

**FISHERY MANAGEMENT PLAN UPDATE
SPOT
AUGUST 2022**

STATUS OF THE FISHERY MANAGEMENT PLAN

Fishery Management Plan History

| | | |
|--------------------|-------------------|---------------|
| FMP Documentation: | October 1987 | |
| | Omnibus Amendment | August 2012 |
| | Addendum II | August 2014 |
| | Addendum III | February 2020 |

Comprehensive Review: 2024

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.

In August 2011, the South Atlantic State/Federal Fisheries Management Board (hereafter referred to as the Board) approved the Omnibus Amendment for Spot, Spotted Seatrout, and Spanish Mackerel. 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.

In August 2014, the Board approved Addendum II to the Omnibus Amendment which 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 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 coastwide 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. For additional information and links to the above-mentioned FMP, amendments, and addendums please refer to the ASMFC webpage for spot (<http://www.asmfc.org/species/spot>).

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. The goals of the North Carolina FMP for Interjurisdictional Fisheries is to adopt FMPs, consistent with North Carolina Law, approved by the Mid-Atlantic Fishery Management Council (MAFMC), South Atlantic Fishery Management Council (SAFMC), or the Atlantic States Marine Fisheries Commission (ASMFC) by reference and implement corresponding fishery regulations in North Carolina to provide compliance or compatibility with approved FMPs and amendments, now and in the future. The goal of the councils and ASMFC plans, established under the Magnuson-Stevens Fishery Conservation Management Act (federal councils) 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 the 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. Spot generally reach maturity by age one or two, rarely living beyond six years. Length at 50 percent maturity is generally between 7- and 11-inches total length. Juvenile and adult spot are bottom feeders, eating mostly worms, small crustaceans, and mollusks. Post-larvae and young-of-the-year spot prey on planktonic organisms (ASMFC 2010).

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 move offshore to spawn during cooler months from late fall to early spring (Hildebrand and Schroeder 1928; Roelofs 1951; Dawson 1958; Hoese 1973). 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). 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

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.

Results from the 2020 TLA (2019 terminal year) indicated harvest indices for both regions and abundance indices for the Mid-Atlantic were above 30% in two of the last three years and thus the TLA for spot triggered at the 30% threshold or moderate concern and management action as outlined in Addendum III was enacted in March 2021 (ASMFC 2020b).

Results of the 2021 TLA included 2020 data for only the harvest composite indices and indicated only the South Atlantic index exceeded the 30% threshold in 2020 (ASMFC 2021a). The Mid-Atlantic index exceeded the 30% threshold in 2018 and 2019 but dropped to about 20% red in 2020. The South Atlantic index has exceeded the 30% threshold since 2016 (ASMFC 2021a; Figure 1). The adult abundance composite characteristic, which combines fishery independent surveys, has exceeded the 30% threshold since 2011 in the Mid-Atlantic region (no 2019-2020 data point as ChesMMAP indices not available) but has not exceeded the 30% threshold in the South Atlantic region since 2007 (no 2019-2020 data point; 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 is highly variable and shows a large spike in the red portion in 2020 (Figure 3).

Stock Assessment

The next Spot Benchmark Stock Assessment is scheduled for 2024. The most recent and first benchmark Stock Assessment, completed in 2017, did not pass peer review and will not be used for management (ASMFC 2017, 2020). The assessment was not recommended for management because of concern over uncertainty in assessment results 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 coastwide 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 closed December 10th, 2021 through April 4th, 2022 to meet the required 1% reduction (FF-66-2021). The same commercial closure period will occur from December 2022 into April 2023. 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. Commercial landings have fluctuated with higher catches reported in the 1990's and have generally declined since 2001, averaging 1,562,390 pounds since 1991 (Table 1; Figure 4a). The lowest landings in the time series have occurred over the past seven years. In 2021, commercial landings were 527,468 pounds, which is a slight decrease from 2020. Commercial spot landings in 2020 and 2021 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. 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 (NCDMF 2021). 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>.

From 1991 through 2021 recreational harvest of spot in North Carolina ranged from 297,813 and 4,596,119 pounds or between 920,512 and 14,032,650 fish, with the lowest landings in both count and weight occurring in 2020 (Table 1, Figure 4b and 5). Harvest by weight was generally stable prior to 2008 when there was a notable decline in the time series. Harvest in the last seven years has been consistently low including four of the lowest values in the time series. Recreational harvest in 2021 was 1,199,080 fish and 435,231 pounds, a 30% increase in number of fish and a 46% increase in weight from 2020.

The number of recreational releases were relatively low in the first ten years of the time series remaining below 4 million fish. In 2006, there was a noticeable spike in releases of 8,196,592 fish and releases remained relatively high until dropping off in 2016 remaining consistently lower into 2021 (Figure 5). The percentage of released recreational catch has steadily increased over the time series from 14% to 66%. In 2021, anglers released 2,357,567 fish or 66% of all catches. This spike in discard percentage may be the result of the bag limit enacted in 2021.

The number of spot measured during MRIP sampling has generally declined since 2011, only 67 individuals were measured in 2021 which is the lowest in the time series (Table 2). Mean fork length (FL) in 2021 was 8.0 inches and there has been little fluctuation since 1991 ranging from 7.6 to 9.2 inches. Maximum FL has remained 10.1 inches for the past three years, while minimum FL dropped slightly in 2021 to 4.7 inches. 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. Length distribution from 2021 recreational catches ranged from 4.0 to 10.0 inches and when compared to commercial catches had greater representation of smaller size classes (Figure 7). The modal length in the recreational harvest was 8.0 inches with 44 percent of the recreational catch within this size class

MONITORING PROGRAM DATA

Fishery-Dependent Monitoring

In 2021, 3,082 spot lengths were obtained from commercial fish house sampling with a mean FL of 8.0 inches, and lengths ranging from 4.9 to 12.1 inches. Mean FL has been consistent since 2019 and relatively stable across the time series ranging from 6.7 to 8.9 inches. The number of spot lengths obtained from commercial fish house sampling has generally decreased since 1994 ranging

from 2,241 to 15,614 (Table 3). Bait samples are included in minimum, maximum, and mean length calculations.

