gnathosomata ii*	1.2

Table 6.4. Continued.

Year/Area/Mesh size/Species	Percent occurrence	Year/Area/Mesh size/Species	Percent occurrence	Year/Area/Mesh size/Species	Percent occurrence
2006		**Multi Mesh size n=14**		**Large Mesh size n=145 continued**	
Albemarle Area		*Brevoortia tyrannus*	28.6	*Brevoortia tyrannus*	57.9
Multi Mesh size n=5		*Callinectes sapidus*	14.3	*Dorosoma cepedianum*	26.2
Brevoortia tyrannus	80.0	*Dorosoma cepedianum*	14.3	*Callinectes sapidus*	25.5
Gnathosomata ii	40.0	*Pogonias cromis*	14.3	*Paralichthys spp.*	17.2
Callinectes sapidus	20.0	*Cynoscion regalis*	7.1	*Paralichthys lethostigma*	13.1
		Sciaenops ocellatus	7.1	*Lepisosteus osseus*	11.0
Small Mesh size n=15				*Moxostoma anisurum*	10.3
Brevoortia tyrannus	46.7	**Small Mesh size n=126**		*Rhinoptera bonasus*	8.3
Alosa spp.	6.7	*Brevoortia tyrannus*	14.3	*Sciaenops ocellatus*	8.3
Callinectes sapidus	6.7	*Callinectes sapidus*	2.4	*Alosa mediocris*	7.6
		Pomatomus saltatrix	2.4	*Amia calva*	7.6
Unknown Mesh size n=37		*Squalus acanthias*	2.4	*Cyprinus carpio*	6.2
Brevoortia tyrannus	10.8	*Sciaenops ocellatus*	1.6	*Morone saxatilis*	5.5
Callinectes sapidus	2.7	*Acipenser oxyrinchus*	0.8	*Micropogonias undulatus*	3.5
		Dorosoma cepedianum	0.8	*Ameiurus catus*	2.8
Pamlico Area		*Gnathosomata ii*	0.8	*Phalacrocorax Auritus*	2.8
Large Mesh size n=257		*Lagodon rhomboides*	0.8	*Acipenser oxyrinchus*	2.1
Callinectes sapidus	5.5	*Paralichthys spp.*	0.8	*Dasyatis sabina*	2.1
Brevoortia tyrannus	4.3	*Pogonias cromis*	0.8	*Erimyzon oblongus*	2.1
Sciaenops ocellatus	2.7	*Rachycentron canadum*	0.8	*Cynoscion nebulosus*	1.4
Limulus polyphemus	2.0			*Ictalurus spp.*	1.4
Paralichthys spp.	2.0	**Unknown Mesh size n=40**		*Pogonias cromis*	1.4
Dasyatis sabina	0.4	*Brevoortia tyrannus*	5.0	*Chelydra serpentina*	0.7
Dorosoma cepedianum	0.4			*Gnathosomata ii*	0.7
Lobotes surinamensis	0.4	**Rivers Area**		*Lagodon rhomboides*	0.7
Pomatomus saltatrix	0.4	**Large Mesh size n=145**		*Leiostomus xanthurus*	0.7
Rhinoptera bonasus	0.4	*Brevoortia tyrannus*	57.9	*M. saxatilis x chrysops*	0.7
		Dorosoma cepedianum	26.2	*Moxostoma spp.*	0.7

Table 6.4. Continued.

Year/Area/Mesh size/Species	Percent occurrence	Year/Area/Mesh size/Species	Percent occurrence
2006		**Small Mesh size n=61 (continued)**	
Rivers Area		*Peprilus spp.*	1.6
Large Mesh size n=145 (continued)		*Perca flavescens*	1.6
Perca flavescens	0.7	*Pomatomus saltatrix*	1.6
Pomoxis nigromaculatus	0.7		
		Unknown Mesh size n=40	
Multi Mesh size n=16		*Brevoortia tyrannus*	7.3
Brevoortia tyrannus	81.3	*Gnathosomata ii*	3.6
Acipenser oxyrinchus	18.8	*Alosa mediocris*	1.8
Alosa mediocris	12.5	*Leiostomus xanthurus*	1.8
Dorosoma cepedianum	12.5	*Pogonias cromis*	1.8
Sciaenops ocellatus	12.5		
Amia calva	6.3	**Sounds Area**	
Callinectes sapidus	6.3	**Large Mesh size n=9**	
Lepisosteus osseus	6.3	*Menticirrhus americanus*	11.1
Paralichthys lethostigma	6.3	*Pomatomus saltatrix*	11.1
Paralichthys spp.	6.3		
		Multi Mesh size n=2	
Small Mesh size n=61		*Brevoortia tyrannus*	100.0
Brevoortia tyrannus	24.6	*Dorosoma cepedianum*	100.0
Dorosoma cepedianum	19.7		
Callinectes sapidus	11.5	**Small Mesh size n=11**	
Lepisosteus osseus	9.8	*Pomatomus saltatrix*	9.1
Pogonias cromis	3.3		
Sciaenops ocellatus	3.3		
Amia calva	1.6		
Ictalurus spp.	1.6		
Lagodon rhomboides	1.6		
Morone saxatilis	1.6		

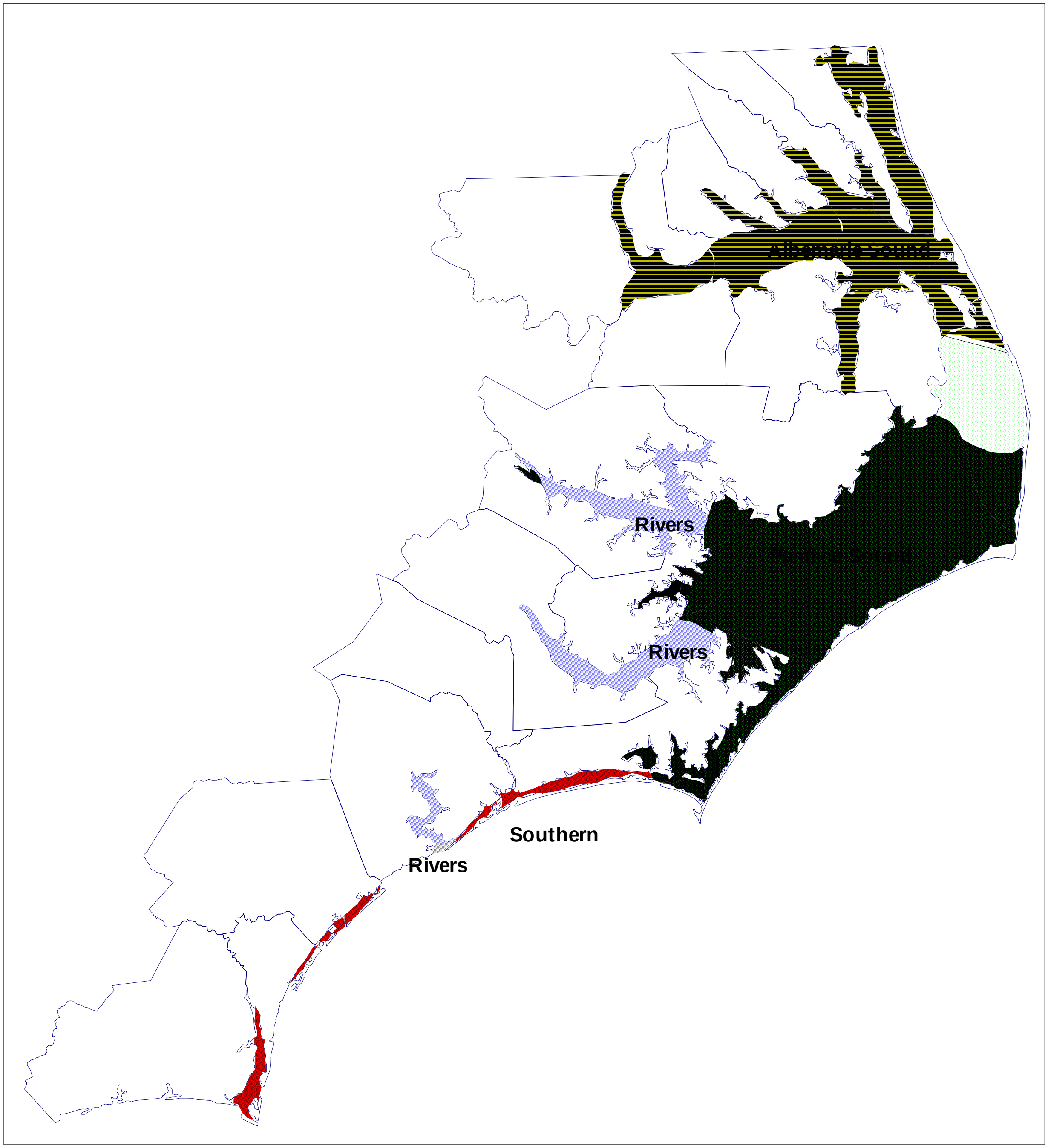


Figure 6.1. Fishing grounds of North Carolina's estuarine gill net fishery divided into the Albemarle, Pamlico, Rivers, and Southern areas.

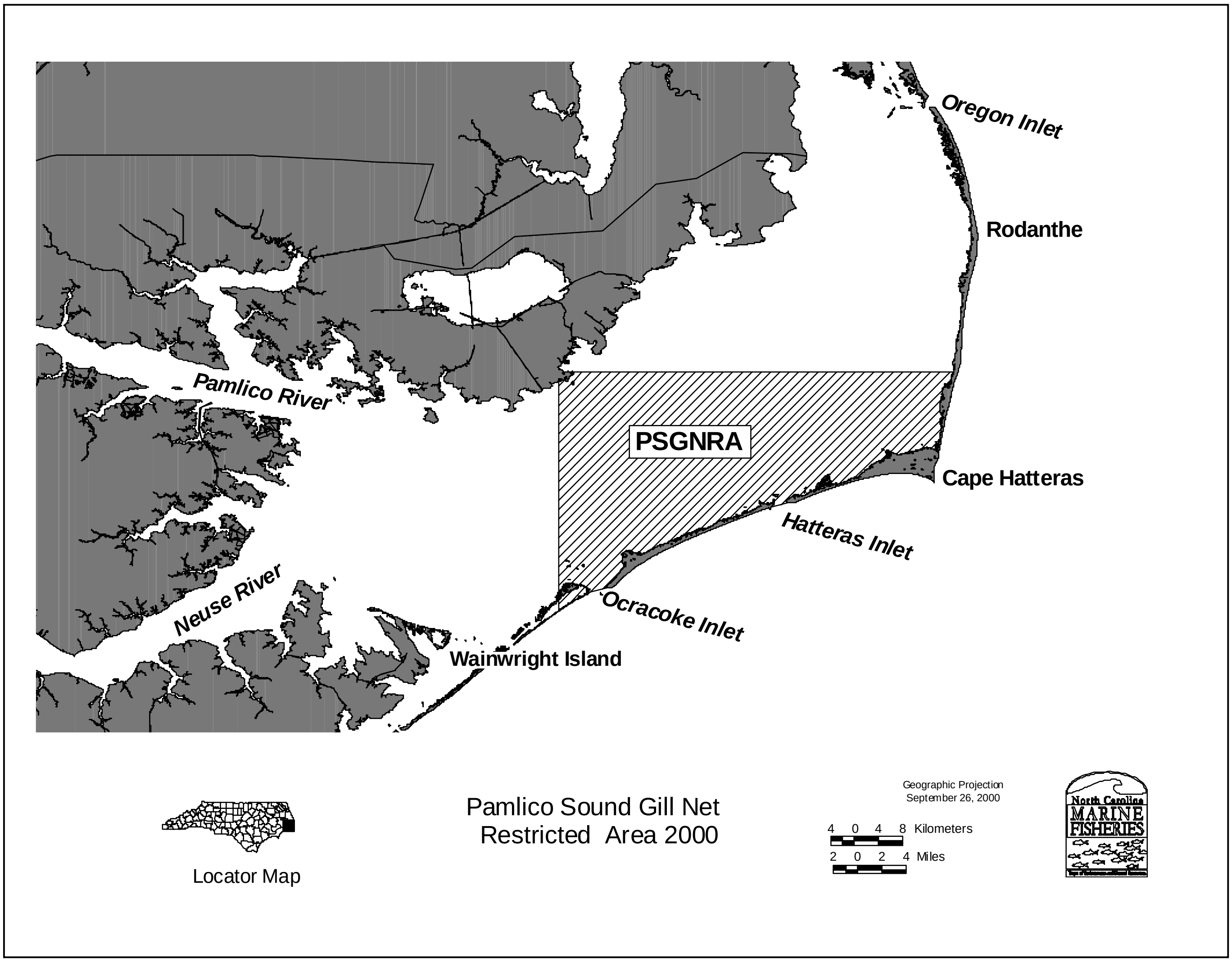


Figure 6.2. Map of southeastern Pamlico Sound and the 2000 Pamlico Sound Gill Net Restricted Area (PSGNRA) (Gearhart 2001).

ASSESSMENT OF NORTH CAROLINA COMMERCIAL FINFISHERIES, 2004-2007

Final Performance Report for Award Number NA04NMF4070216, 1-3

December 2007

SPECIES SECTION 7

Species Summarization:

Weakfish – Lee Paramore
Atlantic croaker – Katy West
Spot – John Schoolfield
Bluefish – Beth Burns
Black sea bass – Beth Burns
Scup - Beth Burns
Summer flounder – Chris Batsavage
Southern and Gulf flounders – Chris Batsavage

ABSTRACT

Length distributions, Catch-Per-Unit-Effort (CPUE), landings and management issues are described for weakfish (*Cynoscion regalis*), Atlantic croaker (*Micropogonias undulatus*), spot (*Leiostomus xanthurus*), bluefish (*Pomatomus saltatrix*), black sea bass (*Centropristis striata*), scup (*Stenotomus chrysops*), summer flounder (*Paralichthys dentatus*), southern flounder (*Paralichthys lethostigma*), and gulf flounder (*Paralichthys albigutta*). The length distribution of weakfish has remained relatively constant for all gears during the study period. The smallest weakfish, mostly less than 28 cm, were taken in the long haul and sciaenid pound net fisheries, while the ocean gill net, winter trawl, and estuarine gill net fisheries landed mostly fish >30 cm. Larger weakfish (>50 cm) were occasionally present, particularly in the ocean gill net fishery. From 1995-2006 the maximum lengths for Atlantic croaker increased for all fisheries, up to 62 cm in 2006 in both the long haul and ocean trawl fisheries. The minimum length ranges have remained fairly constant for all fisheries from 1995-2006 at 19-20 cm. The modal peaks have increased slightly in 2004-2006 for several fisheries (sciaenid pound net, ocean trawl, and estuarine gill net). Length ranges in the estuarine and ocean gill net fishery were mostly consistent from 1995-2005 but in 2006 there was a decrease in size in the gill net fisheries. Long haul seine length frequencies have shown little change from 1995-2006. Small bluefish (24-46 cm) dominated long haul seine and estuarine gill net catches. Ocean gill nets were important contributors of all sizes of bluefish, and particularly to large (>58 cm) bluefish. The ocean trawl fishery captured a wide range of size classes, but small fish predominated. Examination of the length distributions suggested that black sea bass were fully recruited to the ocean trawl fishery at about 22 cm in the late 1980's though 1998, but increased to 26 cm from 1999-2006. The contribution of larger (>40 cm) black sea bass increased in recent years to as much as 24-26% in 2005 and 2006. Limited data is available for scup due a depressed stock as well as the lack of interest in the species by North Carolina fishermen. The mode of scup captured in recent years has increased from 24-26 cm in 2003 to 28-30 cm in 2006, and the contribution of fish >30 cm increased to 19% of the 2006 catch. The effects of minimum size limit changes (13 in to 14 in) are evident in the length distributions and the proportion of summer flounder landed. The size range of summer flounder landed has increased over the time period, as the proportion of summer flounder >50 cm increased to 15-17% from 2003 to 2006. The weighted length distributions for southern flounder landed in the flounder pound net fishery ranged from 26 to 76 cm from 1995-2006, but length frequency distributions varied annually. Size distribution in 2005 & 2006 were influenced by a minimum size increase to 14 in (35.6 cm). Southern flounder 38 cm and smaller comprised 64-77% of the estuarine gill net catch during 1995-2004, and 57% in 2006. Gulf flounder landed in the flounder pound net fishery from 1996 to 2006 ranged from 30-52 cm, but the majority were less than 46 cm. The weighted length distributions for Gulf flounder landed in the estuarine gill net fishery from 1996 to 2006 ranged from 30 to 54 cm, but the majority were less than 40 cm.

Landings and CPUEs of summer flounder, black sea bass and scup were directly impacted by commercial quotas and trip limits and were not compared in this report. After a brief increase in landings and CPUE through the late 1990s, weakfish landings and CPUE have dramatically declined for all gears through 2006. The 2006 commercial landings are at historical lows. Overall commercial marketable landings for Atlantic croaker rose consistently since 1995 with a peak in 2003 at 6,545 mt. Spot landings reached a historical low in 2006 and have been decreasing since 2001 with the exception of 2004 when there was a slight increase. CPUEs in all fisheries combined have fluctuated without trend from 1995-2006 but the CPUE value in 2006 was the lowest of the twelve-year study period.

INTRODUCTION

North Carolina's commercial finfisheries capture a variety of species important to the State. The top three species, in value, for the period 2004-2006 were southern flounder (*Paralichthys lethostigma*), summer flounder (*Paralichthys dentatus*), and Atlantic croaker (*Micropogonias undulatus*) (NCDMF Commercial Landings Database). Several other species captured by the fisheries described in this document are included in the top 25 commercially important finfish. These include weakfish (*Cynoscion regalis*), spot (*Leiostomus xanthurus*), bluefish (*Pomatomus saltatrix*), and black sea bass (*Centropristis striata*).

Data on the target species were compiled from the long haul seine, pound net, winter trawl, ocean gill net, and estuarine gill net fisheries in order to present a statewide assessment for each of these fish. Target species, except southern flounder, have Mid-Atlantic Fishery Management Council (MAFMC), or Atlantic States Marine Fisheries Commission (ASMFC), or joint MAFMC/ASMFC fishery management plans (FMP). In addition the North Carolina Division of Marine Fisheries (NCDMF) prepared a state Interjurisdictional (IJ) FMP that adopts these federal FMP's, consistent with North Carolina law, by reference and implements corresponding fishery regulations in North Carolina in order to provide compliance or compatibility with approved federal FMP's and amendments. The North Carolina Marine Fisheries Commission (NCMFC) adopted the IJ FMP in February 2005. The purpose of the species section is to provide information on the length distribution, catch per unit effort, and landings of selected commercially important finfishes of North Carolina. Prior reports included age distributions, but age distributions will no longer be reported. Age data is collected and available for the target species. Since species age series are generally constructed for coast wide assessments under specific protocols, it was determined to be inefficient and burdensome to include incomplete age series in this report.

METHODS AND MATERIALS

The NCDMF has sampled the state's major commercial finfisheries on a continual basis since 1982. Winter trawl, ocean winter trawl, and ocean trawl were used interchangeably in this report to describe the trawl fishery, which takes place in the ocean generally from November through April. This fishery consists of two main components: flynets and flounder trawl. A flynet is a two seam otter trawl designed to target sciaenids, bluefish and Atlantic mackerel. Although this report emphasizes the study period (July 2004 through June 2007) we have presented historical data in this section so that trends in these important species can be described and discussed.

For the species discussed the following standard annual information is presented for selected fisheries and combined overall: marketable harvest (mt and number of individuals) and value (ex-vessel dollars), trips, bait (estimated mt and number of individuals), marketed catch per trip (CPUE, kg), separate length distributions (cm) for bait and marketed. Two major methodology changes from previous project reports include the length graphs only represent the marketed component, and CPUEs are solely calculated from dealer submitted landings and trips from the

North Carolina Trip Ticket Program (NCTTP). Trips for each species include a count of all trips where the species was present on the trip ticket (excludes zero catch trips). Previous reports CPUEs were based on the biological sample data collected at the fish houses.

The number of individuals, weight, and length frequencies of each species in a sample (see Fisheries Methods Sections) were expanded to represent the species quantities in the total State catch (trip sample data were expanded to represent the total catch-see Fisheries Methods Section for details). Expansion was accomplished by matching at the market grade level biological fish house sample data (mean weight or length data) to the corresponding NCTTP market grade harvest. For example, the total length frequency of a species within a catch was derived by expanding the length frequency of the individuals measured in the subsample of a market grade (culled samples) to the total market category weight of that species in the sampled trip. These sample distributions were then summed and the summed distribution applied to the total state landings of that market grade. Finally, all of the annual (or semi-annual) market grade distributions were summed to produce a single annual length distribution (i.e., weighted by number individuals in each distribution). In cases where only partial data sets were obtained such as no fish house sample for a reported market grade, substitute values were calculated across fisheries within the year. In cases where species collection weight was obtained, but not species collection number, substitute estimates based on means calculated from available data in the same or adjacent sampling cells were used to fill in missing values. Also for the flounder species an additional step was needed to first divide the NCTTP data, which records all flounder landed in the ocean as summer flounder and all flounder landed in estuarine waters as southern flounder, into the component species (southern, summer, and Gulf). The proportion of these species in the biological fish house samples was used to accomplish this.

Total weight of a species in the scrapfish samples was calculated by determining the proportion of a species in the subsample and expanding that to the respective species proportional weight of the total scrapfish for the trip. Scrapfish sampling was initiated in 1986. The number of individuals per species in the scrapfish component was calculated by expanding the number of individuals in the sample to represent the total weight of the species for the scrapfish in the samples. Estimates of annual statewide scrapfish landings for individual species were determined by applying the tri-annual ratio of marketable fish to scrapfish in the fish house samples to the reported triannual marketable landings (see Fishery Methods Sections).

WEAKFISH

Background

Weakfish (*Cynoscion regalis*) occur along the east coast of the United States from southern Florida to the Gulf of Maine, and occasionally as far north as Nova Scotia. They are most abundant from North Carolina to New York. Weakfish spawn near the inlets along the coast and in the sounds from March through September, with peak spawning occurring during May and June. Young weakfish are most abundant in the deeper areas of the estuaries in July and August. Juveniles and adults migrate out of the estuaries to the ocean with declining water temperatures in the fall. In general, adult weakfish follow a seasonal migratory pattern, moving south and offshore during autumn/winter and north and inshore during spring/summer. Adults return to the estuaries in the spring and spend the summer in the sounds and bays. Eighty-five percent of weakfish are mature at age 1 (7-8 in TL) and 99% are mature by age 2 (Daniel and Armstrong 2000). Weakfish size at age is highly variable, but in general, they reach age 1 at about 18 cm (7 in), age 2 at 25.5 cm (10 in), age 3 at 30.5-33 cm (12-13 in), age 4 at 38-43 cm (15-17 in), and ages 5-7 from 43-71 cm (17-28 in) (ASMFC 1991, Lowerre-Barbieri 1994).

Weakfish are harvested by both commercial and recreational methods along the east coast from Massachusetts to Florida. Commercial fisheries have generally followed the stock on their annual north-south migration to wintering grounds off Virginia and North Carolina. Pound nets, long haul seines, and gill nets are the principal fisheries that operate during spring and summer whereas ocean winter trawl (flynet) and sink net fisheries are active in late fall and winter. Weakfish support an important recreational fishery in the mid-Atlantic (ASMFC 1996).

Length Distributions

Fishery dependent sampling for lengths was conducted in the long haul seine fishery, sciaenid pound net fishery, ocean sink net fishery, ocean winter trawl fishery and the estuarine gill net fishery. For each North Carolina fishery, annual length distributions (all lengths reported in fork length (FL)) weighted by commercial landings (kg, quarterly) are presented for weakfish.

The length distribution of weakfish in the long haul seine fishery has shifted to larger fish since the 25.4 cm (10 inch) TL size limit was implemented in 1992. The 26-30 cm size classes have consistently dominated the catches during the most recent period of 1995 to 2006 (Figure 7.1). The annual range of lengths has remained constant with fish 24-42 cm accounting for the vast majority of the landings.

The sciaenid pound net fishery is seasonally and geographically similar to the long haul seine fishery and has historically taken similarly sized weakfish, with a modal peak of 26 to 30 cm (Figure 7.2). The modal peak in size distribution of these catches has varied little since 1995 and is just above the 25.4 cm (10 inch) TL minimum size limit. The annual range of lengths continues to be constant with fish 24-42 cm accounting for most of the fish.

In the early 1980s the ocean sink net fishery had a bimodal distribution with one group at 34-36 cm and another at 72-74 cm. The group of larger fish was not observed after 1985 but started to become more representative in catches in 1996 with over 12% of the fish greater than 44 cm versus 0% over that size in 1993. Since 1999 the bimodal distribution has been apparent, although larger fish are not consistently landed from year to year. For example, in 2005 the majority of the catch was over 60 cm, while 2006 yielded very few fish over 50 cm (Figure 7.3).

The length distributions of weakfish taken in the ocean winter trawl (flynet) fishery were dominated by small weakfish less 24-26 cm until regulatory changes that occurred in the mid-1990s. The closure to flynets south of Cape Hatteras that serves as an overwintering nursery area for age 0 and 1 weakfish, an increase in the minimum size limit to 30.5 cm (12 in) TL, and an increase in the minimum trawl mesh size has dramatically altered the size distribution of the catches in this segment of the fishery. The modal peak, which was as low as 21 cm in 1988, has shifted to larger fish during the most recent period and has been as high as 32 cm in recent years (Figure 7.4). The majority of the fish taken in this fishery since 1995 have been between 28 and 48 cm TL.

Fish ranging from 30-44 cm TL have dominated the estuarine gill net fishery landings since 1995 (Figure 7.5). The modal size of fish taken in this fishery has ranged from a low of 34 cm in 1997 to a high of 40 cm in 1998. Since 1997 the minimum size limit in this fishery has been 30.5 cm (12 in) TL, an increase from 25.4 cm (10 in) TL that was in place prior to the adoption of Amendment 3.

Annual length distributions for weakfish combined across all fisheries (weighted by number of individuals) reflect the contribution, by size, of each fishery to the overall harvest (Figure 7.6). The implementation of different minimum size limits has resulted in a shift in the size distributions of the different fisheries in North Carolina. Estuarine long haul seine and pound nets have a minimum size limit of 25.4 cm (10 inches) TL and consequently most of the landings from these gears are comprised of weakfish less than 28 cm. All ocean fisheries (i.e., ocean trawl and sink net) as well as, estuarine gill nets have a minimum size limit of 30.5 cm (12 inches) TL, and while some 26 to 28 cm fish are taken, 30 cm and larger fish dominate the catches. The largest weakfish are typically encountered in the ocean fisheries, particularly the sink net fishery.

Table 7.1 presents the size distribution of weakfish in bait samples. Bait sizes range from 14-36 cm. Dominant length modes for bait weakfish by fishery were 18-26 cm for the long haul seine, 18-26 cm for pound net fisheries, and 18-30 cm in the ocean trawl. The implementation of minimum size limits and mesh restrictions have resulted in a significant decline in the bait/scrap component of the weakfish fishery.

CPUE and Landings

The long haul seine fishery accounted 6.4 to 32.3% of the marketable North Carolina weakfish landings during the report period (Table 7.2). Landings and CPUE (weight and number) for weakfish by fishery are presented in Table 7.3 and Figure 7.7 (weight only). Long haul seine landings exhibited a slight increase in 1997 but have generally trended down over the past dozen years to their lowest level in 2006. The bait component of this fishery is much lower than in previous years. In 1991 the bait component represented 43% by number of the overall harvest of weakfish. In more recent years the bait component has been much lower and has ranged from been less than 1% to 21% of the weakfish harvest by number since 1995 (Table 7.3).

The sciaenid pound net fishery is a minor contributor to the marketable North Carolina weakfish landings ranging from 0.7% to 3.8% of the overall landings from 1995-2007 (Table 7.2). Landings and CPUE show a downward trend (Figure 7.7). The bait component of this fishery is low and made up between less than 1 and 12% of the number of weakfish landed in this gear every year since 1995 (Table 7.3).

Ocean sink nets have been the single largest contributor to landings of marketable weakfish over the last 12 years. Annual contributions have fluctuated from a high of 72.2% in 2001 to a low of 36.5% in 1992 (Table 7.2). While ocean sink net landings exhibited an upward trend during the mid-1990s, landings have declined dramatically since, reaching the lowest annual landings in the time series in 2005. (Figure 7.7). The CPUE trends are similar to landings with the exception of 2001 and 2002, which saw an increase in CPUE. Essentially all weakfish taken in this fishery were marketable (Table 7.3).

The ocean winter trawl fishery has seen an overall decrease in its contribution to the states weakfish landings. During the early 1990's winter trawl fisheries contributed >40% of the overall landings, however since 1995, the overall annual contribution has ranged from a low of 7.4% in 2004 to a high of 30.6% in 2000 (Table 7.2). In the current period, landings have been low compared to historical records but were relatively stable until 2000 (Figure 7.7). In five of the past six years, winter trawl landings in North Carolina have been at the lowest level in the time series with the lowest annual total occurring in 2006. Since 1995 bait weakfish has decreased accounting for between 9% and 18% of the total catch by number through 2000. In more recent years however, the dramatic decrease in marketable weakfish landings has caused the bait to market ratio to increase and weakfish landed as bait accounted for 21% to 89% of all weakfish landed from 2001 to 2006 (Table 7.3). It is important to note that discards made at sea were not accounted for in these figures.

Estuarine gill nets annual contribution to weakfish landings has ranged from 5.3% to 24% annually since 1995 (Table 7.2). Landings were low in the early 1990's, increased through the mid-1990's and have decreased steadily until 2001 (Figure 7.7). From 2001 to 2006, landings have been low but stable. The CPUE has followed a similar trend to landings. Essentially all weakfish taken in this fishery were marketable (Table 7.3).

Annual landings and CPUEs for weakfish combined across these five fisheries (weighted by respective fishery landings - kg) are presented in Figure 7.7. Landings and CPUE trends for the combined fisheries are down dramatically. Current landings are the lowest on record. While these observations may be partly attributed to the implementation of rigid controls on the fishery, weather patterns or market conditions, it appears that the weakfish population along the Atlantic coast is currently at a level of low abundance.

Management Issues

The ASMFC adopted the Fishery Management Plan for Weakfish (FMP) in 1985. Original provisions of the plan called for the delay of harvest of weakfish until age 1 and promoted the use of Bycatch Reduction Devices (BRDs) in the southern shrimp fishery. The continuing weakfish decline prompted the adoption of Amendment 1 in October 1991. The FMP declared weakfish overfished with fishing mortality rates twice the level recommended to insure long-term stock replacement. Amendment 1 adopted the target fishery mortality rate of F_{20}, thus setting F=0.35 and recommended management measures to reduce fishing mortality by 52% by 1995. However, during 1992-1993, none of the states with directed weakfish fisheries had achieved the mortality reduction goals (ASMFC 1996).

The failure of states to implement the management measures for weakfish under the original voluntary state compliance with the ASMFC FMP contributed to the enactment of the Atlantic Coastal Fisheries Cooperative Management Act in December 1993. This act provided for mandatory state compliance with ASMFC approved FMPs. The law provides that the federal government may impose a moratorium in the state in the event that the state is not in compliance with the FMP.

Amendment 2 was passed in October 1994 as a temporary measure to stabilize the decline of weakfish until a more comprehensive amendment could be developed. Amendment 2 required: 1) states with directed weakfish fisheries to implement a 12 inch TL minimum size or equivalent measure; 2) states must maintain current minimum mesh sizes; 3) states with directed fisheries to implement harvest control strategies to reduce exploitation 25% by 1 April 1995; 4) South Atlantic states to implement management measures to achieve the 50% reduction in weakfish bycatch in the shrimp trawl fisheries for the 1996 shrimp fishing year; and 5) in the event that the ASMFC did not complete Amendment 3 by March 31, 1996, states with directed weakfish fisheries must implement harvest control strategies to achieve F_{20} for the fishing year beginning 1 April 1996 (ASMFC 1996).

The Weakfish Management Board passed Amendment 3 in May 1996. The objectives of Amendment 3 were: 1) to rebuild the weakfish stock over a five year period; 2) to reach and maintain a target fishing mortality rate of F = 0.5; and 3) to restore the historic, expanded age and size structure of the stock. To comply with Amendment 3 to the Weakfish FMP, the North Carolina Marine Fisheries Commission and the North Carolina Division of Marine Fisheries (NCDMF) put into place in 1997 the following management measures for weakfish:

1. For hook-and-line, a 14 in TL minimum size and 10 fish per person per day limit;
2. For commercial gear within state waters or within 200 miles of shore in the Atlantic Ocean, a 12 in TL minimum size;
3. For long haul seines and pound nets in internal waters, a 10 in TL minimum size;
4. Defined a flynet and specified a minimum stretched mesh length of 3 ½ in hung on the square or 3 ¾ in hung on a diamond. Prohibited flynets south of Cape Hatteras to the NC/SC border line.
5. One or more functional BRDs must be installed in shrimp trawl tailbags. The NCDMF has documented the weakfish reduction capability of three devices (Florida Fish Excluder, large mesh, and extended funnel BRDs) at over 40% by number.

The Weakfish Management Board passed Amendment 4 in November 2002. The objectives of Amendment 4 were designed to build on the achievements of Amendment 3 and continue to manage the fishery by minimum size limits, bag limits, minimum mesh sizes, bycatch reduction devices in shrimp trawls and long hauls seines, and the closure south of Cape Hatteras to flynets. Changes in North Carolina's fisheries as a result of Amendment 4 included a recreational bag/size limit of 7 weakfish at 12 in TL and an increase in the commercial trip limit from 150 to 300 lbs for bycatch of weakfish in any gear not meeting the minimum mesh sizes required for targeting weakfish. All weakfish bycatch must have an equal poundage of other species on board the vessel in order to retain and land any weakfish.

The original 1985 FMP suggested that by protecting the young of the year and delaying harvest to age two, the weakfish stock would improve. This is precisely what North Carolina has done with size limits and gear restrictions. In fact, many of the management options taken to date have been directed toward achieving this objective. Requiring BRDs in South Atlantic shrimp trawl fisheries has reduced bycatch of weakfish by at least 40%. Minimum size, mesh, and harvest restrictions have increased the age of recruitment in directed fisheries to age three and an additional year class has made it through the fishery each year since 1994. Finally, the closure of the flynet fishery south of Cape Hatteras has protected millions of age 0 and age 1 weakfish in their overwintering nursery area. Because 85% of weakfish are sexually mature at age one, the majority of weakfish are now able to spawn at least twice before becoming vulnerable to directed harvest.

Despite the various conservation measures and harvest restrictions in place for weakfish, weakfish landings from 1999 to 2006 have plummeted to all time lows along the Atlantic coast. The most recent stock assessment conducted on data from 1982 to 2003 indicates that weakfish are currently at levels of low spawning stock biomass (ASMFC 2006). The primary findings indicate that there has been no apparent substantive increase in fishing mortality to explain the dramatic decrease in weakfish biomass. The available data suggests instead, that natural mortality has risen sharply, likely causing the weakfish decline. Culprits for this increase are not fully understood, although insufficient forage, especially menhaden, and increased predation by striped bass have been strongly correlated to the recent decline. Cyclical changes in abundance over time are not uncommon for weakfish, which have experienced periodic high and low commercial landings dating back to the 1920s.

While the most recent assessment was not accepted by external review, the ASMFC Weakfish Management Board did accept five conclusions from the report: 1) the stock is declining; 2) total mortality is increasing; 3) there is not much evidence of overfishing; 4) something other than fishing mortality is causing the decline in the stock; and 5) there is a strong chance that regulating the fishery will not, in itself, reverse stock decline.

In response to the significant decline in stock abundance and increasing mortality since 1999, the Board passed Addendum II to Amendment 4 in 2007 as an effort increase the probability that the stock may rebuild. Changes included a more conservative recreational creel limit (6 fish) and commercial bycatch limit (150 lbs), and an annual commercial landings limit of 3.7 million pounds (based on average coastwide landings from 2002-2004). These management measures are to be re-evaluated when either the coastwide commercial landings equal or exceed 80% of the commercial landings limit or any single state’s landings exceed its five-year mean by more than 25% in any single year.

A final point to consider for providing a stable weakfish population is the maintenance of quality weakfish habitat. Habitat impacts may have two different effects on weakfish. Impacts that result in mortality above that which would occur naturally will reduce the size of the population. The other type of impact reduces or eliminates marketability but may not increase mortality. This includes non-lethal levels of contaminants that render fish unfit for human consumption, or changes in water quality that cause fish to be unfit for consumption. The NCDMF needs to identify essential weakfish habitat and work with other state agencies to preserve and protect it.

Table 7.1 North Carolina weakfish (Cynoscion regalis) expanded length frequency of bait samples for selected fisheries, 1995-2006; n=number of fish measured, en=expanded number of individuals in catches sampled.

				Length (cm)											
Fishery/ Year	n	en	number	14	16	18	20	22	24	26	28	30	32	34	36
Ocean trawl															
1995	92	16,441	210,849	2.9	7.2	20.5	12.1	8.9	25.9	14.9	5.5	0.4	0.7	0.4	0.7
1996	62	3,864	34,700	-	1.5	1.0	2.9	6.2	12.3	26.3	22.1	10.5	6.2	10.7	0.3
1997	176	13,252	76,356	2.4	2.7	14.3	9.3	7.8	4.8	20.8	21.2	10.5	3.4	1.2	1.3
1998	117	7,988	45,636	-	0.1	4.9	3.4	0.1	2.9	24.2	29.2	15.7	6.5	2.9	10.1
1999	264	22,198	112,421	2.8	7.7	13.8	15.6	9.6	10.9	14.6	10.5	5.6	3.8	2.9	12.4
2000	476	17,589	51,927	1.3	2.6	2.6	9.5	5.7	11.3	17.3	21.0	10.4	5.0	5.9	7.4
2001	205	6,674	146,389	-	-	5.5	12.5	6.1	19.3	19.2	12.0	13.3	7.6	1.8	2.7
2002	350	11,083	102,503	0.3	2.0	17.3	20.1	6.3	7.8	11.7	10.9	11.7	7.0	2.3	2.6
2003	167	11,392	202,476	1.2	0.9	3.5	3.7	2.5	10.1	20.2	22.5	12.4	6.9	5.2	11.0
2004	203	12,024	436,156	0.1	2.1	5.0	2.0	9.8	24.4	24.8	20.7	8.2	2.3	0.7	-
2005	153	15,705	135,563	1.0	2.1	6.9	14.2	3.4	24.1	20.9	19.9	3.2	2.2	1.8	0.4
2006	275	23,848	151,794	-	0.5	13.9	18.6	17.8	18.4	17.7	5.9	5.0	1.2	0.9	-
Ocean gill net															
1995	0	0	25	-	-	-	-	-	-	-	-	-	-	-	-
1996	0	0	6	-	-	-	-	-	-	-	-	-	-	-	-
1997	0	0	6	-	-	-	-	-	-	-	-	-	-	-	-
1998	0	0	6	-	-	-	-	-	-	-	-	-	-	-	-
1999	0	0	6	-	-	-	-	-	-	-	-	-	-	-	-
2000	0	0	0	-	-	-	-	-	-	-	-	-	-	-	-
2001	0	0	0	-	-	-	-	-	-	-	-	-	-	-	-
2002	0	0	13	-	-	-	-	-	-	-	-	-	-	-	-
2003	4	16	470							75.0		25.0			
2004	0	0	12	-	-	-	-	-	-	-	-	-	-	-	-
2005	0	0	13	-	-	-	-	-	-	-	-	-	-	-	-
2006	5	5	27	-	-	-	20.0	-	20.0	-	-	40.0	20.0	-	-
Sciaenid pound net															
1995	11	86	1,356	44.2	-	-	-	25.6	-	25.6	4.7	-	-	-	-
1996	19	285	2,635	-	1.1	2.8	25.6	28.1	39.6	2.8	-	-	-	-	-
1997	11	96	1,890	-	-	-	30.2	22.9	46.9	-	-	-	-	-	-
1998	11	222	1,249	-	-	-	-	35.1	30.2	27.5	3.6	-	-	-	-
1999	13	469	4,165	-	-	0.6	30.1	38.2	21.5	9.6	-	-	-	-	-
2000	1	31	317	-	-	100	-	-	-	-	-	-	-	-	-
2001	7	69	1,095	-	8.7	49.3	-	-	42.0	-	-	-	-	-	-
2002	0	0	0	-	-	-	-	-	-	-	-	-	-	-	-
2003	10	92	778	-	-	-	-	-	-	80.4	19.6	-	-	-	-
2004	0	0	0	-	-	-	-	-	-	-	-	-	-	-	-
2005	4	595	1,192	-	-	-	-	62.9	37.1	-	-	-	-	-	-
2006	3	18	120	-	-	77.8	22.2	-	-	-	-	-	-	-	-

Table 7.1 (Continued)

Fishery/ Year	n	en	number	Length (cm) 14	16	18	20	22	24	26	28	30	32	34	36
Long haul															
1995	29	497	14,644	-	-	-	-	7.8	48.3	43.9	-	-	-	-	-
1996	129	10,150	133,674	-	0.5	6.1	21.7	35.1	33.1	2.4	1.0	-	-	-	-
1997	7	695	8,738	-	-	-	77.7	20.1	-	-	2.2	-	-	-	-
1998	10	791	12,575	-	-	-	26.5	18.1	35.1	-	20.2	-	-	-	-
1999	69	3,926	57,964	0.8	5.9	45.1	34.9	9.8	0.3	0.8	1.3	-	1.2	-	-
2000	47	3,225	17,129	-	-	20.5	34.3	26.2	15.0	2.9	1.2	-	-	-	-
2001	2	119	754	-	-	-	-	-	-	100	-	-	-	-	-
2002	3	358	4,391	-	-	85.5	-	-	-	13.4	1.1	-	-	-	-
2003	32	2,095	18,675	7.1	12.9	46.3	8.8	9.8	6.7	8.5	-	-	-	-	-
2004	15	2,289	13,810	-	3.8	10.9	19.3	18.2	44.8	3.0	-	-	-	-	-
2005	2	132	1,556	-	-	49.2	-	50.8	-	-	-	-	-	-	-
2006	18	1,381	17,874	-	-	11.7	21.8	32.7	22.3	-	-	11.5	-	-	-
Estuarine gill net															
1995	-	-	1,875	-	-	-	-	-	-	-	-	-	-	-	-
1996	-	-	3,068	-	-	-	-	-	-	-	-	-	-	-	-
1997	15	19	75	-	5.3	-	5.3	-	5.3	36.8	-	21.1	26.3	-	-
1998	0	0	25	-	-	-	-	-	-	-	-	-	-	-	-
1999	2	2	9	-	-	-	50.0	-	-	-	-	-	-	50.0	-
2000	0	0	12	-	-	-	-	-	-	-	-	-	-	-	-
2001	6	6	31	-	-	-	-	-	-	33.3	16.7	16.7	16.7	-	16.7
2002	0	0	32	-	-	-	-	-	-	-	-	-	-	-	-
2003	0	0	12	-	-	-	-	-	-	-	-	-	-	-	-
2004	0	0	13	-	-	-	-	-	-	-	-	-	-	-	-
2005	0	0	0	-	-	-	-	-	-	-	-	-	-	-	-
2006	0	0	0	-	-	-	-	-	-	-	-	-	-	-	-

Table 7.2. North Carolina commercial landings of marketable weakfish by fishery,1995-2006, includes landings (metric tons), value (thousands dollars) and contribution of fishery to NC weakfish landings.

	YEAR											
Fishery	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Long Haul												
Metric Tons	136.1	138.6	203.5	168.7	75.6	68.7	109.2	56.6	100.3	100.3	45.6	33.2
Value ($)	151.5	155.6	204.5	165.9	80.6	80.3	114.8	60.8	132.3	144.3	80.1	60.9
% State	7.3	7.7	12.6	11.1	6.4	8.1	12.3	6.8	26.0	32.3	23.8	20.2
Flounder Pound Net												
Metric Tons	9.3	3.1	6.1	1.8	1.9	0.6	3.1	0.7	<0.1	0.2	0.3	0.1
Value ($)	10.3	3.9	6.5	1.9	2.3	0.9	3.2	0.9	<0.1	0.4	0.6	0.3
% State	0.5	0.2	0.4	0.1	0.2	0.1	0.3	0.1	<0.1	0.1	0.2	0.1
Sciaenid Pound Net												
Metric Tons	43.0	37.1	61.6	44.8	40.3	12.1	6.4	10.5	2.7	2.8	6.6	1.7
Value ($)	47.2	42.3	62.6	44.0	42.7	13.8	6.8	11.4	3.3	4.0	11.0	3.1
% State	2.3	2.1	3.8	2.9	3.4	1.4	0.7	1.3	0.7	0.9	3.5	1.1
Estuarine Gill Net												
Metric Tons	185.1	95.4	171.1	137.2	120.5	80.2	48.8	43.9	32.5	41.4	47.1	34.2
Value ($)	246.8	127.0	214.3	158.9	149.3	107.2	56.5	54.5	46.8	68.0	91.7	68.6
% State	9.9	5.3	10.6	9.0	10.1	9.5	5.5	5.3	8.4	13.3	24.6	20.8
Ocean Gill Net												
Metric Tons	976.7	1,279.0	723.2	896.1	599.8	362.5	645.4	477.9	190.7	136.8	58.9	77.6
Value ($)	116.9	1,669.1	850.9	1,009.9	698.0	493.3	764.5	610.8	268.5	227.6	113.5	143.9
% State	52.3	70.9	44.8	58.9	50.5	42.8	72.6	57.6	49.5	44.0	30.8	47.2
Ocean Trawl												
Metric Tons	387.1	163.4	393.4	218.1	302.5	259.7	68.3	229.8	55.7	22.9	24.2	12.5
Value ($)	383.4	200.4	466.2	257.0	364.8	322.9	82.5	302.1	77.6	35.0	45.1	23.9
% State	20.7	9.1	24.4	14.3	25.5	30.6	7.7	27.7	14.5	7.4	12.7	7.6
Other Fisheries												
Metric Tons	128.4	87.5	56.4	54.7	46.6	63.9	7.9	9.6	3.1	6.4	8.6	5.2
Value ($)	156.2	106.2	64.7	60.6	53.4	71.5	8.8	10.7	4.2	9.6	14.9	9.9
% State	6.9	4.9	3.5	3.6	3.9	7.5	0.9	1.2	0.8	2.1	4.5	3.2
All												
Metric Tons	1,865.7	1,804.1	1,615.2	1,521.3	1,187.3	847.7	889.1	829.1	385.0	310.9	191.2	164.6
Value ($)	2,165.3	2,304.4	1,869.6	1,698.3	1,391.0	1,090.0	1,037.2	1,051.1	532.9	488.9	357.1	310.7

Source: North Carolina Division of Marine Fisheries commercial landings database.
Long Haul includes: gear code 030 or 025 and non-ocean waters.
Flounder Pound Net includes: gear code 275, months October, November, December for counties Beaufort, Carteret, Dare, Hyde, Tyrrell, and month September for counties Beaufort, Carteret, Hyde and Tyrrell.
Sciaenid Pound Net includes: gear code 275, months May through August for counties Dare and Hyde, and month September for Dare.
Estuarine Gill Net includes: gear code 425, 426, 427, 470, 475, 480 and all non-ocean waters.
Ocean Gill Net includes: gear code 425, 426, 427, 470, 475, 480 and Atlantic Ocean.
Ocean Trawl includes: gear codes 210 and 230, Atlantic Ocean, and months January through May and September through December.

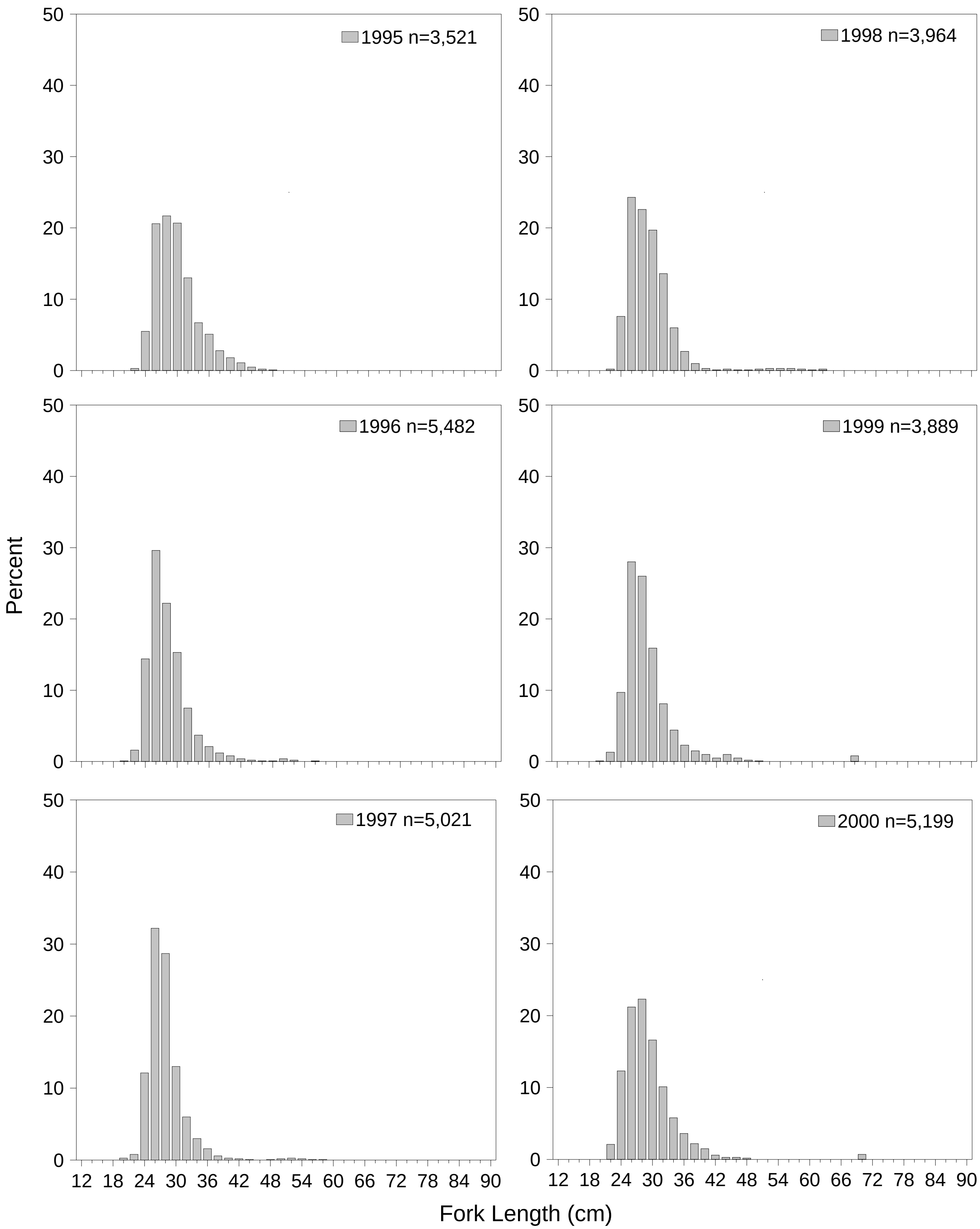


Figure 7.1. North Carolina long haul seine fishery weighted length frequency distributions for marketable weakfish (*Cynoscion regalis*), 1995-2006.

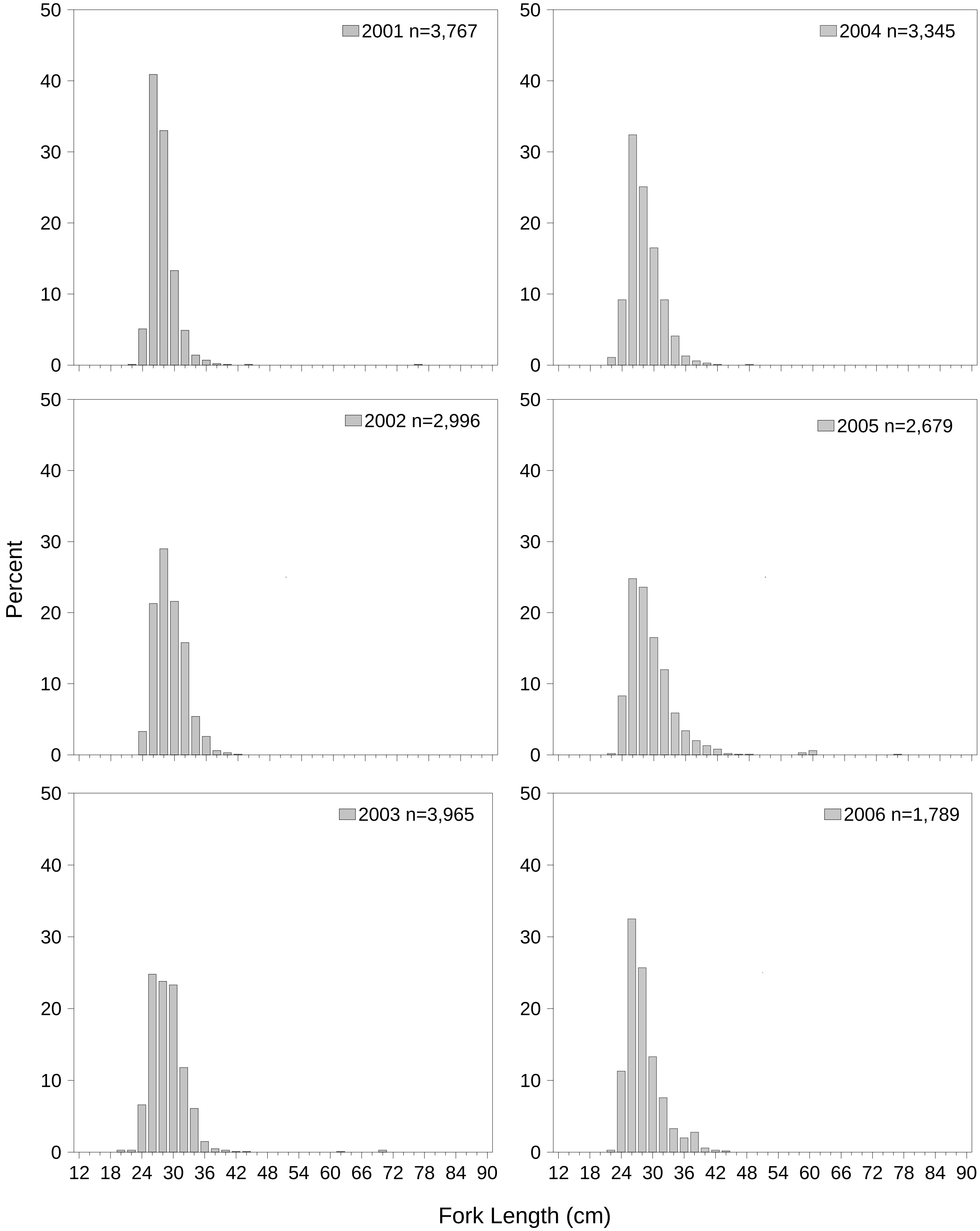


Figure 7.1. (Continued).

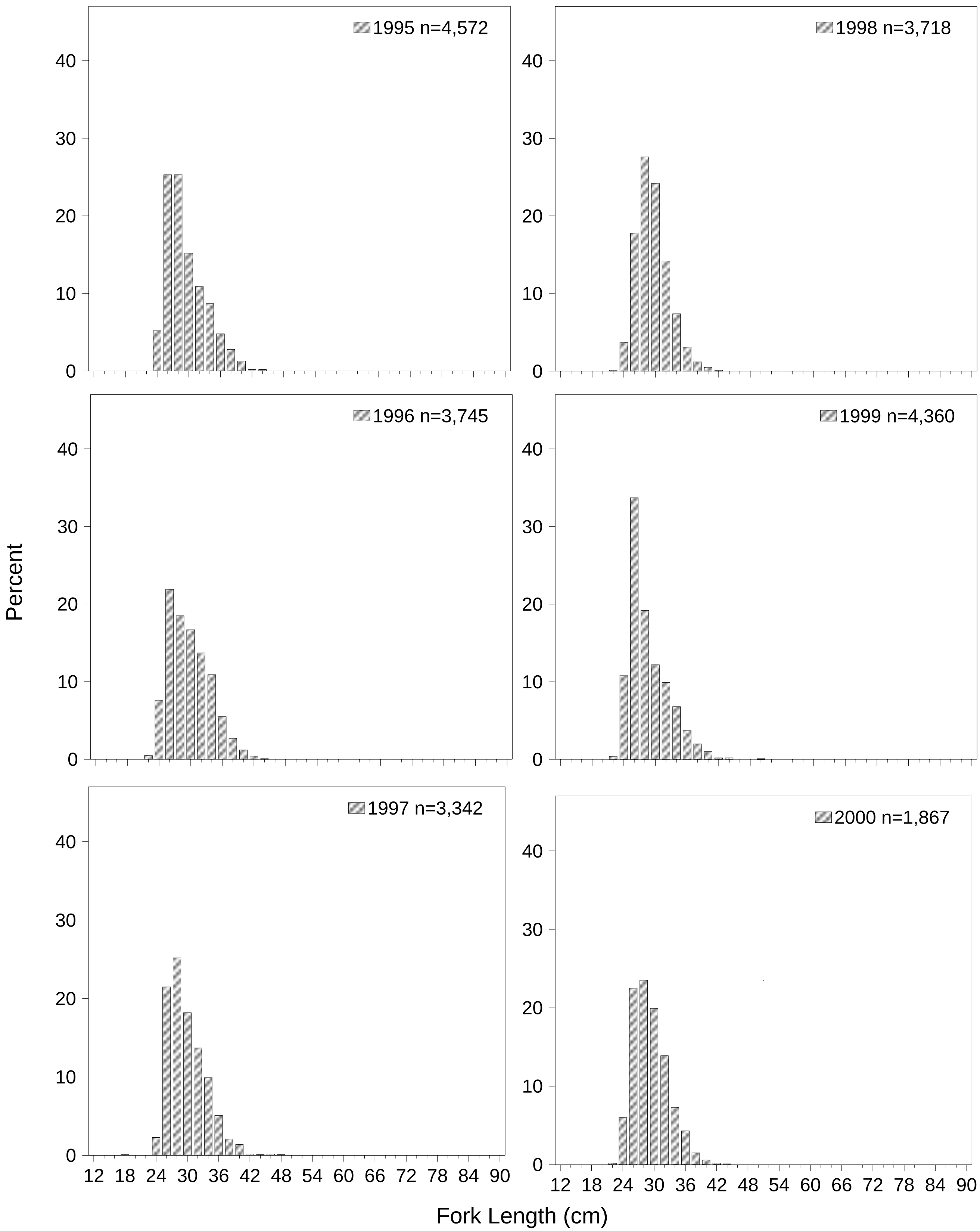


Figure 7.2. North Carolina sciaenid pound net fishery weighted length frequency distributions for marketable weakfish (*Cynoscion regalis*), 1995-2006.

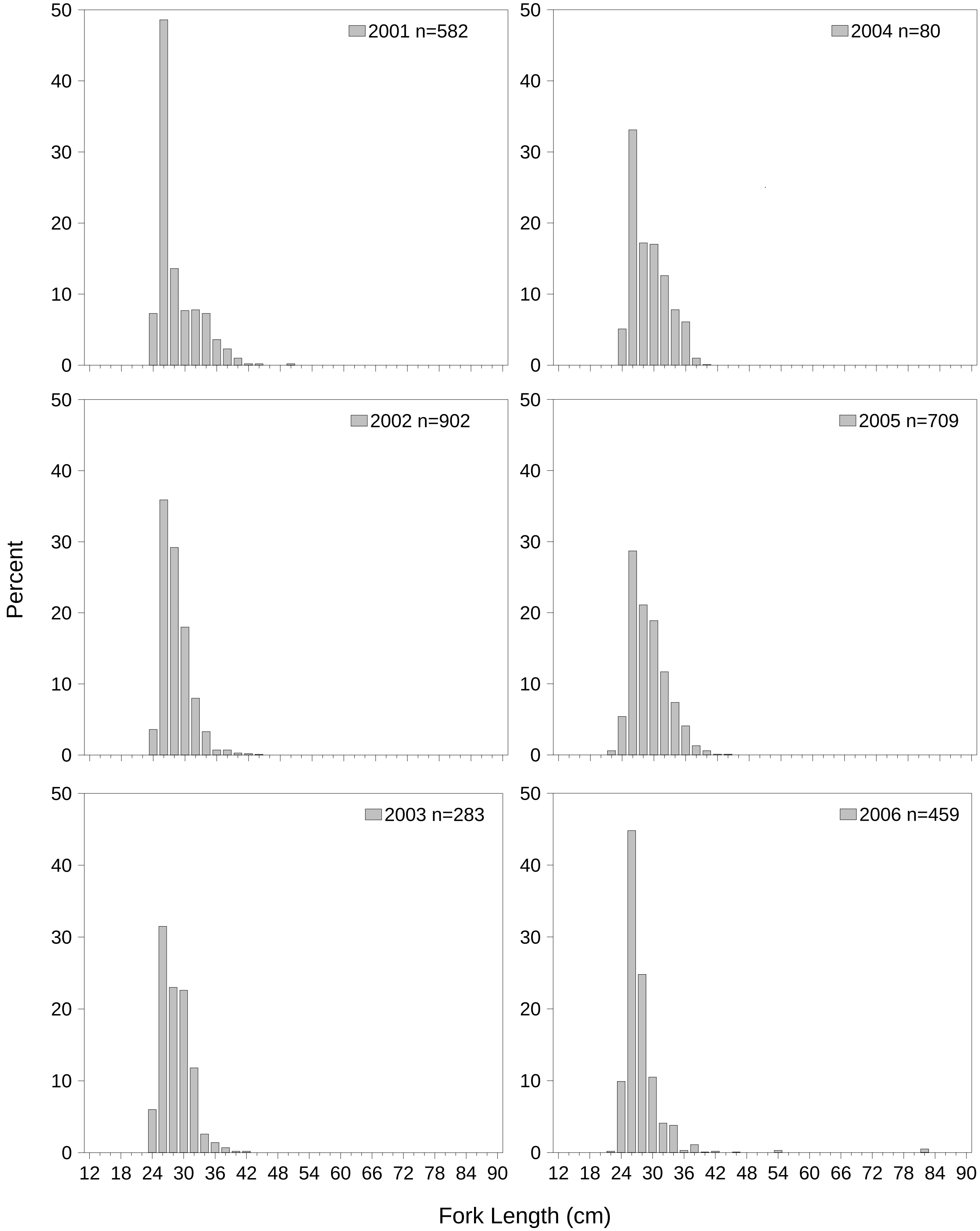


Figure 7.2. (Continued).

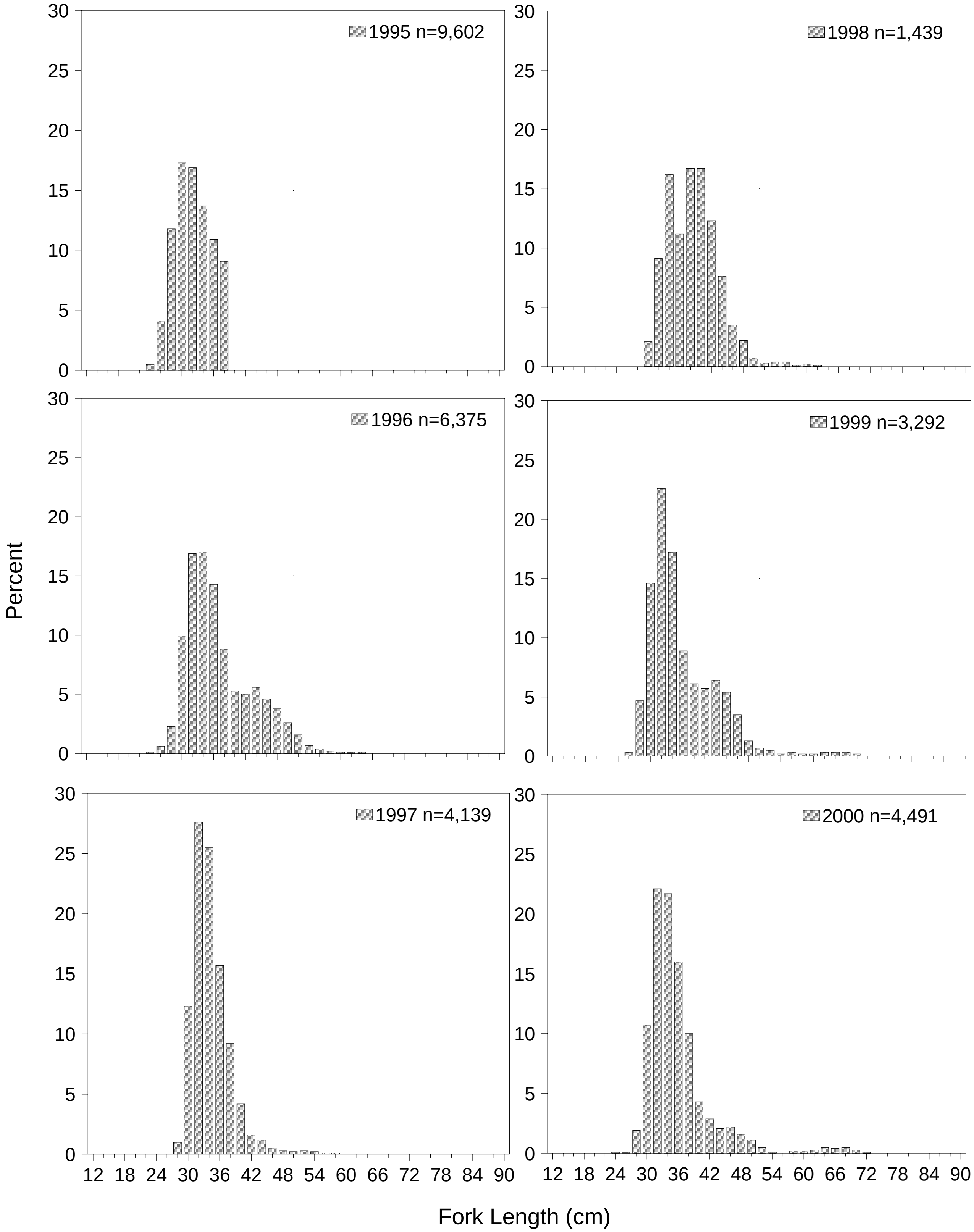


Figure 7.3. North Carolina ocean gill net fishery weighted length frequency distributions for marketable weakfish (*Cynoscion regalis*), 1995-2006.

