

**FISHERY MANAGEMENT PLAN UPDATE  
SPOT  
AUGUST 2024**

**STATUS OF THE FISHERY MANAGEMENT PLAN**

**Fishery Management Plan History**

|                        |                   |               |
|------------------------|-------------------|---------------|
| Original FMP Adoption: | ASMFC FMP         | October 1987  |
| Amendments:            | Omnibus Amendment | August 2012   |
|                        | Addendum II       | August 2014   |
|                        | Addendum III      | February 2020 |
| Comprehensive Review:  | 2025              |               |

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 2020a). 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 Chesapeake Bay to South Carolina. Spot generally reach maturity by age one or two, rarely reaching a maximum age of six years. Length at 50 percent maturity is generally between seven- 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 of the 2022 TLA (2021 terminal year) indicated only the South Atlantic harvest composite characteristic index exceeded the 30% threshold in 2021 (ASMFC 2022). The Mid-Atlantic harvest composite index dropped below the 30% threshold in 2020 and 2021, to around 20% red in 2020 and 25% red in 2021 (ASMFC 2022). The South Atlantic harvest composite index has exceeded the 30% red threshold since 2016, with the 2021 index rising to around 55% red (ASMFC 2022; Figure 1). The TLA report cautioned that the harvest composite indices for 2021 should not be used to trigger management because catch restrictions were in place in 2021 (ASMFC 2022). The adult abundance composite index, which combines fishery independent surveys, has exceeded the 30% red threshold since 2011 in the Mid-Atlantic region (no 2020-2021 data points as ChesMMA indices were not available; ASMFC 2022). The South-Atlantic abundance composite index dropped below the 30% threshold in 2019, for the first time since 2015, to around 15% red (2020 and 2021 data were incomplete; Figure 2). 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 spikes in the red portion in 2020 and 2021 (Figure 3). Because both abundance composite indices were missing data for 2020 and 2021, a determination of whether the TLA triggered in 2021 or if management measures can be removed could not be made and management was maintained.

The TLA was not completed in 2023 due to continued unavailable data and so the Spot Technical Committee could focus on completing the 2025 benchmark stock assessment. The TLA will be completed in 2024 with available data through 2023.

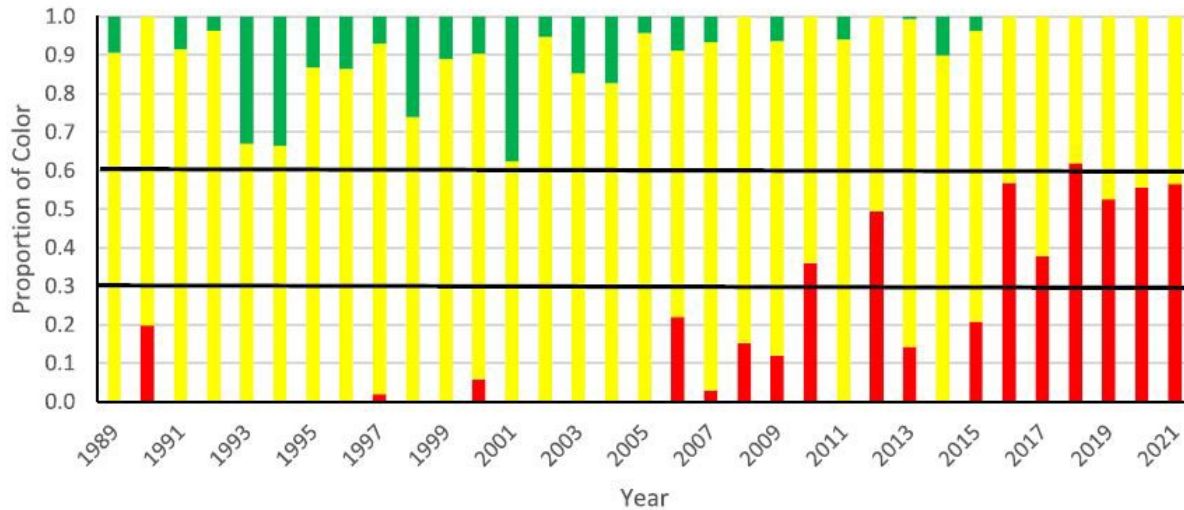


Figure 1. Annual harvest composite TLA color proportions for South Atlantic region (NC-FL) spot recreational and commercial landings, 1989 – 2021 (ASMFC 2022). The reference period is 2002-2012.