Modal length generally increased from 1994 to the early 2000's (Figure 8). The range of lengths harvested narrowed in the late 2000s with little change since. Size trends in 2021 commercial samples indicate a dominance of 7.0- and 8.0-inch fish (Figure 7). When compared to the recreational fishery, the commercial fishery harvested a narrower range of sizes.

Fishery-Independent Monitoring

The number of spot aged in North Carolina's comprehensive life history program (P930) using otoliths from 1997 through 2021 has ranged from 230 to 783 (Table 4). In 2021, 783 spot were aged and preliminary data indicates the modal age was one and maximum age was five, a notable increase from the past eight years with a maximum age of three. Modal age was one in every year except 2004 when modal age was two and 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 9).

The Pamlico Sound Survey (Program 195) samples 54 randomly selected stations (grids) annually in June and September. 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). Data from this survey is 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 juvenile composite TLA. Length cutoffs for juvenile spot were updated in 2022 after analyzing length distribution of age-0 and age-1 spot in P930. Juvenile spot are defined as fish <140 mm TL (5.5 inches) in June, and fish <190 mm TL (7.5 inches) in September.

The COVID pandemic impacted sampling in 2020 and 2021. 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. In 2020, sampling was limited to 28 stations sampled in June and 35 stations sampled in September. A total of 35 stations were sampled in June 2021 and 32 stations were sampled in September 2021. Limited sampling likely impacted abundance indices calculated from Sound Survey data. An initial analysis of this impact was conducted for the 2020 spot abundance indices and concluded the magnitude of abundance may be overestimated slightly but limited sampling was likely able to capture the general abundance trends.

The spot weighted JAI from the Pamlico Sound Survey is highly variable in both June and September with a time series average of 460 and 393 respectively (Figure 10). Throughout the time series, large peaks tend to be followed by large declines. JAI reached a peak of 1,285 individuals per tow in June 2008 and 774 individuals per tow in September 2005. June JAI has been declining since 2018, dropping below the time series average in 2020 at 254 individuals per tow and 255 individuals per tow in 2021. September JAI has also declined since 2018 and dropped below the time series average in 2021 at 244 individuals per tow.

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 11). 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. Frequency of smaller size classes has increased 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. The top three recommendations are reported below (ASMFC 2021b). Additional research and monitoring recommendations can be found in the 2017 Spot Stock Assessment Peer Review Report (ASMFC 2017).

- Expand collection of life history data (age, growth, and reproduction data) from fishery dependent sources while maintaining these collections from ongoing state level fishery independent sources as well as multistate monitoring surveys. In addition, identification of coastal stocks and their movement through tagging and genetic studies.
- Increase efforts to characterize commercial discards through expanded observer coverage, particularly within the shrimp trawl fishery, and develop a standardized bycatch protocol with collection of lengths and ages of discards and by-catch. Other sources for discard mortality studies include scrap and bait fisheries, commercial gears and recreational gear, and direct research and engagement of commercial harvesters.
- Investigate environmental impacts of temperature shifts, climate change and large scale oceanic cycles (e.g., Atlantic Multi-Decadal Oscillation, AMO, and El Nino Southern Oscillation, El Nino) on recruitment SSB, stock distribution and maturity schedules for incorporation into stock assessment models.

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.

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TABLES

Table 1. Spot recreational harvest and number released (Marine Recreational Information Program), commercial harvest (North Carolina Trip Ticket Program), and total harvest, 1991–2021. All weights are in pounds.

| Year | Recreational | | | Commercial | |
|------|---------------|-----------------|--------------------|--------------------|-------------------|
| | Number Landed | Number Released | Weight Landed (lb) | Weight Landed (lb) | Total Weight (lb) |
| 1991 | 9,894,562 | 3,454,466 | 3,066,857 | 3,047,305 | 6,114,162 |
| 1992 | 5,043,969 | 2,908,974 | 1,431,733 | 2,826,138 | 4,257,871 |
| 1993 | 6,877,688 | 1,445,961 | 2,879,162 | 2,672,164 | 5,551,326 |
| 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 | 377,028 | 1,210,418 |
| 2016 | 1,928,716 | 1,831,415 | 558,799 | 241,044 | 799,843 |
| 2017 | 2,418,331 | 1,902,281 | 909,796 | 415,465 | 1,325,261 |
| 2018 | 2,068,865 | 2,062,163 | 597,511 | 167,696 | 765,207 |
| 2019 | 2,822,884 | 2,356,120 | 851,998 | 392,206 | 1,244,204 |
| 2020 | 920,512 | 1,673,676 | 297,813 | 542,870 | 840,683 |
| 2021 | 1,199,080 | 2,357,567 | 435,231 | 527,468 | 962,699 |
| Mean | 6,274,898 | 3,023,123 | 2,304,420 | 1,562,390 | 3,866,810 |

Table 2. Mean, minimum, maximum fork length (inches), and total number of spot measured by Marine Recreational Information Program (MRIP) sampling in North Carolina, 1989–2021.

