

**FISHERY MANAGEMENT PLAN UPDATE
BLUEFISH
AUGUST 2020**

STATUS OF THE FISHERY MANAGEMENT PLAN

Fishery Management Plan History

Original FMP Adoption:	October 1990
Amendments:	Amendment 1 2000 Framework 1 2001 Amendment 2 2007 Amendment 3 2011 Addendum I 2012 Amendment 4 2013 Amendment 5 2015 Amendment 6 2017 Framework 2 2017 Framework 3 2018
Revisions:	None
Supplements:	None
Information Updates:	None
Schedule Changes:	None
Next Benchmark Review:	Fall 2022

The bluefish Fishery Management Plan (FMP) was developed through a novel (at the time) joint management effort between the interstate Atlantic States Marine Fisheries Commission (ASMFC) and the federal Mid-Atlantic Fishery Management Council (MAFMC). Amendment 1 initiated a 10-year rebuilding schedule to eliminate overfishing and allow for stock rebuilding which was achieved in 2009. Amendment 1 also established commercial and recreational quota allocations, state-specific commercial allocations, and allowed for the transfer of unused recreational quota to the commercial fishery. Framework 1 established annual harvest allocations specifically for biological monitoring programs. Amendments 2 and 5 were implemented to establish a strategy for monitoring bluefish bycatch. Amendment 3 added a formalizing process to incorporate scientific and management uncertainty when establishing catch limits. Addendum I established a coastwide biological monitoring program to improve the quantity and quality of information available for use in bluefish stock assessments. Amendment 4 modified the accountability measures for the recreational bluefish fishery. Amendment 6 addressed considerations for examining potential influence of the removal of forage fish species

by increasing directed fishing and advocated for future ecosystem-based management approaches. Framework 2 required for-hire vessels with federal permits for species managed by MAFMC to submit electronic vessel trip reports to the National Oceanic and Atmospheric Administration. Framework 3 established a process to specify constant multi-year acceptable biological catches. The bluefish FMP, associated amendment documents, and framework information can be found at <https://www.mafmc.org/bluefish>.

MAFMC and ASMFC are currently developing an amendment to review and possibly revise the allocation of the Atlantic bluefish between the commercial and recreational fisheries and the commercial allocations between the states. The FMP goals and objectives and quota transfer process will also be reviewed. The ASMFC and MAFMC will work with the Plan Development Team in 2020 on developing the range of draft alternatives to be included in the amendment. This amendment is tentatively scheduled for the summer or fall of 2021.

The FMP allows a state-by-state commercial quota system and a coastwide recreational harvest limit to reduce fishing mortality. Reporting and permit requirements, outlined in Amendment 1, are implemented for both commercial and recreational fishing sectors as well as fish dealers. The bluefish monitoring committee annually reviews contemporaneous fisheries data and recommends appropriate management measures as needed to achieve management goals.

To ensure compliance with interstate requirements, North Carolina (N.C.) also manages bluefish 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 and 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. The goal of these plans, established under the Magnuson-Stevens Fishery Conservation and Management Act (federal council plans) and the Atlantic Coastal Fisheries Cooperative Management Act (ASMFC plans), are like the goals of the Fisheries Reform Act of 1997 to “ensure long-term viability” of these fisheries (NCDMF 2015).

Management Unit

The FMP defines the management unit of bluefish as a single stock occurring in U.S. waters of the western Atlantic Ocean. All member Atlantic states participate in the ASMFC bluefish FMP process with the exception of Pennsylvania and the District of Columbia.

Multiple committees advise Atlantic bluefish fisheries managers. The ASMFC Stock Assessment Subcommittee and Technical Committee provide scientific insight to the ASMFC Bluefish Management Board and the MAFMC Bluefish Committee. Board and Committee members task science committees with logistical assistance, provide framework adjustment recommendations, and vote on management strategies for implementation.

Goal and Objectives

On July 26, 2000, the National Oceanic and Atmospheric Administration (NOAA) Fisheries published the final rule to implement the measures contained in Amendment 1 of the ASMFC/MAFMC bluefish FMP. The goal of Amendment 1 is to conserve the bluefish resource along the Atlantic Coast, specifically to: 1) increase understanding of the stock and fishery; 2) provide the highest availability of bluefish to U.S. fishermen; while maintaining, within limits, traditional uses of bluefish; 3) provide for cooperation among the coastal states, the various regional marine fishery management councils, and federal agencies involved along the coast to enhance the management of bluefish throughout its range; 4) prevent recruitment overfishing; and 5) reduce the waste in both the commercial and recreational fisheries.

