FISHERY MANAGEMENT PLAN UPDATE
SHEEPSHEAD
AUGUST 2024

STATUS OF THE FISHERY MANAGEMENT PLAN

Fishery Management Plan History

Original FMP Adoption:	None
Amendments:	None
Revisions:	None
Supplements:	None
Information Updates:	None
Schedule Changes:	None
Comprehensive Review:	None

Sheepshead (*Archosargus probatocephalus*) was previously managed in the South Atlantic Fishery Management Council (SAFMC) Snapper Grouper Fishery Management Plan (FMP). The plan restricted recreational anglers to an aggregate 20 fish bag limit, no commercial trip limit, and no size limit. In state waters, North Carolina deferred management to the Council regulations. In April 2012, sheepshead was removed from the SAFMC snapper grouper management complex through the Comprehensive Annual Catch Limit Amendment (Amendment 25; SAFMC 2011). Subsequently, N. C. Division of Marine Fisheries (DMF) Director proclamation authority for sheepshead management was invalidated since sheepshead was no longer part of the North Carolina FMP for Interjurisdictional Fisheries or a Council managed species. In November 2012, the N.C. Marine Fisheries Commission (MFC) requested a rule be developed for sheepshead; and approved the rule in November 2013 that specifies the Director's proclamation authority, including the ability to implement size, bag, and trip limits, as well as season and gear restrictions (NCMFC 15A NCAC 03M .0521). In July 2014, the DMF began developing potential management measures for sheepshead to present to the MFC. In 2015, the Commission implemented new regulations that included size, bag, and trip limits to prevent overharvest, as well as to allow a greater number of fish to spawn before being harvested. There currently is no state or federal FMP for sheepshead.

Management Unit

North Carolina manages sheepshead in state coastal waters (internal and 0 to 3 miles in Atlantic Ocean).

Goal and Objectives

None

DESCRIPTION OF THE STOCK

Biological Profile

Sheepshead are a relatively large, long-lived member of the porgy family that ranges from Nova Scotia, Canada to Florida and the Gulf of Mexico south to the Atlantic coast of Brazil. They are

generally found year-round in North Carolina coastal waters ranging from inshore brackish waters to offshore rocky bottom (Hildebrand and Cable 1938). Juveniles are associated with shallow vegetated habitat as well as hard structures that offer protection (Parsons and Peters 1987). As sheepshead grow larger, they move to typical adult habitat including oyster reefs, rocks, pilings, jetties, piers, and wrecks (Johnson 1978). While sheepshead exhibit strong site fidelity and tend to stay in the same areas throughout much of the year, they migrate seasonally to spawn (Wiggers 2010). Migration patterns based on mark recapture studies have not documented large scale, north-south movements. Movement instead tends to be towards inlets during the fall and winter when adult sheepshead migrate to ocean waters to spawn (Jennings 1985; Wiggers 2010).

Sheepshead are omnivores, eating plants as well as animals (barnacles, crabs, oysters; Jennings 1985). Sheepshead grow quickly up to age 6, and then their growth slows. After their first year, sheepshead average 10 inches fork length (FL); at this size less than 50% of the fish are sexually mature (McDonough et al. 2011). Most sheepshead mature at age-2 (12 inches fork length) and all sheepshead are mature by ages 3 to 5 (14 inches FL; McDonough et al. 2011). In North Carolina, sheepshead commonly reach a length of 20 to 25 inches FL with average weight ranging from 5 to 15 pounds. The maximum reported age in North Carolina is 34 years.

Stock Status

The Division is continuing to collect data from recreational, commercial, and independent sampling efforts to estimate trends in abundance of sheepshead; age structure, maturity, and other biological information is also being collected.

Stock Assessment

There is not an approved stock assessment for sheepshead in North Carolina. Multiple coast-wide stock assessment strategies (from Virginia through Georgia) were explored by a doctoral candidate at North Carolina State University, with data from 1996 through 2019. Most of the models indicate that sheepshead are not currently overfished and overfishing is most likely not occurring (Teears 2023). A preferred model was identified by the doctoral candidate, it has not been peer-reviewed within the Division's in-person peer-review process and therefore cannot be used for management.

DESCRIPTION OF THE FISHERY

Current Regulations

In 2015, the MFC implemented a 10-inch FL minimum size limit for both recreational and commercial fisheries (Proclamation FF-28-2015). There is a recreational bag limit of 10 fish per person per day or per trip (if a trip occurs over more than one calendar day). Commercial fishing operations are limited to 300 pounds per trip with two exceptions; gig and spear operations are limited to 10 fish per person per day or trip (if a trip occurs over more than one calendar day), and pound net operations are exempt from the commercial trip limits.