| Year | Mean Fork Length | Minimum Fork Length | Maximum Fork Length | Number Measured |
|------|------------------|---------------------|---------------------|-----------------|
| 1991 | 7.6 | 4.0 | 13.3 | 3,022 |
| 1992 | 7.6 | 3.2 | 11.7 | 1,193 |
| 1993 | 8.4 | 4.9 | 13.5 | 1,385 |
| 1994 | 8.2 | 5.7 | 35.5 | 2,633 |
| 1995 | 8.5 | 4.3 | 19.4 | 2,040 |
| 1996 | 8.5 | 4.9 | 11.6 | 2,376 |
| 1997 | 8.7 | 5.7 | 15.6 | 1,762 |
| 1998 | 8.6 | 6.3 | 12.4 | 1,632 |
| 1999 | 9.1 | 5.5 | 11.5 | 1,159 |
| 2000 | 8.6 | 5.5 | 20.5 | 1,223 |
| 2001 | 8.8 | 5.4 | 13.9 | 1,627 |
| 2002 | 8.3 | 6.3 | 12.0 | 860 |
| 2003 | 8.7 | 4.6 | 14.2 | 1,403 |
| 2004 | 9.2 | 4.8 | 12.8 | 2,034 |
| 2005 | 8.4 | 5.2 | 16.2 | 1,286 |
| 2006 | 8.9 | 4.8 | 13.5 | 1,216 |
| 2007 | 9.1 | 5.7 | 12.0 | 1,243 |
| 2008 | 8.3 | 5.0 | 12.2 | 1,344 |
| 2009 | 8.4 | 5.0 | 10.8 | 682 |
| 2010 | 8.1 | 5.8 | 12.0 | 1,096 |
| 2011 | 8.2 | 5.9 | 11.1 | 1,534 |
| 2012 | 7.9 | 5.6 | 11.7 | 611 |
| 2013 | 7.9 | 4.5 | 11.5 | 484 |
| 2014 | 8.2 | 4.8 | 11.9 | 344 |
| 2015 | 8.1 | 6.1 | 11.9 | 214 |
| 2016 | 8.0 | 6.3 | 11.0 | 107 |
| 2017 | 8.1 | 6.3 | 10.6 | 98 |
| 2018 | 8.4 | 5.7 | 10.9 | 125 |
| 2019 | 7.7 | 5.0 | 10.1 | 276 |
| 2020 | 8.1 | 5.0 | 10.1 | 131 |
| 2021 | 8.0 | 4.7 | 10.1 | 67 |

Table 3. Mean, minimum, maximum fork length (inches), and total number of spot measured from North Carolina commercial fish house samples, 1994–2021. 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 | 12.5 | 3,200 |
| 2021 | 8.0 | 4.9 | 12.1 | 3,082 |

Table 4. Modal, minimum, maximum age, and total number of spot aged in North Carolina from fishery dependent and fishery independent sampling, 1997–2021. Includes otolith ages only. Age data from 2014 and 2021 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 | 3 | 452 |
| 2021 | 1 | 0 | 5 | 783 |

FIGURES

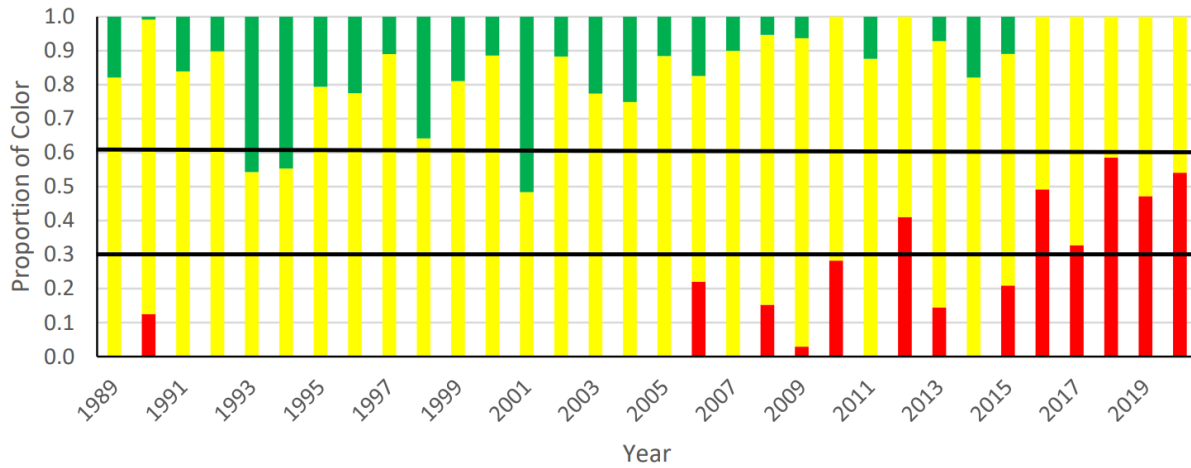


Figure 1. Annual harvest composite TLA color proportions for South Atlantic region (NC-FL) spot recreational and commercial landings, 1989–2020 (ASMFC 2021a). The reference period is 2002–2012.