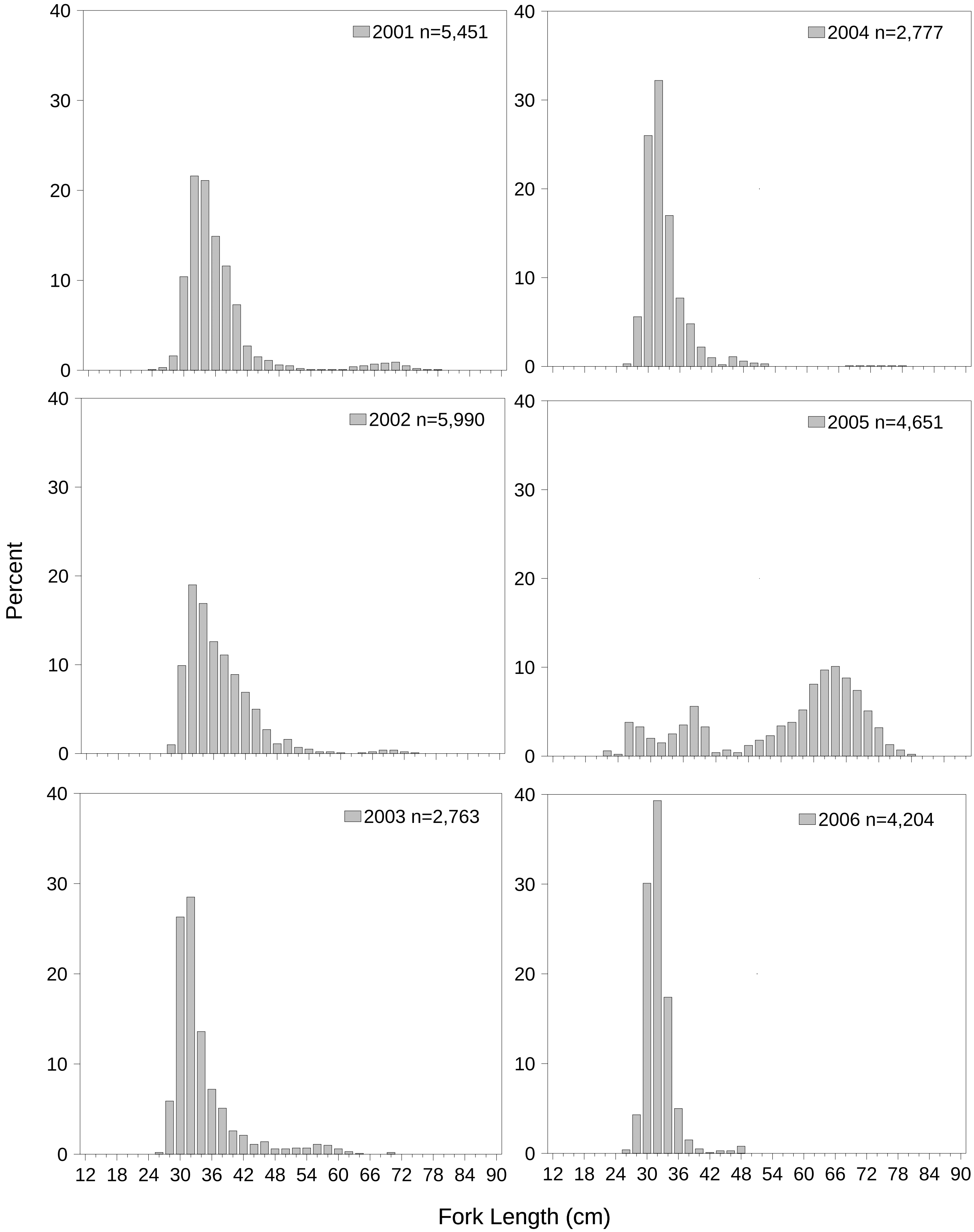


Figure 7.3. (Continued).

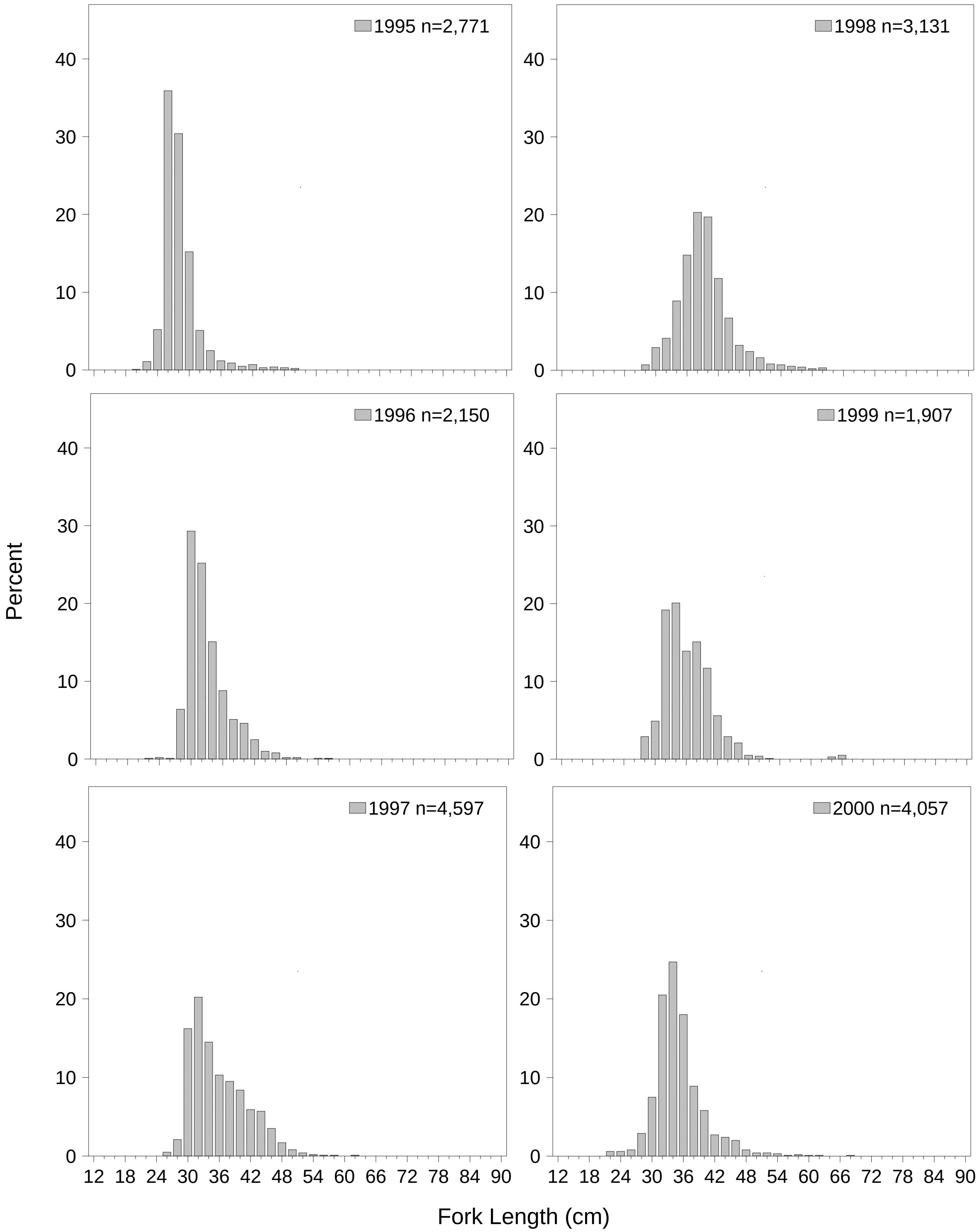


Figure 7.4. North Carolina ocean trawl fishery weighted length frequency distributions for marketable weakfish (*Cynoscion regalis*), 1995-2006.

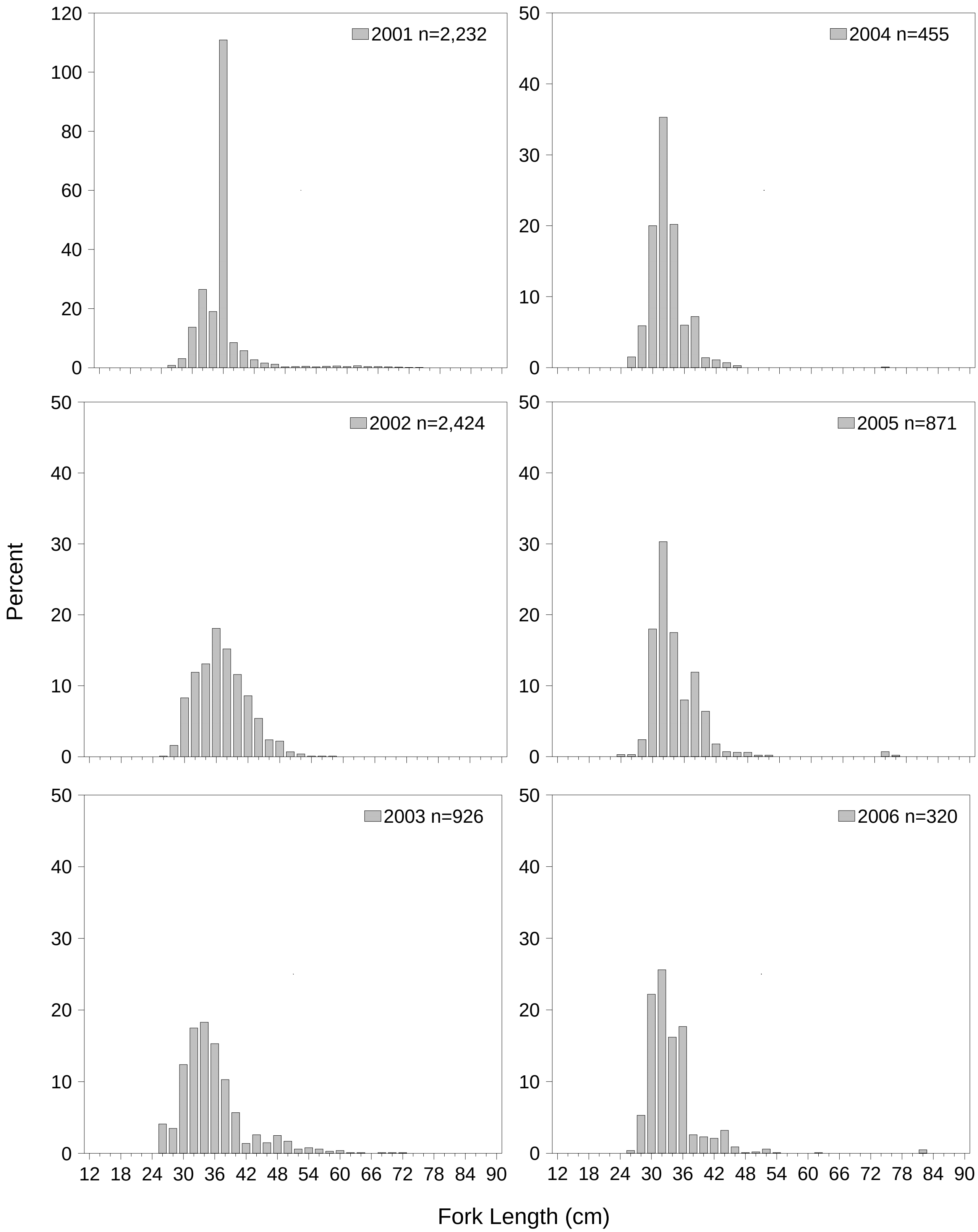


Figure 7.4. (Continued).

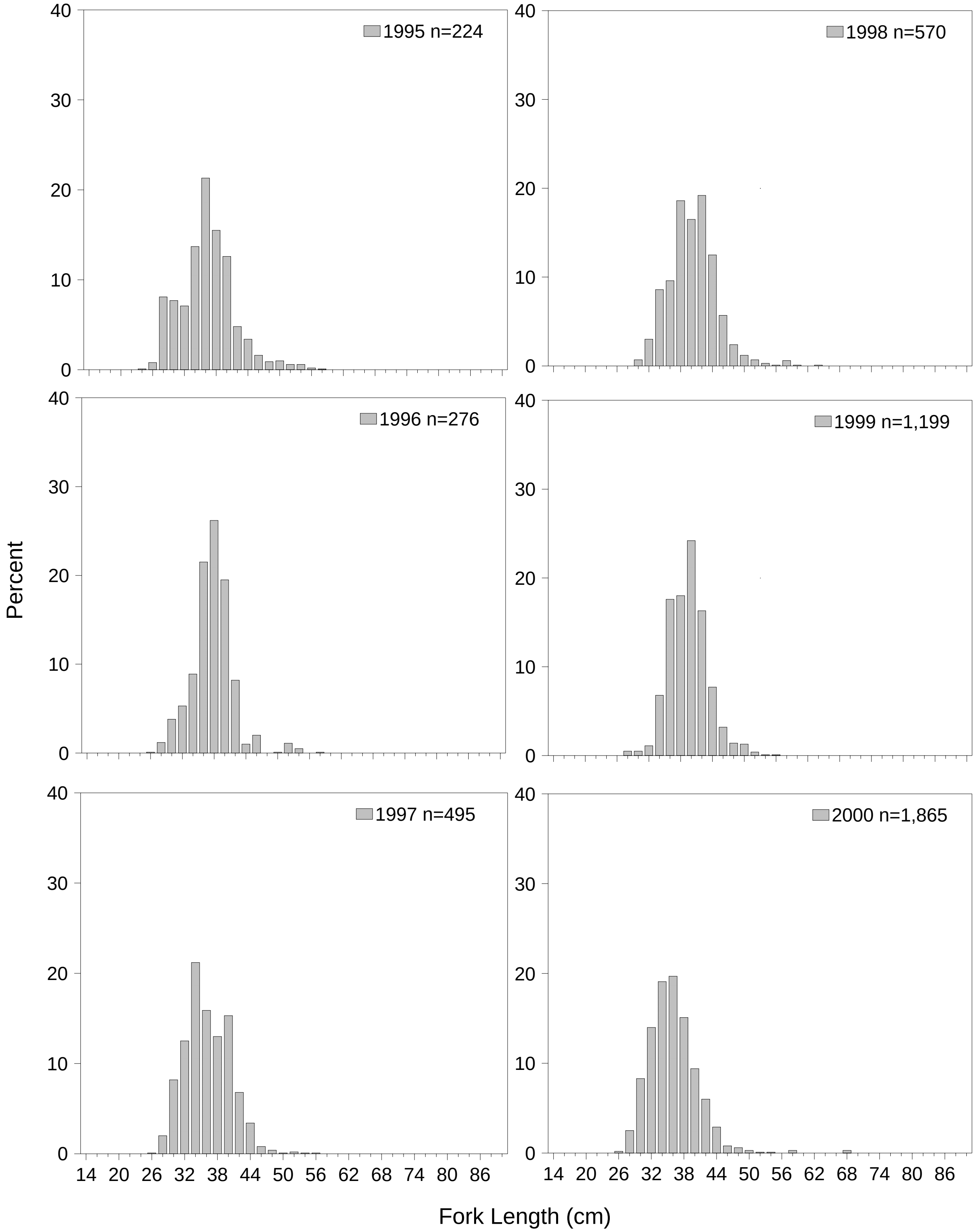


Figure 7.5. North Carolina estuarine gill net fishery weighted length frequency distributions for marketable weakfish (*Cynoscion regalis*), 1995-2006.

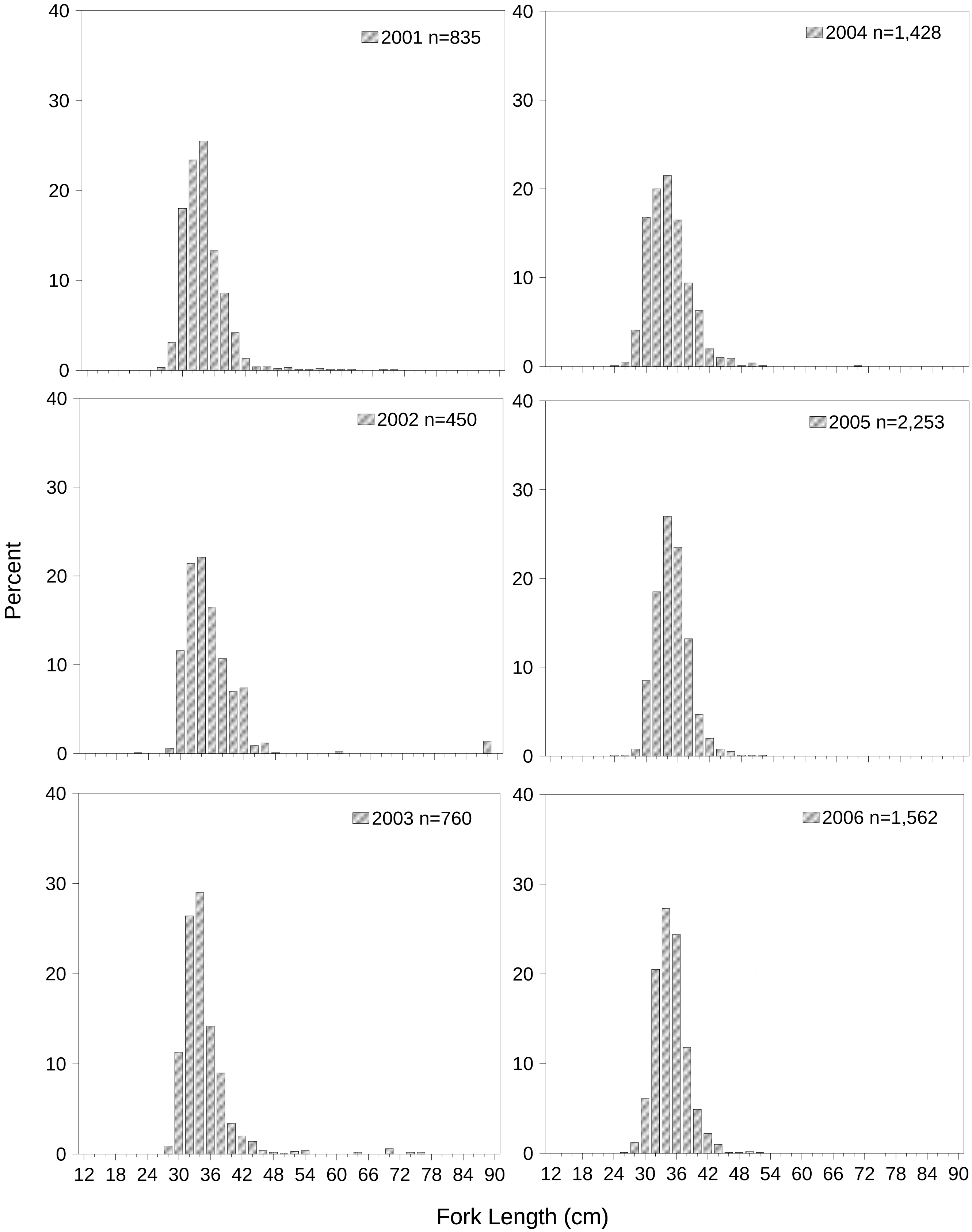


Figure 7.5. (Continued).

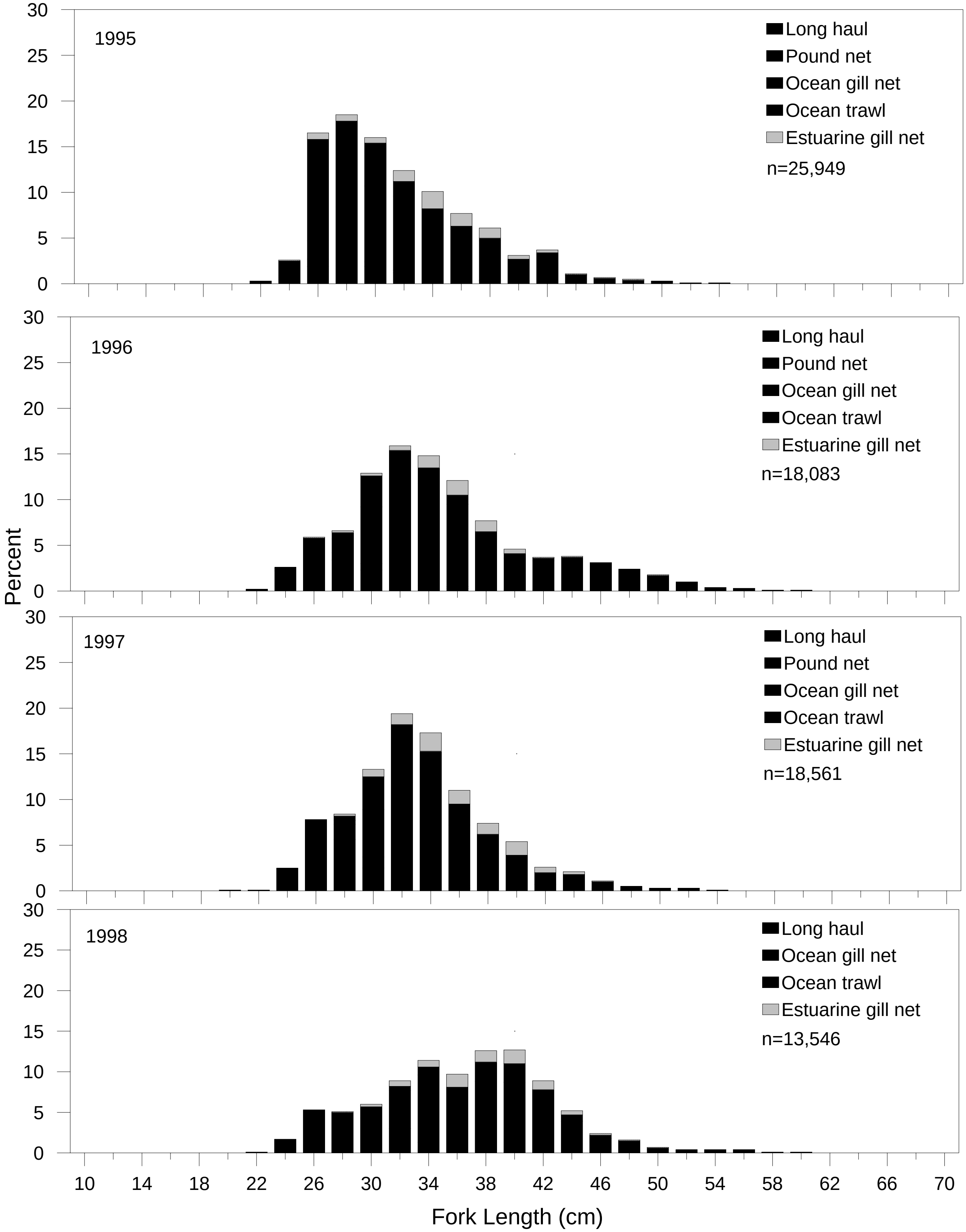


Figure 7.6. North Carolina commercial fishery weighted length frequency distributions for marketable weakfish *(Cynoscion regalis),* 1995-2006.

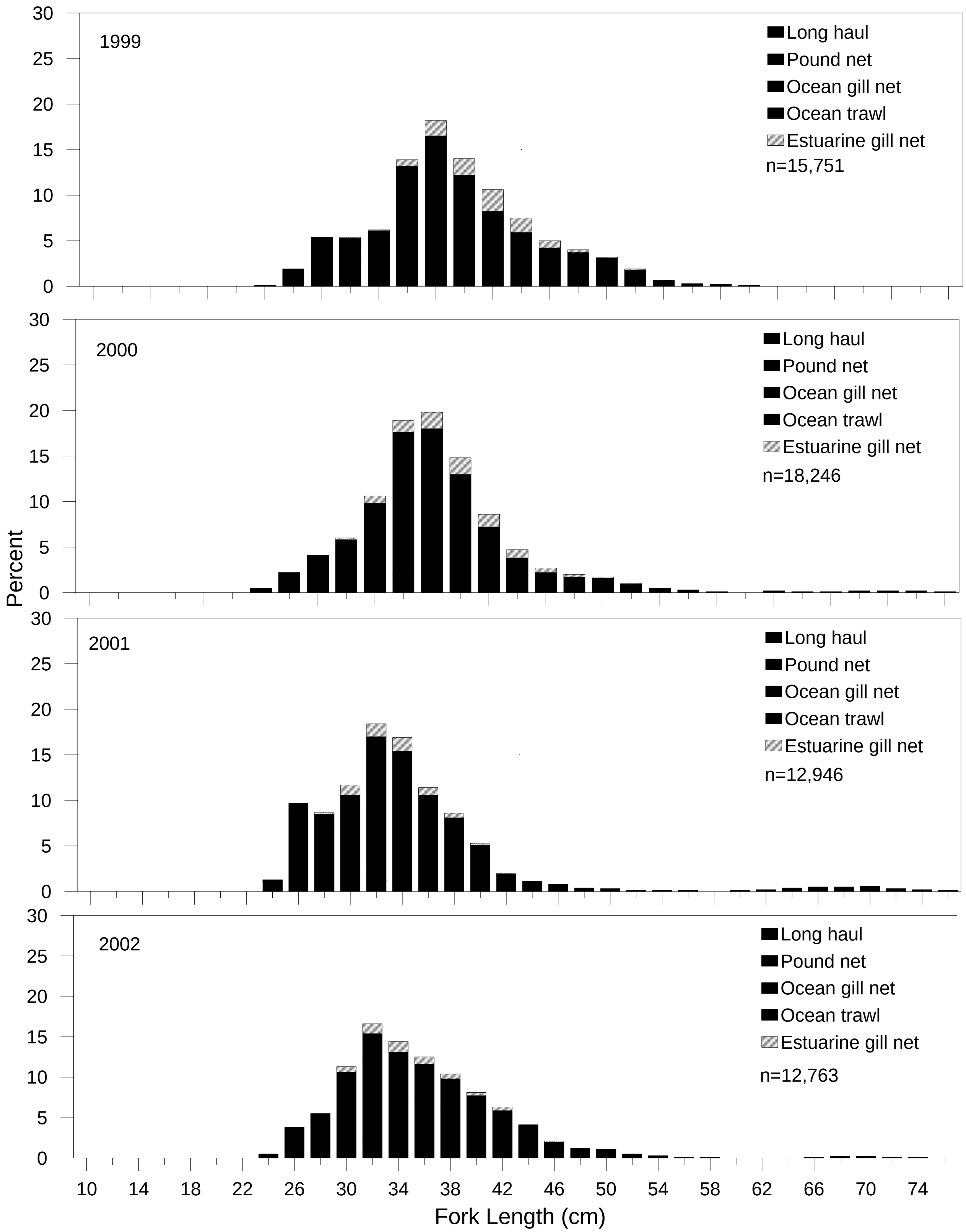


Figure 7.6. (Continued).

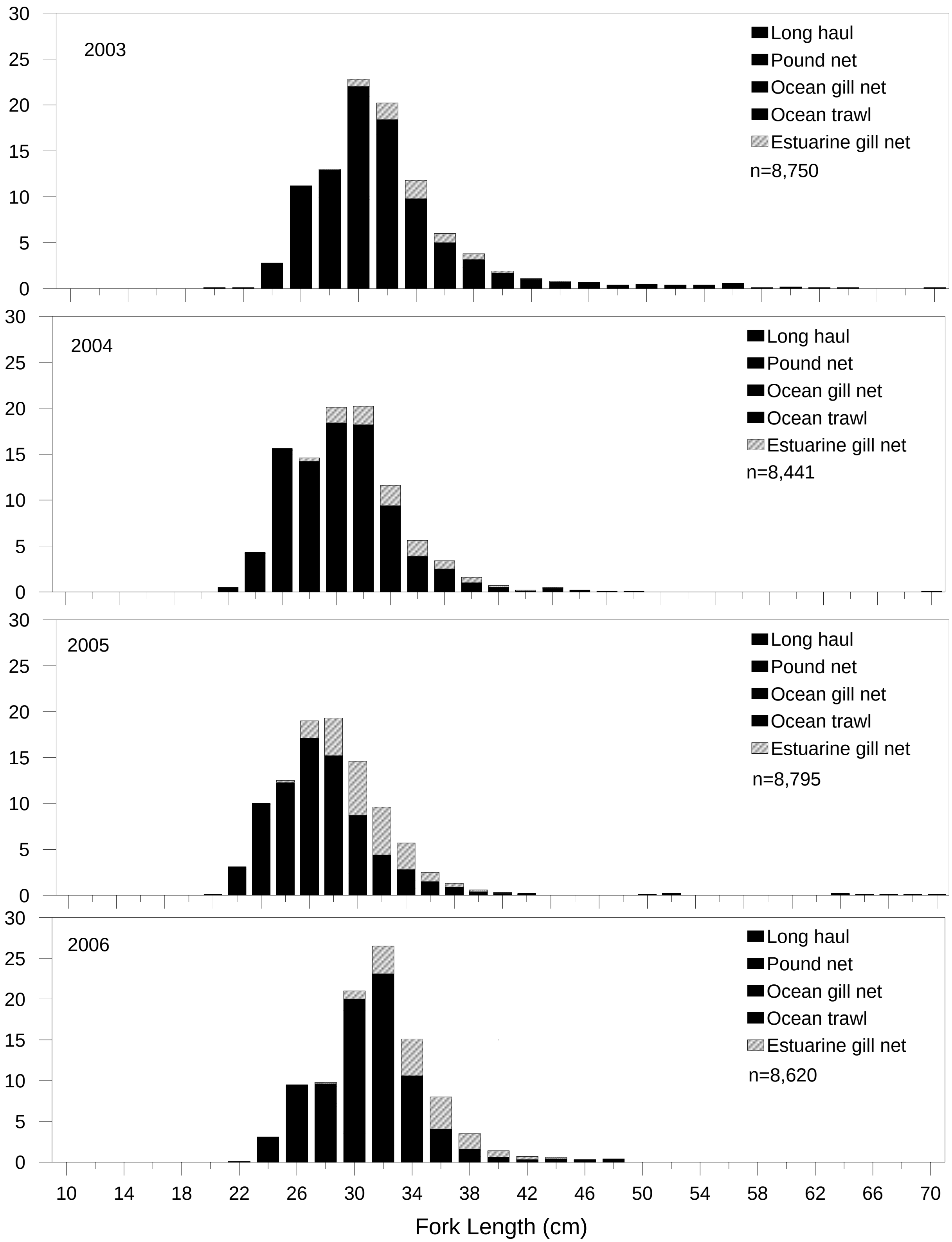


Figure 7.6. (Continued).

Table 7.3. North Carolina weakfish (*Cynoscion regalis*) landings (weight - metric tons, number – 1000's individuals), marketable landings per trip (CPUE weight -kgs), and total number of trips, by type for selected commercial fisheries, 1995-2006.

		Landings									
		Weight					Number				# Trips
		Total	Market		Bait	% Bait	Total	Market	Bait	% Bait	
Fishery	Year	Landed (metric tons)	Landed (metric tons)	CPUE	Landed (metric tons)		Landed (1000's)	Landed (1000's)	Landed (1000's)		
Long Haul											
	1995	137	136	254	1	<1	451	436	15	3	536
	1996	151	136	202	16	11	640	506	134	21	686
	1997	204	203	370	1	<1	655	646	9	1	550
	1998	153	152	381	1	<1	579	566	13	2	443
	1999	80	76	224	4	5	294	236	58	20	337
	2000	70	69	203	2	3	246	229	17	7	338
	2001	109	109	290	<1	<1	377	376	<1	<1	377
	2002	57	57	227	<1	<1	198	194	4	2	249
	2003	101	100	303	1	<1	404	385	19	5	331
	2004	102	100	300	1	<1	414	400	14	3	334
	2005	46	46	168	<1	2	154	152	2	1	272
	2006	35	33	110	2	6	136	118	18	13	301
Sciaenid Pound Net											
	1995	43	43	85	<1	<1	150	149	1	<1	509
	1996	37	37	76	<1	<1	145	142	3	2	489
	1997	62	62	112	<1	<1	222	220	2	<1	551
	1998	45	45	109	<1	<1	166	165	1	<1	409
	1999	41	40	91	<1	<1	165	161	4	2	444
	2000	12	12	55	<1	<1	49	48	<1	2	220
	2001	7	6	43	<1	<1	21	20	1	5	150
	2002	11	11	54	0	<1	46	46	0	0	197
	2003	3	3	37	<1	<1	11	11	<1	9	72
	2004	3	3	32	0	<1	10	10	0	0	88
	2005	7	7	72	<1	<1	26	25	1	4	92
	2006	2	2	15	<1	<1	8	7	<1	12	114

Table 7.3. (Continued).

		Landings									
		Weight					Number				# Trips
		Total	Market		Bait	% Bait	Total	Market	Bait	% Bait	
Fishery	Year	Landed (metric tons)	Landed (metric tons)	CPUE	Landed (metric tons)		Landed (1000's)	Landed (1000's)	Landed (1000's)		
Ocean Gill Net											
	1995	976	976	201	<1	<1	2,224	2,224	<1	<1	4,850
	1996	1,279	1,279	239	<1	<1	2,085	2,085	<1	<1	5,356
	1997	721	721	147	<1	<1	1,398	1,398	<1	<1	4,905
	1998	896	896	197	<1	<1	1,336	1,336	<1	<1	4,539
	1999	599	599	145	<1	<1	1,004	1,004	<1	<1	4,123
	2000	362	362	119	<1	<1	629	629	<1	<1	3,034
	2001	645	645	204	<1	<1	1,135	1,135	<1	<1	3,160
	2002	478	478	205	<1	<1	817	817	<1	<1	2,328
	2003	191	191	77	<1	<1	385	385	<1	<1	2,478
	2004	137	137	65	<1	<1	310	310	<1	<1	2,099
	2005	59	59	42	<1	<1	129	129	<1	<1	1,412
	2006	77	77	53	<1	<1	221	221	<1	<1	1,454
Ocean Trawl											
	1995	424	399	1,308	25	6	1,653	1,443	210	13	296
	1996	177	170	678	8	5	416	381	35	8	241
	1997	410	395	1,038	15	4	811	735	76	9	379
	1998	230	218	661	11	5	346	301	45	13	330
	1999	323	303	1,084	21	7	624	512	112	18	279
	2000	272	260	973	12	4	569	517	52	9	267
	2001	90	68	245	22	24	262	116	146	56	279
	2002	253	230	1,132	23	9	488	385	103	21	203
	2003	103	56	243	47	46	287	85	202	70	229
	2004	106	23	197	83	78	492	56	436	89	116
	2005	47	24	218	23	49	183	47	136	74	111
	2006	35	13	80	22	63	181	29	152	84	155

Table 7.3. (Continued).

		Landings									
		Weight					Number				# Trips
		Total	Market		Bait	% Bait	Total	Market	Bait	% Bait	
Fishery	Year	Landed (metric tons)	Landed (metric tons)	CPUE	Landed (metric tons)		Landed (1000's)	Landed (1000's)	Landed (1000's)		
Estuarine Gill Net											
	1995	185	185	17	<1	<1	417	415	2	<1	11,055
	1996	96	95	11	<1	<1	199	196	3	1	8,603
	1997	171	171	14	<1	<1	317	317	<1	<1	11,926
	1998	137	137	15	<1	<1	226	226	<1	<1	9,247
	1999	120	120	12	<1	<1	207	207	<1	<1	9,848
	2000	80	80	10	<1	<1	144	144	<1	<1	8,443
	2001	49	49	7	<1	<1	104	104	<1	<1	7,062
	2002	44	44	7	<1	<1	87	87	<1	<1	6,129
	2003	33	33	6	<1	<1	63	63	<1	<1	5,199
	2004	41	41	8	<1	<1	87	87	<1	<1	5,103
	2005	47	47	9	0	<1	99	99	0	0	5,463
	2006	34	34	7	0	<1	74	74	0	0	4,660
Fisheries Combined											
	1995	1,765	1,739	100	26		4,895	4,667	228	5	17,246
	1996	1,740	1,717	111	24		3,485	3,310	175	5	15,375
	1997	1,568	1,552	85	16		3,403	3,316	87	3	18,311
	1998	1,461	1,448	98	13		2,653	2,594	59	2	14,968
	1999	1,163	1,138	76	25		2,294	2,120	174	8	15,031
	2000	796	783	64	14		1,637	1,567	71	4	12,302
	2001	900	877	80	23		1,899	1,751	148	8	11,028
	2002	843	820	90	23		1,636	1,529	107	7	9,106
	2003	431	383	46	48		1,150	929	221	19	8,309
	2004	389	304	39	85		1,313	863	450	34	7,740
	2005	206	183	25	23		591	452	139	24	7,350
	2006	183	159	24	24		620	449	171	28	6,684

Source: NCDMF commercial landings database and NCDMF fishery biological database.
Bait quantity estimate obtained from ratio of market to bait in fish house samples. Does not include discards at sea.

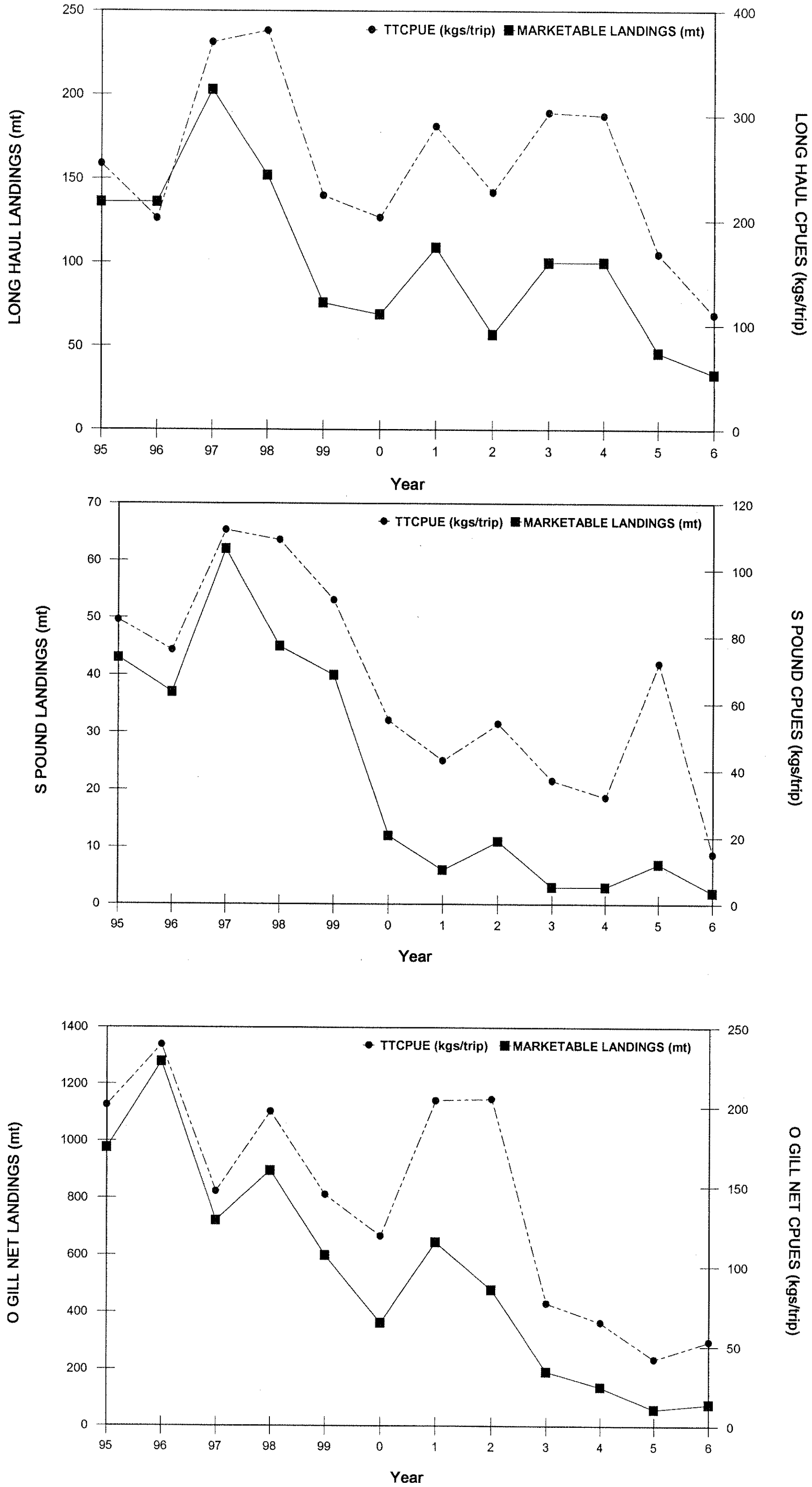


Figure 7.7. North Carolina weakfish (Cynoscion regalis) annual commercial landings (metric
Tons and mean CPUE (landed catch per trip, kg) for selected fisheries and overall, 1995-2006.

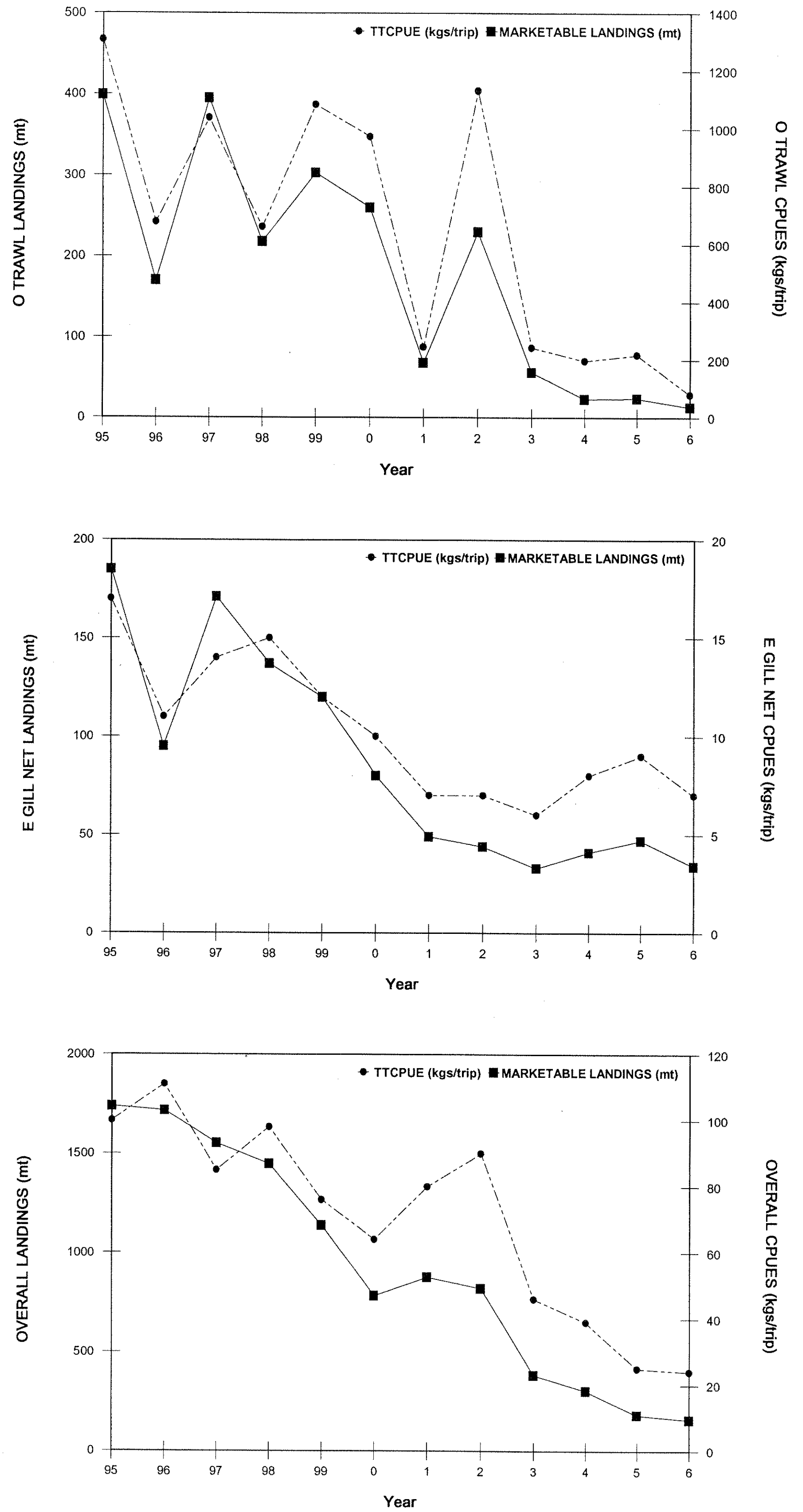


Figure 7.7. (continued).

ATLANTIC CROAKER

Background

Atlantic croaker (*Micropogonias undulates*) is one of 23 members of the family Sciaenidae, commonly known as drums. While Atlantic croaker occurs from Cape Cod, Massachusetts to the Bay of Campeche, Mexico, the area of greatest abundance of Atlantic croaker extends from Chesapeake Bay to Florida (Smith 1898, Welsh and Breder 1923, Hildebrand 1955, Gutherz and Thompson 1977). It is one of the most abundant inshore demersal fish species in the southeastern Atlantic and the northern Gulf of Mexico (Haven 1957, Bearden 1964, Anderson 1968, Chittenden and McEachran 1976). Spawning occurs in the fall some distance from shore in continental shelf waters (Bearden 1964, Hoese 1973, Morse 1980). Recruitment of young-of-the-year to estuarine areas occurs over an extended period but generally peaks in the fall north of Cape Hatteras, North Carolina and in the winter and early spring to the south (Hansen 1969, Nelson 1969, Warlen 1980, Miglarese et al. 1982, Lewis and Judy 1983). Annual recruitment is highly variable and dependent on natural environmental conditions. Individuals appear sexually mature between the ages of two and three, at lengths of 13-23 cm (5-9 inches) for males and 18-23 cm (7-9 inches) for females. Size at any given age varies throughout the range (ASMFC 1987).

Atlantic croaker is a principal target of the major North Carolina finfish fisheries. The North Carolina fisheries coincide with the seasonal migration of Atlantic croaker. During the warmer months as the fish move northward and inshore, and are exploited by the long haul seine, sciaenid pound net, and estuarine gill net fisheries. Atlantic croaker is exploited by the ocean trawl (flynet) and ocean sink net fisheries as the fish move southward in the ocean during the winter months.

Length Distribution

From 1995-2006 the maximum lengths for Atlantic croaker increased for all fisheries, up to 62 cm in 2006 in both the long haul and ocean trawl fisheries. The minimum length ranges have remained fairly constant for all fisheries from 1995-2006 at 19-20 cm. The modal peaks have increased slightly in recent years for several fisheries (sciaenid pound net, ocean trawl, and estuarine gill net).

Atlantic croaker captured by the long haul fishery during the years of 1995-2006 exhibited an increasing trend in the maximum size (Figure 7.8). The maximum length classes of Atlantic croaker in the long haul fishery ranged from a high of 49 cm in 2002 to a low of 41 cm in 1995. Minimum length classes ranged from 11 cm in 1995 to 21 cm in 2005 but are generally in the 18-20 cm range. The annual length frequency distribution is either unimodal (majority) or bimodal with peaks at 24-26 cm and 32 cm (Figure 7.8).

Due to small sample sizes it is difficult to adequately characterize the length distributions for the sciaenid pound net fishery. Maximum length classes ranged from 43-49 cm and minimal sizes ranged from 14 cm in 1997 to 23 cm in 1996 but were generally in the 19-20 cm range (Figure 7.9). The unimodal peaks were stable at 25-30 cm but dropped to 24 cm in 2006.

In the ocean sink net fishery the length distributions tend toward bimodal, with peaks at 24-27 cm and 31-36 cm. Maximum lengths of Atlantic croaker ranged from 43-49 cm (Figure 7.10). Minimum lengths ranged from 17 cm in 1998 to 24 cm in 2005

The ocean trawl fishery length frequency unimodal distributions were similar from 1995-2006 with the modal peak at 25-29 cm (Figure 7.11). A smaller length component in the 15 cm range in the years 1996-1997 is no longer present. Maximum lengths of Atlantic croaker ranged from 40 cm in 1995 to 62 cm in 2006. Minimum lengths were fairly stable at 19-20 cm.

In the estuarine gill net fishery maximum lengths of Atlantic croaker ranged from 41 cm in 1995 to 62 cm in 2006 (Figure 7.12). The minimum lengths generally were 19–20 cm, with a trend to the higher value since 2001. Length distribution were either unimodal or bimodal, with modal peaks at 26–30 cm and 37–42 cm. During the report period 2004-2006 unimodal peaks were 28-30 cm.

Annual length distributions for Atlantic croaker combined across all fisheries (weighted by number of individuals) reflect the contribution by size of each fishery to the overall harvest (Figure 7.13). Due to the magnitude of their harvest, the two ocean fisheries dominate the overall length distributions. The ocean trawl fisheries provides one of the bimodal peaks at 25-29 cm and the ocean sink net is the majority of the second peak at 33-35 cm, at least through 2002. After 2002 the ocean trawl fishery contribution to this mode increased. Since 2003 the overall distribution has tended toward a broader unimodal distribution.

Lengths of Atlantic croaker in bait samples ranged from 14-34 cm (Table 7.4). Dominant length modes by fishery were generally 14-26 cm. The ocean trawl fishery showed a general increase in the dominant length mode for bait samples since 1996. The dominant length mode since 1996 has remained at 24-26 cm in the ocean trawl fishery. While the ocean sink net fishery shows a similar range, given the lack of bait in the samples it is difficult to determine a true trend in the data. The inside fisheries (long haul, estuarine gill nets, and sciaenid pound net) bait samples showed smaller dominant length modes than the ocean fisheries. There are more fluctuations from year to year in the inside fisheries and from 2000-2006 the dominant length modes were between 18-20 cm. The estuarine gill net fishery, like the ocean sink net fishery, does not have adequate samples of bait to determine a trend in the data.

Landings, Trips, and CPUE

Overall commercial marketable landings for Atlantic croaker rose consistently since 1995 with a peak in 2003 at 6,544.9 mt (Table 7.5). The years between 1995 and 1996 produced the least amount of Atlantic croaker in the 12-year period (2,731 and 4,518 mt). Harvest has been above the 12 year average of 4,868 mt for three of the last five years. Average landings (5,185 mt) during the report period of 2004-2006 were 6% above the 12 year average. For the selected target fisheries combined (Table 7.6, Figure 7.14) the peak CPUE of 958 kg occurred in 2003, and the report period CPUE (826 kg) increased 49% from the 12 year average of 556 kg. The CPUE trends have varied throughout the period but have shown a general increase over time. Report period effort (6,301 trips) declined 36% from the 12 year average of 9,905 trips. The percent contribution of Atlantic croaker bait (weight) to the total landings (market plus bait) has declined, with the report period average of 8% being 59% below the 12 year average (18%)

Historically long haul seines were a major contributor to North Carolina Atlantic croaker harvest. From 1995-2006 long haul seines (36 mt mean) contributed 0.8 % to the state harvest (Table 7.5). Average landings (16 mt) during the report period of 2004-2006 were 56% below this 12 year average. For the long haul fishery (Table 7.6, Figure 7.14) the peak CPUE of 328 kg occurred in 1996, and the report period CPUE (98 kg) declined 22% from the 12 year average of 125 kg. Report period effort (165 trips) declined 27% from the 12 year average of 229 trips. The percentage of Atlantic croaker bait (weight) to the total landings (market plus bait) has been declining, with the report period average of 64% being 15% below the 12 year average (75%). (Table 7.6).

From 1995-2006 the sciaenid pound net fishery (2 mt average) contributed <0.1% to the state harvest (Table 7.5). Average landings (0.2 mt) during the report period of 2004-2006 were 90% below this 12 year average. For this fishery (Table 7.6, Figure 7.14) the peak CPUE of 69 kg occurred in 1999, and the report period CPUE (5 kg) declined 57% from the 12 year average of 12 kg. Report period effort (42 trips) declined 74% from the 12 year average of 162 trips. The percentage of Atlantic croaker bait (weight) to the total landings (market plus bait) has been declining, with the report period average of 55% being 27% below the 12 year average (75%). (Table 7.6).

From 1995-2006 ocean sink nets (1,772 mt average) contributed 36% to the state harvest (Table 7.5). The ocean sink net fishery was the second ranked contributor of marketable Atlantic croaker. Average landings (1,689 mt) during the report period of 2004-06 were 5% below this 12 year average. For this fishery (Table 7.6, Figure 7.14) the peak CPUE of 1,613 kg occurred in 2005, and the report period CPUE (1,314 kg) rose 50% from the 12 year average of 873 kg. Report period effort (1,285 trips) declined 46% from the 12 year average of 2,393 trips. The bait component in the ocean sink nets was negligible accounting for less than 1% by weight. (Table 7.6)

The ocean trawl (flynet) fishery ranked first for contributing marketable Atlantic croaker (Table 7.5). From 1995-2006 the ocean trawl fishery (2,954 mt average) contributed 60% to the state harvest (Table 7.5). Average landings (3,445 mt) during the report period of 2004-2006 were 17% above this 12 year average. For this fishery (Table 7.6, Figure 7.14) the peak CPUE of 19,292 kg occurred in 2003, and the report period CPUE (16,483 kg) rose 43% from the 12 year average of 11,501 kg. Report period effort (210 trips) declined 26% from the 12 year average of 283 trips. The percentage of Atlantic croaker bait (weight) to the total landings (market plus bait) has been declining, with the report period average of 4% being 37% below the 12 year average (6%). (Table 7.6)

The estuarine gill net fishery contributed 1% to the Atlantic croaker total landings during the 12 year period (Table 7.5). Landings (50 mt average) and CPUEs (8 kg average) have remained low for Atlantic croaker in this fishery throughout the entire period. Report period effort (4,599 trips) declined 33% from the 12 year average of 6,837 trips and the report period landings (32 mt) declined 37% from the 12 year average. The bait component of the estuarine gill net fishery was negligible, accounting for nearly zero weight (Table 7.6)

Management Issues

The North Carolina 2006 stock status report declared Atlantic croaker to be viable. The Atlantic croaker population in the mid-Atlantic region is not overfished and overfishing is not taking place. Most available data, including commercial landings and the juvenile abundance index demonstrates the stock to be viable. This is a recruitment driven stock where abundance fluctuates in response to large year classes, and over the last few years this abundance has been at historical all time highs for croaker in the mid-Atlantic region (NCDMF 2007). The CPUEs for Atlantic croaker in 1995-2006 increased greatly in the ocean trawl and sink net fisheries and the size distributions shifted to older larger fish. Some of this increase is attributable to more fishing effort on Atlantic croaker as a result of the harvest restrictions placed on weakfish during this period. However, comparable increases did not occur in the inside sound water fisheries; the long haul and pound net fisheries continue to show a decline in the harvest of Atlantic croaker. There have also been socioeconomic changes within the inside fisheries that may contribute to the decline in commercial landings for these inside fisheries. Overall recreational landings have a downward trend by weight. There also is no evidence of a major increase in the annual abundance of juvenile Atlantic croaker in North Carolina nursery areas or the Pamlico Sound trawl survey (NCDMF 2006).

Atlantic croaker is included in the North Carolina Interjurisdictional FMP, which defers to the Atlantic States Marine Fisheries Commission (ASMFC) FMP compliance requirements. An ASMFC FMP was initially approved in 1987, with the Amendment 1 approved in November 2005 (ASMFC 2005a). The amendment was fully implemented by January 1, 2006. Amendment 1 does not require any specific measures restricting recreational or commercial harvest of Atlantic croaker. States with more conservative management measures are encouraged to maintain those requirements.

The goal of Amendment 1 is to utilize interstate management to perpetuate the self-sustainable Atlantic croaker resource throughout its range and generate the greatest economic and social benefits from its commercial and recreational harvest and utilization over time. Amendment 1 contains four objectives:

1) Manage the fishing mortality rate for Atlantic croaker to provide adequate spawning potential to sustain long-term abundance of the Atlantic croaker population.
2) Manage the Atlantic croaker stock to maintain the spawning stock biomass above the target biomass levels and restrict fishing mortality to rates below the threshold.
3) Develop a management program for restoring and maintaining essential Atlantic croaker habitat.
4) Develop research priorities that will further refine the Atlantic croaker management program to maximize the biological, social, and economic benefits derived from the Atlantic croaker population.

Consistent with the 2004-2005 stock assessment, Amendment 1 defines two management areas: the south-Atlantic region, including the states Florida through South Carolina; and the mid-Atlantic region, including the states North Carolina through New Jersey. Amendment 1 established biological reference points (BRPs) to define overfished stock status and overfishing. Overfished status is defined by a threshold female spawning stock biomass (SSB) of 44.65 million pounds, with a target SSB of 63.78 million pounds. Overfishing is defined by a threshold fishing mortality rate (F) of 0.39, with a target F of 0.29. The BRPs apply only to the mid-Atlantic region; the status of the stock for the south-Atlantic region remains unknown due to a lack of data. **Data for North Carolina from this project that allowed for the production of individual state fisheries seasonal aged based data series were crucial for an approved SEDAR assessment of the mid-Atlantic unit for Atlantic croaker.** As noted below this included project estimates of Atlantic croaker landed as bait.

Amendement 1 also established triggers to initiate a stock assessment prior to the normal five year time span. For the landings trigger, Amendment 1 states that a stock assessment will be triggered if the most recent year's commercial or recreational landings are less than 70% of the previous two years' average landings (ASMFC 2005b). Completion of the trigger exercise in 2007 demonstrated that the 2006 coastwide landings of Atlantic croaker did not trigger a stock assessment prior to the scheduled 2009 SEDAR assessment.

Currently, no regulations directly govern fishing practices for Atlantic croaker in North Carolina. However, several regulations indirectly impact the harvest of small croaker. The regulation (15A NCAC 3M .0162) limiting the scrapfish catch to 5,000 lbs per vessel per day had an indirect effect on Atlantic croaker, because the species comprise a large percentage by weight of the scrapfish landed by North Carolina commercial fishing gears. Bycatch Reduction Devices (BRDs) were required in all shrimp trawls in the fall of 1992 by proclamation (and by the consent of the MFC (15A NCAC 3J .0104)). Since 1991, area restrictions and incidental finfish limits taken by shrimp and crab trawls in inside waters limit these gears from having no more than 500 pounds of finfish from December 1 through February 28 and 1,000 pounds of finfish from March 1 to November 30 (15A NCAC 3J .0104(a)). Minimum mesh size restrictions in shrimp trawls (1 ½" tailbag) have been in effect since 1991 as well as for flynets (4" main body, 3" extension, and 1 3/4" tail bag) since 1992 (Proclamation FF-26-92), and the closure of ocean waters south of Cape Hatteras to the South Carolina state line for flynets in 1994 (Proclamation FF-18-94), all of which may indirectly affect the fishing impact on Atlantic croaker and change the size and age distributions of the harvest.

The NCDMF conducted a study to evaluate the use of culling panels in long hauls and swipe nets (Gearhart 2000). The study proved that shifts occurred in the length frequency distribution of many species including Atlantic croaker, which resulted in a 1999 permanent rule changes mandating the use of culling panels in some areas of North Carolina. Language in this rule was modified and strengthened for improved enforcement in August 2003.

In the 2005 ASMFC stock assessment, aggregate, unculled (“scrap”) bait fisheries landings data were included for North Carolina and Virginia, and at-sea discard data were included from gill net and trawl fisheries. Scrap landings and discards were combined in the model. The stock assessment indicated that between 1973 and 1995, scrap/discards accounted for an average 20% of removals, and from 1996 to 2002, an average 3% of removals (ASMFC 2005b). Management actions appear to be reducing the quantity of subadult Atlantic croaker harvested and this should increase spawning stock biomass and increase yield per recruit.

Table 7.4. North Carolina Atlantic croaker (*Micropogonias undulatus*) expanded length frequency of bait samples for selected fisheries, 1995-2006; n=number of fish measured, en=expanded number of individuals in catches sampled, and number=estimated number (1,000s) of individuals in the landings.

Fishery/ Year	n	en	number	14	16	18	20	22	24	26	28	30	32	34
Long Haul														
1995	1,833	319,638	10,254	6.5	30.9	33.5	17.6	7.4	1.0	0.1	<0.1	-	-	-
1996	2,415	139,800	802	9.6	14.8	12.7	23.6	26.4	11.0	1.7	0.1	<0.1	<0.1	<0.1
1997	1,060	182,404	2,040	11.5	24.0	34.8	18.6	8.9	1.8	0.3	0.3	-	<0.1	-
1998	1,245	164,728	1,201	61.0	9.3	4.6	10.9	11.9	2.1	0.1	0.1	-	<0.1	<0.1
1999	869	148,221	1,933	54.3	16.2	18.4	8.7	2.0	0.3	0.2	-	-	-	-
2000	1,461	193,314	3,080	10.0	26.4	33.6	22.3	5.8	1.6	0.3	-	-	-	-
2001	1,338	555,423	1,257	5.9	16.6	30.4	35.1	10.7	1	0.1	-	<0.1	-	-
2002	1,436	271,048	499	1.1	17.1	36.5	31.2	11.1	2.4	0.5	-	-	-	-
2003	1,467	311,884	1,653	15.7	20.5	21.8	24.0	11.6	5.4	1.0	-	-	-	-
2004	648	64,454	457	22.9	21.8	20.1	17.7	13.0	4.1	0.4	-	-	-	-
2005	744	61,715	350	28.6	21.3	12.5	14.3	19.2	4	0.1	-	-	-	-
2006	769	82,651	512	14.4	21.8	18.9	22.0	20.1	2.8	-	-	-	-	-
Sciaenid pound net														
1995	747	10,029	119	3.2	13.1	47.3	29.9	6.1	0.3	0.1	<0.1	-	-	-
1996	395	9,004	1,067	<0.1	3.4	27.0	49.8	18.0	1.5	0.2	-	-	-	-
1997	250	3,372	68	4.7	14.0	37.0	30.8	10.9	2.5	-	-	-	-	-
1998	414	11,655	24	2.2	8.2	39.0	24.2	18.8	6.8	0.6	0.3	-	-	-
1999	1,466	79,804	2,855	1.2	39.5	47.2	8.9	2.6	0.4	0.2	<0.1	-	-	-
2000	389	38,842	260	1.1	45.3	37.5	15.0	1.1	-	-	-	-	-	-
2001	227	6,411	23	3.6	3.7	12.7	61.8	12.5	2.3	2.7	0.6	-	-	-
2002	55	2,666	129	-	3.9	48.3	43.6	4.2	-	-	-	-	-	-
2003	6	234	10	-	28.2	29.5	19.2	19.2	-	-	-	-	-	3.8
2004	22	344	1	22.7	13.7	13.7	22.7	18.3	9.0	-	-	-	-	-
2005	80	1,887	4	14.3	56.5	25.4	2.6	0.5	0.5	0.2	-	-	-	-
2006	139	7,311	26	2.5	35.4	44.6	9.5	7.6	0.3					
Ocean gill net														
1995	-	-	<1	-	-	-	-	-	-	-	-	-	-	-
1996	-	-	<1	-	-	-	-	-	-	-	-	-	-	-
1997	-	-	<1	-	-	-	-	-	-	-	-	-	-	-
1998	89	224	<1	-	-	-	-	3.1	43.3	33.5	16.1	2.7	1.3	-
1999	4	4	<1	-	-	-	50.0	50.0	-	-	-	-	-	-
2000	5	5	<1	-	-	-	-	20.0	40.0	40.0	-	-	-	-
2001	-	-	<1	-	-	-	-	-	-	-	-	-	-	-
2002	45	287	10	-	-	-	-	0.3	5.6	37.2	32.7	24.0	-	-
2003	-	-	<1	-	-	-	-	-	-	-	-	-	-	-
2004	57	57	1	-	-	-	-	14.0	68.4	14.0	3.5	-	-	-
2005	-	-	<1	-	-	-	-	-	-	-	-	-	-	-
2006	5	7	<1	-	-	28.6	-	28.6	42.9	-	-	-	-	-

Table 7.4 (Continued)

Fishery/ Year	n	en	number	14	16	18	20	22	24	26	28	30	32	34
Ocean Trawl														
1995	1,702	311,109	3,043	0.8	3.9	5.3	33.7	41.7	13.1	1.3	0.3	<0.1	-	-
1996	1,802	383,031	2,118	0.4	0.5	3.5	14.9	21.1	32.2	20.6	6.5	0.5	0.1	0.1
1997	2,490	297,403	1,360	-	<0.1	1.3	14.9	31.3	32.1	15.4	0.3	0.5	0.1	-
1998	1,064	78,100	304	-	-	0.1	5.7	23.1	36.6	26.7	6.4	0.8	0.4	0.2
1999	1,402	151,611	548	-	-	0.3	9.3	27.7	34.3	16.3	10.4	1.2	0.4	-
2000	1,648	149,780	492	-	0.1	1.1	7.7	25.7	38.8	20.0	5.1	0.8	0.5	0.2
2001	2,071	163,951	640	-	-	1.0	8.4	25.7	37.8	21.3	4.9	0.4	0.2	-
2002	1,002	102,938	525	-	-	0.3	4.7	11.1	34.0	31.4	14.7	3.3	0.2	0.3
2003	2,319	320,299	1,653	-	0.1	1.3	10.3	18.0	27.2	26.6	11.6	3.6	1.1	0.2
2004	1,636	202,640	1,045	0.1	0.1	0.4	3.0	19.2	39.0	25.2	8.8	3.1	0.8	0.2
2005	949	89,435	569	-	0.1	4.7	12.1	15.2	25.7	29.5	10.0	1.9	0.7	0.2
2006	918	120,009	694	-	0.2	3.0	16.3	41.7	29.0	7.4	1.4	0.4	0.4	0.1
Estuarine gill net														
1995	29	381	1	-	11.5	33.5	46.7	4.2	3.9	-	-	-	-	-
1996	2	2	1	50.0	-	-	-	-	-	50.0	-	-	-	-
1997	10	10	3	-	10.0	-	30.0	-	30.0	-	20.0	10.0-	-	-
1998	6	6	4	-	-	-	50.0	-	33.3	16.7	-	-	-	-
1999	10	10	<1	40.0	10.0	10.0	10.0	30.0	-	-	-	-	-	-
2000	20	20	1	-	-	-	-	50.0	50.0	-	-	-	-	-
2001	2	2	1	-	-	50.0	-	-	-	-	-	-	-	50.0
2002	-	-	<1	-	-	-	-	-	-	-	-	-	-	-
2003	-	-	<1	-	-	-	-	-	-	-	-	-	-	-
2004	-	-	<1	-	-	-	-	-	-	-	-	-	-	-
2005	-	-	<1	-	-	-	-	-	-	-	-	-	-	-
2006	-	-	<1	-	-	-	-	-	-	-	-	-	-	-

Table 7.5 North Carolina commercial landings of marketable Atlantic croaker (*Micropogonias undulatus*) by fishery, 1995-2006, includes landings (metric tons), value (thousands dollars) and contribution of fishery to North Carolina Atlantic croaker landings.