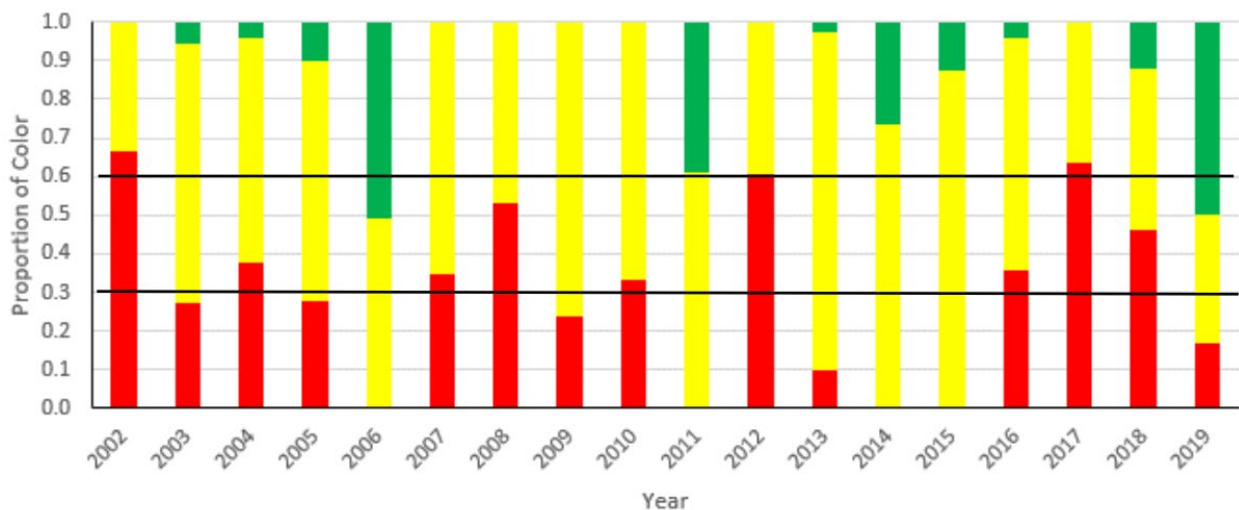


Figure 2. Annual abundance composite TLA color proportions for the South Atlantic region (NC-FL) adult spot (age 1+) from fishery-independent indices (SEAMAP and NCDMF Program 195), 2002-2019 (no 2020 or 2021 data due to limited sampling; ASMFC 2022). The reference period is 2002-2012.

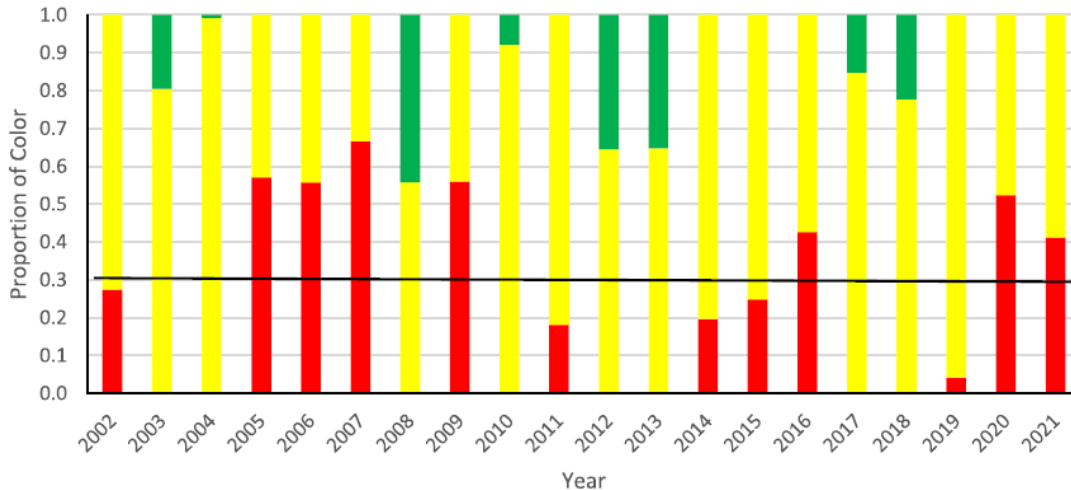


Figure 3. Annual TLA color proportions for the South Atlantic region abundance composite for juvenile spot (age 0) from the DMF Pamlico Sound Survey, 2002-2021 (ASMFC 2022). Juvenile index does not trigger management action. Reference period is 2002-2012.

### Stock Assessment

The next Spot Benchmark Stock Assessment is scheduled for 2025. 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 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) and has remained in place. The commercial spot fishery closed December 10<sup>th</sup>, 2022, through April 4<sup>th</sup>, 2023, and December 10<sup>th</sup>, 2023, through April 4<sup>th</sup>, 2024, to meet the required 1% reduction (FF-57-2022; FF-60-2023). 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. Higher commercial landings were reported in the 1990's but declined from 2001 to 2018. Landings have increased in recent years (since 2018), averaging 552,834 pounds since 2019 (Table 1; Figure 4). The lowest landings in the time series occurred in 2018 at 167,696 pounds. In 2023, commercial landings were 758,527 pounds, which is a 15% increase from 2022. Commercial spot landings have exceeded recreational harvest since 2020. Spot are a component of the scrap or bait fishery in North Carolina, but this component generally makes up a small percentage of landings.

