

**FISHERY MANAGEMENT PLAN UPDATE
SUMMER FLOUNDER
AUGUST 2020**

STATUS OF THE FISHERY MANAGEMENT PLAN

Fishery Management Plan History

Original FMP Adoption: Adopted by the ASMFC in 1982 and the MAFMC in 1988

Amendments:

- Amendment 1 in 1991
- Amendment 2 in 1993
- Amendment 3 in 1993
- Amendment 4 in 1993
- Amendment 5 in 1993
- Amendment 6 in 1994
- Amendment 7 in 1995
- Amendment 10 in 1997
- Amendment 11 in 1998
- Amendment 12 in 1999
 - Framework 1 in 2001
 - Framework 2 in 2001
 - Addendum III in 2001
 - Addendum IV in 2001
 - Framework 5 in 2004
 - Addendum VIII in 2004
 - Addendum XIV in 2004
 - Addendum XV in 2004
 - Addendum XVI in 2005
 - Addendum XVII in 2005
 - Framework 6 in 2006
 - Addendum XVIII in 2006
 - Framework 7 in 2007
 - Addendum XIX in 2007
- Amendment 16 in 2007
- Amendment 15 in 2011
- Amendment 19 (Recreational Accountability Amendment) in 2013
 - Addendum XXV in 2014
- Amendment 17 in 2015
 - Addendum XXVI in 2015
- Amendment 18 in 2015
 - Addendum XXVII in 2016
 - Addendum XXVIII in 2017
- Amendment 20 in 2017

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Framework 10 in 2017
Framework 11 in 2018
Framework 13 in 2018
Addendum XXXI in 2018
Addendum XXXII in 2018
Framework 14 in 2019

Revisions: None

Supplements: None

Information Updates: None

Schedule Changes: None

Next Benchmark Review: A benchmark stock assessment was completed in 2018.

Because of their presence in, and movement between state waters (0-3 miles) and federal waters (3-200 miles), the Mid-Atlantic Fishery Management Council (MAFMC) manages summer flounder (*Paralichthys dentatus*) cooperatively with the Atlantic States Marine Fisheries Commission (ASMFC). The two management entities work in conjunction with the National Marine Fisheries Service (NMFS) as the federal implementation and enforcement entity. The Summer Flounder, Scup and Black Sea Bass Fishery Management Plan (FMP) and amendments use output controls (catch and landings limits) as the primary management tool, with landings divided between the commercial (60 percent) and recreational (40 percent) fisheries. The FMP also includes minimum fish sizes, bag limits, seasons, gear restrictions, permit requirements, and other provisions to prevent overfishing and ensure sustainability of the fisheries. Recreational bag and size limits and seasons are determined on a regional basis using conservation equivalency. The commercial quota is divided into state-by-state quotas.

Specific details for each Amendment include:

Amendment 1 - established an overfishing definition for summer flounder.

Amendment 2 - established rebuilding schedule, commercial quotas, recreational harvest limits, size limits, gear restrictions, permits, and reporting requirements for summer flounder; created the summer flounder monitoring committee.

Amendment 3 - revised the exempted fishery line for summer flounder; increased the large mesh net threshold for summer flounder; established otter trawl retention requirements for large mesh use in the summer flounder fishery.

Amendment 4 - revised state-specific shares for summer flounder commercial quota allocation.

Amendment 5 - allowed states to combine or transfer summer flounder commercial quota.

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Amendment 6 - set criteria for allowance of multiple nets on board commercial vessels for summer flounder; established deadline for publishing catch limits; established commercial management measures for summer flounder.

Amendment 7 - revised the fishing mortality rate reduction schedule for summer flounder.

Amendment 10 - modified commercial minimum mesh requirements; continued commercial vessel moratorium permit; prohibited transfer of summer flounder at sea; established a special permit for the summer flounder party/charter sector.

Amendment 11 - modified certain provisions related to vessel replacement and upgrading, permit history transfer, splitting, and permit renewal regulations.

Amendment 12 - revised Summer Flounder, Scup, and Black Sea Bass FMP to comply with the Sustainable Fisheries Act and established a framework adjustment process; established quota set-aside for research for summer flounder, scup and black sea bass; established state-specific conservation equivalency measures; allowed the rollover of the winter scup quota; revised the start date for the scup summer quota period; established a system to transfer scup at sea.

Framework 1 - established quota set-aside for research for summer flounder, scup and black sea bass.

Framework 2 - established state-specific conservation equivalency measures for the recreational summer flounder fishery.

Addendum III - established recreational fishing specifications for 2001 for summer flounder and scup.

Addendum IV - provided that upon the recommendation of the relevant monitoring committee and joint consideration with the Mid-Atlantic Fishery Management Council, the ASMFC's Summer Flounder, Scup, and Black Sea Bass Management Board will decide the state regulations rather than forward a recommendation to the National Marine Fisheries Science center; made states responsible for implementing the ASMFC's Summer Flounder, Scup, and Black Sea Bass Management Boards decisions on regulations.

Framework 5 - established multi-year specification setting of the quotas for summer flounder, scup, and black sea bass.

Addendum VIII - established a program wherein any state which exceeds its recreational harvest limit for summer flounder in 2003 and beyond will receive a reduction from its future recreational harvest limits.

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Addendum XIV - implemented a system of conservation equivalency for the recreational fishery of summer flounder to achieve the annual recreational harvest limit.

Addendum XV - established an allocation program for the increase in commercial total allowable landings in the summer flounder fishery for 2005 and 2006 only.

Addendum XVI - provided a species-specific mechanism of ensuring that a state meets its obligations under the plan in a way that minimizes the probability that a state's delay in complying does not adversely affect other states fisheries or conservation of the resource.

Addendum XVII - established a program wherein the ASMFC Management Board has the ability to sub-divide the recreational summer flounder coast-wide allocations into voluntary regions.

Framework 6 - established region-specific conservation equivalency measures for summer flounder.

Addendum XVIII - stabilized fishing rules as close to those that existed in 2005, in part, to minimize the drastic reductions facing three states.

Framework 7 - built flexibility into process to define and update status determination criteria for summer flounder, scup and black sea bass.

Addendum XIX - continued the state-by-state black sea bass commercial management measures, without a sunset clause; broadened the descriptions of stock status determination criteria contained within the Summer Flounder, Scup, and Black Sea Bass FMP to allow greater flexibility in those definitions, while maintaining objective and measurable status determination criteria for identifying when stocks or stock complexes covered by the fishery management plan are overfished.

Amendment 16 - standardized bycatch reporting methodology.

Amendment 15 - established annual catch limits and accountability measures.

Amendment 19 - (Recreational Accountability Amendment) modified the accountability measures for the MAFMC recreational fisheries.