STATUS OF THE STOCK

Life History

Bluefish (*Pomatomus saltatrix*) are migratory open water (pelagic) species found throughout the Atlantic Ocean. Bluefish migrate seasonally, moving north as water temperatures rise during spring and summer and south during the fall and winter to areas along the South Atlantic Bight (Shepherd et al. 2006). During the summer, bluefish mostly concentrate in waters from Maine to Cape Hatteras (Klein-MacPhee 2002). During the winter, they are found in offshore waters between North Carolina and Florida (Goodbred and Graves 1996). Therefore, bluefish are found off North Carolina year-round (Morley et al. 2007). Within North Carolina's estuarine waters bluefish are most common from March through October. Bluefish generally school with similarly sized fish (Austin et al. 1999).

Bluefish are fast growers (Wilk 1977) and opportunistic predators who feed indiscriminately. Over 70 different marine species have been documented in bluefish stomach contents including Atlantic menhaden, butterfish, silversides, spotted seatrout, Atlantic croaker, spot, shrimp, lobster, squid, crabs, worms, and clams (Buckel et al. 1999; Scharf et al. 2004).

The maximum documented age for bluefish is 14 years (Robillard et al. 2009). The annual maximum ages for bluefish collected in North Carolina usually range between 10 and 11 years old. The largest bluefish can exceed 39 inches and 31 lb (<http://portal.ncdenr.org/web/mf/north-carolina-state-saltwater-records>).

Bluefish usually reach sexual maturity by age 2 around a length of 13 inches (Robillard et al. 2008). They spawn offshore from Massachusetts through Florida. Some research suggests that two discrete cohorts of bluefish spawn at different times during the year with one group spawning during the spring and a second spawning during the summer (Lassiter 1962). More recent research suggests that bluefish continue to spawn as they migrate northward during the spring and summer (Robillard et al. 2008).

Stock Status

A 2015 benchmark stock assessment indicated that the Atlantic bluefish stock is not experiencing overfishing and is not considered overfished (NMFS 2015). The 2019 operational

stock assessment, which included data through 2018, determined that bluefish are overfished but are not experiencing overfishing (NMFS 2019).

Stock Assessment

Estimates from the 2019 operational assessment show that spawning stock biomass (SSB) has been decreasing since 2008 and has been below the SSB threshold since 2014 (Figure 1). SSB in 2018 was estimated to be 91,041 MT, which is 46% of the target reference point (NMFS 2019).

STATUS OF THE FISHERY

Current Regulations

In North Carolina, the private recreational (all persons not fishing on a for-hire vessel) bag limit is three bluefish per person per day and the recreational for-hire (all persons fishing on a for-hire vessel) is five bluefish per person per day.

Commercial Landings

Bluefish commercial landings have fluctuated annually since 1972 (Table 1; Figure 2); however, landings in recent years have been lower than average. Commercial landings in 2019 were 1,107,902 lb, well below the allowed commercial quota of 2.47 million pounds. Estuarine and ocean gill nets combined represent the largest commercial landings of bluefish accounting for 97.6% of the harvest in 2019 (Figure 4).

Recreational Landings

Recreational landings for bluefish have been annually variable but relatively stable for the last couple of decades (Table 1; Figure 2). Marine Recreational Information Program (MRIP) data collected by the NOAA Fisheries indicates that approximately 3.0 million pounds of bluefish were recreationally harvested in 2019. Recreational estimates across all years have been updated and are now based on the Marine Recreational Information Program (MRIP) new Fishing Effort Survey-based calibrated estimates. For more information on MRIP see:

<https://www.fisheries.noaa.gov/topic/recreational-fishing-data>.

The NCDMF offers award citations for exceptional catches of bluefish. Bluefish exceeding 15 lb are eligible for an award citation. Since 1991, award citations for bluefish have been variable with typically less than 20 citations awarded per year. The highest values occurred in the 1990's (Figure 3). Since 2017, the NCDMF has offered an additional citation for released bluefish that exceed 34 inches in length. Approximately 66% of the citations awarded since 2017 have been for released fish.

MONITORING PROGRAM DATA

Fishery-Dependent Monitoring

Bluefish are sampled from a variety of North Carolina commercial fishery gears including estuarine long haul, ocean trawl, pound net, ocean gill net, estuarine gill net, and ocean beach seine fisheries. Information on the location(s) of the catch should be obtained in as much detail as possible (e.g. water body, nearest landmark, marker number, etc.). Additionally, information on fishing gear type, specifications, soak time, and water depth should be recorded.

Subsampling of commercial catch to collect biological information on bluefish includes fork length (mm) and aggregate weight (kg) by market grade when possible. Trip ticket information (total weight of catch) is also recorded and reported to DMF by licensed dealers. The size of fish harvested recreationally is characterized through the MRIP survey.