Table 1. Spot recreational harvest and number released (Marine Recreational Information Program), commercial harvest (North Carolina Trip Ticket Program), and total harvest, 1989–2023. All weights are in pounds.

| Year | Recreational  |                 |                    | Commercial         |                          |
|------|---------------|-----------------|--------------------|--------------------|--------------------------|
|      | Number Landed | Number Released | Weight Landed (lb) | Weight Landed (lb) | Total Weight Landed (lb) |
| 1989 | 10,246,429    | 1,995,653       | 3,566,280          | 3,254,473          | 6,820,753                |
| 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          | 3,047,305          | 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          | 768,943            | 2,558,194                |
| 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            | 527,464            | 962,695                  |
| 2022 | 1,197,145     | 2,331,484       | 375,168            | 543,104            | 918,272                  |
| 2023 | 855,729       | 2,737,778       | 300,052            | 758,527            | 1,058,579                |
| Mean | 6,135,481     | 2,961,445       | 2,232,348          | 1,612,743          | 3,845,091                |

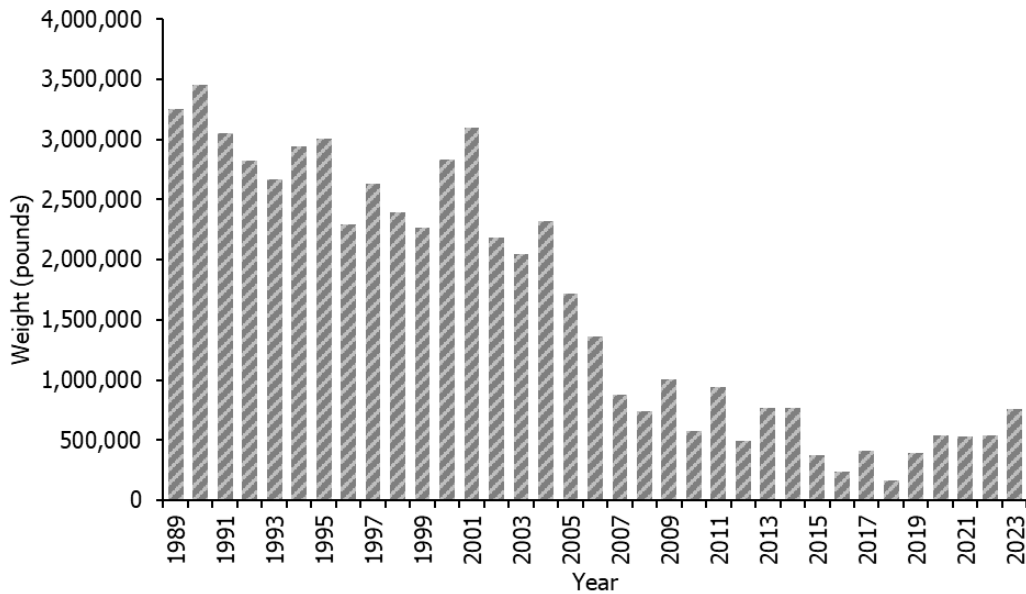


Figure 4. Annual commercial landings (North Carolina Trip Ticket Program) in pounds for spot in North Carolina, 1989–2023.

### Recreational Fishery

Recreational estimates across all years have been updated and are 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 1989 through 2023 recreational harvest of spot in North Carolina ranged from 297,813 to 4,596,119 pounds or between 920,512 and 11,797,824 fish, with the lowest landings in both count and weight occurring in 2020 (Table 1; Figures 5 and 6). Harvest by weight was generally stable prior to 2008 when there was a notable decline in the time series. Harvest in the last eight years has been consistently low. The three lowest values in the time series occurred in the last four years. Recreational harvest in 2023 was 855,729 fish or 300,052 pounds, a 29% decrease in number of fish and a 20% decrease in weight from 2022. Recreational harvest in 2023 was the second lowest in the time series.

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 increase in releases to 8,196,592 fish and releases remained relatively high until dropping in 2016, remaining between 1.6 million fish and 2.7 million fish into 2023 (Figure 6). The percentage of released recreational catch has steadily increased over the time series from 14% in 1994 to 76% in 2023, when anglers released 2,737,778 fish.

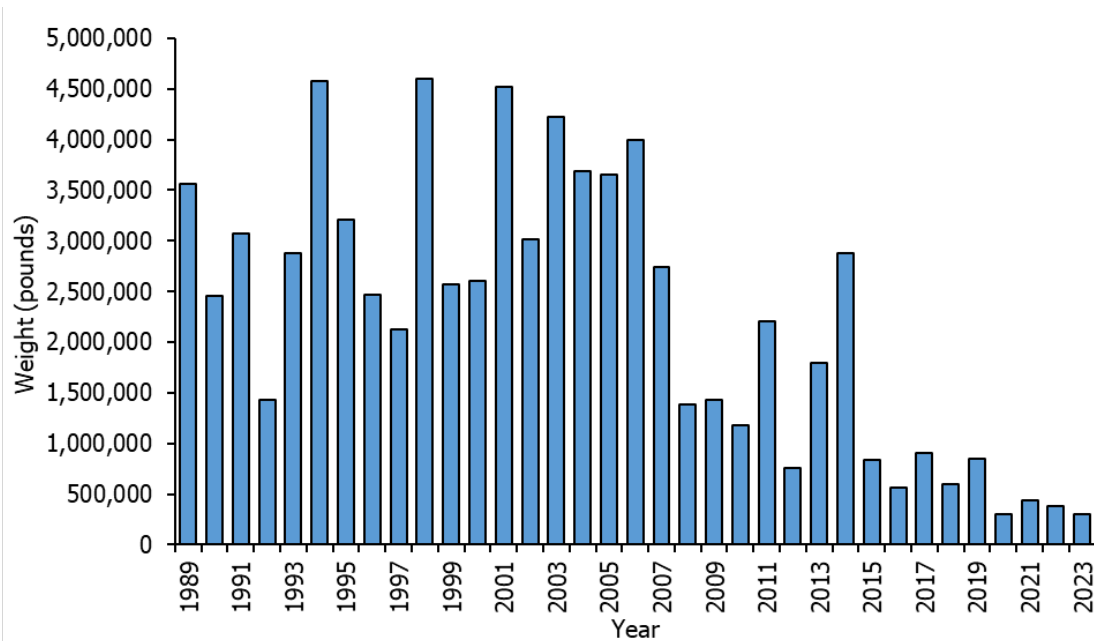


Figure 5. Annual recreational harvest (Marine Recreational Information Program) in pounds for spot in North Carolina, 1989–2023.

