FISHERY MANAGEMENT PLAN UPDATE
SPOT
AUGUST 2021

STATUS OF THE FISHERY MANAGEMENT PLAN

Fishery Management Plan History

Original FMP Adoption:	October 1987
Amendments:	Omnibus Amendment – August 2012 Addendum II – August 2014 Addendum III – February 2020
Revisions:	None
Supplements:	None
Information Updates:	None
Comprehensive Review:	2022

The original interstate Fishery Management Plan (FMP) for spot was adopted in 1987 with recommendations to improve data collection to produce a stock assessment and improve information for management (ASMFC 1987). The original FMP was adopted prior to the passage of the Atlantic Coastal Fisheries Cooperative Management Act (1993) and the Atlantic States Marine Fisheries Commission (ASMFC) Interstate Fishery Management Program (ISFMP) Charter (1995). After passage of the Act, the ASMFC adopted the Charter to establish standards and procedures for the preparation and adoption of FMPs. Once an FMP was amended to incorporate the standards and procedures in the ISFMP Charter, the Commission could adopt management requirements that can be enforced through the Act. The Omnibus Amendment updated the FMP with the Act and Charter requirements and initiated annual trigger exercises to monitor the status of the spot resource while also directing the board to consider management action depending on results of the trigger exercise (ASMFC 2012). Without coast-wide minimum management measures, the trigger exercises did little to provide effective management between stock assessments. Addendum II to the Amendment established the use of the Traffic Light Approach (TLA; Caddy and Mahon 1995; Caddy 1998; Caddy 1999; Caddy 2002) as a precautionary management framework. The TLA is preferred for fast-growing, early maturing species like spot, where it is more important to respond to multi-year trends rather than annual changes. The TLA more effectively illustrates long term trends than the triggers established by the Omnibus Amendment. The management framework utilizing the TLA (ASMFC 2014) replaced the management triggers established in the Omnibus Amendment.

In February 2020, the South Atlantic State/Federal Fisheries Management Board (hereafter referred to as the Board) approved Addendum III to the Omnibus Amendment, which revised the

TLA's trigger mechanism and management response for the recreational and commercial fisheries (ASMFC 2020). Addendum III incorporated the use of a regional approach (Mid-Atlantic NJ-VA and South Atlantic NC-FL) to better reflect localized fishery trends and changed the TLA to trigger management action if two of the three terminal years exceed threshold levels. State-specific management action is initiated when the proportion of red exceeds specified thresholds (30% or 60%) for both harvest and abundance. If management action is triggered, the coast-wide response includes recreational bag limits and quantifiable measures to achieve percent reductions in commercial harvest. Response requirements vary depending on which threshold is exceeded. Addendum III also defines the mechanism by which triggered management actions may be removed, after abundance characteristics are no longer triggering management action. The TLA is reviewed annually in September.

The 2020 TLA review (2019 terminal year) for spot triggered at the 30% threshold or moderate concern because harvest indices for both regions and abundance indices for the Mid-Atlantic were above 30% in two of the last three years, management action as outlined in Addendum III was enacted in March 2021 (ASMFC 2020b). The management response outlined in Addendum III specifies, non *de minimis* states are required to implement a 50 fish bag limit for their recreational fishery and must reduce commercial harvest by 1% of the average state commercial harvest from the previous 10 years. In North Carolina, the 50 fish per person per day recreational bag limit was effective April 15th, 2021 (FF-23-2021). The commercial spot fishery will close December 10th, 2021 through April 4th, 2022 to meet the required 1% reduction. Management measures will remain in place for at least two years and future TLA updates will determine future management action after this time. Management measures to be enacted were discussed internally by NCDMF staff and feedback from commercial fishermen was considered to determine the best option for the timing of the commercial season closure. Management measures were then presented to and approved by the TC and the board.

The North Carolina Wildlife Federation submitted a petition for rulemaking on November 2, 2016, and a modification to the petition on January 12, 2017. The petitioner put forth seven rules to designate nursery areas, restrict gear and seasonality in the shrimp trawl fishery to reduce bycatch of fish (including spot, Atlantic croaker, and weakfish), and establish an eight-inch minimum size limit for spot and a 10-inch minimum size limit for Atlantic croaker. At its February 2017 business meeting, the North Carolina Marine Fisheries Commission passed a motion to approve the petitioned rules and begin the rulemaking process. Upon review by the Office of State Budget and Management, it was determined that sufficient state funds are not available to implement the proposed rule changes without undue detriment to the agency's existing activities, and the rules were never adopted.

To ensure compliance with interstate requirements, North Carolina also manages spot under the North Carolina Fishery Management Plan for Interjurisdictional Fisheries (IJ FMP). The goals of the IJ FMP are to adopt fishery management plans, consistent with N.C. law, approved by the Mid-Atlantic Fishery Management Council, South Atlantic Fishery Management Council, or the ASMFC by reference and implement corresponding fishery regulations in North Carolina to provide compliance or compatibility with approved fishery management plans and amendments, now and in the future. The goals of these plans, established under the Magnuson-Stevens Fishery Conservation and Management Act (federal council) and the Atlantic Coastal Fisheries

Cooperative Management Act (ASMFC), are similar to the goals of the N.C. Fisheries Reform Act of 1997 to "ensure long-term viability" of these fisheries (NCDMF 2015).

Management Unit

Delaware through the east coast of Florida.

Goal and Objectives

The primary goal of the Omnibus Amendment is to bring the FMPs for Spanish mackerel, spot, and spotted seatrout under the authority of the Act, providing for more efficient and effective management and changes to management in the future. The objectives for spot under this amendment are to:

- Increase the level of research and monitoring of spot bycatch in other fisheries, and to complete a coast-wide stock assessment.
- Manage the spot fishery to encourage reduced mortality on spot stocks until age-1.
- Develop research priorities that will further refine the spot management program to maximize the biological, social, and economic benefits derived from the spot population. The Omnibus Amendment does not require specific fishery management measures in either the recreational or commercial fisheries for states within the management unit range.

DESCRIPTION OF THE STOCK

Biological Profile

Spot (*Leiostomus xanthurus*) are short-lived, estuarine dependent members of the drum family, ranging from the Gulf of Maine to Florida but are most abundant from the Chesapeake Bay to South Carolina (ASMFC 2010). Spot generally reach maturity by age one or two (ASMFC 2010) and spawn in the ocean from late fall to early spring (Hildebrand and Schroeder 1928; Roelofs 1951; Dawson 1958; Hoese 1973). Length at 50 percent maturity is generally between seven and 11 inches total length (ASMFC 2010). Wind and currents carry the young into the upper reaches of the estuaries where they remain throughout the spring (Warlen and Chester 1985; Govoni and Spach 1999; Hare et al. 1999; Odell et al. 2017). Adult spot migrate seasonally between estuarine and nearshore ocean waters but are rarely found in the upper reaches of the estuary (Hildebrand and Schroeder 1928; Dawson 1958; Hoese 1973; Odell et al. 2017). Spot are bottom feeders, eating mostly worms, small crustaceans, and mollusks (ASMFC 2010). Spot are most susceptible to commercial and recreational fishing activity during the fall when schools migrate from estuarine to oceanic waters (Pacheco 1962).

Stock Status

The first benchmark stock assessment for spot was completed in 2017 but was not recommended for use in management by a peer review panel (ASMFC 2017). However, the review panel did not identify any major problems in the fishery that would require immediate management action.

Because there is no currently approved stock assessment, the stock status for spot with relation to overfishing or overfished is unknown.

To evaluate the status of the stock between stock assessments, the TLA established under Addendum II and revised under Addendum III, is reviewed annually in years when an assessment is not already being conducted. The name comes from assigning a color (red, yellow, green) to categorize relative levels of indicators on the condition of the population (abundance metric) or fishery (harvest metric). For example, as harvest or abundance decrease, the amount of red in that year becomes more predominant.