A total of 4,220 bluefish were measured from commercial landings in 2019 (Table 2). Mean fork length was 15 inches and ranged from 8 to 33 inches. Size ranges have varied minimally since 1985. The mean length of fish harvested and measured by MRIP in the recreational fishery in 2019 was 13 inches and ranged from 7 to 32 inches fork length (Table 3). Overall, the size distribution of fish taken in the recreational fishery tends to be smaller than the distribution of fish harvested in the commercial fishery (Figure 5). Since 1985, the annual length distribution of harvest in both the commercial and recreational fisheries has varied little with most fish harvested ranging from 7 to 16 inches fork length (Figures 6 and 7). Larger bluefish occur more sporadically and appear to be less prominent in more recent years.

Fishery-Independent Monitoring

Bluefish are found in several of NCDMF sampling programs, including the juvenile trawl (P120), the Pamlico Sound trawl (P195), and the Pamlico Sound independent gill net (P915), and Long-line (P365) surveys. The Division's Pamlico Sound Independent Gill Net Survey was initiated in May of 2001 and has continuously sampled since. This survey catches more bluefish than any other independent survey. This survey provides fishery independent indices of relative abundance along with associated length and age data. These estimates provide essential data for input into the regional bluefish stock assessment. The relative abundance index, defined as the number of bluefish per set, has ranged from 2.8 in 2015 to 8.6 in 2019 during the last 19 years (Figure 8). The relative abundance index in 2019 was 8.6, which is well above the time-series average (5.4) and double the relative abundance index in 2018 (4.3).

The majority of bluefish age samples are obtained from the Pamlico Sound Independent Gill Net Survey as well as the commercial and recreational fisheries. In 2019, bluefish ages ranged from 0 to 8 years old, with a modal age of 1 (Table 4). The maximum age over the time-series has been 11 years of age. Bluefish length increases with age, although the size at a given age can be quite variable (Figure 9).

MANAGEMENT STRATEGY

Amendment 1 of the bluefish FMP allocates 83% of the resource to recreational fisheries and 17% to commercial fisheries. However, the commercial quota can be increased up to 10.5 million pounds if the recreational fishery is projected to not land its entire allocation for the upcoming year. The commercial fishery is controlled through state-by-state quotas based on historic landings from 1981-1989. The ASMFC and MAFMC are currently in the process of developing an amendment to review and possibly revise the allocation of bluefish between commercial and recreational fisheries as well as between states. Final rule making is scheduled for summer or fall of 2021.

North Carolina is a state subject to compliance of the biological monitoring program implemented under Addendum I to Amendment 1. To comply with these monitoring requirements NCDMF must collect at least 100 aging structures from bluefish each year. In 2019, 870 bluefish otoliths were extracted (Table 4).

The ASMFC/MAFMC FMP allocates 32% of the Atlantic Coast total bluefish quota to North Carolina. The FMP for bluefish welcomes individual states to implement management measures in addition to those required by the FMP or FMP amendments. The scope of North Carolina's bluefish proclamation authority is limited to actions that comply with the management requirements incorporated in Federal Fishery Management or Atlantic States Marine Fisheries Commission plans (15A NCAC 03M .0512).

To comply with the requirements of the Mid-Atlantic Fishery Management Council/Atlantic States Marine Fisheries Commission 2019 Bluefish Fishery Management Plan, North Carolina has reduced the recreational bag limit from the previous year. From June 2001 to January 2020, North Carolina had a 15-fish recreational bag limit, and starting in April 2003 only five of the 15 fish could be greater than 24-inches total length. Starting on February 1, 2020, the private recreational (all persons not fishing on a for-hire vessel) bag limit is three bluefish per person per day and the recreational for-hire (persons fishing on a for-hire vessel) is five bluefish per person per day. There are currently no size restrictions.

RESEARCH NEEDS

- Continue research on species interactions and predator-prey relationships. Investigate the feasibility of alternative survey methods that target bluefish across all age classes to create a more representative fishery-independent index of abundance
- Initiate sampling of offshore populations in winter months
- Initiate coastal surf zone seine study to provide more complete indices of juvenile abundance
- Develop additional adult bluefish indices of abundance (e.g., broad spatial scale longline survey or gillnet survey)
- Expand age structure of Southeast Area Monitoring and Assessment Program index
- Investigate species associations with recreational angler trips targeting bluefish (on a regional and seasonal basis) to potentially modify the MRIP index used in the assessment model