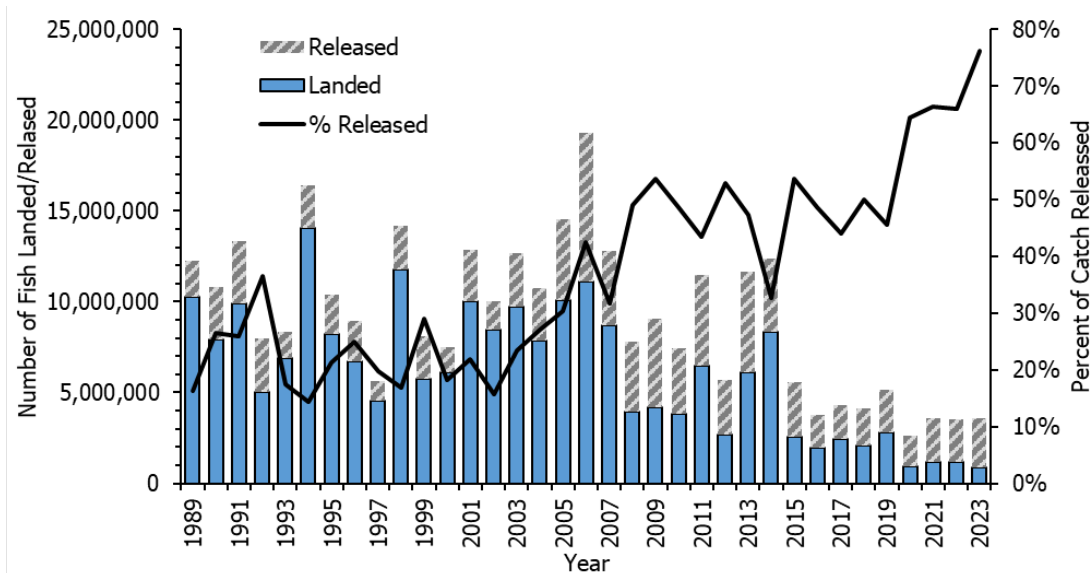


Figure 6. Recreational catch (landings and releases, in numbers) and the percent of catch that is released, 1989–2023 from the MRIP.

The number of spot measured during MRIP sampling has generally declined since 2011, with only 61 individuals measured in 2023 which is the lowest in the time series (Table 2). Mean fork length (FL) in 2023 was 7.8 inches and there has been little fluctuation since 1989 with mean length ranging from 7.6 to 9.2 inches. Maximum FL in 2023 was 11.0 inches, and minimum FL decreased in 2023 to 4.4 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 7). However, in the '90s and early 2000s, a wider range of lengths were harvested in the recreational fishery. Primarily, spot over 12 inches FL have not been observed in the recreational fishery for over 10 years. Length distribution from 2023 recreational catches ranged from 4.4 to 11.0 inches (Figure 8). The modal



length in the recreational harvest for 2023 was 7.0 inches with 41 percent of the recreational catch within this size class.

Table 2. Mean, minimum, maximum fork length (inches), and total number of spot measured by Marine Recreational Information Program (MRIP) sampling in North Carolina, 1989–2023.

| Year | Mean Length | Minimum Length | Maximum Length | Total Number Measured |
|------|-------------|----------------|----------------|-----------------------|
| 1989 | 7.9         | 4.5            | 13.6           | 1,513                 |
| 1990 | 7.6         | 4.3            | 12.6           | 1,167                 |
| 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            | 14.9           | 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                    |
| 2022 | 8.1         | 6.4            | 11.8           | 69                    |
| 2023 | 7.8         | 4.4            | 11.0           | 61                    |