Addendum XXV - established regional management for the 2014 recreational black sea bass and summer flounder fishery.

Amendment 17 - implemented standardized bycatch reporting methodology.

Addendum XXVI - established alternate regional management for the 2015 recreational summer flounder fishery.

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- Amendment 18 - eliminated the requirement for vessel owners to submit “did not fish” reports for the months or weeks when their vessel was not fishing; removed some of the restrictions for upgrading vessels listed on federal fishing permits.
- Addendum XXVII - continued regional management of the recreational summer flounder fishery, extended ad hoc regional management of the black sea bass recreational fishery for the 2016 and 2017 fishing year and addressed the discrepancies in recreational summer flounder management measures within Delaware Bay.
- Addendum XXVIII - initiated an addendum to consider adaptive management, including regional approaches, for the 2017 summer flounder recreational fishery.
- Amendment 20 - (Unmanaged Forage Omnibus Amendment) implemented management measures to prevent the development of new, and the expansion of existing, commercial fisheries on certain forage species in the Mid-Atlantic.
- Framework 10 - (Omnibus For-Hire Electronic Trip Report Framework) implemented a requirement for vessels that hold party/charter permits for Council-managed species to submit vessel trip reports electronically (eVTRS) while on a trip carrying passengers for hire.
- Framework 11 - (Omnibus Acceptable Biological Catch Framework) established a process for setting constant multi-year Acceptable Biological Catch (ABC) limits for Council-managed fisheries, clarified that the Atlantic Bluefish, Tilefish, and Atlantic Mackerel, Squid, and Butterfish FMPs will now automatically incorporate the best available scientific information in calculating ABCs (as all other Mid-Atlantic management plans do) rather than requiring a separate management action to adopt them, clarified the process for setting ABCs for each of the four types of ABC control rules.
- Framework 13 - modified the accountability measures required for overages not caused by directed landings (i.e., discards) in the summer flounder, scup, and black sea bass fisheries
- Addendum XXXI - established conservation equivalency for black sea bass and transit provisions in federal waters around Block Island, Rhode Island for recreational and commercial fishermen which allows permitted fishermen to pass through federal waters legally.
- Addendum XXXII - established a specifications process instead of an addendum process to implement recreational management measures more quickly for summer flounder and black sea bass.
- Framework 14 - gives the Council the option to waive the federal recreational black sea bass measures in favor of state measures through conservation equivalency; implements a transit zone for commercial and recreational summer flounder,

scup, and black sea bass fisheries in Block Island Sound; and allows for the use of a maximum size limit in the recreational summer flounder and black sea bass fisheries.

Specific details for each amendment under development include:

Summer Flounder, Scup, and Black Sea Bass Commercial/Recreational Allocation Amendment is underway. This amendment is considering potential modifications to the allocations of catch or landings between the commercial and recreational sectors for summer flounder, scup, and black sea bass. As of June 2020, the ASMFC and MAFMC has reviewed public comment from the scoping period and is in the process of developing a range of draft alternatives to be included for consideration in the amendment. Any action resulting from the Amendment is scheduled for late 2021 or early 2022.

Summer Flounder Commercial Issues Amendment – This amendment will update the summer flounder goals in the Summer Flounder, Scup, and Black Sea Bass FMP and implements some changes on criteria for annual state-by-state commercial summer flounder allocations.

To ensure compliance with interstate requirements, North Carolina also manages this species under the North Carolina Fishery Management Plan for Interjurisdictional Fisheries (IJ FMP). The goal of the IJ FMP is to adopt fishery management plans, consistent with N.C. law, approved by the MAFMC, 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. These plans were established under the Magnuson-Stevens Fishery Conservation and Management Act (federal council plans) and the Atlantic Coastal Fisheries Cooperative Management Act (ASMFC plans) with the goal, like the Fisheries Reform Act of 1997 to “ensure long-term viability” of these fisheries (NCDMF 2015).

Management Unit

U.S. waters in the western Atlantic Ocean from the southern border of North Carolina northward to the U.S.-Canadian border.

Goal and Objectives

The objectives of the Summer Flounder, Scup and Black Sea Bass FMP are to:

1. Reduce fishing mortality in the summer flounder, scup and black sea bass fisheries to assure that overfishing does not occur;
2. Reduce fishing mortality on immature summer flounder, scup and black sea bass to increase spawning stock biomass;
3. Improve the yield from these fisheries;

4. Promote compatible management regulations between state and federal jurisdictions;
5. Promote uniform and effective enforcement of regulations;
6. Minimize regulations to achieve the management objectives stated above.

The 2011 Omnibus Amendment contains Amendment 15 to the Summer Flounder, Scup and Black Sea Bass FMP. The amendment is intended to formalize the process of addressing scientific and management uncertainty when setting catch limits for the upcoming fishing year(s) and to establish a comprehensive system of accountability for catch (including both landings and discards) relative to those limits, for each of the managed resources subject to this requirement. Specifically: (1) Establish allowable biological catch control rules, (2) Establish a MAFMC risk policy, which is one variable needed for the allowable biological catch control rules, (3) Establish annual catch limits, (4) Establish a system of comprehensive accountability, that addresses all components of the catch, (5) Describe the process by which the performance of the annual catch limit and comprehensive accountability system will be reviewed, (6) Describe the process to modify the above objectives (1-5) in the future.

STATUS OF THE STOCK

Life History

Summer flounder are estuarine dependent members of the left eyed flounder family that also includes southern flounder (*Paralichthys lethostigma*) and gulf flounder (*Paralichthys albigutta*), all of which occur in North Carolina waters. Summer flounder are found in both inshore and offshore waters from Nova Scotia, Canada to Florida but are most abundant from Cape Cod, Massachusetts to Cape Fear, North Carolina. Spawning typically occurs at age 2 to 3 during the months of November to March as they move offshore. Juveniles move inshore to coastal and estuarine areas for about one year and later begin to join adults offshore. Summer flounder typically mature by age 1 with females maturing at 11 inches total length and males maturing at 10 inches total length. Summer flounder have a maximum age of 19 years. They like to burrow into sandy substrates and ambush prey such as small fish, crabs, shrimp, squid and worms (Packer 1999).

Stock Status

The 2018 summer flounder benchmark stock assessment included data through 2017. It indicated that the stock was not overfished and overfishing was not occurring in 2017.

Stock Assessment

The 2018 summer flounder benchmark stock assessment estimated fishing mortality rates and stock sizes using a statistical catch at age model calculated by using the Age Structured Assessment Program. It also included revised National Oceanic and Atmospheric Administration (NOAA) Marine Recreational Information Program estimates of recreational landings and discards that contributed to increased biomass estimates. The benchmark stock assessment indicated that the stock was not overfished, and that overfishing was not occurring in 2017

relative to the new biological reference points established in the 2018 benchmark stock assessment. Fishing mortality estimates increased since 2007 and below average recruitment persisted from 2011 to 2017. Spawning stock biomass was above the new threshold biomass reference point in 2017. Higher biomass projections resulted in a 49% increase in the commercial quota and recreational harvest limit beginning in 2019.