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

- Explore age- and time-varying natural mortality from, for example, predator prey relationships; quantify effects of age- and time-varying natural mortality in the assessment model
- Continue to evaluate the spatial, temporal, and sector-specific trends in bluefish growth and quantify their effects in the assessment model
- Continue to examine alternative models that take advantage of length-based assessment frameworks
- Evaluate the source of bimodal length frequency in the catch (e.g., migration, differential growth rates)
- Modify thermal niche model to incorporate water temperature data more appropriate for bluefish in a timelier manner [(e.g., sea surface temperature data & temperature data that cover the full range of bluefish habitat (South Atlantic Bight and estuaries)]
- Quantify recreational discard mortality of bluefish has discards are a large component of the recreational fishery
- Investigate potential spatial distribution shifts of the Atlantic stock

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TABLES

Table 1. Bluefish recreational harvest and number released (Marine Recreational Information Program) and commercial harvest (North Carolina Trip Ticket Program) for 1985-2019. All weights are in pounds.

Year	Recreational		Landed	Commercial Weight (lb)	Total Weight (lb)
	Numbers	Released			
1985	3,706,930	1,281,466	7,001,181	3,604,445	10,605,626
1986	5,184,834	1,233,792	16,245,390	3,450,230	19,695,620
1987	3,248,002	1,402,327	8,542,577	4,561,101	13,103,678
1988	3,131,369	1,002,321	4,475,001	5,039,039	9,514,040
1989	4,843,723	2,314,161	7,123,822	3,291,468	10,415,290
1990	6,838,820	2,427,701	10,345,929	4,578,172	14,924,101
1991	2,423,772	1,478,829	4,627,434	3,919,786	8,547,220
1992	1,562,752	1,957,741	2,226,311	2,839,057	5,065,368
1993	1,620,184	1,825,095	1,991,395	2,705,278	4,696,673
1994	673,341	3,235,793	847,458	1,782,345	2,629,803
1995	660,979	2,345,163	770,490	3,010,742	3,781,232
1996	632,382	1,613,566	1,352,444	3,298,639	4,651,083
1997	1,476,271	2,286,439	2,366,435	4,003,160	6,369,595
1998	1,530,106	1,530,488	1,888,463	2,925,929	4,814,392
1999	1,774,946	2,749,327	1,232,827	2,761,084	3,993,911
2000	2,325,583	5,231,507	1,721,367	3,368,610	5,089,977
2001	3,410,135	6,756,435	3,048,743	4,066,000	7,114,743
2002	2,484,516	4,357,535	2,327,789	2,323,964	4,651,753
2003	2,161,780	3,432,547	1,843,018	3,470,100	5,313,118
2004	2,825,382	3,781,031	2,773,518	3,762,944	6,536,462
2005	3,004,921	4,417,822	2,938,814	2,837,661	5,776,475
2006	2,842,593	5,213,436	2,651,326	2,791,187	5,442,513
2007	3,749,514	6,740,155	3,616,359	2,329,718	5,946,077
2008	2,855,199	5,146,870	2,385,349	1,930,391	4,315,740
2009	3,190,313	6,447,822	3,566,768	2,360,081	5,926,849
2010	3,691,868	7,419,644	3,185,652	3,216,030	6,401,682
2011	3,613,883	7,150,476	3,158,287	1,897,471	5,055,758
2012	2,684,392	3,268,032	2,872,922	758,858	3,631,780
2013	4,287,526	7,050,725	3,517,233	1,159,580	4,676,813
2014	4,418,858	5,862,762	3,764,005	2,019,279	5,783,284
2015	4,123,461	6,356,252	3,754,577	804,336	4,558,913
2016	4,489,223	6,802,960	3,356,049	1,148,126	4,504,175
2017	3,173,218	8,255,510	3,634,502	1,544,037	5,178,539
2018	3,304,587	7,912,210	2,630,685	910,262	3,540,947
2019	2,752,589	7,162,431	3,011,480	1,107,902	4,119,382
Average	2,991,370	4,212,868	3,737,017	2,730,772	6,467,789

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

Table 2. Summary of fork length data (inches) sampled from all sources of length data (harvest and bait) from the bluefish commercial fishery from 1985-2019.