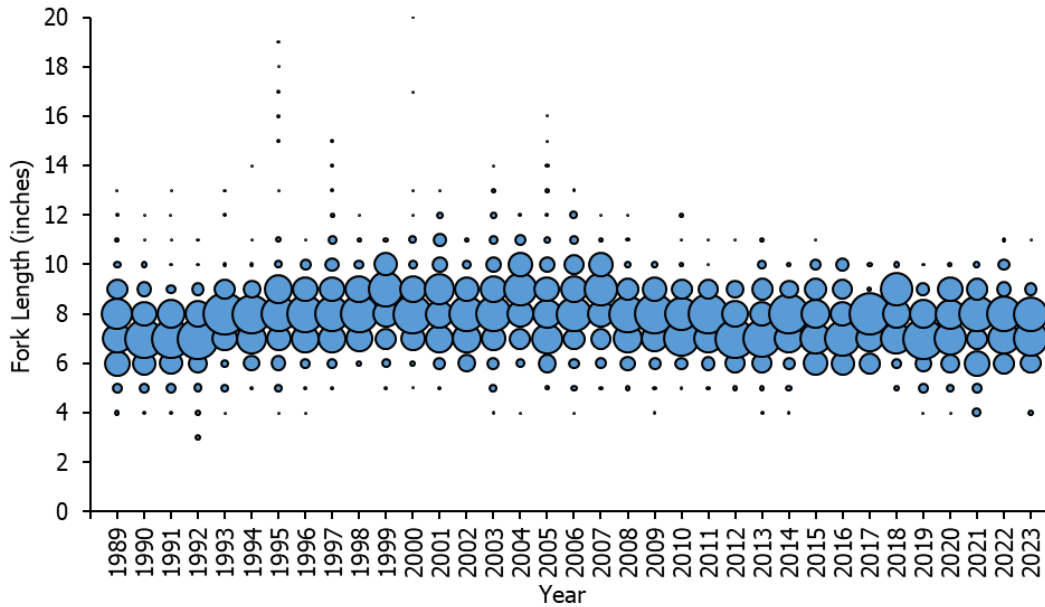


Figure 7. Recreational length frequency (fork length, inches) of spot harvested in North Carolina, 1989–2023 (MRIP, n= 38,017). Bubbles represent fish at length and the bubble size is proportional to the number of fish at that length.

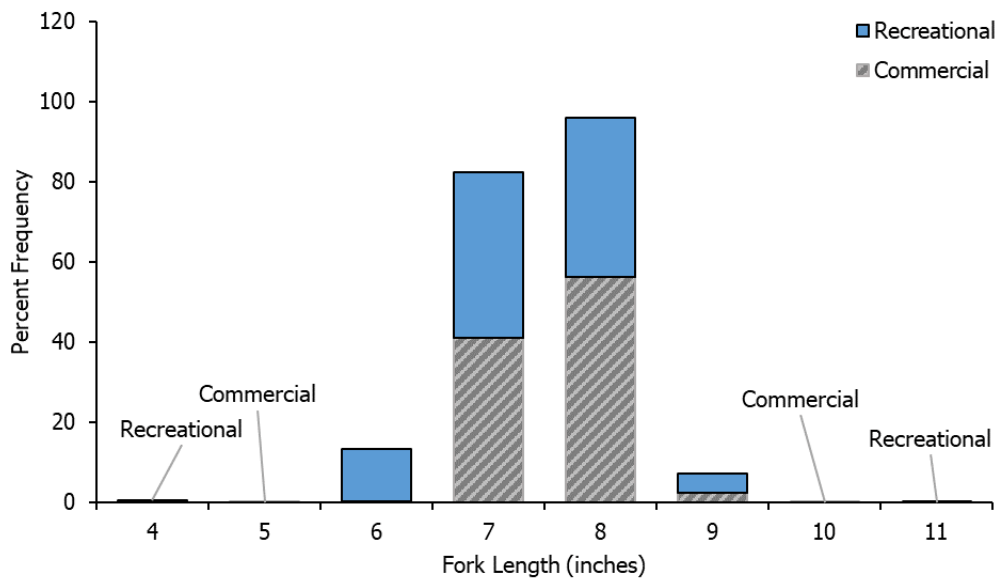


Figure 8. Commercial (n=2,111,490) and recreational (n=855,729) length frequency distribution for spot harvested in North Carolina, 2023.

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).

## MONITORING PROGRAM DATA

### Fishery-Dependent Monitoring

In 2023, 2,070 spot lengths were obtained from commercial fish house sampling with a mean FL of 8.1 inches, and lengths ranging from 4.4 to 10.5 inches. Mean FL has been consistent since 2020 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 2005 ranging from 2,070 in 2023 to 15,616 in 2000 (Table 3). Bait samples are not included in minimum, maximum, and mean length calculations.

Table 3. Mean, minimum, maximum fork length (inches), and total number of spot measured from North Carolina commercial fish house samples, 1994–2023. Bait samples are not included.

| Year | Mean Length | Minimum Length | Maximum Length | Total Number Measured |
|------|-------------|----------------|----------------|-----------------------|
| 1994 | 6.7         | 3.9            | 11.9           | 9,066                 |
| 1995 | 6.7         | 3.9            | 11.4           | 11,026                |
| 1996 | 7.3         | 3.9            | 11.8           | 14,010                |
| 1997 | 7.3         | 3.9            | 13.3           | 15,331                |
| 1998 | 7.4         | 3.9            | 12.2           | 11,726                |
| 1999 | 7.7         | 3.9            | 11.7           | 9,176                 |
| 2000 | 7.9         | 3.9            | 17.6           | 15,616                |
| 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           | 12,366                |
| 2005 | 8.9         | 4.0            | 13.1           | 15,532                |
| 2006 | 8.3         | 4.1            | 13.2           | 13,503                |
| 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            | 11.8           | 4,457                 |
| 2013 | 8.3         | 4.2            | 13.3           | 4,699                 |
| 2014 | 8.2         | 4.1            | 13.1           | 6,650                 |
| 2015 | 8.3         | 4.3            | 11.6           | 4,543                 |
| 2016 | 8.0         | 4.9            | 12.8           | 2,250                 |
| 2017 | 8.3         | 4.4            | 11.7           | 2,648                 |
| 2018 | 7.9         | 4.2            | 10.9           | 2,241                 |
| 2019 | 7.9         | 4.4            | 12.9           | 3,719                 |
| 2020 | 8.0         | 5.0            | 12.5           | 3,200                 |
| 2021 | 8.0         | 4.9            | 12.0           | 3,085                 |
| 2022 | 8.0         | 4.4            | 11.7           | 2,587                 |
| 2023 | 8.1         | 4.4            | 10.5           | 2,070                 |

Modal length generally increased from 1994 to the early 2000's (Figure 9). The range of lengths harvested narrowed in the late 2000s with little change since. Size composition in 2023 commercial samples indicate a dominance of spot from the 7.0- and 8.0-inch size classes (Figure 9).