Commercial Fishery

Commercial landings of sheepshead in North Carolina have been available since 1950. However, monthly landings were not available until 1974. North Carolina instituted mandatory reporting of commercial landings through the Trip Ticket Program starting in 1994. Landings information collected since 1994 is considered the most reliable. Landings have fluctuated from year to year, ranging from 50,414 pounds in 1997 to 180,225 pounds in 2013. The number of trips landing

sheepshead has shown a general decline since 2013. In 2023, 114,761 pounds of sheepshead were landed in the commercial fishery (Table 1; Figure 1).

Table 1. Recreational harvest (number of fish released and weight) and releases (number of fish; MRIP) and commercial harvest (weight in pounds; Atlantic Coastal Cooperative Statistics Program and N.C. Trip Ticket Program) of sheepshead from North Carolina, 1996 – 2023. All weights are in pounds.

	Recreational			Commercial	
Year	Number Landed	Number Released	Weight Landed (lb)	Weight Landed (lb)	Total Weight Landed (lb)
1996	77,750	12,798	256,911	82,290	339,201
1997	209,662	55,258	308,381	50,414	358,795
1998	151,473	109,454	209,825	60,184	270,009
1999	255,885	124,676	758,153	60,895	819,048
2000	355,192	94,963	780,622	88,459	869,081
2001	183,781	66,594	654,527	64,522	719,049
2002	181,197	68,317	781,567	57,434	839,001
2003	294,989	85,877	983,640	53,361	1,037,001
2004	86,554	40,263	453,372	82,009	535,381
2005	87,504	65,863	340,227	53,259	393,486
2006	137,312	90,502	445,182	57,481	502,663
2007	433,872	334,014	1,456,396	77,173	1,533,569
2008	503,666	172,604	1,007,914	89,726	1,097,640
2009	362,439	299,221	577,311	132,390	709,701
2010	327,223	190,823	966,467	157,631	1,124,098
2011	196,844	78,821	522,896	120,976	643,872
2012	346,609	269,226	797,963	109,881	907,844
2013	784,747	391,809	1,220,357	180,225	1,400,582
2014	185,267	224,062	389,583	173,376	562,959
2015	181,554	160,447	520,382	124,827	645,209
2016	149,085	212,471	375,328	93,513	468,841
2017	282,480	910,841	810,633	128,269	938,902
2018	343,772	524,967	735,738	90,291	826,029
2019	221,419	312,479	590,150	86,394	676,544
2020	247,390	518,140	592,774	76,501	669,275
2021	324,540	873,080	928,130	85,413	1,013,543
2022	387,924	570,444	1,024,623	69,258	1,093,881
2023	263,328	734,253	619,265	114,761	734,026
Mean	270,124	271,152	682,440	93,632	776,072

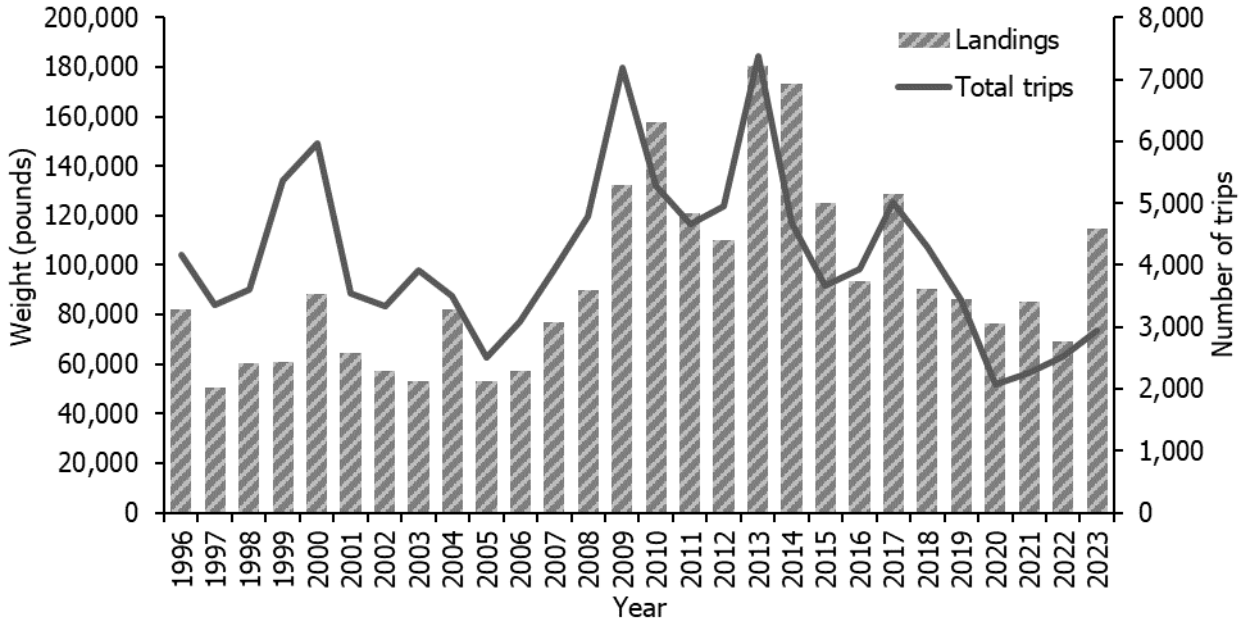

Figure 1. Annual commercial (N.C, Trip Ticket Program) landings in pounds and number of trips for sheepshead in North Carolina from 1996 – 2023.