	YEAR											
Fishery	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Long Haul												
Metric Tons	72.4	163.7	26.9	11.4	3.2	21.1	45.0	13.6	23.3	15.7	14.5	16.2
Value ($)	52.1	118.4	17.7	6.3	2.1	12.9	24.0	7.2	10.7	8.5	7.5	8.3
% State	2.7	3.6	0.6	0.2	0.1	0.5	0.8	0.3	0.4	0.3	0.3	0.3
Pound Net												
Metric Tons	5.9	5.2	0.8	0.1	5.6	0.5	10.6	0.3	0.1	0.5	0.2	<0.1
Value ($)	4.9	4.3	0.6	<0.1	3.7	0.3	5.9	0.2	<0.1	0.3	<0.1	<0.1
% State	0.2	0.1	<0.1	<0.1	0.1	<0.1	0.2	<0.1	<0.1	<0.1	<0.1	<0.1
Estuarine Gill Net												
Metric Tons	68.7	83.1	36.8	72.1	46.0	43.0	63.5	59.0	40.0	37.4	30.3	27.7
Value ($)	51.0	57.3	28.2	53.9	31.0	28.0	36.2	43.2	17.9	24.5	19.2	21.1
% State	2.5	1.8	0.8	1.5	1.0	0.9	1.2	1.3	0.6	0.7	0.6	0.6
Ocean Gill Net												
Metric Tons	872.4	1,861.3	1,277.9	2,544.1	1,770.5	1,726.2	2,372.7	1,909.5	1,866.4	1,800.9	2,016.1	1,250.4
Value ($)	80.8	1,685.1	1,303.2	1,887.1	1,333.8	1,241.4	1,452.2	1,496.7	806.7	1,261.0	1,409.4	1,054.9
% State	31.9	41.2	26.3	51.6	38.3	37.6	43.5	41.3	28.5	33.1	37.3	26.5
Ocean Trawl												
Metric Tons	1,687.9	2,126.1	3,252.4	2,289.1	2,777.3	2,785.6	2,946.8	2,635.7	4,610.8	3,580.5	3,335.7	3419.4
Value ($)	1,071.0	1,560.9	2,543.7	1,494.1	1,737.1	1,694.9	1,555.0	1,684.2	2,086.7	2,230.7	1,971.1	2477.0
% State	61.8	47.1	66.9	46.4	60.1	60.7	54.1	57.0	70.4	65.8	61.8	72.5
Beach Seines												
Metric Tons	6.8	45.6	10.9	6.1	10.6	11.3	4.1	1.2	1.0	0.3	1.1	0.6
Value ($)	4.1	32.8	7.4	3.9	7.3	7.1	2.2	0.7	0.4	0.2	0.6	0.4
% State	0.2	1.0	0.2	0.1	0.2	0.2	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Other Fisheries												
Metric Tons	1.7	234.6	252.9	5.7	7.0	3.5	8.4	2.3	2.7	4.5	1.1	1.2
Value ($)	11.3	173.9	215.5	4.4	4.7	2.2	4.6	1.2	1.3	2.7	0.7	0.9
% State	0.6	5.2	5.2	0.1	0.2	0.1	0.2	<0.1	<0.1	0.1	<0.1	<0.1
All												
Metric Tons	2,731.1	4,518.5	4,858.6	4,928.6	4,620.0	4,591.4	5,450.9	4,621.6	6,544.9	5,439.9	5,399.2	4,715.7
Value ($)	2,002.3	3,642.6	4,116.4	3,450.0	3,119.8	2,986.8	3,080.2	3,233.4	2,923.9	3,528.0	3,408.5	3,562.5

Source: North Carolina Division of Marine Fisheries commercial landings database.
Long Haul includes: gear code 030 or 025 and non-ocean waters.
Flounder Pound Net includes: gear code 275, months October, November, December for counties Beaufort, Carteret, Dare, Hyde, Tyrrell, and month September for counties Beaufort, Carteret, Hyde and Tyrrell.
Sciaenid Pound Net includes: gear code 275, months May through August for counties Dare and Hyde, and month September for Dare.
Estuarine Gill Net includes: gear code 425, 426, 427, 470, 475, 480 and all non-ocean waters.
Ocean Gill Net includes: gear code 425, 426, 427, 470, 475, 480 and Atlantic Ocean.
Ocean Trawl includes: gear codes 210 and 230, Atlantic Ocean, and months January through May and September through December.

Table 7.6. North Carolina Atlantic croaker *(Micropogonias undulatus*) landings (weight - metric tons, number 1000's individuals), marketable landings per trip (CPUE weight -kgs), and total number of trips, by type for selected commercial fisheries, 1995-2006.

		Landings									
		Weight					Number				# Trips
		Total	Market		Bait	%Bait	Total	Market	Bait	%Bait	
Fishery	Year	Landed (metric tons)	Landed (metric tons)	CPUE	Landed (metric tons)		Landed (1000's)	Landed (1000's)	Landed (1000's)		
Long Haul											
	1995	895	72	163	823	92	10,571	317	10,254	97	444
	1996	244	163	328	81	33	1,450	648	802	55	496
	1997	169	27	95	142	84	2,162	122	2,040	94	283
	1998	81	11	62	70	86	1,261	60	1,201	95	184
	1999	114	3	34	111	97	1,942	9	1,933	100	93
	2000	221	21	99	200	90	3,157	77	3,080	98	214
	2001	155	45	197	110	71	1,398	141	1,257	90	228
	2002	67	14	83	53	80	558	59	499	89	165
	2003	142	23	155	119	84	1,727	74	1,653	96	151
	2004	46	16	98	30	66	529	72	457	86	161
	2005	37	15	121	22	60	399	49	350	88	120
	2006	49	16	76	33	67	589	77	512	87	215
Sciaenid Pound Net											
	1995	15	6	12	9	60	137	18	119	87	473
	1996	100	5	14	95	95	1,079	12	1,067	99	372
	1997	7	1	3	6	89	70	2	68	97	272
	1998	2	<1	1	2	95	24	<1	24	98	88
	1999	202	6	22	196	97	2,872	17	2,855	99	257
	2000	16	<1	4	16	97	261	1	260	100	107
	2001	13	11	69	2	16	47	24	23	49	154
	2002	11	<1	5	11	97	130	1	129	99	66
	2003	2	<1	4	2	94	10	<1	10	97	36
	2004	1	1	9	<1	13	2	1	1	51	54
	2005	0	<1	3	<1	57	5	1	4	88	49
	2006	2	<1	3	2	96	26	<1	26	99	23

Table 7.6. (Continued).

Fishery	Year	Landings: Weight: Total: Landed (metric tons)	Weight: Market: Landed (metric tons)	Weight: Market: CPUE	Weight: Bait: Landed (metric tons)	Weight: %Bait	Number: Total: Landed (1000's)	Number: Market: Landed (1000's)	Number: Bait: Landed (1000's)	Number: %Bait	# Trips
Ocean Gill Net											
	1995	873	872	278	<1	<1	2,615	2,615	<1	<1	3,133
	1996	1,861	1,861	476	<1	<1	5,200	5,200	<1	<1	3,913
	1997	1,278	1,278	363	<1	<1	3,249	3,249	<1	<1	3,518
	1998	2,547	2,544	723	3	<1	5,677	5,677	<1	<1	3,521
	1999	1,771	1,770	618	<1	<1	3,490	3,490	<1	<1	2,866
	2000	1,734	1,726	830	8	<1	3,449	3,399	<1	1	2,081
	2001	2,373	2,373	924	<1	<1	4,636	4,636	<1	<1	2,567
	2002	1,912	1,910	1,113	2	<1	3,627	3,617	10	<1	1,716
	2003	1,866	1,866	1,210	<1	<1	3,503	3,503	<1	<1	1,542
	2004	1,801	1,801	1,320	<1	<1	3,245	3,244	1	<1	1,364
	2005	2,016	2,016	1,613	<1	<1	4,223	4,223	<1	<1	1,250
	2006	1,250	1,250	1,008	<1	<1	2,883	2,883	<1	<1	1,240
Ocean Trawl											
	1995	2,013	1,688	7,469	325	16	11,115	8,072	3,043	27	226
	1996	2,428	2,126	7,963	302	12	11,567	9,449	2,118	18	267
	1997	3,449	3,252	8,719	197	6	7,809	6,449	1,360	17	373
	1998	2,388	2,289	4,311	99	4	7,813	7,509	304	4	531
	1999	2,865	2,777	7,567	88	3	9,651	9,103	548	6	367
	2000	2,863	2,786	9,640	77	3	9,845	9,353	492	5	289
	2001	3,053	2,947	11,740	106	3	10,771	10,131	640	6	251
	2002	2,733	2,636	11,873	97	4	8,538	8,013	525	6	222
	2003	4,889	4,611	19,292	278	6	15,567	13,914	1,653	11	239
	2004	3,775	3,580	14,981	195	5	11,862	10,817	1,045	9	239
	2005	3,424	3,336	16,933	88	3	11,424	10,855	569	5	197
	2006	3,523	3,419	17,535	104	3	12,927	12,233	694	5	195

Table 7.6. (Continued).

Fishery	Year	Landings: Weight: Total: Landed (metric tons)	Weight: Market: Landed (metric tons)	Weight: Market: CPUE	Weight: Bait: Landed (metric tons)	Weight: %Bait	Number: Total: Landed (1000's)	Number: Market: Landed (1000's)	Number: Bait: Landed (1000's)	Number: %Bait	# Trips
Estuarine Gill Net											
	1995	69	69	6	<1	<1	233	232	1	<1	11,055
	1996	83	83	10	<1	<1	269	268	1	<1	8,222
	1997	38	37	4	1	3	131	128	3	2	8,882
	1998	73	72	13	1	1	166	162	4	2	5,486
	1999	46	46	6	<1	<1	104	104	<1	<1	7,999
	2000	43	43	5	<1	<1	104	103	1	1	7,891
	2001	64	64	8	<1	<1	149	148	1	1	7,983
	2002	59	59	10	<1	<1	134	134	<1	<1	5,874
	2003	40	40	8	<1	<1	86	86	<1	<1	4,862
	2004	37	37	7	<1	<1	89	89	<1	<1	5,341
	2005	30	30	7	<1	<1	79	79	<1	<1	4,488
	2006	28	28	7	<1	<1	85	85	<1	<1	3,968
Fisheries Combined											
	1995	3,864	2,707	177	1,157	30	24,671	11,254	13,417	54	15,331
	1996	4,717	4,238	319	478	10	19,565	15,577	3,988	20	13,270
	1997	4,941	4,595	345	346	7	13,421	9,950	3,471	26	13,328
	1998	5,092	4,917	501	175	3	14,941	13,408	1,533	10	9,810
	1999	4,998	4,602	397	395	8	18,059	12,723	5,336	30	11,582
	2000	4,878	4,577	433	301	6	16,815	12,932	3,883	23	10,582
	2001	5,657	5,439	486	218	4	17,001	15,079	1,921	11	11,183
	2002	4,781	4,618	574	163	3	12,987	11,824	1,163	9	8,043
	2003	6,940	6,541	958	399	6	20,893	17,576	3,316	16	6,830
	2004	5,660	5,435	759	225	4	15,727	14,223	1,504	10	7,159
	2005	5,507	5,397	884	110	2	16,129	15,206	923	6	6,104
	2006	4,853	4,714	836	139	3	16,511	15,279	1,232	7	5,641

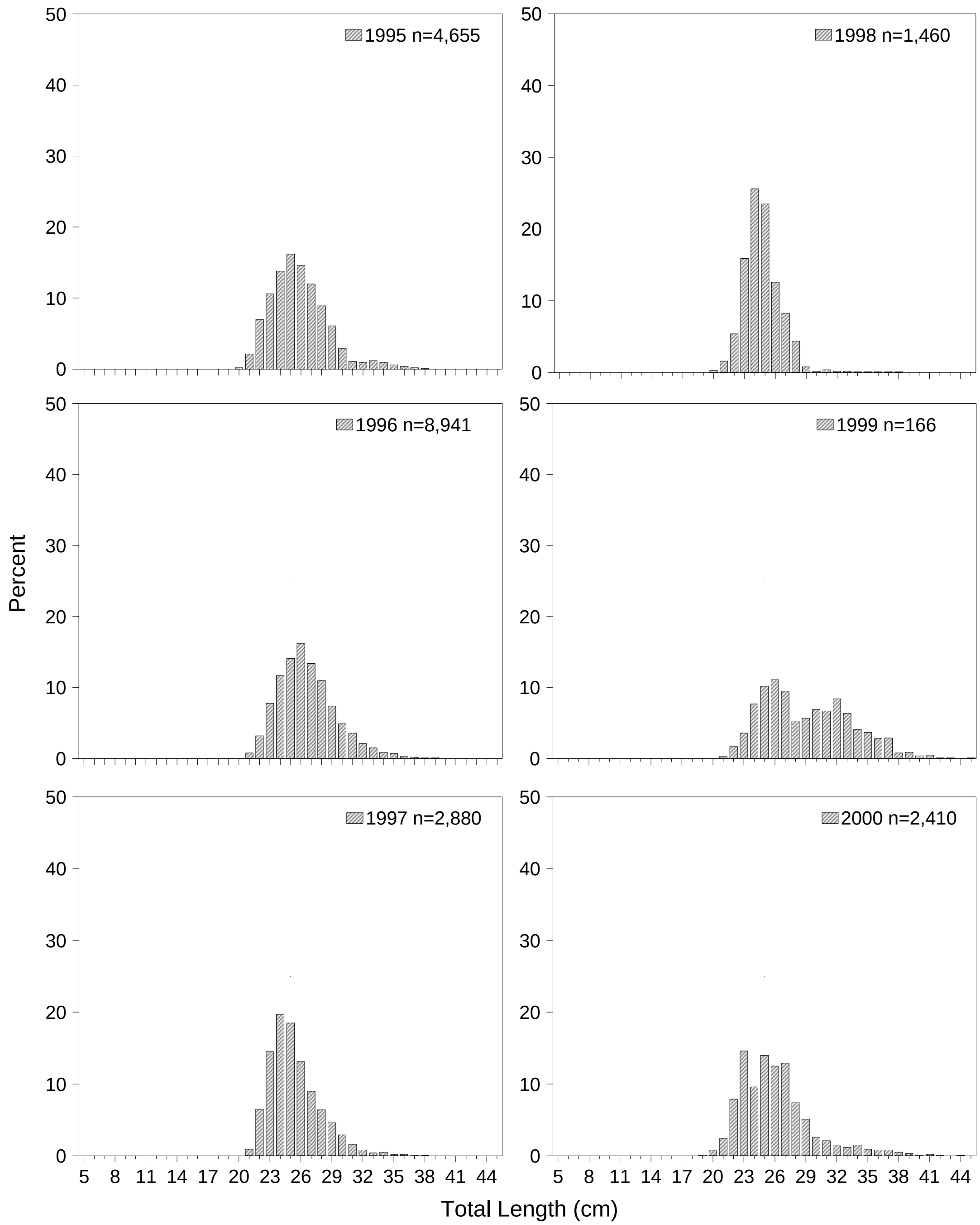


Figure 7.8 North Carolina long haul seine fishery weighted length frequency distributions for marketable Atlantic croaker *(Micropogonias undulatus)*, 1995-2006.

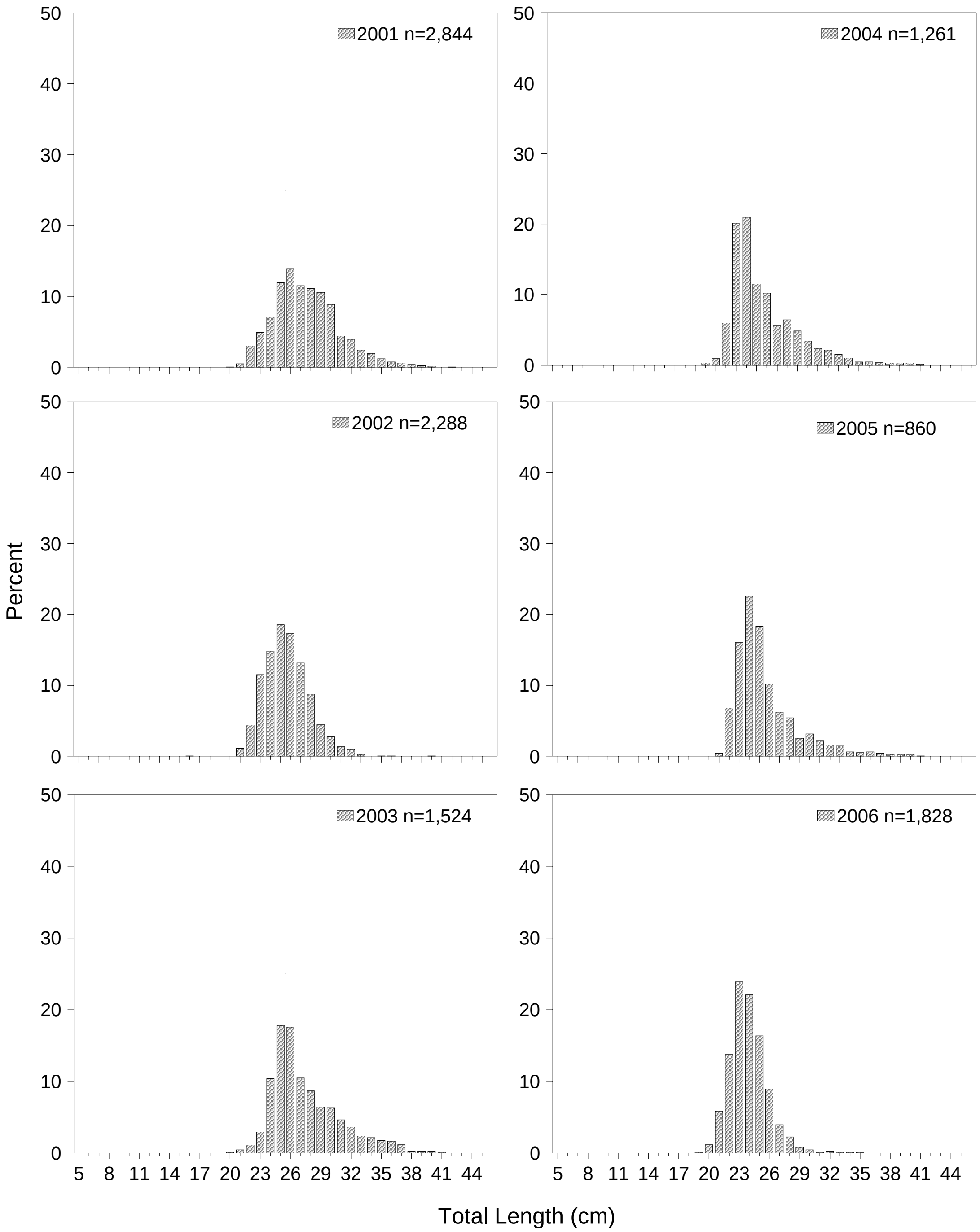


Figure 7.8. (Continued).

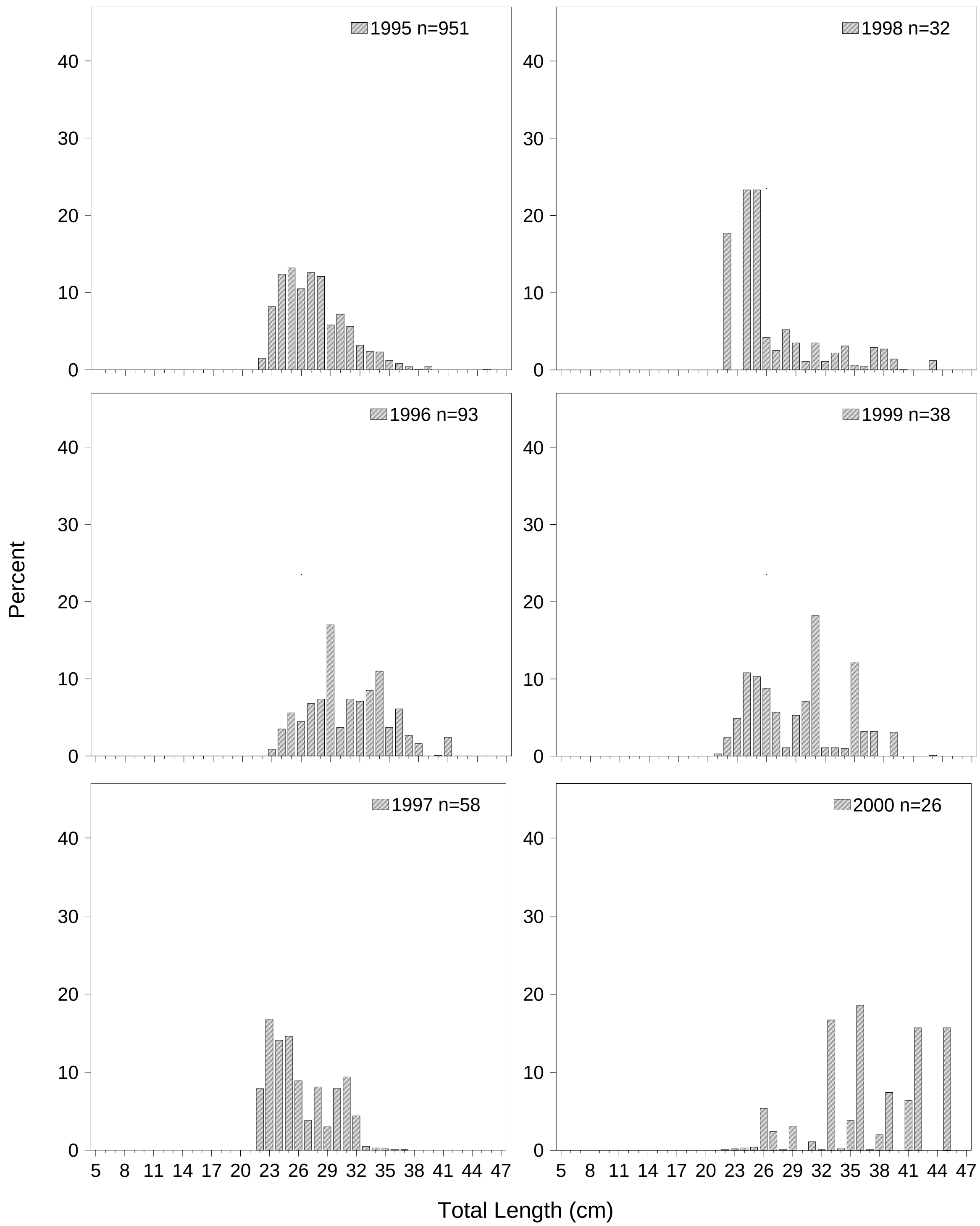


Figure 7.9. North Carolina sciaenid pound net fishery weighted length frequency distributions for marketable Atlantic croaker (*Micropogonias undulatus*), 1995-2006.

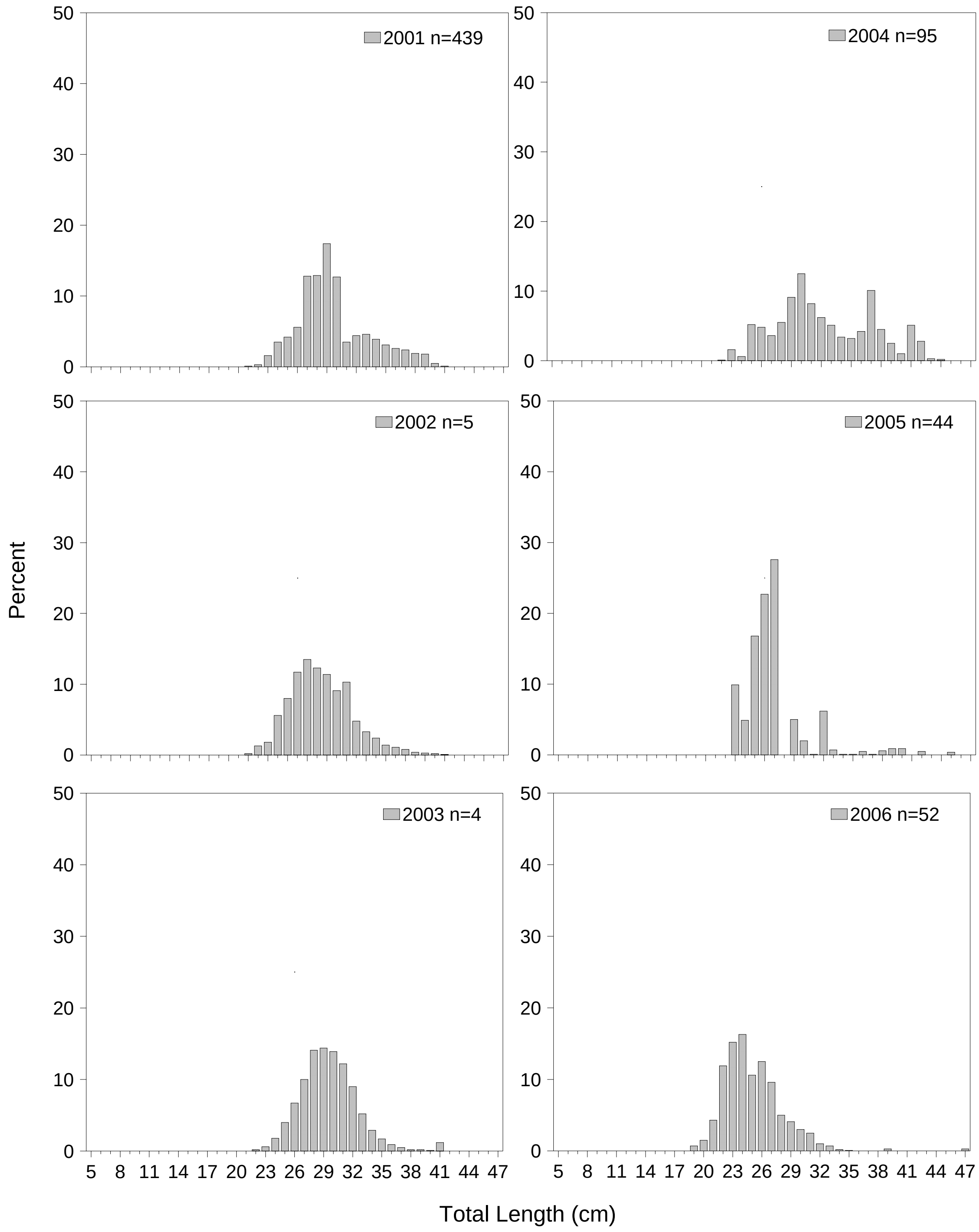


Figure 7.9. (Continued).

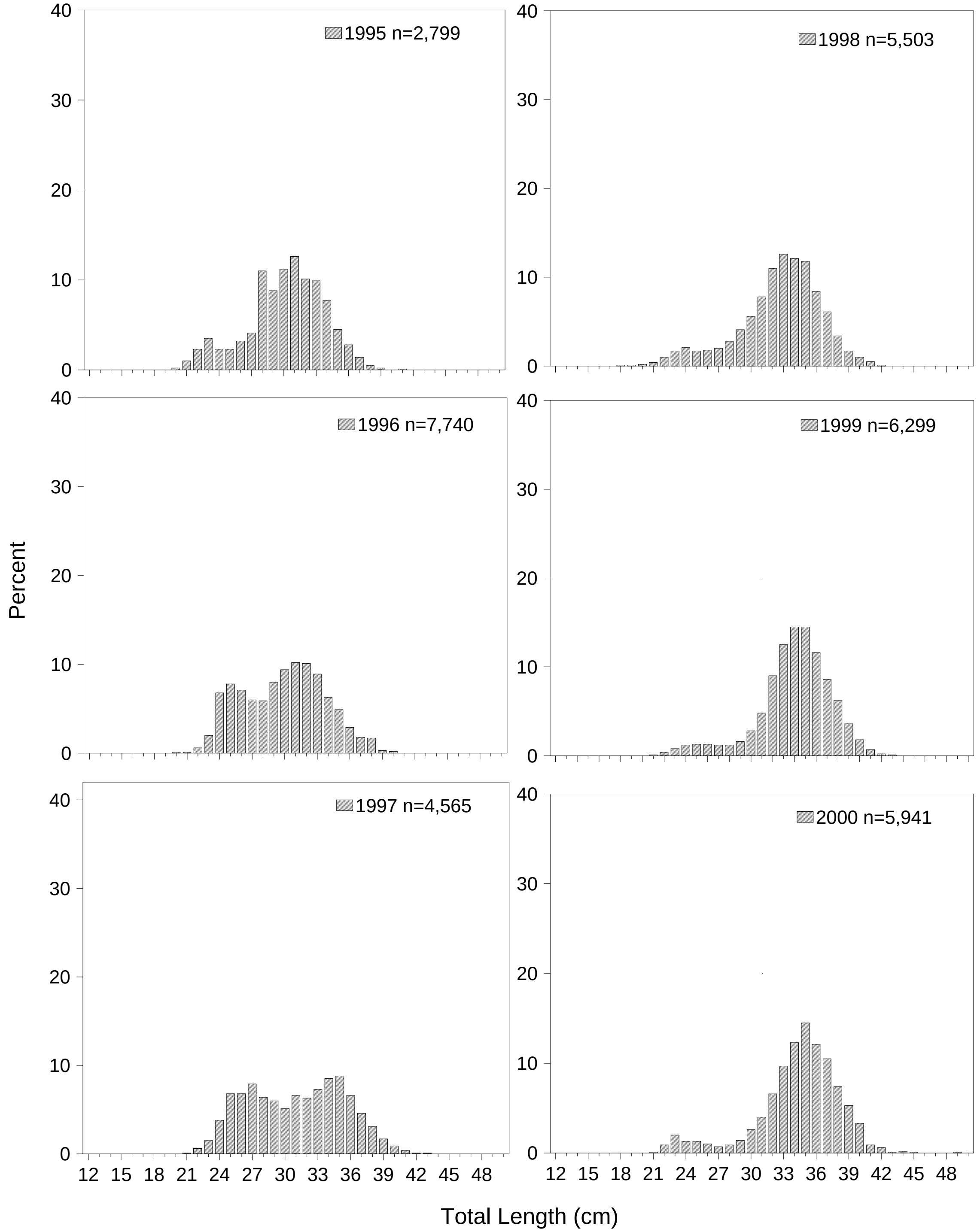


Figure 7.10. North Carolina ocean gill net fishery weighted length frequency distributions for marketable Atlantic croaker (*Micropogonias undulatus*), 1995-2006.

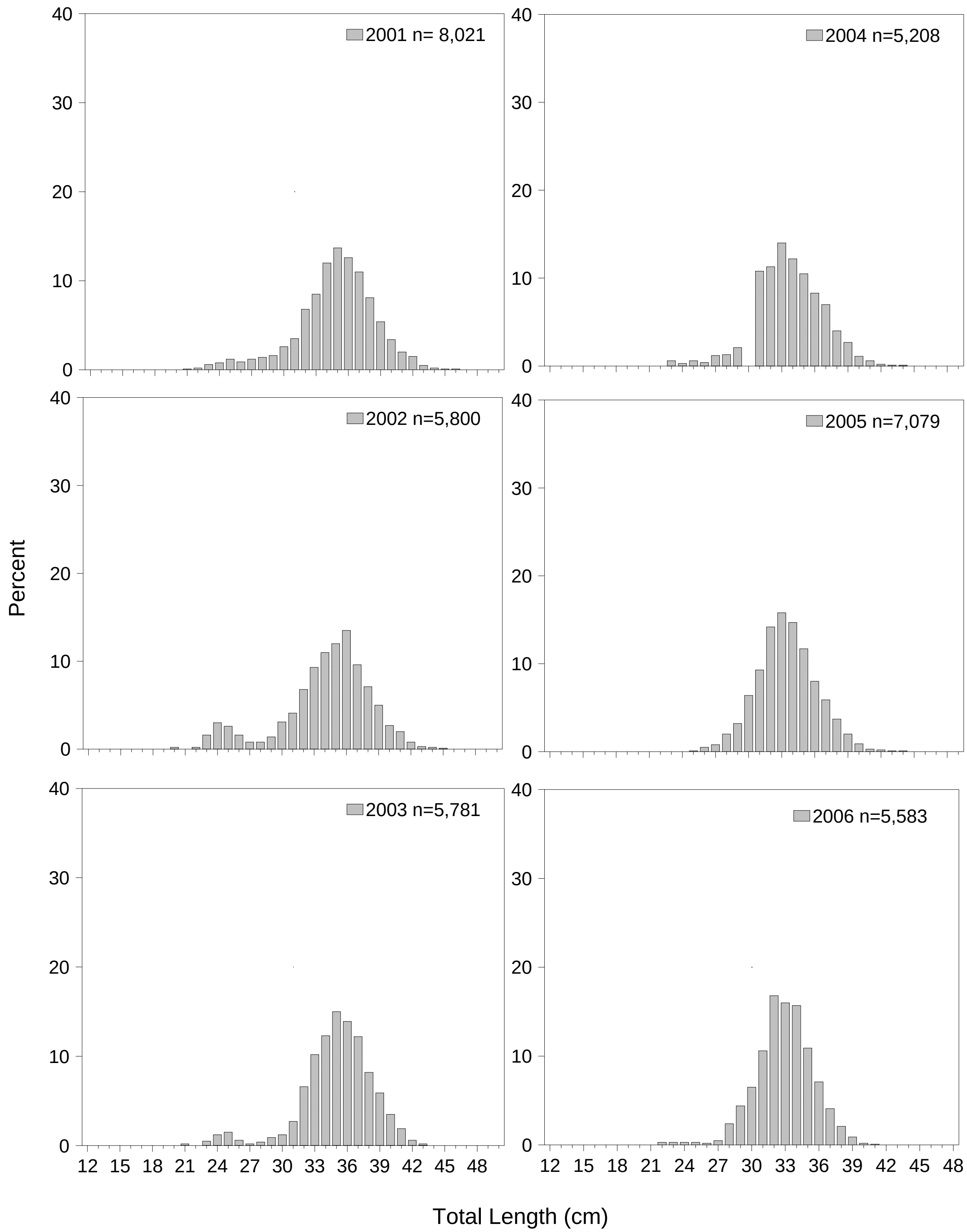


Figure 7.10. (Continued).

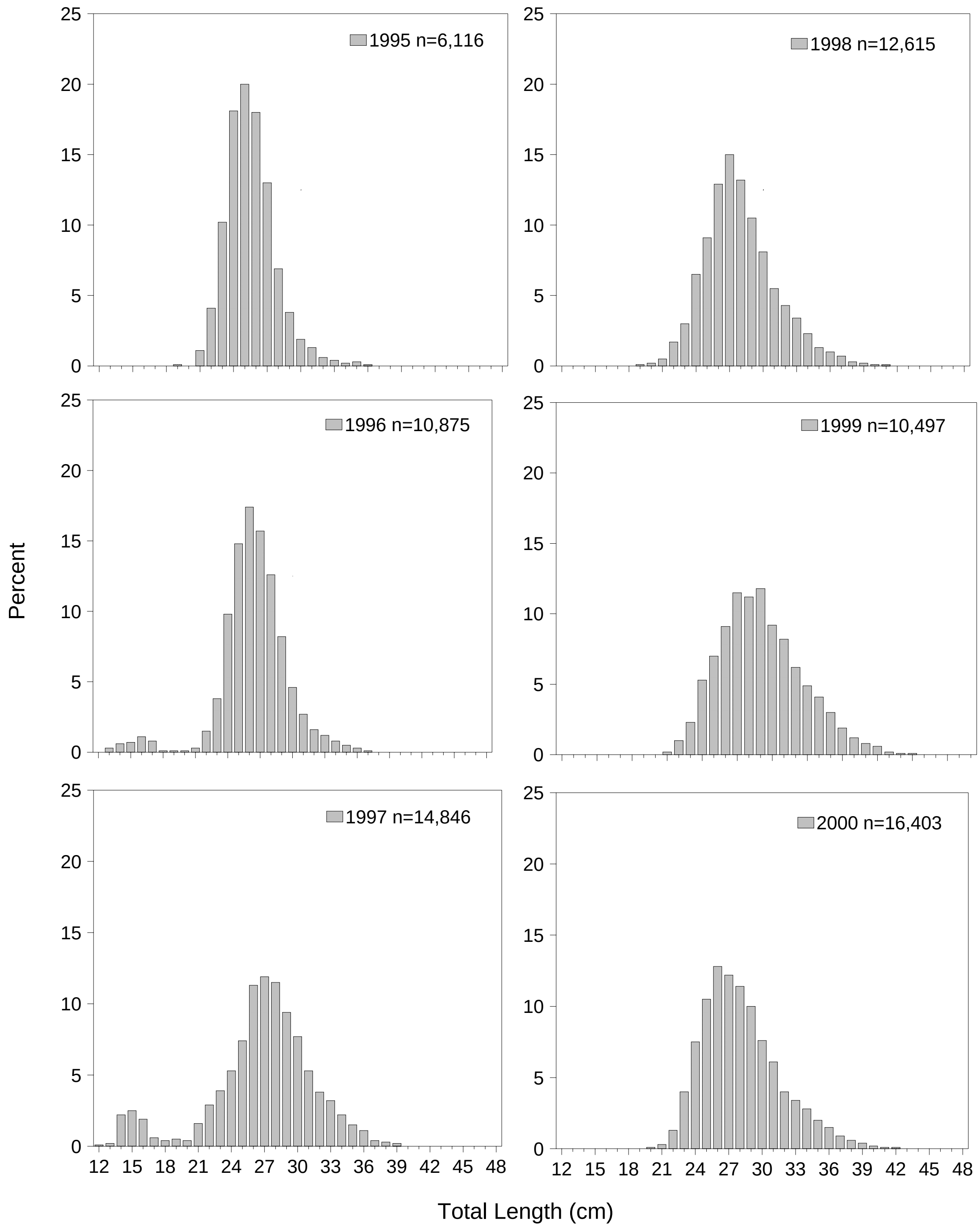


Figure 7.11. North Carolina ocean trawl fishery weighted length frequency distributions for marketable Atlantic croaker (*Micropogonias undulatus*), 1995-2006.

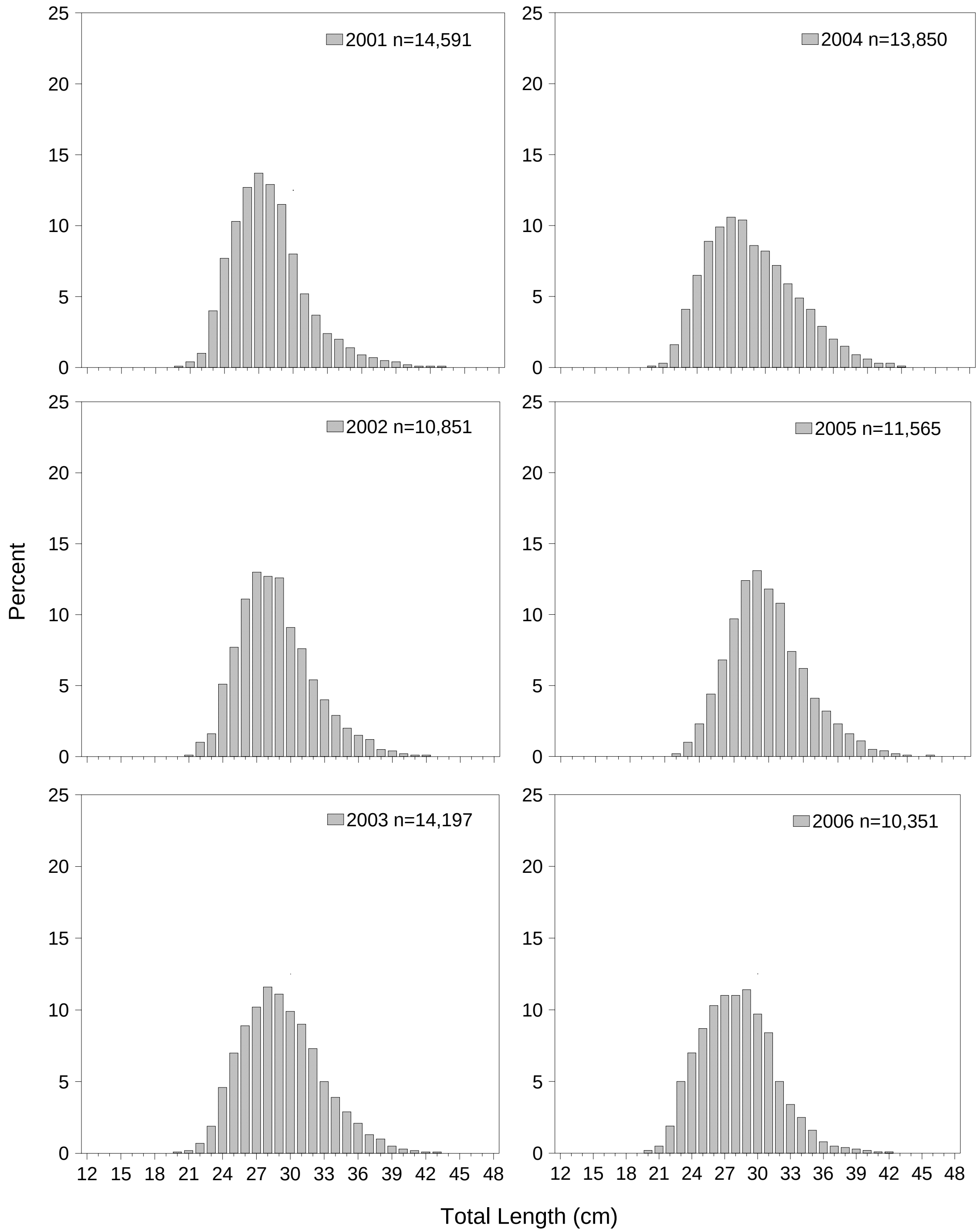


Figure 7.11 (Continued).

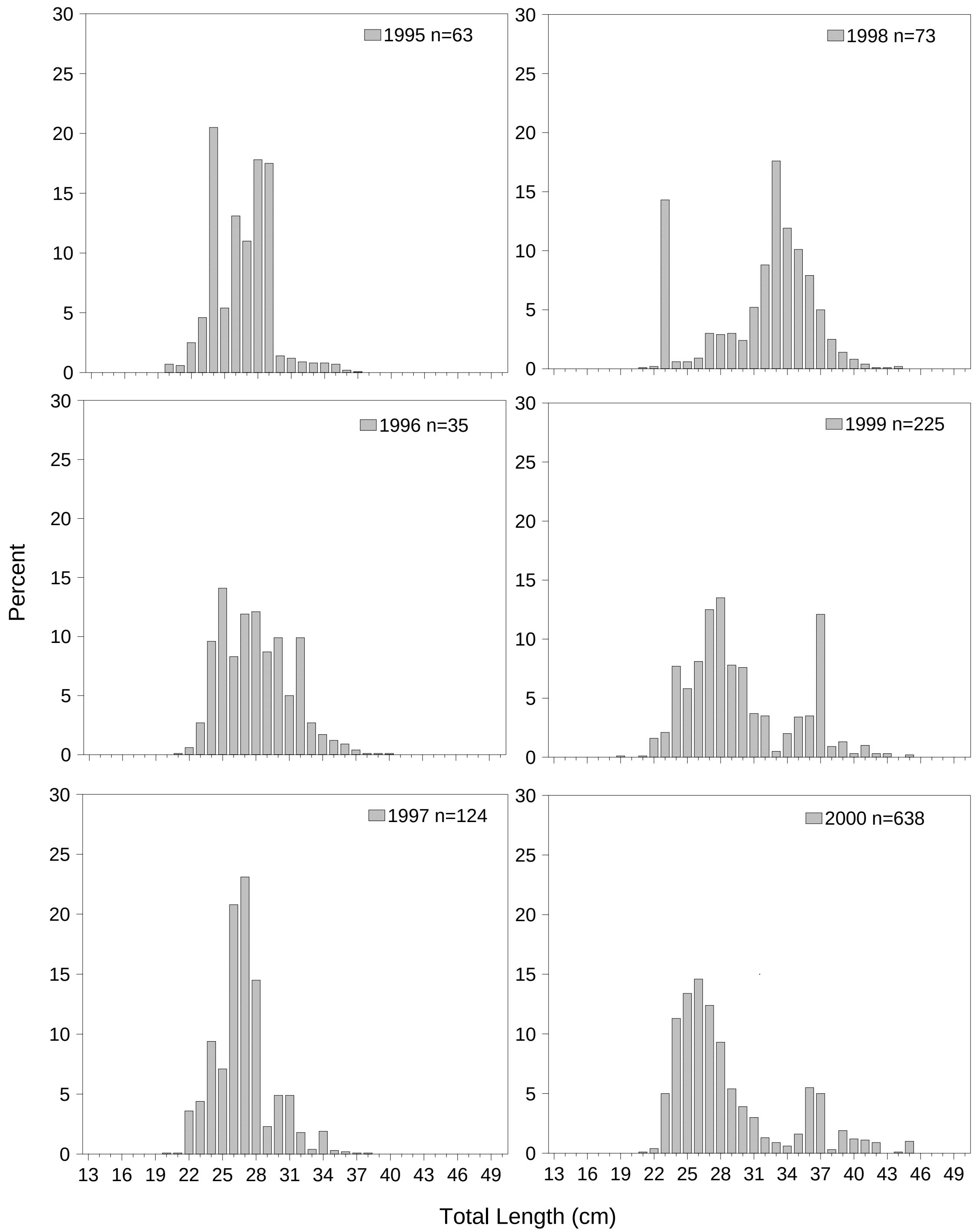


Figure 7. 12 North Carolina estuarine gill net fishery weighted length frequency distributions for marketable Atlantic croaker (*Micropogonias undulatus*), 1995-2006.

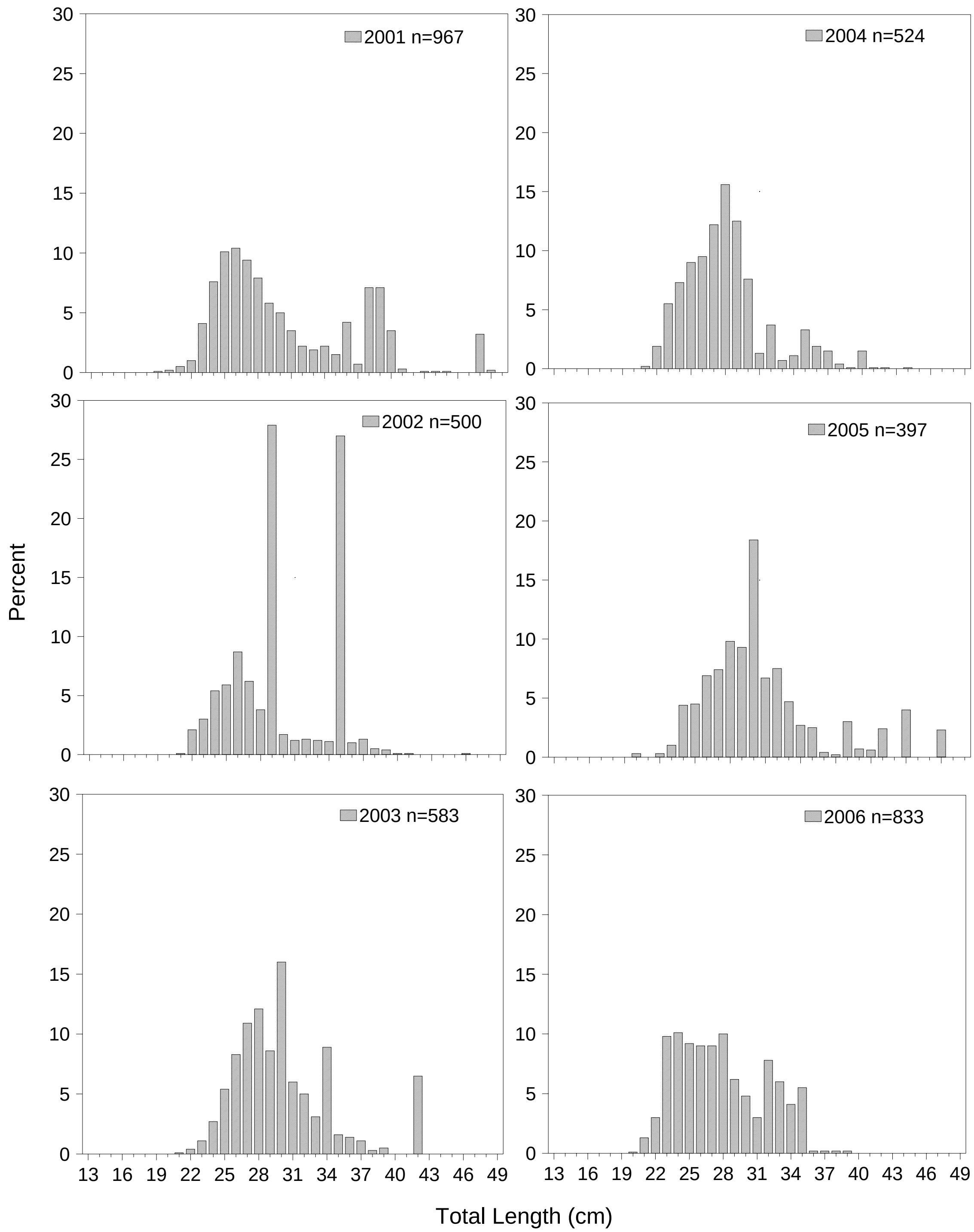


Figure 7.12. (Continued).

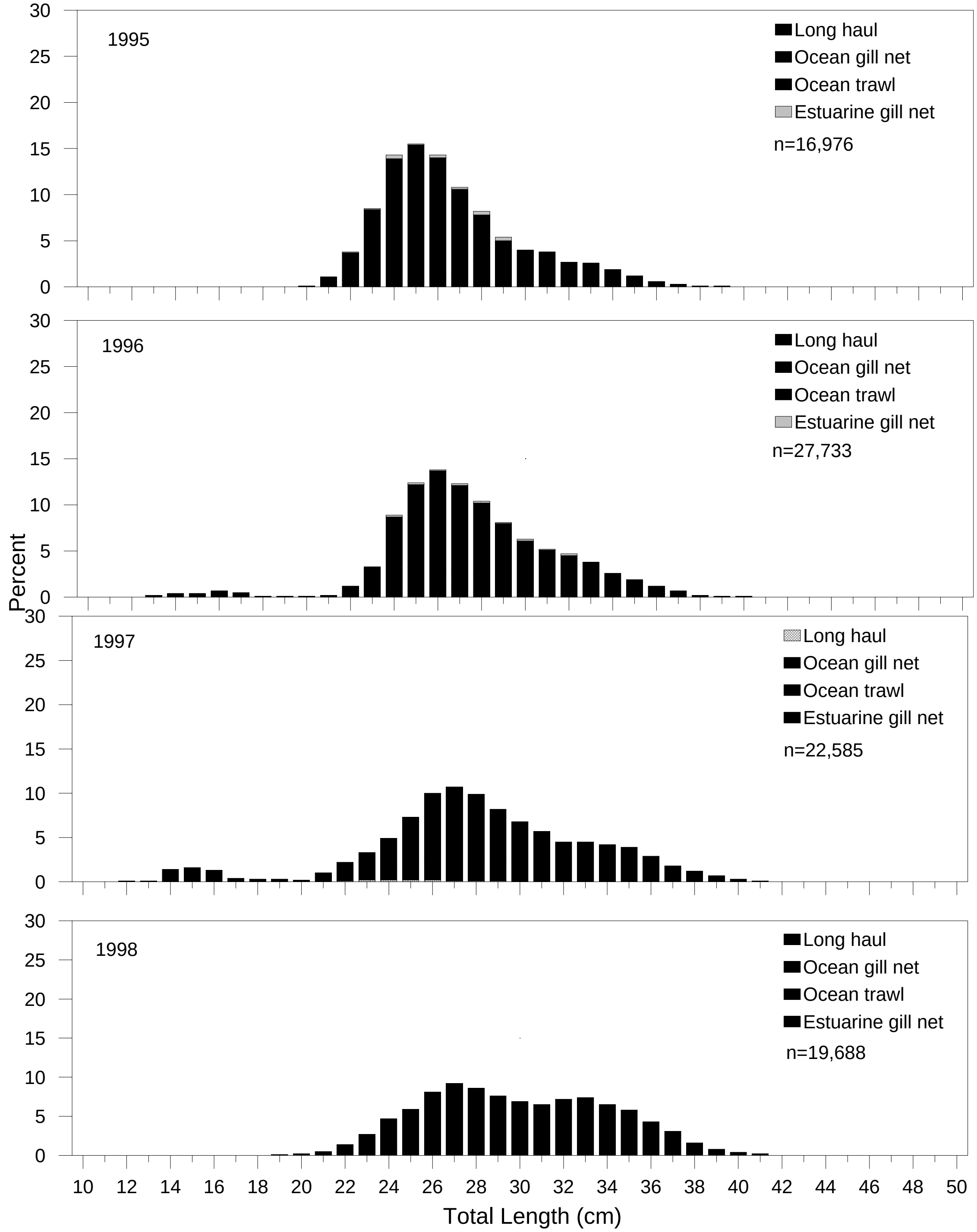


Figure 7.13. North Carolina commercial fishery weighted length frequency distributions for marketable Atlantic croaker *(Micropogonias undulatus),* 1995-2006.

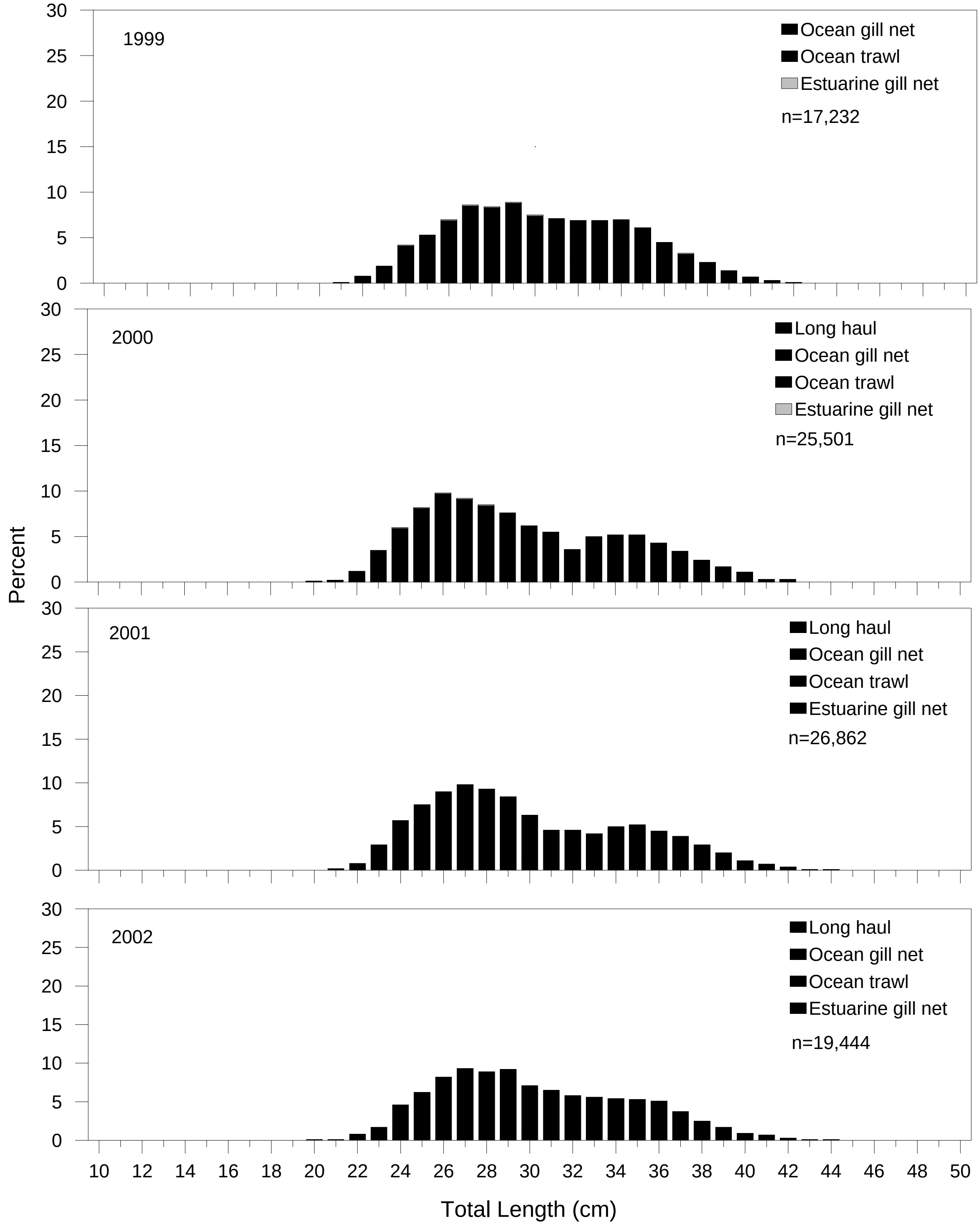


Figure 7.13. (Continued).

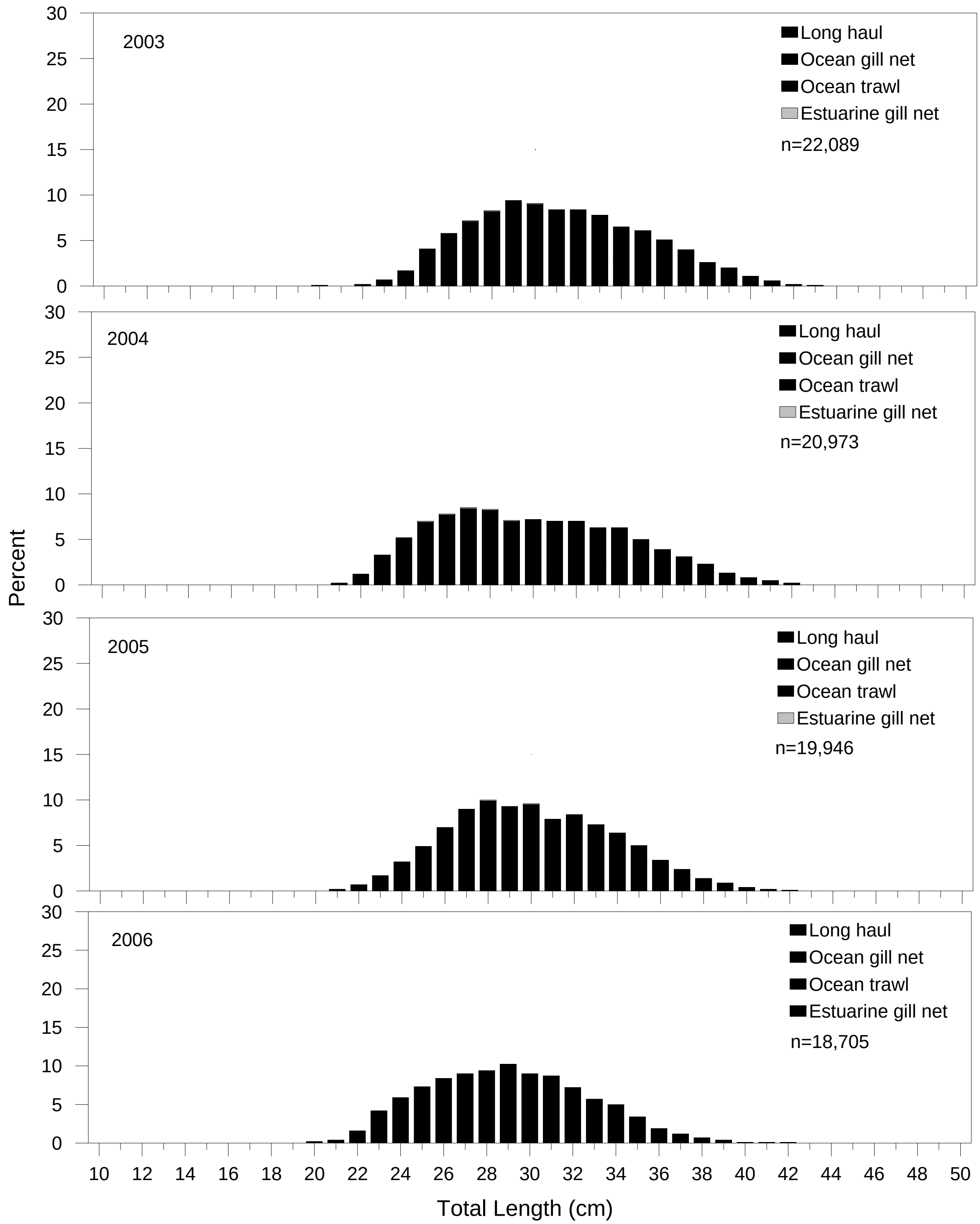


Figure 7.13. (Continued).

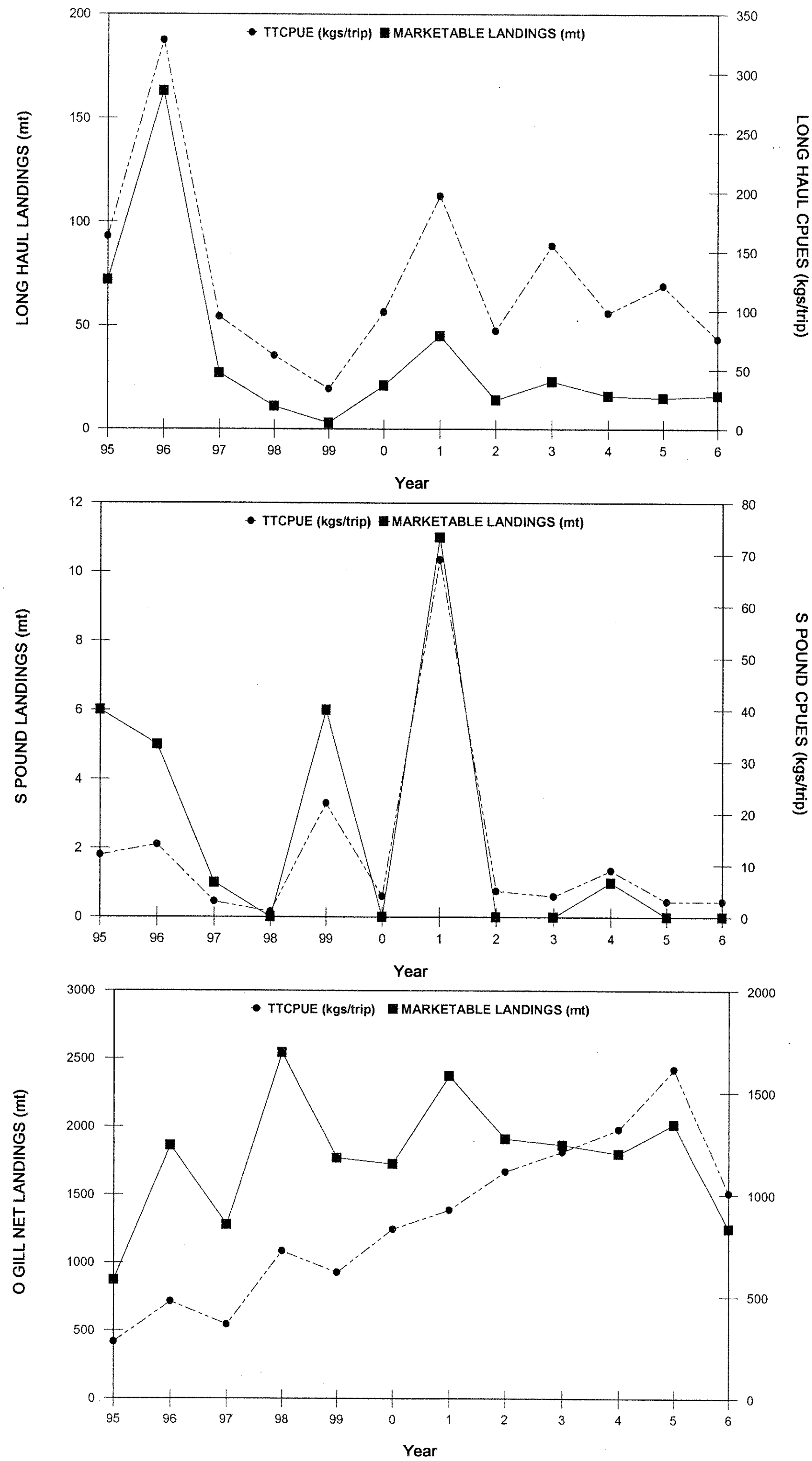
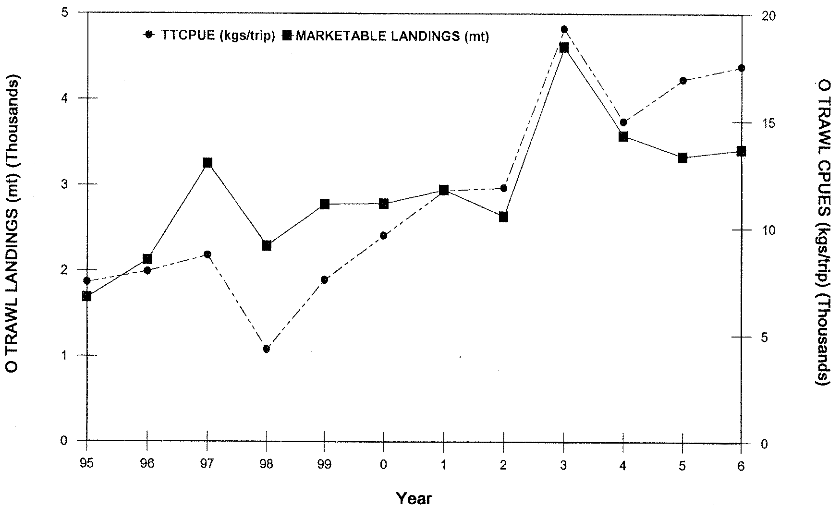
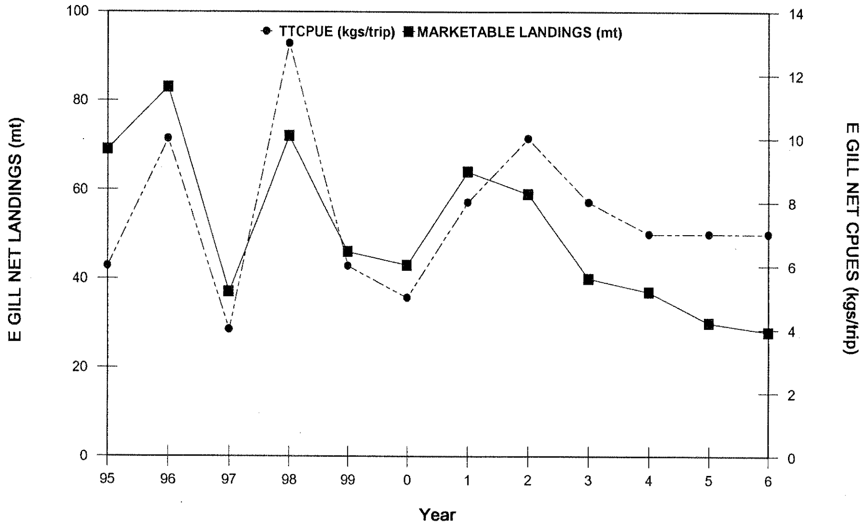


Figure 7.14. North Carolina Atlantic croaker (*Micropogonias undulatus*) annual commercial landings and mean CPUE (landed catch per trip, kg) for selected fisheries and overall, 1995-2006.