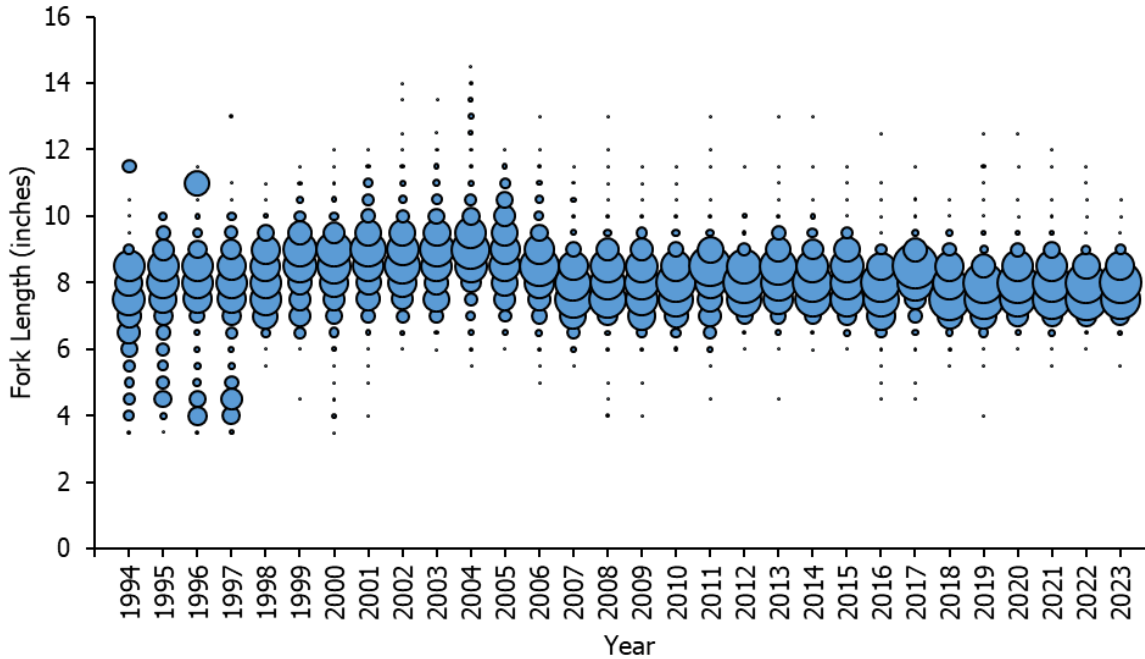


Figure 9. Commercial length frequency (fork length, inches) of spot harvested from 1994 to 2023. Bubbles represent fish at length and the bubble size is proportional to the number of fish at that length. Bait samples not included.

### **Fishery-Independent Monitoring**

The number of spot aged in North Carolina’s comprehensive life history program (P930) using otoliths from 1997 through 2023 has ranged from 230 to 776 (Table 4). In 2023, 585 spot were aged with a modal age of one and maximum age of four. The maximum age observed was three from 2013 to 2022. 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 10).

Table 4. Modal, minimum, maximum age, and total number of spot aged in North Carolina from fishery dependent and fishery independent sampling, 1997–2023. Includes otolith ages only and only samples for which a length was recorded.

| 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           | 687               |
| 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           | 3           | 776               |
| 2022 | 1         | 0           | 3           | 392               |
| 2023 | 1         | 0           | 4           | 585               |