Sheepshead are primarily caught as bycatch in several of North Carolina's commercial fisheries (e.g., gill nets, pound nets, haul seines). Estuarine gill nets and pound nets have made up greater than 50% of the landings for most of the time series. A targeted spear fishery developed in the last 15-years, and the gig fishery has also become more popular (Table 2). While the long-haul fishery used to account for up to 20% of the landings, this fishery has accounted for less than one percent of the harvest in recent years. In 2023, most commercial landings came from pound nets (62%) and gill nets (30%; primarily estuarine gill nets). Pound net and estuarine gill net landings doubled between 2022 and 2023. An additional 5% was landed by spears and gigs (Table 2), the lowest percent in the last decade.

Table 2. Commercial harvest (weight in pounds) of sheepshead by gear type, 2014 – 2023 (Source N.C. Trip Ticket Program).

Year	Spears and Gigs[$]	Estuarine Gillnet	Long Haul	Ocean Gillnet	Pound Net	Trawls	Other*	Total Harvest
2014	21,886	39,524	11,805	3,253	92,988	2,581	1,339	173,376
2015	13,695	27,268	400	5,741	73,035	3,998	713	124,850
2016	14,761	30,851	322	2,509	36,839	7,068	1163.35	93,513
2017	10,720	33,770	513	1,677	74,246	7,047	635.5	128,608
2018	9,076	25,722	40	2,936	50,429	1,012	1190.6	90,406
2019	13,858	25,309	843	3,437	36,496	5,567	897.31	86,406
2020	7,391	16,964	838	1,966	47,445	1,600	427	76,630
2021	8,960	18,255	298	5,121	48,842	2,850	1125.95	85,452
2022	6,497	16,972	1679	1,751	38,792	1,100	2466.5	69,258
2023	5,675	33,744	43	2,880	70,679	316	1,425	114,762
Mean	11,252	26,838	1,678	3,127	56,979	3,314	1,138	104,326

* Other gears include fyke nets, crab pots, and hook and line.
[$] Spear and gigs have also been combined due to data confidentiality.

Recreational Fishery

The recreational fishery tends to be more of a targeted fishery compared to the commercial. This fishery is primarily a hook and line fishery, but the species is becoming a favorite of spear fishermen. Recreational harvest estimates have been available since 1981. Recreational estimates across all years have been updated and are now based on the Marine Recreational Information Program (MRIP) new Fishing Effort Survey-based calibrated estimates. For more information see https://www.fisheries.noaa.gov/topic/recreational-fishing-data.

On average, recreational harvest accounts for 86% of North Carolina total harvest (pounds) from 1996 – 2023. In 2023, recreational harvest accounted for 84% of the total harvest (Table 1). Like commercial harvest, landings have fluctuated annually, with a low of 209,825 pounds harvested in 1998 and a high of 1,456,396 pounds in 2007 (Table 1). In 2023, 619,265 pounds of sheepshead were landed recreationally. Recreational releases increased 29% from 2022 to 2023 (Table 1). Since 2016, a larger targeted fishery has developed for this species. Since 2019, recreational catch (harvest and releases, numbers) has been increasing, potentially the result of normal fluctuations in availability or possibly the result of increased regulations for other species such as southern flounder. Directed trips for sheepshead averaged 200,000 per year until 2021, when they increased by 119%; directed trips have remained at this higher level through 2023 (Figure 2). Annual catch, as well as survey data, will continue to be monitored to determine trends for this stock.