Under the TLA configuration established under Addendum III (ASMFC 2020a), management action outlined in Addendum III has been triggered coast-wide at the 30% threshold. The harvest composite index, which combines recreational and commercial harvest data, triggered at the 30% threshold in both regions in 2019. The Mid-Atlantic index has exceeded the 30% threshold for four of the last five years and the South Atlantic index has exceeded the 30% threshold in three of the last five years (ASMFC 2020b; Figure 1). The adult abundance composite characteristic, which combines fishery independent surveys, exceeded the 30% threshold in five of the last six years in the Mid-Atlantic region (no 2019 data point as ChesMMAP indices not available) but has not exceeded the 30% threshold in the South Atlantic region since 2007 (Figure 2). The South Atlantic index indicates a general increase in adult abundance since 2016 (increasing green portion), primarily driven by higher adult abundance in the SEAMAP index compared to the NCDMF Program 195 index. While not used for management decisions, the composite juvenile abundance index consisting of North Carolina Program 195 trawl survey data is reviewed annually. This index has not exceeded any threshold since 2016 indicating consistent or increasing trends in recruitment (Figure 3). The TLA for the 2020 fishing year will be reviewed later in 2021. Because harvest indices for both regions and abundance indices for the Mid-Atlantic were above 30% in two of the last three years, a management response as outlined in Addendum III was enacted in March 2021.

Stock Assessment

A benchmark stock assessment, completed in 2017, did not pass peer review and will not be used for management (ASMFC 2017, 2020). Uncertainty in assessment results was due to disagreement between trends in harvest and abundance. Abundance in fishery-independent surveys has generally been increasing whereas commercial and recreational harvest has been declining. The review panel noted that the discard estimates from the shrimp trawl fishery were an improvement, and recommended shrimp trawl discard estimates be incorporated into annual monitoring using the TLA.

DESCRIPTION OF THE FISHERY

Current Regulations

The 2020 TLA review (2019 terminal year) for spot triggered at the 30% threshold and coast-wide management action as outlined in Addendum III was enacted in March 2021 (ASMFC 2020b). The management response outlined in Addendum III specifies, non *de minimis* states are

required to implement a 50 fish bag limit for their recreational fishery and must reduce commercial harvest by 1% of the average state commercial harvest from the previous 10 years. In North Carolina, the 50 fish per person per day recreational bag limit was effective April 15th, 2021 (FF-23-2021). The commercial spot fishery will close December 10th, 2021 through April 4th, 2022 to meet the required 1% reduction. Management measures will remain in place for at least two years and future TLA updates will determine future management action after this time.

Commercial Fishery

Two gear types (gill nets and haul seines) are used in directed commercial trips and harvest of spot. Other gear types, including sciaenid pound nets, beach seines, swipe nets, and crab pots contribute minimally to commercial landings. The North Carolina Trip Ticket Program (NCTTP) has collected data on commercial harvest since 1994. Commercial landings have fluctuated with higher catches reported in the 1990's and have generally declined since 2001, averaging 1,706,895 pounds since 1989 (Table 1; Figure 3). The lowest landings in the time series have occurred in the past six years. In 2020, commercial landings were 547,026 pounds, which is an increase from 2019. Commercial spot landings in 2020 were higher than recreational harvest for the first time since 2000. Spot are a component of the scrap or bait fishery in North Carolina, but this component generally makes up a small percentage of landings.

Recreational Fishery

Spot are targeted recreationally by shore-based anglers and those fishing from private vessels during the fall. Recreational estimates across all years have been updated and are now based on the Marine Recreational Information Program (MRIP) Fishing Effort Survey-based calibrated estimates. For more information on MRIP see https://www.fisheries.noaa.gov/topic/recreational-fishing-data. Recreational harvest averaged 2,406,929 pounds from 1989 through 2020 (Table 1). Recreational harvest fluctuated but was generally steady from 1989 through 2007 before declining in 2008 and fluctuating little since except for a peak in 2014 (Table 1; Figure 4). In 2020, recreational harvest reached a time series low of 297,813 pounds, a decrease of 554,185 pounds from 2019. The number of individuals landed in 2020 was also the lowest of the timeseries at 920,512 individuals. Number of releases averaged 3,006,992 individuals from 1989 through 2020. The number of releases in 2020 was below average at 1,673,676, a decrease of 682,444 individuals from 2019 releases.

The number of spot measured during MRIP sampling has generally declined since 2011, only 131 individuals were measured in 2020 which is among the lowest in the time series (Table 2). Mean fork length (FL) in 2020 was 8.1 inches but there has been little fluctuation since 1989 ranging from 7.6 to 9.2 inches. Similarly, minimum and maximum FL have remained consistent, though in 2017, 2019, and 2020 maximum FL was smaller than in other years. In 2020, modal length in the recreational harvest was 7.0 inches with 36.3 percent of the recreational catch within this size class (Figure 5). The recreational fishery harvests similar size classes to the commercial fishery except for the smaller size classes, 4 to 5 inches FL, which are not caught in the commercial fishery. Most of the recreational catch consists of spot from 6.0 to 9.0 inches FL with little change in length composition since 1989 (Figure 6). However, in the '90s and early

2000s, a wider range of lengths was harvested in the recreational fishery. Primarily, spot over 12 inches FL have not been observed in the recreational fishery for the past 10 years.

Harvest data from the Recreational Commercial Gear License (RCGL) were collected from 2002 to 2008. The program was discontinued in 2009 due to a lack of funding. From 2002 to 2008, an average of 203,383 pounds was harvested per year, ranging from 97,753 to 339,077 pounds (Table 3).

MONITORING PROGRAM DATA

During 2020, sampling was impacted during March through June due to the COVID pandemic. Executive Order (EO) 116, issued on March 10, 2020, declared North Carolina under a State of Emergency, and was soon followed by EO 120 which implemented a statewide Stay at Home Order for all non-essential State employees. During this time, limited sampling occurred.

Fishery-Dependent Monitoring

The number of spot lengths obtained from commercial fish house sampling has generally decreased since 1994 ranging from 2,241 to 15,614 (Table 4). Mean, minimum, and maximum FL has fluctuated but generally been stable. Mean FL ranged from 6.7 to 8.9 inches. In 2020, 2,930 spot were measured from commercial fisheries with a mean FL of 8.0 inches, a minimum of 5.0 inches, and a maximum of 11.7 inches. Bait samples are included in minimum, maximum, and mean length calculations.

In 2020, modal length in the commercial fishery was 8.0 inches FL, with 53.9% of the commercial catch within this size class (Figure 5). There were no fish in size classes under 6.0 inches TL in the commercial fishery, but commercial catches included larger size classes than in the recreational fishery. The length composition and modal length of spot caught in the commercial fishery (excluding bait samples) increased slightly from 1994 through the early 2000s (Figure 7). The range of lengths harvested narrowed in the late 2000s with little change since.

Fishery-Independent Monitoring

The number of spot aged using otoliths in North Carolina from 1997 through 2019 has ranged from 230 to 684 (Table 5). Modal age was one in every year except 2004 when modal age was two and in 2016 when modal age was zero. Minimum age was zero in every year, while maximum age ranged from two to six and is most frequently three. There is substantial overlap in length at age for ages zero through three with length at age becoming less variable after age four (Figure 8).

The Pamlico Sound Survey (Program 195) samples 54 randomly selected stations (grids) in June and September annually. Stations are randomly selected from strata based upon depth and geographic location. Tow duration is 20 minutes, using double rigged demersal mongoose trawls (9.1 m headrope, 1.0 X 0.6 m doors, 2.2-cm bar mesh body, 1.9-cm bar mesh cod end, and a 100-mesh tailbag extension). During 2020, sampling was impacted due to the COVID pandemic.