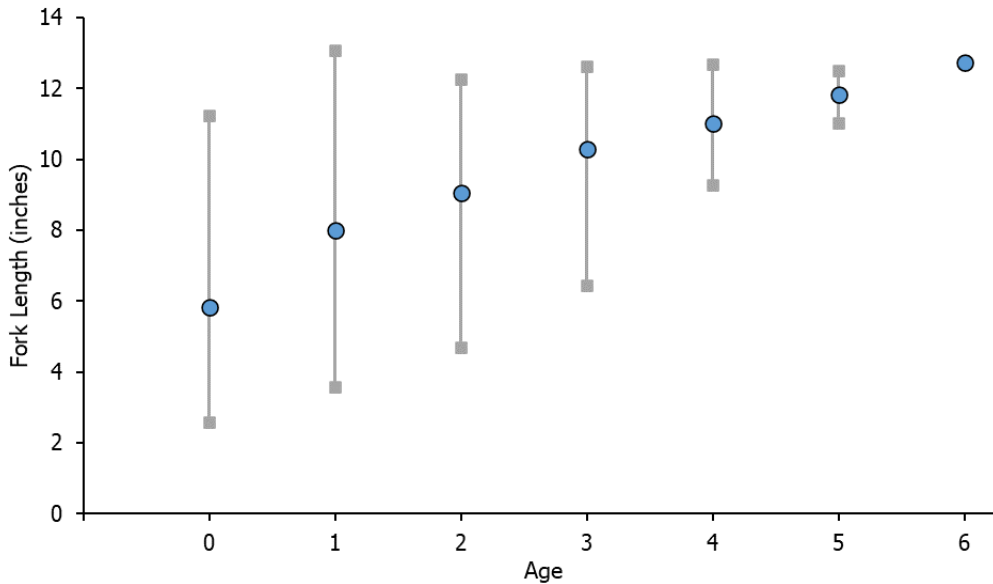


Figure 10. Spot length at age based on age samples collected from 1997 to 2023 (n=12,518). Blue circles represent the mean size at a given age while the grey squares represent the minimum and maximum observed size at age. Only ages derived from otoliths and from samples for which a length was recorded were used.

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 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 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 33 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 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 464 and 408 respectively (Figure 11). 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. The June JAI declined from 2018 to 2021, dropping below the time series average in 2020 to 254 individuals per tow and 255 individuals per tow in 2021. The June JAI increased to 632 individuals per tow in 2022 before dropping to 444 individuals per tow in 2023. The September JAI also declined

from 2018 to 2021, dropping below the time series average in 2021 to 326 individuals per tow before increasing to 582 individuals per tow in 2022 and 755 individuals per tow in 2023. The JAI for September 2023 was the second highest in the time series.

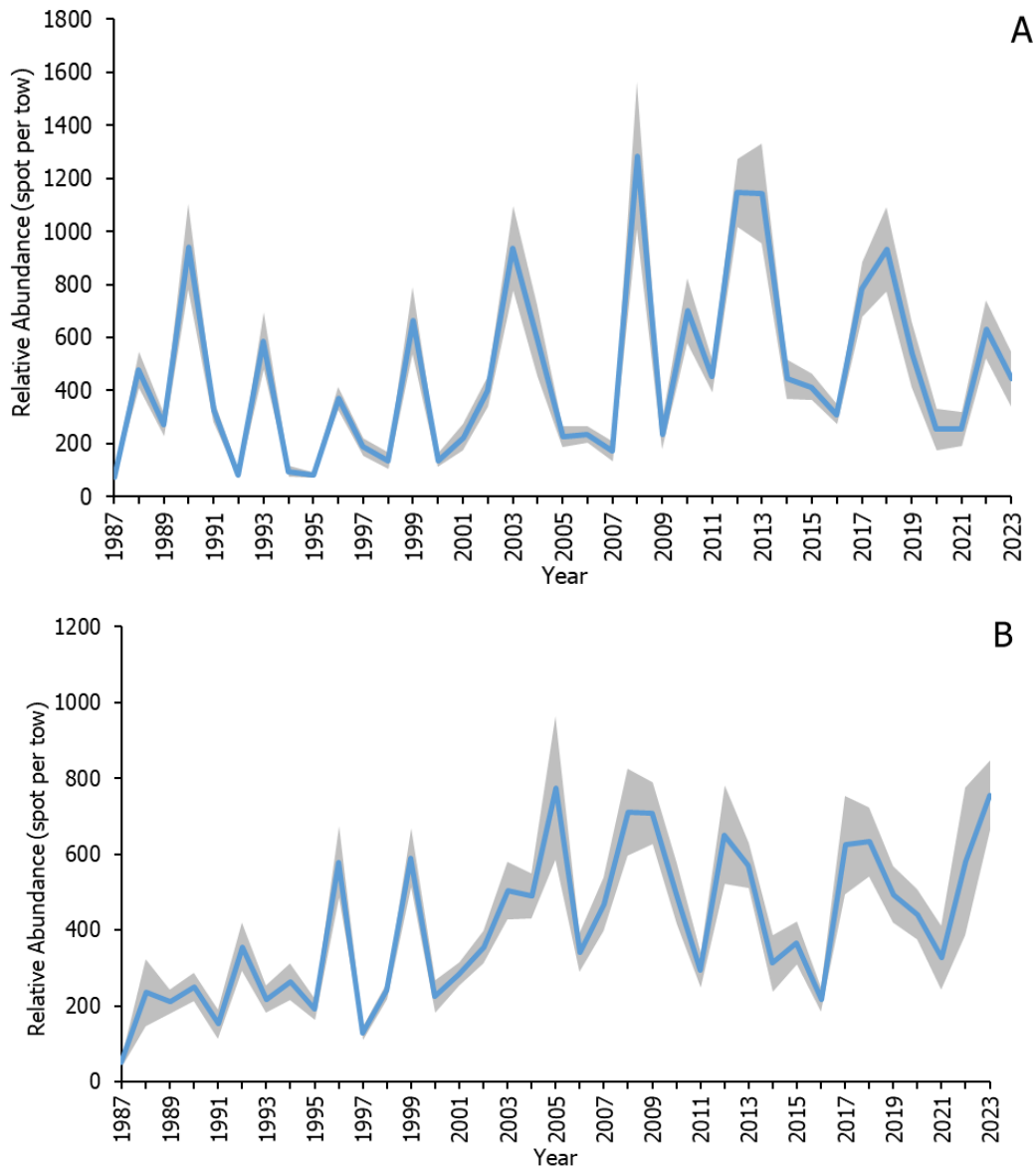


Figure 11. Spot juvenile weighted abundance index (number per tow) for A) June and B) September from the Pamlico Sound Survey, 1987–2023. Shaded area represents standard error. Length cutoffs are <140 mm FL (5.5 in) in June and <190 mm TL (7.5 in) in September.