STATUS OF THE FISHERY

Current Regulations

Commercial

There is a 14-inch total length minimum size limit in Atlantic Ocean waters and a 15-inch total length minimum size limit in internal coastal waters as well as harvest seasons and minimum mesh size requirements for the flounder trawl fishery. Trip limits are set for landings windows established by proclamation to constrain harvest to the quota allocation (see most recent North Carolina Division of Marine Fisheries (NCDMF) proclamation on commercial summer flounder fishery). A bycatch trip limit of 100 pounds is in place during the closed trawl season. A license to land flounder from the Atlantic Ocean is required to land more than 100 pounds per trip.

Recreational

Season closures are currently in effect for North Carolina. The recreational closure effects all flounder species in North Carolina and was done in accordance with Amendment 2 to the North Carolina Southern Flounder Fishery Management Plan. The 2020 open recreational season will be August 16 through September 30 for internal and ocean waters of the state. During the open season, a 15-inch total length minimum size limit and 4-fish creel limit will be in effect.

Commercial Landings

Any landings reported as caught in the Atlantic Ocean are considered to be summer flounder by the North Carolina Trip Ticket Program. Most summer flounder landings were from trawls although gill nets and other gears such as hook and line catch much smaller numbers of summer flounder in the Atlantic Ocean (Figure 1). Landings are constrained by the coast-wide quota of which North Carolina has an allocation of 27.4 percent. In recent years, landings peaked in 2004 and have been generally stable since 2007 aside from 2012 and 2013. The low landings in 2012 and 2013 were primarily due to the closure of Oregon Inlet to large vessels (such as trawlers) due to shoaling and the consequent transfer of most of North Carolina's quota allocation to Virginia and other states. Since 2014, more winter trawl vessels returned to North Carolina to land catches (Table 1, Figure 2).

Recreational Landings

Summer flounder harvest is reported through the NOAA Marine Recreational Information Program (MRIP). Recreational estimates across all years have been updated and are now based on the MRIP new Fishing Effort Survey-based calibrated estimates. For more information on MRIP see <https://www.fisheries.noaa.gov/topic/recreational-fishing-data>. Recreational harvest of

summer flounder has varied annually but has seen a decline over the years (Table 1, Figure 2). Some of this decline in landings is likely the result of increases in size limits time which have limited harvest opportunities in North Carolina waters.

MONITORING PROGRAM DATA

Fishery-Dependent Monitoring

Several NCDMF sampling programs collect biological data on commercial and recreational fisheries that catch summer flounder. Program 433 (winter trawl fishery) is the primary program that collects commercial length and age data for harvested summer flounder. Other programs that collect information include: 432 (flounder pound net), 434 (ocean gill net), 435 (beach seine), 461 (estuarine gill net), and 437 (long haul seine). Programs 466 (sea turtle bycatch monitoring) and 570 (commercial shrimp trawl fishery characterization) collect length data on harvested and discarded flounder. Recreational fishery sampling for harvest, releases and lengths occurs through the NOAA Marine Recreational Information Program. Age data from the recreational fishery are collected through voluntary angler donations of carcasses.

During 1991 through 2019, annual mean commercial fishery lengths increased from 17 to 20 inches total length and the mean number of fish measured during 1991 through 2018 was 19,348 (Table 2). Most summer flounder harvested commercially during 2019 ranged from 14 to 25 inches total length with the majority of fish being 16 inches total length (Figure 3). During 1991 through 2019, summer flounder harvested commercially ranged from 12 to 35 inches total length (Table 2, Figure 4).

As for recreational fishery length data during 1982 through 2018, annual mean lengths increased overtime as size limits have been implemented. The number of fish measured during 1982 through 2019 was variable (Table 3). Most summer flounder harvest recreationally during 2019 ranged from 14 to 17 inches total length with the majority of fish being 15 inches total length (Figure 3). During 1982 through 2019, summer flounder harvested recreationally ranged from 5 to 29 inches total length (Table 3, Figure 5).

Fishery-Independent Monitoring

Several NCDMF independent sampling programs collect biological data on summer flounder. However, most surveys do not catch summer flounder regularly enough to provide consistent length, age or abundance data. The main exception is Program 195 (the Pamlico Sound Trawl Survey), which employs a random stratified survey design in waters of Pamlico Sound and its major river tributaries. Stations are randomly selected from strata based upon depth and geographic location. Randomly selected stations are optimally allocated among the strata based upon all previous sampling in order to provide the most accurate abundance estimates (PSE <20). Tow duration is 20 minutes; using double rigged demersal mongoose trawls (9.1m headrope, 1.0m X 0.6m doors, 2.2-cm bar mesh body, 1.9-cm bar mesh cod end and a 100-mesh tail bag extension). The survey takes place in June and September with the samples collected in June serving as a juvenile abundance index (JAI) for summer flounder in North Carolina. Annual mean lengths ranged from 5 to 7 inches total length during 1987 through 2019 (Table 4). During 2019, a total of 400 summer flounder were caught in the survey and the JAI value was

5.8 fish per tow. The 1987-2019 average JAI value was 9.0 with data from 1999 being excluded from the average due to sampling occurring in July instead of June (Figure 6). The summer flounder JAI from the Pamlico Sound Survey is one of the recruitment indices provided for the annual coast-wide stock assessment of summer flounder and was used in the 2019 summer flounder benchmark stock assessment.

To characterize age structure, summer flounder otoliths are primarily collected from the commercial winter trawl fishery but are also collected from other dependent (recreational) and various independent (scientific surveys) throughout the year. While scales were used to determine the age of summer flounder historically, otoliths are now preferred and have been collected exclusively since 2016. In 2019, 1,070 summer flounder otoliths were collected yielding a range in age from 0 to 19 years. Maximum ages since 2010 were higher than previous years, suggesting expansion of the stock age structure. Modal age ranged from 2 to 7 during 1991 through 2019 (Table 5). The age data suggests that summer flounder grow very quickly during their first year of life with an average total length of 13 inches at age 1. They continue to grow to an average total length of 28 inches by age 14 (Figure 7).

MANAGEMENT STRATEGY

An update of the summer flounder stock assessment is completed every two years by NMFS Northeast Fisheries Science Center (NEFSC). Data are analyzed from the previous year based on decisions made for the previous benchmark assessment. Projections based on stock assessments are used to set the coast-wide quota level each year. Amendments to the FMP are undertaken as issues arise that require action. North Carolina has several specific management strategies for summer flounder (Table 6).