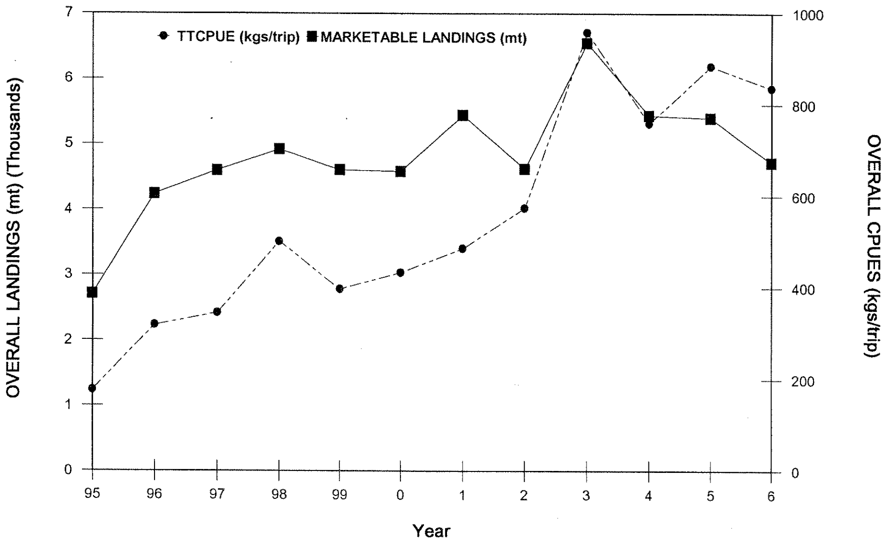


Figure 7.14. (continued).

SPOT

Background

Spot (*Leiostomus xanthurus*) occur in the estuarine and coastal waters extending from the Gulf of Maine south to Florida, although the highest abundance occurs from Chesapeake Bay to South Carolina (Mercer 1987). Spot form huge aggregations during seasonal spawning offshore-inshore migrations, increasing vulnerability to commercial and recreational fishing pressure. Spot mature between their second and third year of life, at a size of 18.6-21.5 (cm).

Spot are short-lived sciaenids and year-to-year fluctuations in catch are not surprising since the catch in most years consists largely on one or two year classes (Mercer 1987). This age structure is typical of species with short life spans (NCDMF 1992a). The strength of a particular year class is recruitment driven and largely dependent on environmental conditions that prevail on spawning grounds and in nursery areas (Joseph 1972).

Spot is one of eight members of the family Sciaenidae that support important commercial fisheries along the North Carolina coast. Commercial gears used to harvest spot include long haul seines, estuarine gill nets, near-shore ocean gill nets and to a lesser extent trawls and pound nets. This report will address these gears and their effects on the spot harvest during the 12-year period from 1995-2006 with specific comments on 2003-2006.

Length Distribution

Weighted fork length (FL) frequency distributions for spot landed in the long haul seine fishery during 2004-2006 ranged from 15-28 cm with modal peaks fluctuating between 20 and 23 cm (Figure 7.15). Length frequencies of marketable fish in the long haul fishery were smaller than in the other two major spot fisheries (estuarine and ocean gill net). The length frequency graphs indicate a wider range of sizes captured by the nonselective long haul gear. Consequently, the percentage of fish represented by the peak modal size did not exceed 20% of the catch in a given year.

Weighted length frequency distributions for spot landed in the sciaenid pound net fishery during the same period ranged from 16-30 cm with modal peaks ranging between 19 cm in 2006 and 29 cm in 2003 (Figure 7.16). Small sample sizes during 2003-2006 are primarily a function of the diminishing effort in this fishery.

Weighted length frequency distributions for spot landed in the ocean gill net fishery during 1995-2006 are depicted in Figure 7.17. Spot landed in this fishery during 2003-2006 ranged from 17-30 cm. In contrast to the long haul and sciaenid pound net gears, distinct modal peaks are evident between 22 and 24 cm indicating the size selectivity of these gill nets.

Weighted length frequency distributions for spot landed in the ocean trawl fishery during the study period 2003-2006 ranged from 12-30 cm (Figure 7.18). Modal peaks were variable during the six-year period 1997-02, fluctuating between 17 and 23 centimeters. Size classes landed in this fishery are variable due to small sample sizes in most years.

Weighted length frequencies of spot landed in the estuarine gill net fishery during 1995-06 are presented in Figure 7.19. Spot landed in this fishery during 2003-2006 ranged from 18-31 cm. Estuarine gill net fishers utilize similar gill net mesh sizes as those targeting spot in the ocean. Consequently, the length frequencies for both fisheries are similar and bell shaped due to the selectivity of the gear (Figures 7.17 and 7.19).

Combined length frequencies for the major spot fisheries were charted (Figure 7.20) for the period 1995-2006. The dominant gears during 2003-2006 were the long haul seine along with estuarine and ocean gill nets. Length frequencies indicate that the long haul and the ocean trawl fisheries land smaller fish than the gill net fisheries.

Length frequencies of spot sampled in the sold bait samples are presented in Table 7.7 for the major fisheries during 1995-2006. The majority of the bait in the long haul fishery consists of young immature spot (less than 18 cm). Length frequencies of the bait spot have remained consistent since 1995. The estimated number of bait spot landed and sold in each of the fisheries is presented in Table 7.7. During 2003-2006, the long haul fishery averaged about 1 million bait spot sold. Other spot fisheries did not land significant numbers of bait spot.

Landings and CPUEs

Total landings by all gears for spot fluctuated without a clear trend from 1995-2001. However, total landings from 2002-2006 have been decreasing on a year-to-year basis. Although fluctuations are expected for such a short-lived species, the recent declines (from 2001) are concerning to fishery managers. Landings averaged approximately 1,160 metric tons (mt) between 1995-2006 ranging from a high of 1.4 mt in 2001 to a historical low of 619 mt in 2006. As the supply of spot has seemingly contracted, the price has increased significantly. The value of the fish has increased from $.98/kg in 2003 to $1.61/kg in 2006. Total dockside values ranged from $1.3 million in 2001 to $0.9 million in 2005. Landings in 1996, 1998 and 1999 were impacted by hurricanes that interrupted the peak harvesting period in the fall.

Historically, long haul fishers have landed more spot than any other commercial user group (Table 7.8). However, since 2001, more spot have been landed in the ocean gill net or the estuarine gill net fishery. This decrease results from a continuing shift in effort towards gill nets and away from long hauls (NCDMF 1992b). Long haul's contribution to the total spot landings ranged from a high of 49.6% in 1997 to a low of 27% in 1999. Long haul landings averaged 39.5% of the total spot landings during the study period 1995-2006. Long haul landings as a percentage of total landings decreased during 2003-2006 as did the effort.

The long haul fishery lands a significant amount of spot that can only be marketed as scrapfish or bait (Table 7.9). Spot less than 19.5 cm are unmarketable (NCDMF 1992a). Between 2003 and 2006, 81% of the spot landed by weight were marketable as food fish and 19% were sold as bait.

In terms of numbers of spot landed in the long haul fishery, 44% of the total number of spot landed over the twelve- year period fell into the bait category. However, since DMF's culling panel regulation was implemented in the long haul fishery (1999) this percentage declined to 33%. Despite this improvement, which is possibly attributed to DMF's culling panel regulation, there still exists a significant catch of small immature fish in the long haul gear.

The sciaenid pound net fishery during 2003-2006 never accounted for more than 1.7 mt or 0.2% of total spot landings (Table 7.8). Most of the spot landed in the sciaenid pound net fishery are not marketable except as bait but the decrease in effort over the last decade has mitigated growth overfishing concerns that existed prior to the mid 1990s. The number of sciaenid pound net stands has decreased from 30 stands in 1982 to 8 stands in 1996 to 4 stands in 2006.

Sciaenid pound net fishery landings were separated into market and bait grade categories, and listed in Table 7.9. Between 1995-2006, there was a consistent excess of bait spot landed in relation to market grade fish. On average, by weight, the portion of the catch classified as bait was 78%.

The ocean trawl fishery for spot consists of the flynet fishery, the flounder trawl fishery and to a lesser extent the shrimp trawl fishery. Landings from these fisheries were slight, ranging from a peak of 4.8% of the total commercial spot catch in 2001, to a low of 0.1% in 2006. During the most recent four years, landings, on average, comprised 0.5% of the total spot landings. As indicated in Table 7.9, most of the spot landed in the ocean trawl fishery were too small to sell as food fish. Between 1995-2006, on average, 83% of the spot were classified bait.

The percentage of spot landed in the estuarine gill net fishery trended upward in the mid 1990s and peaked in 2005 at 43.9% of the total spot landings, surpassing the ocean gill net and long haul seine fisheries (Table 7.8). During the most recent four years (2003-2006), estuarine gill net landings averaged 34.5% of the total spot landings, while in the eight years prior; landings averaged 22.1% of the total.

Landings in the ocean gill net fishery have also trended upward since the mid 1990s (Table 7.8). However, the upward trend appears to have stabilized and even decreased during the most recent four year period, a time during which more effort shifted towards estuarine gill netting. During 2003-2006, ocean gill netting averaged 21.9% of the total spot landings. During the eight years prior to 2003, ocean gill net landings averaged 28% of the landings. As depicted in Figure 7.34 and Table 7.9, the ocean and estuarine gill net fisheries landed spot that were almost 100% marketable. Growth overfishing is not a problem with these gears.

CPUEs of spot landed and sold from the major fisheries were calculated from NCDMF's trip ticket program and are presented in Table 7.9 and Figure 7.21. CPUEs in the long haul fishery ranged from a high of 1,316 kg in 2000 to a low of 586 kg in 1996. The average during 2003-2006 was 807 kg. This compares to an average of 957 kg during 1995-02 and may indicate a decrease in the availability of spot to this gear. The average number of trips for the twelve-year period 1995-2006 was 471 trips. During the period 2003-2006 the average decreased to 362 trips. The number of trips ranged from a high of 702 trips in 1996 to a low of 306 trips in 2005 (Table 7.9, Figure 7.21).

Spot CPUEs in the sciaenid pound net fishery are small and relatively insignificant due to this fisheries diminished contribution to overall landings. CPUEs ranged from a low of 2 kg in 2000 to 39 kg in 2004. The number of trips capturing spot has decreased from a high of 242 in 1995 to a low of 21 in 2005 (Table 7.9, Figure 7.21).

CPUEs in the spot ocean trawl fishery have fluctuated greatly ranging from a high of 986 kg in 2002 to a low of 11 kg in 2006. These fluctuations are likely due to effort decreases in this fishery. The number of ocean trawl trips landing spot ranged from a high of 72 trips in 2001 to only 5 trips in 2006 with an average of 28 trips since 1995 (Table 7.9, Figure 7.21).

CPUEs in the estuarine gill net fishery ranged from a high of 49 kg in 2004 to 21 kg in 1997. The twelve- year average CPUE for trips landing spot during 1995-2006 was 37 kg. The average for 2003-2006 was 41 kg. The number of trips landing spot did not show a lot of change during the study period. The greatest number of trips occurred in 2002 (8,848), while the fewest trips occurred in 1998 (6,742 trips). The average number of trips in this fishery for the twelve-year period was 7,401. The average decreased to 7,126 trips when the last four years were calculated (Table 7.9, Figure 7.21).

CPUEs in the ocean gill net fishery ranged from a high of 226 kg in 2001 to a low of 88 kg in 1997 and averaged 153 kg from 1995 until 2006. The average for the most recent four years (2003-2006) was 125.5 kg. The number of ocean gill nets trips landing spot has also been decreasing. On average, fishers made 1,785 trips landing spot from 1995-2006 but that average decrease to 1,298 trips for the most recent four years (Table 7.9, Figure 7.21).

CPUEs were examined for all major fisheries combined and that data is presented in Table 7.9 and Figure 7.21. Both trips and CPUEs showed a decreasing trend during 1995-2006. CPUEs ranged from a high of 129 kg in 1995 to a low of 71 kg during 2006 with a twelve-year average of 96.6 kg. During 2003-2006, the average decreased to 86.5 kg. The number of trips landing spot for all fisheries combined ranged from 11,236 trips in 1997 to 7,622 trips in 2006 with a twelve-year average of 9,751 trips. The average number of trips during 2003-2006 decreased to 8,836 trips. The commercial spot fishery has experiencing declining effort and declining landings since 1995.

Management Issues

Currently, the NCDMF does not have any regulations directed at the commercial or recreational spot fisheries. However, there are several regulations dealing with fishing gears and areas that affect the capturing efficiency of spot. Regulation 15A NCAC 3N.0162 limits the scrapfish catch to 5,000 pounds per vessel, and indirectly affects spot since they comprise a large percentage by weight of the bait fish landed by North Carolina fishers. A regulation enacted in 1991 (15A NCAC 3J .0104(a)) includes area restrictions and incidental finfish limits on fish captured by shrimp and crab trawls in inside waters. Trips by these gears are limited to 50 pounds of finfish from December 1 through February 28 and 1,000 pounds of finfish from March 1 to November 30.

A rule (15A NCAC 3J 0202 (4) made permanent in 1996 restricts ocean trawls (flynets) from Cape Hatteras to the North Carolina/ South Carolina boundary. This rule was followed in 1998 by the “50-50” rule (15A NCAC 3J 0202 5 (a,b) which requires that the weight of finfish caught in shrimp and crab trawl operations from November 30 to March 1 be equal to or less than the shrimp or crab catch weight except that an additional 300 lb of kingfish are allowed south of Bogue Inlet. In addition, a rule directed at the flynet fishery limits mesh sizes to 4 inches in the main body, 3 inches in the extension, and 1 ¾ inches in the tailbag. Finfish reduction devices have been required in all shrimp trawls since the fall of 1992 (15A NCAC 3J.0104) and escape panels have been required (since April 1999) in the bunt nets of long haul seines in an area south and west of Bluff Shoals in the Pamlico Sound (15A NCAC 03J.0109). This rule was modified by the MFC in August 2003 to include more specific wording on installation and placement of the culling panels. This rule resulted from a NCDMF study on the use of culling panels in long haul and swipe nets (Gearhart 2000).

The NCDMFin 2006 has classified the status of spot as concerned in North Carolina (NCDMF 2006a). Managers are concerned over the recent declines in the abundance of spot. Reasons for these declines are being investigated but may include growth overfishing in the long haul fishery and to a much lesser extent in the winter trawl and flounder pound net fisheries. The culling panels required in long haul seines since April 1999 have reduced the harvest of bait fish. However, since excessive fishing mortality on small spots still occurs, there is a need to increase the size of fish harvested and reduce the amount of bait fish landed. This would alleviate the growth overfishing and possibly result in a larger spawning stock biomass. However, incorporating this strategy is difficult since spot isn’t a targeted species but is harvested by mixed species gears (Mercer 1987).

The bycatch of spot in the inshore and ocean shrimp trawl fishery is also a concern. The NCDMF began requiring Bycatch Reduction Devices (BRDs) in all shrimp trawls in the fall of 1992 (15A NCAC 3J .0104). The intent of this regulation was to minimize the incidental catch of finfish and other living marine organisms. On average, 82% of shrimp trawl trips during 1994-97 occurred in the estuaries and spot along with weakfish and Atlantic croaker account for the bulk of the finfish bycatch (NCDMF 1999). Additionally, data indicate spot comprise approximately 9% of the total biomass in a south Atlantic shrimp trawl fishing operation (NMFS 1995a). Studies need to be conducted to determine what effect, if any, these bycatch mortalities may have on the stocks of short lived, high natural mortality fish. The benefit gained from “saved spot” in the trawl fishery is uncertain but possibly significant. Experimental gear development on the use of BRDs in the shrimp trawl fishery is continuing and should lead to the development of new BRDs that are more efficient at reducing bycatch.

The ASMFC fishery management plan written for spot in 1987 (Mercer 1987) outlined specific management objectives that might perpetuate the spot resource. Although several objectives have been met, data in other areas are still lacking and need to be collected. Data on reproduction, migration patterns, and stock structure is still incomplete. The effect of spawning stock size on recruitment is still unknown. It is known that spot are a short-lived species and that landings in most years consist largely of a single year class (Mercer 1987); the strength of that year class is most likely dependent on recruitment, which is based on natural environmental factors. However, manmade environmental factors may also be a factor in the recent decline in abundance. Spot are estuarine dependent sciaenids that depend on nursery areas for their growth and development. Coastwide development has placed many anthropogenic perturbations on their nursery areas including water quality stresses from both pollutants and freshwater runoff. The effects of these stresses on the nursery areas needs to be analyzed relative to their habitat to determine possible impacts on the spot stocks. Protection of nursery areas and high standards of water quality must be maintained to ensure optimum recruitment.

Table 7.7 North Carolina spot (*Leiostomus xanthurus*) expanded length frequency of bait samples for selected fisheries, 1995-2006; n=number of fish measured, en=expanded number of individuals in catches sampled.

Fishery/ Year	n	en	number	14	16	18	20	22	24	26	28	30	32	34
Ocean trawl														
1995	151	18,591	10,951,764	60.4	24.8	14.3	0.4	0.1	-	-	-	-	-	-
1996	242	53,146	16,766,499	4.0	68.0	26.3	1.0	0.7	-	-	-	-	-	-
1997	490	70,709	5,170,382	1.5	31.9	59.2	5.7	1.7	-	-	-	-	-	-
1998	170	13,826	10,087,425	2.3	19.8	69.4	8.3	0.3	-	-	-	-	-	-
1999	159	8,248	6,881,727	1.9	44.8	32.8	15.9	1.9	2.7	-	-	-	-	-
2000	662	60,961	933,512	2.2	19.5	40.6	22.3	13.1	1.6	0.6	-	-	-	-
2001	298	18,580	421,036	3.9	14.7	26.7	31.1	12.7	9.0	1.6	0.3	-	-	-
2002	107	4,247	423,849	-	21.9	51.5	18.8	3.0	3.0	0.7	1.2	-	-	-
2003	156	9,550	136,719	1.0	32.8	57.2	9.0	-	-	-	-	-	-	-
2004	29	1,985	220,959	54.8	8.5	7.4	3.3	26.0	-	-	-	-	-	-
2005	123	12,579	152,498	20.1	54.2	18.5	4.1	1.3	0.5	0.3	-	-	-	-
2006	178	19,825	840,808	13.3	57.0	28.0	1.0	0.7	-	-	-	-	-	-
Ocean gill net														
1995	0	0	150	-	-	-	-	-	-	-	-	-	-	-
1996	0	0	150	-	-	-	-	-	-	-	-	-	-	-
1997	0	0	8	-	-	-	-	-	-	-	-	-	-	-
1998	0	0	150	-	-	-	-	-	-	-	-	-	-	-
1999	6	6	6,179	-	-	66.7	16.7	16.7	-	-	-	-	-	-
2000	3	3	7,982	-	-	-	33.3	33.3	33.3	-	-	-	-	-
2001	0	0	16	-	-	-	-	-	-	-	-	-	-	-
2002	0	0	92	-	-	-	-	-	-	-	-	-	-	-
2003	0	0	978	-	-	-	-	-	-	-	-	-	-	-
2004	13	120	5,105	-	-	31.7	67.5	0.8	-	-	-	-	-	-
2005	0	0	8	-	-	-	-	-	-	-	-	-	-	-
2006	0	0	17	-	-	-	-	-	-	-	-	-	-	-
Sciaenid pound net														
1995	934	7,532	32,574	45.8	47.7	6.1	0.5	-	-	-	-	-	-	-
1996	267	4,137	55,645	58.4	26.3	13.0	2.3	-	-	-	-	-	-	-
1997	192	2,835	62,489	72.6	12.5	13.9	0.6	0.4	-	-	-	-	-	-
1998	331	9,896	78,878	32.9	50.1	13.4	3.2	-	0.4	-	-	-	-	-
1999	331	12,517	282,430	76.5	17.8	5.5	0.1	-	-	-	-	-	-	-
2000	52	2,022	22,353	30.0	45.2	23.4	1.4	-	-	-	-	-	-	-
2001	97	1,730	30,557	91.6	4.7	2.9	0.8	-	-	-	-	-	-	-
2002	11	304	3,228	33.2	49.2	11.5	5.9	-	-	-	-	-	-	-
2003	12	430	150,076	30.7	24.0	43.3	-	2.1	-	-	-	-	-	-
2004	49	767	3,868	38.7	55.1	6.1	-	-	-	-	-	-	-	-
2005	245	17,215	10,697	38.7	57.1	4.2	-	-	-	-	-	-	-	-
2006	310	11,401	19,450	59.1	35.8	5.1	-	-	-	-	-	-	-	-

Table 7.7 (Continued)

Fishery/ Year	n	en	number	14	16	18	20	22	24	26	28	30	32	34
Long haul														
1995	2,206	115,026	2,611,688	47.1	16.7	22.5	10.9	2.7	-	-	-	-	-	-
1996	1,746	89,820	1,414,208	71.5	14.4	10.4	3.4	0.2	-	-	-	-	-	-
1997	3,066	326,240	13,110,734	68.6	17.3	12.4	1.7	-	-	-	-	-	-	-
1998	2,525	293,994	2,791,516	49.6	31.2	17.8	1.4	-	-	-	-	-	-	-
1999	1,464	200,530	1,623,866	51.9	19.5	26.4	2.1	0.1	-	-	-	-	-	-
2000	1,979	284,861	1,249,428	65.4	18.0	12.7	3.5	0.4	-	-	-	-	-	-
2001	1,607	282,666	1,486,931	51.5	15.0	17.5	12.1	3.9	-	-	-	-	-	-
2002	1,524	148,296	463,725	35.7	17.0	31.3	14.1	1.9	0.2	-	-	-	-	-
2003	1,323	219,529	1,298,286	37.6	22.0	33.6	6.4	0.5	-	-	-	-	-	-
2004	957	234,829	1,584,821	50.1	34.0	8.5	6.3	1.0	-	-	-	-	-	-
2005	1,272	87,887	563,547	35.0	39.6	21.9	3.4	-	-	-	-	-	-	-
2006	1,134	124,632	805,627	40.6	31.7	22.8	4.7	0.1	-	-	-	-	-	-
Estuarine gill net														
1995	0	0	15,840	-	-	-	-	-	-	-	-	-	-	-
1996	0	0	46,433	-	-	-	-	-	-	-	-	-	-	-
1997	3	3	511	-	-	-	33.3	66.7	-	-	-	-	-	-
1998	0	0	325	-	-	-	-	-	-	-	-	-	-	-
1999	1	1	108	-	-	100	-	-	-	-	-	-	-	-
2000	0	0	0	-	-	-	-	-	-	-	-	-	-	-
2001	1	1	8	-	-	-	100	-	-	-	-	-	-	-
2002	0	0	0	-	-	-	-	-	-	-	-	-	-	-
2003	0	0	0	-	-	-	-	-	-	-	-	-	-	-
2004	1	1	17	-	-	-	-	100	-	-	-	-	-	-
2005	2	14	17	-	-	-	-	100	-	-	-	-	-	-
2006	1	1	50	100	-	-	-	-	-	-	-	-	-	-

Table 7.8 North Carolina commercial landings of marketable spot by fishery,1995-2006, includes landings (metric tons), value (thousands dollars) and contribution of fishery to NC spot landings.

Fishery	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Long Haul												
Metric Tons	467.3	411.2	591.6	436.4	276.9	487.0	492.5	297.0	321.9	335.1	235.9	274.2
Value ($)	319.4	342.7	575.0	402.4	262.5	445.0	438.6	279.2	317.6	341.9	273.1	438.5
% State	34.3	39.6	49.6	40.1	27.0	37.9	35.1	30.0	34.7	31.9	30.3	44.3
Beach Seine												
Metric Tons	118.6	68.9	166.2	112.6	124.1	79.3	67.0	56.9	30.4	77.3	89.1	70.9
Value ($)	81.0	56.8	161.4	103.6	117.9	72.5	58.5	53.5	29.2	78.2	106.6	116.7
% State	8.7	6.6	13.9	10.4	12.1	6.2	4.8	5.7	3.3	7.4	11.5	11.4
Sciaenid Pound Net												
Metric Tons	1.3	2.0	0.3	0.2	0.6	0.3	0.1	0.7	0.4	1.7	0.05	0.08
Value ($)	0.9	1.7	0.3	0.2	0.6	0.2	0.1	0.6	0.3	1.7	0.06	0.1
% State	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	<0.1	<0.1
Estuarine Gill Net												
Metric Tons	293.8	213.6	173.9	175.8	301.3	282.7	268.7	327.3	313.4	347.1	341.6	167.5
Value ($)	200.8	177.2	167.9	161.8	300.0	258.4	248.2	307.8	307.0	352.9	396.5	272.2
% State	21.5	20.6	14.6	16.2	29.4	22.0	19.1	33.0	33.8	33.0	43.9	27.1
Ocean Gill Net												
Metric Tons	439.3	283.0	207.9	336.8	284.9	384.4	465.5	250.6	217.8	263.6	103.8	97.3
Value ($)	300.2	237.9	201.1	310.3	282.8	350.7	431.0	235.7	214.7	266.6	120.5	156.1
% State	32.2	27.2	17.4	31.0	27.8	30.0	33.2	25.3	23.5	35.1	13.4	15.7
Ocean Trawl												
Metric Tons	0.2	10.4	1.2	0.5	5.4	3.6	67.1	33.5	1.7	1.1	0.4	0.05
Value ($)	0.1	8.8	0.8	0.4	5.4	3.3	62.6	31.5	1.7	1.1	0.5	0.09
% State	0.1	1.0	0.1	0.1	0.5	0.3	4.8	3.4	1.8	0.1	0.1	0.1
Other Fisheries												
Metric Tons	43.2	49.5	50.8	24.9	33.0	46.2	42.4	24.7	26.0	25.1	6.6	8.9
Value ($)	29.6	41.0	48.8	23.0	33.0	42.1	39.4	23.2	24.7	25.5	7.7	14.3
% State	3.2	4.8	4.3	2.3	3.2	3.6	3.0	2.5	2.8	2.4	0.9	1.4
All												
Metric Tons	1,363.8	1,038.7	1,191.9	1,087.1	1,026.0	1,283.5	1,403.3	990.6	926.8	1,051.0	777.6	619.0
Value ($)	932.1	866.1	1,155.3	1,001.7	1002.0	1,172.2	1,278.3	931.5	910.3	1,068.0	905.0	998.0

Source: North Carolina Division of Marine Fisheries commercial landings database.
Long Haul includes: gear code 030 or 025 and non-ocean waters.
Flounder Pound Net includes: gear code 275, months October, November, December for counties Beaufort, Carteret, Dare, Hyde, Tyrrell, and month September for counties Beaufort, Carteret, Hyde and Tyrrell.
Sciaenid Pound Net includes: gear code 275, months May through August for counties Dare and Hyde, and month September for Dare.
Estuarine Gill Net includes: gear code 425, 426, 427, 470, 475, 480 and all non-ocean waters.
Ocean Gill Net includes: gear code 425, 426, 427, 470, 475, 480 and Atlantic Ocean.
Ocean Trawl includes: gear codes 210 and 230, Atlantic Ocean, and months January through May and September through December.

Table 7.9 North Carolina spot (*Leiostomus xanthurus*) landings (weight - metric tons, number – 1000's individuals), marketable landings per trip (CPUE weight -kgs), and total number of trips, by type for selected commercial fisheries, 1995-2006.

		Landings									
		Weight					Number				# Trips
		Total	Market		Bait	%Bait	Total	Market	Bait	%Bait	
Fishery	Year	Landed (metric tons)	Landed (metric tons)	CPUE	Landed (metric tons)		Landed (1000's)	Landed (1000's)	Landed (1000's)		
Ocean Gill Net											
	1995	436	436	212	0	0	1,964	1,964	0	0	2,072
	1996	281	281	123	0	0	1,440	1,440	0	0	2,292
	1997	206	206	88	0	0	1,181	1,181	0	0	2,375
	1998	336	336	160	0	0	1,528	1,528	0	0	2,099
	1999	284	284	142	<1	<1	1,357	1,351	6	<1	2,004
	2000	385	384	197	1	<1	2,090	2,082	8	<1	1,954
	2001	466	466	226	0	0	2,388	2,388	0	0	2,063
	2002	251	251	182	0	0	1,326	1,326	0	0	1,374
	2003	217	217	130	0	0	948	948	0	0	1,677
	2004	264	264	172	<1	<1	1,234	1,229	5	<1	1,532
	2005	104	104	110	0	0	479	479	0	0	946
	2006	97	97	94	0	0	606	606	0	0	1,037
Ocean Trawl											
	1995	542	15	24	527	97	11,039	87	10,952	99	8
	1996	1,243	29	336	1,214	98	16,349	93	16,256	99	31
	1997	343	18	62	325	95	3,596	149	3,447	96	20
	1998	811	13	28	798	98	9,995	52	9,943	99	17
	1999	467	18	119	449	96	5,039	97	4,942	98	45
	2000	117	27	103	90	77	955	135	820	86	35
	2001	86	81	932	5	6	438	398	40	9	72
	2002	77	41	986	36	47	427	115	312	73	34
	2003	35	30	515	5	14	122	80	42	34	33
	2004	29	11	58	18	90	219	34	185	84	19
	2005	14	2	23	12	86	151	5	146	97	17
	2006	92	5	11	87	95	841	13	828	98	5

Table 7.9. (continued).

		Landings									
		Weight					Number				# Trips
		Total	Market		Bait	%Bait	Total	Market	Bait	%Bait	
Fishery	Year	Landed (metric tons)	Landed (metric tons)	CPUE	Landed (metric tons)		Landed (1000's)	Landed (1000's)	Landed (1000's)		
Long Haul											
	1995	669	467	841	202	30	6,484	3,872	2,612	40	556
	1996	488	408	586	80	16	4,159	2,745	1,414	34	702
	1997	1,117	592	1,049	525	47	16,927	3,816	13,111	77	564
	1998	646	433	911	213	33	5,762	2,971	2,791	48	479
	1999	362	277	787	85	23	3,282	1,658	1,624	49	352
	2000	561	487	1,316	74	13	4,525	3,276	1,249	28	370
	2001	609	492	1,210	117	19	4,391	2,904	1,487	34	407
	2002	337	297	955	40	12	2,221	1,757	464	21	311
	2003	413	322	899	91	22	3,206	1,908	1,298	40	358
	2004	433	335	877	98	23	3,394	1,809	1,585	47	382
	2005	275	236	771	39	14	1,823	1,259	564	31	306
	2006	329	274	682	55	17	2,468	1,662	806	33	402
Sciaenid Pound Net											
	1995	3	1	6	2	67	47	14	33	70	242
	1996	5	2	9	3	60	69	13	56	81	228
	1997	4	3	2	1	25	65	2	63	97	156
	1998	5	<1	2	5	97	79	1	78	99	88
	1999	14	1	3	13	93	285	3	282	99	191
	2000	2	2	2	<1	66	22	<1	22	100	100
	2001	1	<1	3	1	97	30	<1	30	100	39
	2002	1	1	8	<1	75	6	2	4	67	87
	2003	12	<1	11	12	98	3	<1	3	100	33
	2004	2	2	39	<1	3	<1	<1	<1	50	43
	2005	0.7	0.1	3	0.6	86	17	<1	17	100	21
	2006	1	0.1	3	0.9	90	5	<1	5	100	29

Table 7.9. (continued).

		Landings									
		Weight					Number				# Trips
		Total	Market		Bait	%Bait	Total	Market	Bait	%Bait	
Fishery	Year	Landed (metric tons)	Landed (metric tons)	CPUE	Landed (metric tons)		Landed (1000's)	Landed (1000's)	Landed (1000's)		
Estuarine Gill Net											
	1995	296	294	46	2	<1	1,548	1,532	16	1	6,421
	1996	215	214	32	1	<1	1,302	1,256	46	4	6,775
	1997	174	174	21	<1	<1	790	790	<1	<1	8,121
	1998	176	176	26	<1	<1	864	864	<1	<1	6,742
	1999	301	301	40	<1	<1	1,087	1,087	<1	<1	7,544
	2000	283	283	34	0	0	1,171	1,171	0	0	8,286
	2001	268	268	36	0	0	1,106	1,106	0	0	7,565
	2002	327	327	37	0	0	1,243	1,243	0	0	8,848
	2003	314	314	41	0	0	1,242	1,242	0	0	7,729
	2004	347	347	49	0	0	1,410	1,410	0	0	7,134
	2005	342	342	46	0	0	1,132	1,332	0	0	7,493
	2006	168	168	27	0	0	680	680	0	0	6,149
Fisheries Combined											
	1995	1,946	1,213	129	733	38	21,082	7,469	13,613	65	9,299
	1996	2,232	934	92	1,298	58	23,319	5,547	17,772	76	10,028
	1997	1,844	993	87	851	46	22,559	5,938	16,621	74	11,236
	1998	1,974	958	101	1,016	51	18,228	5,416	12,812	70	9,425
	1999	1,428	881	86	547	38	11,050	4,196	6,854	62	10,136
	2000	1,348	1,183	108	165	12	8,763	6,664	2,099	24	10,745
	2001	1,430	1,307	128	123	9	8,353	6,796	1,557	19	10,146
	2002	993	917	85	76	8	5,223	4,443	780	15	10,654
	2003	991	883	89	108	11	5,521	4,178	1,343	24	9,830
	2004	1,075	959	104	116	11	6,257	4,482	1,775	28	9,110
	2005	736	684	78	52	7	3,802	3,075	727	19	8,783
	2006	687	544	71	143	21	4,600	2,961	1,639	36	7,622

Source: NCDMF commercial landings database and NCDMF fishery biological database.
Bait quantity estimate obtained from ratio of market to bait in fish house samples.
Does not include discards at sea.

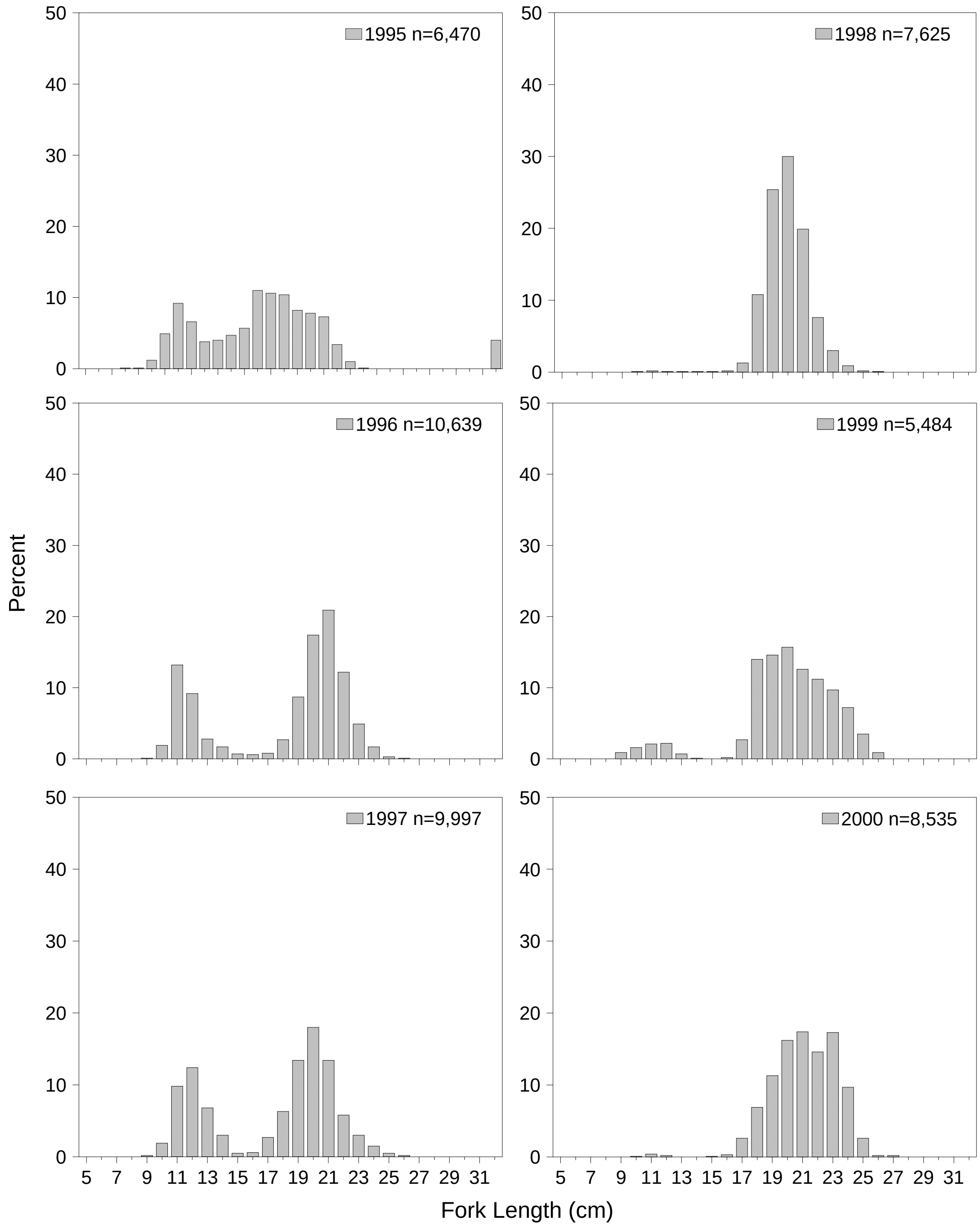


Figure 7.15. North Carolina long haul seine fishery weighted length frequency distributions for marketable spot *(Leiostomus xanthurus)*, 1995-2006.

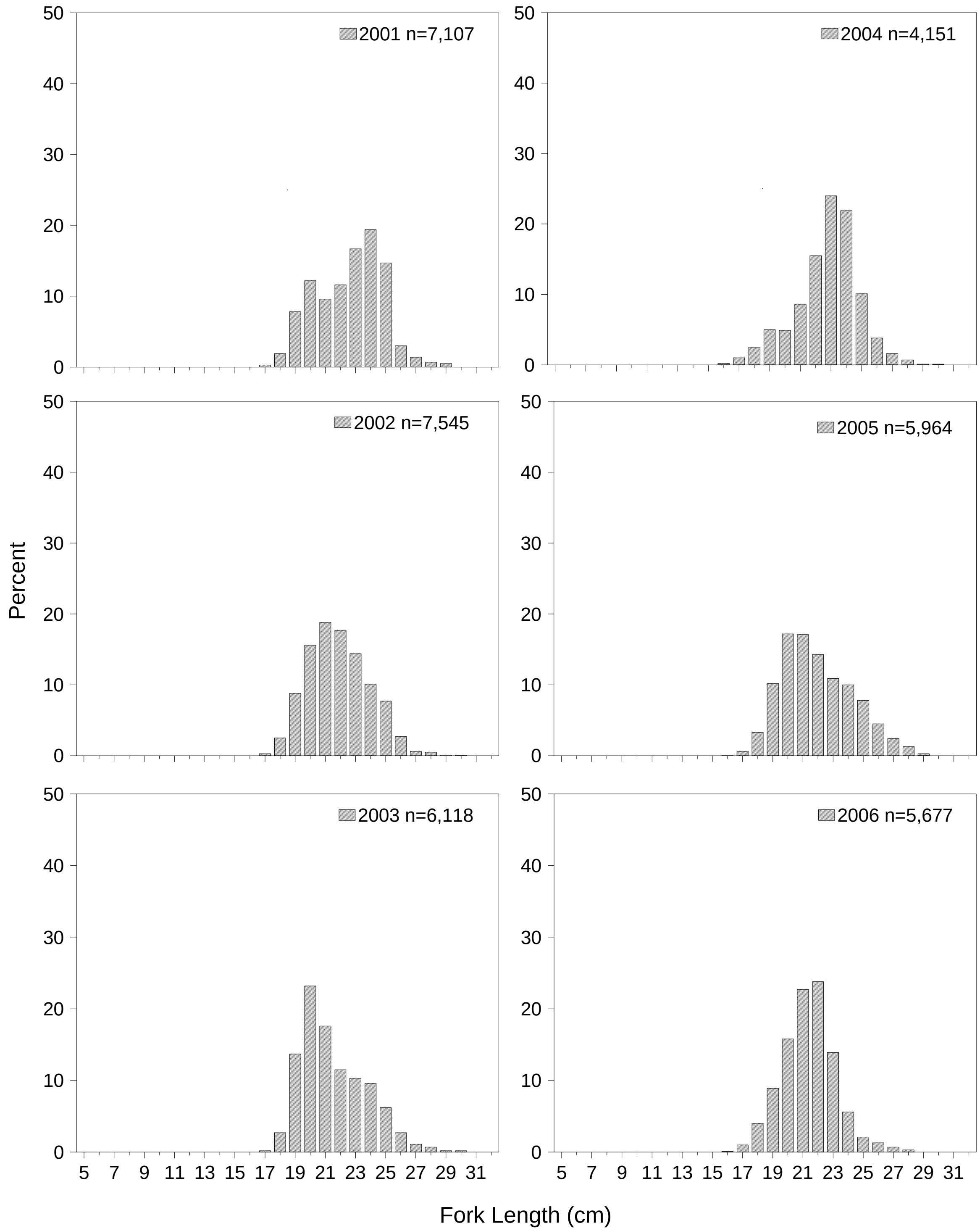


Figure 7.15. (Continued).

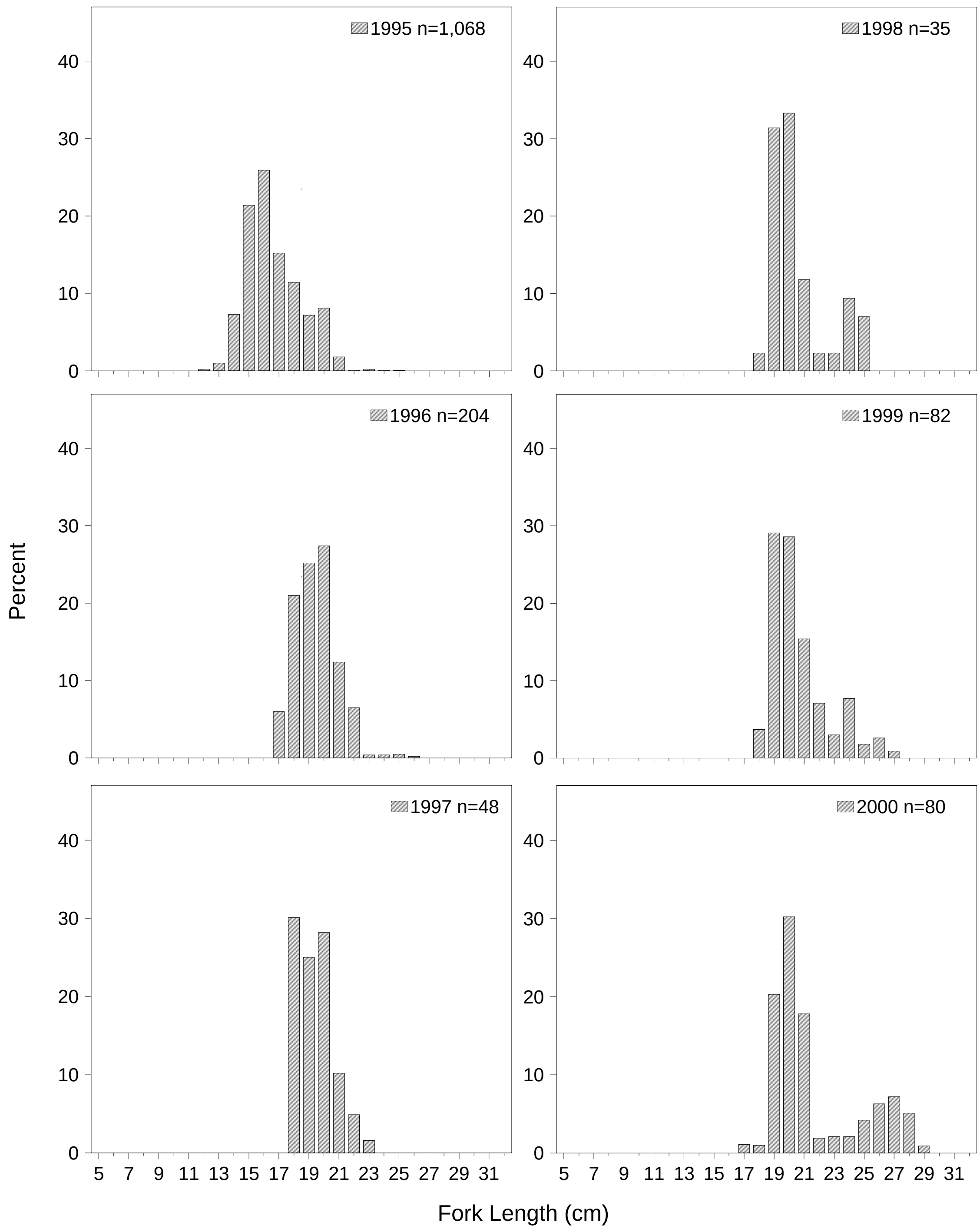


Figure 7.16. North Carolina sciaenid pound net fishery weighted length frequency distributions for marketable spot (*Leiostomus xanthurus*), 1995-2006.

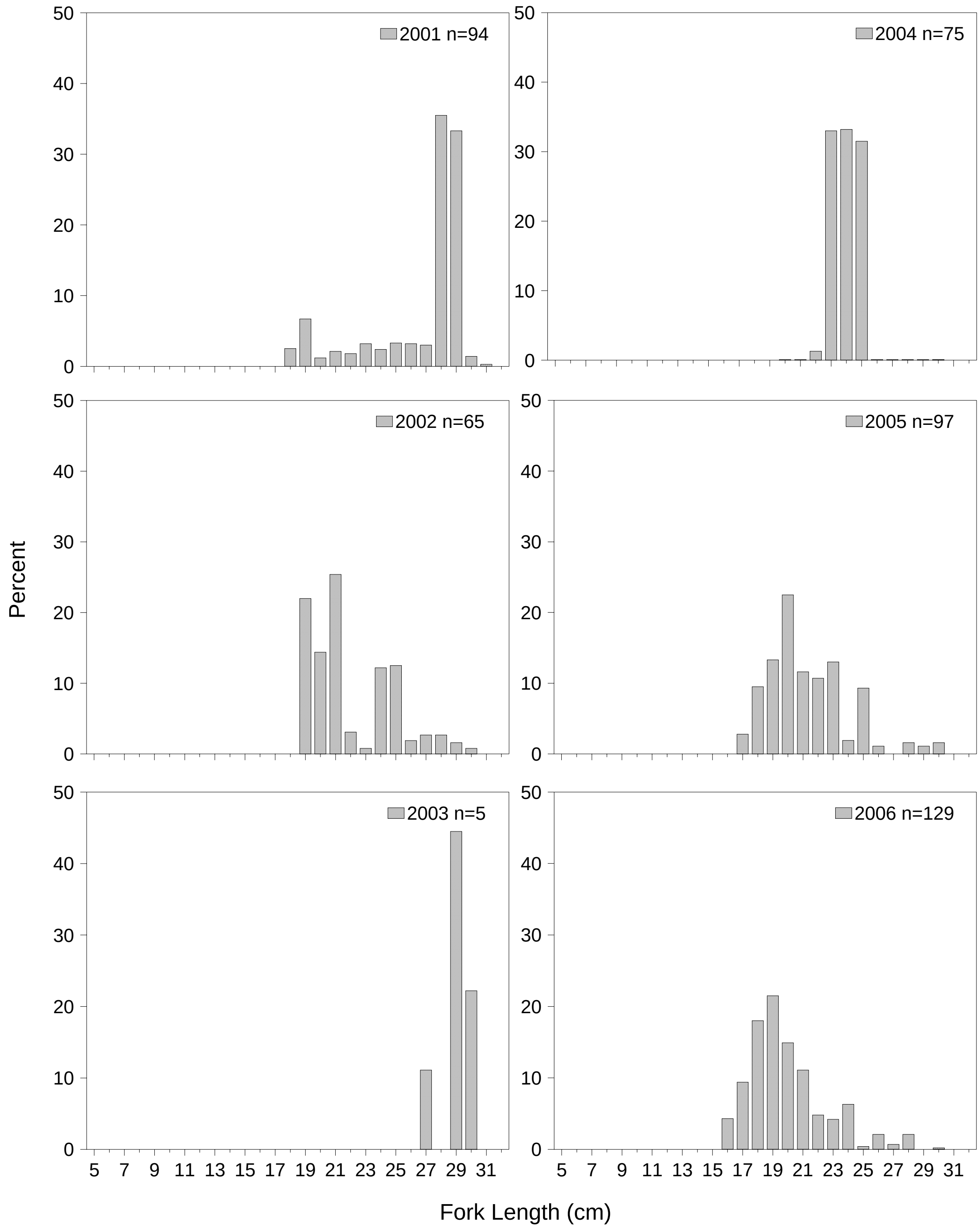


Figure 7.16. (Continued).

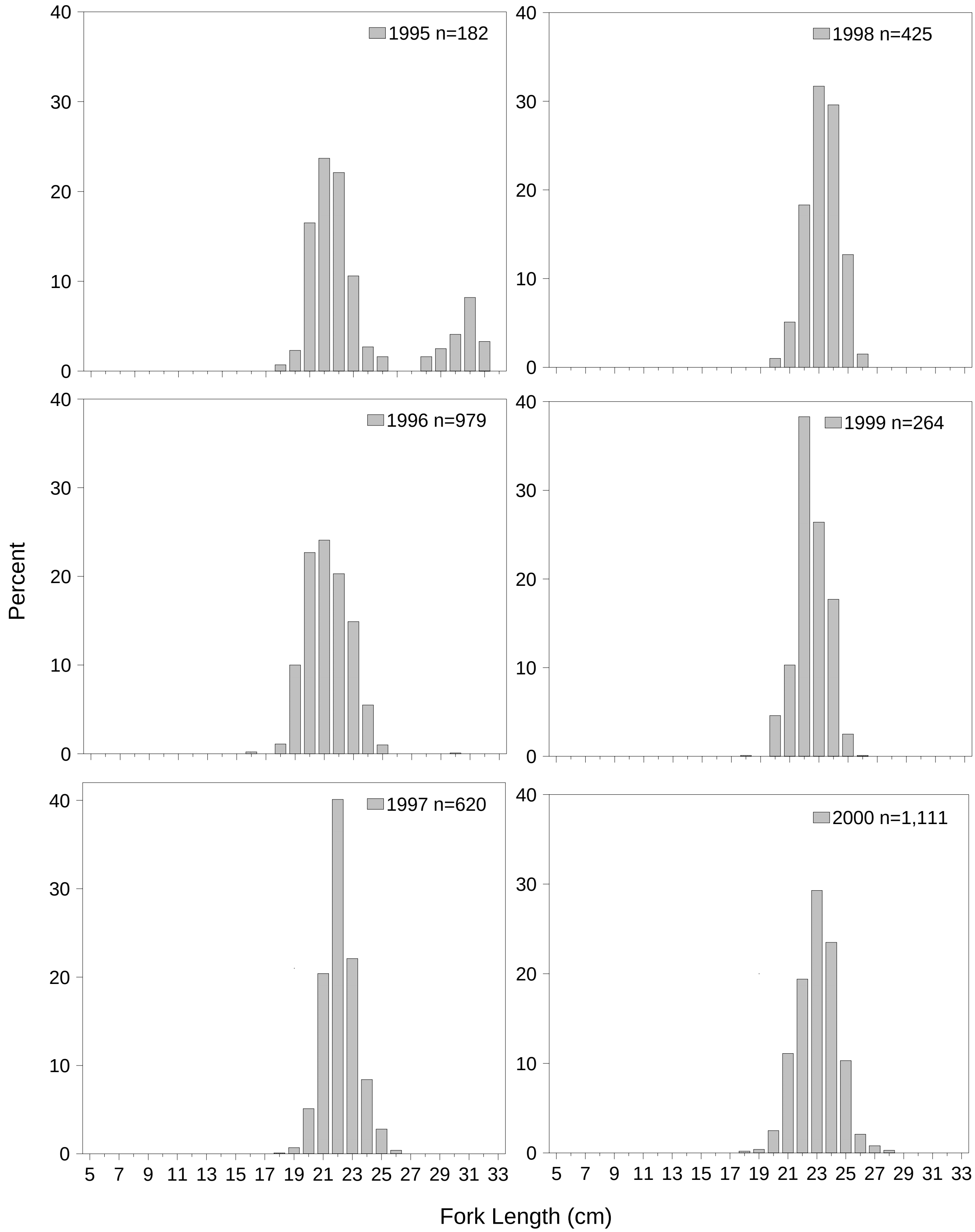


Figure 7.17. North Carolina ocean gill net fishery weighted length frequency distributions for marketable spot (*Leiostomus xanthurus*), 1995-2006.

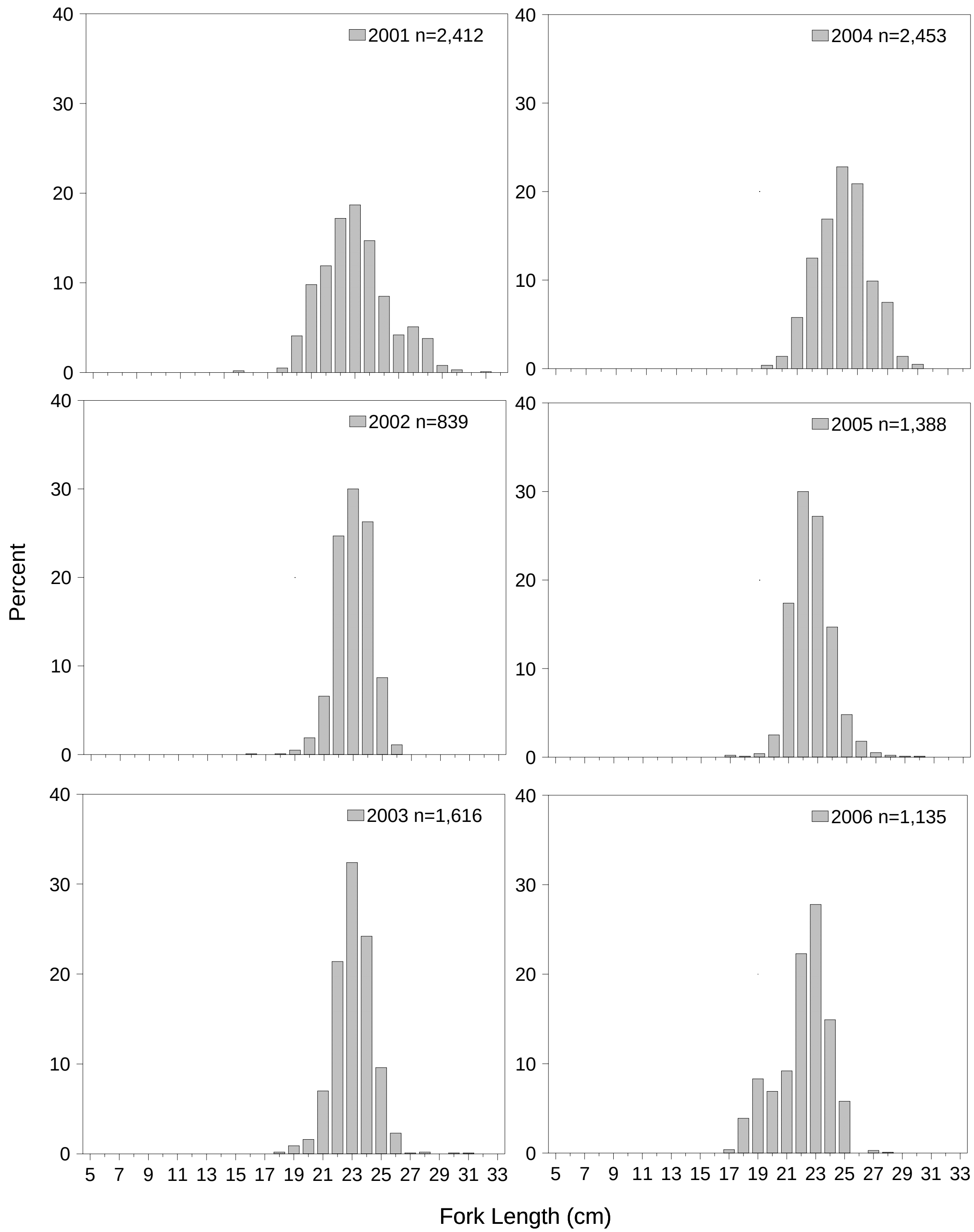


Figure 7.17. (Continued).

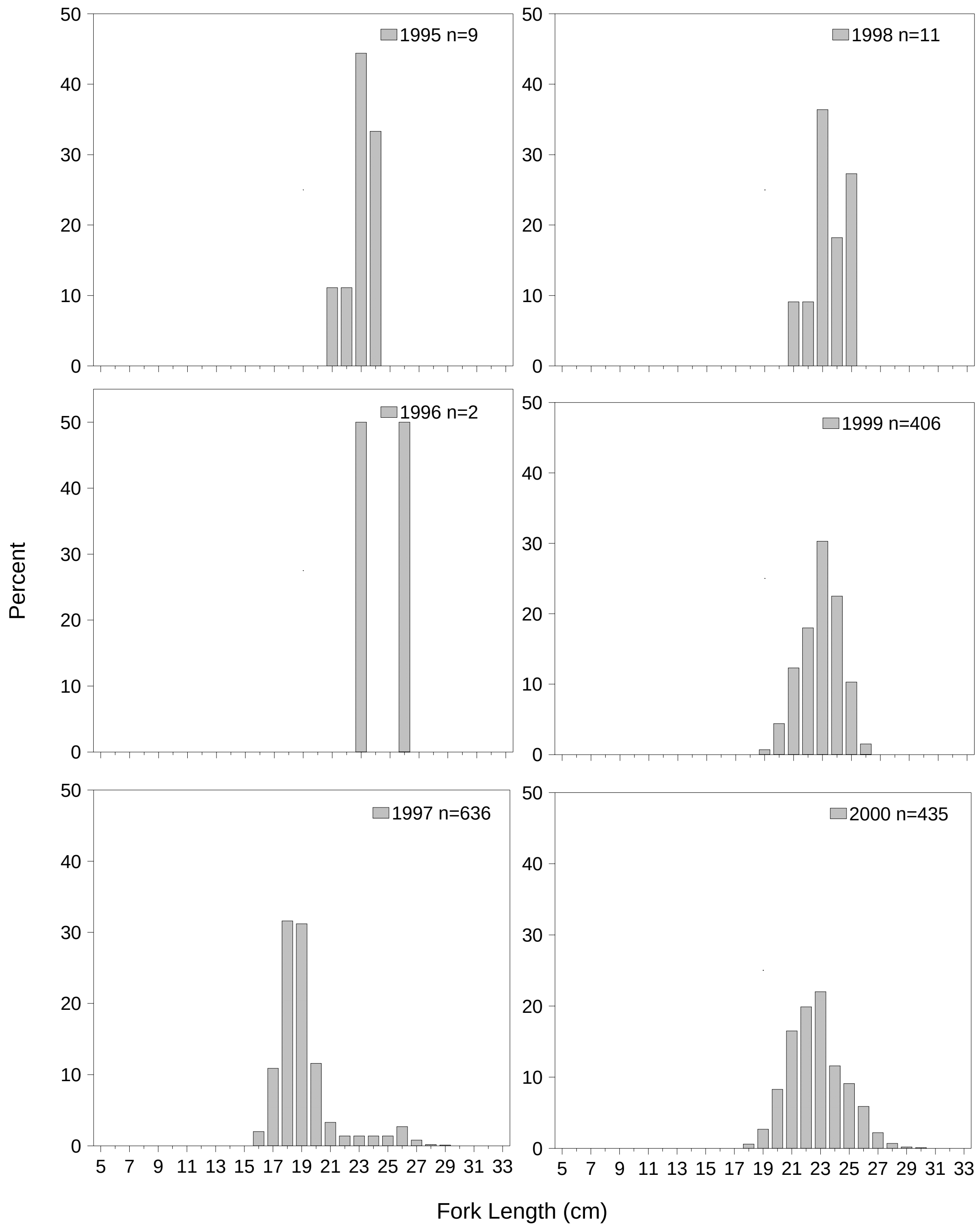


Figure 7.18. North Carolina ocean trawl fishery weighted length frequency distributions for marketable spot (*Leiostomus xanthurus*), 1995-2006.

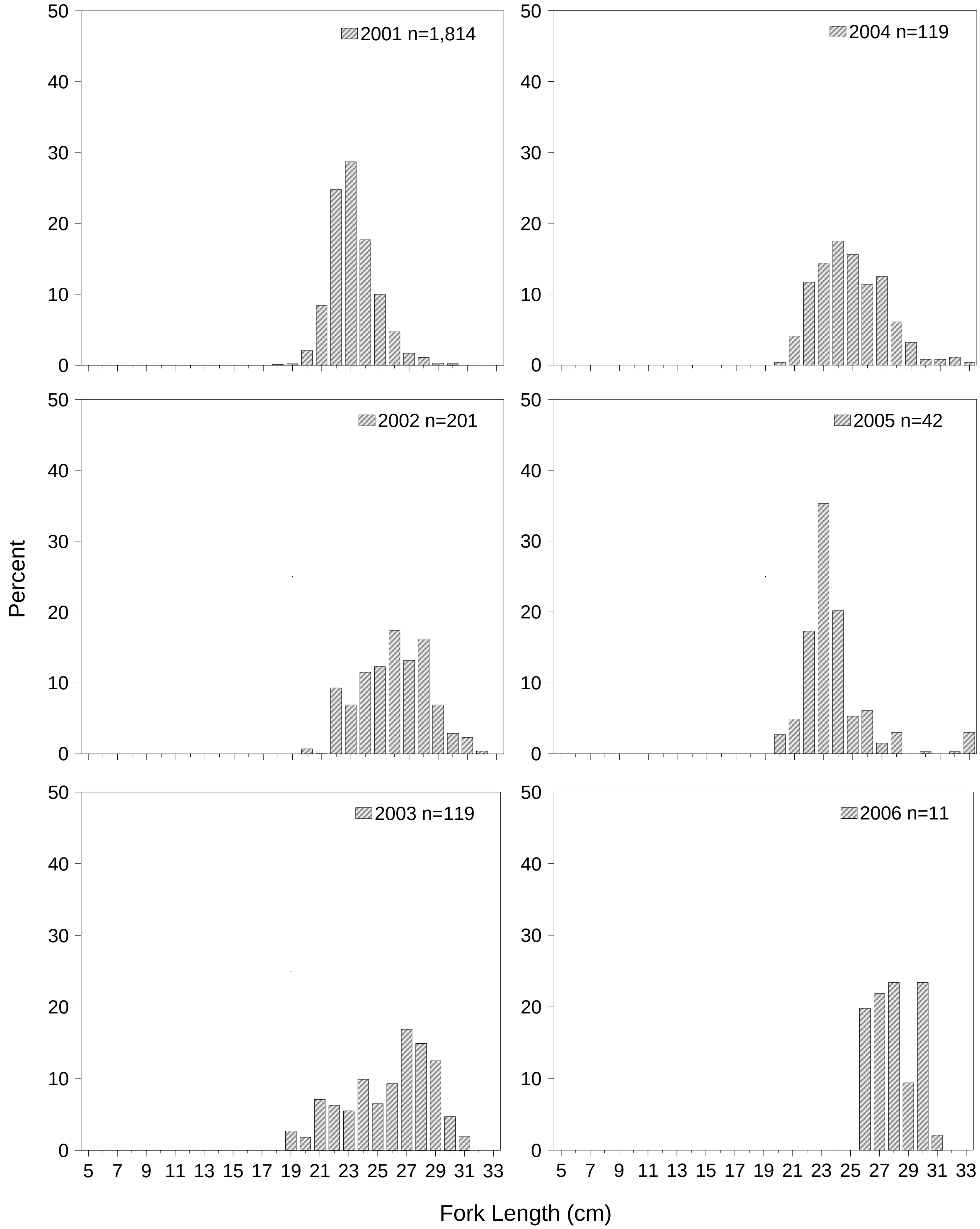


Figure 7.18 (Continued).

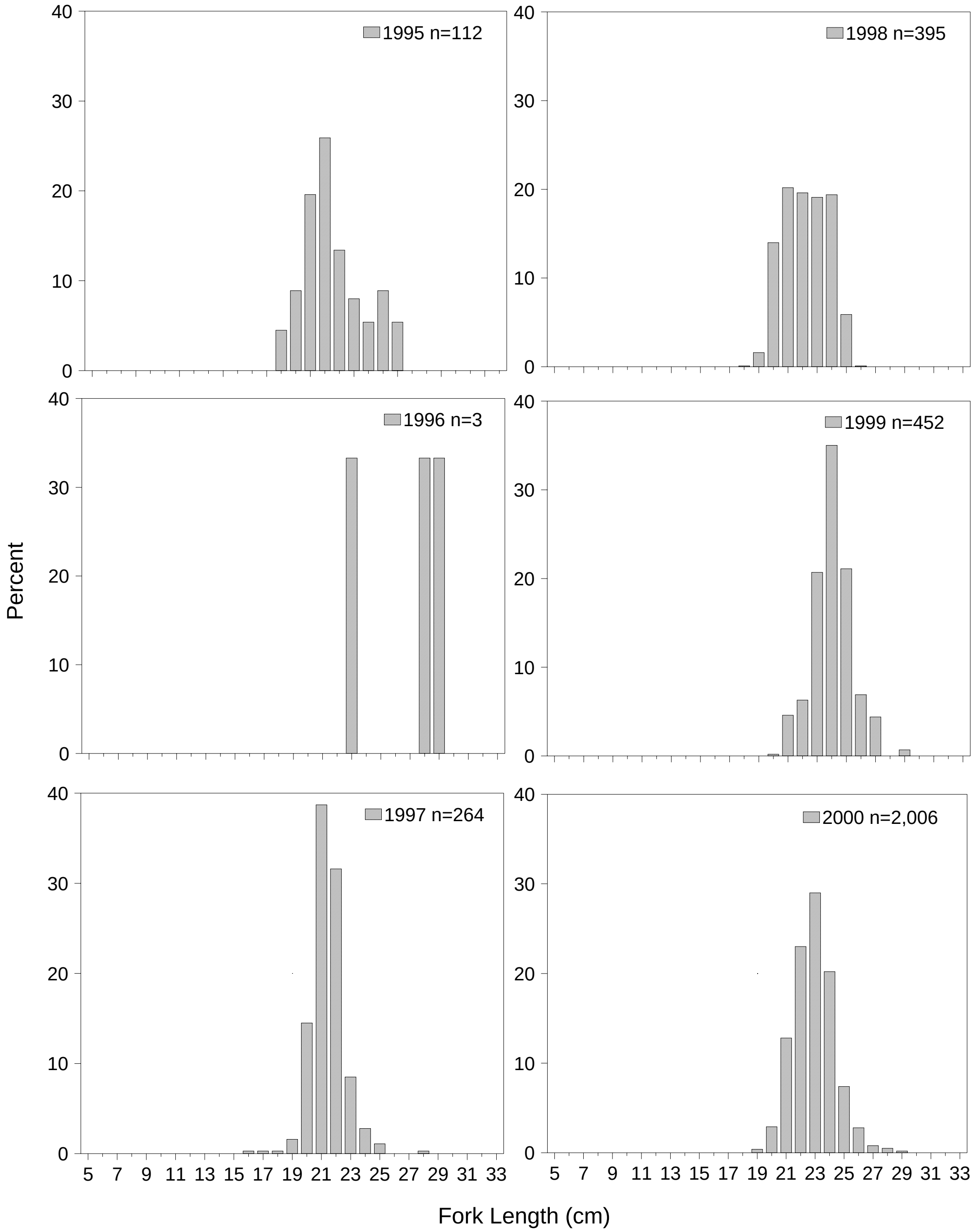


Figure 7. 19. North Carolina estuarine gill net fishery weighted length frequency distributions for marketable spot (*Leiostomus xanthurus*), 1995-2006.