Most spot captured in the Pamlico Sound Survey are juveniles (age 0), but a number of age one or greater fish are captured producing two distinct length modes, particularly in June. One mode is around 3.5 inches FL (age 0), and the other is around 6.0 inches FL (age 1 or greater; Figure 12). Modal length from the September portion of the Pamlico Sound Survey is more variable than June ranging from 3.0 to 5.5 inches FL with a wider range of lengths captured.

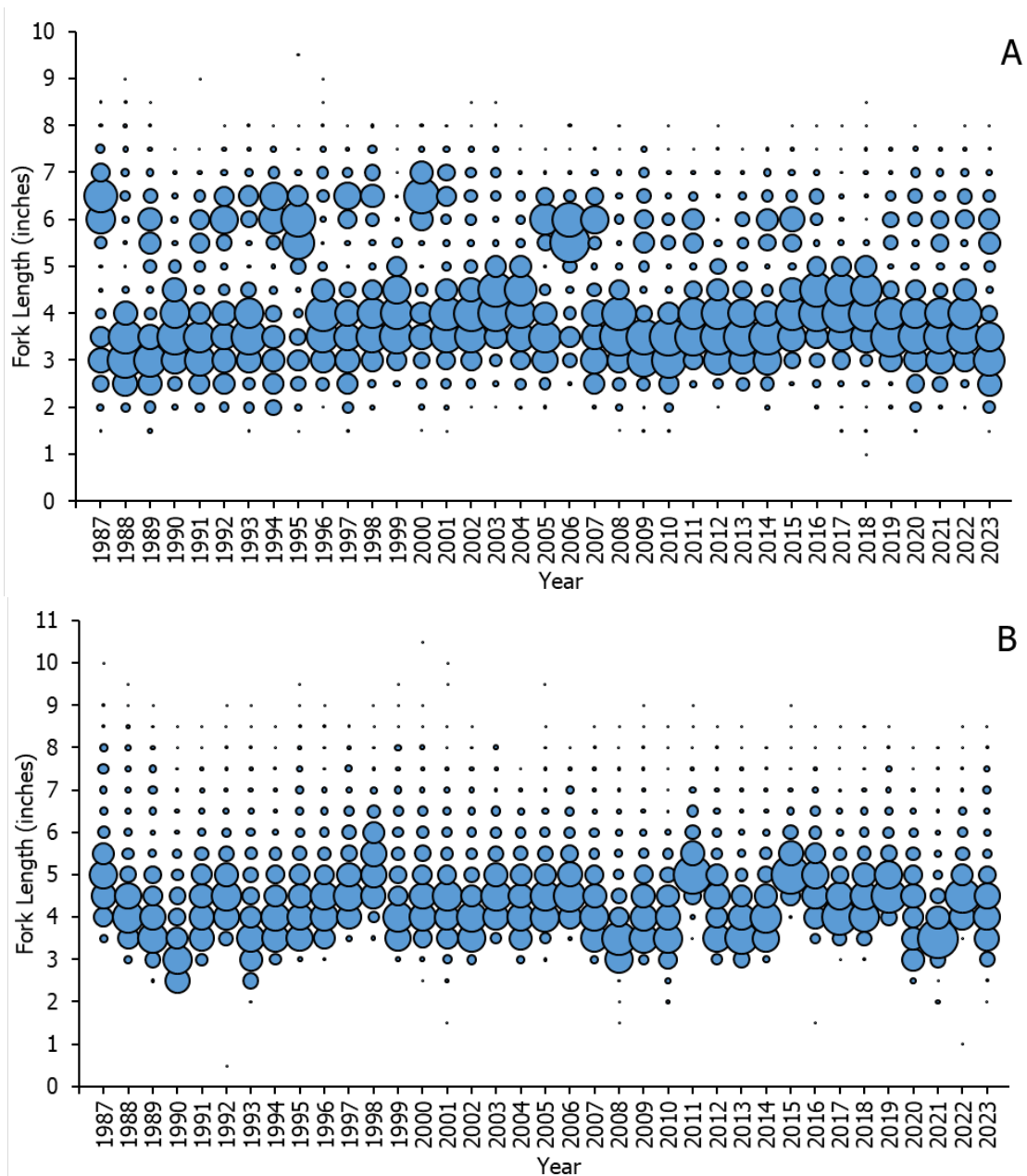


Figure 12. Length frequency (Fork Length, inches) of all spot captured in Pamlico Sound Survey sampling during A) June and B) September, 1987–2023. Bubbles represent fish at length and the bubble size is proportional to the number of fish at that length.

## 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 2023). 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, investigate 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**

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. Because both abundance composite indices were missing data for 2020 and 2021, a determination of whether the TLA triggered in 2021 or if management measures can be removed could not be made. The TLA will be updated in 2024 including data through 2023.

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