Year	Total Number Measured	Mean Fork Length (inches)	Minimum Fork Length (inches)	Maximum Fork Length (inches)
1985	5,351	15	4	33
1986	4,220	14	4	33
1987	3,902	16	4	33
1988	4,243	16	3	32
1989	5,701	16	4	33
1990	8,090	16	4	33
1991	6,068	14	4	35
1992	6,771	13	4	32
1993	3,796	16	3	35
1994	2,096	15	5	33
1995	2,095	15	3	32
1996	2,428	16	5	33
1997	4,355	14	4	35
1998	4,693	16	5	33
1999	7,063	18	5	34
2000	8,369	18	6	35
2001	11,748	18	4	35
2002	8,288	18	5	35
2003	7,861	19	6	34
2004	9,608	19	6	33
2005	9,766	19	5	33
2006	10,255	18	5	33
2007	8,856	15	6	33
2008	8,035	16	5	33
2009	7,471	18	6	34
2010	6,721	17	6	35
2011	5,768	16	6	33
2012	7,030	14	5	34
2013	6,928	14	6	33
2014	6,459	15	8	34
2015	6,100	14	7	31
2016	7,616	14	3	33
2017	5,580	16	7	35
2018	3,778	15	7	34
2019	4,299	15	8	33

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

Table 3. Summary of fork length data (inches) sampled from the bluefish recreational fishery from 1985-2019.

Year	Total Number Measured	Mean Fork Length (inches)	Minimum Fork Length (inches)	Maximum Fork Length (inches)
1985	312	14	6	34
1986	420	18	6	38
1987	1,319	16	5	40
1988	1,117	7	0	38
1989	1,633	12	5	40
1990	2,413	13	5	34
1991	1,572	14	5	36
1992	1,044	13	7	33
1993	1,187	13	7	36
1994	1,174	14	7	36
1995	740	14	4	36
1996	1,177	15	6	38
1997	2,404	14	6	37
1998	1,624	13	6	40
1999	1,316	12	6	34
2000	1,356	12	6	34
2001	2,191	13	7	31
2002	999	13	7	34
2003	781	13	7	34
2004	1,149	13	6	40
2005	1,056	12	6	35
2006	1,028	12	6	36
2007	1,048	12	6	37
2008	894	12	5	35
2009	778	13	7	34
2010	1,323	12	6	38
2011	1,784	12	6	34
2012	1,190	12	7	35
2013	563	11	7	29
2014	660	12	7	29
2015	577	12	7	18
2016	732	11	8	23
2017	657	12	6	35
2018	846	11	6	30
2019	2,309	13	7	32

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

Table 4. Summary of bluefish age samples collected from both dependent (commercial and recreational fisheries) and independent (surveys) sources from 1989-2019.

Year	Modal Age	Minimum Age	Maximum Age	Number of Samples
1985	1	0	11	562
1986	1	0	9	455
1987	1	0	9	382
1988	1	0	9	348
1989	1	0	9	330
1990	1	0	9	374
1991	1	0	8	291
1992	1	0	9	706
1993	1	0	10	729
1994	1	0	10	533
1995	1	0	9	635
1996	1	0	10	489
1997	1	0	10	1,069
1998	1	0	9	1,340
1999	1	0	10	882
2006	1	0	10	558
2006	3	0	10	89
2007	2	0	11	433
2008	1	0	10	656
2009	3	0	10	488
2010	3	0	8	527
2011	3	0	9	551
2012	1	0	9	818
2013	0	0	9	742
2014	1	0	9	803
2015	1	0	10	622
2016	1	0	11	678
2017	2	0	10	630
2018	1	0	10	669
2019	1	0	8	870