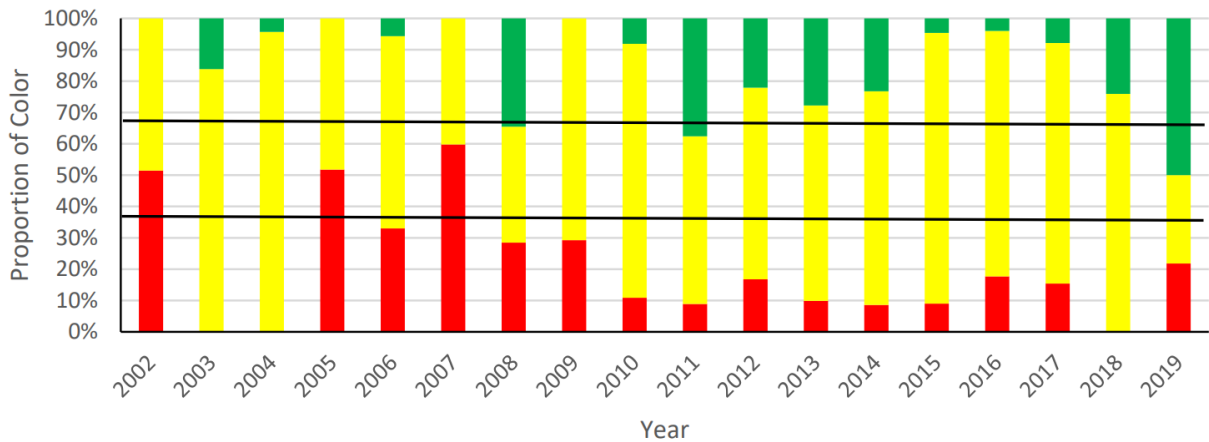


Figure 2. Annual abundance composite TLA color portions for the South Atlantic region (NC-FL) adult spot (age 1+) from fishery independent indices (SEAMAP and NCDMF Program 195), 2002–2019 (no 2020 data point due to limited sampling; ASMFC 2021a). The reference period is 2002–2012.

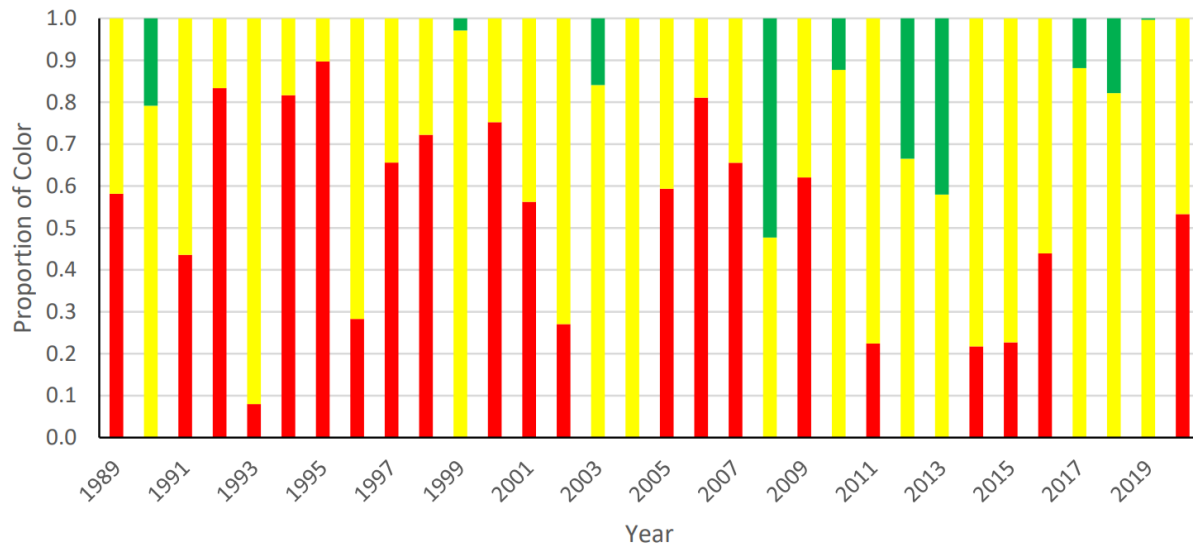


Figure 3. Annual TLA color proportions for the South Atlantic region abundance composite for juvenile spot (age 0) from the NCDMF Pamlico Sound Survey, 1989–2020 (ASMFC 2021a). Juvenile index does not trigger management action. Reference period is 2002–2012.