RESEARCH NEEDS

Updated research needs from the 2018 summer flounder benchmark 66th Stock Assessment Workshop are provided below. The research needs listed below start with the most recent. Text in parenthesis indicates known progress made to address these needs.

- Continue to explore changes in the distribution of recruitment. Develop studies, sampling programs, or analyses to better understand how and why these changes are occurring, and the implications to stock productivity (progress unknown at this time).
- The reference points are internally consistent with the current assessment. It may be useful to carry uncertainty estimates through all the components of the assessment, biological reference points, and projections (progress unknown at this time).
- Explore the potential mechanisms for recent slower growth that is observed in both sexes (progress unknown at this time).
- Evaluate uncertainties in biomass to determine potential modifications to OFL CV employed (research is ongoing).
- Evaluate fully the sex- and size distribution of landed and discarded fish, by sex, in the summer flounder fisheries (research is ongoing).
- Incorporate sex-specific differences in size at age into the stock assessment (progress has been made and research is ongoing).

- Determine and evaluate the sources of the over-optimistic stock projections (progress has been made).
- Evaluate the causes of decreased recruitment and changes in recruitment per spawner in recent years (progress has been made).
- Further work examining aspects that create greater realism to the summer flounder assessment (e.g., sexually dimorphic growth, sex-specific F, differences in spatial structure [or distribution by size?]) should be conducted. This could include: a) Simulation studies to determine the critical data and model components that are necessary to provide reliable advice, and need to determine how simple a model can be while still providing reliable advice on stock status for management use, and should evaluate both simple and most complex model configurations. b) Development of models incorporating these factors that would create greater realism. c) These first steps (a or b) can be used to prioritize data collection, and determine if additional investment in data streams (e.g., collection of sex at age and sex at length and maturity data from the catch, additional information on spatial structure and movement, etc.) are worthwhile in terms of providing more reliable assessment results. d) The modeling infrastructure should be simultaneously developed to support these types of modeling approaches (flexibility in model framework, MCMC/bootstrap framework, projection framework) (some progress has been made and research is ongoing).
- Develop an ongoing sampling program for the recreational fishery landings and discards (i.e., collect age, length, sex) to develop appropriate age-length keys for ageing the recreational catch (research is needed).
- Apply standardization techniques to all of the state and academic-run surveys, to be evaluated for potential inclusion in the assessment (progress has been made and research is ongoing).
- Continue efforts to improve understanding of sexually dimorphic mortality and growth patterns. This should include monitoring sex ratios and associated biological information in the fisheries and all ongoing surveys to allow development of sex-structured models in the future (research is ongoing).

LITERATURE CITED

Atlantic States Marine Fisheries Commission. 2018. Fisheries Management, Summer Flounder. <http://www.asmfc.org/species/summer-flounder>.

Mid-Atlantic Fishery Management Council. 2018. Fisheries, Summer Flounder, Scup, Black Sea Bass. <http://www.mafmc.org/sf-s-bsb/>.

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.

North Carolina Division of Marine Fisheries. 2018. <http://portal.ncdenr.org/web/mf/home>.

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Northeast Fisheries Science Center. 2019. 66th Northeast Regional Stock Assessment Workshop Assessment Report for summer flounder. US Dept Commer, Northeast Fish Sci Cent Ref Doc. 19-08; 1170 p. Available from: <http://www.nefsc.noaa.gov/publications/>.

Packer, David, Sarah Griesback, Peter Berrien, Christine Zetlin, Donna Johnson, and Wallace Morse. 1999. Summer Flounder, *Paralichthys dentatus*, Life History and Habitat Characteristics. National Oceanic and Atmospheric Administration. 98 pp.

TABLES

Table 1. Summer flounder recreational harvest and number released (NOAA Marine Recreational Information Program) and commercial harvest (North Carolina Trip Ticket Program) for 1982-2019. All weights are in pounds.

Year	Recreational		Landed	Commercial Weight (lb)	Total Weight (lb)
	Landed	# Released			
1982	2,263,184	1,240,516	2,028,678	6,499,785	8,528,463
1983	1,522,625	601,360	986,346	7,279,379	8,265,725
1984	1,695,404	736,472	2,025,350	12,792,430	14,817,780
1985	2,012,982	476,231	2,153,031	8,968,385	11,121,416
1986	3,228,832	688,243	3,753,337	6,231,310	9,984,647
1987	530,793	1,096,193	403,096	5,362,322	5,765,418
1988	1,469,995	1,895,950	138,242	6,951,749	7,089,991
1989	559,131	509,719	792,196	4,329,403	5,121,599
1990	1,112,750	2,293,475	1,236,371	2,829,105	4,065,476
1991	567,660	1,398,056	622,637	3,630,629	4,253,266
1992	458,311	1,868,903	562,855	2,613,003	3,175,858
1993	593,005	2,457,437	716,004	3,120,901	3,836,905
1994	767,804	2,094,265	947,445	3,592,781	4,540,226
1995	241,409	955,117	344,315	4,582,176	4,926,491
1996	486,480	1,243,934	582,987	4,227,052	4,810,039
1997	463,367	1,560,563	597,973	1,501,171	2,099,144
1998	599,776	2,942,394	780,861	2,983,107	3,763,968
1999	357,645	1,097,385	466,028	2,869,055	3,335,083
2000	611,081	2,007,411	780,211	3,386,578	4,166,789
2001	424,615	1,836,338	577,139	2,784,741	3,361,880
2002	366,467	1,376,069	435,113	4,129,119	4,564,232
2003	177,360	763,794	273,895	3,572,448	3,846,343
2004	318,632	1,283,788	467,869	4,844,126	5,311,995
2005	202,797	734,860	289,495	4,064,464	4,353,959

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Table 1 Continued. Summer flounder recreational harvest and number released (NOAA Marine Recreational Information Program) and commercial harvest (North Carolina Trip Ticket Program) for 1982-2019. All weights are in pounds.

Year	Recreational		Landed	Commercial Weight (lb)	Total Weight (lb)
	Landed	# Released			
2006	254,653	977,039	326,684	3,981,413	4,308,097
2007	251,068	1,299,735	379,387	2,670,110	3,049,497
2008	88,501	939,708	132,743	2,406,603	2,539,346
2009	219,321	1,894,409	307,692	2,859,039	3,166,731
2010	245,839	1,486,980	341,310	3,310,992	3,652,302
2011	186,877	1,009,389	311,573	2,854,122	3,165,695
2012	176,553	1,452,828	287,522	1,090,218	1,377,740
2013	123,742	1,359,319	196,002	541,542	737,544
2014	150,201	1,478,527	215,294	2,911,750	3,127,044
2015	99,263	856,849	157,437	2,878,753	3,036,190
2016	65,494	664,388	110,392	2,071,091	2,181,483
2017	91,193	977,285	147,426	1,563,045	1,710,471
2018	57,913	440,676	92,032	1,657,761	1,749,793
2019	34,895	467,942	52,872	2,026,146	2,079,018
Average	271,652	1,276,961	369,296	2,898,439	3,267,735

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Table 2. Summer flounder length (total length, inches) data from commercial fish house samples, 1991-2019.