During this time, sampling was limited to 28 stations sampled in June and 35 stations sampled in September.

Data from this survey are used to produce juvenile abundance indices (JAI) that are incorporated into ASMFC stock assessments and reported annually to ASMFC as part of compliance reports and for incorporation into the TLA. Length cutoffs for juvenile spot are fish <120 mm FL (4.7 inches) in June, and fish <140 mm FL (5.5 inches) in September. The spot weighted JAI from the Pamlico Sound Survey is highly variable in both June and September with a time series average of 433 and 349 respectively (Figure 9). Throughout the time series large peaks tend to be followed by large declines. June JAI reached a peak of 1,267 individuals per tow in 2008 and September JAI peaked at 703 individuals per tow in 2005. The 2020 JAI was greater in June at 241 individuals per tow compared to 399 individuals per tow in September but the 2020 June JAI fell below the time series average. Both June and September 2020 JAI decreased compared to the 2019 JAI.

Most spot captured in the Pamlico Sound Survey are juveniles (age-0), but a number of age one or greater fish are captured in some years producing two distinct length modes, particularly in June. One mode is around 3.0 inches FL (age-0), and the other is around 6.0 inches FL (age-1 or greater; Figure 10). Modal length from the September portion of the Pamlico Sound Survey is more variable than June ranging from 2.0 to 5.0 inches FL with a wider range of lengths captured. Representation of smaller size classes shows an increasing trend in both months over the past five years.

RESEARCH NEEDS

There are no research or monitoring programs required of the states except for the submission of an annual compliance report. However, several coast-wide and state-specific research recommendations have been identified through the FMP process, and the stock assessment peer review and include (ASMFC 2017):

- Expand collection of life history data for examination of lengths and age, especially fishery-dependent data sources – HIGH (Ongoing in North Carolina)
- Organize an otolith exchange and develop an ageing protocol between ageing labs – HIGH (Needed)
- Increase observer coverage for commercial discards, particularly the shrimp trawl fishery – HIGH (Ongoing in North Carolina)
- Develop a standardized, representative sampling protocol and pursue collection of individual lengths and ages of discarded finfish – HIGH (Ongoing in North Carolina)
- Continue state and multi-state fishery-independent surveys throughout the species range and subsample for individual lengths and ages. Ensure NEFSC trawl survey continues to take lengths and ages. Examine potential factors affecting catchability in long-term fishery-independent surveys – HIGH (Ongoing in North Carolina)
- Continue to develop estimates of length-at-maturity and year-round reproductive dynamics throughout the species range. Assess whether temporal and/or density-dependent shifts in reproductive dynamics have occurred – HIGH (Needed)
- Re-examine historical ichthyoplankton studies for an indication of the magnitude of

estuarine and coastal spawning, as well as for potential inclusion as indices of spawning stock biomass in future assessments. Pursue specific estuarine data sets from the states (NJ, VA, NC, SC, DE, ME) and coastal data sets (MARMAP, EcoMon) – HIGH (Needed)

- Develop and implement sampling programs for state-specific commercial scrap and bait fisheries in order to monitor the relative importance of spot. Incorporate biological data collection into program – MEDIUM (Ongoing in North Carolina)
- Conduct studies of discard mortality for commercial fisheries. Ask commercial fishermen about catch processing behavior for spot when trawl/gill nets brought over the rail to determine if the discard mortality rate used in the assessment is reasonable – MEDIUM (Needed)
- Conduct studies of discard mortality for recreational fisheries – MEDIUM (Needed)
- Collect data to develop gear-specific fishing effort estimates and investigate methods to develop historical estimates of effort – MEDIUM (Needed)
- Identify stocks and determine coastal movements and the extent of stock mixing, via genetic and tagging studies – MEDIUM (Needed)
- Investigate environmental and recruitment/ natural mortality covariates and develop a time series of potential covariates to be used in stock assessment models – MEDIUM (Needed)
- Investigate environmental covariates in stock assessment models, including climate cycles (e.g., Atlantic Multi-decadal Oscillation, AMO, and El Niño Southern Oscillation, El Niño) and recruitment and/or year class strength, spawning stock biomass, stock distribution, maturity schedules, and habitat degradation – MEDIUM (Needed)
- Investigate the effects of environmental changes (especially climate change) on maturity schedules for spot, particularly because this is an early maturing species, and because the sSPR estimates are sensitive to changes in the proportion mature – MEDIUM (Needed)
- Investigate environmental and oceanic processes in order to develop better understanding of larval migration patterns into nursery grounds – MEDIUM (Needed)
- Investigate the relationship between estuarine nursery areas and their proportional contribution to adult biomass (i.e., are select nursery areas along Atlantic coast contributing more to SSB than others, reflecting better juvenile habitat quality?) – MEDIUM (Needed)
- Develop estimates of gear-specific selectivity – MEDIUM (Needed)

MANAGEMENT STRATEGY

The TLA established under Addendum II and revised under Addendum III (approved February 2020) to the Omnibus Amendment is used as a precautionary management framework for spot. The TLA provides guidance in lieu of a current stock assessment. Addendum III incorporated the use of a regional approach (Mid-Atlantic NJ-VA and South Atlantic NC-FL) to better reflect localized fishery trends. Under this management program, if the amount of red in the Traffic Light for both population characteristics (adult abundance and harvest) meet or exceed the threshold for any two of the three most recent years, then management action is required. The harvest composite triggered at the 30% threshold in both regions in 2019. The adult abundance composite exceeded the 30% threshold in the Mid-Atlantic region but not in the South Atlantic region. Since both population characteristics were above the 30 percent threshold in at least two years (2017-2019), management actions were implemented in March 2021. See Table 6 for a summary of management strategies.

LITERATURE CITED

ASMFC (Atlantic States Marine Fisheries Commission). 1987. Fishery Management Plan for Spot. Washington (DC): ASMFC Fisheries Management Report #11. Atlantic States Marine Fisheries Commission. Washington, District of Columbia. 90 pp.

ASMFC. 2010. Spot life history report: report to the ASMFC South Atlantic State/Federal Fisheries Management Board. Washington (DC): ASMFC. 44 pp.

ASMFC. 2012. Omnibus Amendment to the Interstate Fishery Management Plans for Spanish Mackerel, Spot, and Spotted Seatrout. Atlantic States Marine Fisheries Commission. Washington, District of Columbia. 131 pp.

ASMFC. 2014. Addendum II to the Omnibus Amendment to the Interstate Fishery Management Plans for Spanish Mackerel, Spot, and Spotted Seatrout. Atlantic States Marine Fisheries Commission. Arlington, VA. 7 pp.

ASMFC. 2017. 2017 spot stock assessment peer review. Arlington, VA. 12 pp.

ASMFC. 2020a. Addendum III to the Omnibus Amendment to the Interstate Fishery Management Plans for Spanish mackerel, spot, and spotted seatrout. Arlington, VA. 14 pp.

ASMFC. 2020b. Traffic Light Analysis of spot (*Leiostomus xanthurus*). Arlington, VA. 31 pp.

Dawson, C.E. 1958. A study of the biology and life history of the spot, *Leiostomus xanthurus* Lacepede, with specific reference to South Carolina. Bears Bluff Lab Contr 28. 48 pp.

Govoni, J.J. and H.L. Spach. 1999. Exchange and flux of larval fishes across the western Gulf Stream front south of Cape Hatteras, USA, in winter. Fisheries Oceanography 8(2):77-92.

Hare, J.A., J.A. Quinlan, F.E. Werner, B.O. Blanton, J.J. Govoni, R.B. Forward, L.R. Settle, and D.E. Hoss. 1999. Larval transport during winter in the SABRE study area: results of a coupled vertical larval behavior-three dimensional circulation model. Fisheries Oceanography 8(2):57-76.