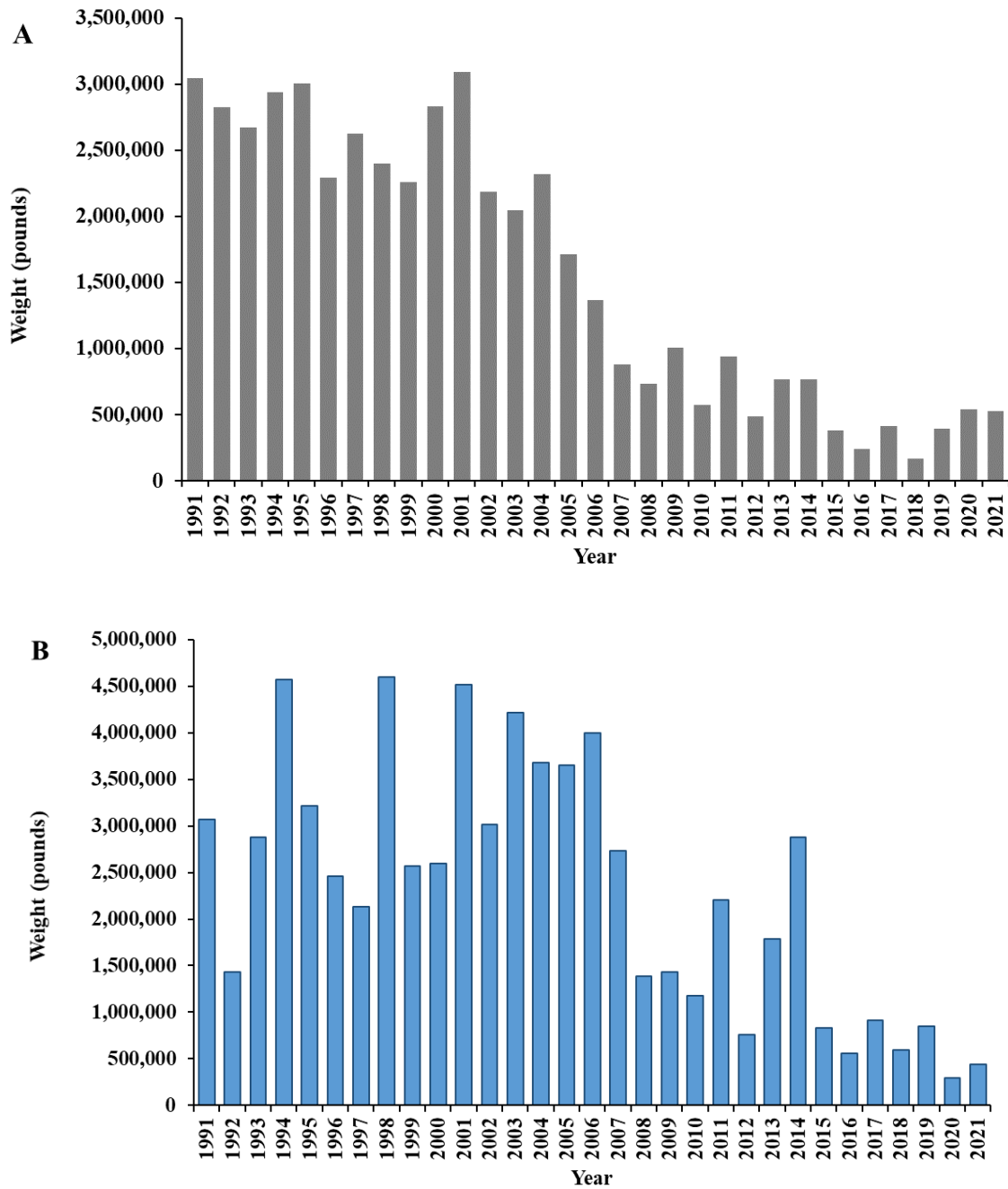


Figure 4. Annual A) commercial landings (North Carolina Trip Ticket Program) and B) recreational harvest (Marine Recreational Information Program) in pounds for spot in North Carolina, 1991–2021.

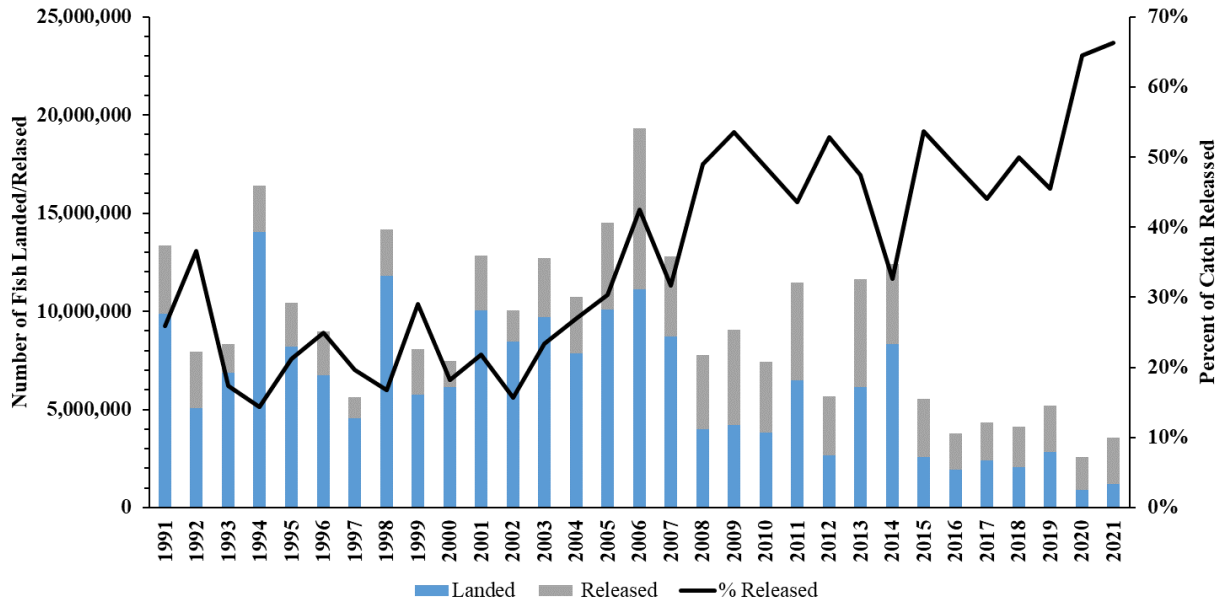


Figure 5. Recreational catch (landings and releases, in numbers) and the percent of catch that is released, 1991–2021 from the MRIP.