FIGURES

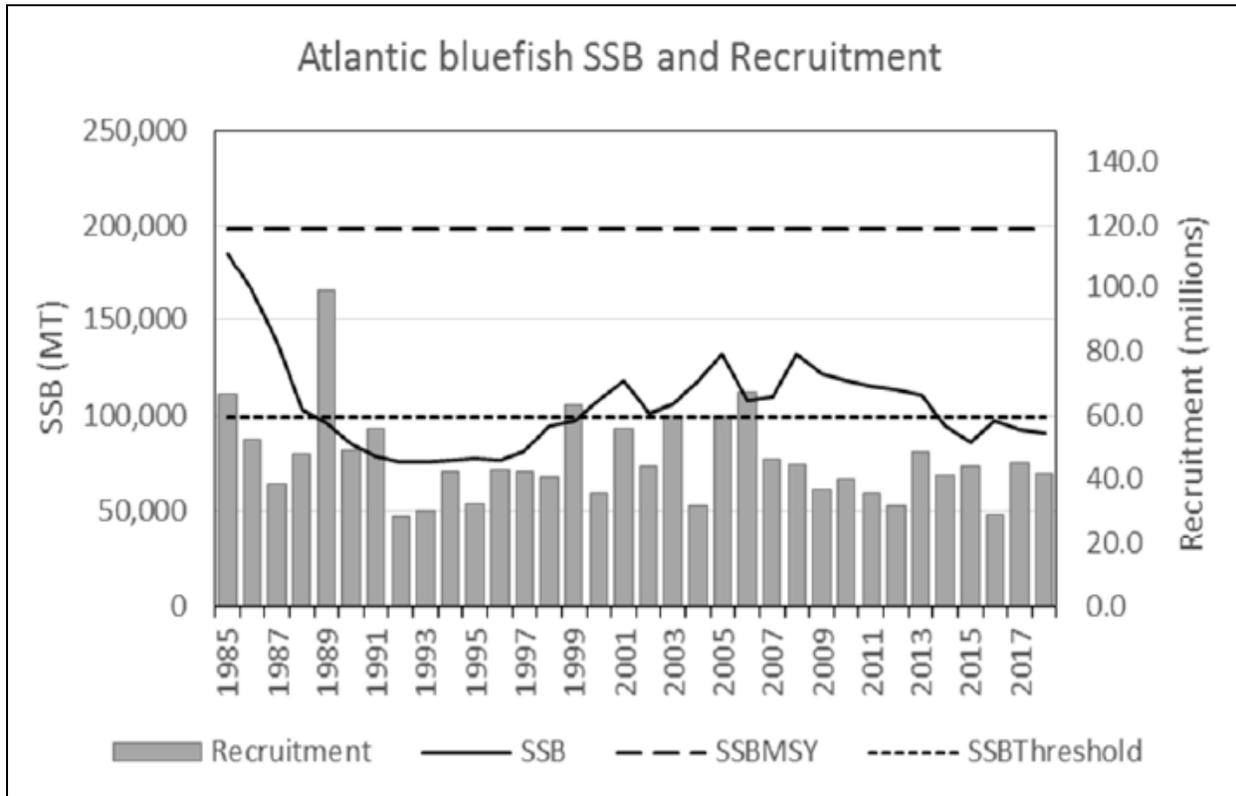


Figure 1. Atlantic bluefish spawning stock biomass (SSB; solid black line) and recruitment at age 0 (R; gray vertical bars) by calendar year. The horizontal dashed line is the updated SSBMSY proxy = SSB40% = 198,717 MT, and the dotted black line is the SSBThreshold = 99,359 MT (NMFS 2019).

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

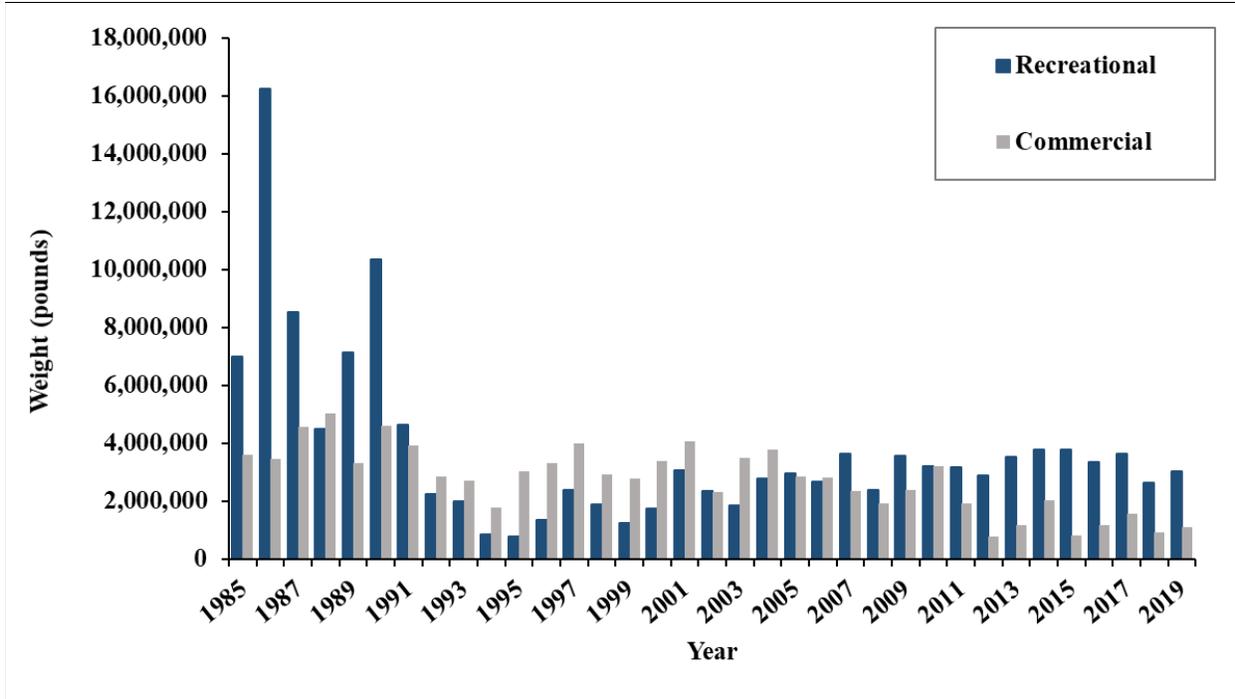


Figure 2. North Carolina commercial and recreational landings of bluefish from 1985 to 2019.