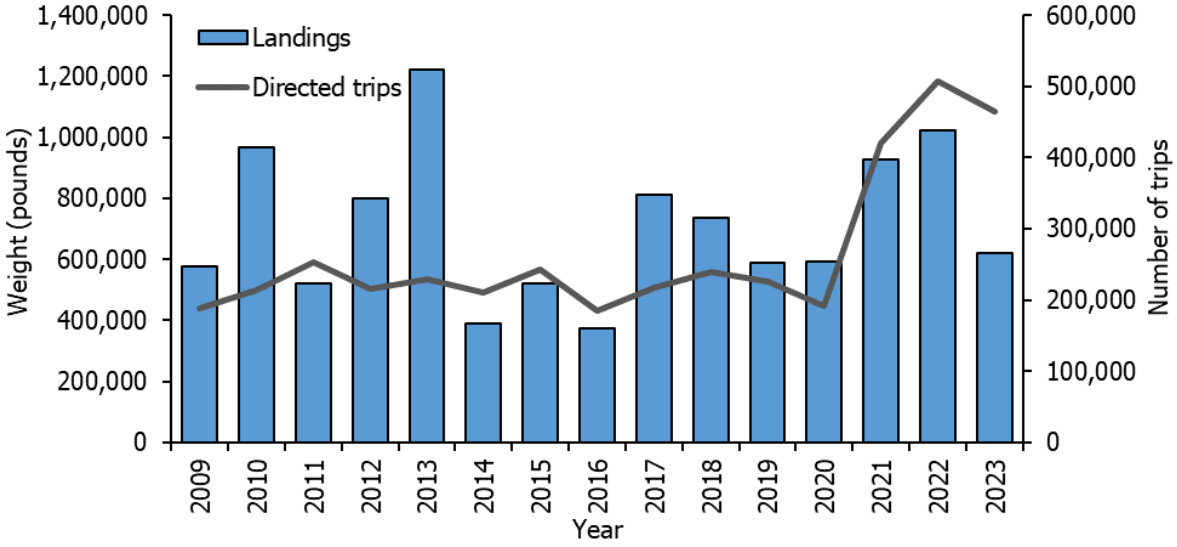

Figure 2. Annual recreational (MRIP) landings in pounds and directed trips for sheepshead in North Carolina from 2009 – 2023.

The DMF offers award citations for exceptional catches of sheepshead. Harvested sheepshead weighing greater than eight pounds are eligible for an award citation. Since 1991, approximately 2,900 citations for sheepshead have been issued. From 1991 through 2007 the number of award citations was under 50 citations per year. From 2008 through 2014 the number of award citations increased steadily but then started to decrease (Figure 3). Between 2021 – 2023, the number of citations increased, and citations issued in 2022 and 2023 represent a 170% increase from 2021. In 2023, 318 citations were issued, the highest awarded in the time series.

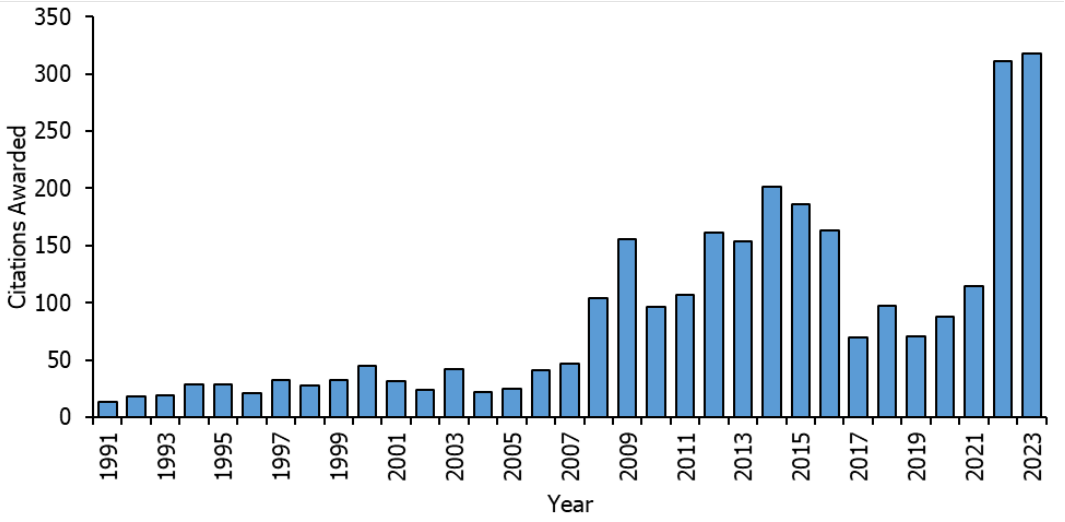

Figure 3. North Carolina Saltwater Fishing Tournament citations awarded for sheepshead from 1991 – 2023.

MONITORING PROGRAM DATA

Fishery-Dependent Monitoring

Commercial fishing activity is monitored through fishery-dependent sampling programs conducted by DMF. Data collected in these programs allow the size and age distribution of sheepshead to be characterized by gear and fishery. In 2023, 357 lengths were measured at fish houses or on the water, the majority of which came from the estuarine gill net, spear, and pound net fisheries. The average size of commercial caught sheepshead was 13 inches FL (Table 3). This has varied from year to year (10 to 20 inches FL), with the average and minimum sizes being smaller when there was no size limit prior to 2015. The majority of sheepshead landed in 2023 were between 10 inches and 16 inches FL (Figure 4).