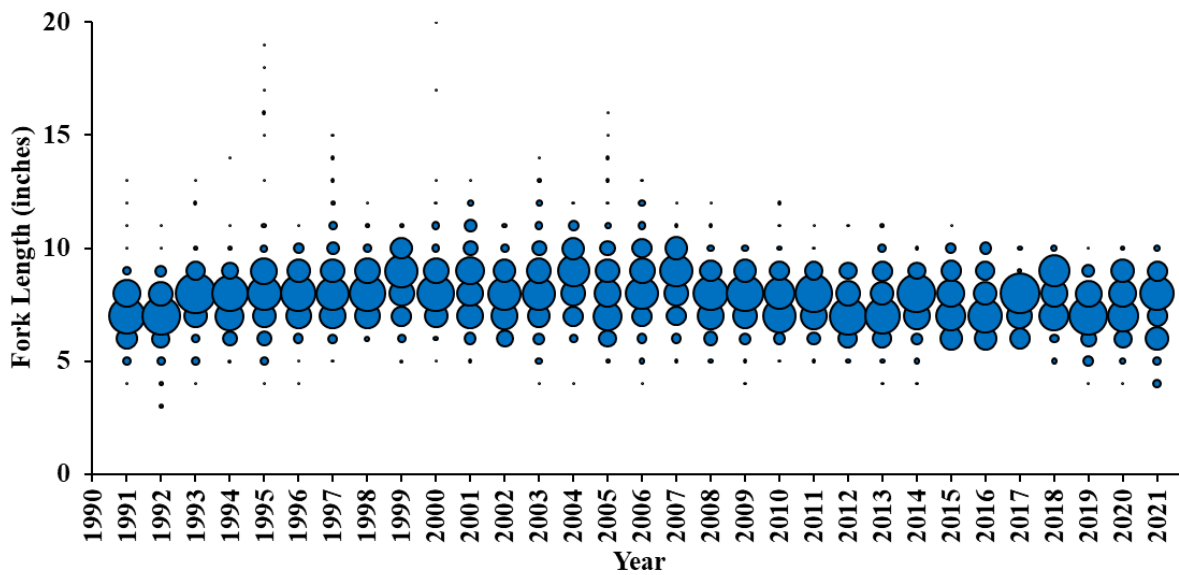


Figure 6. Recreational length frequency (fork length, inches) of spot harvested in North Carolina, 1991–2021 (MRIP, n=194,521,845). Bubble represents the proportion of fish at length.

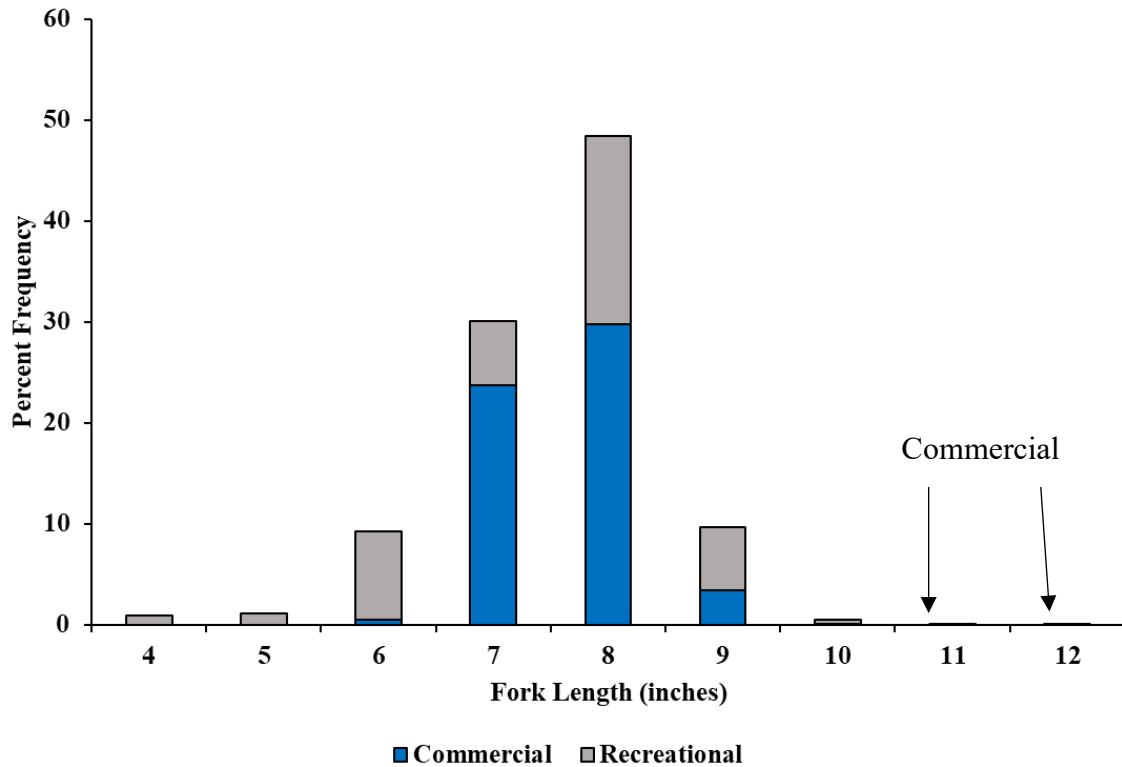


Figure 7. Commercial (n=1,625,386) and recreational (n=2,824,466) length frequency distribution for spot harvested in North Carolina, 2021.