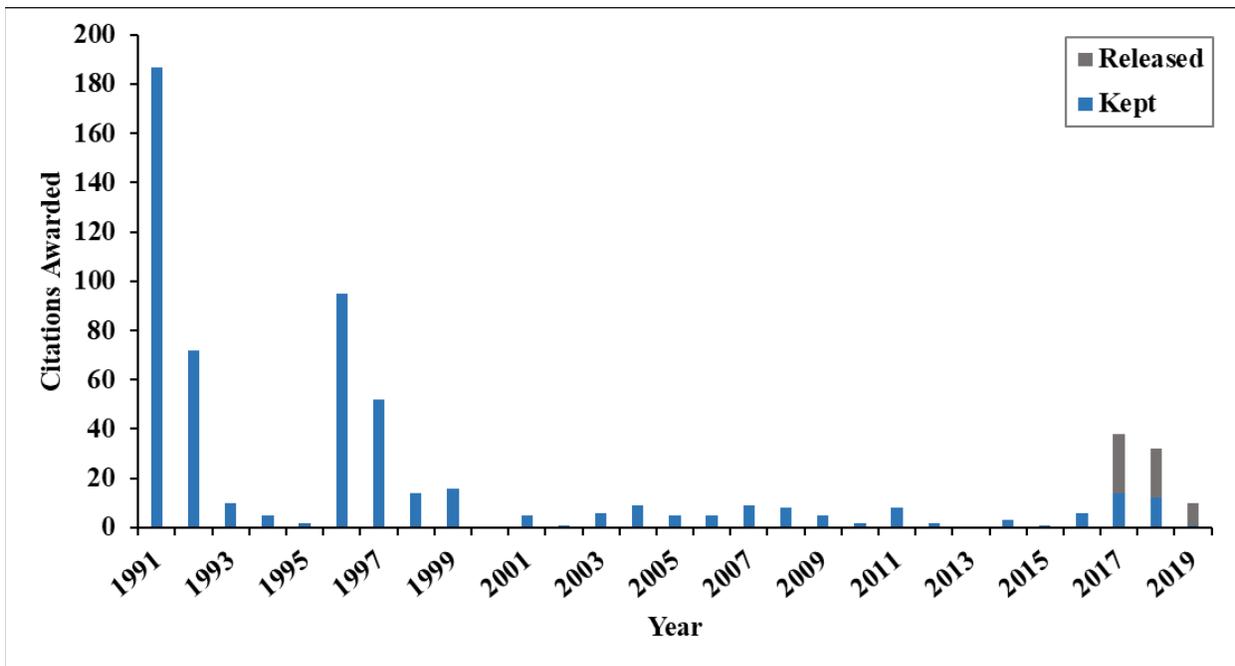


Figure 3. North Carolina recreational award citations for bluefish from 1981 to 2019. Award citations are given for bluefish catches taken by hook and line that are 15 lb or larger. Beginning in 2017, award citations were also offered for the release of bluefish that measure 34 inches or larger.