Hildebrand, S.F., and W.C. Schroeder. 1928. The fishes of Chesapeake Bay. Bulletin of the United States Bureau of Fisheries 43(1). 388 pp.

Hoese, H.D. 1973. A trawl study of nearshore fishes and invertebrates of the Georgia coast. Contributions in Marine Science 17:63-98.

Caddy, J.F. 1998. A short review of the precautionary reference points and some proposals for their use in data-poor situations. FAO Fisheries Technical Paper No. 379. 30 pp.

Caddy, J.F. 1999. Deciding on precautionary management measures for a stock based on a suite of Limit Reference Points (LRPs) as a basis for a multi-LRP harvest law. NAFO Sci. Council Studies 32:55-68.

Caddy, J.F. 2002. Limit reference points, traffic lights, and holistic approaches to fisheries management with minimal stock assessment input. Fisheries Research 56:133-137.

NCDMF (North Carolina Division of Marine Fisheries). 2015. Fishery Management Plan for Interjurisdictional Fisheries: Information Update. North Carolina Department of Environmental Quality. North Carolina Division of Marine Fisheries. Morehead City, North Carolina. 85 pp.

Odell, J., D.H. Adams, B. Boutin, W. Collier II, A. Deary, L.N. Havel, J.A. Johnson Jr., S.R. Midway, J. Murray, K. Smith, K.M. Wilke, and M.W. Yuen. 2017. Atlantic sciaenid habitats: A review of utilization, threats, and recommendations for conservation, management, and research. Atlantic States Marine Fisheries Commission Habitat Management Series No. 14, Arlington, VA. 144 p.

Pacheco, A.L. 1962. Movements of spot, *Leiostomus xanthurus*, in the lower Chesapeake Bay. Chesapeake Science 3(4):256-257.

Warlen, S.M., and A.J. Chester. 1985. Age, growth, and distribution of larval spot, *Leiostomus xanthurus*, off North Carolina. US National Marine Fisheries Service. Fisheries Bulletin 83(4):587-599.

TABLES

Table 1. Spot recreational harvest and number released (Marine Recreational Information Program), commercial harvest (North Carolina Trip Ticket Program), and total harvest, 1989-2020. All weights are in pounds.

	Recreational			Commercial	Total
	Numbers		Weight (lb)	Weight (lb)	Weight (lb)
Year	Landed	Released	Landed	Harvest	Harvest
1989	10,246,429	1,995,653	3,566,280	3,254,464	6,820,744
1990	7,920,697	2,868,842	2,453,645	3,455,460	5,909,105
1991	9,894,562	3,454,466	3,066,857	3,047,296	6,114,153
1992	5,043,969	2,908,974	1,431,733	2,826,128	4,257,861
1993	6,877,688	1,445,961	2,879,162	2,672,157	5,551,319
1994	14,032,650	2,365,031	4,571,386	2,937,311	7,508,697
1995	8,199,743	2,214,819	3,214,061	3,006,845	6,220,906
1996	6,729,366	2,234,354	2,461,892	2,290,000	4,751,892
1997	4,529,620	1,110,650	2,129,481	2,627,925	4,757,406
1998	11,797,824	2,379,578	4,596,119	2,396,979	6,993,098
1999	5,736,185	2,343,795	2,565,546	2,262,175	4,827,721
2000	6,121,384	1,366,746	2,598,813	2,829,818	5,428,631
2001	10,043,845	2,804,349	4,519,545	3,093,872	7,613,417
2002	8,456,981	1,569,579	3,017,466	2,184,032	5,201,498
2003	9,717,824	2,970,990	4,220,534	2,043,387	6,263,921
2004	7,845,322	2,899,319	3,682,623	2,317,169	5,999,792
2005	10,105,205	4,407,100	3,652,186	1,714,597	5,366,783
2006	11,109,551	8,196,592	3,995,432	1,364,743	5,360,175
2007	8,728,295	4,049,250	2,737,144	879,091	3,616,235
2008	3,970,431	3,817,529	1,382,428	736,484	2,118,912
2009	4,197,640	4,847,202	1,427,956	1,006,500	2,434,456
2010	3,830,384	3,615,808	1,173,173	572,315	1,745,488
2011	6,480,714	4,993,544	2,201,947	936,970	3,138,917
2012	2,677,082	2,995,879	760,276	489,678	1,249,954
2013	6,120,985	5,513,732	1,789,251	768,592	2,557,843
2014	8,343,467	4,043,710	2,877,483	766,224	3,643,707
2015	2,572,738	2,984,629	833,390	376,994	1,210,384
2016	1,928,716	1,831,415	558,799	241,039	799,838
2017	2,418,331	1,902,281	909,796	413,999	1,323,795
2018	2,068,865	2,062,163	597,511	167,696	765,207
2019	2,822,884	2,356,120	851,998	392,067	1,244,065
2020	920,512	1,673,676	297,813	547,026	844,839
Mean	6,609,059	3,006,992	2,406,929	1,706,895	4,113,824

Table 2. Total number measured, mean, minimum, and maximum fork length (in) of spot measured by Marine Recreational Information Program (MRIP) sampling in North Carolina, 1989-2020.

Year	Number Measured	Mean Length	Minimum Length	Maximum Length
1989	1,513	7.9	4.5	13.6
1990	1,167	7.6	4.3	12.6
1991	3,022	7.6	4.0	13.3
1992	1,193	7.6	3.2	11.7
1993	1,385	8.4	4.9	13.5
1994	2,633	8.2	5.7	35.5
1995	2,040	8.5	4.3	19.4
1996	2,376	8.5	4.9	11.6
1997	1,762	8.7	5.7	15.6
1998	1,632	8.6	6.3	12.4
1999	1,159	9.1	5.5	11.5
2000	1,223	8.6	5.5	20.5
2001	1,627	8.8	5.4	13.9
2002	860	8.3	6.3	12.0
2003	1,403	8.7	4.6	14.2
2004	2,034	9.2	4.8	12.8
2005	1,286	8.4	5.2	16.2
2006	1,216	8.9	4.8	13.5
2007	1,243	9.1	5.7	12.0
2008	1,344	8.3	5.0	12.2
2009	682	8.4	5.0	10.8
2010	1,096	8.1	5.8	12.1
2011	1,534	8.2	5.9	11.1
2012	611	7.9	5.6	11.7
2013	484	7.9	4.5	11.5
2014	344	8.2	4.8	11.9
2015	214	8.1	6.1	11.9
2016	107	8.0	6.3	11.0
2017	98	8.1	6.3	10.6
2018	125	8.4	5.7	10.9
2019	276	7.7	5.0	10.1
2020	131	8.1	5.0	10.1

Table 3. North Carolina Recreational Commercial Gear License (RCGL) harvest of spot 2002-2008, with number of trips and landings in pounds. Estimates of trips and landings are from a RCGL survey conducted from 2002 to 2008; funding was discontinued in 2009.

Year	Trips	Harvest (lb)
2002	16,731	339,077
2003	11,799	255,060
2004	12,610	252,291
2005	9,703	193,769
2006	10,511	180,342
2007	7,399	97,753
2008	7,664	105,392
Average	10,917	203,383

Table 4. Mean, minimum, maximum fork length (in), and total number of spot measured from North Carolina commercial fish house samples, 1994-2020. Bait samples are included in calculation of mean, minimum and maximum length.