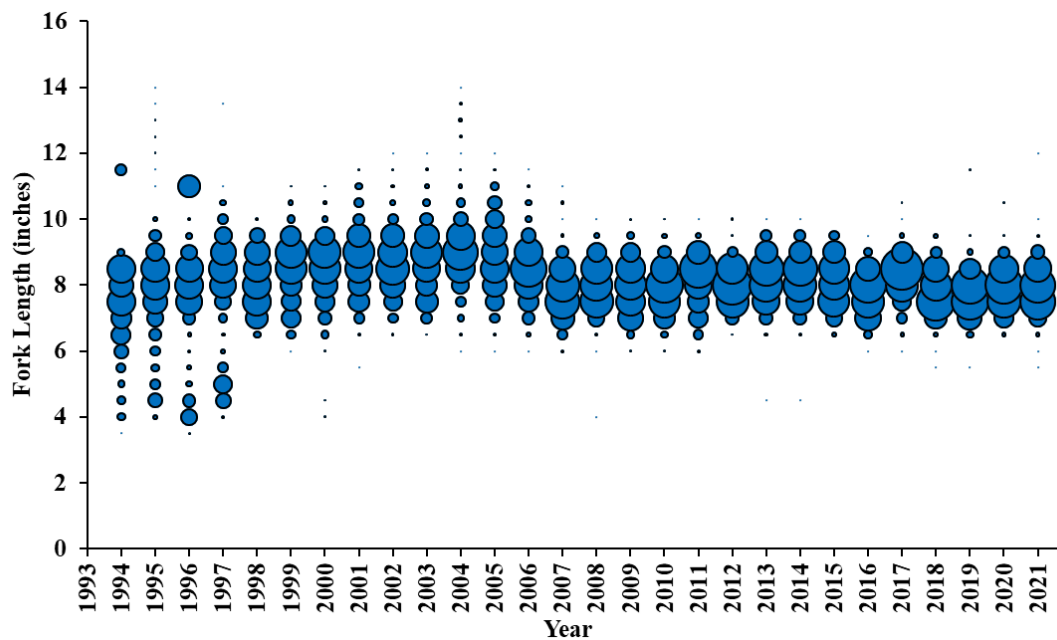


Figure 8. Commercial length frequency (fork length, inches) of spot harvested from 1994 to 2021. Bubble represents the proportion of fish at length. Bait samples not included.

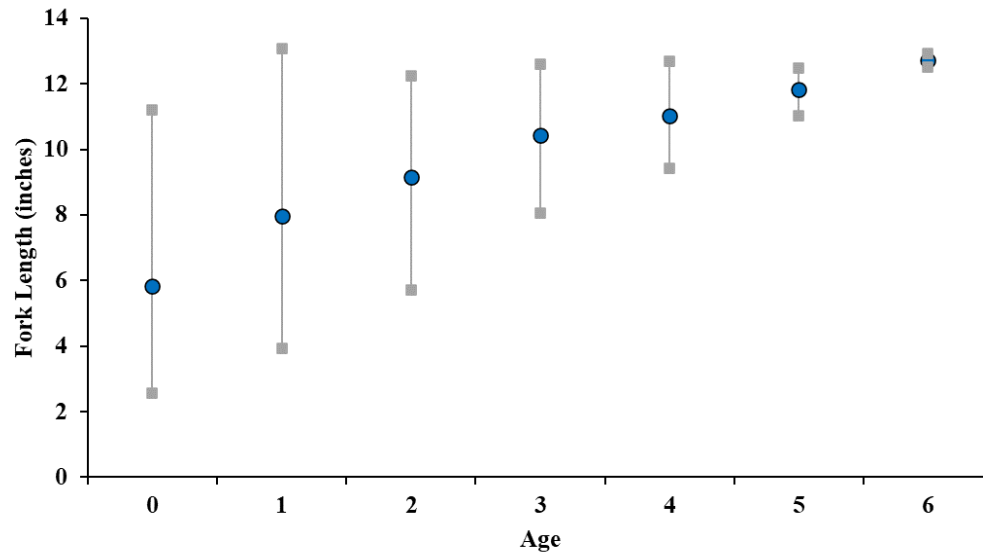


Figure 9. Spot length at age based on all otolith age samples collected from 1997 to 2020 (n=10,444). Blue circles represent the mean size at a given age while the grey squares represent the minimum and maximum observed size at age.