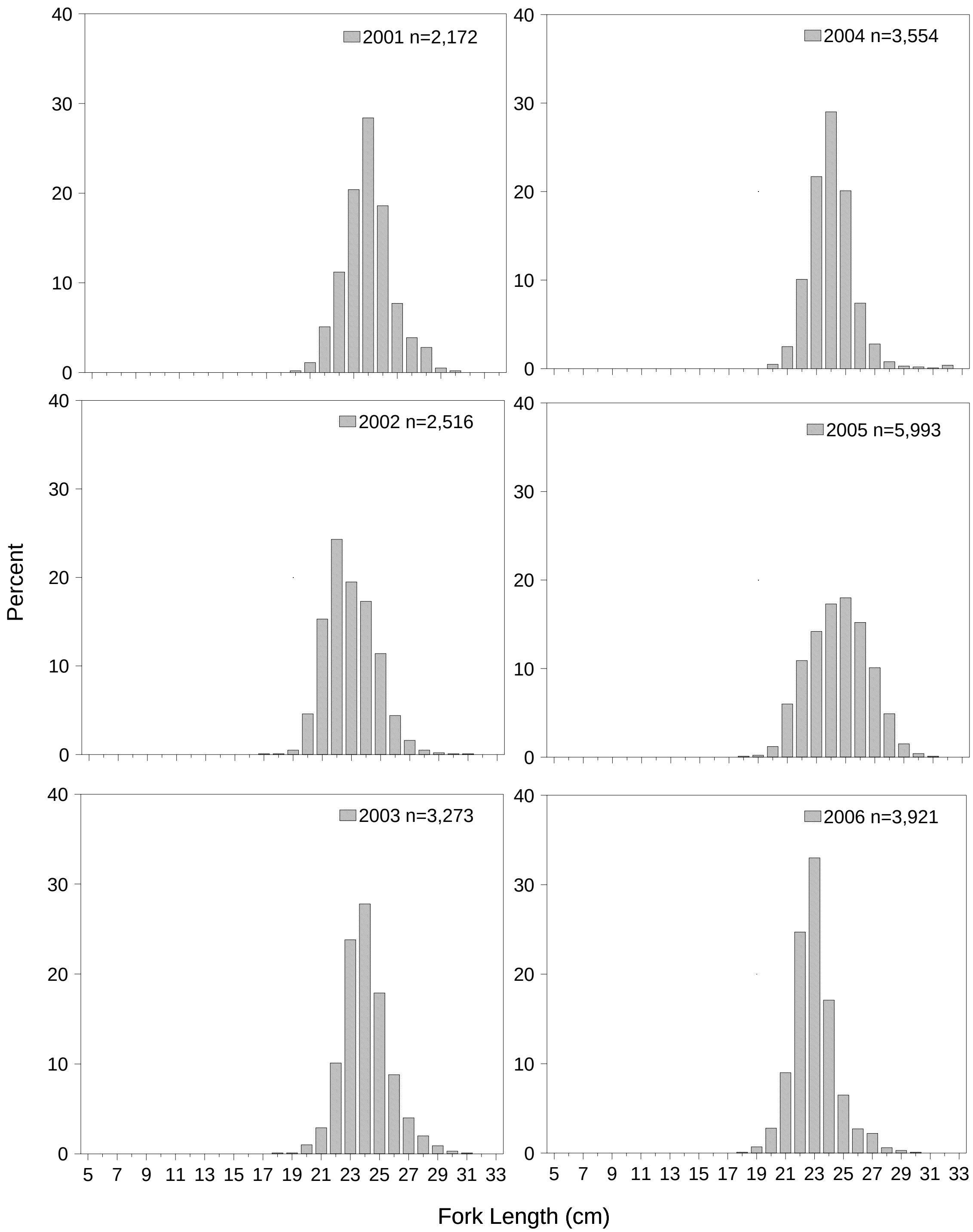


Figure 7.19. (Continued).

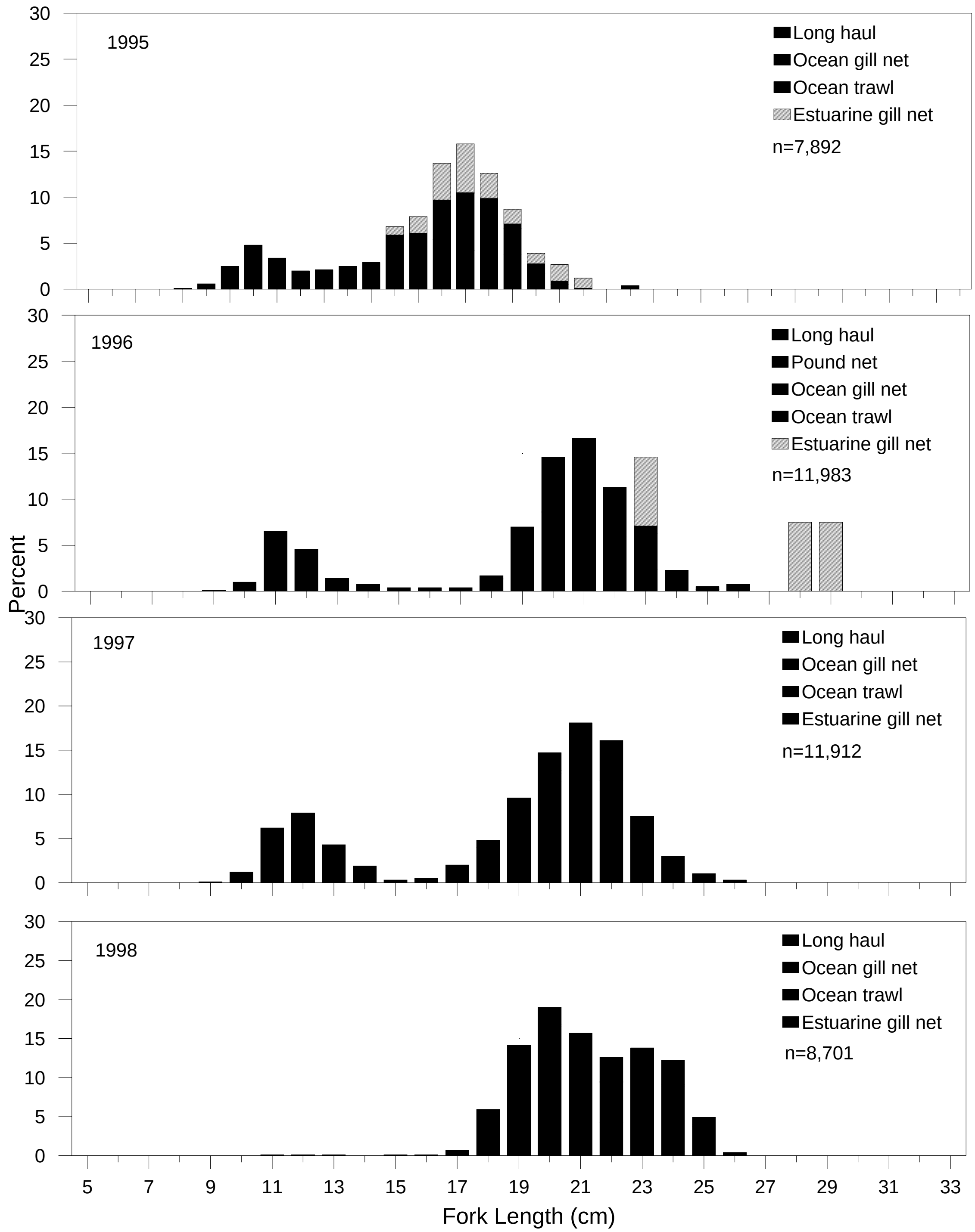


Figure 7.20. North Carolina commercial fishery weighted length frequency distributions for marketable spot *(Leiostomus xanthurus),* 1995-2006.

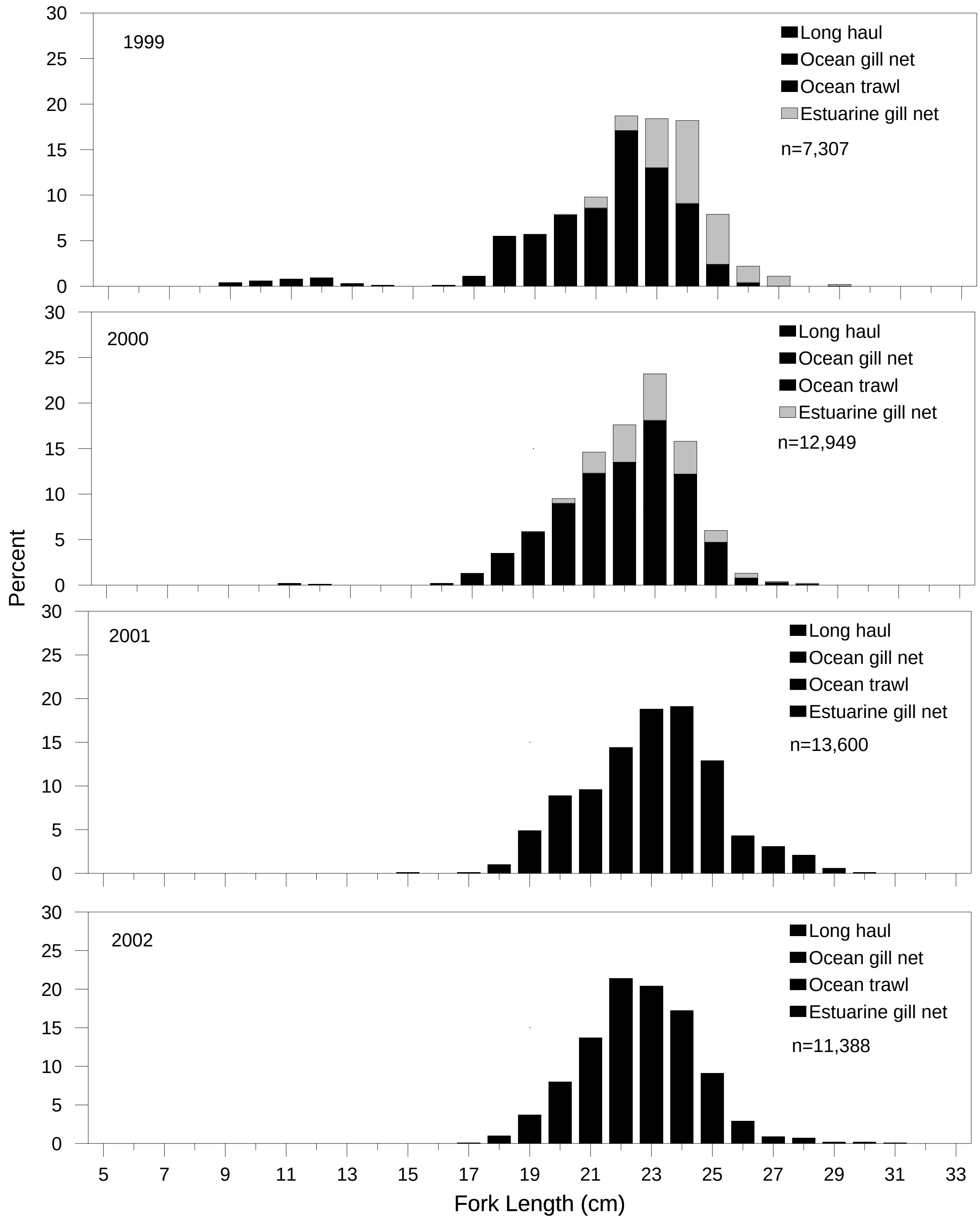


Figure 7.20. (Continued).

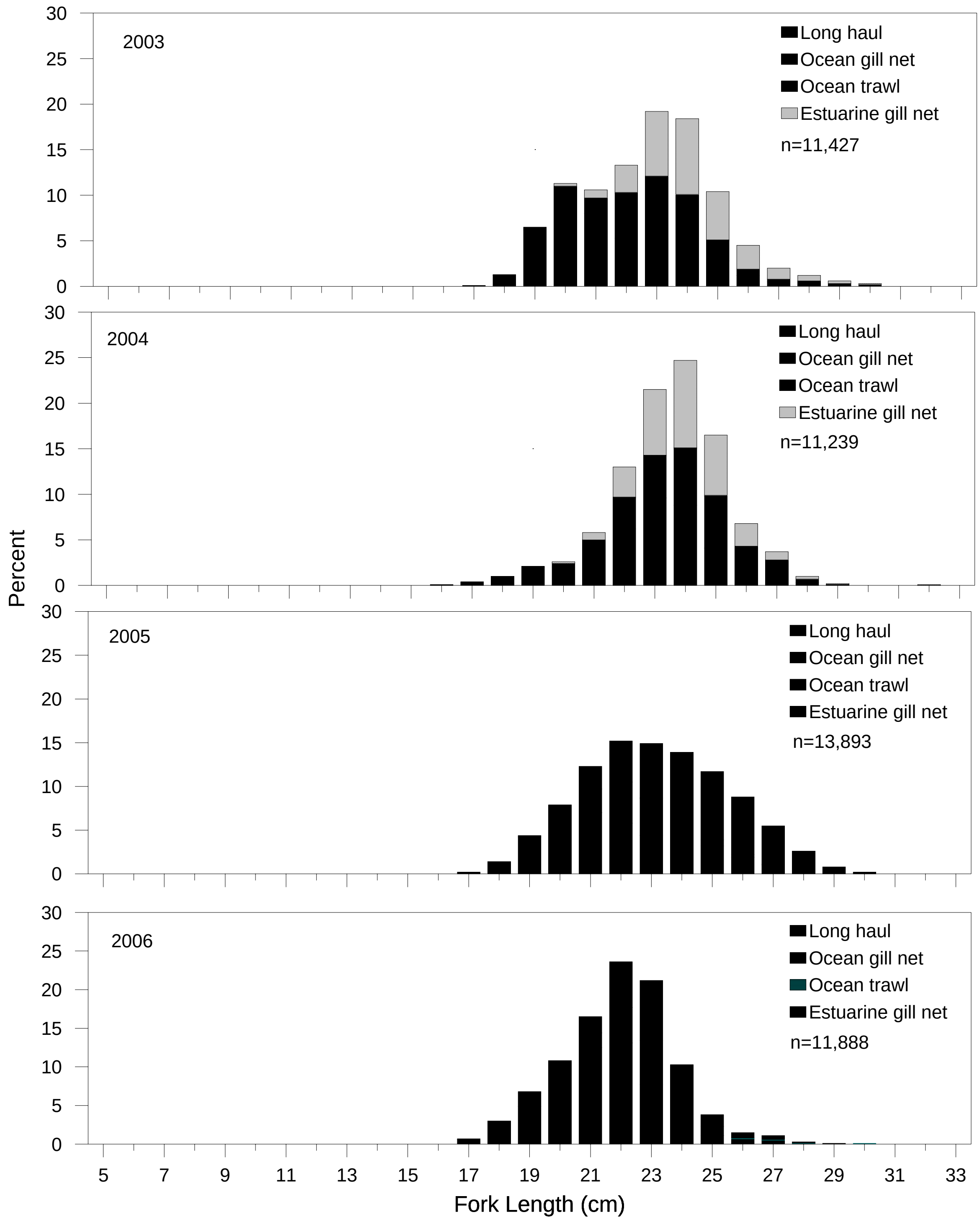


Figure 7.20. (Continued).

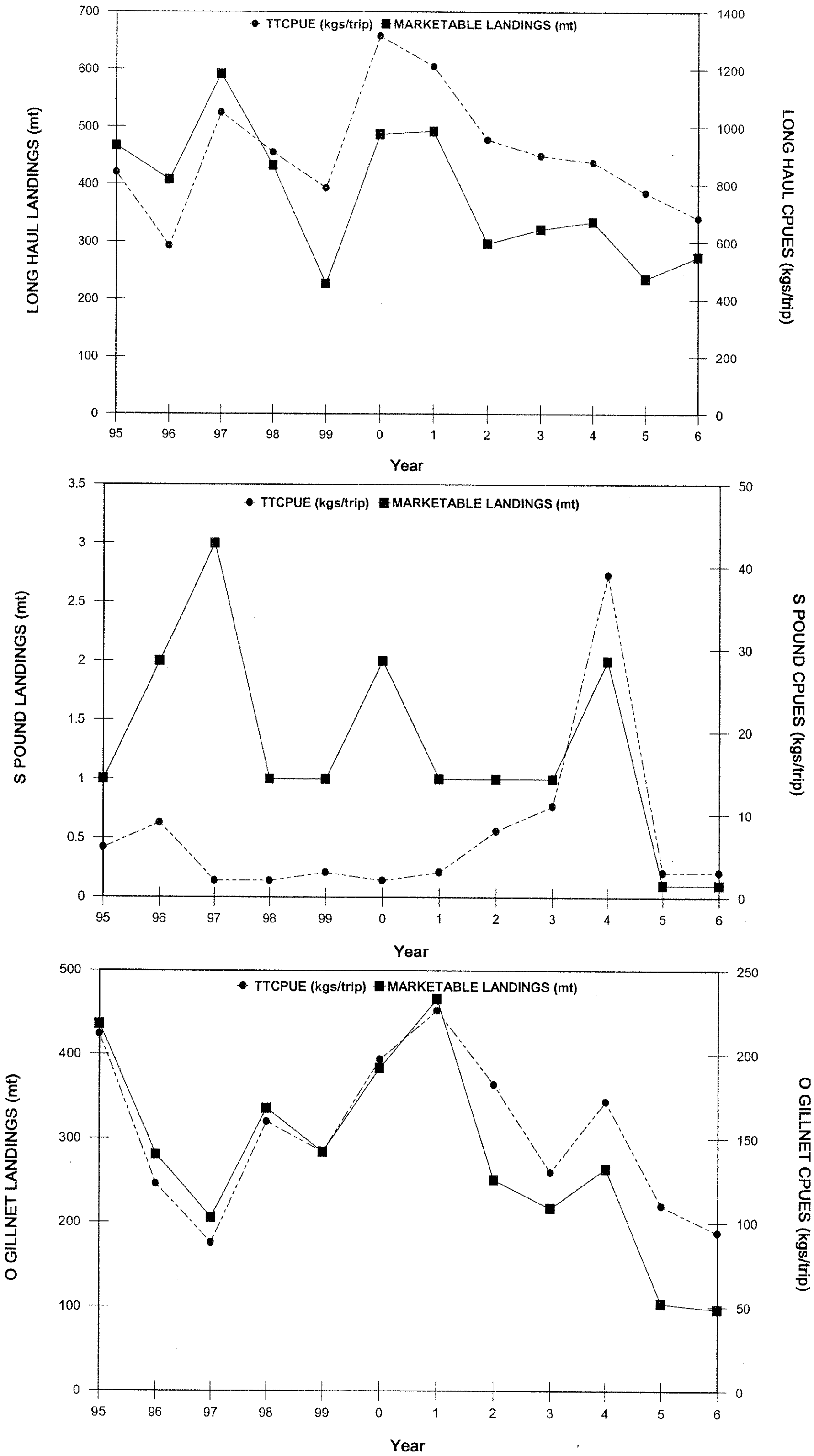
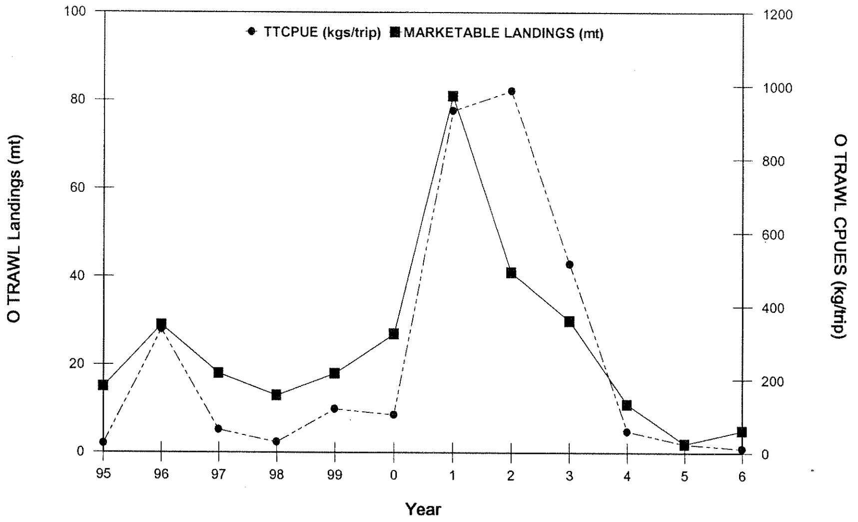
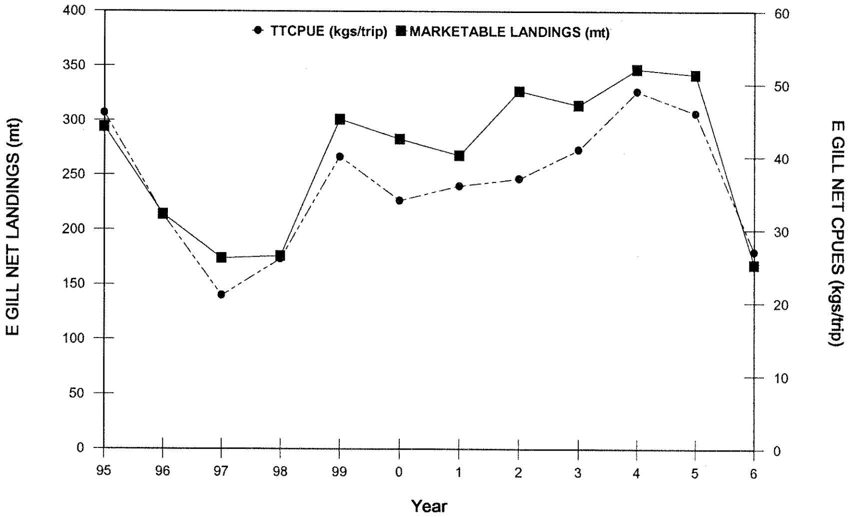


Figure 7.21. North Carolina spot (*Leiostomus xanthurus*) annual commercial landings (metric tons) and mean CPUE (landed catch per trip, kg) for selected fisheries and overall, 1995-2006.





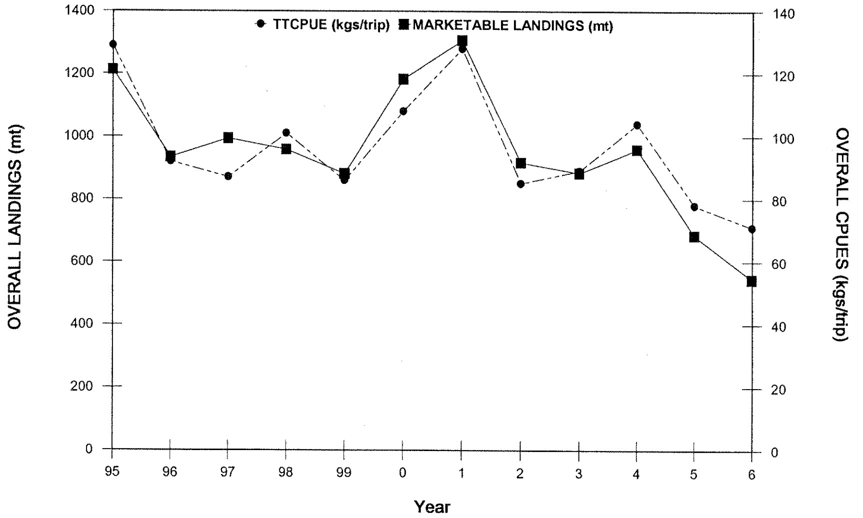


Figure 7.21. (continued).

BLUEFISH

Background

Bluefish (*Pomatomus saltatrix*) is a pelagic migratory species inhabiting most temperate continental shelf-waters throughout the world, except the eastern Pacific. Along the U.S. Atlantic coast, they range from Nova Scotia to Florida and mix extensively during seasonal coastal migrations. Bluefish exhibit extensive coastal migrations and generally travel in like-sized groups, moving northward in the spring and southward in the fall. During winter, large bluefish tend to remain in the Middle Atlantic Bight, with the waters off North Carolina a critical wintering ground for large bluefish. Small fish move further south in winter with some fish wintering off the coast of Florida. As water temperatures increase, the spring migration north begins and spawning occurs in the South Atlantic Bight at this time. By summer, bluefish move into the Middle Atlantic Bight, although some medium size fish may remain off Florida (Shepherd et al. 2006). A second spawning occurs in the offshore waters of the Middle Atlantic Bight during summer. The result of these two spawning events is the appearance of two distinct size groups of juvenile bluefish during the fall (Able and Fahay 1998). Fish from the two spawning cohorts mix extensively during the year and constitute a single genetic stock (Graves et al. 1992). Bluefish may attain ages of 11-12 years and can exceed 3 ft in length (ASMFC 1989). The official rod and reel record is 31 lbs and a bluefish weighing 45 lbs was reportedly caught off the African coast (Anderson 1978).

Bluefish are caught along the entire east coast. They are generally the number one species landed by recreational fishermen from New England to the Mid-Atlantic region. Historically, the recreational fishery has accounted for 80-90% of the total catch, and recreational landings peaked in 1981. Commercially, bluefish are targeted in both state and EEZ waters by a variety of fishing gears, with gill nets and otter trawls being the predominant gear types. Coastwide, the commercial catch historically accounted for approximately 20% of the total catch (ASMFC 1989). Since 1985, North Carolina has had the highest commercial landings of bluefish every year, with the exception of 1994 when New Jersey was slightly higher. The North Carolina bluefish fishery occurs throughout the year with peak catches of large fish in the winter by the ocean gill net and ocean trawl fisheries, and catches of smaller fish earlier in the summer by estuarine gill nets, pound nets, beach seines and estuarine long haul seines.

Length Distribution

The length distribution of bluefish in the long haul seine fishery was dominated by small fish, with a few large fish landed each year. In most years, 24-44 cm size classes accounted for the majority of the catch (Figure 7.22). The annual modal size class varied but occurred at 28-36 cm. The annual range of lengths was fairly constant with fish 22-48 cm accounting for 97- 99% of the distribution, except for 1995 and 2004. In 1995, very small 16-22 cm fish composed 8% of the catch, while 4% were large 68 cm bluefish. In 2004, an estimated 12.7% of the catch were large 74 cm bluefish.

The sciaenid pound net fishery takes small bluefish similar in size to what was caught in the long haul fishery, but large bluefish are rarely caught. With the exceptions of years 2002, 2004, & 2006, 24-36 cm size classes accounted for most of the sciaenid pound net catch (Figure 7.23). There was a slight shift in modal length from 26 cm in 1995 to 28-30 cm in most other years, and 32 cm in 2001. In 2002, the mode occurred at 44 cm and large fish (68-78 cm) comprised 2.1% of the catch. Bluefish caught in 2004 were unique in that the mode occurred at 40 cm, 65.5% of the catch was 36-42 cm, and 10.8% were 44-68 cm, but sample size was extremely small (n=25). Small fish were observed in 1999 & 2006 with 2.2% of the 1999 catch 18-20 cm and 36.2% of the 2006 catch16-20 cm. It should be noted that sample size was extremely small as effort by the sciaenid pound net fishery has been severely reduced in recent years.

The ocean gill net fishery for bluefish historically has had a consistent bimodal distribution, but distributions in recent years are more typically trimodal. Bimodal distributions were observed in years 1995, 1996, 2002, & 2003. The first modal group generally occurred between 28-36 cm and the second modal group decreased from 74 cm in 1995, 70 cm in 1996 and 2002, and 68 cm in 2003 (Figure 7.24). Trimodal distributions occurred in 1997, 1998, 1999, 2000, 2001, 2004, 2005 and 2006. In most years, the first and middle modal groups occurred at 26-38 cm & 40-42 cm, but occurred at 38-40 and 50-52 cm in 1998, 2004 & 2006. The third mode occurred at 64-76 cm. The portion of the distribution contained by each modal group varied from year to year. Smaller fish (14-38 cm) accounted for as much as 53% of the catch in 1995. Medium sized fish (40-56 cm) accounted for 43% of the fish in the 1999 catches. The majority of the catch was larger fish (58-88 cm) in 1996, 2000, 2003, & 2005 (Figure 7.24).

The ocean trawl fishery had a multi-modal distribution that encompassed the full size range (14-88 cm) since 1995 (Figure 7.25). Generally, three modes were apparent. The small group (14-38 cm) was the dominant mode in 1997, 1999, 2001 and 2004. The contribution of medium bluefish landed by the winter trawl fishery was highest in 1995 and 2000. Large bluefish fish (56 cm and greater) was highest in the 2005 winter trawl catch when it comprised 54% of the catch.

Bluefish captured in the estuarine gill net fishery are predominantly small to medium sized fish, with a few large fish caught in some years (Figure 7.26). Modes ranged from 32 to 38 cm, and fish lengths ranged from 24-86 cm.

Annual length distributions for bluefish combined across all fisheries (weighted by number of individuals) reflected the contribution by size of each fishery to the overall harvest. Long haul seines generally dominated in the 24-42 cm group (Figure 7.27). Estuarine gill nets were very similar to long hauls, but slightly larger, as important

contributors to the 26-46 cm group. In 1998, this size range of bluefish caught by estuarine gill nets accounted for 53% of the number of bluefish caught that year. Ocean gill nets were important contributors of all sizes of fish, and particularly to the large size range of bluefish. Their contribution of large medium sized fish (46-58 cm) is unique and especially increased in 1998, 2003, 2004, and 2006. Ocean gill nets were the major contributor of larger fish (>58 cm). Interestingly, although the contribution of large bluefish taken by ocean gill nets was highest in 2000 (34.4%), the mode of large bluefish taken was considerably smaller (66 cm). The mode of large bluefish decreased from 74-76 cm in 1995-1999, to 70 cm in 2001 & 2002, 68 cm in 2003-2005, and 64 cm in 2006. The ocean trawl fishery captured a range of size classes, but small fish (26-44 cm) predominated, especially in 1995 (18%). Medium sized fish (46-58 cm) were important in some years (1996, 1998 & 2005). Ocean trawls contributed to the catch of large bluefish (> 58 cm) in most years, particularly in 2005 when 3.4% of the catch was large bluefish caught by ocean trawls (Figure 4.18).
Overall size distribution was generally bimodal with the first peak at small and medium bluefish and a secondary peak at large bluefish. Bait sizes ranged from 14-36 cm, with a dominant mode of 18-28 cm for most fisheries (Table 7.10).

Landings and CPUEs

Contributions of landings of marketable bluefish by the long haul seine fishery decreased notably in recent years from highs of 13% in 1985 & 1986 (NCDMF 1997) to lows of 1% in 1996 and 1999, 2001 & 2003 (Table 7.11). Long haul seine landings exhibited a general downward trend beginning in 1987 (NCDMF 1997), and generally continued through 2003, with the exception of bluefish landings in 2002 which increased slightly to 26 mt (2.5%). An increasing trend has occurred in the most recent years from 23.5 mt (1.4%) in 2004, to 25.0 mt (1.9%) in 2005, and 27.5 mt (2.2%) in 2006. Although landings have leveled out in recent years, they are nowhere near historic levels. The twelve-year mean landings for 1995-2006 (24mt) was 78% lower than the previous seven-year mean 1988-1994 (112 mt). The number of long haul seine operations also declined significantly since the late 1980's, remained about the same through the late 1990's, but effort has decreased to an all time low in the most recent years, with only ~ 4 active crews statewide.

CPUEs and landings of marketable bluefish in the long haul fishery fluctuated and are generally parallel from 1995-2006, with the exception of 1997 and 1998. This discrepancy is likely attributable to the fact that larger fish were landed in 1998, as CPUE by weight increased, while CPUE by number decreased (Table 7.12). The highest CPUEs of bluefish occurred in 2002 (118 kg/trip) and 2005 (110 kg/trip). Landings (32 mt) and the number of marketable fish landed (73,000) were highest in 1997 (32 mt), but CPUES were not as high (68 kg/trip) since the number of trips made (479) were higher than in more recent years (Table 7.12; Figure 7.28).

The sciaenid pound net fishery, on average, contributed only 0.3% (range of 0.1-1.1%) of the marketable North Carolina bluefish landings (NCDMF 1997). This contribution has continued to decline in recent years from 0.1-0.3 (1994-2002), to only 0.1-<0.1% from 2003-2006. Landings exhibited a continued downward trend with the 1995-2004 ten year average landings (2 mt) 96% lower than the high reported in 1985 (51 mt) (NCDMF 1997), and continued to decline with 2005 (0.4 mt) & 2006 (0.5 mt) landings 76-80% lower than the ten year mean (2 mt). The number of sciaenid pound net operations has remained very low through the 1990's and 2000's. As restrictions in the estuarine gill net fisheries increase, we are starting to see resurgence in the effort by the sciaenid pound net fishery.

CPUEs and landings of marketable bluefish landed by the sciaenid pound net fishery shoed similar trents until 1999 but since then correlations are difficult to interpret. CPUES peak in 2001 & 2004, while landings remain constant at 1-2 mt (Figure 7.46). The number of trips made decreased from 419 trips in 1995 to 59-81 trips from 2003-2006.

The ocean gill net fishery has always been a major contributor to marketable North Carolina bluefish landings, and comprised 74-87% of bluefish landed in 2004-2006 (Table 7.11). The 2004-2006 average (1,151 mt) was similar to the 1995-2003 average (1,161 mt). Essentially all bluefish taken in this fishery were marketable (Table 7.12).

CPUEs and landings of bluefish landed by ocean gill nets show similar trends, with the exception of 1997. Although landings and catch of marketable bluefish increased in 1997, CPUE decreased because the number of trips (4,244) made to catch the fish was the highest recorded during 1995-2007.

The ocean trawl fishery was the major contributor in the early 1980's, however, its overall contribution of the marketable bluefish declined 96% from a high in 1988 (544 mt) to a low of 20 mt in 1994, followed by fluctuations from 1995-2006 (Table 7.11). The contribution of ocean winter trawl to the overall marketable bluefish landings has declined to lows in 2003, but have increased notably from 2003 (35.3 mt; 2.2%) to 2005 (108.8 mt; 8.5%). Bait bluefish was, on average, <1% by weight & 12% by number, of the ocean trawl bluefish landed (Table 7.12).

CPUE and landings of bluefish landed by ocean trawls exhibit an overall declining trend from 1995 to 2002 (CPUE) and 2003 (landings), and increases from 2002-2003 to 2005. In 1997, although landings increased, CPUE decreased. This could be explained by smaller fish being landed (numbers of fish landed increased to 13,500) and by the increased number of trips made (229) to catch the fish (Table 7.12). The opposite happened in 2003, as landings decreased and CPUE increased, larger fish were captured (19,000) and the number of trips made (172) to catch the fish decreased.

Estuarine gill nets are the second most important gear that contributes to the total marketable landings of bluefish in North Carolina in recent years. Their contribution in 1998

(19%) was the highest over the study period, and ranged from 7-14% from 2003-2006 (Table 7.11). Essentially all bluefish taken in this fishery were marketable (Table 7.12).

CPUE and landings of bluefish landed by estuarine gill nets show parallel trends and generally increased from 1997-2005. A phenomenal number of gill net trips were made annually, ranging from 4,784 trips (2004) to 9,351 trips (1997), and averaged 6,724 trips (Table 7.12).

Annual landings for bluefish combined across these five fisheries (weighted by respective fishery landings) are presented in Figure 7.28. For the combined fisheries, landings generally increased from 1999-2001 and 2002-2004, but decreased from 2001-2002 and 2004-2006. Overall trends are largely driven by trends in the ocean gill net fishery. During 1997, in both the ocean gill net fishery and all fisheries combined, landings of marketable bluefish increased while CPUE decreased. This trend is a result of the fact that in 1997, the number of trips made was the highest recorded (14,752 trips).

Management Issues

Bluefish are managed under a joint management plan collaboratively developed by the Mid-Atlantic Fishery Management Council and the Atlantic States Marine Fisheries Commission, implemented in 1990. The management measures presently include an overall annual landings quota in which 17% of the quota is allocated to the commercial fishery and 83% is allocated to the recreational fishery. The total commercial quota is divided into state specific quotas and there may be a transfer of a portion of the recreational quota to the commercial sector if predicted recreational landings are below the annual allocation. North Carolina’s commercial allocation is 32%.

The most recent stock status information indicates that bluefish are not overfished and overfishing is not occurring, based on the biological reference points developed in the 2005 stock assessment. Trends in state and Northeast Fishery Science Center data show a decreasing trend in fishing mortality, an increasing trend in population biomass, and an increasing trend in population numbers. The stock rebuilding deadline is 2010 and biomass is projected to be at or above the rebuilding target in 2009.

Table 7.10 North Carolina bluefish (*Pomatomus saltatrix*) expanded length frequency of bait samples for selected fisheries, 1995-2006; n=number of fish measured, en=expanded number of individuals in catches sampled, and number=estimated number in the landings.

Fishery/ Year	n	en	number	14	16	18	20	22	24	26	28	30	32	34	36
Ocean trawl															
1995	19	475	11,290	-	-	-	-	18.1	15.2	39.8	24.4	2.5	-	-	-
1996	52	8,183	204,445	-	-	39.0	45.7	8.2	-	-	0.8	0.4	-	3.1	2.7
1997	43	2,225	14,439	-	-	4.4	0.5	26.3	38.5	23.4	4.6	-	-	-	2.3
1998	8	286	1,239	-	-	-	-	9.4	28.3	47.9	14.3	-	-	-	-
1999	28	1,393	6,367	-	-	-	-	1.4	20.1	48.2	20.2	-	-	10.1	-
2000	43	3,850	5,803	-	-	-	-	13.2	29.8	30.2	15.0	6.1	2.6	3.1	-
2001	38	826	3,450	-	-	1.7	30.9	28.2	12.8	14.9	3.9	0.7	-	1.3	5.6
2002	38	1,555	7,487	2.1	14.5	14.4	2.1	5.5	12.9	17.2	1.2	16.3	8.5	5.5	-
2003	9	356	2,472	-	-	-	-	10.7	36.0	3.7	16.1	-	-	3.7	-
2004	42	1,682	4,573	-	-	1.2	-	15.6	15.5	10.2	1.2	1.2	-	3.9	51.0
2005	8	635	2,810	18.0	-	-	16.9	-	33.9	10.6	16.2	-	4.6	-	-
2006	5	580	4,424	-	-	-	-	42.1	26.7	26.7	-	-	4.5	-	-
Ocean gill net															
1995	0	0	5	-	-	-	-	-	-	-	-	-	-	-	-
1996	0	0	194	-	-	-	-	-	-	-	-	-	-	-	-
1997	0	0	5	-	-	-	-	-	-	-	-	-	-	-	-
1998	108	464	3	-	-	-	-	-	0.6	-	-	1.5	7.5	12.9	77.4
1999	89	93	595	-	-	-	1.1	-	2.2	28.0	46.2	19.4	3.2	-	-
2000	0	0	15	-	-	-	-	-	-	-	-	-	-	-	-
2001	168	1,872	25,800	-	-	-	-	-	2.1	29.5	28.6	25.2	12.0	2.6	-
2002	0	0	3	-	-	-	-	-	-	-	-	-	-	-	-
2003	94	607	8,123	-	-	-	-	-	2.8	20.9	15.2	17.6	22.6	10.9	10.0
2004	1	19	273	-	-	-	-	-	100	-	-	-	-	-	-
2005	23	23	193	-	-	-	-	-	-	4.3	4.3	13.0	21.7	26.1	30.4
2006	1	1	8	-	-	-	-	-	-	100	-	-	-	-	-
Sciaenid pound net															
1995	70	1,281	18,170	-	4.0	17.2	32.2	29.4	5.0	12.2	-	-	-	-	-
1996	14	153	3,543	-	5.2	22.2	8.5	20.3	32.7	11.1	-	-	-	-	-
1997	105	791	12,111	1.5	-	18.2	24.4	11.9	16.2	11.5	9.4	5.2	1.8	-	-
1998	61	1,440	5,129	-	13.8	19.2	26.8	26.3	10.2	3.3	0.3	-	-	-	-
1999	148	2,153	28,294	-	14.2	22.0	31.7	24.9	2.3	0.7	0.6	-	3.6	-	-
2000	40	845	14,838	-	-	2.1	24.5	24.1	29.8	14.6	4.0	0.8	-	-	-
2001	40	741	25,460	-	11.5	21.5	20.6	21.6	16.9	8.0	-	-	-	-	-
2002	16	319	7,746	21.6	11.0	16.3	-	11.0	17.2	22.9	-	-	-	-	-
2003	7	63	2,852	-	-	-	-	-	4.8	19.0	76.2	-	-	-	-
2004	0	0	0	-	-	-	-	-	-	-	-	-	-	-	-
2005	152	2,691	16,804	1.0	18.7	23.8	29.5	15.2	4.2	4.4	3.3	-	-	-	-
2006	78	2,360	4,654	10.9	46.7	4.1	10.1	6.9	6.2	13.6	0.9	-	-	-	-

Table 7.10 (Continued)

Fishery/ Year	n	en	number	14	16	18	20	22	24	26	28	30	32	34	36
Long haul															
1995	173	4,574	318,438	4.4	4.0	11.4	32.2	34.7	4.3	4.5	1.7	-	-	-	-
1996	122	2,603	52,788	-	5.5	9.5	20.4	25.4	21.8	12.5	3.2	1.4	-	0.3	-
1997	187	3,551	79,633	2.5	-	8.2	19.1	23.9	19.6	15.3	10.5	0.5	0.5	-	-
1998	197	8,543	71,136	1.0	6.9	11.4	16.8	16.9	14.9	25.3	4.9	1.7	0.3	-	-
1999	165	3,190	26,341	2.8	3.3	10.1	16.7	33.9	18.2	12.1	2.0	0.7	0.3	-	-
2000	106	2,590	19,756	-	0.7	3.5	15.6	9.0	28.6	26.2	14.5	2.0	-	-	-
2001	349	11,717	370,381	0.1	1.3	3.5	10.5	22.6	47.4	8.8	5.3	0.6	-	-	-
2002	254	9,198	23,643	0.4	8.8	14.0	19.0	26.8	19.5	7.4	3.4	0.5	-	-	0.1
2003	88	5,335	37,411	2.1	6.8	17.5	12.5	15.5	23.8	19.9	1.1	0.9	-	-	-
2004	71	7,199	65,652	2.8	20.1	6.7	19.0	12.3	26.4	10.6	-	-	-	2.0	-
2005	132	5,032	43,261	0.1	1.3	4.3	4.6	10.6	22.7	33.8	21.6	0.6	0.6	-	-
2006	141	7,260	53,535	4.0	7.2	9.3	15.8	18.5	20.8	16.4	7.4	0.6	-	-	-
Estuarine gill net															
1995	0	0	129,873	-	-	-	-	-	-	-	-	-	-	-	-
1996	0	0	889	-	-	-	-	-	-	-	-	-	-	-	-
1997	1	1	105	-	-	-	-	-	-	-	-	100	-	-	-
1998	65	272	30	-	-	-	-	-	-	-	-	-	2.6	4.0	93.4
1999	0	0	2	-	-	-	-	-	-	-	-	-	-	-	-
2000	0	0	2	-	-	-	-	-	-	-	-	-	-	-	-
2001	41	41	48	-	-	-	2.4	7.3	7.3	41.5	29.3	9.8	2.4	-	-
2002	0	0	20	-	-	-	-	-	-	-	-	-	-	-	-
2003	0	0	6	-	-	-	-	-	-	-	-	-	-	-	-
2004	1	10	4	-	-	-	-	-	-	-	-	-	-	-	100
2005	174	750	17,939	-	-	-	-	-	0.8	0.5	1.3	3.3	8.9	24.8	60.2
2006	5	7	331	-	-	-	-	28.6	-	-	28.6	-	-	-	42.9

Table 7.11 North Carolina commercial landings of marketable bluefish by fishery,1995-2006, includes landings (metric tons), value (thousands dollars) and contribution of fishery to NC bluefish landings.

Fishery	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Long Haul												
Metric Tons	30.2	19.7	32.3	27.3	15.7	25.3	17.7	26.0	15.5	23.5	25.0	27.5
Value ($)	18.8	10.4	19.3	15.5	9.9	17.3	8.9	17.4	7.1	10.1	14.1	14.9
% State	2.2	1.3	1.8	2.1	1.3	1.7	1.0	2.5	1.0	1.4	1.9	2.2
Flounder Pound Net												
Metric Tons	1.9	1.1	1.4	0.8	0.7	0.9	1.7	1.8	0.4	1.1	0.5	0.2
Value ($)	1.2	0.6	0.9	0.4	0.5	0.7	0.9	1.1	0.2	0.5	0.3	0.1
% State	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	<0.1	0.1	<0.1	<0.1
Sciaenid Pound Net												
Metric Tons	2.7	1.7	5.3	1.8	1.9	1.9	2.2	1.8	0.7	1.0	0.4	0.5
Value ($)	1.2	0.9	2.9	0.9	1.2	1.3	1.0	1.0	0.4	0.4	0.2	0.3
% State	0.2	0.1	0.3	0.1	0.2	0.1	0.1	0.2	<0.1	0.1	<0.1	<0.1
Estuarine Gill Net												
Metric Tons	127.6	89.6	96.5	252.9	145.5	103.1	205.1	123.8	224.3	132.3	174.4	109.2
Value ($)	75.0	50.6	61.8	147.3	92.9	70.4	106.3	77.5	108.6	57.5	94.4	59.4
% State	9.3	6.0	5.3	19.1	11.6	6.7	11.1	11.7	14.2	7.8	13.6	8.6
Ocean Gill Net												
Metric Tons	1,007.9	1,214.4	1,450.6	934.5	942.3	1,307.8	1,486.8	836.5	1,269.8	1,479.3	954.6	1,019.6
Value ($)	862.7	700.7	934.5	537.6	674.2	952.6	903.3	635.2	620.6	747.2	602.0	672.3
% State	73.8	81.2	79.9	70.4	75.2	85.6	80.6	79.4	80.7	86.7	74.2	80.5
Ocean Trawl												
Metric Tons	147.5	98.5	139.3	63.1	115.9	64.9	113.6	47.4	35.3	54.2	108.8	95.8
Value ($)	89.1	59.4	88.9	36.3	81.0	45.9	62.0	34.7	17.3	26.3	67.1	62.1
% State	10.8	6.6	7.7	4.8	9.3	4.2	6.2	4.5	2.2	3.2	8.5	7.6
Other Fisheries												
Metric Tons	47.7	71.2	90.3	46.7	30.3	24.1	17.0	16.8	27.9	15.4	23.3	13.2
Value ($)	30.8	38.8	57.7	25.5	18.0	16.0	8.7	9.7	13.5	7.2	12.1	6.5
% State	3.5	4.8	5.0	3.5	2.4	1.6	0.9	1.6	1.8	0.9	1.8	1.0
All												
Metric Tons	1,365.6	1,496.2	1,815.7	1,327.1	1,252.4	1,528.0	1,844.3	1,054.1	1,574.0	1,706.8	1,287.1	1,266.0
Value ($)	1,078.9	861.5	1,166.0	763.6	877.7	1,104.1	1,091.0	776.6	767.6	849.3	790.3	815.6

Source: North Carolina Division of Marine Fisheries commercial landings database.
Long Haul includes: gear code 030 or 025 and non-ocean waters.
Flounder Pound Net includes: gear code 275, months October, November, December for counties Beaufort, Carteret, Dare, Hyde, Tyrrell, and month September for counties Beaufort, Carteret, Hyde and Tyrrell.
Sciaenid Pound Net includes: gear code 275, months May through August for counties Dare and Hyde, and month September for Dare.
Estuarine Gill Net includes: gear code 425, 426, 427, 470, 475, 480 and all non-ocean waters.
Ocean Gill Net includes: gear code 425, 426, 427, 470, 475, 480 and Atlantic Ocean.
Ocean Trawl includes: gear codes 210 and 230, Atlantic Ocean, and months January through May and September through December.

Table 7.12. North Carolina bluefish *(Pomatomus saltatrix)* landings (weight - metric tons, number – 1000's individuals), marketable landings per trip (CPUE weight -kgs), and total number of trips, by type for selected commercial fisheries, 1995-2006.

		Landings									
		Weight					Number				# Trips
		Total	Market		Bait	%Bait	Total	Market	Bait	%Bait	
Fishery	Year	Landed (metric tons)	Landed (metric tons)	CPUE	Landed (metric tons)		Landed (1000's)	Landed (1000's)	Landed (1000's)		
Long Haul											
	1995	58	30	66	28	48	377	59	318	79	460
	1996	29	19	36	10	34	92	39	53	56	546
	1997	49	32	68	17	35	153	73	80	48	479
	1998	39	23	83	15	38	109	38	71	64	329
	1999	19	16	68	4	21	49	23	26	44	232
	2000	29	25	83	4	14	68	48	20	29	306
	2001	80	18	62	62	78	400	30	370	90	287
	2002	29	26	118	3	10	50	26	24	34	222
	2003	22	16	53	6	27	64	27	37	52	292
	2004	33	24	84	9	27	92	26	66	56	281
	2005	35	25	110	10	29	92	49	43	46	227
	2006	37	27	81	9	24	96	42	54	53	340
Sciaenid Pound Net											
	1995	5	3	6	2	40	25	7	18	64	419
	1996	2	2	6	<1	50	8	4	4	44	299
	1997	8	5	12	2	25	25	13	12	46	449
	1998	3	2	7	<1	33	9	4	5	50	276
	1999	5	2	6	3	60	33	5	28	82	299
	2000	5	2	10	3	60	19	4	15	75	195
	2001	6	2	15	4	67	30	5	25	81	148
	2002	3	2	10	<1	33	10	2	8	67	175
	2003	1	<1	10	<1	<100	5	2	3	75	79
	2004	<1	<1	15	0	0	1	<1	0	0	70
	2005	2	<1	7	2	100	18	<1	17	94	59
	2006	1	<1	7	<1	<100	6	1	5	83	81

Table 7.12. (Continued).

Fishery	Year	Landings: Weight: Total: Landed (metric tons)	Weight: Market: Landed (metric tons)	Weight: Market: CPUE	Weight: Bait: Landed (metric tons)	Weight: %Bait	Number: Total: Landed (1000's)	Number: Market: Landed (1000's)	Number: Bait: Landed (1000's)	Number: %Bait	# Trips
Ocean Gill Net											
	1995	998	998	314	<1	<1	419	418	<1	<1	3,215
	1996	1,211	1,211	391	<1	<1	498	497	<1	<1	3,109
	1997	1,439	1,439	342	<1	<1	629	628	<1	<1	4,244
	1998	928	928	249	<1	<1	428	427	<1	<1	3,758
	1999	936	936	315	<1	<1	443	442	<1	<1	2,991
	2000	1,308	1,308	533	<1	<1	521	520	<1	<1	2,456
	2001	1,495	1,487	686	7	<1	627	601	26	4	2,168
	2002	836	836	387	<1	<1	377	376	<1	<1	2,163
	2003	1,273	1,270	514	3	<1	542	534	8	1	2,470
	2004	1,479	1,479	668	<1	<1	692	691	<1	<1	2,215
	2005	955	955	552	<1	<1	366	365	<1	<1	1,731
	2006	1,020	1,020	574	<1	<1	514	513	<1	<1	1,775
Ocean Trawl											
	1995	149	148	983	2	<1	160	149	11	7	150
	1996	117	87	730	30	<1	289	85	204	71	135
	1997	143	140	608	3	<1	149	135	14	9	229
	1998	63	63	223	<1	<1	30	29	1	3	283
	1999	118	116	408	2	<1	78	72	6	7	284
	2000	66	65	299	1	<1	85	79	6	7	217
	2001	114	114	617	<1	<1	106	103	3	3	184
	2002	50	47	140	2	4	34	27	7	21	338
	2003	36	35	206	<1	<1	21	19	2	10	172
	2004	57	54	315	2	4	35	30	5	14	172
	2005	104	104	547	<1	<1	60	57	3	5	199
	2006	96	96	424	<1	<1	58	54	4	7	226

Table 7.12 (continued).

Fishery	Year	Landings: Weight: Total: Landed (metric tons)	Market: Landed (metric tons)	Market: CPUE	Bait: Landed (metric tons)	%Bait	Number: Total: Landed (1000's)	Market: Landed (1000's)	Bait: Landed (1000's)	%Bait	# Trips
Estuarine Gill Net											
	1995	150	128	16	22	15	323	193	130	40	8,071
	1996	90	90	16	<1	<1	150	149	<1	<1	5,528
	1997	97	97	10	<1	<1	140	139	<1	<1	9,351
	1998	253	253	32	<1	<1	337	336	<1	<1	7,852
	1999	146	146	20	<1	<1	234	233	<1	<1	7,383
	2000	103	103	14	<1	<1	4	173	<1	<1	7,420
	2001	205	205	28	<1	<1	348	347	<1	<1	7,212
	2002	124	124	19	<1	<1	140	139	<1	<1	6,489
	2003	224	224	44	<1	<1	332	331	<1	<1	5,140
	2004	132	132	28	<1	<1	197	196	<1	<1	4,784
	2005	185	174	31	10	5	311	293	18	6	5,599
	2006	109	109	19	<1	<1	176	175	<1	<1	5,864
Fisheries Combined											
	1995	1,362	1,307	107	55	4	1,421	943	478	34	12,315
	1996	1,452	1,409	148	43	3	1,091	828	263	24	9,617
	1997	1,737	1,713	117	24	1	1,129	1,021	108	10	14,752
	1998	1,288	1,269	102	19	1	952	873	79	8	12,498
	1999	1,227	1,216	109	11	<1	899	837	62	7	11,189
	2000	1,513	1,503	142	10	<1	898	855	43	5	10,594
	2001	1,901	1,826	183	75	4	1,536	1,111	425	28	9,999
	2002	1,043	1,035	110	8	<1	597	556	41	7	9,387
	2003	1,558	1,546	190	12	<1	976	925	51	5	8,153
	2004	1,703	1,690	225	13	<1	1,035	962	73	7	7,522
	2005	1,283	1,259	162	24	2	842	760	82	10	7,815
	2006	1,266	1,253	151	13	1	937	872	65	7	8,286

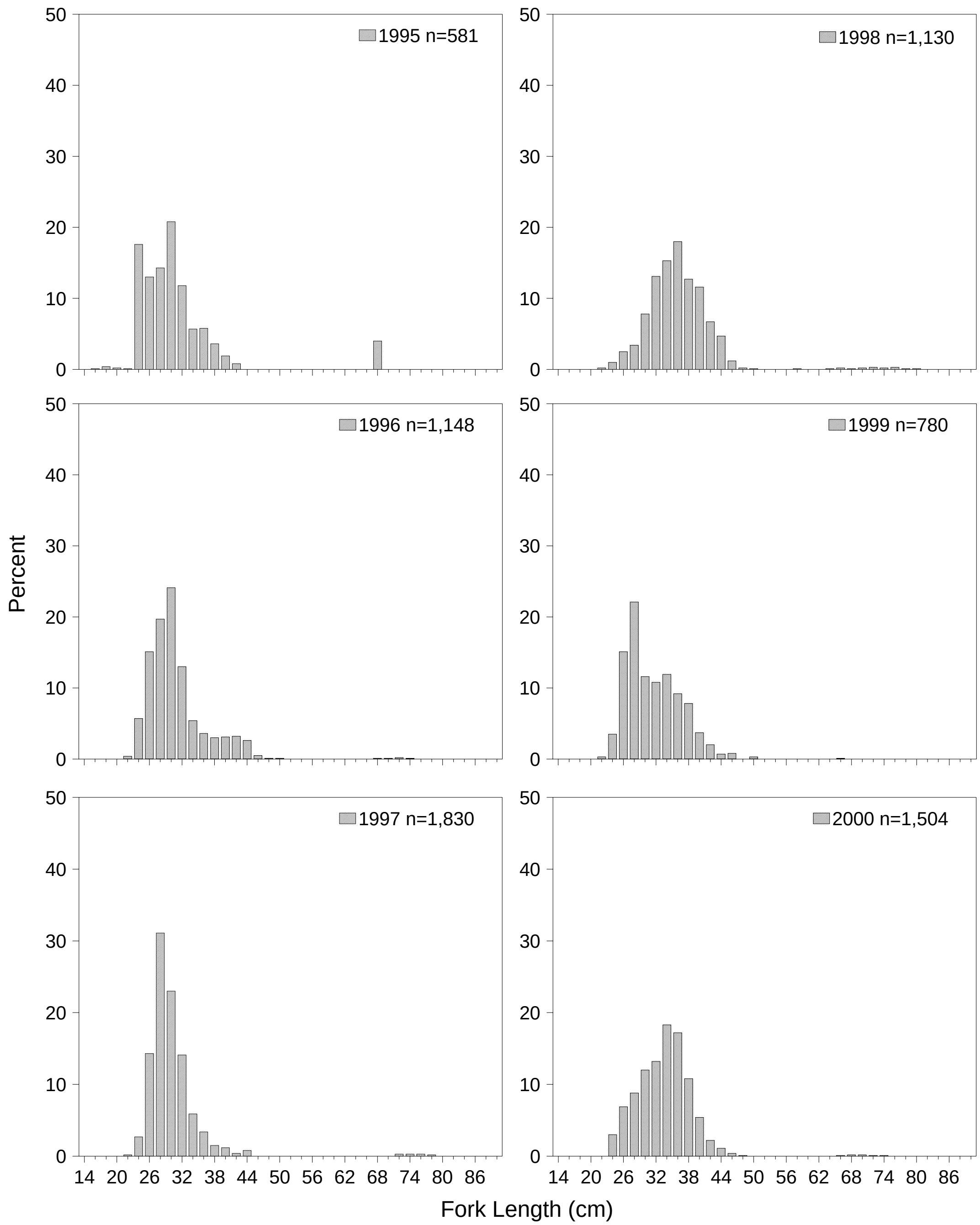


Figure 7.22. North Carolina long haul seine fishery weighted length frequency distributions for marketable bluefish (*Pomatomus saltaltrix*), 1995-2006.

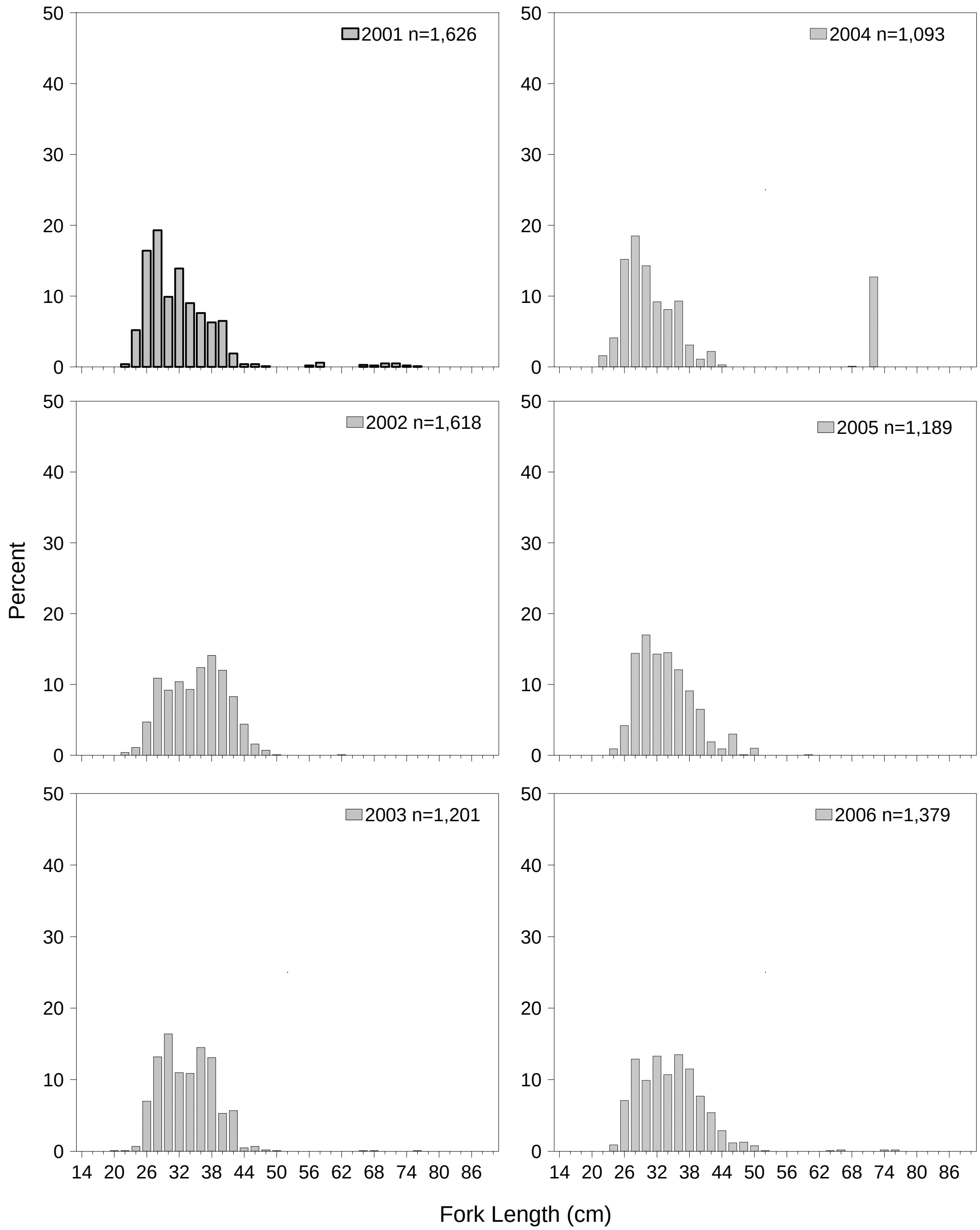


Figure 7.22. (Continued).

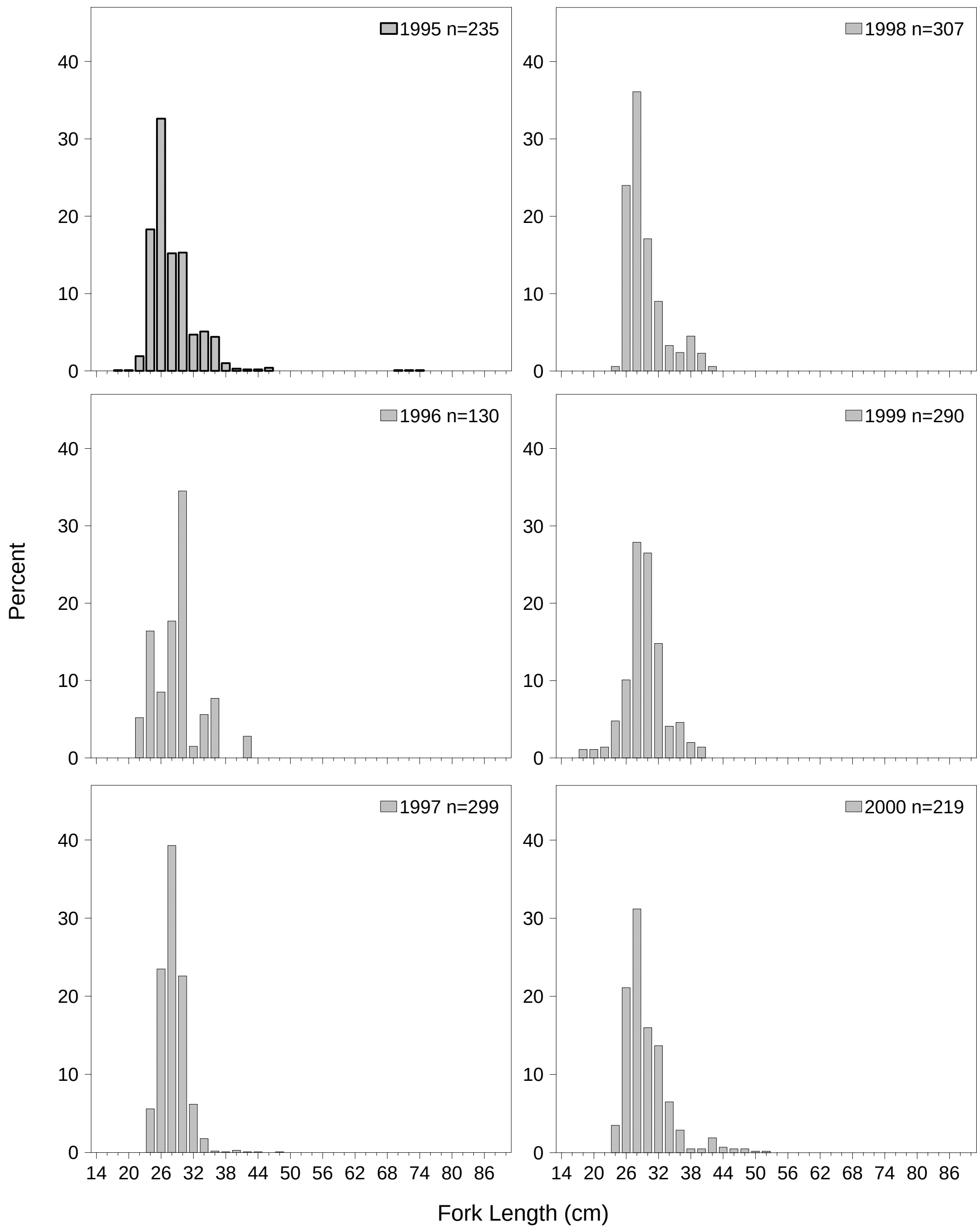


Figure 7.23. North Carolina sciaenid pound net fishery weighted length frequency distributions for marketable bluefish (*Pomatomus saltaltrix*), 1995-2006.