Year	Mean Length	Minimum Length	Maximum Length	Number Measured
1994	6.7	3.9	11.9	9,183
1995	6.8	3.9	15.4	11,136
1996	7.3	3.9	11.8	14,139
1997	7.4	3.9	13.3	15,574
1998	7.4	3.9	12.2	11,815
1999	7.7	3.9	11.7	9,188
2000	7.9	3.9	17.6	15,614
2001	8.5	3.9	12.4	15,584
2002	8.4	3.9	17.8	13,029
2003	8.6	3.9	13.9	12,907
2004	8.8	3.9	15.0	12,370
2005	8.9	4.0	13.1	15,535
2006	8.3	4.1	13.2	13,517
2007	7.9	3.9	12.0	13,889
2008	7.9	3.9	13.3	10,744
2009	8.1	3.9	11.7	9,087
2010	8.1	3.9	11.6	7,491
2011	8.1	4.3	13.1	8,906
2012	8.0	4.1	19.1	4,461
2013	8.3	4.2	13.3	4,699
2014	8.2	4.1	13.1	6,650
2015	8.3	4.3	12.8	4,543
2016	8.0	4.9	12.8	2,250
2017	8.3	4.4	11.7	2,643
2018	7.9	4.2	10.9	2,241
2019	8.0	4.4	16.1	3,719
2020	8.0	5.0	11.7	2,930

Table 5. Total number aged, modal, minimum, and maximum age of spot in North Carolina from fishery dependent and fishery independent sampling, 1997-2020. Includes otolith ages only. Age data from 2014 and 2020 are preliminary.

Year	Modal Age	Minimum Age	Maximum Age	Total Number Aged
1997	1	0	3	263
1998	1	0	3	603
1999	1	0	2	522
2000	1	0	3	551
2001	1	0	4	555
2002	1	0	5	603
2003	1	0	4	354
2004	2	0	6	455
2005	1	0	6	529
2006	1	0	5	501
2007	1	0	3	284
2008	1	0	3	408
2009	1	0	3	365
2010	1	0	3	268
2011	1	0	3	413
2012	1	0	4	230
2013	1	0	3	360
2014	1	0	3	684
2015	1	0	3	505
2016	0	0	3	373
2017	1	0	3	528
2018	1	0	3	516
2019	1	0	3	440
2020	1	0	2	454

Table 6. Summary of management strategies and needs.

Management Strategy	Implementation Status
Coastwide management action, as outlined in Addendum III, enacted in 2021 based on TLA triggering at the 30% threshold	In N.C., a 50 fish per person per day recreational bag limit went into effect April 15th, 2021. In N.C. the commercial spot fishery will close December 10th, 2021 through April 4th, 2022 to meet the required 1% reduction. Management measures will remain in place for at least two years and future TLA updates will determine future management action after this time.
Revise Traffic Light to better reflect trends in the spot population	Addendum III to the Omnibus Amendment , approved February 2020.
Establish Traffic Light method for monitoring the stock in non-assessment years	Addendum II to the Omnibus Amendment, 2014. Replaced triggers established by the Omnibus Amendment
Update FMP with Atlantic Coastal Fisheries Cooperative Management Act and Interstate Fishery Management Program requirements	Omnibus Amendment to the Interstate Fishery Management Plans for Spanish Mackerel, Spot, and Spotted Seatrout, 2012
ASMFC annual state compliance reports submitted in November each year	
Establish triggers to be used in monitoring stock in non-assessment years	
Promote the development and use of trawl efficiency devices (TEDs) through demonstration in the southern shrimp fishery, and fish separators in the finfish trawl fishery	Fishery Management Plan for Spot, 1987 Ongoing
Promote increases in yield per recruit through delaying entry to spot fisheries to ages greater than one	
Improve data collection to produce a stock assessment and improve management	

FIGURES

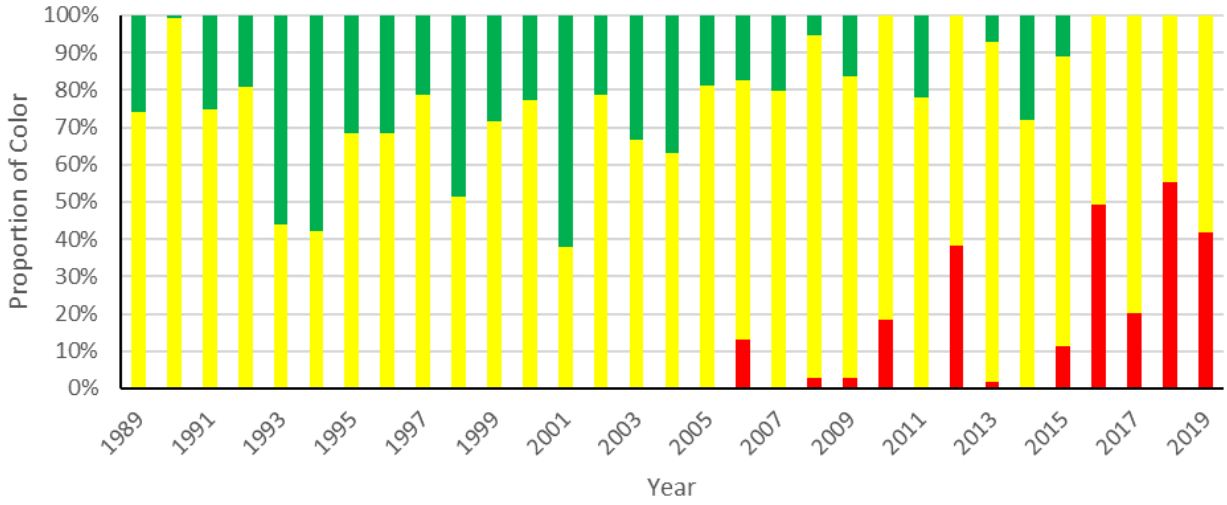

Figure 1. Annual TLA color proportions for South Atlantic region (NC-FL) harvest composite Traffic Light Analysis for spot recreational and commercial landings, 1989-2019 (ASMFC 2020b). The reference period is 2002-2012.

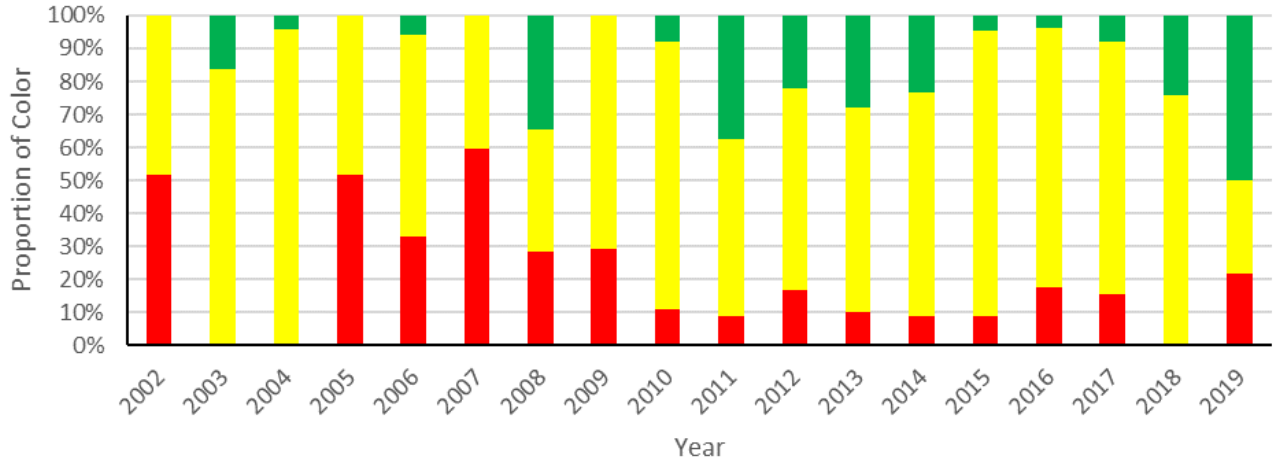

Figure 2. Annual TLA color portions for the South Atlantic region (NC-FL) abundance composite Traffic Light Analysis for adult spot (age 1+) fishery independent indices (SEAMAP and NCDMF Program 195), 2002-2019 (ASMFC 2020b). The reference period is 2002-2012.