Year	Mean Total Length (in)	Minimum Total Length (in)	Maximum Total Length (in)	Total Number Measured
1991	17	12	31	24,855
1992	17	12	30	14,714
1993	17	12	32	21,317
1994	18	12	32	21,837
1995	17	12	30	18,805
1996	17	12	30	18,004
1997	17	12	30	13,074
1998	18	12	29	21,538
1999	19	12	31	11,976
2000	19	12	30	24,360
2001	19	12	30	19,994
2002	18	12	31	21,790
2003	19	12	32	17,558
2004	19	12	33	20,469
2005	19	13	32	20,660
2006	20	12	33	20,946
2007	19	12	30	26,280
2008	20	12	31	27,914
2009	20	13	31	19,801
2010	20	12	33	23,381
2011	19	12	31	17,202
2012	20	13	33	7,682
2013	21	13	31	6,452
2014	20	13	35	20,982
2015	20	13	35	28,145
2016	20	12	32	24,268
2017	20	12	33	14,281
2018	20	13	32	13,844
2019	20	13	33	18,964

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Table 3. Summer flounder length (total length, inches) data from NOAA Marine Recreational Information Program recreational samples, 1982-2019.

Year	Mean Total Length (in)	Minimum Total Length (in)	Maximum Total Length (in)	Total Number Measured
1982	13	8	22	562
1983	12	6	19	150
1984	14	5	19	244
1985	14	5	20	274
1986	14	8	23	281
1987	13	7	29	400
1988	13	8	25	717
1989	15	9	22	338
1990	14	6	25	1,285
1991	14	5	20	810
1992	14	8	22	556
1993	14	8	25	979
1994	15	9	23	1,453
1995	15	10	28	484
1996	15	8	23	1,155
1997	15	9	22	998
1998	15	11	23	1,239
1999	15	12	25	544
2000	15	11	25	703
2001	15	12	23	915
2002	15	9	25	566
2003	15	13	21	121
2004	16	11	23	244
2005	16	13	23	193
2006	15	12	21	217
2007	16	13	21	286
2008	16	13	19	88
2009	16	13	20	136
2010	16	12	22	259
2011	16	13	24	213
2012	16	11	24	228
2013	16	14	23	114
2014	16	13	19	137
2015	16	13	20	116
2016	16	13	21	59
2017	16	13	24	129
2018	16	13	20	91
2019	16	13	19	65

ASMFC AND FEDERALLY-MANAGED SPECIES WITH N.C. INDICES – SUMMER FLOUNDER

Table 4. Summer flounder length (total length, inches) data from Program 195 (Pamlico Sound Survey) samples, 1987-2019.

Year	Mean Total Length (in)	Minimum Total Length (in)	Maximum Total Length (in)	Total Number Measured
1987	6	1	19	1,711
1988	7	2	15	493
1989	6	2	14	662
1990	6	3	15	763
1991	6	3	14	359
1992	6	3	16	874
1993	6	3	13	619
1994	7	3	13	842
1995	7	3	13	607
1996	5	3	15	1,378
1997	6	3	17	1,044
1998	6	3	16	794
1999	7	2	14	408
2000	7	3	18	401
2001	6	3	17	1,225
2002	6	3	16	985
2003	6	3	16	592
2004	6	2	16	536
2005	5	3	13	710
2006	7	3	15	310
2007	6	3	13	397
2008	6	3	16	1,096
2009	7	3	19	596
2010	6	2	15	685
2011	6	3	17	695
2012	7	3	16	644
2013	6	3	14	1,169
2014	6	2	17	596
2015	7	3	17	477
2016	6	3	12	272
2017	6	3	14	559
2018	6	3	12	618
2019	6	3	15	400

ASMFC AND FEDERALLY-MANAGED SPECIES WITH N.C. INDICES – SUMMER FLOUNDER

Table 5. Summer flounder age samples collected from both dependent (commercial and recreational fisheries) and independent (surveys) sources from 1991-2019.

Year	Modal Age	Minimum Age	Maximum Age	Total Number Aged
1991	2	0	8	632
1992	2	0	7	359
1993	2	0	6	401
1994	2	0	7	552
1995	2	0	7	381
1996	2	1	9	246
1997	2	0	6	444
1998	2	0	6	476
1999	3	1	8	412
2000	3	1	8	569
2001	4	1	8	499
2002	3	1	8	609
2003	3	1	8	610
2004	3	1	10	553
2005	3	1	11	620
2006	4	1	11	682
2007	3	1	11	697
2008	4	1	11	751
2009	5	1	11	723
2010	3	1	14	783
2011	4	2	12	417
2012	3	1	13	541
2013	4	0	13	610
2014	5	1	16	1,120
2015	6	0	17	889
2016	7	0	18	998
2017	4	0	19	1,177
2018	5	0	19	881
2019	5	0	19	1,070

ASMFC AND FEDERALLY-MANAGED SPECIES WITH N.C. INDICES – SUMMER FLOUNDER

Table 6. Summary of management strategies by North Carolina for summer flounder.

Management Strategy	Outcome
14-inch total length (Atlantic Ocean waters) and 15-inch total length (internal coastal waters) minimum size limit for the commercial fishery	Size limit accomplished by rule 3M.0503(a)
Minimum trawl stretched mesh size of $\geq 5 \frac{1}{2}$ -inches (diamond) or ≥ 6 -inches (square) throughout the body, extensions and tailbag required to possess more than 100 pounds of flounder May 1 through October 31 or more than 200 pounds of flounder November 1 through April 30 (flynets are exempt from minimum trawl mesh requirements)	Rules 3M.0503(b) 3M.0503(f) 3M.0503(g) 3M.0503(h)(1-3)
Owner of a vessel required to possess a Licenses to Land flounder from the Atlantic Ocean and in order for a dealer to purchase or offload ≥ 100 pounds of flounder from the Atlantic Ocean.	Rules 3M.0503(c)(1-4)
Commercial seasons that allocate 80 percent of the quota to the winter season (starting January 1), a bycatch trip limit of 100 pounds during the closed season and the remaining quota allocated to the fall season (starting no earlier than November 1)	Rules 3M.0503(i)(1-3). Rule suspended for 2013 and 2014 fishing seasons.
Trip limits established for the open seasons	Rule 3M.0503(j) Specific trip limits by Proclamation Authority
15-inch total length (Atlantic Ocean and internal coastal waters) minimum size and 4 fish creel limit for recreational fishery in all joint and coastal waters	Proclamation FF-4-2017