Similar to the commercial fishery, average size varies little from year to year in the recreational fishery (Table 3). In 2023, the average size recreational sheepshead was 13 inches FL (Table 3). The majority of sheepshead landed in 2023 were between 10 inches and 19 inches FL (Figure 5). In both fisheries, sublegal fish (<10 inches FL) are still being harvested (Table 3; Figures 4 and 5). This is most likely due to fishermen confusing sheepshead and black drum regulations. While the size limits differ, black drum are measured for total length and sheepshead for FL.

Table 3. Sheepshead length (fork length, inches) data from commercial fish house and Marine Recreational Information Program samples, 1996 – 2023.

Year	Commercial				Recreational			
	Mean Length	Minimum Length	Maximum Length	Total Number Measured	Mean Length	Minimum Length	Maximum Length	Total Number Measured
1996	15	7	22	137	15	9	26	79
1997	16	6	24	102	11	6	24	134
1998	13	6	24	330	11	6	23	191
1999	13	8	24	492	14	7	29	187
2000	16	8	28	1,305	13	8	24	239
2001	15	8	22	306	15	10	30	132
2002	13	8	24	412	16	10	23	56
2003	14	9	24	421	14	8	26	96
2004	16	8	23	305	17	9	24	54
2005	17	7	25	443	16	9	23	34
2006	16	8	24	467	15	7	24	55
2007	14	7	24	850	15	7	24	118
2008	13	6	24	1,420	12	7	21	108
2009	12	6	23	1,399	11	7	21	159
2010	13	7	24	1,743	14	8	26	221
2011	15	9	24	1,247	14	7	25	160
2012	13	7	23	1,161	13	6	23	254
2013	13	7	24	1,283	11	6	24	351
2014	14	7	23	1,296	13	8	25	99
2015	15	8	24	982	14	9	23	134
2016	15	8	24	964	14	8	25	106
2017	14	9	23	348	14	4	22	272
2018	14	8	23	694	13	9	23	386
2019	15	8	24	624	14	10	25	243
2020	14	9	22	426	13	8	25	260
2021	13	8	23	586	14	8	22	177
2022	13	8	22	431	14	8	25	222
2023	13	9	22	357	13	10	22	218

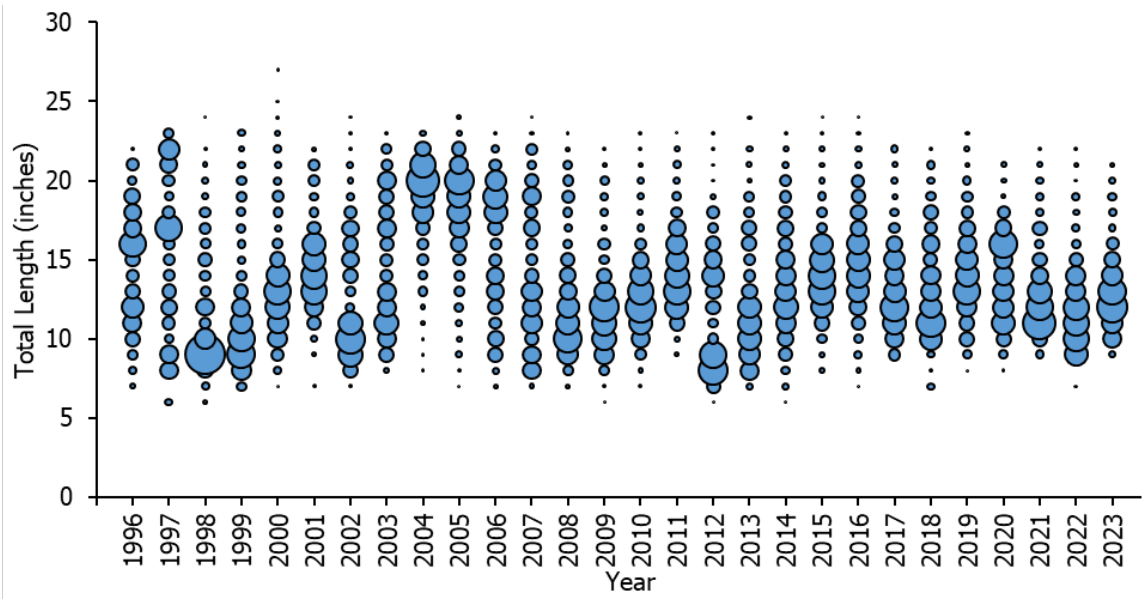

Figure 4. Commercial length frequency (fork length, inches) of sheepshead harvested from 1996 – 2023. Bubbles represent fish at length and the bubble size is proportional to the number of fish at that length.