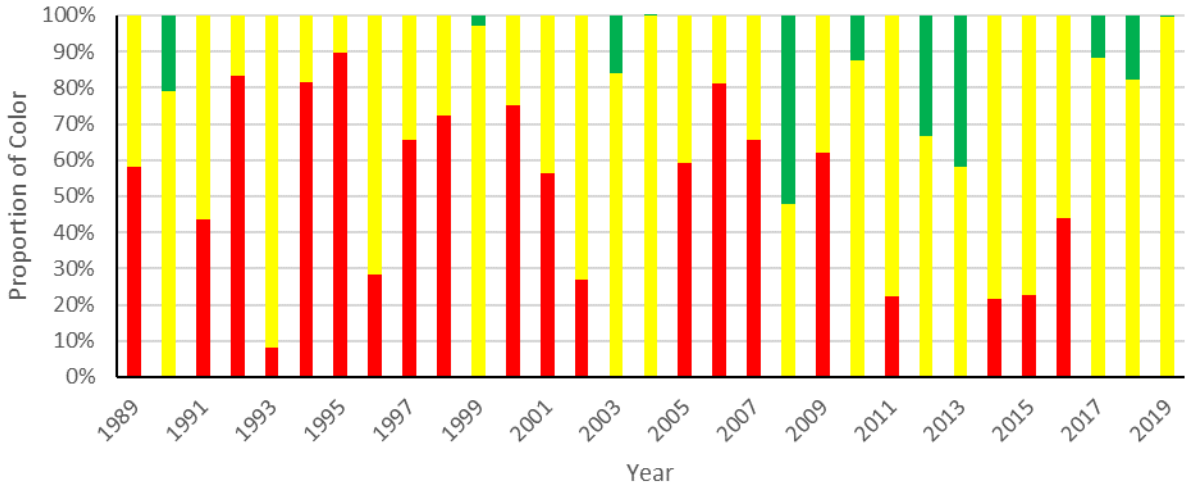

Figure 3. Annual TLA color proportions for the South Atlantic region abundance composite traffic light analysis for juvenile spot (age 0) from the NCDMF Pamlico Sound Survey, 1989-2019 (ASMFC 2020b). Juvenile index does not trigger management action. Reference period is 2002-2012.

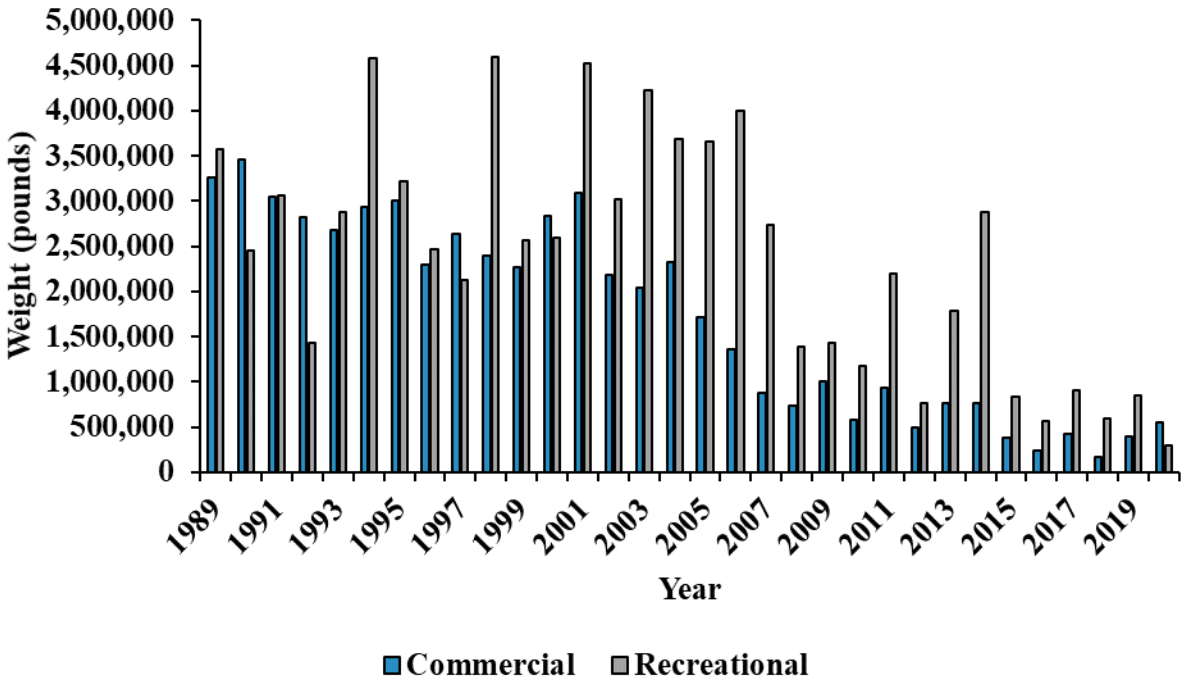

Figure 4. Annual commercial and recreational landings in lbs for spot in North Carolina, 1989-2020.

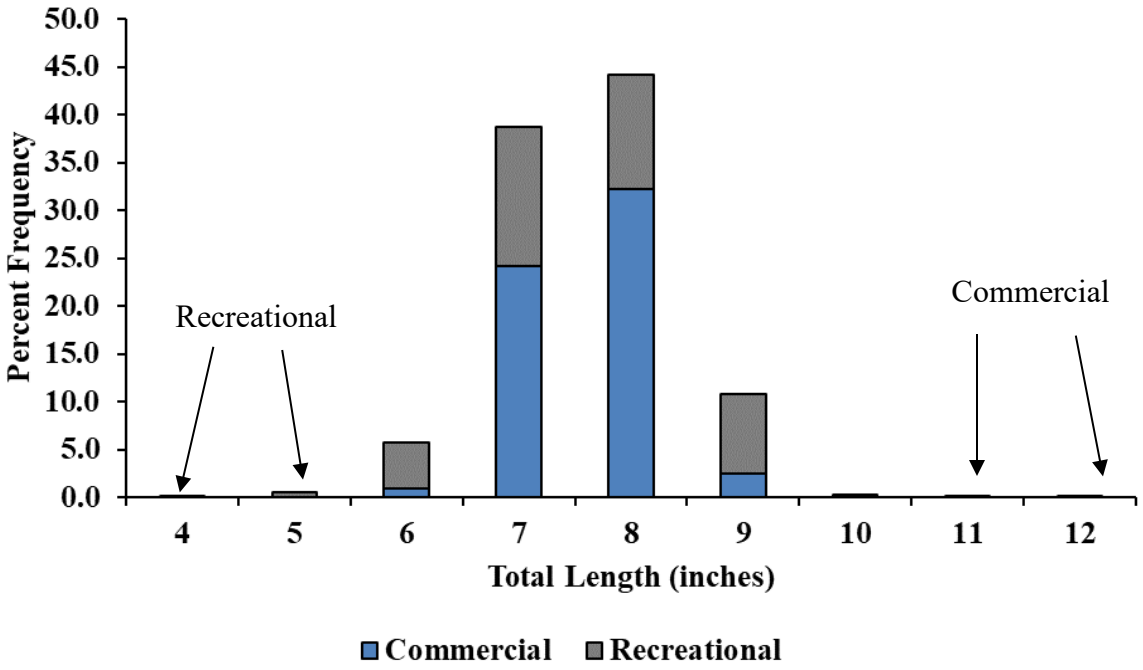

Figure 5. Commercial (n=1,368,762) and recreational (n=920,512) length frequency distribution from spot harvested in 2020.