FIGURES

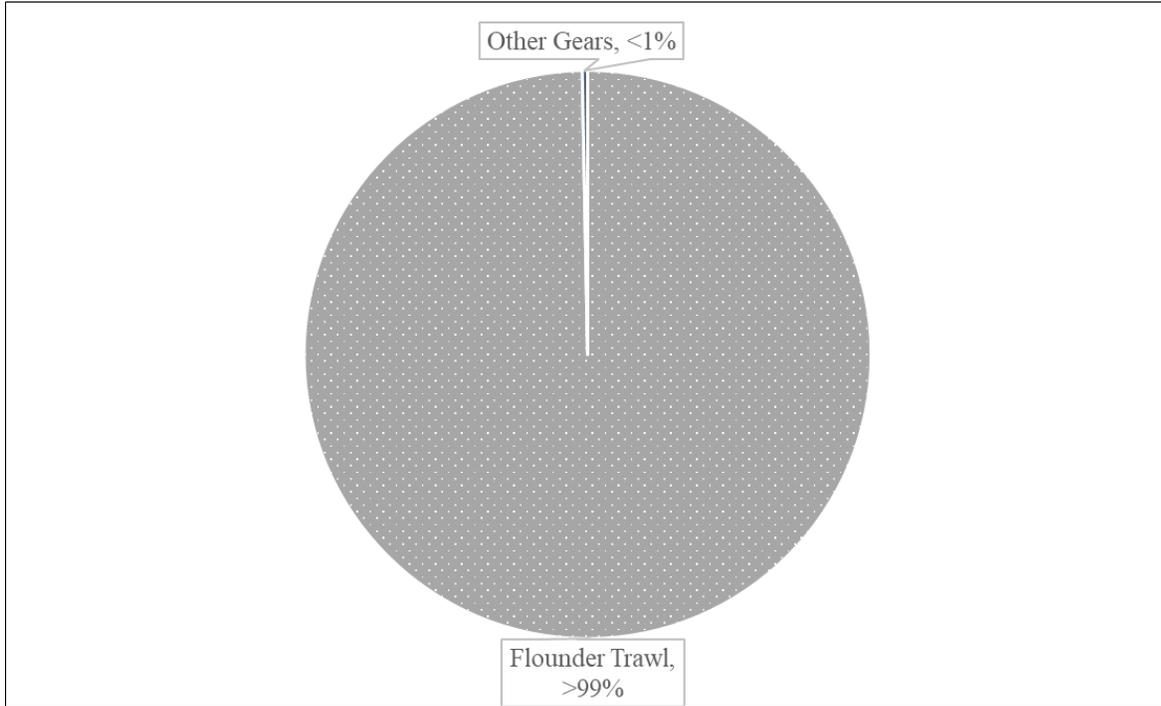


Figure 1. Commercial harvest of summer flounder in North Carolina by gear type in 2019.

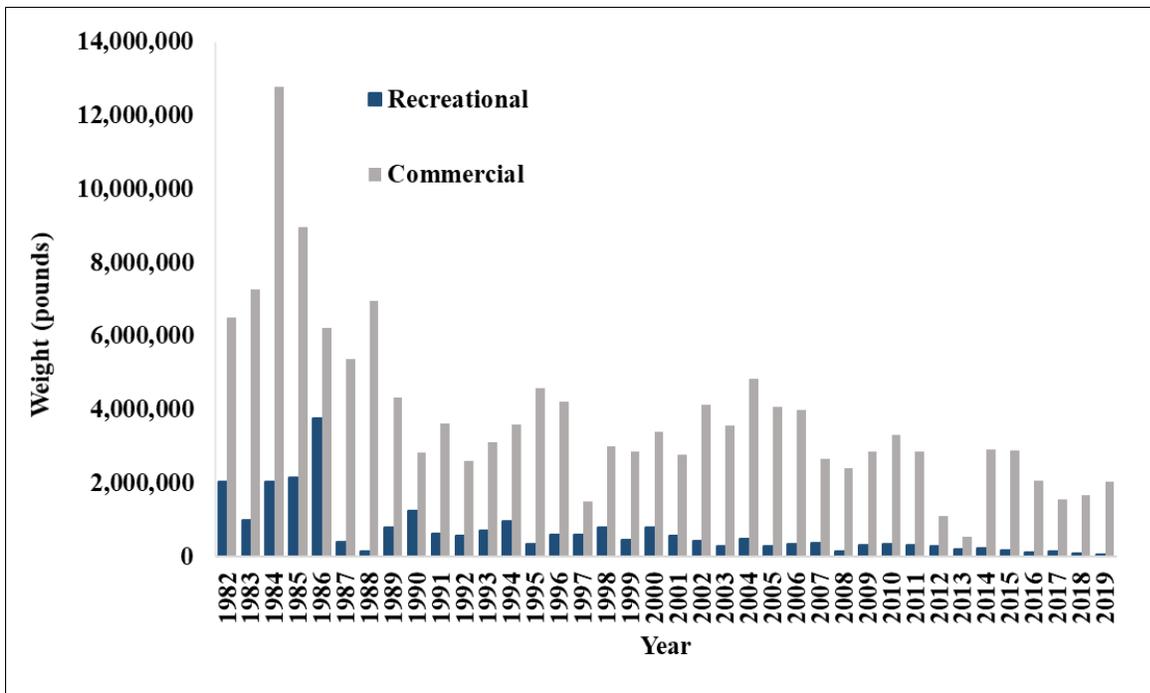


Figure 2. Annual commercial and recreational landings in pounds for summer flounder in North Carolina from 1982-2019.