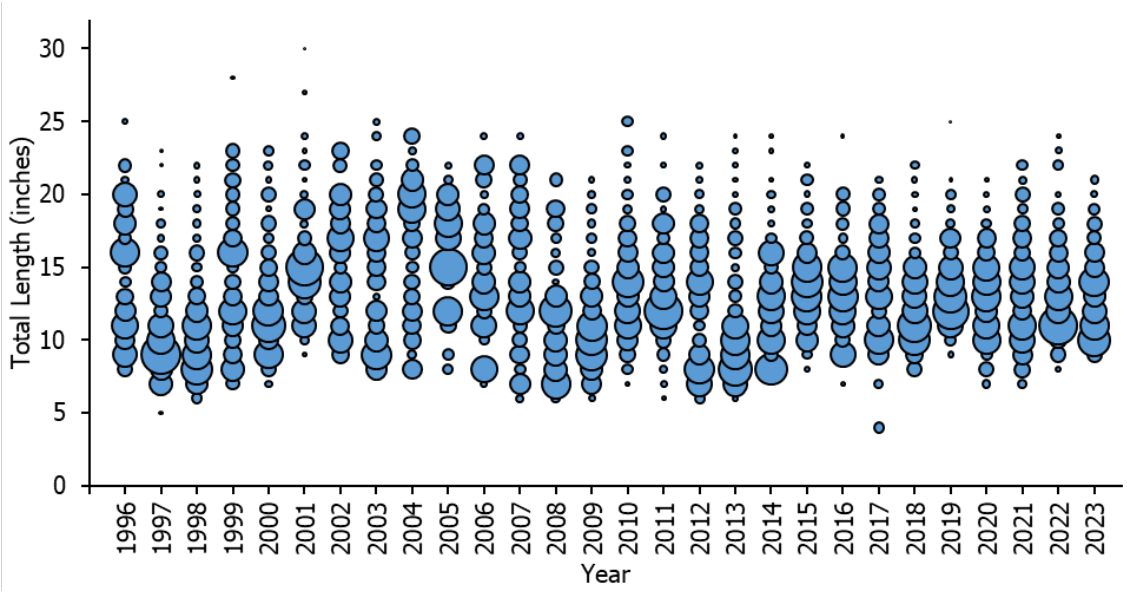

Figure 5. Recreational length frequency (fork length, inches) of sheepshead harvested from 1996 – 2023. Bubbles represent fish at length and the bubble size is proportional to the number of fish at that length.

Fishery-Independent Monitoring

In 2001, the DMF initiated a fishery-independent gill net survey in Pamlico Sound (Program 915). The objective of this project is to provide annual, independent, relative-abundance indices for key estuarine species in the nearshore Pamlico Sound. The survey employs a stratified random sampling design and utilizes multiple mesh gill nets (3.0-inch to 6.5-inch stretched mesh, by half-inch increments). By continuing a long-term database of age composition and developing a relative index of abundance for sheepshead this survey will help managers assess the sheepshead stocks

without relying solely on commercial and recreational fishery dependent data. The annual weighted index of abundance (number of sheepshead per set) was 0.85 in 2023 and represents the second highest relative abundance in the time series (Figure 6).

For 2020, indices of abundance are not available for sheepshead from the Fishery-Independent Gill-Net Survey (Program 915) due to the COVID pandemic. Sampling in this program was suspended in February 2020 due to COVID-19 restrictions and protected species interactions but resumed July 2021.