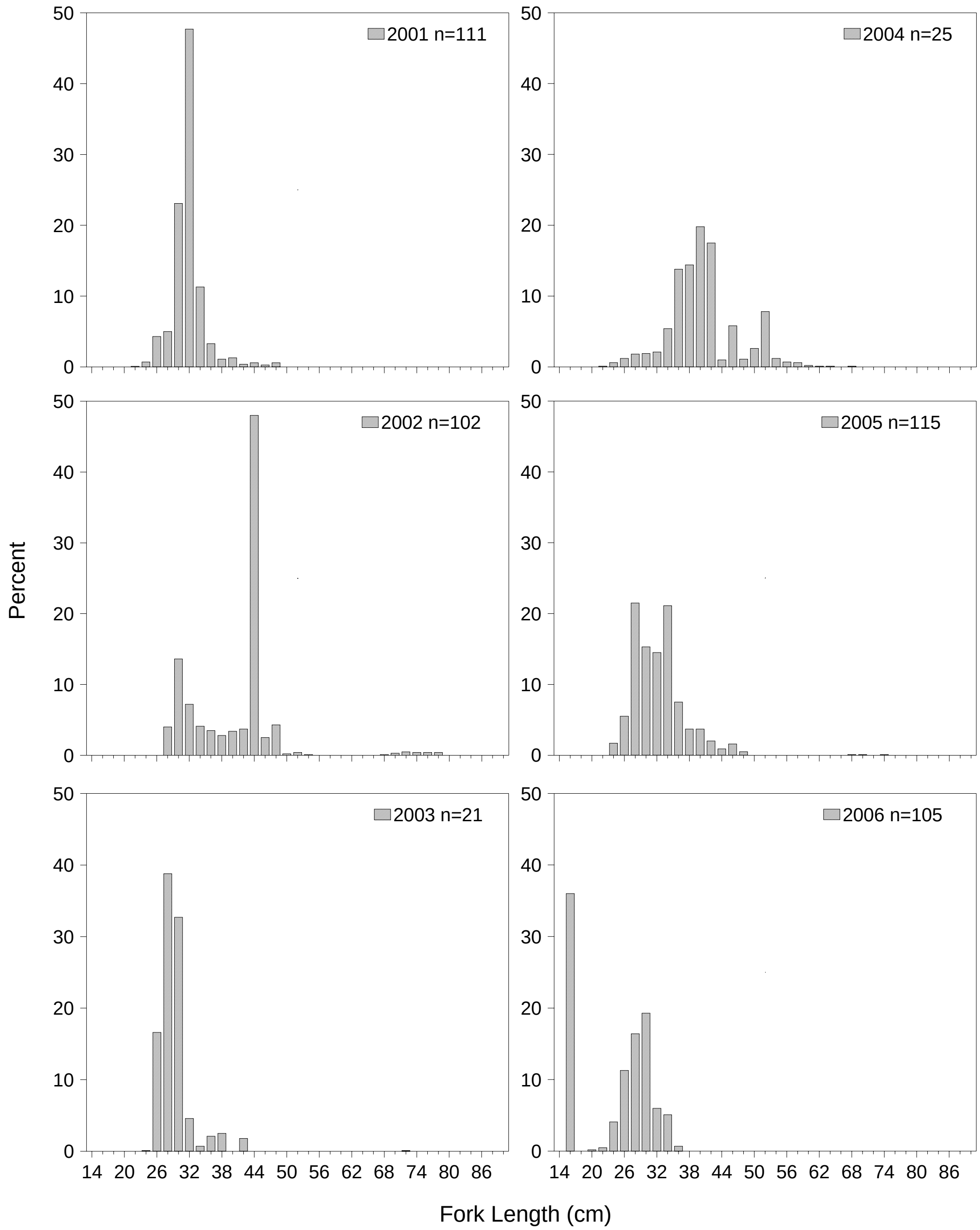


Figure 7.23. (Continued).

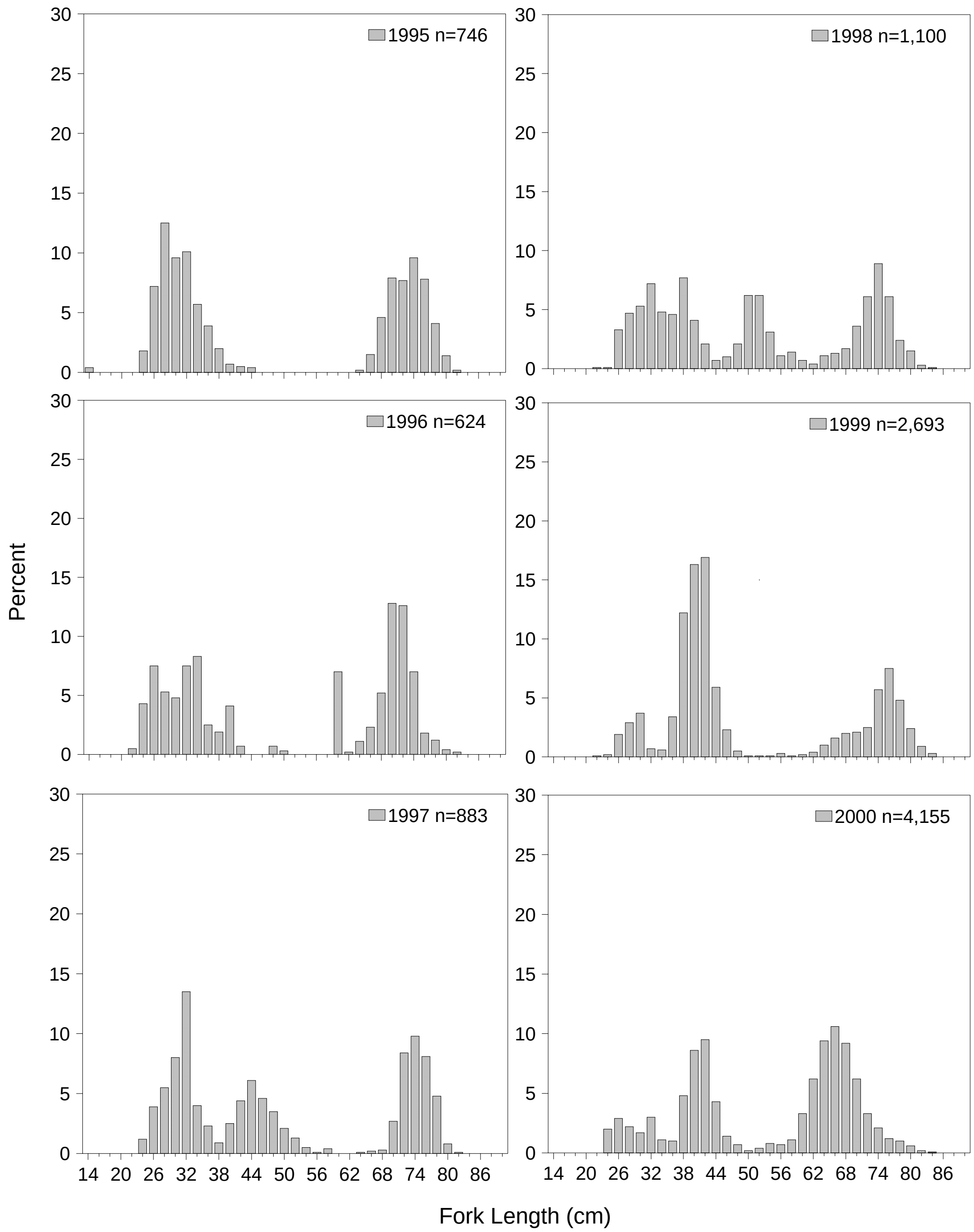


Figure 7.24. North Carolina ocean gill net fishery weighted length frequency distributions for marketable bluefish (*Pomatomus saltatrix*), 1995-2006.

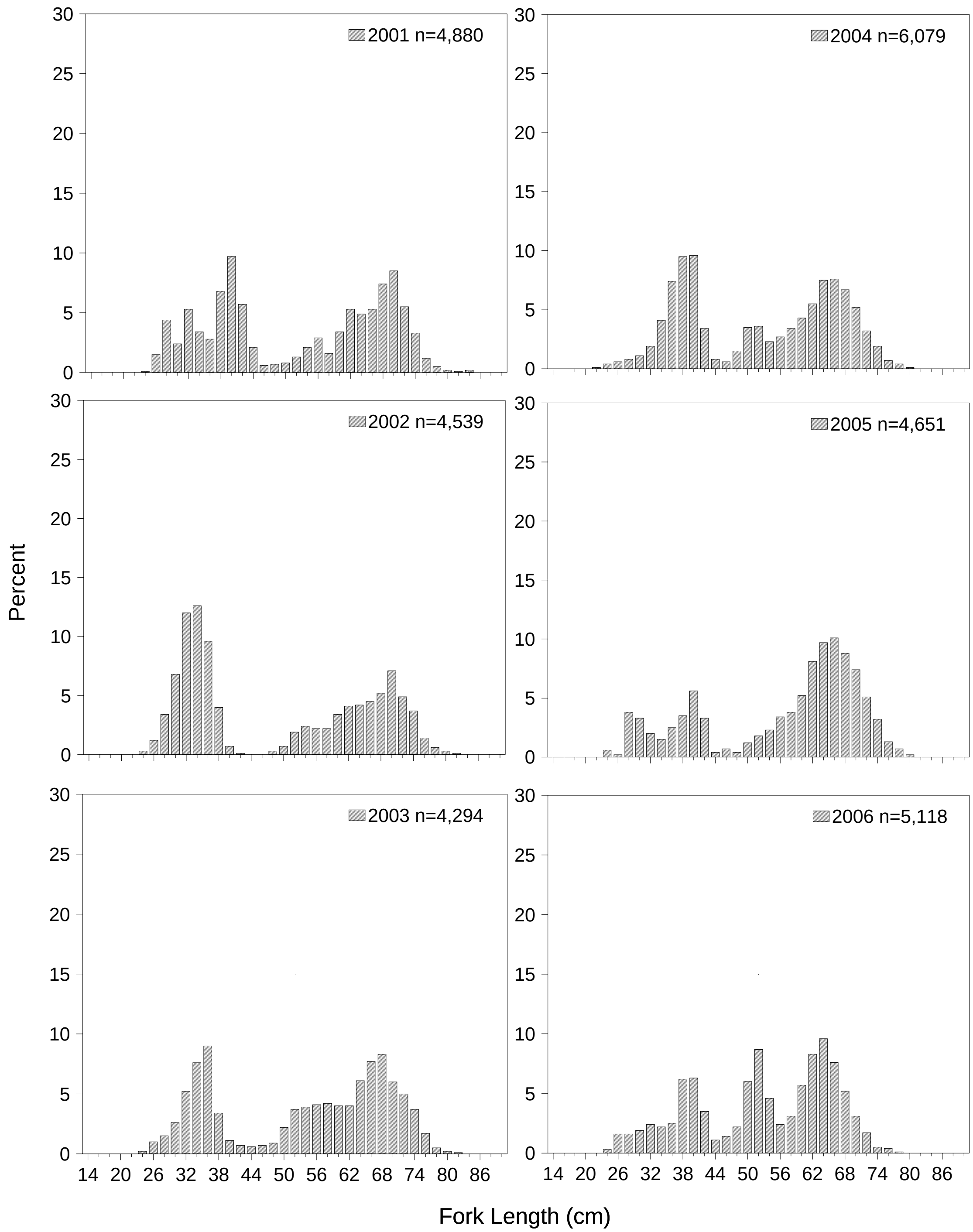


Figure 7.24. (Continued).

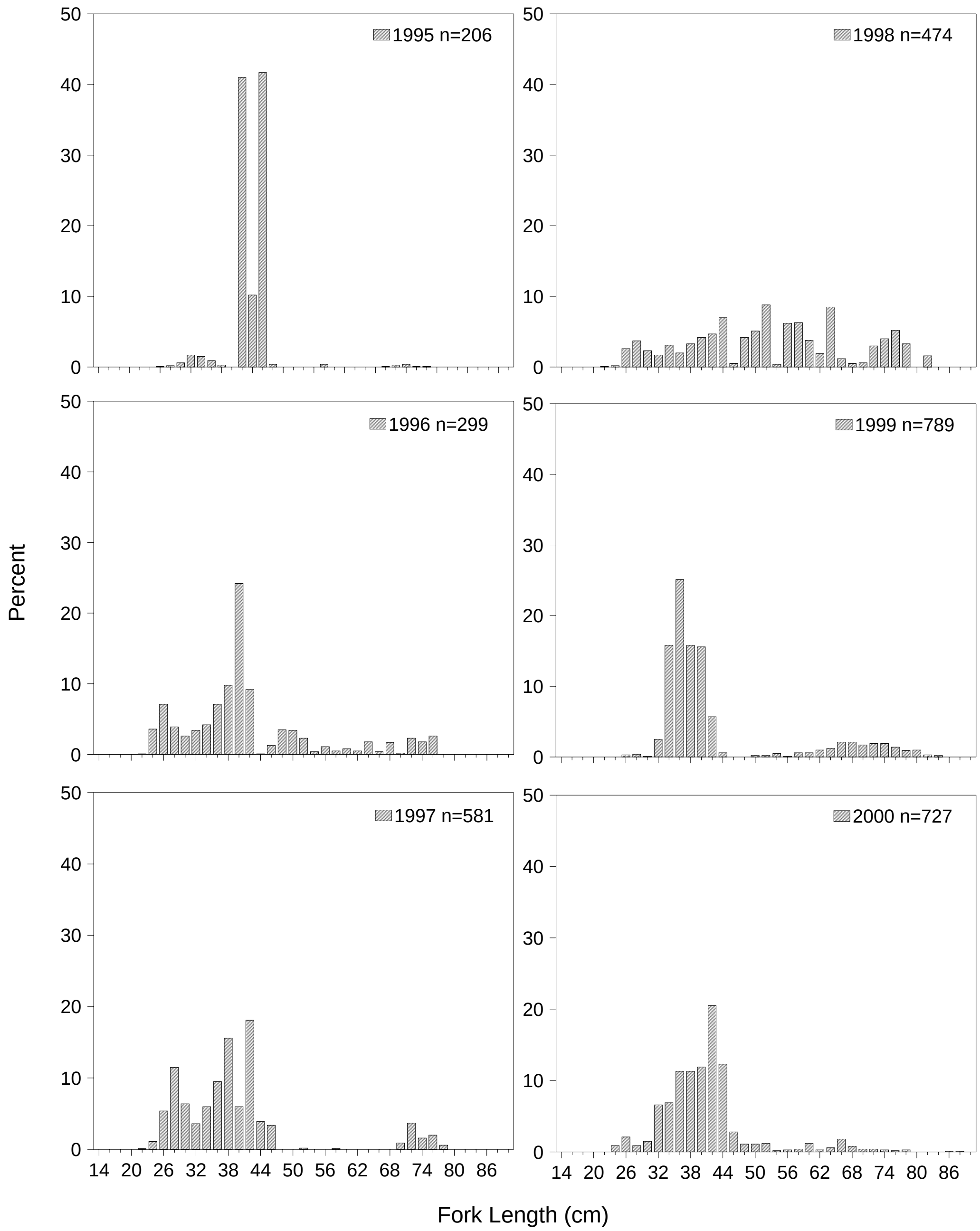


Figure 7.25. North Carolina ocean trawl fishery weighted length frequency distributions for marketable bluefish (*Pomatomus saltaltrix*), 1995-2006.

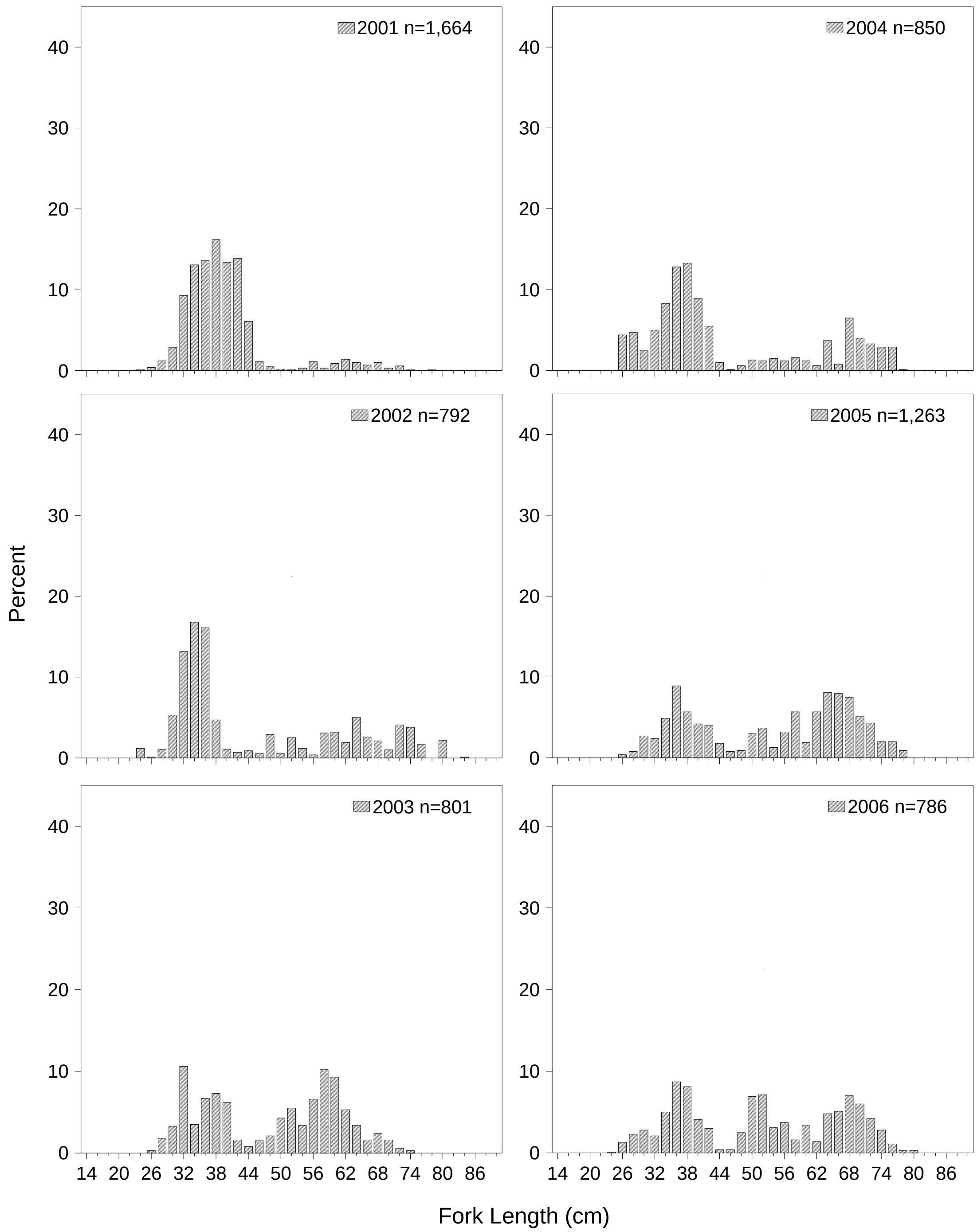


Figure 7.25. (Continued).

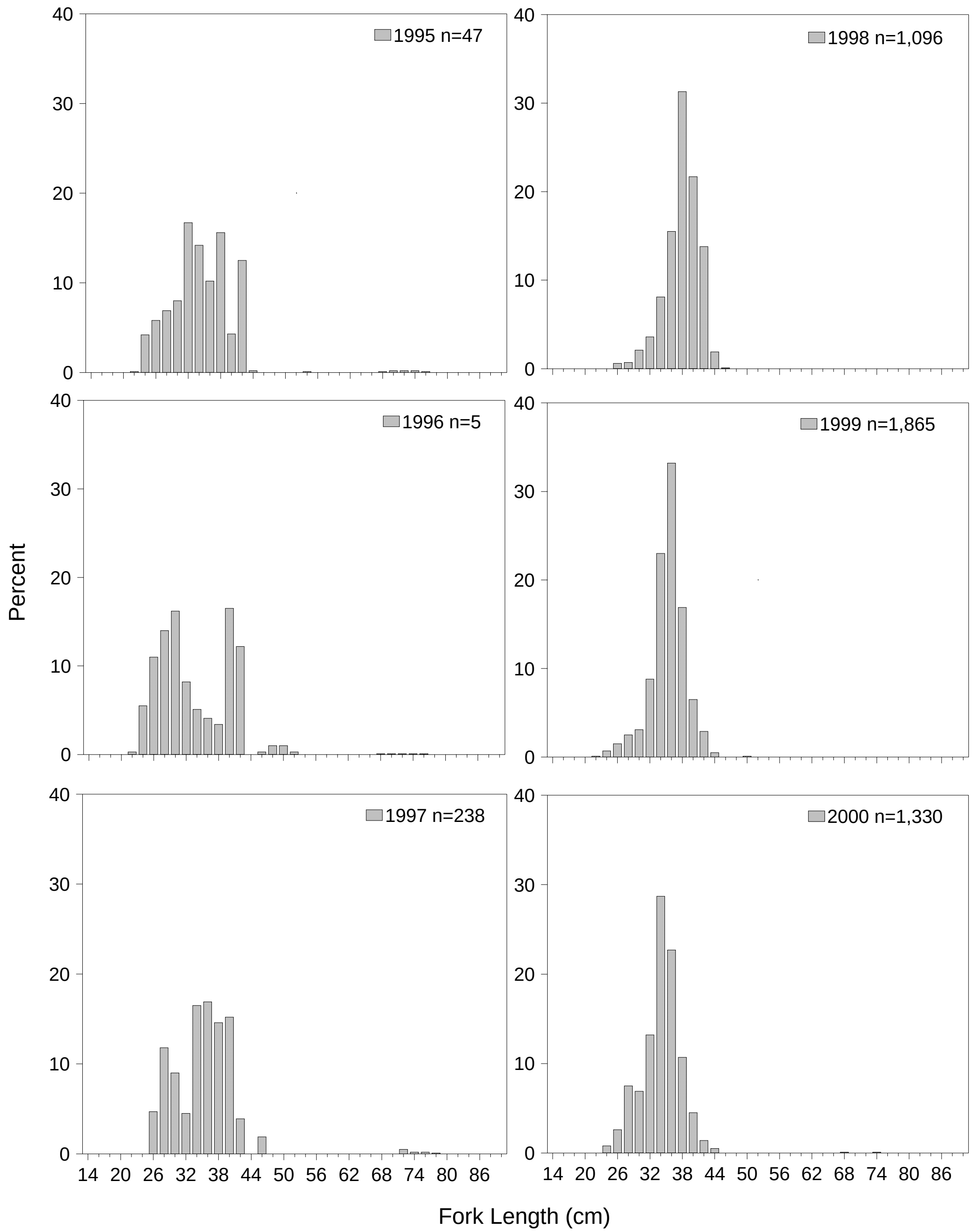


Figure 7. 26. North Carolina estuarine gill net fishery weighted length frequency distributions for marketable bluefish (*Pomatomus saltaltrix*), 1995-2006.

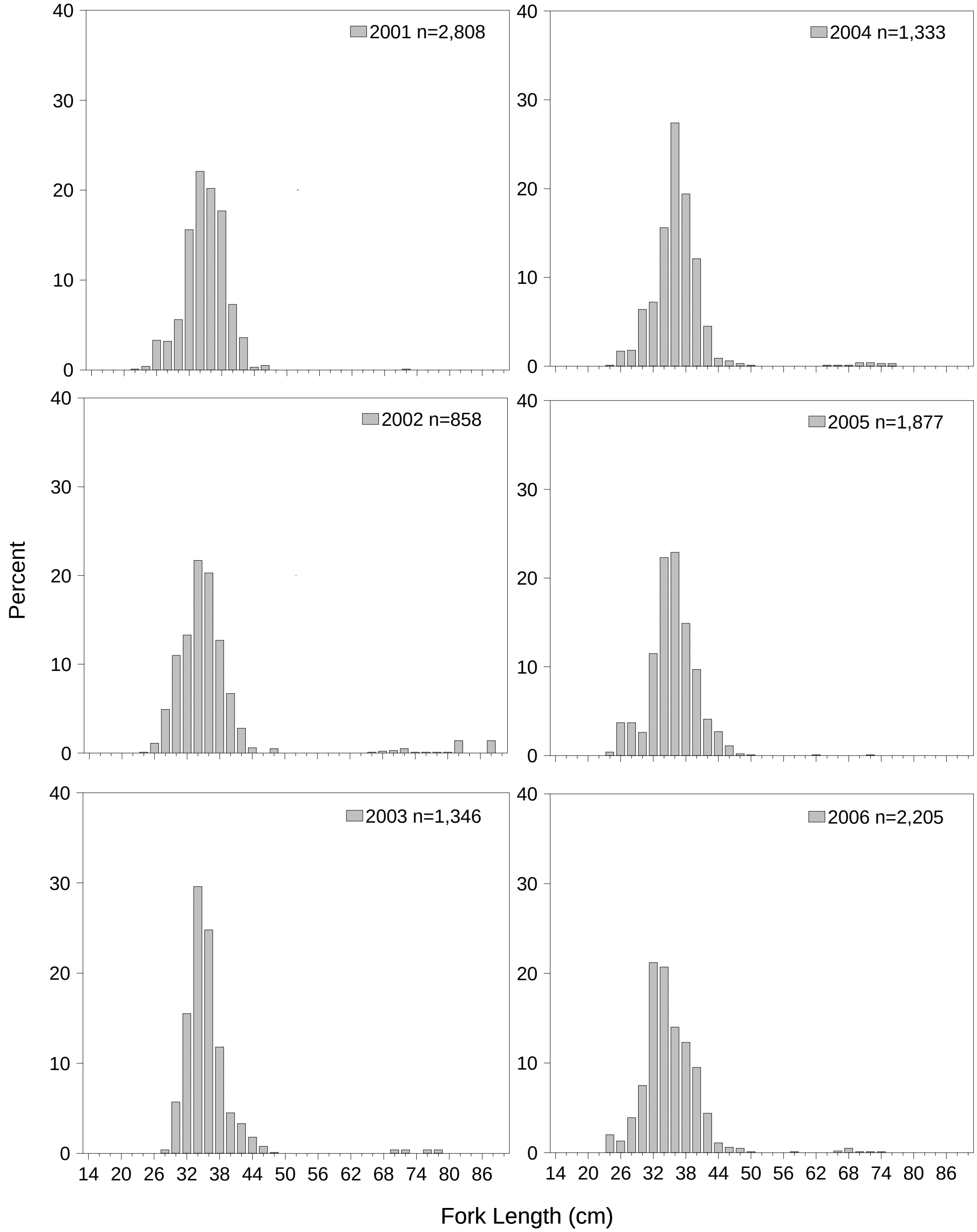


Figure 7.26. (Continued).

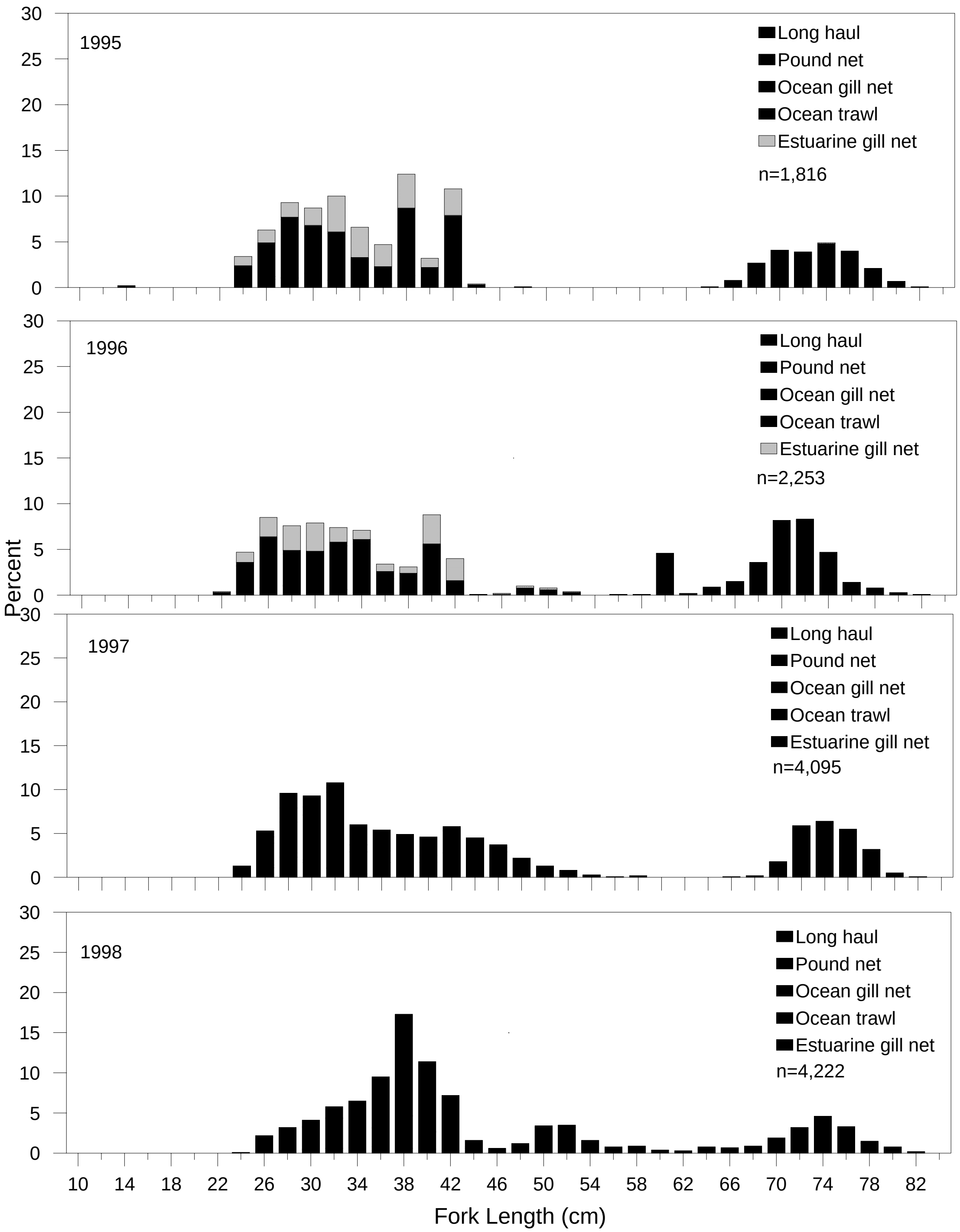


Figure 7.27. North Carolina commercial fishery weighted length frequency distributions for marketable bluefish *(Pomatomus saltatrix),* 1995-2006.

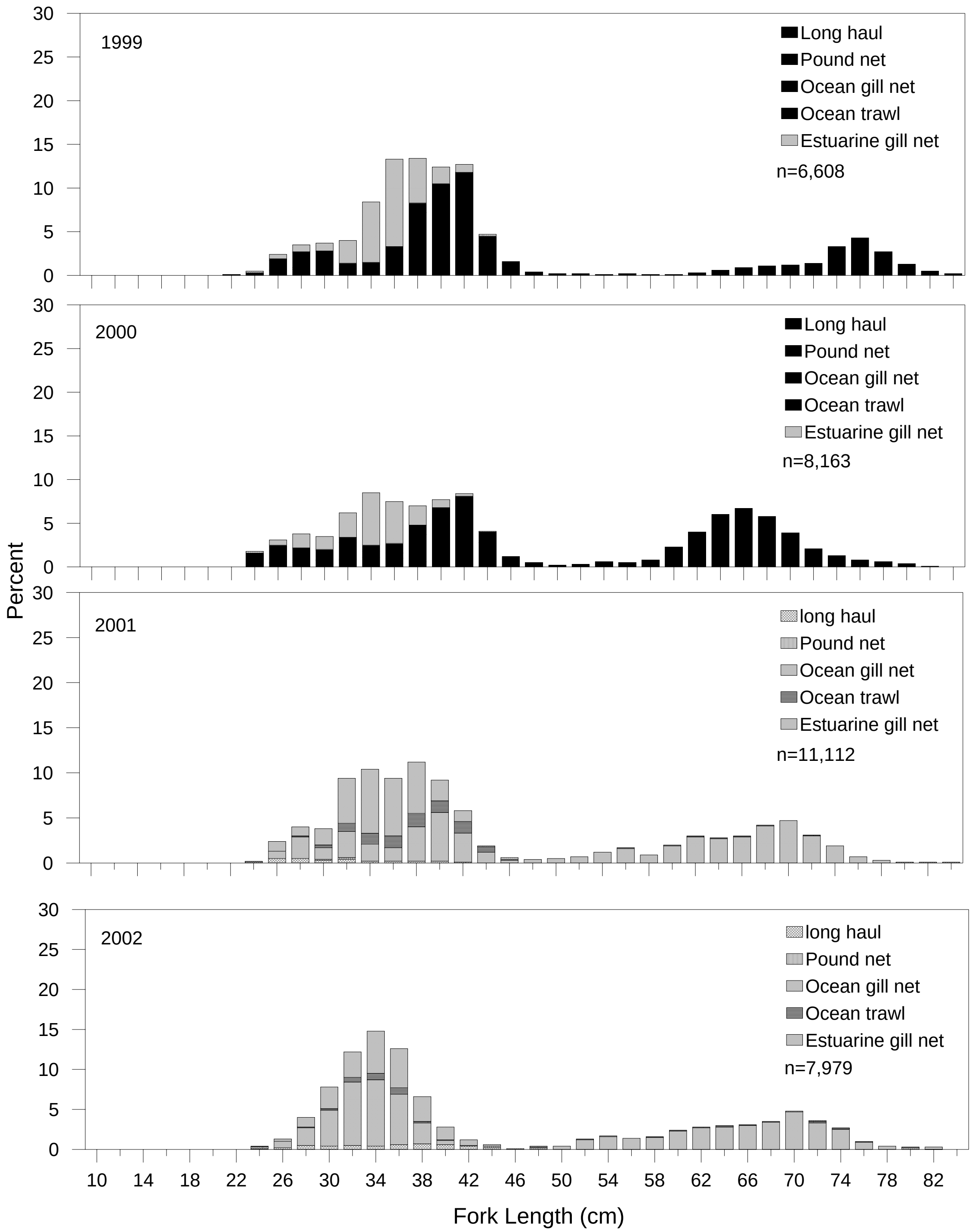


Figure 7.27. (Continued).

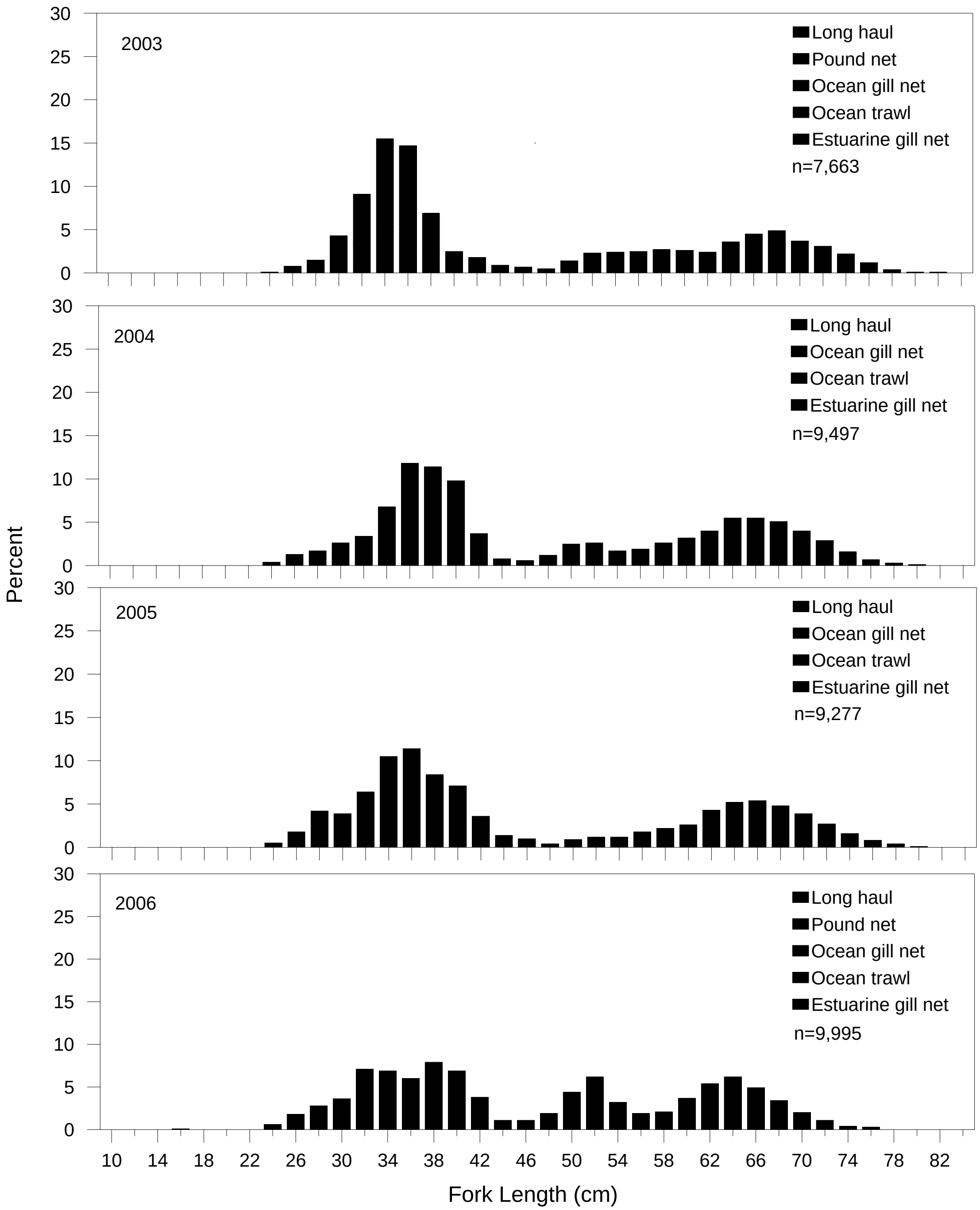


Figure 7.27. (Continued).

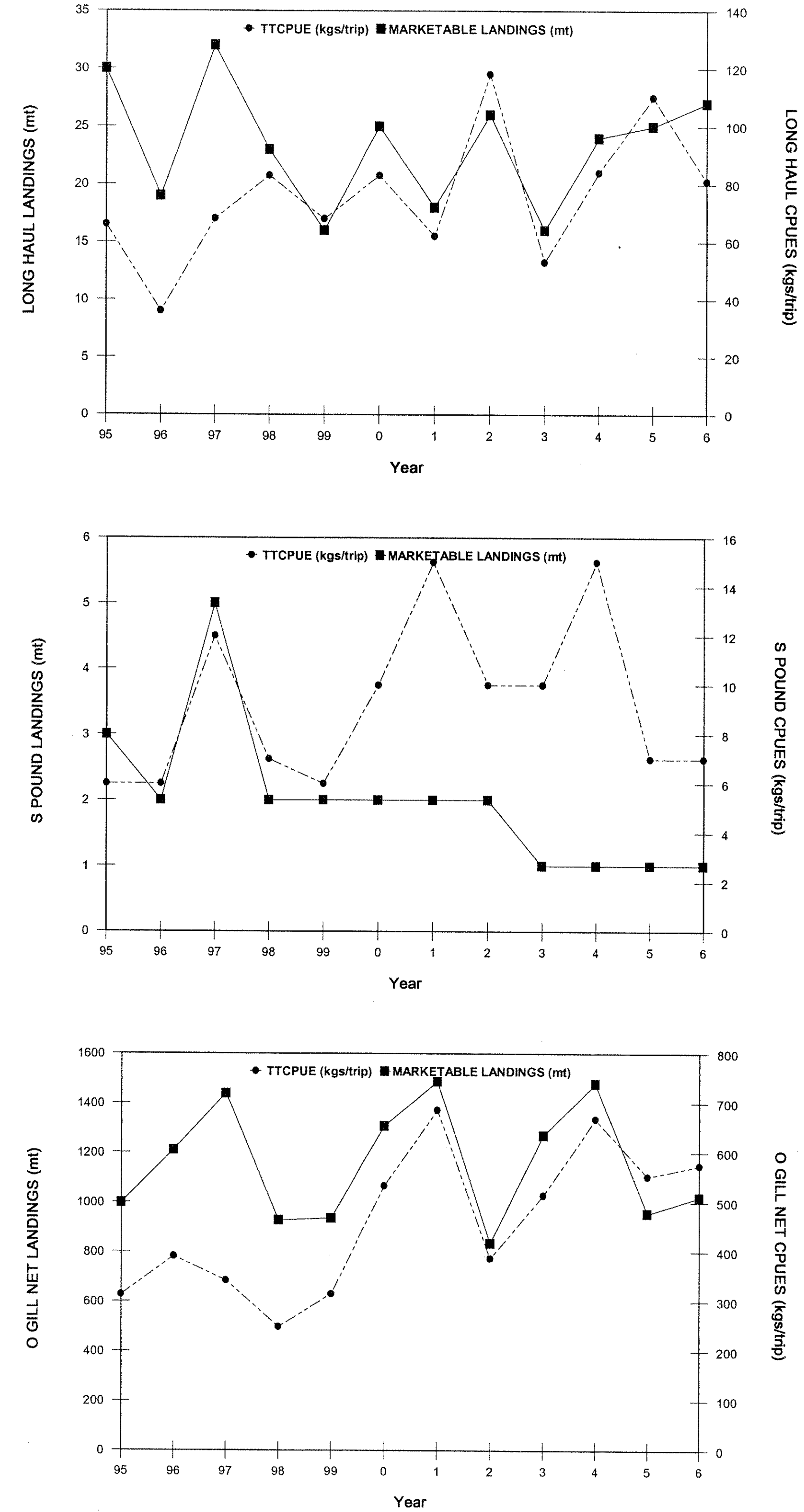
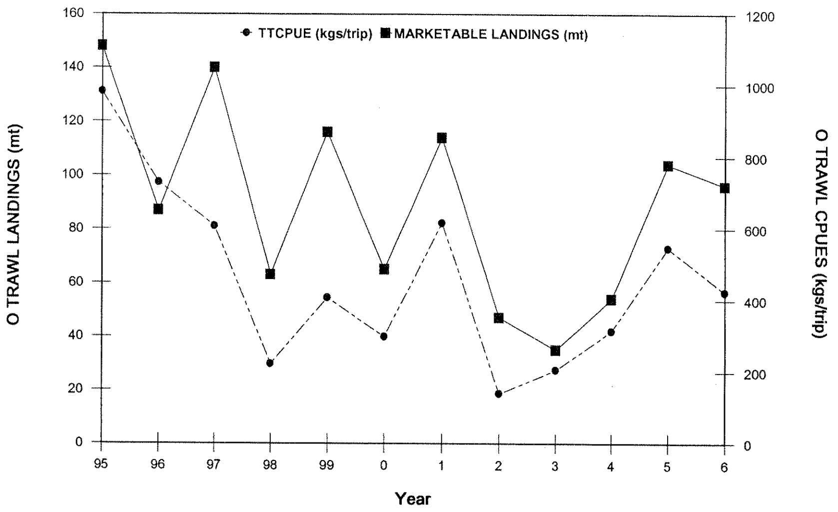
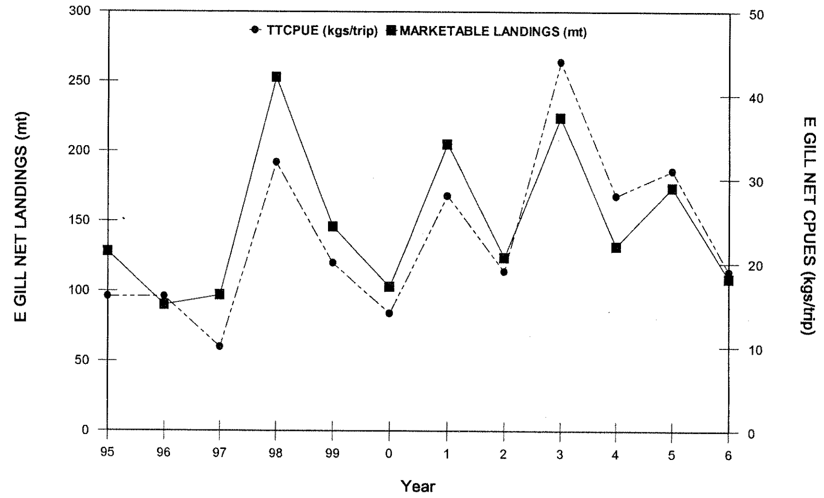


Figure 7.28. North Carolina bluefish (*Pomatomus saltatrix*) annual commercial landings (metric tons) and mean CPUE (landed catch per trip, kg) for selected fisheries and overall, 1995-2006.





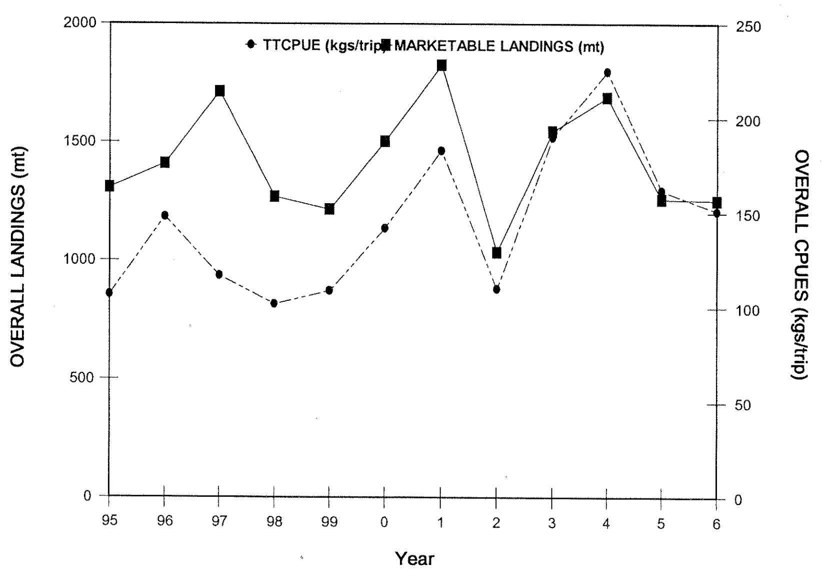


Figure 7.28. (Continued).

BLACK SEA BASS

Background

Black sea bass (*Centropristis striata*) range from the Gulf of Maine to the Gulf of Mexico and the population is partitioned into two stocks north and south of Cape Hatteras, NC (Musick and Mercer 1977, Shepherd 1991). In North Carolina, the stock north of Cape Hatteras is currently included in the Interjurisdictional FMP, which defers to a joint Atlantic States Marine Fisheries Commission (ASMFC)/Mid-Atlantic Fisheries Management Council (MAFMC) FMP which was completed and approved in 1996. The management unit of the ASMFC/MAFMC FMP includes all black sea bass in U.S, waters in the western Atlantic Ocean from Cape Hatteras, North Carolina to the Canadian border (NEFSC 2006). Black sea bass south of Cape Hatteras are currently included in the Interjurisdicitonal FMP, which defers to the South Atlantic Fisheries Management Council (SAFMC), but will not be included in this report. The primary commercial fisheries that land black sea bass in North Carolina are fish pots, hook and line and ocean trawl. Black sea bass landed by the ocean trawl fishery are discussed in this section, while, the hook and line and pot fisheries, conducted primarily south of Cape Hatteras, are not discussed.

Length Distribution

Weighted length frequencies of black sea bass landed by the ocean trawl fishery varied considerably through 1998, but were more consistent in recent years (Figure 7.29). Distributions for trawl catches from 1988 through 1998 were skewed towards smaller fish (NCDMF 2001). Examination of the length distributions suggested that black sea bass are fully recruited to the ocean trawl fishery at about 22 cm in the late 1980's through the 1998, but increased to 26 cm from 1999-2006. Fish greater than 40 cm represented less than 5% of the measured catch during the late 1980's-1998, but the contribution of larger fish increased to 10-19% from 1999-2004 and as much as 24-26% in 2005 and 2006.

Landings

The ocean trawl fishery has historically landed most of the black sea bass in North Carolina, north of Cape Hatteras. This trend continues, as ocean trawls accounted for 90-95% of the black sea bass landed in the North Carolina, north of Cape Hatteras from 2004-2006. (The percent contribution values in Table 7.13 may be misleading since they illustrate coastwide contributions and not just landings north of Cape Hatteras).

Trawl catches declined after the early 1990's due to decreased availability of sea bass followed by restrictive quotas and trip limits. Ocean trawl landings of black sea bass in recent years have increased dramatically. Average landings for 2003-2006 (152 mt) are 188% higher than the previous eight year mean (53 mt). This is likely a result of displaced trawlers due to restrictions in the flounder trawl fishery, and possibly an increased availability of fish. The fishery is highly regulated by catch limits, therefore trends in CPUEs are probably not indicative of stock trends and not discussed herein.

Management Issues

Based on landings data from 1983-1992, 49% of the coastwide total allowable landings (TAL) is allocated to the commercial fishery and 51% is allocated to the recreational fishery. Amendment 13 to the FMP established the implementation of a state-specific allocation of the coastwide quota. As such, North Carolina's commercial quota allocation is 11%. Commercial black sea bass landings and the black sea bass commercial quota are monitored through the North Carolina trip ticket program. Harvest seasons are established and adjusted by proclamation to constrain black sea bass landings to North Carolina's quota. The season is opened by proclamation, with varying possession limits per window, by gear.

The commercial minimum size for black sea bass in North Carolina, north of Cape Hatteras was 8 in TL from 1991-1997 and increased to 10 in TL in 1998, and increased to 11 in TL in 2002. Presently, the commercial trawl fishery is managed by the minimum fish size, a minimum cod end mesh size of 4 in, a quota and trip limits. The Commission and Council approved increases in the minimum sizes for circular vents (now 2.5 " in diameter) and the number of vents in traps and pots, and all traps and pots will be required to have at least two vents in the parlor portion of the trap to help increase escapement of sub-legal fish (implemented by January 1, 2007). Trawl nets are required to have a cod end (tailbag) less than 4 ½ inches (hung on a diamond) applied throughout the cod end for at least 75 continuous meshes forward of the terminus (end) of the net; or Trawl nets with cod ends less than 75 meshes (including an extension) with a mesh size less than 4 ½ inches (hung on a diamond) applied throughout the net. Tailbag liners of any mesh size or double hung cod ends may not be used or possessed on deck of a vessel.

The average biomass index from the Northeast Fishery Science Center 2006 spring survey biomass index (0.98 kg/tow) is above the biomass threshold (0.90 kg/tow) and therefore the stock is not overfished. However, the Stock Assessment Review Committee (SARC) panelists rejected the 2006 Stock Assessment based on concerns about the soundness of the current biological reference points. Overfishing is unknown because discard losses in the commercial fisheries are not estimated and remain an uncertain component of the fishery.

Table 7.13. North Carolina commercial landings of marketable black sea bass by fishery, 1995-2006, includes landings (metric tons), value (thousands dollars) and contribution of fishery to NC black sea bass landings. (Includes landings North and South of Cape Hatteras).

	YEAR											
Fishery	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Fish Pot												
Metric Tons	135.9	190.7	199.2	168.9	173.8	172.5	202.0	169.6	192.6	206.2	129.3	189.3
Value ($)	336.2	495.6	585.6	469.4	586.7	579.6	676.5	494.6	621.3	659.3	447.6	783.3
% State	61.1	54.1	57.3	50.2	62.5	67.1	69.1	63.2	49.9	51.6	41.3	53.7
Hook and Line												
Metric Tons	46.3	61.2	92.1	99.5	86.3	44.4	36.2	36.3	38.4	39.1	24.3	20.0
Value ($)	145.4	211.8	365.9	381.1	413.5	207.5	162.1	130.8	152.2	152.6	102.6	99.5
% State	20.8	17.4	26.5	29.6	31.1	17.3	12.4	13.5	10.0	9.8	7.8	5.7
Ocean Gill Net												
Metric Tons	2.7	2.0	1.5	1.4	1.2	1.2	1.9	0.9	0.4	0.6	0.4	0.5
Value ($)	4.9	4.3	3.8	4.4	6.1	4.2	7.0	2.3	1.2	1.8	2.0	2.2
% State	1.2	0.6	0.4	0.4	0.4	0.5	0.7	0.3	0.1	0.1	0.1	0.1
Ocean Trawl												
Metric Tons	37.5	97.5	54.2	66.7	16.0	39.0	51.7	61.0	154.3	153.7	158.9	142.9
Value ($)	108.8	282.1	166.5	244.5	70.0	181.5	215.7	247.9	641.8	672.4	780.0	830.4
% State	16.9	27.7	15.6	19.8	5.8	15.2	17.7	22.7	40.0	38.5	50.8	40.5
Other Fisheries												
Metric Tons	0.1	1.1	0.5	<0.1	0.6	<0.1	0.3	0.6	<0.1	<0.1	0	<0.1
Value ($)	0.3	4.6	1.9	0.2	2.5	<0.1	0.9	2.5	<0.1	0.2	0	<0.1
% State	0.1	0.3	0.1	<0.1	0.2	<0.1	0.1	0.2	<0.1	<0.1	0	<0.1
All												
Metric Tons	222.5	352.6	347.4	336.5	277.9	257.1	292.1	268.4	385.7	399.7	313.0	352.7
Value ($)	595.5	998.4	1,123.7	1,099.7	1,078.7	972.9	1,062.3	878.1	1,416.6	1,486.3	1,332.2	1,715.4

Source: North Carolina Division of Marine Fisheries commercial landings database.
Fish Pot includes gear 345, Atlantic Ocean.
Hook and Line includes gear codes 610, 660, 675, 676, 677, and 680, Atlantic Ocean.
Ocean Gill Net includes gears 425, 426,427, 470, 475, 480, Atlantic Ocean.
Ocean Trawl includes gear codes 210 and 230, Atlantic Ocean, and months January through May and September through December.

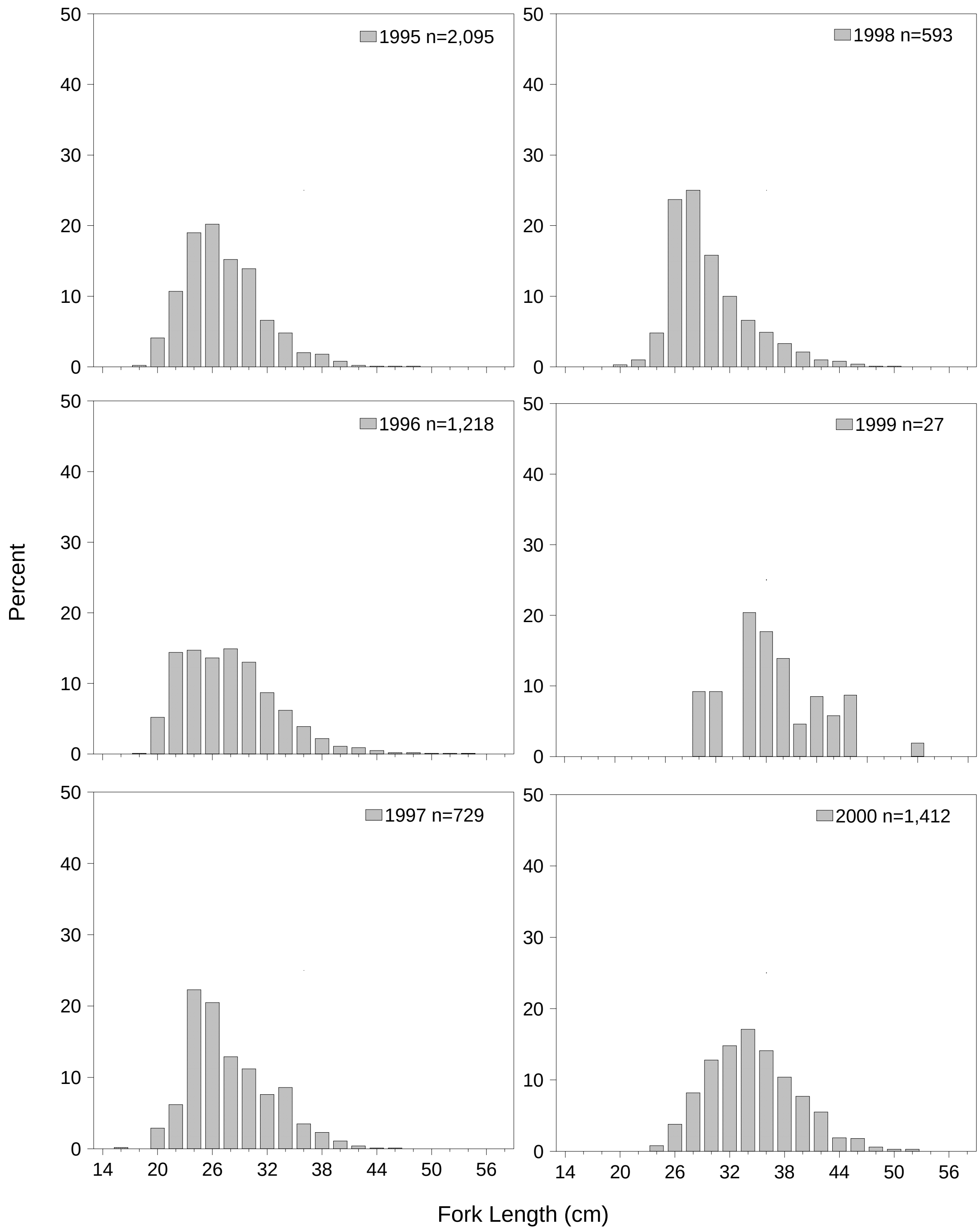


Figure 7.29. North Carolina ocean trawl fishery weighted length frequency distributions for marketable black sea bass (*Centropristis striata*), 1995-2006.

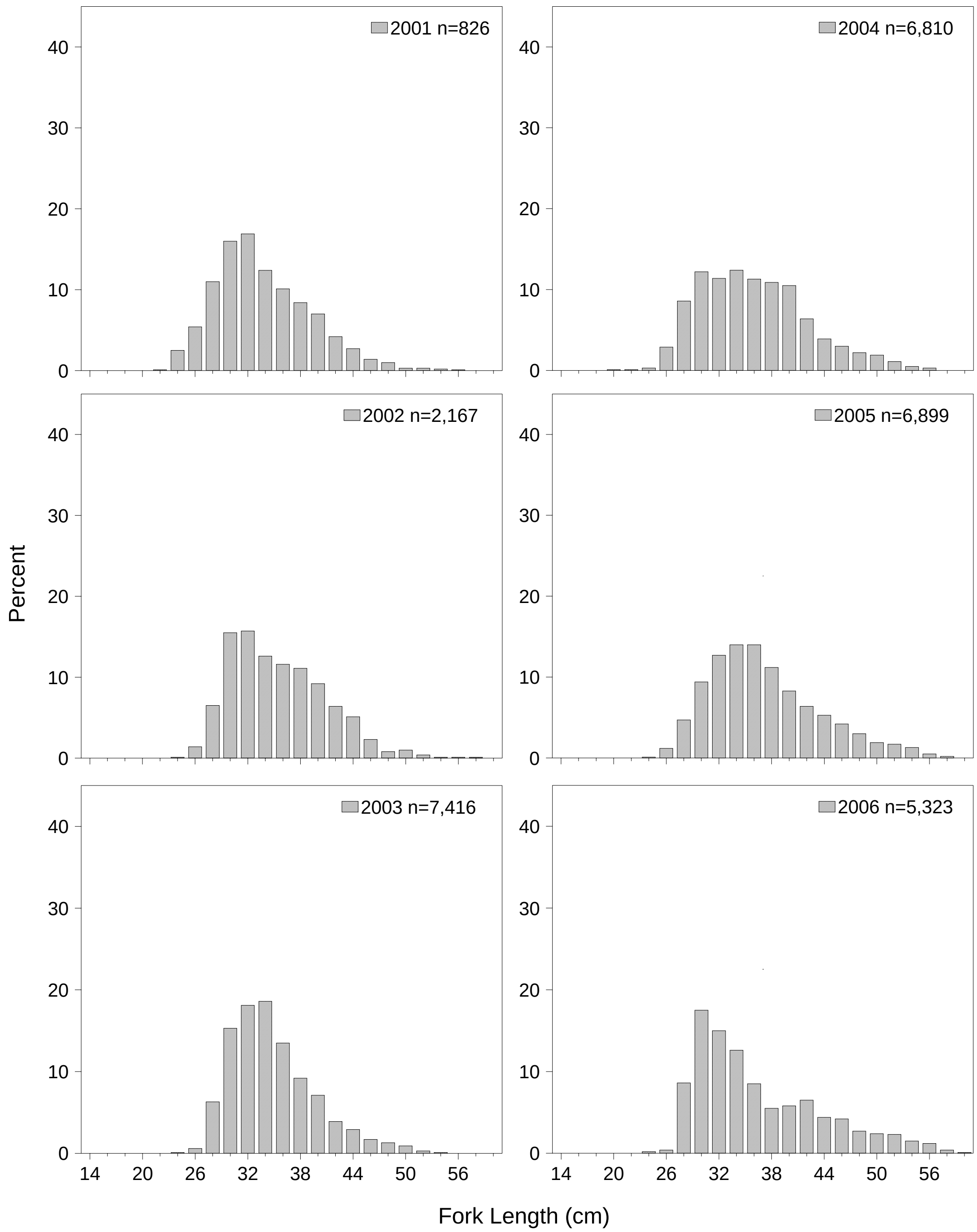


Figure 7.29. (Continued).

SCUP

Background

Scup (*Stenotomus chrysops*) are a schooling continental shelf species found in depths from 40 fathoms to 100 fathoms, distributed primarily between Cape Cod, MA. And Cape Hatteras, NC, and are assumed to constitute a single unit stock. Scup migrate south and offshore in autumn as the water temperature decreases, but generally not commercially landed in North Carolina until the coldest winter months (January-April). Scup are landed by the ocean (winter) trawl fishery in North Carolina. North Carolina landings of scup come from the Atlantic Ocean on the edge of the continental shelf near the canyons off Maryland south to the waters of North Carolina that are north of Cape Hatteras. Commercial scup landings in North Carolina occur primarily as a result of bycatch in ocean trawl fisheries for summer flounder and black sea bass. However, during periods of extremely cold weather or abnormally low water temperatures, scup abundance many increase in North Carolina waters. During such events, directed trawl fisheries may occur for scup or bycatch levels may increase in other trawl fisheries.

Length Distribution

Weighted length frequencies of scup landed by the winter trawl fishery varied considerably between 1986 and 1998 (NCDMF 2001; Figure 7.30). Implementation of a minimum fish size of 19.7 cm FL in 1995 is evident in length distributions for all years after 1995, except 1997. Length data from 1995-1999 should be viewed with caution due to very low sample sizes. No scup were sampled in 1999-2002. The low number of scup measured is reflective of the depressed stock and the lack of interest in the species by North Carolina fishermen. However, catches of scup increased in 2003, as did sample sizes. Interestingly, the mode of fish captured in recent years has increased from 24-26 cm in 2003, to 26-28 cm in 2004 & 2005, and 28-30 cm in 2006. The contribution of fish > 30 cm increased to 4% of the catch in 2004 & 2005, and 19% in 2006.

Landings

Restrictions in the flounder trawl fishery forced fishermen to diversify target species. Perhaps as a result of this shift in effort, and/or due to the availability of fish, landings of scup increased from virtually no fish landed from 1999-2001, to 9.4 mt landed in 2002, and to 63-238 mt landed from 2003-2006 (Table 7.14). The fishery is highly regulated by catch limits, therefore trends in CPUEs are probably not indicative of stock trends and not discussed herein.

Management Issues

In North Carolina, scup is currently included in the Interjurisdictional Fisheries Management Plan that defers to a fishery management plan developed by the MAFMC, in cooperation with ASMFC, NMFS, the New England Fisheries Management Council, and the South Atlantic Fishery Management Council (MAFMC 1995b). A quota, a minimum mesh size of 5" (12.7 cm), and minimum fish size of 9 in TL (22 cm TL or 19.7 cm FL) are required in the trawl fishery. The 9 in minimum fish size, escape vents, and degradable fasteners are required in the pot fishery.

The commercial fishery is restricted by landings and possession limits and the scup commercial quota are monitored through the North Carolina trip ticket program. Winter I (January-April), Summer (May-October), and Winter II (November-December) harvest periods were implemented in accordance with the FMP and closed when the quota was projected to be landed for the respective harvest periods. Current possession limits are 30,000 lbs for Winter I and 1,500 lbs for Winter II. Harvest seasons were established and adjusted by proclamation to constrain landings to North Carolina's commercial allocation (0.000246).

The stock is characterized as overfished by the Northeast Fisheries Science Center (NEFSC) of NMFS, but it cannot be determined if overfishing is occurring due to poor discard estimates. Primary concerns continue to be excessive discard of scup and near collapse of the stock.

Table 7.14. North Carolina commercial landings of scup by fishery, 1995-2006, includes landings (metric tons), value (thousands dollars) and contribution of fishery to NC scup landings.

	YEAR											
Fishery	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Ocean trawl												
Metric Tons	10.9	26.7	0.6	6.7	0.0	0.0	0.0	9.4	64.9	237.5	159.5	63.3
Value ($)	9.8	19.8	0.7	8.1	0.0	0.0	0.0	9.0	75.4	332.0	156.5	96.6
% State	99.8	100.0	94.8	100.0	0.0	0.0	0.0	100.0	100.0	100.0	99.8	99.6
Other Fisheries												
Metric Tons	<0.1	0.0	<0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	<0.1	<0.1
Value ($)	<0.1	0.0	<0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	<0.1	<0.1
% State	0.2	0.0	5.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.4
All												
Metric Tons	10.9	26.7	0.6	6.8	0.0	0.0	0.0	9.4	64.9	237.5	159.9	63.5
Value ($)	9.9	19.8	0.8	8.1	0.0	0.0	0.0	9.0	75.5	332.0	156.9	96.9

Source: North Carolina Division of Marine Fisheries commercial landings database.
Ocean Trawl includes gear codes 210 and 230, Atlantic Ocean, and months January through May and September through December.