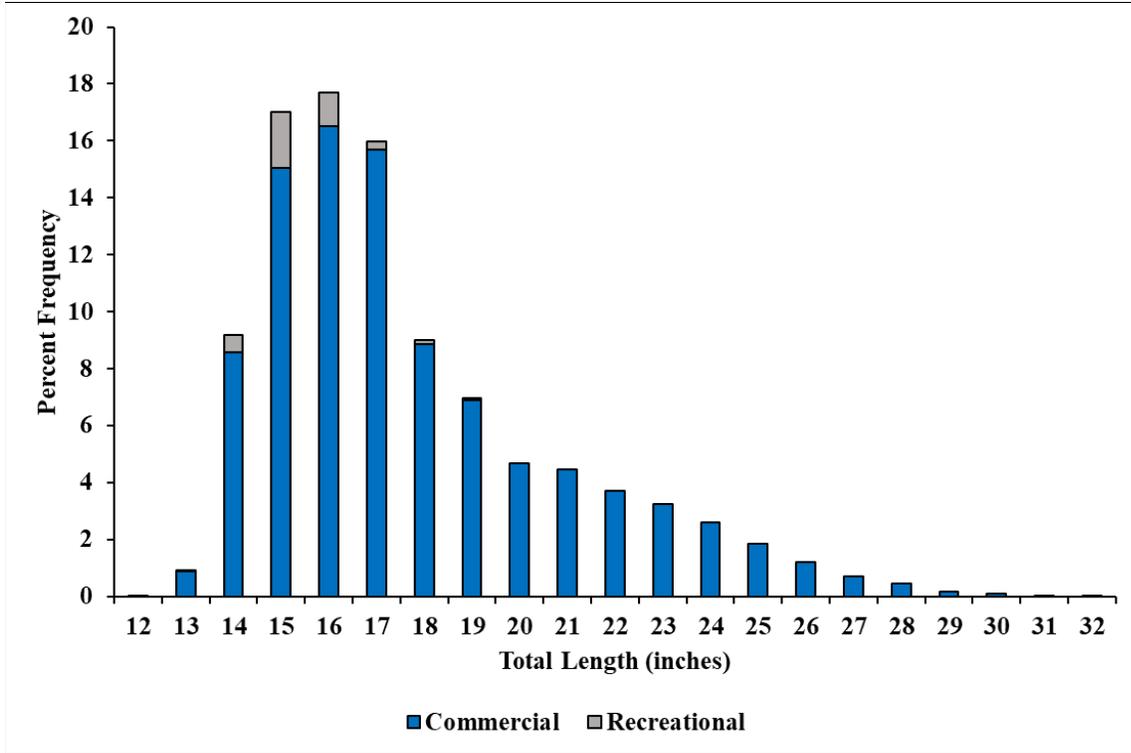


Figure 3. Commercial and recreational length frequency distribution from summer flounder harvested in 2019.

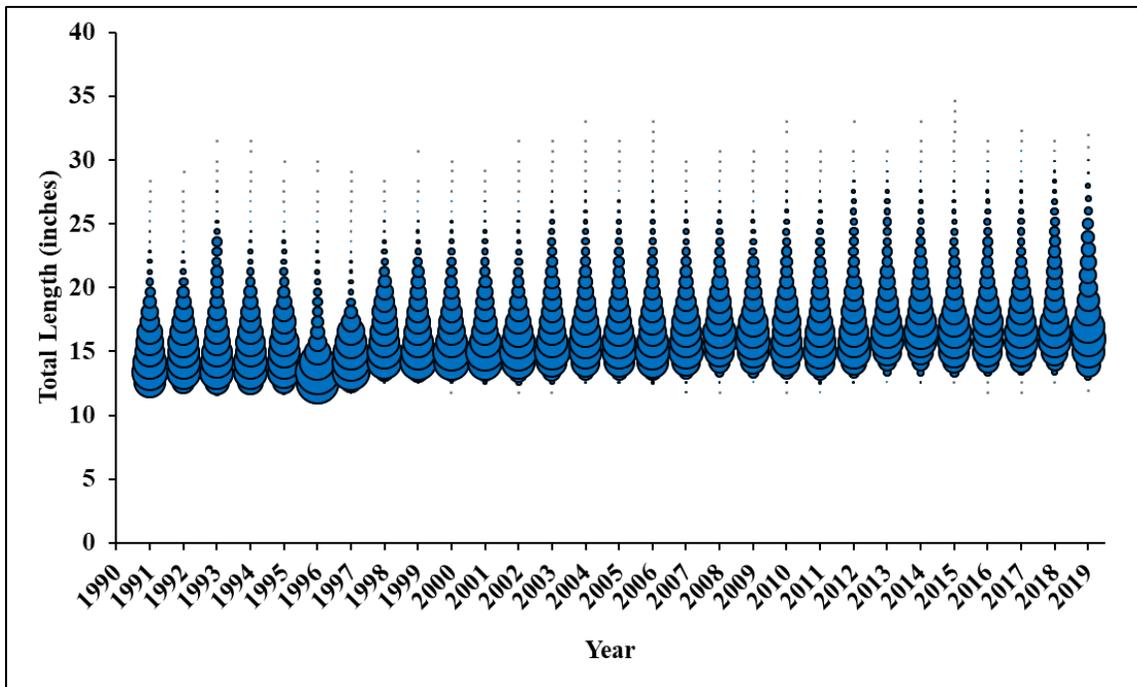


Figure 4. Commercial length frequency total length (inches) of summer flounder harvested from 1991 to 2019. Bubbles represent fish harvested at length and the size of the bubble is equal to the proportion of fish at that length.

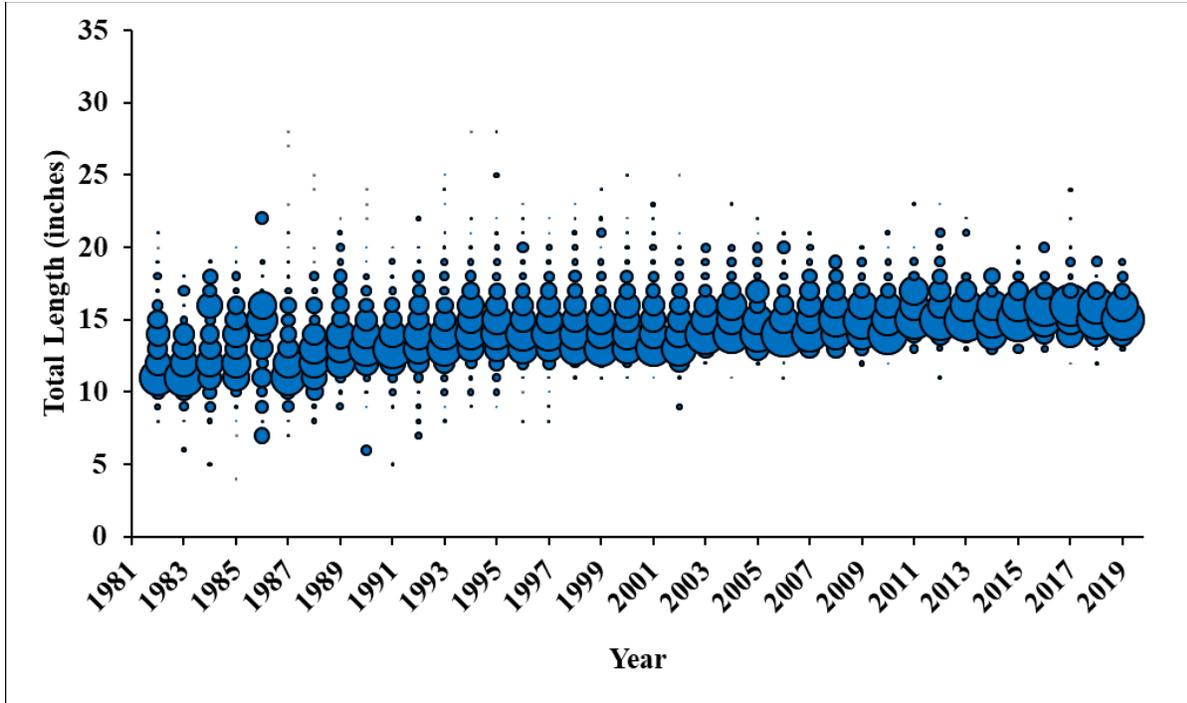


Figure 5. Recreational length frequency (total length, inches) of summer flounder harvested from 1982 to 2019. Bubbles represent fish harvested at length and the size of the bubble is equal to the proportion of fish at that length.