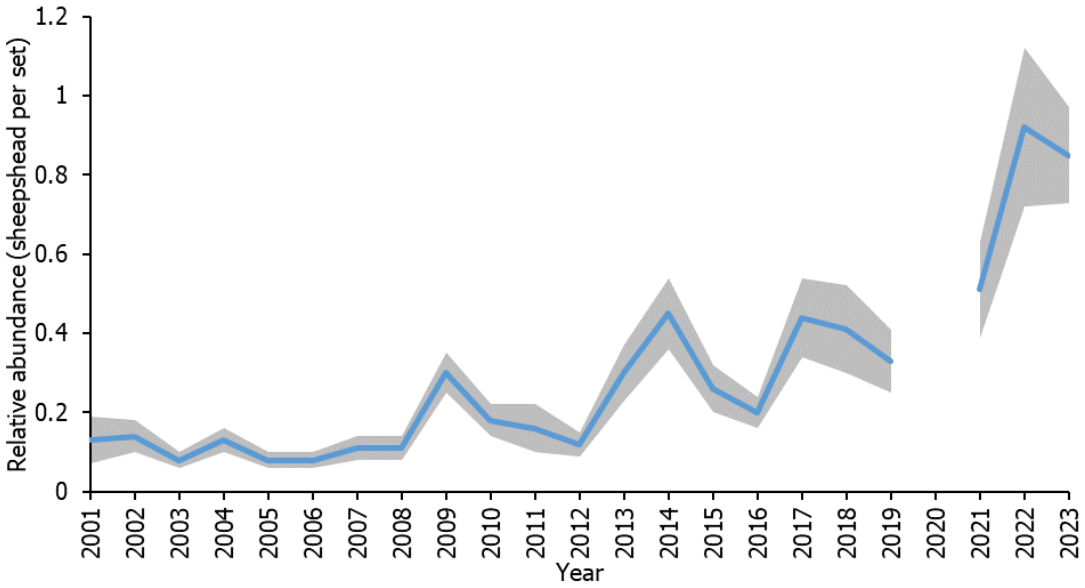

Figure 6. Annual index of abundance of sheepshead in the DMF Pamlico Sound Independent Gill Net Survey, 2001–2023. Pamlico Sound Independent Gill Net Survey sampling did not occur in 2020 and the first half of 2021. Shaded area represents + one standard error.

Data collected by Program 120 (Estuarine Trawl Survey) were used to calculate a relative Juvenile Abundance Index (JAI) by the doctoral candidate working on the coast-wide stock assessment. Program 120 is a fishery independent multispecies monitoring program that has been ongoing since 1971 in the months of May and June. One of the key objectives of this program is to provide a long-term database of annual juvenile recruitment for economically important species. This survey samples a fixed set of 104 core stations with additional stations as needed. The core stations are sampled from western Albemarle Sound south to the South Carolina border each year without deviation two times in the months of May and June. An additional set of 27 spotted seatrout juvenile stations in Pamlico Sound and its major tributaries were added in 2004 and are sampled during the months of June and July. Data from the seatrout specific stations are used to generate an index of relative abundance of age zero sheepshead, calculated as the average number of fish per tow. The resulting relative abundance index for the time series is variable with no significant trend and peaks in 2008 and 2015 suggesting relatively higher recruitment in those years (Figure 7). The Program 120 relative abundance index in 2023 was 0.04, which was an increase from 2022.

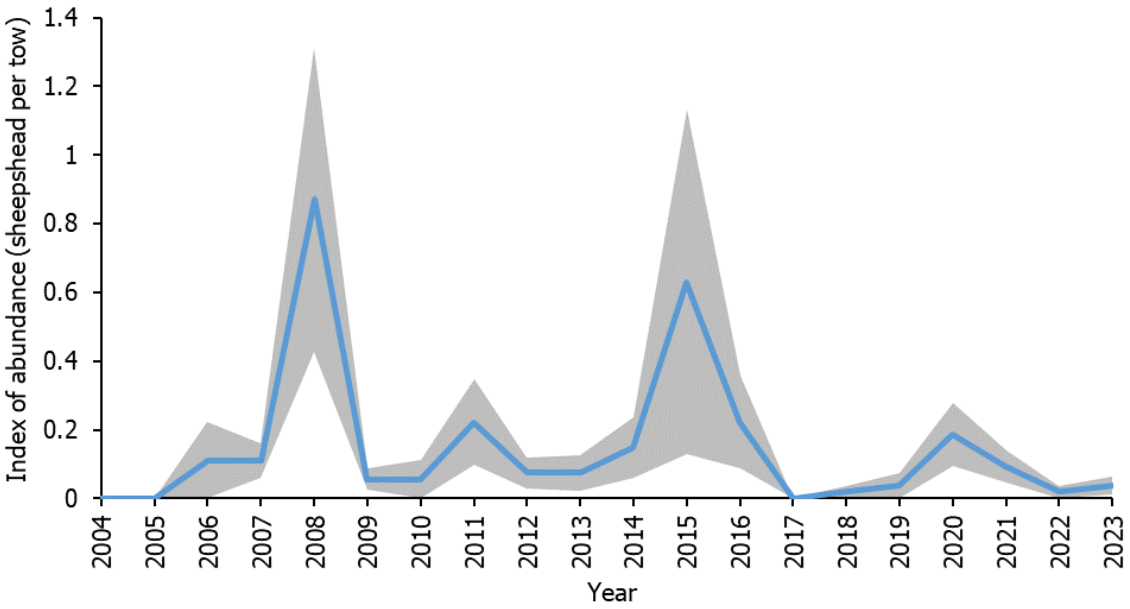

Figure 7. Annual juvenile index of abundance of sheepshead in the DMF Estuarine Trawl Survey, 2004 – 2023. Shaded area represents + one standard error.