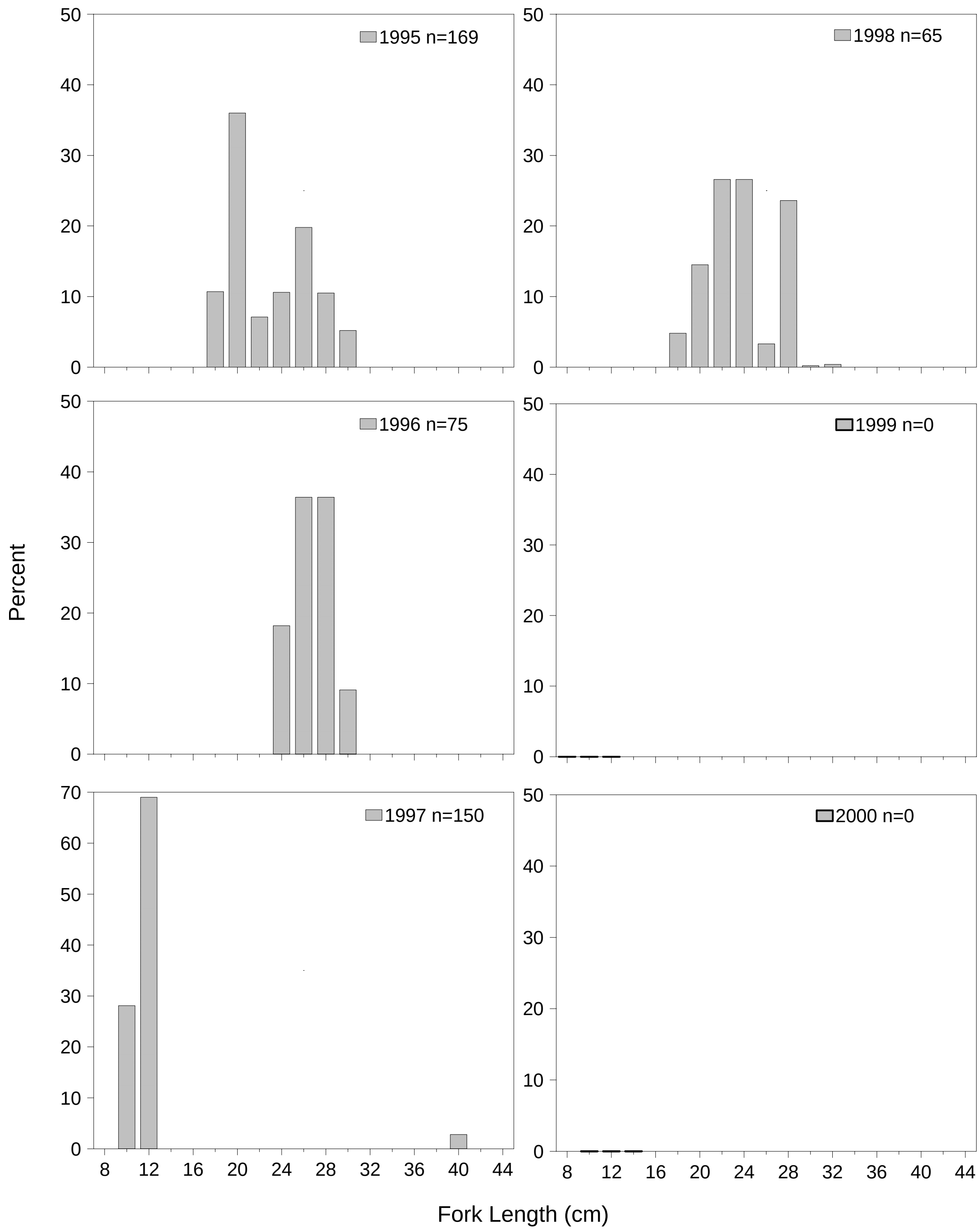


Figure 7.30. North Carolina ocean trawl fishery weighted length frequency distributions for marketable scup (*Stenotomus chrysops*), 1995-2006.

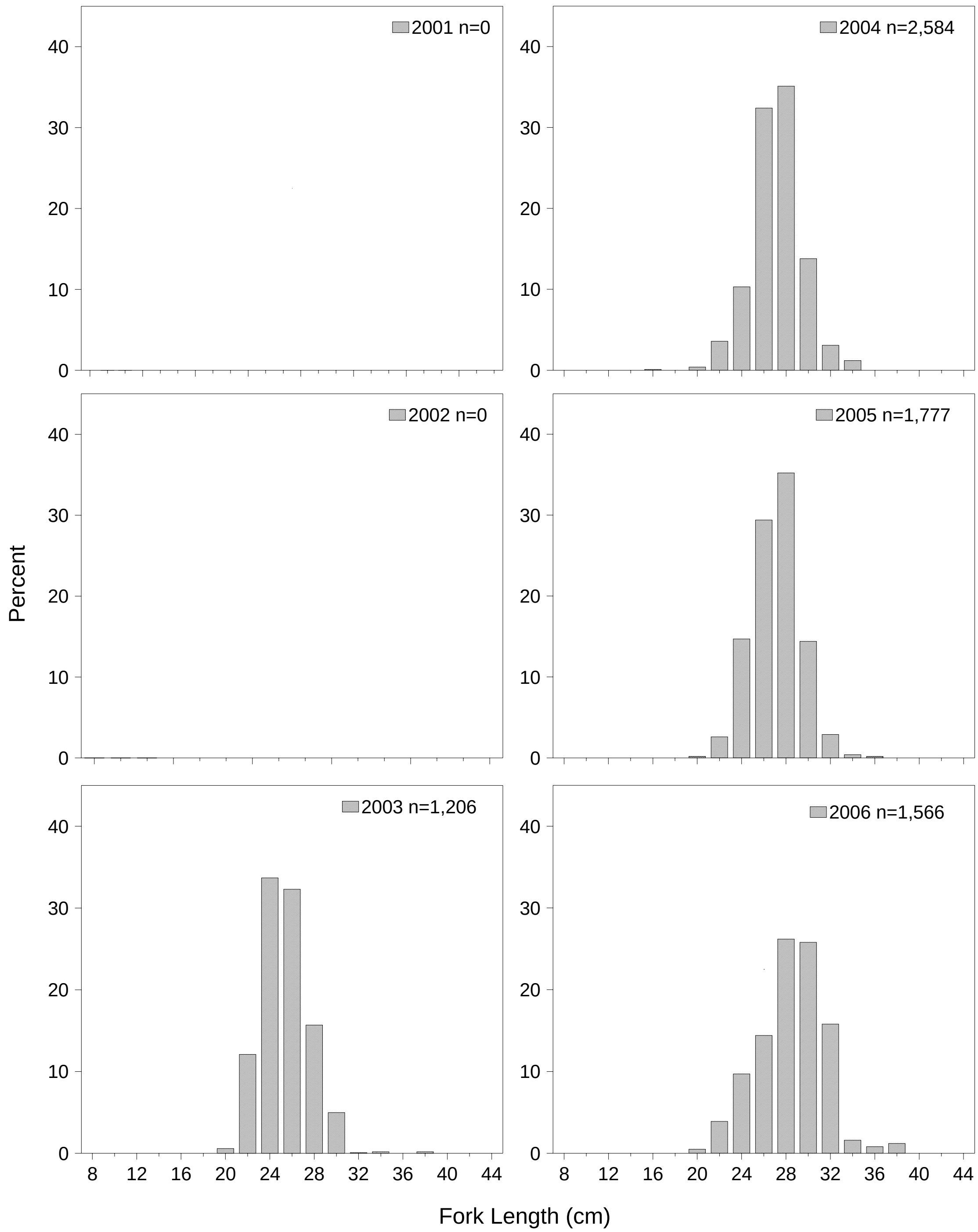


Figure 7.30. (Continued).

SUMMER FLOUNDER

Background

Summer flounder (*Paralichthys dentatus*) are found in estuarine and coastal waters from Nova Scotia to the east coast of southern Florida (Leim and Scott 1966, Gutherz 1967). Detailed information on distribution, migration and life history are presented in Monaghan (1997). A recent paper on stock identification supports earlier studies that suggest Cape Hatteras as a zoogeographic barrier for summer flounder stocks and suggests northern and southern groups should be considered functional stocks (Burke et al. 2000).

Length Distribution

The winter trawl fishery contributed from 97% to over 99% of the summer flounder landed commercially in North Carolina from 1995 to 2006 (Table 7.15). Summer flounder were only an incidental catch in other commercial fisheries. Hence, the only length data set that was of a sufficient size to be biologically meaningful was from the winter trawl fishery.

Weighted length frequencies of summer flounder landed by the winter trawl fishery have changed from 1995 to 2006 (Figure 7.31). The modal size classes of summer flounder measured from 1995 to 1997 were 34-36 cm total length each year, and the relative abundance of summer flounder in the size classes 40 cm and less was 67-88%. From 1998 to 2002, the modal size classes were 36-38 cm and the proportion of summer flounder in the size classes 40 cm and less decreased to 53-59%. The proportion of summer flounder in these size classes decreased further from 2003 to 2006 to 39-52%. The effects of the 13 in (33 cm) minimum size limit, which was in effect from 1988 to March 1997, and the 14 in (35.6 cm) minimum size limit since April 1997 are evident in the length distributions and the proportion of summer flounder in size classes 40 cm and less from 1995 through 2006. The size range of summer flounder has increased over the time period. From 1995 to 1997, the proportion of summer flounder in size classes 50 cm and greater ranged from 2 to 7%. From 1998 to 2002, the proportion of summer flounder in these size classes increased to 9-12% and continued to increase to 15-17% from 2003 to 2006 (Figure 7.31).

CPUE and Landings

Landings and CPUEs of summer flounder in North Carolina were directly impacted by commercial quotas and trip limits from 1995 to 2006, and were not compared in this report. Summer flounder landed in other fisheries are incidental catches, which limits the analysis of CPUE trends in these fisheries. Trends in landings and CPUE for the period 1972-1994 were discussed in a past completion report for this grant (Monaghan 1997). Landings under the quota system had an ex-vessel value of 2.7 million dollars in 1997 to 8.4 million dollars in 2006 (Table 7.15). Summer flounder landings in North Carolina were reflective of the State’s 27.44% allocation of the coastwide commercial quota for each year since 1993, except for 1996 when a court decision added 374 mt to the North Carolina quota.

Management Issues

The North Carolina Marine Fisheries Commission (NCMFC) and NCDMF have implemented a number of management measures for summer flounder. These were precipitated by a concern within the state of North Carolina, the Mid-Atlantic Fishery Management Council (MAFMC), and the Atlantic States Marine Fisheries Commission (ASMFC) over the decline of the summer flounder stock. Summer flounder are managed in federal and state waters by a joint MAFMC/ASMFC plan that is presently in its 12th amendment. The plan manages the unit stock, defined as those fish from Maine to the North Carolina/South Carolina border by recreational and commercial harvest limits, mesh and size regulations, seasons, and permit requirements. The commercial harvest is controlled by a coast-wide quota divided among the states based on percentages derived from historical landings. The quota is used in conjunction with a 5½ in (14 cm) minimum mesh size for otter trawls and a 14 in minimum fish size.

The federal Magnuson-Stevens Fishery Conservation and Management Act, which was amended in 2006, requires the coastwide stock of summer flounder to be rebuilt by January 1, 2013. The 2007 summer flounder stock assessment update indicated that the summer flounder stock is overfished and overfishing is occurring based on the most current biological reference points (SDWG 2007). Spawning stock biomass (SSB) has generally increased since 1989 and fishing mortality (F) has steadily decreased during the same time period; however, the current estimate for SSB is below the threshold and the current estimate for F is above the target. Despite the overfished status of the stock, the age class structure of summer flounder has increased in recent years (Terceiro 2006). The contribution of age 3 and older fish to the stock as well as the maximum age has increased significantly. This increase in age class structure is evident in the increased contribution of summer flounder greater than 50 cm in the North Carolina winter trawl fishery (Figure 7.49).

The overfished status of the summer flounder stock and the stock rebuilding deadline of January 1, 2013 has resulted in smaller commercial and recreational allocations since 2005. The smaller commercial allocations of summer flounder to North Carolina ultimately result in decreased trip limits to prevent exceeding the allocation. Trip limits that are too low will impact the North Carolina winter trawl fleet because large (≥5,000 lb/trip) trip limits are necessary to offset fishing expenses.

Table 7.15. North Carolina commercial landings of marketable summer flounder (*Paralichthys dentatus*) by fishery, 1995-2006, includes landings (metric tons), value (thousands of dollars) and contribution of fishery to North Carolina summer flounder landings.

	Year											
Fishery	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Flounder Pound Net												
Metric Tons	1.6	7.1	7.5	4.6	5.3	2.0	3.8	4.9	1.8	0.4	0.4	0.2
Value ($)	5.8	31.5	33.6	18.9	20.5	8.3	13.8	17.2	7.5	1.5	2.0	0.9
% State	0.1	0.4	1.1	0.3	0.4	0.1	0.3	0.3	0.1	0.0	0.0	0.0
Long Haul Seine												
Metric Tons	0.1	0.4	0.1	0.1	0.2	0.2	0.1	<0.1	<0.1	<0.1	<0.1	0.0
Value ($)	0.3	1.6	0.5	0.5	0.9	0.6	0.5	0.1	0.1	0.1	0.1	0.0
% State	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ocean Gill Net												
Metric Tons	0.0	0.0	0.0	7.9	2.8	3.5	1.4	0.3	0.5	0.7	0.5	0.0
Value ($)	0.0	0.0	0.0	32.3	11.5	14.3	4.9	0.9	1.8	2.3	2.0	0.0
% State	0.0	0.0	0.0	0.6	0.2	0.2	0.1	0.0	0.0	0.0	0.0	0.0
Ocean Trawl												
Metric Tons	2,066.0	1,904.2	669.5	1,339.5	1,295.6	1,526.7	1,256.8	1,868.3	1,617.9	2,193.3	1,841.4	1,797.5
Value ($)	8,142.6	6,735.0	2,781.5	5,364.6	4,989.3	5,954.5	4,429.2	6,092.4	6,000.2	7,606.5	7,491.4	8,410.4
% State	99.4	99.2	96.7	98.5	98.7	99.0	99.2	99.6	99.7	99.7	99.7	99.8
Sciaenid Pound Net												
Metric Tons	8.6	8.4	12.5	4.9	0.9	2.4	4.1	0.2	1.0	4.8	3.7	2.4
Value ($)	35.9	36.2	54.6	19.5	3.5	9.5	14.4	0.8	3.7	17.0	14.9	11.6
% State	0.4	0.4	1.8	0.4	0.1	0.2	0.3	0.0	0.1	0.2	0.2	0.1
Estuarine Gill Net												
Metric Tons	1.4	0.0	2.8	2.5	7.6	7.7	1.1	1.5	1.4	1.1	0.8	1.3
Value ($)	6.5	0.0	12.9	10.8	29.7	30.1	4.6	5.5	5.8	4.4	3.9	6.7
% State	0.1	0.0	0.4	0.2	0.6	0.5	0.1	0.1	0.1	0.0	0.0	0.1
Crab Trawl												
Metric Tons	<0.1	0.0	0.1	0.1	0.3	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Value ($)	0.2	0.0	0.4	0.4	1.0	0.9	0.1	0.1	0.2	0.1	0.1	<0.1
% State	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other Fisheries												
Metric Tons	0.1	0.0	<0.1	<0.1	0.2	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Value ($)	0.3	0.0	0.3	0.3	0.8	0.7	0.2	0.2	0.1	0.1	0.1	0.1
% State	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
All												
Metric Tons	2,078.0	1,920.0	692.5	1,359.7	1,312.8	1,542.8	1,267.4	1,875.3	1,622.8	2,200.3	1,846.9	1,801.3
Value ($)	8,191.6	6,804.2	2,883.9	5,447.3	5,057.1	6,018.9	4,467.8	6,177.2	6,019.4	7,632.0	7,514.4	8,429.8
% State	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: North Carolina Division of Marine Fisheries commercial landings database and biological database.

Flounder Pound Net includes gear 275, Beaufort, Carteret, Hyde and Tyrell counties for September and Beaufort, Carteret, Dare, Hyde and Tyrell counties for October through December.

Sciaenid Pound Net gear 275, Dare and Hyde counties for May through August and Dare County for September.

Long Haul Seine includes gears 030 and 025 in estuarine waters only.

Ocean Gill Net includes gears 425,426,427,470,475 and 480, Atlantic Ocean.

Estuarine Gill Net includes gears 425,426,427,470,475 and 480, estuarine waters only.

Ocean Trawl includes gears 210 and 230, Atlantic Ocean, January through May and September through December.

Crab Trawl includes gear 205.

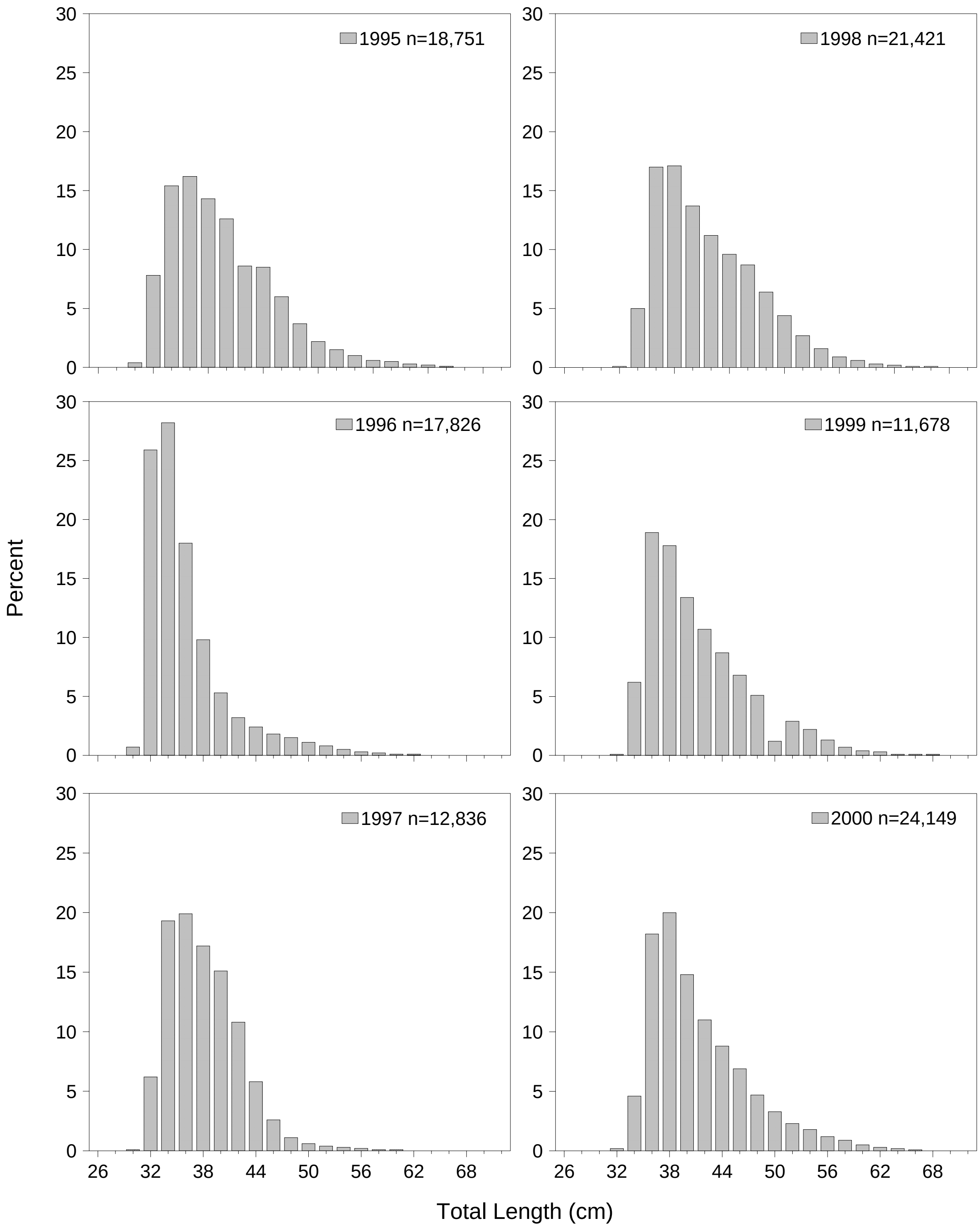


Figure 7.31 North Carolina ocean trawl fishery weighted length frequency distributions for marketable summer flounder (*Paralichthys dentatus*), 1995-2006.

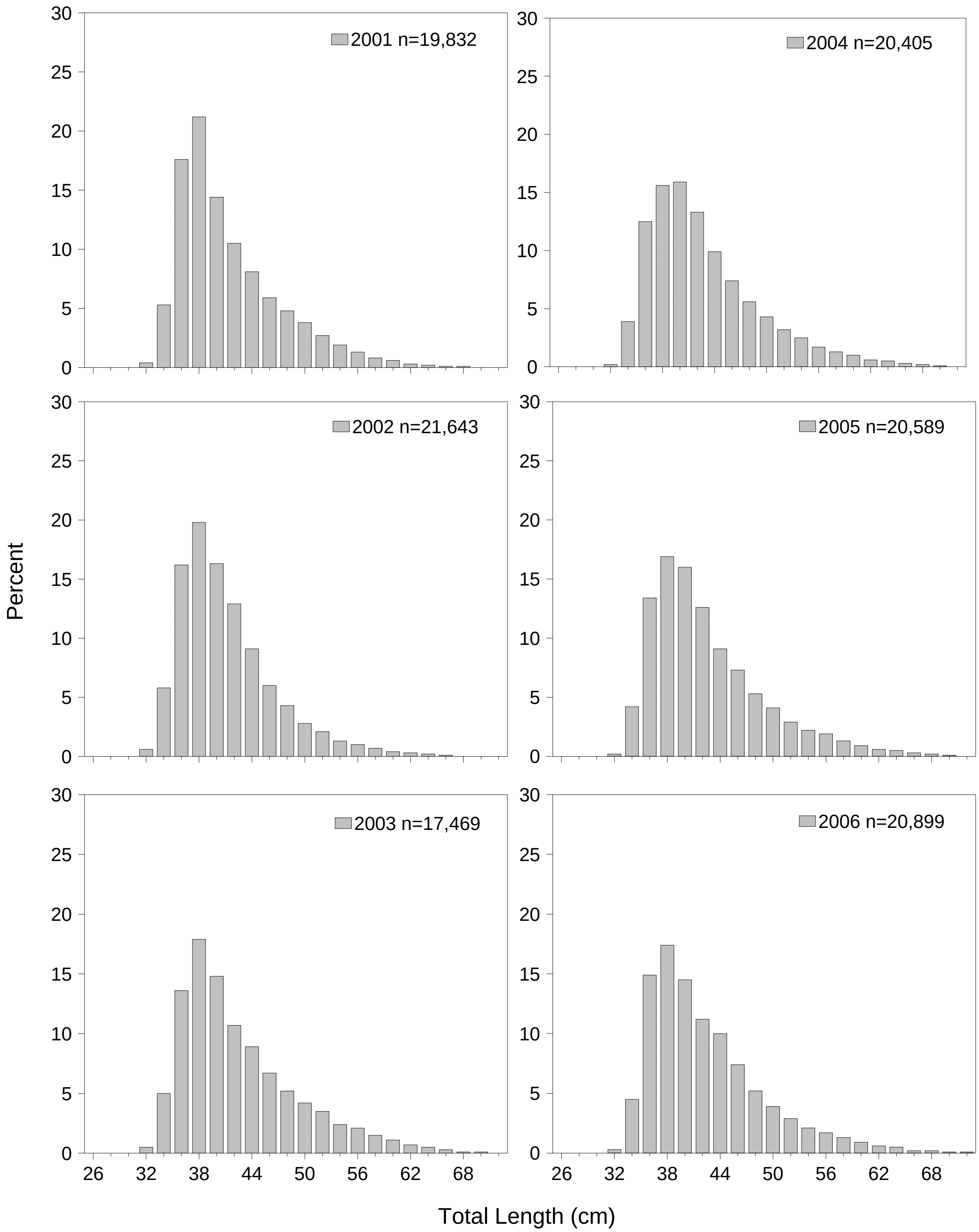


Figure 7.31. (Continued).

SOUTHERN AND GULF FLOUNDER

Background

Southern flounder (*Paralichthys lethostigma*) are found in riverine, estuarine, and coastal waters from Virginia south to the Loxahatchee River on the Atlantic coast of Florida (Gilbert 1986). This species has not been collected from waters surrounding the southern tip of Florida, but is found on the Gulf coast of Florida starting at the Caloosahatchee River estuary (Gilbert 1986) and around the Gulf of Mexico to northern Mexico (Ginsburg 1952, Gutherz 1967 Hoese and Moore 1977, Gilbert 1986). Metamorphosing larvae and early juvenile southern flounder (11-22 mm SL) collected from the Newport River and North River estuaries fed primarily on mysids, amphipods, and calanoid copepods (Burke 1995). As they grow larger (150-200 mm TL), fish dominate their diets (Stokes 1977, Wenner et al. 1990).

Southern flounder grow rapidly during the first two years of life, reaching 266-309 mm TL at age 1 and 373-428 mm TL at age 2 (Stokes 1977, Music and Pafford 1984, Wenner et al. 1990). Males older than age 4 have not been collected from Atlantic or Gulf of Mexico waters. Female southern flounder continue their fast growth through age 5 (Wenner et al. 1990).

A congener of southern flounder found in North Carolina waters is the Gulf flounder (*P. albigutta*). Little is known about its biology; however, some information about Gulf flounder has been reported in the literature coincidentally with southern and summer flounder. The range of the Gulf flounder extends from Oregon Inlet, North Carolina to Corpus Christi Pass, Texas (Ginsburg 1952, NCDMF unpublished data). Gulf flounder are found over sandy bottoms in high salinity areas near inlets but are uncommon in low energy, muddy bottoms. Juvenile Gulf flounder have been collected in grass flats and grass shoals in the Florida Keys (where they seem to replace southern flounder), Texas, and North Carolina (Reid 1954, Stokes 1977, NCDMF unpublished data). Gulf flounder less than 150 mm TL feed on invertebrates, primarily mysids and crustaceans (Stokes 1977). Fish occurred in 72% of the stomachs in fish greater than 150 mm TL (Stokes 1977).

Length Distribution

The weighted length distributions for southern flounder landed in the flounder pound net fishery from 1995 to 2006 ranged from 26 to 76 cm, but the length frequency distributions varied annually (Figure 7.32). Modal size classes ranged from 34 to 44 cm over the time period. The left sides of the distributions from 1995 to 2004 reflect the 13 in (33 cm) minimum size limit for flounder (Figure 7.32). The percent frequency in the 32 cm size class decreased sharply in 2005 with the minimum size limit increase to 14 in (35.6 cm).

The weighted length distributions for southern flounder landed in the estuarine gill net fishery from 1995 to 2006 ranged from 26 to 78 cm (Figure 7.33). The modal peak for the fishery was typically around 34-36 cm from 1995 to 2004. The modal peaked increased to 36-

38 cm with the minimum size limit increase to 14 in (35.6 cm). Southern flounder in the size classes 38 cm and less comprised 64-77% of the catch during from 1995 to 2005. Southern flounder in these size classes decreased to 57% in 2006. Those fish in size classes 40 cm and greater made up 23-36% of the catch from 1995 to 2005 and 43% in 2006.

Overall weighted length frequencies for southern flounder were comprised of lengths primarily from the estuarine gill net fishery and secondarily from the flounder pound net fishery (Figure 7.34). The long haul seine, sciaenid pound net, ocean gill net fisheries contribute minimally to the overall length frequency distribution. Because the estuarine gill net fishery dominated the overall weighted length frequencies, the length distributions of southern flounder taken by these fisheries consistently peaked at the 34-36 cm size classes from 1995 to 2004 and the 36-38 cm size classes in 2005 and 2006. The length frequencies from the sciaenid pound net and long haul seine fisheries were generally comprised of fish less than 40 cm. In contrast the winter trawl and ocean gill net fisheries contributed some of the largest southern flounder sampled. These fish were incidental catches in the near shore flounder trawl fishery targeting summer flounder and the large mesh anchored gill net fishery targeting monkfish.

The weighted length distributions for Gulf flounder landed in the flounder pound net fishery from 1996 to 2006 ranged from 30 to 52 cm, but the majority were less than 46 cm (Figure 7.35). The weighted length distributions for Gulf flounder landed in the estuarine gill net fishery from 1996 to 2006 ranged from 30 to 54 cm, but the majority were less than 40 cm (Figure 7.36). Small sample sizes due to the incidental catch of Gulf flounder in these fisheries preclude discussing trends in modal sizes. The left sides of the distributions from 1996 to 2006 reflect the 13 in (33 cm) and 14 in (35.6 cm) minimum size limits for flounder.

Overall weighted length frequencies for Gulf flounder for most years were comprised of lengths primarily from the estuarine gill net fishery and secondarily from the flounder pound net fishery (Figure 7.37). Significant contributions of Gulf flounder lengths from the ocean trawl fishery occurred in 1996 and 1998. Weighted lengths had a mode at 34-36 cm for most years.

CPUE and Landings

The overall landed catch per trip, or catch-per-unit-of-effort (CPUE), of southern flounder peaked in 2002 and has generally decreased since (Figure 7.38 and Table 7.16). These shifts should be driven by CPUEs in the two major southern flounder fisheries, estuarine gill net and flounder pound net fishery, but most closely parallel the CPUE trends of the flounder pound net fishery. The mean CPUE for the estuarine gill net fishery from 1995 to 2006 peaked at 38 kg/trip in 1998, but otherwise it generally fluctuated between 30 and 35 kg/trip (Figure 7.38). The mean CPUE in the flounder pound net fishery ranged from 241 to 277 kg/trip from 1995 to 2000 before peaking at 387 kg/trip in 2002 (Table 7.16). The CPUEs of southern flounder in the flounder pound net fishery have decreased since 2003 with mean CPUE ranging from 187 to 247 kg/trip. The CPUEs in the long haul seine and sciaenid pound net fisheries varied without trend due to the infrequent catches of southern flounder in these fisheries. The relatively high CPUEs in the sciaenid pound net fishery might be a result of the inclusion of flounder pound net catches that fall out of the definition of flounder pound nets used in this report (See Section 5, Flounder Pound Net Fishery). The trends in commercial southern flounder CPUEs in the directed fisheries can be confounded by variations in fishing effort in the estuarine gill net and flounder pound net fisheries over time as well as hurricane events that occur during times of peak landings for southern flounder.

Overall southern flounder landings and value from 1995 to 2006 showed a general decreasing trend from 1,761 mt and 7.2 million dollars in 1995 to 793 mt and 3.2 million dollars in 2005 (Table 7.17). Southern flounder were landed primarily by the estuarine gill net fishery and the flounder pound net fishery, as these fisheries contributed between 92-96% of the total southern flounder landings from 1995 to 2006. The estuarine gill net fishery landed the largest percentage of southern flounder, averaging 64% over the 12-year period. The contribution of this fishery increased during the period from 52% in 1996 to 73% in 2005. Estuarine gill net landings accounted for at least 70% of the annual southern flounder harvest since 2003. The flounder pound net fishery, which was the dominant source of southern flounder for the state until 1994 (NCDMF Staff, 2004), accounted for an average of 31% of the state’s landings from 1995 to 2006. However, the percent contribution of southern flounder landings from this fishery has declined over time and has contributed less than 26% of the annual southern flounder harvest since 2003 (Table 7.18). The crab trawl fishery represented a 12% share of southern flounder landings in 1985 (Monaghan 1997), but has shown a decline over the time series to an average of less than 2% of the southern flounder landings over the past twelve years (Table 7.17). Southern flounder landings from crab trawls in 2006 accounted for only 0.1% of the total harvest in 2006, the lowest in the time series.

Overall Gulf flounder landings and value fluctuated without trend from 1995 to 2001 before peaking at 17.2 mt and $58,000 in 2002; landings and value have decreased to less than 8 mt since 2004 (Table 7.18). The variable landings from 1995 to 2001 are reflective of the incidental nature of Gulf flounder in these fisheries. However, the overall trend in Gulf flounder landings since 2002 was similar to the overall trends in southern flounder landings. It is uncertain whether an increased frequency/abundance of Gulf flounder in these fisheries in recent years is the reason for the similar trends. Gulf flounder were landed primarily by the estuarine gill net fishery and the flounder pound net fishery, as these fisheries contributed between 66-99% of the total Gulf flounder landings from 1995 to 2006. Trends in percent contributions of overall Gulf flounder landings in the flounder pound net and estuarine gill net fisheries showed similar trends to southern flounder landings for this time period.

The southern and Gulf flounder landings do not include unclassified paralichthid flounder landings for those fisheries not sampled under this project. The shrimp trawl fishery is essentially the only major flounder fishery that is non-sampled. Therefore, the actual southern and Gulf flounder landings were greater than those shown in Table 7.17. These landings were assigned to a category called “unclassified paralichthids” and are shown in Table 7.19.

Management Issues

The North Carolina Marine Fisheries Commission (NCMFC) approved the North Carolina Southern Flounder Fishery Management Plan (FMP) in February 2005. The FMP implemented management measures to rebuild the stock within 10 years and still allow the commercial and recreational fisheries to occur. The 2004 southern flounder stock assessment determined that the southern flounder stock in North Carolina is overfished and overfishing is occurring. Several management measures were implemented that have an impact on the flounder fisheries. These include increasing the minimum size limit for Paralicthid flounders in internal waters from 13 inches to 14 inches total length, a commercial seasonal closure in internal waters from December 1-31, maintaining the 200-yard limit between gill nets and active pound nets statewide except in the Albemarle Sound, excluding tributaries, during August 15 – November 30 where the minimum distance is 500 yards, require the incorporation of escape panels with 14 cm (5½-inch) stretched mesh in all flounder pound nets statewide and continue the rule requiring a minimum distance of 1,000 yards between new and existing flounder pound nets (NCDMF 2005). The stock assessment for southern flounder will be updated in 2008. Further management measures may be needed if the status of the stock does not show improvement.

Table 7.16 Southern flounder (*Paralichthys lethostigma*) landings (weight-metric tons, number-1000's individuals), marketable landings per trip (CPUE weight (kg) and numbers) and total number of trips, by fishery, for selected commercial fisheries, 1995-2006.

		Weight		Number		
Fishery	Year	Landed (mt)	CPUE	Landed (1000's)	CPUE	Number of trips
Estuarine Gill Net						
	1995	974	30	1,346	42	32,097
	1996	851	30	1,199	42	28,804
	1997	1,072	32	1,424	43	33,500
	1998	1,087	38	1,418	50	28,364
	1999	849	33	1,120	43	25,865
	2000	937	33	1,347	48	28,214
	2001	855	33	1,215	47	26,100
	2002	815	34	1,094	46	23,849
	2003	661	31	946	45	21,161
	2004	722	34	936	44	21,099
	2005	582	31	746	39	19,004
	2006	693	32	831	39	21,570
Flounder Pound Net						
	1995	653	267	693	284	2,445
	1996	668	272	746	304	2,457
	1997	550	241	570	250	2,278
	1998	521	277	590	312	1,881
	1999	328	257	340	266	1,275
	2000	355	268	399	301	1,324
	2001	547	344	648	408	1,588
	2002	571	387	576	391	1,473
	2003	226	247	257	281	913
	2004	261	244	289	271	1,068
	2005	182	187	197	203	974
	2006	252	247	249	243	1,022
Long Haul						
	1995	2	7	3	11	315
	1996	8	22	10	27	382
	1997	1	3	1	5	251
	1998	3	11	4	16	235
	1999	1	7	3	13	202
	2000	1	4	1	7	149
	2001	1	4	1	7	182
	2002	2	15	4	24	154
	2003	1	9	1	7	118
	2004	0	3	1	6	107
	2005	0	4	1	7	81
	2006	1	9	1	10	108

Table 7.16. (Continued).

		Weight		Number		
Fishery	Year	Landed (mt)	CPUE	Landed (1000's)	CPUE	Number of trips
Sciaenid Pound Net						
	1995	61	110	84	151	553
	1996	33	67	41	85	484
	1997	23	55	36	85	423
	1998	17	53	24	74	329
	1999	12	31	14	36	377
	2000	18	89	19	94	201
	2001	35	152	51	223	227
	2002	13	58	17	71	233
	2003	9	89	14	137	105
	2004	19	193	15	160	96
	2005	10	121	12	150	83
	2006	14	130	15	139	108
Fisheries Combined						
	1995	1,689	48	2,126	60	35,410
	1996	1,560	49	1,996	62	32,127
	1997	1,646	45	2,030	56	36,452
	1998	1,628	53	2,036	66	30,809
	1999	1,190	43	1,476	53	27,719
	2000	1,310	44	1,765	59	29,888
	2001	1,437	51	1,914	68	28,097
	2002	1,402	55	1,690	66	25,709
	2003	897	40	1,218	55	22,297
	2004	1,001	45	1,241	55	22,370
	2005	775	38	956	47	20,142
	2006	961	42	1,096	48	22,808

Table 7.17. North Carolina commercial landings of southern flounder by fishery, 1995-2006, includes landings (metric tons), value (thousands dollars) and contribution of fishery to North Carolina southern flounder landings.

	Year											
Fishery	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Flounder Pound Net												
Metric Tons	652.6	668.3	550.0	521.3	327.6	355.0	546.8	570.7	225.7	260.5	182.4	252.5
Value ($)	2,748.3	2,977.5	2,468.1	2,122.5	1,266.5	1,472.1	2,005.2	2,004.7	891.2	996.3	819.2	1,263.2
% State	37.1	41.0	32.2	30.7	26.3	26.0	36.7	39.6	24.2	25.1	23.0	25.8
Long Haul Seine												
Metric Tons	2.3	8.5	0.1	2.6	1.4	0.7	0.7	2.3	1.1	0.3	0.3	1.0
Value ($)	9.1	35.4	3.6	10.0	5.1	2.6	2.6	7.4	3.7	1.0	1.2	4.6
% State	0.1	0.5	0.0	0.2	0.1	0.0	0.1	0.2	0.1	0.0	0.0	0.1
Ocean Gill Net												
Metric Tons	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.4	0.2	0.7	0.2	7.5
Value ($)	0.0	0.0	0.0	0.0	0.0	0.0	1.7	1.4	0.9	2.4	0.7	35.0
% State	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.8
Ocean Trawl												
Metric Tons	4.1	2.6	0.5	1.6	0.4	4.1	1.0	0.2	0.0	0.2	0.0	0.1
Value ($)	16.3	9.5	2.0	6.5	1.5	16.1	3.5	0.6	0.0	0.8	0.0	0.8
% State	0.2	0.2	0.0	0.1	0.0	0.3	0.1	0.0	0.0	0.0	0.0	0.0
Sciaenid Pound Net												
Metric Tons	60.8	32.6	23.4	17.5	11.7	18.0	34.6	13.4	9.3	18.5	10.0	14.1
Value ($)	252.4	140.1	102.1	69.5	46.2	70.7	121.8	44.7	34.9	65.2	40.4	67.5
% State	3.5	2.0	1.4	1.0	0.9	1.3	2.3	0.9	1.0	1.8	1.3	1.4
Estuarine Gill Net												
Metric Tons	973.5	850.9	1,071.9	1,086.6	849.0	936.5	854.6	815.2	661.2	721.5	582.1	693.2
Value ($)	3,834.3	3,427.2	4,558.6	4,281.8	3,237.9	3,572.0	2,999.1	2,605.2	2,377.6	2,441.6	2,307.0	3,168.7
% State	55.3	52.3	62.7	63.9	68.3	68.7	57.3	56.5	70.9	69.6	73.4	70.8
Crab Trawl												
Metric Tons	26.5	38.5	35.3	41.8	31.5	27.6	23.4	13.6	17.5	18.9	7.2	0.8
Value ($)	98.2	146.8	144.3	157.8	113.4	102.7	81.9	41.9	60.9	62.4	27.5	3.3
% State	1.5	2.4	2.1	2.5	2.5	2.0	1.6	0.9	1.9	1.8	0.9	0.1
Other Fisheries												
Metric Tons	41.0	26.7	27.5	29.4	21.8	21.5	30.3	26.2	17.1	16.5	10.7	9.4
Value ($)	156.3	102.4	112.6	113.4	82.1	80.5	105.7	81.8	60.1	54.1	40.2	41.3
% State	2.3	1.6	1.6	1.7	1.8	1.6	2.0	1.8	1.8	1.6	1.3	1.0
All												
Metric Tons	1,760.9	1,628.1	1,709.5	1,700.9	1,243.4	1,363.4	1,491.9	1,442.0	932.1	1,037.2	793.0	978.5
Value ($)	7,155.1	6,838.8	7,391.2	6,761.4	4,752.7	5,316.7	5,321.6	4,787.8	3,429.2	3,623.7	3,236.4	4,584.4
% State	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: North Carolina Division of Marine Fisheries commercial landings database and biological database.

Flounder Pound Net includes gear 275, Beaufort, Carteret, Hyde and Tyrell counties for September and Beaufort, Carteret, Dare, Hyde and Tyrell counties for October through December.

Sciaenid Pound Net gear 275, Dare and Hyde counties for May through August and Dare County for September.

Long Haul Seine includes gears 030 and 025 in estuarine waters only.

Ocean Gill Net includes gears 425,426,427,470,475 and 480, Atlantic Ocean.

Estuarine Gill Net includes gears 425,426,427,470,475 and 480, estuarine waters only.

Ocean Trawl includes gears 210 and 230, Atlantic Ocean, January through May and September through December.

Crab Trawl includes gear 205.

Table 7.18. North Carolina commercial landings of Gulf flounder by fishery, 1995-2006, includes landings (metric tons), value (thousands dollars) and contribution of fishery to North Carolina Gulf flounder landings.

	Year											
Fishery	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Flounder Pound Net												
Metric Tons	1.1	4.2	9.9	2.1	2.0	1.2	4.3	7.9	2.0	1.2	0.8	0.6
Value ($)	4.7	18.8	44.3	8.6	7.8	5.1	15.9	27.7	7.7	4.6	3.3	2.9
% State	64.6	62.1	63.5	38.8	19.3	14.6	28.0	45.7	21.2	16.1	19.1	10.2
Long Haul Seine												
Metric Tons	0.0	0.1	0.0	0.0	0.0	0.0	<0.1	<0.1	<0.1	<0.1	<0.1	0.0
Value ($)	0.0	0.6	0.0	0.0	0.0	0.0	0.1	0.1	<0.1	<0.1	<0.1	0.0
% State	0.0	2.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.2	0.0
Ocean Gill Net												
Metric Tons	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	<0.1	0.0	0.0
Value ($)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.5	0.1	0.0	0.0
% State	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	1.4	0.4	0.0	0.0
Ocean Trawl												
Metric Tons	0.6	2.1	0.5	1.1	0.1	0.0	0.6	0.0	0.0	0.0	0.0	0.0
Value ($)	2.4	7.4	2.2	4.3	0.5	0.0	2.2	0.0	0.0	0.0	0.0	0.0
% State	34.2	30.7	3.4	19.3	1.0	0.0	4.0	0.0	0.0	0.0	0.0	0.0
Sciaenid Pound Net												
Metric Tons	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Value ($)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
% State	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Estuarine Gill Net												
Metric Tons	<0.1	0.3	4.9	2.2	7.8	6.8	9.9	8.8	6.8	5.9	3.0	5.0
Value ($)	0.4	2.1	22.1	9.5	30.7	26.9	35.6	28.8	25.0	20.7	12.5	24.0
% State	1.3	4.9	31.7	40.1	75.4	81.5	64.3	51.2	73.7	79.9	78.6	88.9
Crab Trawl												
Metric Tons	<0.1	<0.1	0.1	0.1	0.3	0.2	0.3	0.1	0.2	0.2	<0.1	<0.1
Value ($)	<0.1	0.1	0.7	0.3	1.1	0.8	1.0	0.5	0.6	0.5	0.2	<0.1
% State	0.0	0.2	0.9	1.2	2.7	2.4	1.7	0.8	1.9	2.1	0.9	0.1
Other Fisheries												
Metric Tons	<0.1	1.0	0.1	<0.1	0.2	0.1	0.3	0.2	0.2	0.1	<0.1	0.1
Value ($)	<0.1	0.1	0.5	0.3	0.8	0.6	1.3	0.9	0.6	0.5	0.3	0.3
% State	0.0	0.0	0.5	0.6	1.7	1.5	2.0	1.4	1.7	1.4	1.2	0.9
All												
Metric Tons	1.7	6.8	15.5	5.4	10.4	8.4	15.4	17.2	9.2	7.4	3.8	5.7
Value ($)	7.5	29.0	69.8	23.0	40.8	33.3	55.9	58.3	34.6	26.5	16.3	27.2
% State	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: North Carolina Division of Marine Fisheries commercial landings database and biological database.

Flounder Pound Net includes gear 275, Beaufort, Carteret, Hyde and Tyrell counties for September and Beaufort, Carteret, Dare, Hyde and Tyrell counties for October through December.

Sciaenid Pound Net gear 275, Dare and Hyde counties for May through August and Dare County for September.

Long Haul Seine includes gears 030 and 025 in estuarine waters only.

Ocean Gill Net includes gears 425,426,427,470,475 and 480, Atlantic Ocean.

Estuarine Gill Net includes gears 425,426,427,470,475 and 480, estuarine waters only.

Ocean Trawl includes gears 210 and 230, Atlantic Ocean, January through May and September through December.

Crab Trawl includes gear 205.

Table 7.19. North Carolina commercial landings of unclassified paralichthid flounders* by fishery, 1995-2006, includes landings (metric tons), value (thousands dollars) and contribution of fishery to North Carolina unclassified paralichthid flounder landings.

	Year											
Fishery	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Ocean Gill Net												
Metric Tons	5.0	3.4	5.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Value ($)	20.4	13.7	24.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
% State	8.9	6.9	9.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Shrimp Trawl												
Metric Tons	12.0	15.1	11.3	4.5	7.2	3.5	6.7	7.2	4.8	2.9	0.8	1.8
Value ($)	44.3	56.6	45.0	16.8	26.3	12.9	23.3	21.8	16.9	9.4	3.0	8.0
% State	21.4	31.1	18.3	12.0	18.1	7.9	13.9	15.6	12.5	6.6	2.5	4.5
Other Fisheries												
Metric Tons	39.1	30.0	44.9	32.7	32.8	40.7	41.4	38.9	34.0	40.9	31.5	39.4
Value ($)	145.2	114.5	182.5	122.9	118.6	152.3	144.3	121.5	118.9	136.5	119.9	174.2
% State	69.8	62.0	72.5	88.0	81.9	92.1	86.1	84.4	87.5	93.4	97.5	95.5
All												
Metric Tons	56.1	48.5	61.9	37.2	39.9	44.2	48.1	46.0	38.9	43.8	32.3	41.2
Value ($)	210.0	184.9	251.6	139.7	144.9	165.1	167.6	143.3	135.8	145.9	122.9	182.2
% State	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: North Carolina Division of Marine Fisheries commercial landings database and biological database.

Ocean Gill Net includes gears 425,426,427,470,475 and 480, Atlantic Ocean.

Shrimp Trawl includes gear 215.

* Unclassified paralichthid flounders includes summer, southern and Gulf flounders that could not be assigned a fishery due to a lack of biological data.

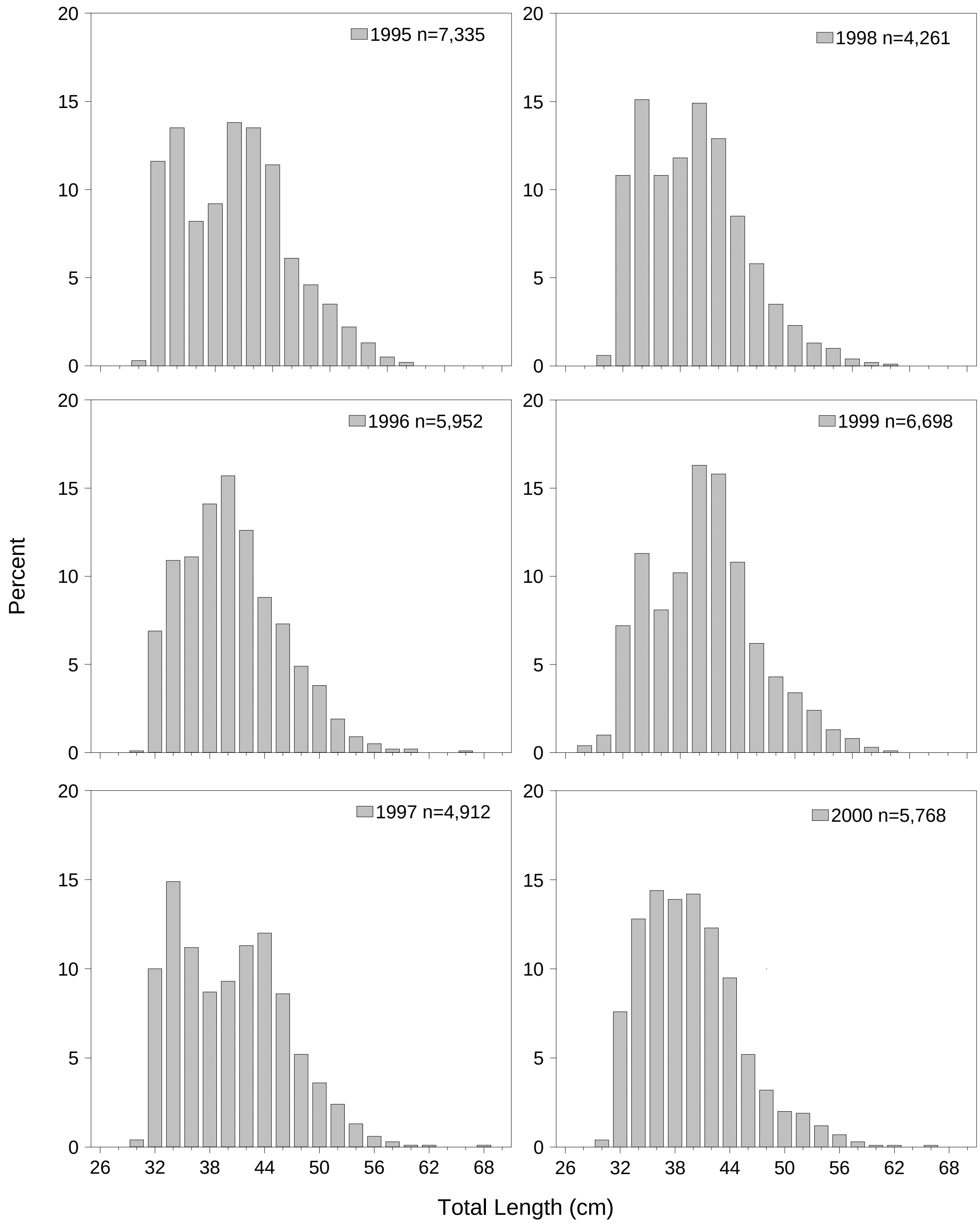


Figure 7.32. North Carolina flounder pound net fishery weighted length frequency distributions for marketable southern flounder (*Paralichthys lethostigma*), 1995-2006.

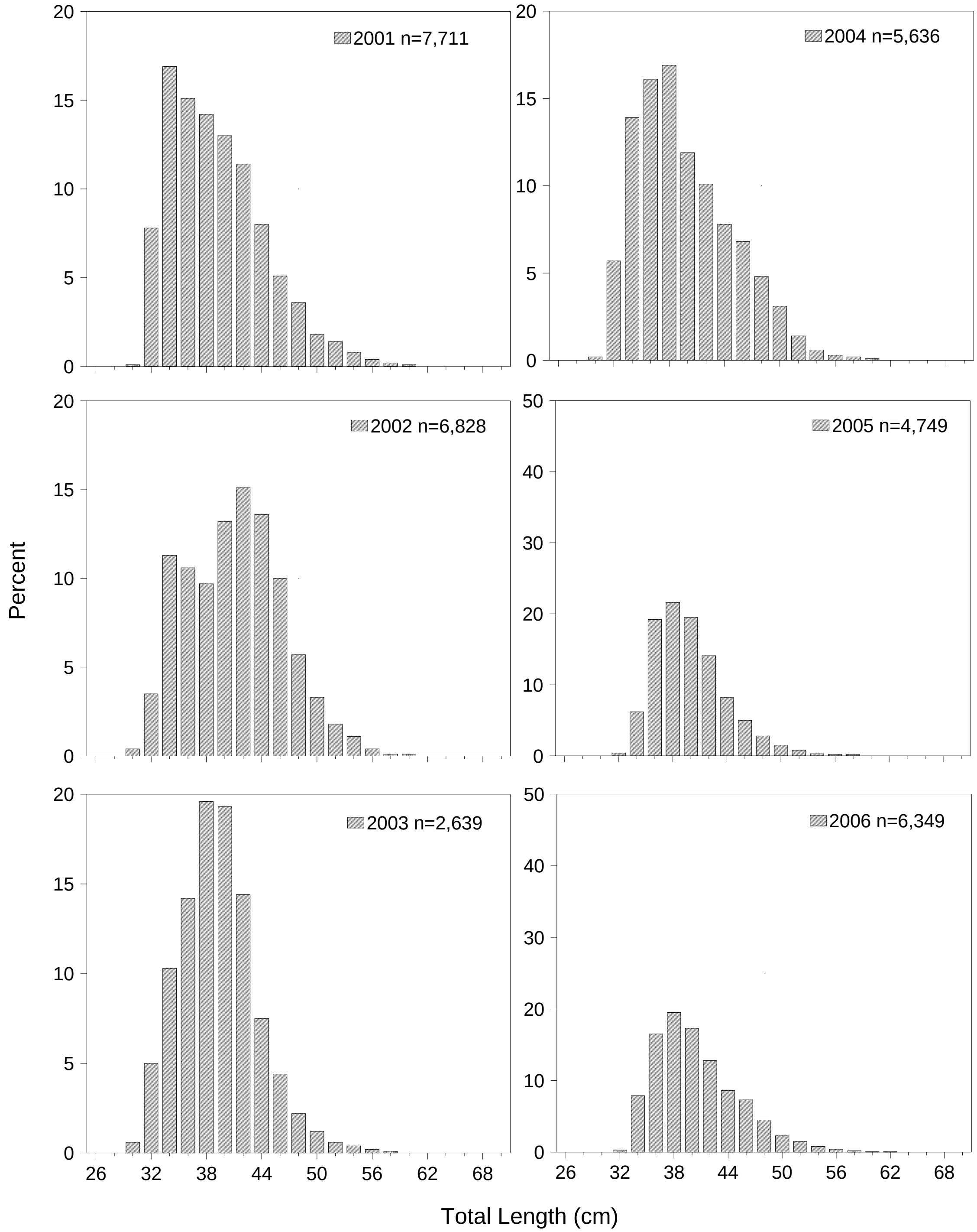


Figure 7.32. (Continued).

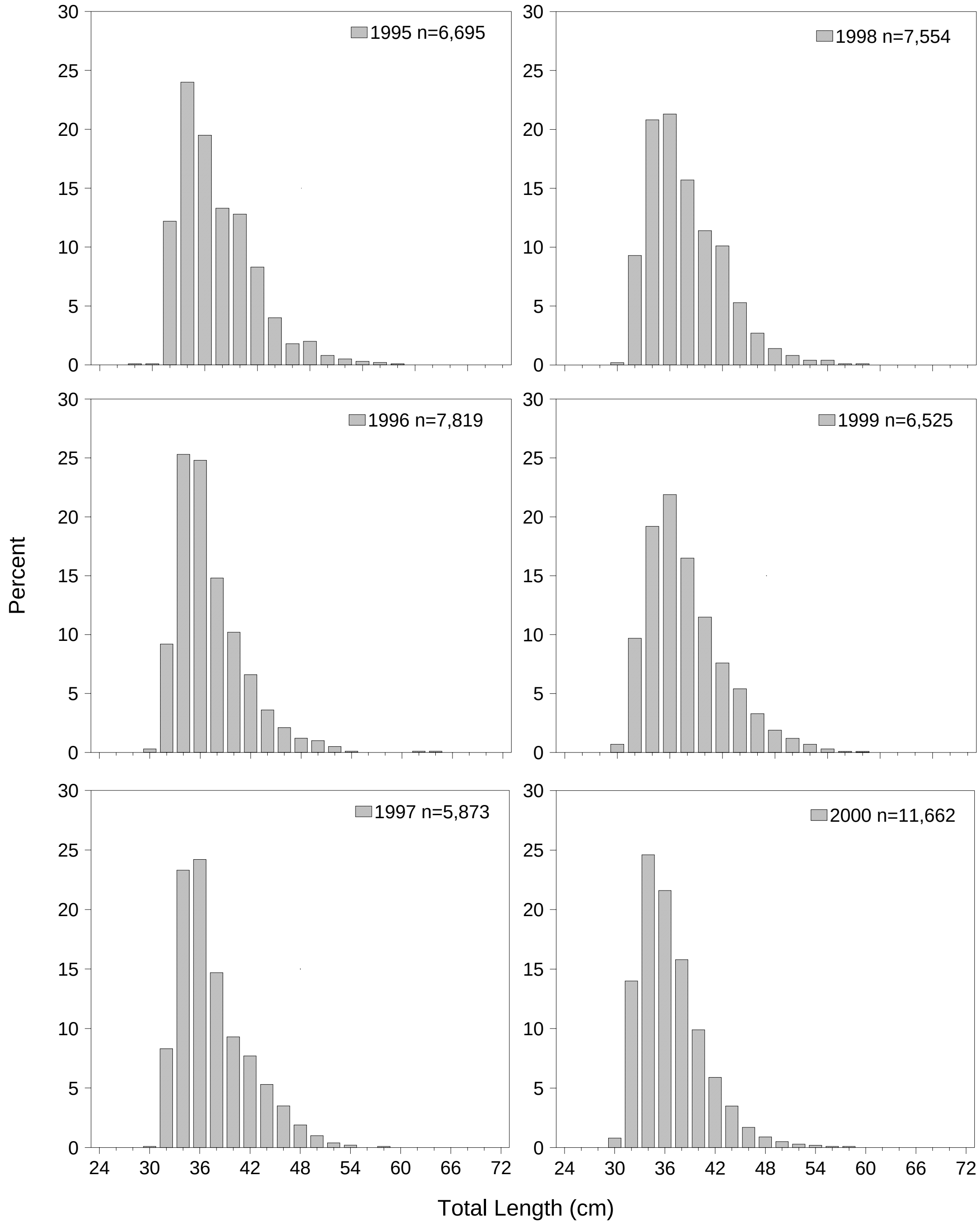


Figure 7. 33 North Carolina estuarine gill net fishery weighted length frequency distributions for marketable southern flounder (*Paralichthys lethostigma*), 1995-2006.

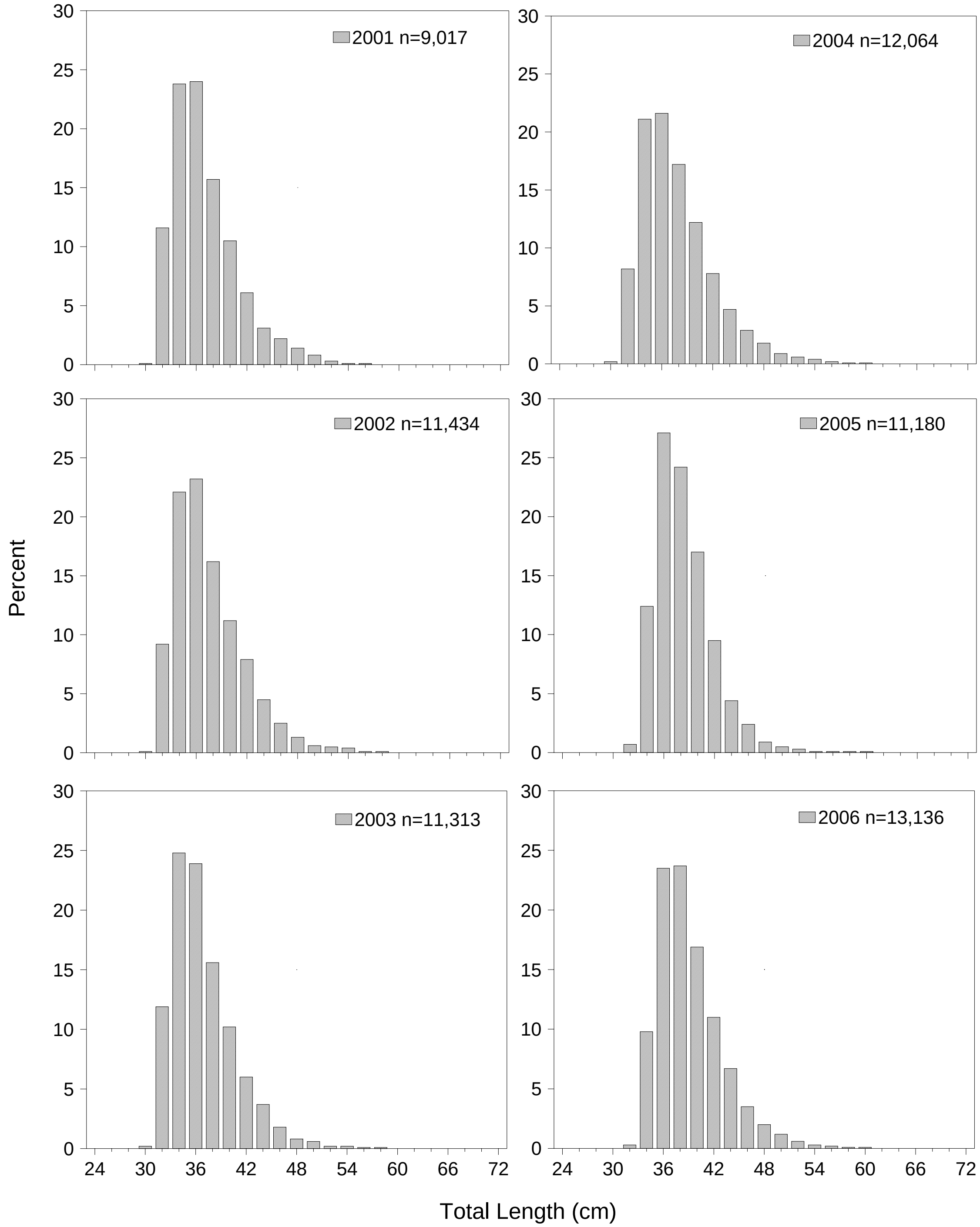


Figure 7.33. (Continued).

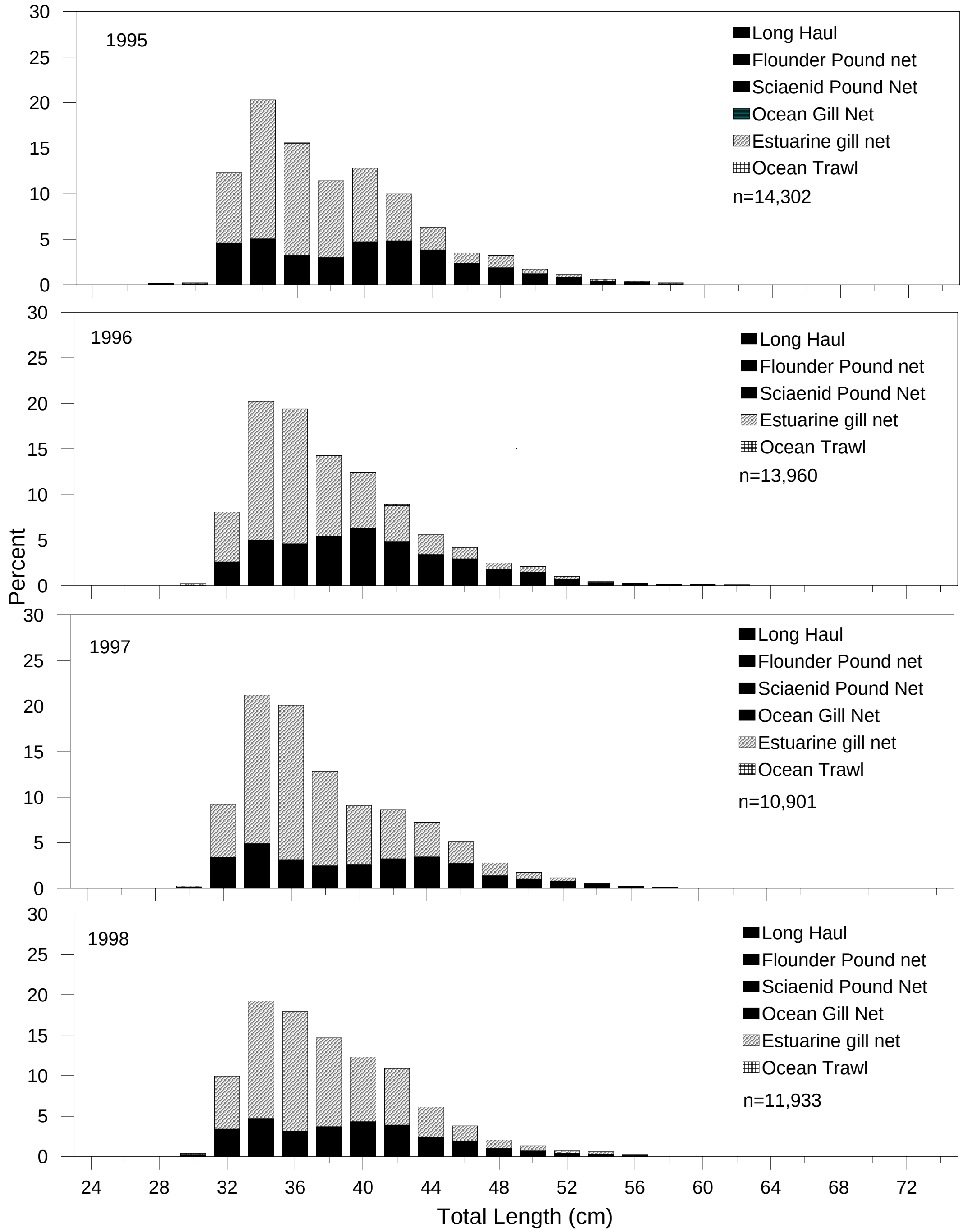


Figure 7.34. North Carolina commercial fishery weighted length frequency distributions for marketable southern flounder *(Paralichthys lethostigma),* 1995-2006.