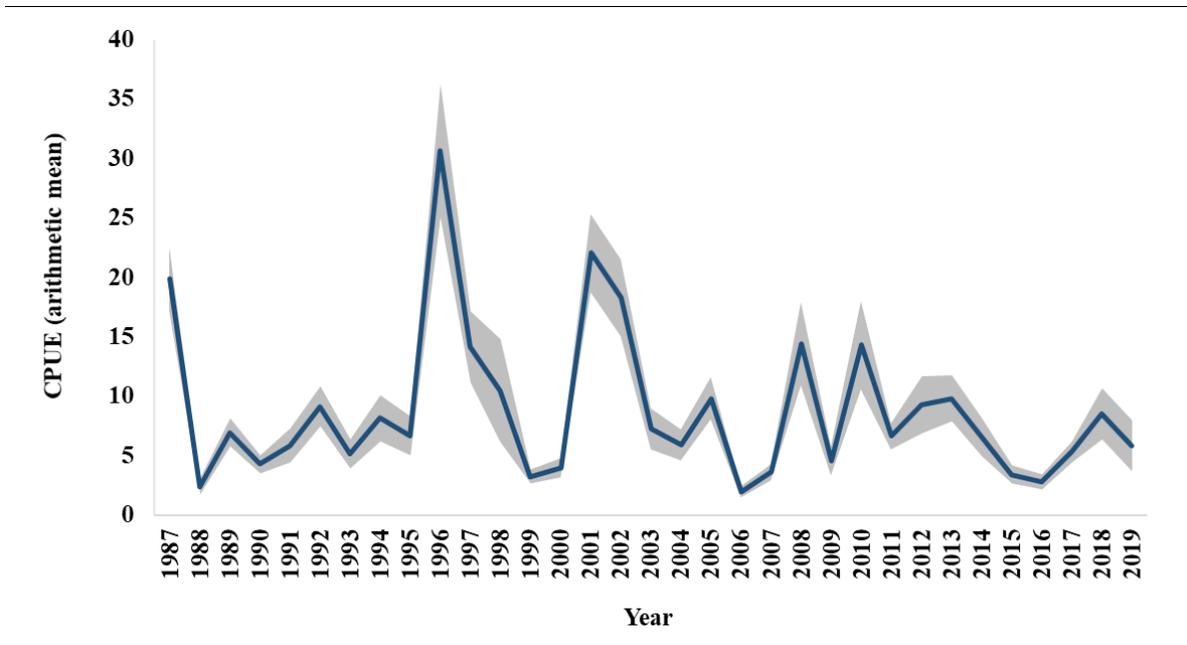


Figure 6. The annual summer flounder juvenile abundance index with standard error shaded in gray from the North Carolina Program 195 (Pamlico Sound Survey) Survey for the period of 1987-2019.

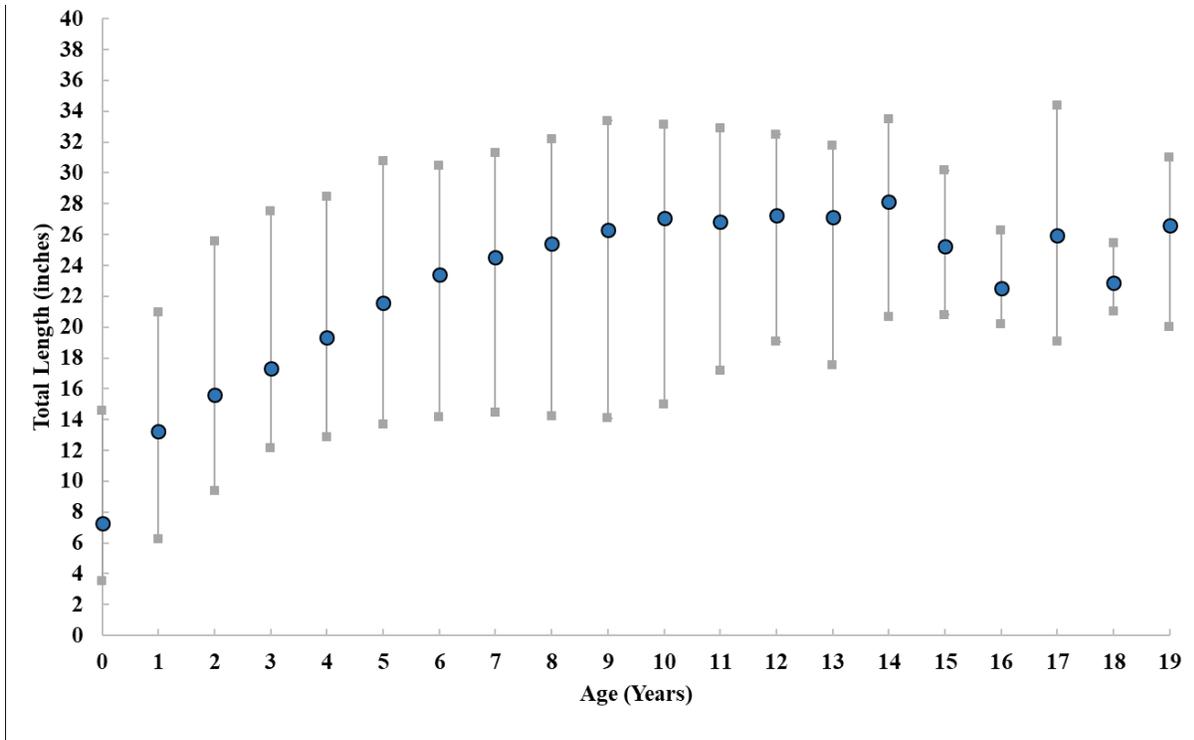


Figure 7. Summer flounder length at age based on age samples collected from 1991 to 2019. Blue circles represent the mean size at a given age while the grey squares represent the minimum and maximum observed size for each age.