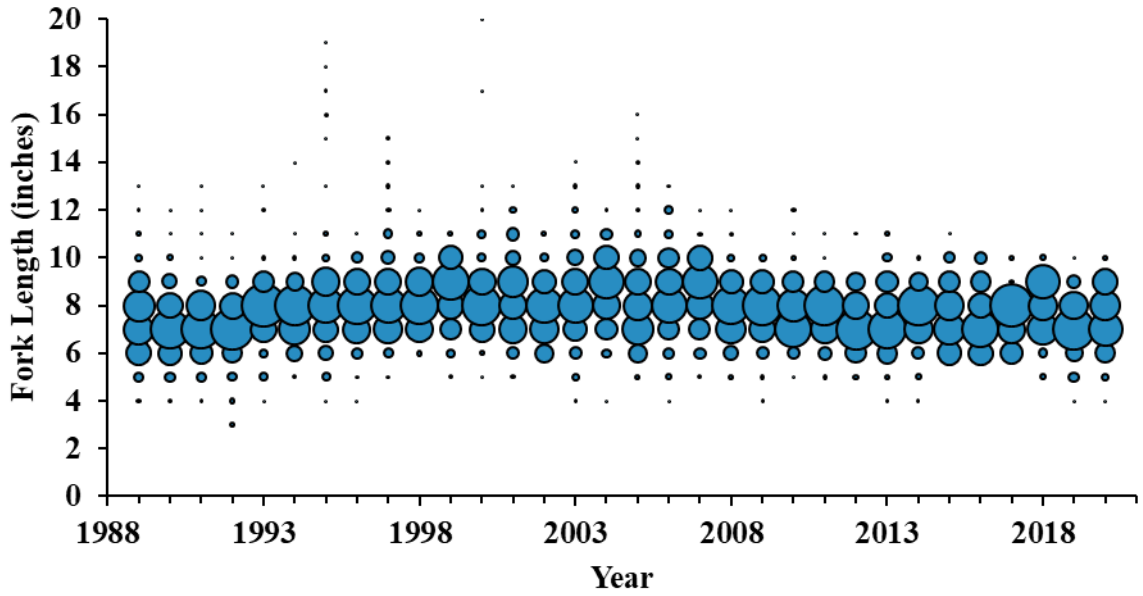

Figure 6. Recreational length frequency (fork length, in) of spot harvested from 1989 to 2020 (n=211,489,891). Bubble represents the proportion of fish at length.

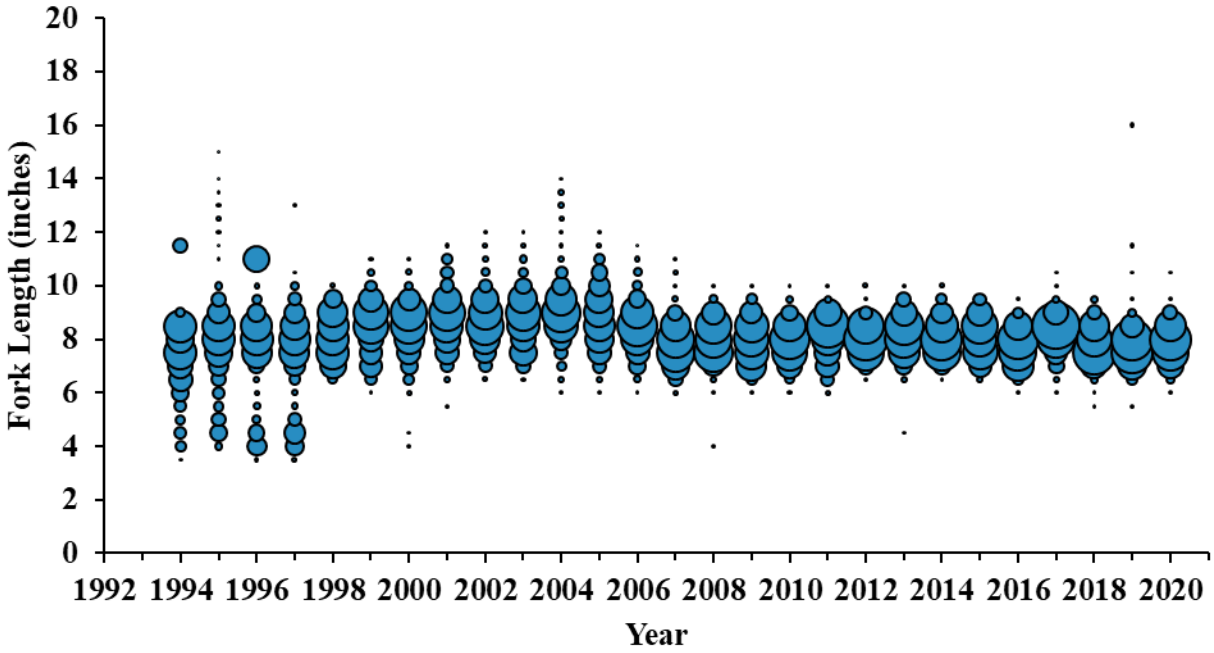

Figure 7. Commercial length frequency (fork length, in) of spot harvested from 1994 to 2020 from the trip ticket program and fish house sampling (n=98,254,447). Bubble represents the proportion of fish at length. Bait samples not included.

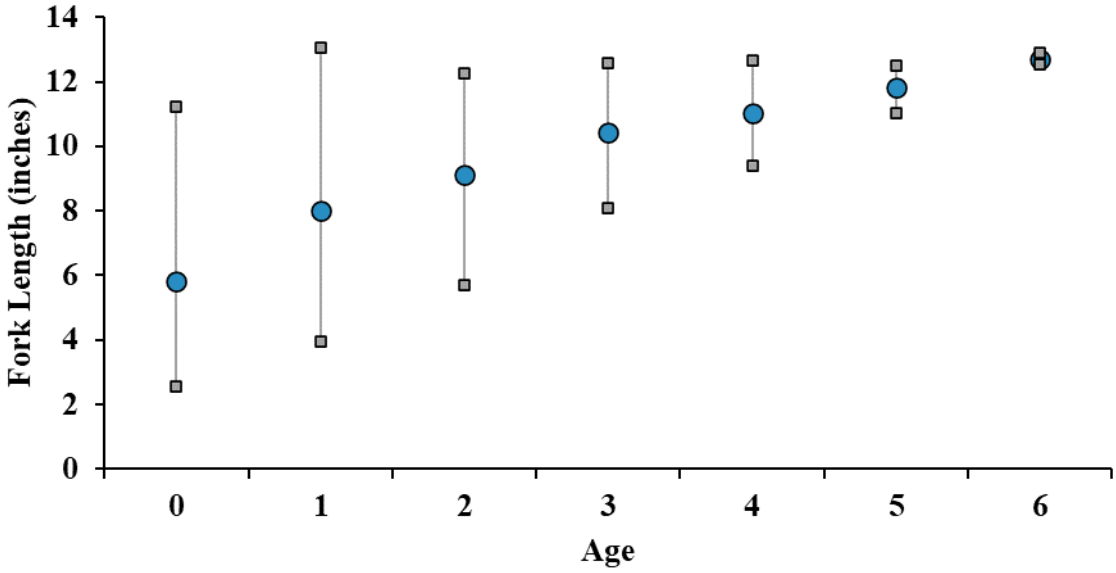

Figure 8. Spot length at age based on all otolith age samples collected from 1997 to 2020 (n=10,764). Blue circles represent the mean size at a given age while the grey squares represent the minimum and maximum observed size at age. Age data from 2014 and 2020 are preliminary.