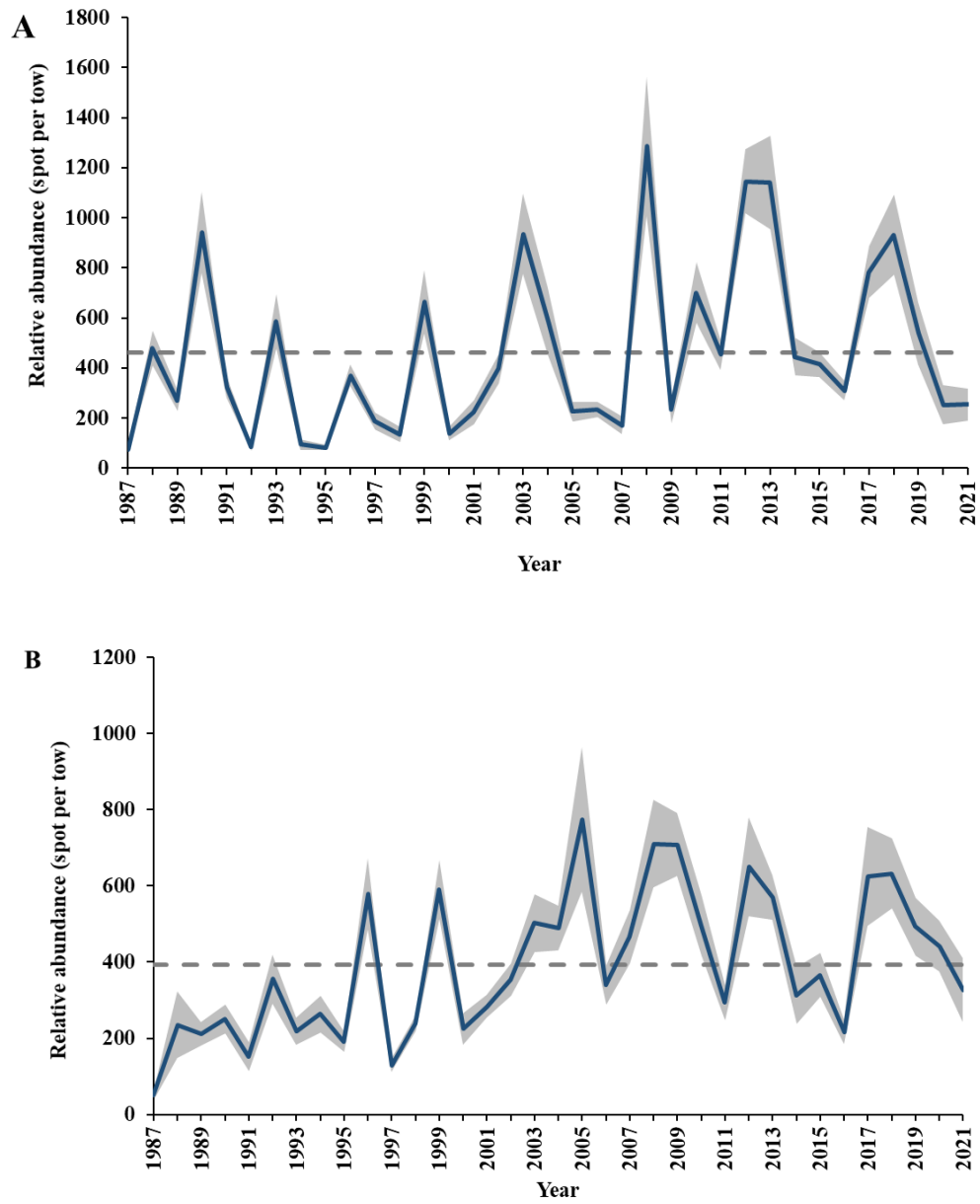


Figure 10. Spot juvenile weighted abundance index (number per tow) for A) June and B) September from the Pamlico Sound Survey, 1987–2021. Shaded area represents standard error and dashed line indicates time series average. Length cutoffs are <140 mm FL (5.5 in) in June and <190 mm TL (7.5 in) in September.

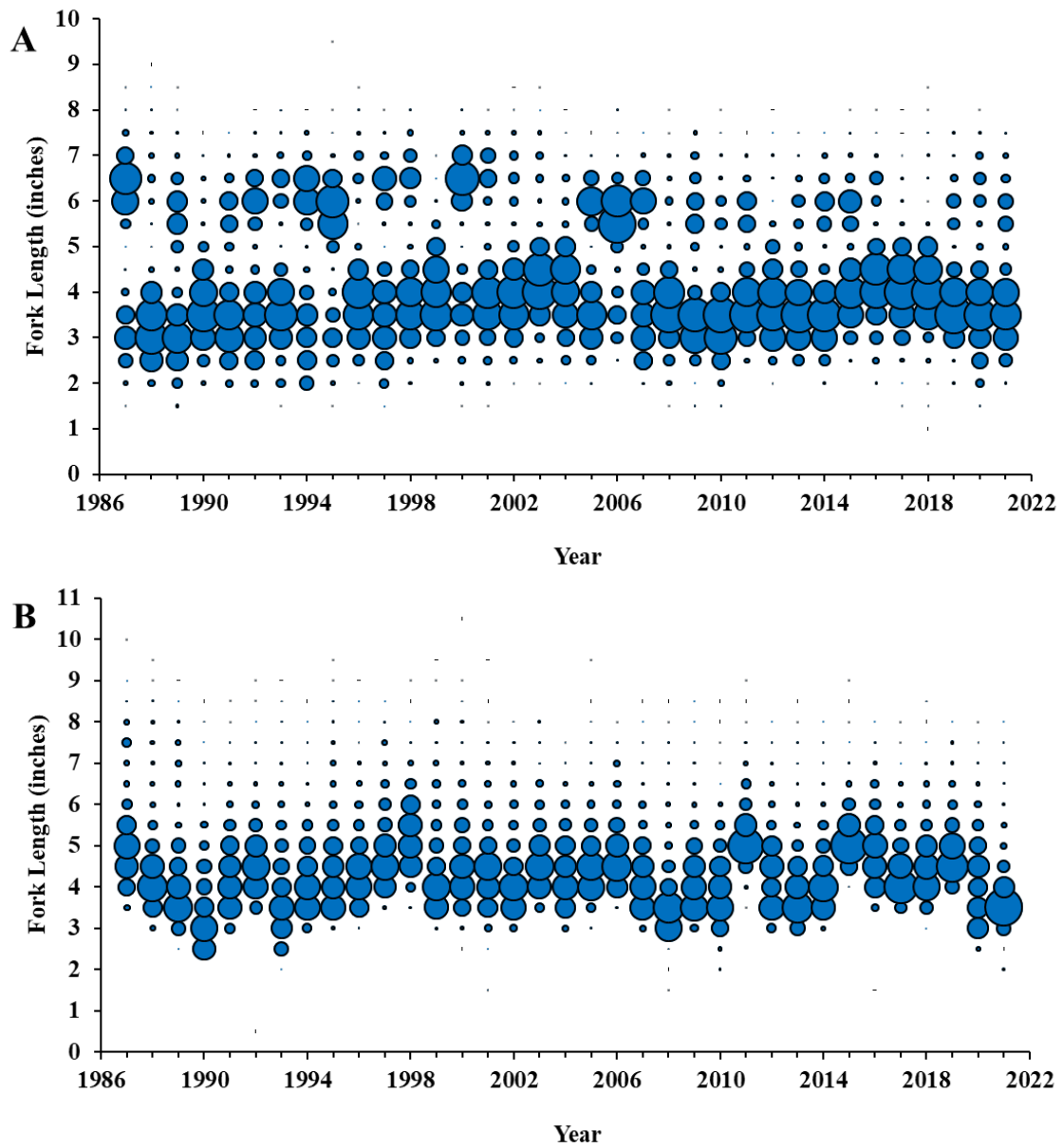


Figure 11. Length frequency (Fork Length, inches) of all spot captured in Pamlico Sound Survey sampling during A) June and B) September, 1987–2021. Bubble represents the proportion of fish at length.