In order to describe the age distribution of the harvest and indices, sheepshead age structures are collected from various fishery independent and dependent sources throughout the year. Otolith collection for sheepshead is relatively new, though there are samples going back to 2008. The collection of sheepshead otoliths was not made a sampling priority until 2013. The majority of sheepshead collected were ages 1 to 8 (Table 4). The maximum reported age is 34 years. In 2023, 317 sheepshead were collected; however, they have not yet been aged. The age-length relationship is hard to predict as there is overlap in age for a given length (Figure 8).

Table 4. Summary of sheepshead age samples collected from both dependent (commercial and recreational) and independent (survey) sources, 2008 – 2023*.

Year	Modal Age	Minimum Age	Maximum Age	Total Number Aged
2008	2	2	8	10
2009	--	3	25	5
2010	6	3	18	10
2011	4	3	10	14
2012	1	1	27	8
2013	2	1	23	151
2014	3	1	24	241
2015	4	1	24	143
2016	5	0	30	212
2017	2	1	29	262
2018	2	0	28	228
2019	3	0	29	356
2020	1	1	34	200
2021	2	0	24	269
2022	3	1	26	439
2023*	3	1	22	317

**2023 ages are preliminary*

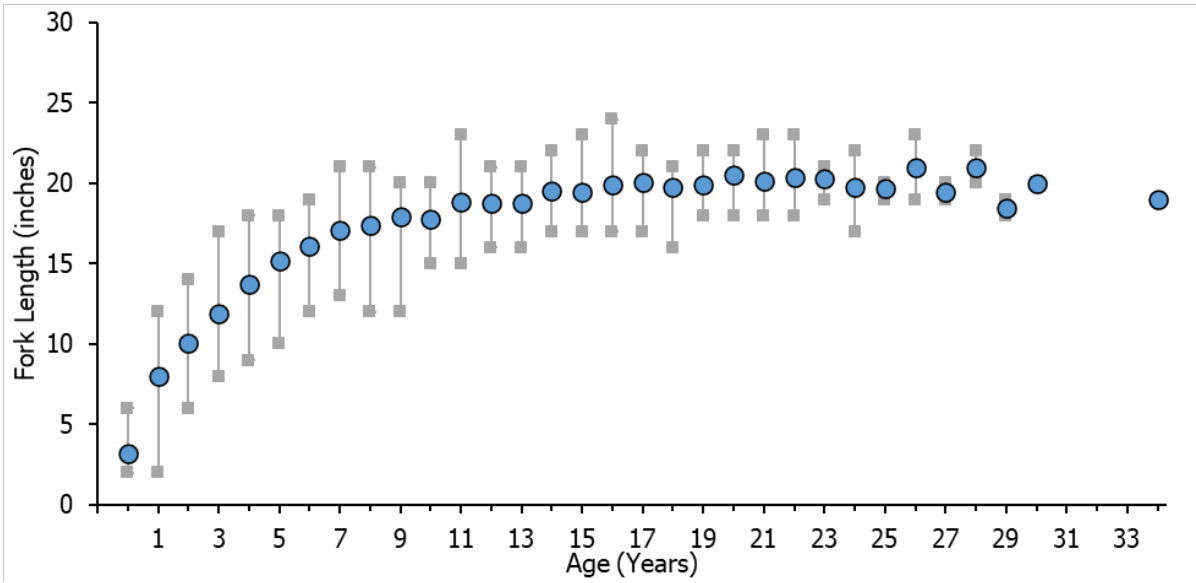

Figure 8. Sheepshead length at age based on all age samples collected from 2008 – 2022. Blue circles represent the mean size at a given age while the grey squares represent the minimum and maximum observed size for each age. Otoliths from 2023 are not included as ages are preliminary.

RESEARCH NEEDS

The following have been identified as research needs for sheepshead in North Carolina.

- Initiate a sheepshead tagging program to develop estimates of growth, natural mortality, fishing mortality, and track the movement of adults throughout the stock's range; include methods to estimate tag retention, reporting rate, and tagging-induced mortality.
- Conduct reproductive studies including spawning periodicity, age- and size-specific fecundity, update maturity schedule, and conduct spawning area surveys in North Carolina and throughout the stock's range.
- Expand discard sampling to collect information on gear, depth, location, and age and size distribution of discarded fish for the recreational and commercial sectors.
- Conduct studies on size- and age-specific selectivity by gear type.
- Determine the patterns and triggers of inshore-offshore migrations.

MANAGEMENT

See Table 5 for current management strategies and implementation status for sheepshead.

Table 5. Summary of management strategies and their implementation status for sheepshead.

Management Strategy	Implementation Status
HARVEST MANAGEMENT	
Implement a size limit, recreational bag limit, and commercial trip limit by June 1, 2015	Proclamation authority through Rule 15A NCAC 03M .0521 (FF-28-2015)

FISHERY MANAGEMENT PLAN SCHEDULE RECOMMENDATIONS

Not Applicable

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