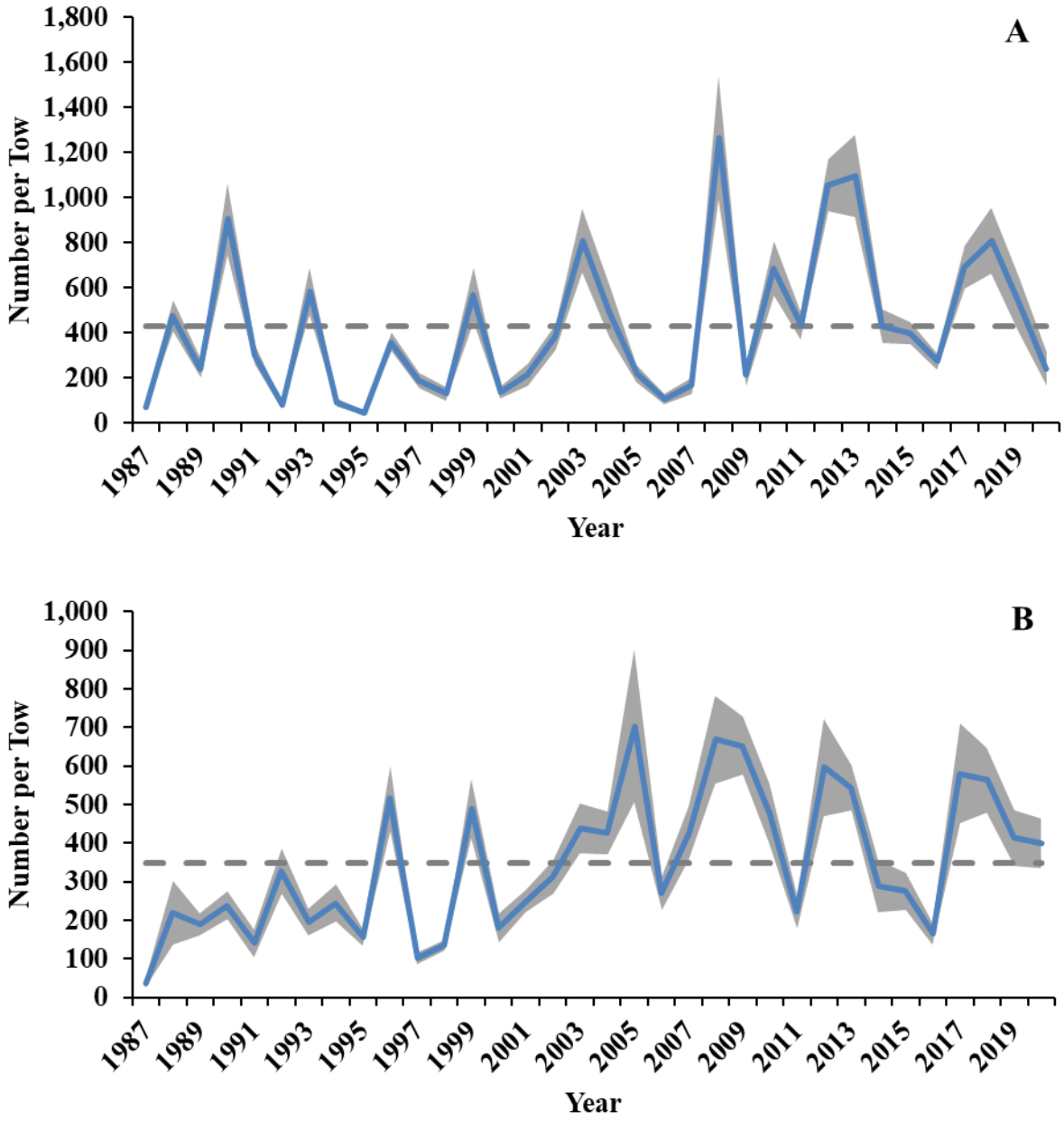

Figure 9. Spot juvenile (<120 mm 4.7 in June; <140mm 5.5 in September) weighted abundance index (number per tow) for June (A) and September (B) from the Pamlico Sound Survey, 1987 to 2020. Shaded area represents standard error and dashed line indicates time series average.

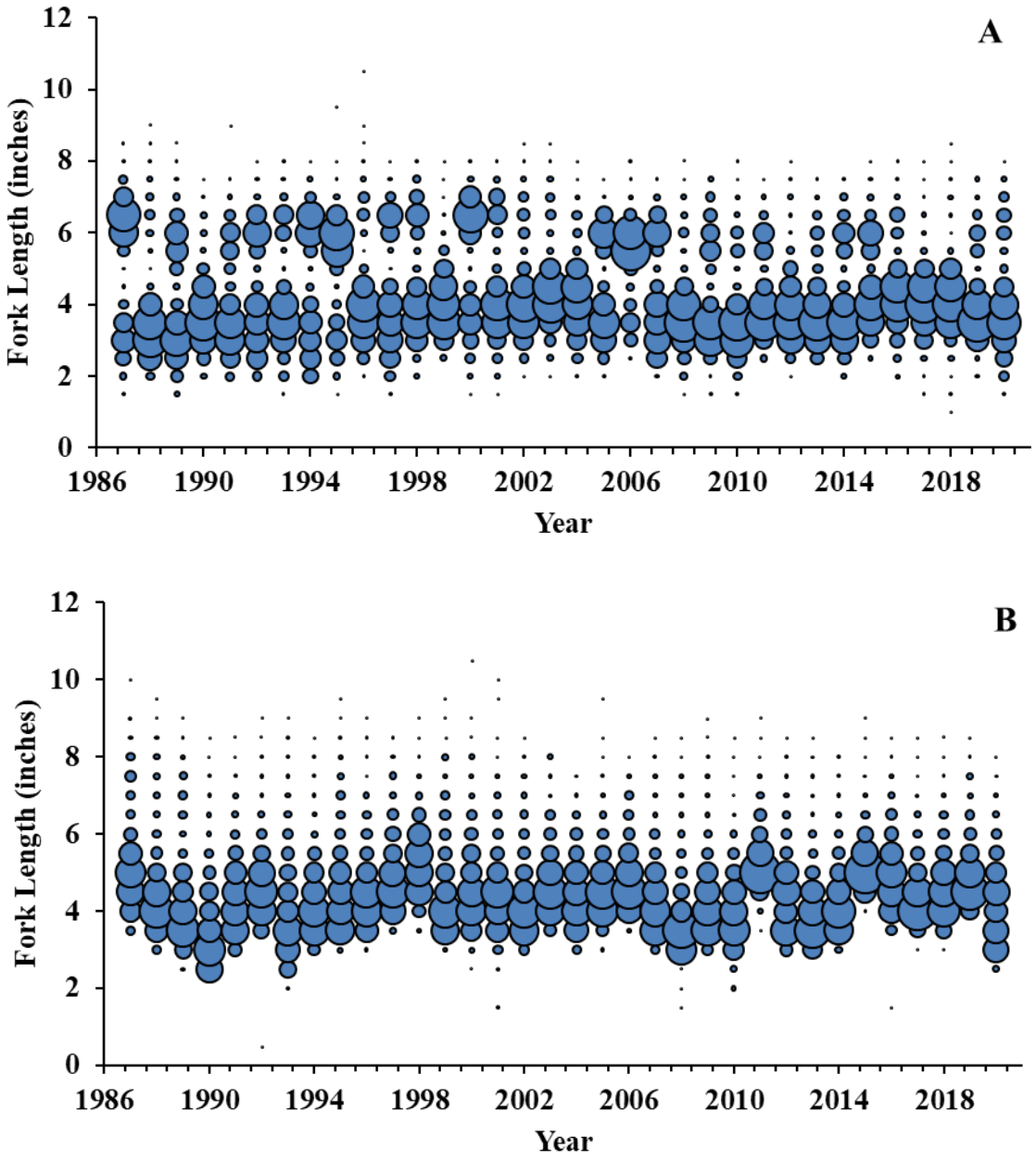

Figure 10. Length frequency of spot captured in Pamlico Sound Survey sampling during June (A) and September (B), 1987 to 2020. Bubble represents the proportion of fish at length.