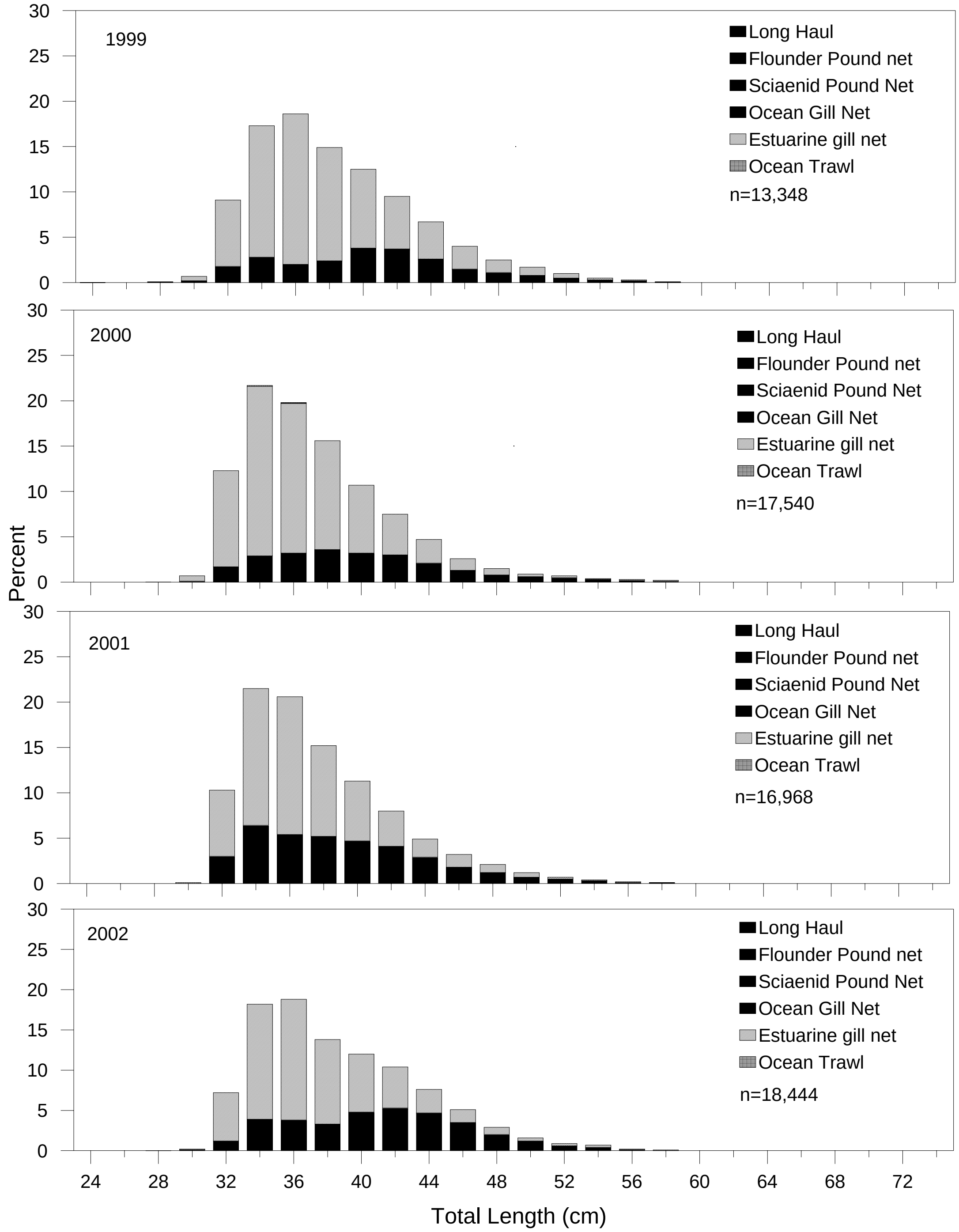


Figure 7.34. (Continued).

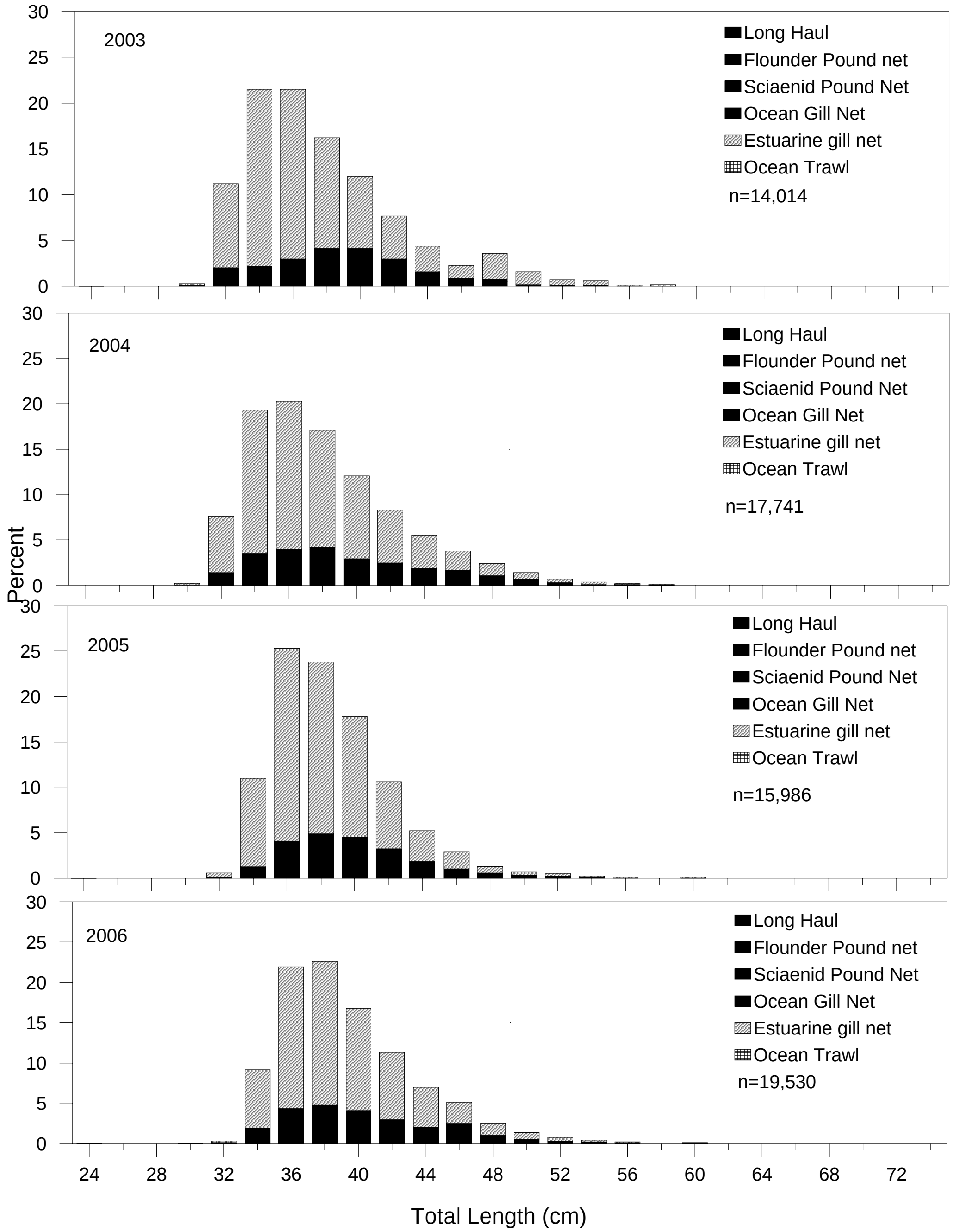


Figure 7.34. (Continued).

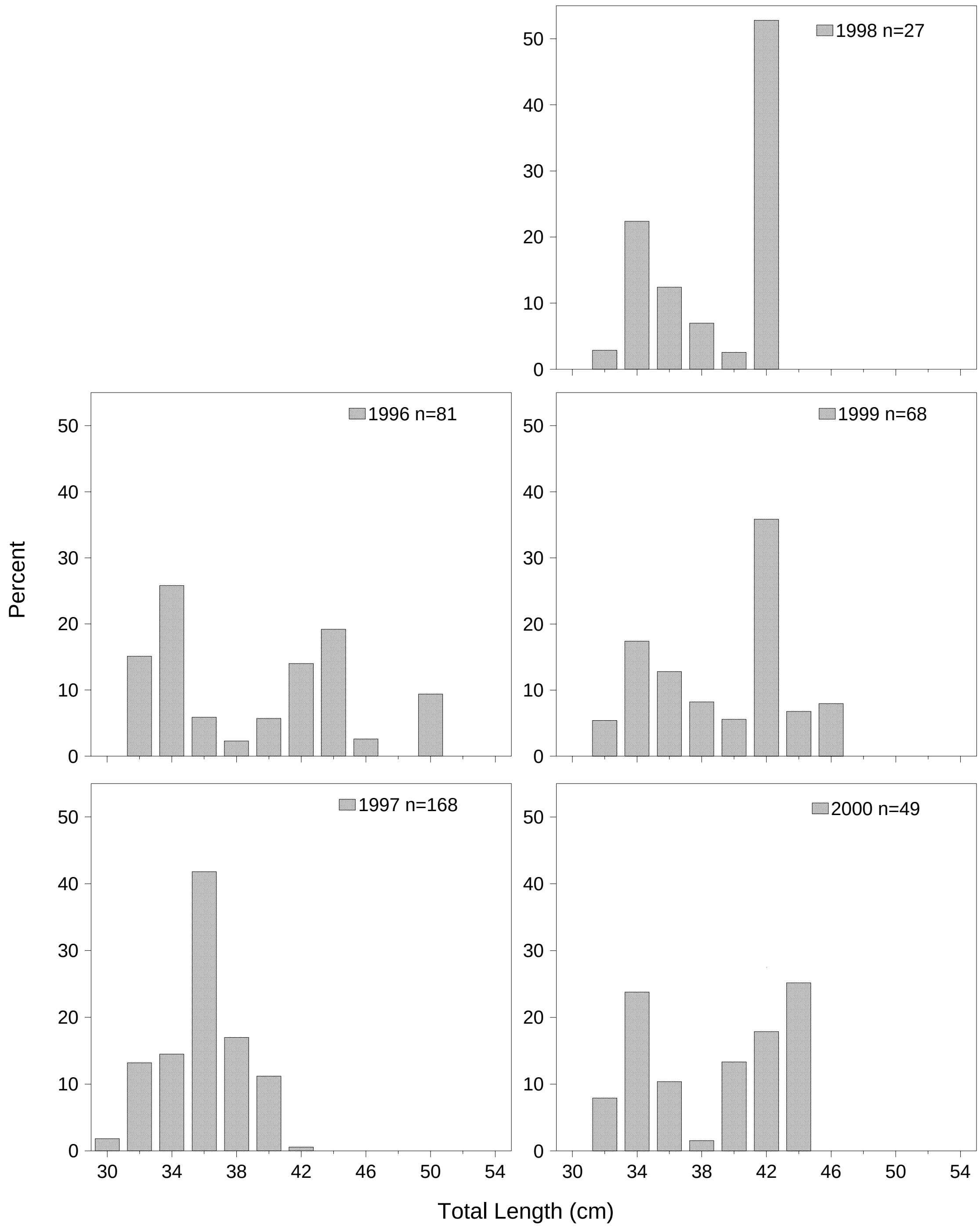


Figure 7.35. North Carolina flounder pound net fishery weighted length frequency distributions for marketable gulf flounder (*Paralichthys albigutta*), 1996-2006.

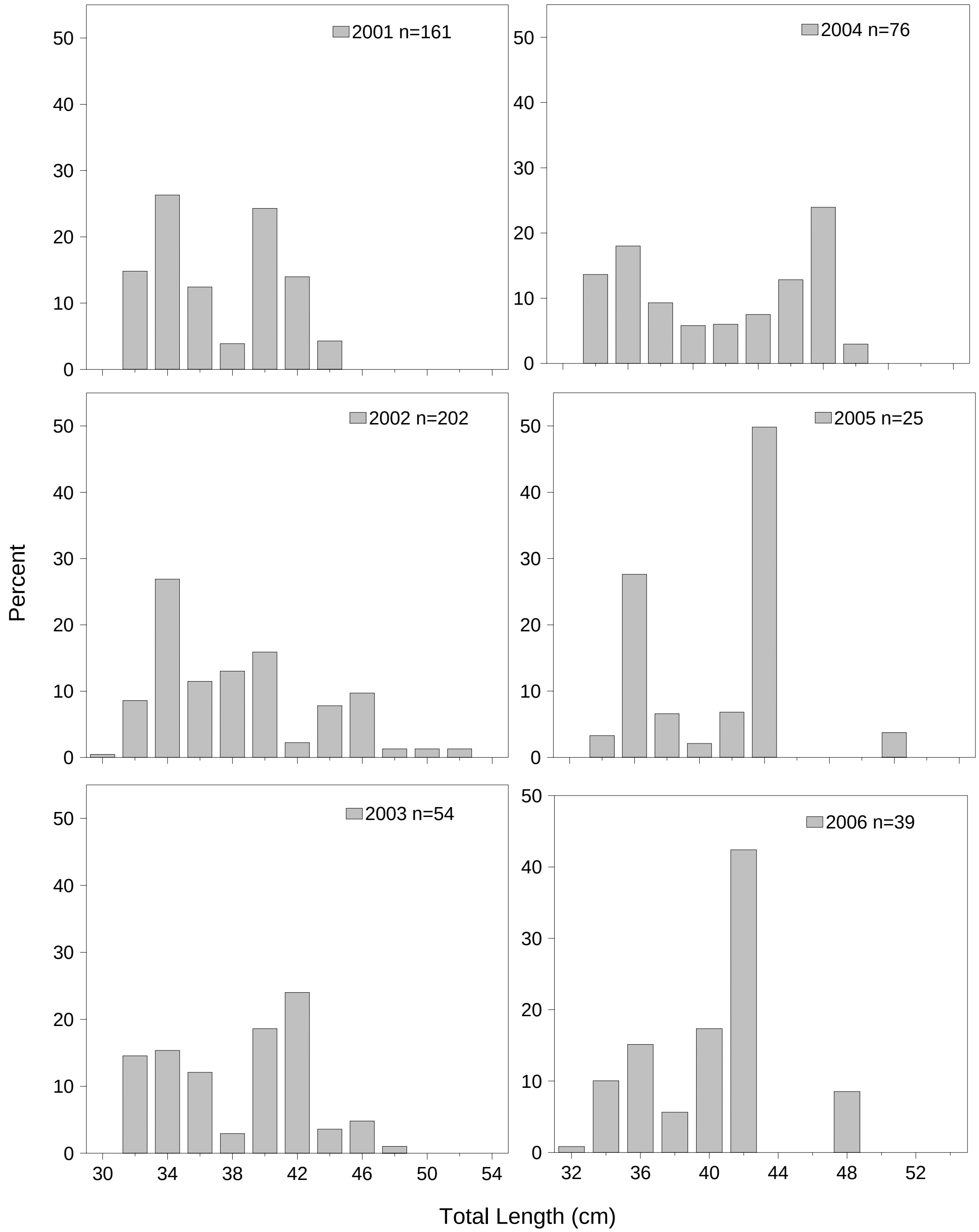


Figure 7.35. (Continued).

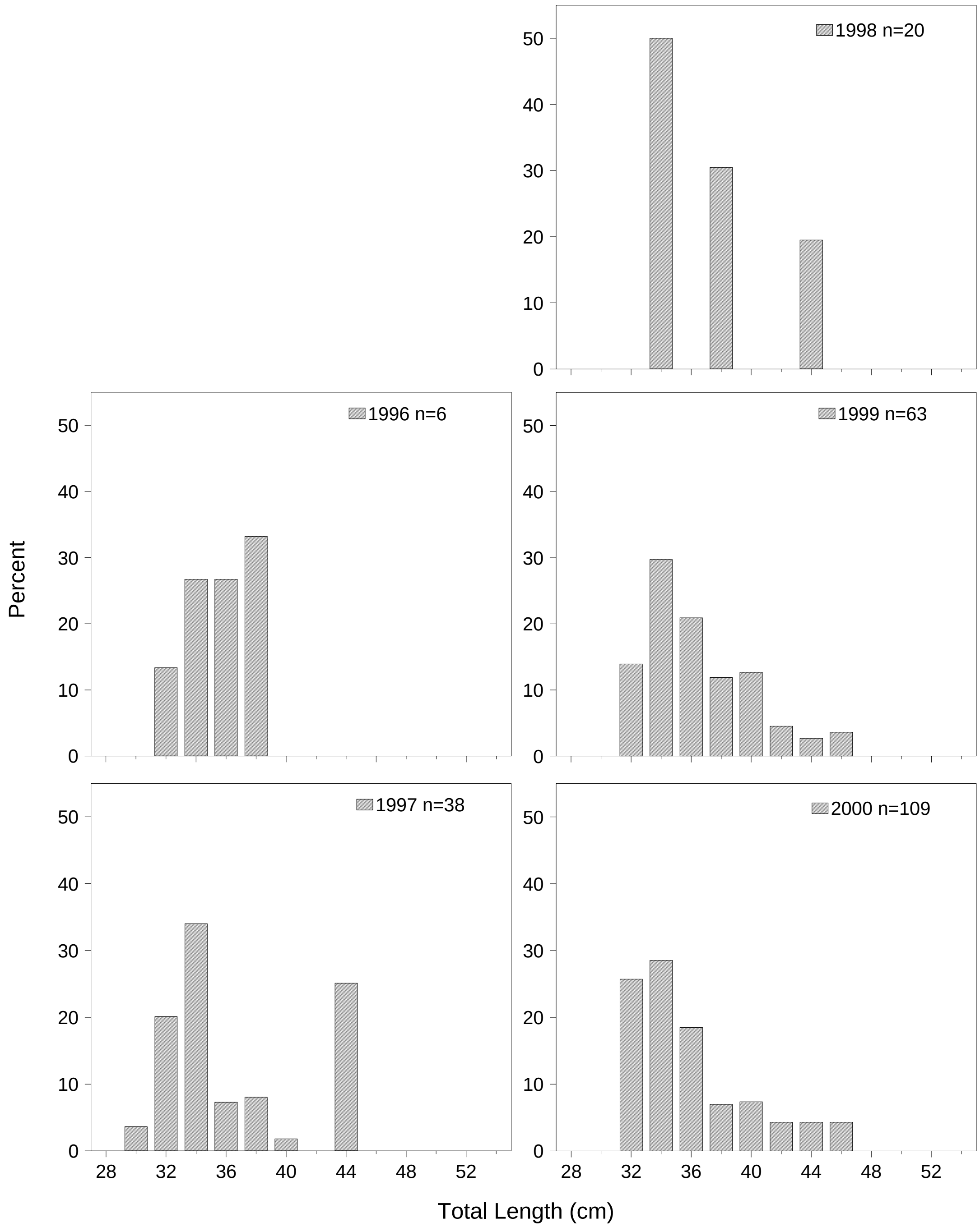


Figure 7. 36 North Carolina estuarine gill net fishery weighted length frequency distributions for marketable gulf flounder (*Paralichthys albigutta*), 1996-2006.

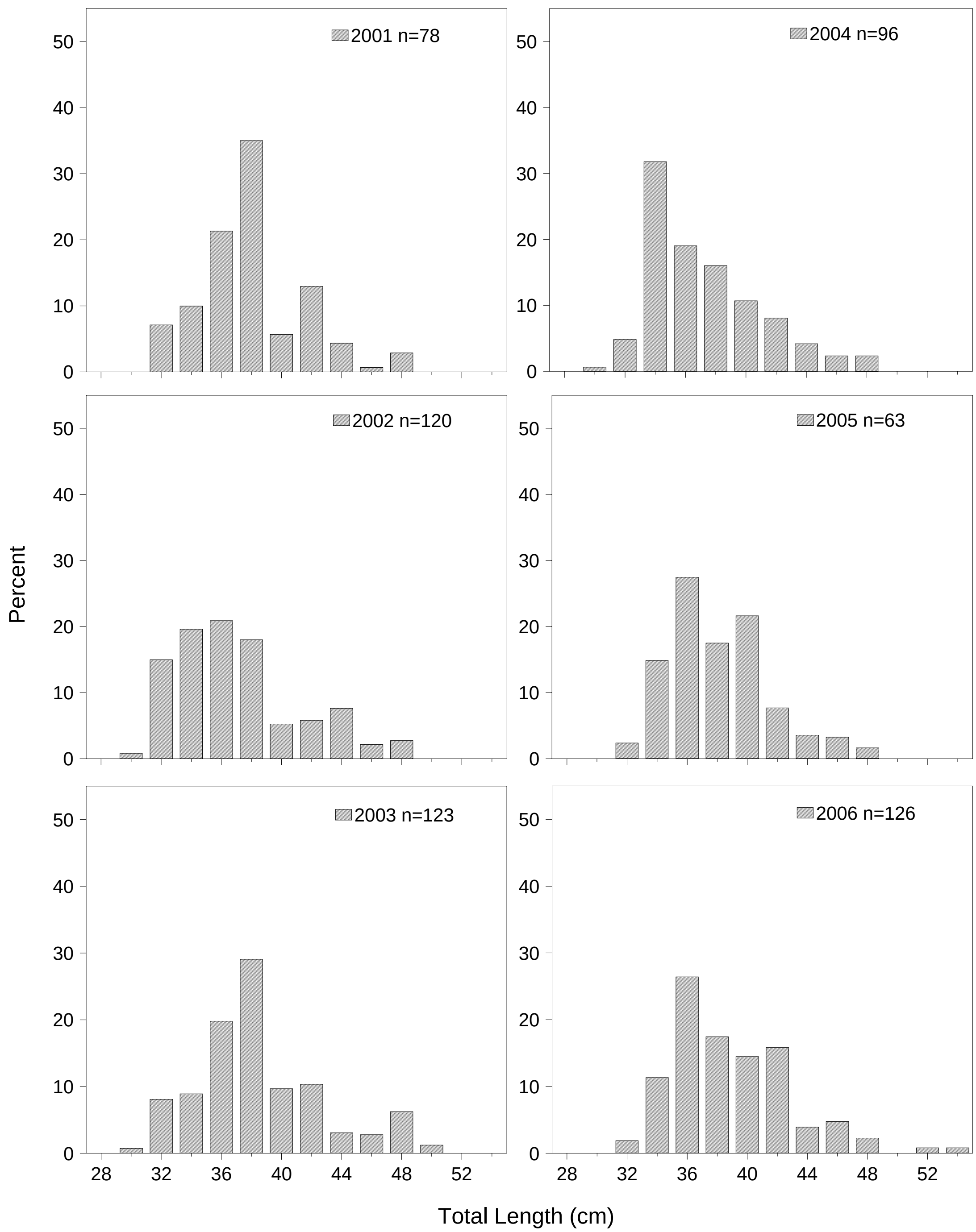


Figure 7.36. (Continued).

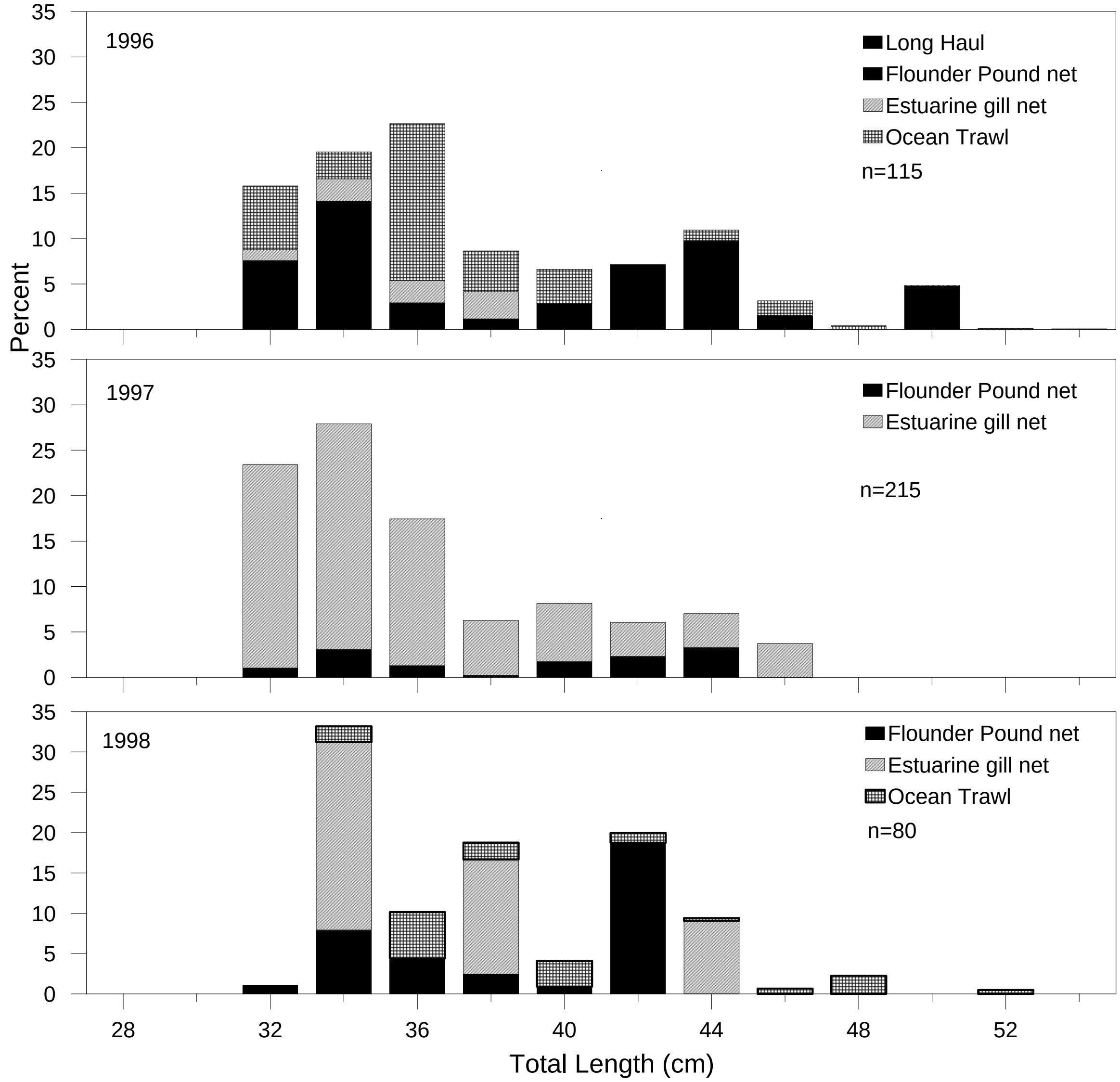


Figure 7.37. North Carolina commercial fishery weighted length frequency distributions for marketable gulf flounder *(Paralichthys albigutta),* 1996-2006.

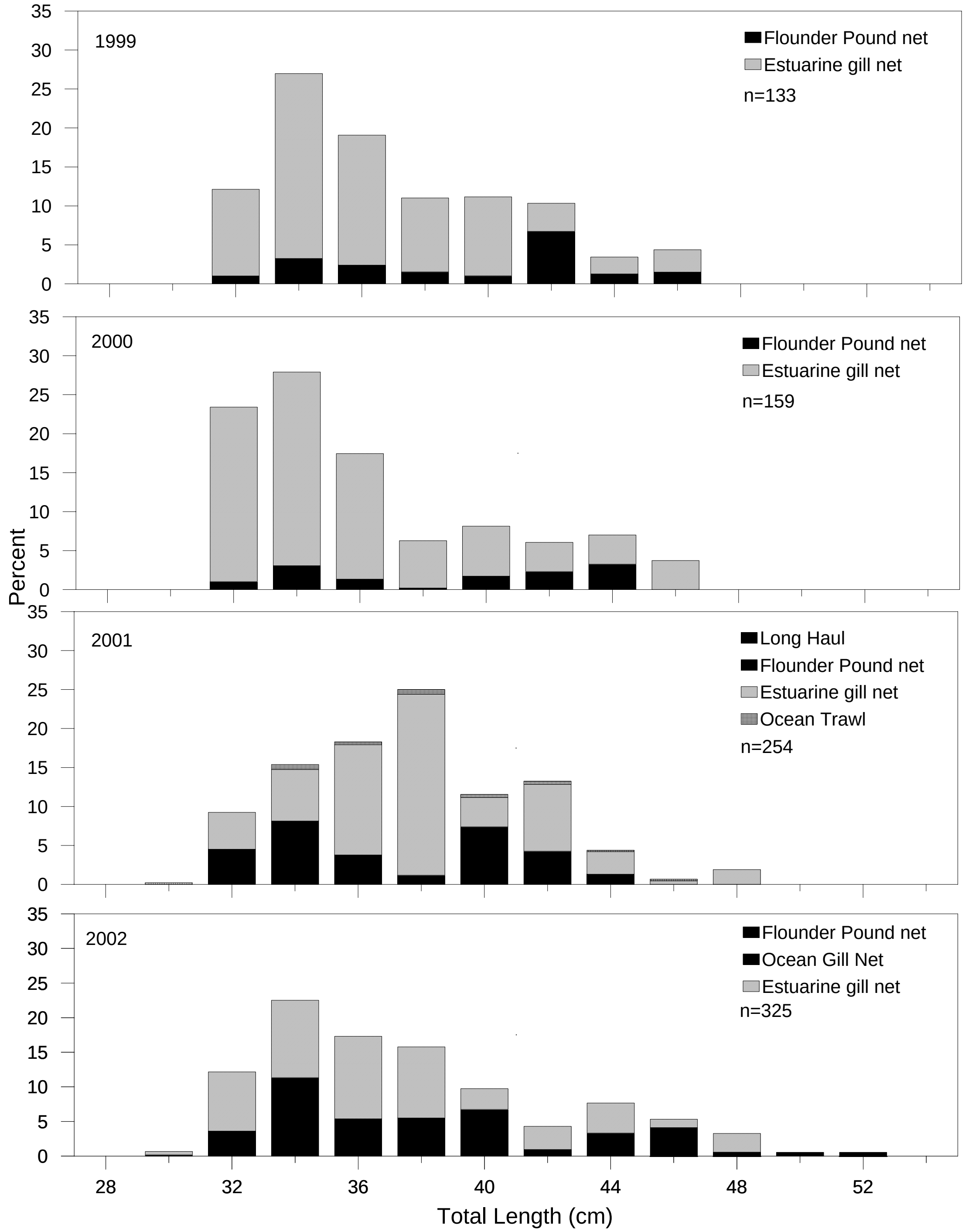


Figure 7.37. (Continued).

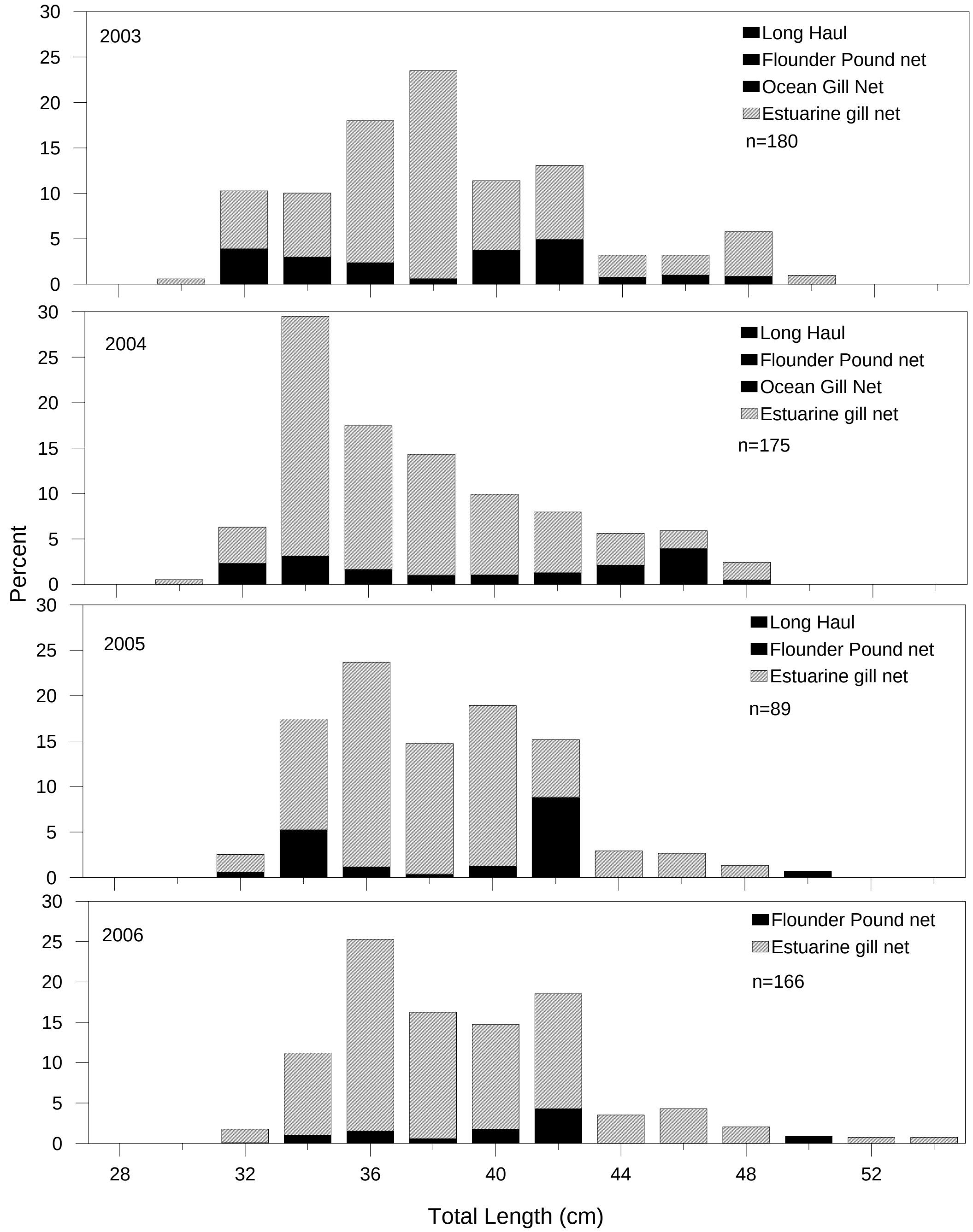


Figure 7.37. (Continued).

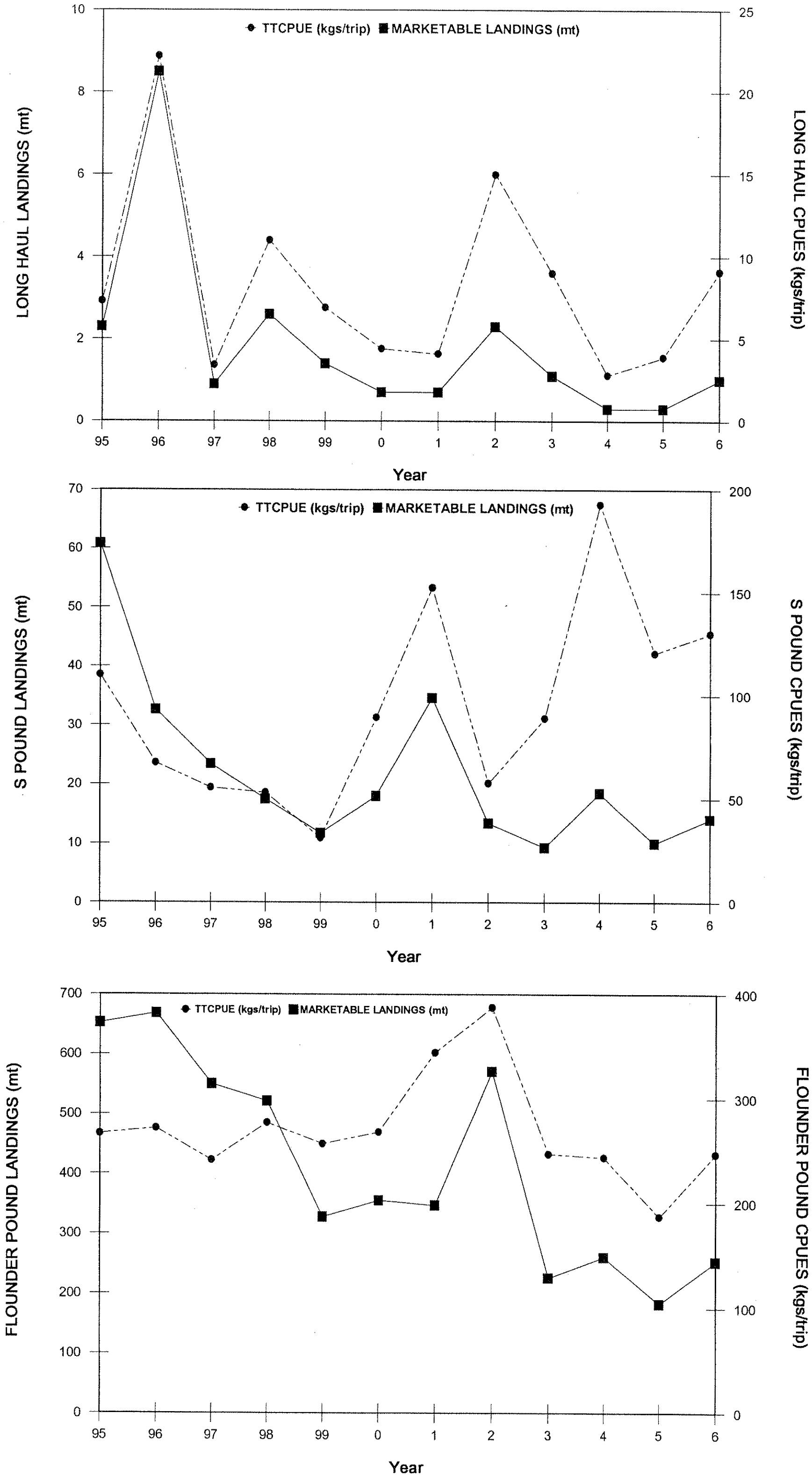
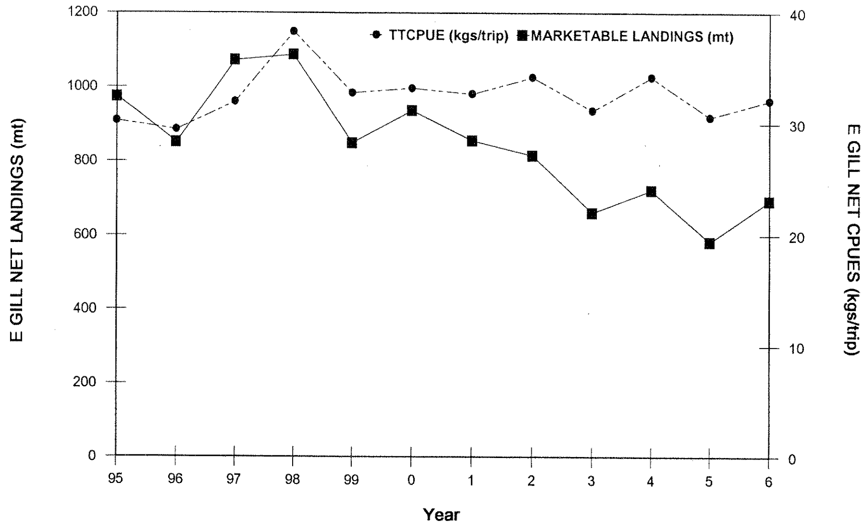


Figure 7.38. North Carolina southern flounder (*Paralichthys lethostigma*) annual commercial landings (metric tons) and mean CPUE (landed catch per trip, kg) for selected fisheries and overall, 1995-2006.



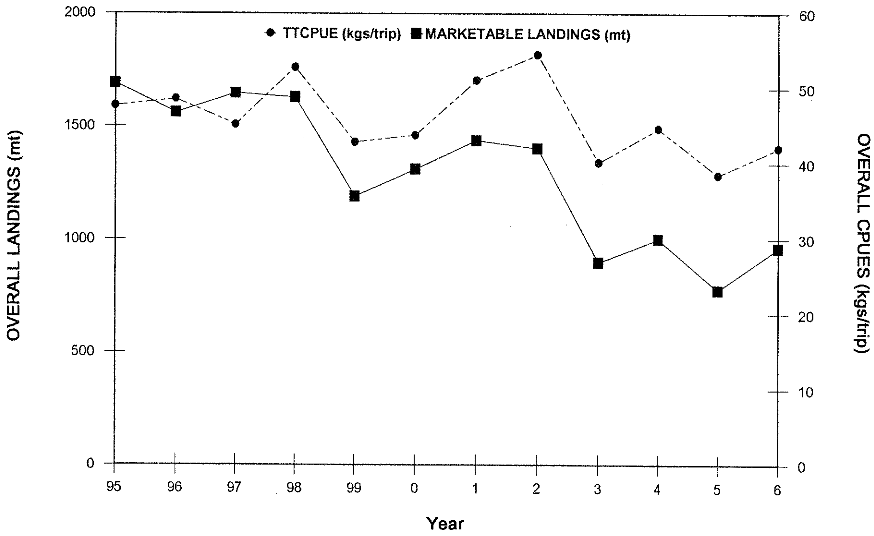


Figure 7.38. (Continued).

LITERATURE CITED

Able, K.W., and M.P. Fahay.
1998. The First Year in the Life of Estuarine Fishes in the Middle Atlantic Bight. Rutgers University Press. New Brunswick, NJ.

Anderson, R.D.
1978. Feeding and spawning of bluefish. Sea Front. 24(6):335-338.

Anderson, W.W.
1968. Fishes taken during shrimp trawling along the south Atlantic coast of the United States, 1893-1935. U.S. Fish. Wildl. Serv., Spec. Sci. Rep. Fish. No. 570, 60 p.

ASMFC (Atlantic States Marine Fisheries Commission).
1987. Fishery management plan for Atlantic croaker. ASMFC Fisheries Management Plan No. 10, Washington, D.C., 90 p.

ASMFC (Atlantic States Marine Fisheries Commission).
1989. Fishery management plan for the bluefish fishery. Fisheries Management Rep. No. 14. Washington, DC.

ASMFC (Atlantic States Marine Fisheries Commission).
1991. Interstate Fisheries of the Atlantic Coast Advisory Committee of the ASMFC, Washington D.C., 131 p.

ASMFC (Atlantic States Marine Fisheries Commission).
1995. Review of the Atlantic States Marine Fisheries Commission fishery management plan for bluefish (*Pomatomus saltatrix*), 1995. ASMFC Bluefish Plan Review Team, Washington, D.C., 11 p.

ASMFC (Atlantic States Marine Fisheries Commission).
1996. Draft Amendment #3 to the fishery management plan for weakfish, public hearing document, R.W. Laney and F. Lockhart, ASMFC, Washington D.C., 61 p.

ASMFC.(Atlantic States Marine Fisheries Commission).
2005a. Amendment 1 to the Interstate Fishery Management Plan for Atlantic Croaker. ASMFC Fishery Management. Report No. 44., Washington D.C., 92 p.

ASMFC. (Atlantic States Marine Fisheries Commission).
2005b. Atlantic Croaker Stock Assessment & Peer Review Reports. ASMFC, Washington, DC.

ASMFC (Atlantic States Marine Fisheries Commission).
2007. Review of the Atlantic States Marine Fisheries Commission fishery management plan for Atlantic croaker (*Micropogonias undulatus*), 2007. ASMFC Atlantic croaker Plan Review Team, Washington, D.C., 16 p.

Bearden, C.M.
1964. Distribution and abundance of Atlantic croaker, *Micropogon undulatus,* in South Carolina. Contrib. Bears Bluff Lab., Rep. No. 40, 23 p.

Bianchi, Alan.
2003. An economic profile analysis of the commercial fishing industry of North Carolina including profiles for the coastal fishing counties. North Carolina Department of Environment and Natural Resources, Division of Marine Fisheries.

Burke, J.S.
1995. Role of feeding and prey distribution of summer and southern flounder in selection of estuarine nursery habitats. J. of Fish Biol. 47, 355-366.

Burke, J.S., J.P. Monaghan, Jr. and S. Yokoyama.
2000. Efforts to understand stock structure of summer flounder (*Paralichthys dentatus*) in North Carolina, USA. Journal of Sea Research. 11p.

Chittenden, M.E., Jr., and J.D. McEachran.
1976. Composition, ecology, and dynamics of demersal fish communities on the northwestern Gulf of Mexico continental shelf, with a similar synopsis for the entire Gulf. Tex. A&M Univ., TAMU-SG-76-208, 104 p.

Christian, R.T.
1993. Atlantic States Marine Fisheries Commission 1993 Annual Review of Interstate Fishery Management Plans. ASMFC, Washington D.C., 3 p.

Collins, M.R., and B.W. Stender.
1987. Larval king mackerel *Scomeromorus cavalla*, Spahish mackerel (*S. maculatus)*, and bluefish (*Pomatomus saltatrix*) off the southeast coast of the United States, 1973-1980. Bull. Mar. Sci 41:822-834.

Daniel, L.B., III. and J.L. Armstrong
2000. Weakfish, *Cynoscion regalis, in* Reproductive ecology of selected marine recreational fishes in North Carolina. Completion Report, Grant F-60, North Carolina Department of Environment and Natural Resources, Division of Marine Fisheries, 9 p.

DeVries, D. A.
1981. Stock assessment of adult fishes in the Core Sound area. Completion Report, Project 2-326-R, North Carolina Department of Natural Resources and Community Development, Division of Marine Fisheries, 54 p.

Gearhart, Jeff.
2000. Study II. Documentation and reduction of bycatch in North Carolina Fisheries. Job 1-Long Haul Seine Escape Panel Evaluation. Interstate Fisheries Managemnt Prgram Implementation for North Carolina. Completion Report for Cooperative Agreement No. NA 57FG0171 /1-3. Department of Environment and Natural Resources. Division of Marine Fisheries. 29pp.

Gilbert, C.R.
1986. Species profiles: life histories and environmental requirements of coastal fishes and invertebrates (South Florida)--southern, gulf, and summer flounders. U.S. Fish Wildl. Serv. Biol. Rep. 82 (11.54). U.S. Army COE, TR EL-82-4, 27 p.

Ginsburg, I.
1952. Flounder of the genus *Paralichthys* and related genera in American waters. U.S. Fish Wildl. Serv., Fish. Bull., 52: 267-351.

Graves, J.E., J.R. McDowell, A.M. Beardsley, and D.R. Scoles.
1992. Stock structure of the bluefish Pomatomus saltatrix along the Mid-Atlantic coast. Fishery Bulletin 90:703-710.

Gutherz, E.J.
1967. Field guide to the flatfishes of the family Bothidae in the western North Atlantic. U.S. Fish Wildl. Cir. No. 263, 47 p.

Gutherz, E.J., and P.A. Thompson, Jr.
1977. Sciaenid stocks of the western central Atlantic between Chesapeake Bay, Virginia and the Amazon River, Brazil. Proc. 2nd Annu. Trop. Subtrop. Fish. Tech. Conf. Amer., TAMU-SG-78-101, 13 p.

Hansen, D.J.
1969. Food, growth, migration, reproduction, and abundance of pinfish, *Lagodon rhomboides*, and Atlantic croaker, *Micropogon undulatus*, near Pensacola, Florida, 1963-65. U.S. Fish. Wildl. Serv., Fish. Bull. 68:135-146.

Haven, D.S.
1957. Distribution, growth and availability of juvenile croaker, *Micropogon undulatus*, in Virginia. Ecology. 38:88-97.

Hawkins, J.R.
1988. Age, growth and mortality of weakfish, *Cynoscion regalis*, in North Carolina with a discussion on population dynamics. M.S. Thesis, East Carolina University,
86 p.

Hildebrand, H.H.
1955. A study of the fauna of the pink shrimp, *Penaeus duorarum,* Burkenroad grounds in the Gulf of Campeche. Univ. Tex. Inst. Mar. Sci. 4(1)171-232.

Hoese, H.D.
1973. A trawl study of the nearshore fishes and invertebrates of the Georgia coast. Contrib. Mar. Sci. 17:63-98.

Hoese, H.D., and R.H. Moore.
1977. Fishes of the Gulf of Mexico: Texas, Louisiana, and adjacent waters. TX A&M Press, College Station, 327 p.

Joseph, E. B.
1972. The status of the sciaenid stocks of the Middle Atlantic Coast. Chesapeake Sci. 13:87-100.

Kendall, A.W. Jr., and L.A. Walford.
1979. Sources and distribution of bluefish, *Pomatomus saltatrix*, larvae and juveniles off the east coast of the United States. Fish. Bull. 90:703-710.

Leim, A.H., and W.B. Scott.
1966. Fishes of the Atlantic coast of Canada. Fish. Res. Bd. Canada, Bull. No. 155, 485 p.

Lewis, R.M. and M.H. Judy.
1983.The occurrence of spot, *Leiostomus xanthurus*, and Atlantic croaker, *Micropogonias undulatus*, larvae in Onslow Bay and Newport River estuary, North Carolina. U.S. Nat. Mar. Fish. Serv. Fish. Bull. 81(2):405-412.

Lowerre-Barbieri, S.K., M.E. Chittenden, and C.M. Jones.
1994. A comparison of a validated otolith method to age weakfish, Cynoscion regalis, with the traditional scale method. Fishery Bulletin 92 (3), p, 555-568.

Lux, F.E., and F.E. Nichy.
1981. Movements of tagged summer flounder, *Paralichthys dentatus*, off southern New England. NOAA Tech. Rep. NMFS SSRF-752, 16 p.

MAFMC (Mid-Atlantic Fishery Management Council).
1995a. Fishery management plan for the black sea bass fishery, March 1995, 151 p. + appendices.

MAFMC (Mid-Atlantic Fishery Management Council).
1995b. Fishery management plan for the scup fishery, May 1995, 143 p. + appendices.

MAFMC (Mid-Atlantic Fishery Management Council).
1998. Amendment 1 to the Bluefish Fishery Management Plan. Mid-atlantic fishery Management Council and the Atlantic States Marine Fisheries Commission, in cooperation with the National Marine Fisheries Service, the New England Fishery Management Council, and the South Atlantic Fishery Management Council.

Massmann, W.H.
1963. Annulus formation on the scales of weakfish, *Cynoscion regalis*, of Chesapeake Bay. Chesapeake Science, 4:54-56.

Mercer, L.P.
1987. Fishery management plan for spot. ASMFC, Washington, DC, and NC Dept. Env. Health and Nat. Resour., Div. Mar. Fish., Spec. Sci. Rep. No. 49, 81 p.

Merriner, J.V.
1973. Assessment of the weakfish resource, a suggested management plan, and aspects of life history in North Carolina. Ph.D. Dissertation, North Carolina State University, Raleigh, 201 p.

Miglarese, J.V., C.W. McMillan, and M.H. Shealy, Jr.
1982. Seasonal abundance of Atlantic croaker, *Micropogonias undulatus,* in relation to bottom salinity and temperature in South Carolina estuaries. Estuaries 5(3):216-223.

Miller, R. J.
1959. A review of the sea basses of the genus *Centropristes* (Serranidae). Tulane Studies in Zoology, 7(2): 35-86.

Monaghan, J.P., Jr.
1997. Summer flounder, southern and gulf flounder, black sea bass, and scup summarizations *in* Assessment of North Carolina commercial finfisheries, 1994-1996, Completion Report for Project 2-IJ-51, North Carolina Department of Environment and Natural Resources, Division of Marine Fisheries, Morehead City, NC, USA, 41 p.

Morse, W.W.
1980. Maturity, spawning and fecundity of Atlantic croaker, *Micropogonias undulatus*, occurring north of Cape Hatteras, North Carolina. U.S. Nat. Mar. Fish. Serv. Fish. Bull. (U.S.). 78(1):190-195.

MRFSS (Marine Recreational Fishery Statistics Survey)
2000. National Marine Fisheries Service, Marine Recreational Fishery Statistics Survey website <http://www.st.nmfs.gov/st1/recreational/survey/index.html>.

Music, J.L. and J.L Pafford.
1984. Population dynamics and life history aspects of major marine sportfishes in Georgia's coastal waters. Georgia Department of Natural Resources, Coastal Resources Division. Contribution Series Number 38, 382 p.

Musick, J.A. and L.P. Mercer.
1977. Seasonal distribution of black sea bass, *Centropristis striata*, in the Mid-Atlantic Bight with comments on the ecology and fishery of the species. Transactions of the American Fisheries Society 106:12-25.

NCDMF (North Carolina Division of Marine Fisheries)
1986. Assessment of North Carolina commercial finfisheries. NC Dep. Env. Health and Nat. Resour. Compl. Rep. Proj. 2-38-R. 418 p.

NCDMF (North Carolina Division of Marine Fisheries).
1991. North Carolina commercial landings bulletin. NC Department of Environment, Health, and Natural Resources, Division of Marine Fisheries, Morehead City, NC.

NCDMF (North Carolina Division of Marine Fisheries).
1992. Assessment of North Carolina commercial finfisheries. NC Dept. Env. Health and Nat. Resour., Div. Mar. Fish., Comp. Rep. Proj. 2-IJ- 16, p. + append.

NCDMF (North Carolina Division of Marine Fisheries)
1992a. Assessment of North Carolina commercial finfisheries. NC Dept. Env. NCDMF Health and Nat. Resour., Div. Mar. Fish., Compl. Rep. Proj. 2-IJ-16 p. + append.

NCDMF (North Carolina Division of Marine Fisheries).
1992b. Description of North Carolina's coastal fishery resources. NC Dept. Env. Health and Nat. Resour., 213, p.+ append.

NCDMF (North Carolina Division of Marine Fisheries).
1992c. North Carolina commercial landings bulletin. NC Department of Environment, Health, and Natural Resources, Division of Marine Fisheries, Morehead City, NC.

NCDMF (North Carolina Division of Marine Fisheries).
1992 d. Description of North Carolina's coastal fishery resources. NC Dept. Env. Health and Nat. Resour. 213 p. + append.

NCDMF (North Carolina Division of Marine Fisheries).
1993. North Carolina commercial landings bulletin. NC Department of Environment,
Health, and Natural Resources, Division of Marine Fisheries, Morehead City, NC.

NCDMF (North Carolina Division of Marine Fisheries).
1995. Status of coastal fisheries stocks in North Carolina, 1994. NC Dept. Env. Health and Nat. Resour., 4 p.

NCDMF (North Carolina Division of Marine Fisheries).
1996. Assessment of North Carolina commercial finfisheries. NC Dept. Env. And Nat. Resour., Div. Mar. Fish., Comp. Rep. 2-IJ-32, 376 p.

NCDMF (North Carolina Division of Marine Fisheries).
1997. Assessment of North Carolina Commercial Finfisheries. NCDMF, Department of Environment, Health and Natural Resources, Completion Report for Project 2-IJ-32.

NCDMF (North Carolina Division of Marine Fisheries).
1999. Shrimp and crab trawling in North Carolina's estuaries: A report to the North Carolina Marine Fisheries Commission, Department of Environment and Natural Resources. 121p, + append.

NCDMF (North Carolina Division of Marine Fisheries).
2000a. Comparison of Age Assignment and Reader Agreement for Bluefish (*Pomatomus saltartix*) Based on Scales, Whole Otoliths, and Sectioned Otoliths.

NCDMF (North Carolina Division of Marine Fisheries).
2000b. Stock status of important coastal fisheries in North Carolina, 2000.NCDMF website, www.ncdmf.net/stocks/index.html

NCDMF (North Carolina Division of Marine Fisheries).
2000c. Survey of population parameters of marine recreational fishes in North Carolina. Annual Progress Report Grant F-42, Segment 9, January - December 1999. North Carolina Division of Marine Fisheries, Morehead City, NC, 72 p.

NCDMF (North Carolina Division of Marine Fisheries).
2004. Assessment of North Carolina Commercial Finfisheries. NCDMF, Department of Environment, Health and Natural Resources, Final Performance Report, Award Number NA 06FI 0321,1-3.

NCDMF (North Carolina Division of Marine Fisheries)
2005. North Carolina southern flounder Fishery Management Plan. North Carolina Division of Marine Fisheries, Morehead City, NC. 335p.

NCDMF (North Carolina Division of Marine Fisheries) Staff
2004. Summer flounder, southern and Gulf flounder summarizations *in* Assessment of North Carolina commercial finfisheries, 2000-2003, Completion Report for Project NA 06 FI 0321, 1-3, North Carolina Department of Environment and Natural Resources, Division of Marine Fisheries, Morehead City, NC, USA, 25 p.

NCDMF (North Carolina Division of Marine Fisheries).
2006 a. Stock Status Report on Atlantic croaker. North Carolina Division of Marine Fisheries website.

NCDMF (North Carolina Division of Marine Fisheries).
2006 b. Survey of population parameters of marine recreational fishes in North Carolina. Annual progress report. Grant F-42, 1 January 2001 - 31 December 2005 (Segments 11-15).. North Carolina Department of Environment and Natural Resources. Division of Marine Fisheries. 2p.

NCMFC (North Carolina Marine Fisheries Commission).
2007. North Carolina Fisheries Rules for Coastal Waters 2007. Department of Environment and Natural Resources. Division of Marine Fisheries. 316 pp.

NEFSC (Northeast Fisheries Science Center). 1993. Report of the 16th Northeast Regional Stock Assessment Workshop (16th SAW) Fall 1992. NEFSC Reference Document No. 93-18. 116 p.

NEFSC (Northeast Fisheries Science Center).
1994. Report of the 18th Northeast Regional Stock Assessment Workshop (16th SAW) Spring 1994. NEFSC Reference Document No. 94-22.

NEFSC (Northeast Fisheries Science Center).
2006. Assessment of the Northern Stock of Black Sea Bass, Report of the 43rd Stock Assessment Review Committee (SARC 43) June 2006.

Nelson, W.R.
1969. Studies on the Atlantic Croaker, *Micropogon undulatus Linnaeus*, and spot, *Leiostomus xanthurus Lacapede*, in Mobile Bay, Alabama. M.S. Thesis, Univ. Alabama, 85 p. J. Mar. Sci. Alabama 1(1):11-92.

NMFS (National Marine Fisheries Service).
1986a. Report of third NEFC stock assessment workshop (Third SAW), Northeast Fisheries Science Center, Woods Hole Laboratory Reference Document No. 86-14.

NMFS (National Marine Fisheries Service).
1986b. Status of the fishery resources off the northeastern United States for 1986. NOAA Technical Memorandum NMFS-F/NEC-43.

NMFS (National Marine Fisheries Service).
1995. Cooperative research program addressing finfish bycatch in the Gulf of Mexico and South Atlantic shrimp fisheries. NMFS Southeast Regional Office, St. Petersburg, Florida, 67pp.

NMFS (National Marine Fisheries Service)
1995a. Cooperative research program addressing finfish bycatch in the Gulf of Mexico and South Atlantic shrimp fisheries. NMFS Southeast Regional Office, St. Petersburg, Florida, 67p.

NMFS (National Marine Fisheries Service).
1995b. Status of the fishery resources off the northeastern United States for 1994. NOAA Technical Memorandum NMFS-NE-108, 140 p.

NMFS (National Marine Fisheries Service).
1997a. Report of the 25th Northeast Regional Stock Assessment Workshop (25th SAW): Stock Assessment Review Committee (SARC) Consensus Summary of Assesssments (Draft 8/5/97). Northeast Fisheries Science Center, Woods Hole, MA, 151 p.

NMFS (National Marine Fisheries Service)
2000. Summer Flounder *in* 31st Northeast regional stock assessment workshop (31st SAW): Stock Assessment Review Committee (SARC) consensus summary of assessments. 95p.

NMFS (National Marine Fisheries Service).
2002. Report of the 35th Northeast Regional Stock Assessment Workshop (35th SAW): Stock Assessment Review Committee (SARC) Consensus Summary of Assesssments (Draft 9/02). Northeast Fisheries Science Center, Woods Hole, MA, 35 p.

Nyman, R.M., and D.O. Conover.
1988. The relation between spawning season and the recruitment of young-of-the-year bluefish, *Pomatomus saltatrix*, to New York. Fish.Bull. 86(1):237-250.

Reid, G.K., Jr.
1954. An ecological study of the Gulf of Mexico fishes in the vicinity of Cedar Key, Florida. Bull. Mar. Sci. Gulf Caribb. 4: 1-94.

Ross, S.W.
1988. Age, growth and mortality of Atlantic croaker, *Micropogonias undulatus*, in North Carolina with comments on population dynamics. Transactions of the American Fisheries Society, 117:461-473.

Shepherd, G.R.
1991. Meristic and morphometric variation in black sea bass north of Cape Hatteras, North Carolina. North American Journal of Fisheries Management. 11:139-148.

Shepherd, G.R., J. Moser, D. Deuel, and P. Carlsen.
2006. The migration pattern of bluefish (*Pomatomus saltatrix*) along the Atlantic coast determined from tag recoveries.

SDWG (Southern Demersal Working Group).
2007. Summer flounder stock assessment summary for 2007. 15 p.

Smith, H.M.
1898.The fishes found in the vicinity of Woods Hole. Bull. U.S. Fish. Comm. 17:85-111.

Stokes, G.M.
1977. Life history studies of southern flounder, *Paralichthys lethostigma* and Gulf flounder, *P. albigutta* in the Aransas Bay area of Texas. Technical Series, No. 25, Texas Parks and Wildlife Department, 37 p.

Terceiro, M.
2006. Stock assessment of summer flounder for 2006. NEFSC Ref. Doc. 06-17. 119 p.

Vaughan, D.S.
1994. Assessment of Atlantic weakfish stock. Report to Weakfish Scientific and Statistical Committee, Atlantic States Marine Fisheries Commission, August 5, 1994, 29 p.

Warlen, S.M.
1980. Age and growth of larvae and spawning time of Atlantic croaker in North Carolina. Proc. Annu. Conf. Southeast. Assoc. Fish Wildl. Ag. 34:204-214.

Welsh, W.W. and C.M. Breder.
1923. Contributions to life histories of Sciaenidae of eastern United States coast. Bull. U.S. Bur. Fish. 39:141-201.

Wenner, C.A., W.A. Roumillat, J.E. Moran, Jr., M.B. Maddox, L.B. Daniel, III, and J.W. Smith.
1990. Investigations on the life history and population dynamics of marine recreational fishes in South Carolina: Part 1. Marine Resources Research Institute, South Carolina Wildlife and Marine Resources Department, Charleston, SC, 180 p.

Wilk, S.J.
1977. Biological and fisheries data on bluefish, *Pomatomus saltatrix*, (Linnaeus). National Marine Fisheries Service, Northeast Fisheries Center, Sandy Hook Laboratory, Technical Series Report No. 11, 56 p.

STATE OF NORTH CAROLINA COMMERCIAL FINFISHERIES, 2004-2007

Final Performance Report for Award Number NA 04NMF4070216

December 2007

SPECIES SECTION 8

RECOMMENDATIONS AND ACKNOWLEDGMENTS

by

North Carolina Division of Marine Fisheries

RECOMMENDATIONS

Many North Carolina fish stocks (e.g., summer flounder, weakfish, bluefish, red drum, Spanish and king mackerel) are managed either by fishery management plans under the guidance of the Atlantic States Marine Fisheries Commission, Mid-Atlantic or South Atlantic Fisheries Management Councils or individual state plans. Stock assessments are conducted by the technical and scientific committees of the organizations to determine the status of the stocks and to recommend necessary harvest control strategies. The data collected by this project are the primary input parameters to any recognized mathematical analysis of fish stock dynamics and as such are the foundation of any management action. The continued development and expansion of the 25-year database allow NCDMF and other agencies to monitor changes in age composition and mortality rates of the stocks and help to determine if overfishing is occurring. The following recommendations should be considered by the Fishery Dependent Subcommittee of the Biological Review Team in order to insure the utility of data gathered by this study:

1. A thorough analysis of the trip ticket database is needed to identify errors and properly define strata for sampling. Strata should be defined temporally and geographically such that a degree of homogeneity is provided for gear and effort parameters.

2. Allocate fish house sampling intensity proportional to the trip ticket strata fishing effort (trips). The implementation of a stratified design for fish house sampling, if possible, may improve the statistical validity of the results. A Division wide standard for determining what trip ticket data constitutes a "large mesh" gill net trip needs to be developed. Also a broader survey of the commercial gill net fishery is needed to better reflect the gear and deployment characteristics on a finer temporal and spatial basis.

3. An expanded observer program for on-the-water sampling should be designed and funded. This type of sampling will not only address lacking data on discards and bycatch, but can be used to develop databases for stock assessments independent of fishery dependent data, which is often influenced by fishery regulations, market conditions, and natural events such as hurricanes. On-the-water sampling should be expanded in order to characterize discard components of these fisheries and to provide additional data on gear configuration. Coverage of estuarine fisheries should continue to be pursued through funds available from the federal government. Increased coverage in the ocean gill net and trawl fisheries should be instituted by the Northeast Fisheries Science Center of NMFS. The safety and liability issues associated with at-sea sampling need to be addressed.

4. All significant sources of catch (by gear, area and time) need to be sampled. Fisheries identified for new or expanded sampling include the estuarine gill net fishery, the ocean gill net fishery, and the shrimp trawl fishery. Sampling effort in the estuarine gill net fishery should be modified to be more equally distributed among the different gill net configurations and component fisheries. Sampling in the ocean gill net fishery needs to continue its expanded coverage west and south of Beaufort Inlet to the North Carolina/South Carolina border. Sampling of large and medium bluefish catches needs to continue along the Outer Banks. In addition, sampling of the

dogfish and goosefish (monkfish) components of the ocean gill net fishery needs to be continued, during the limited time when landings are allowed. Sampling should be maintained for all other ongoing fisheries, even those at a low level of effort such as the sciaenid pound net and long haul seine fisheries.

5. The fishery independent gill net sampling program needs to be expanded coastwide. The program provides invaluable fishery independent data that provides CPUE and age and length distribution composition, bycatch estimates, and mesh selectivity indices.

6. An adequate sample of hard parts across all size classes is needed for age-length analysis. Additional individual fish lengths and weights are needed for all market grades to provide valid mean weights at age by fishery.

7. An expanded program will have to be supported beyond the current limited federal funds. The NCDMF needs to plan for dedicated state resources for the program. These state funds should be used for data management and analysis support as well as for additional field staff and operations.

8. Landings, sampling protocol and actual field methods should be reviewed annually to insure consistency across fisheries and areas to maximize sampling efficiency and to account for fluctuations within fisheries, such as changes in targeted species, gear modifications, responses to regulations and spatial expansion or shrinkage of the fisheries.

ACKNOWLEDGMENTS

The authors thank the following individuals for their hard work, technical skill, support and field assistance: John Alexander, Chris Braddy, Carol Etheridge, Jeff Ferrence, Jill Coyle, Lele Judy, Greg Judy, Marc Hamric, Parks Lewis, Jenny Pearce, William Schmidt, and David Skinner; George Joyner, Maggie Tyndall, and Roxanne Russell for database support; and Brian Cheuvront and David Taylor for administrative support.

A special thanks to Katy West for her SAS expertise and assistance, to Alan Bianchi for providing commercial landings and catch per unit effort data, and to Beth Burns for providing species section graphics. We are especially grateful to the commercial fishermen, fishhouse managers, and fish dealers who cooperated with this project and made data collection possible.