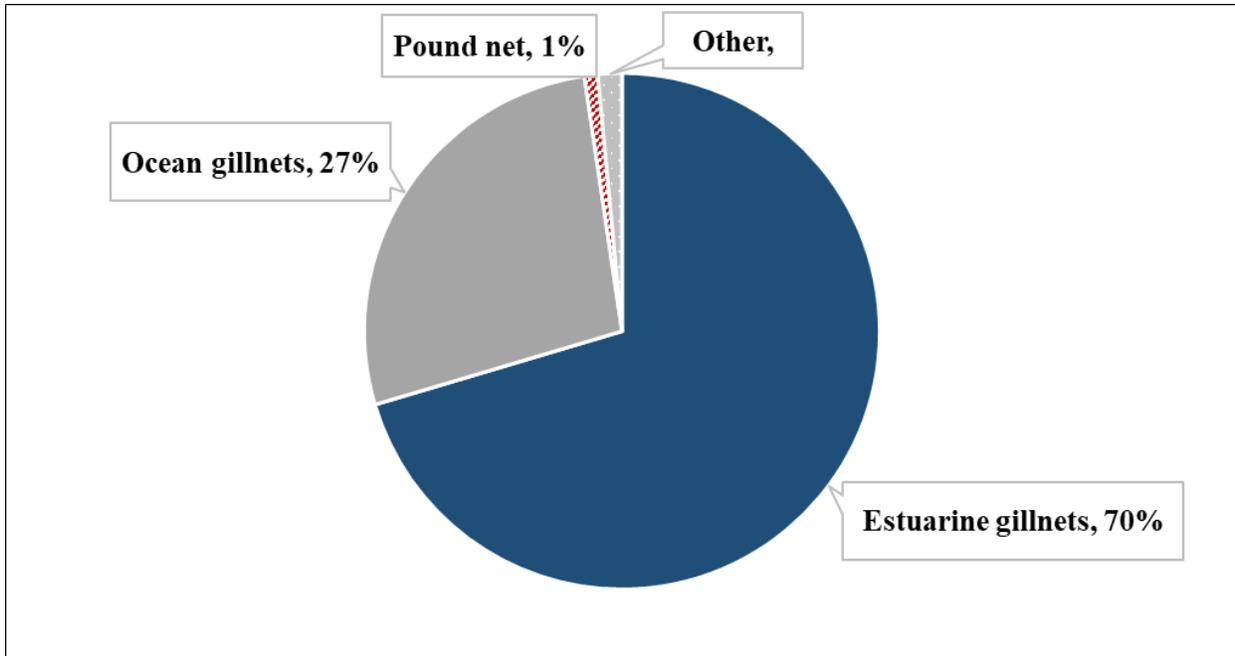


Figure 4. Commercial harvest in 2019 by gear type.

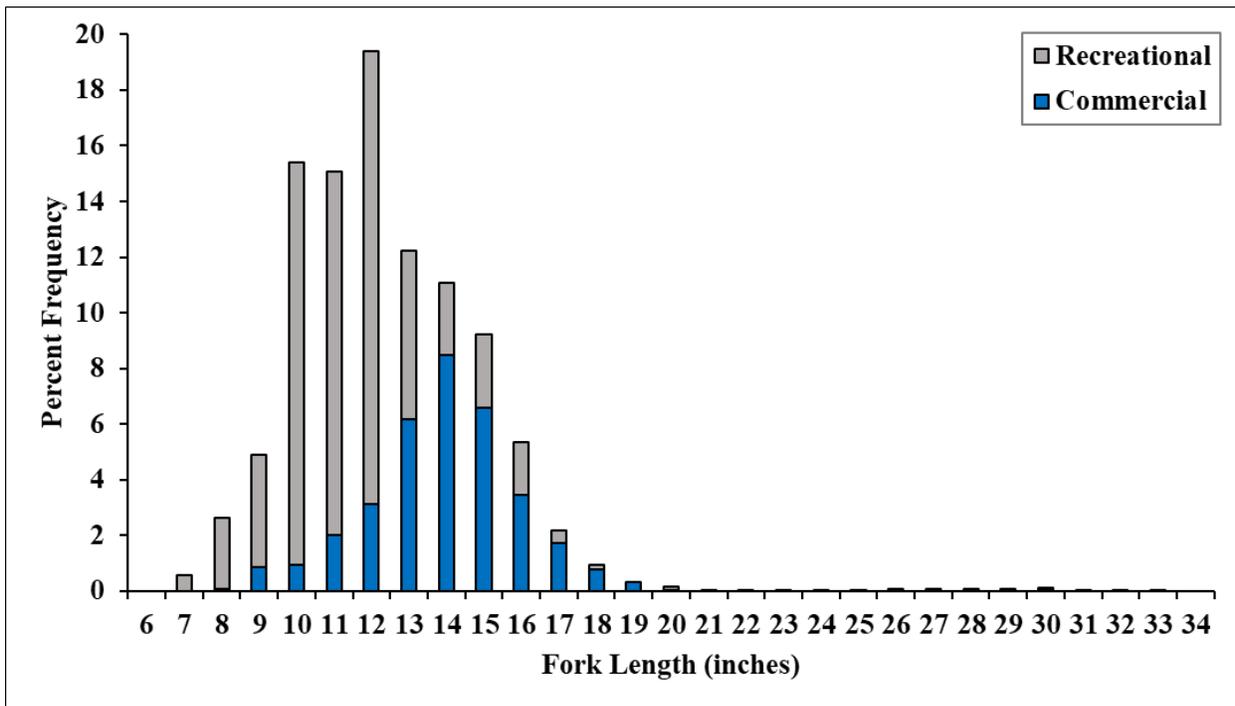


Figure 5. Commercial and recreational length frequency distribution from bluefish harvested in 2019.

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

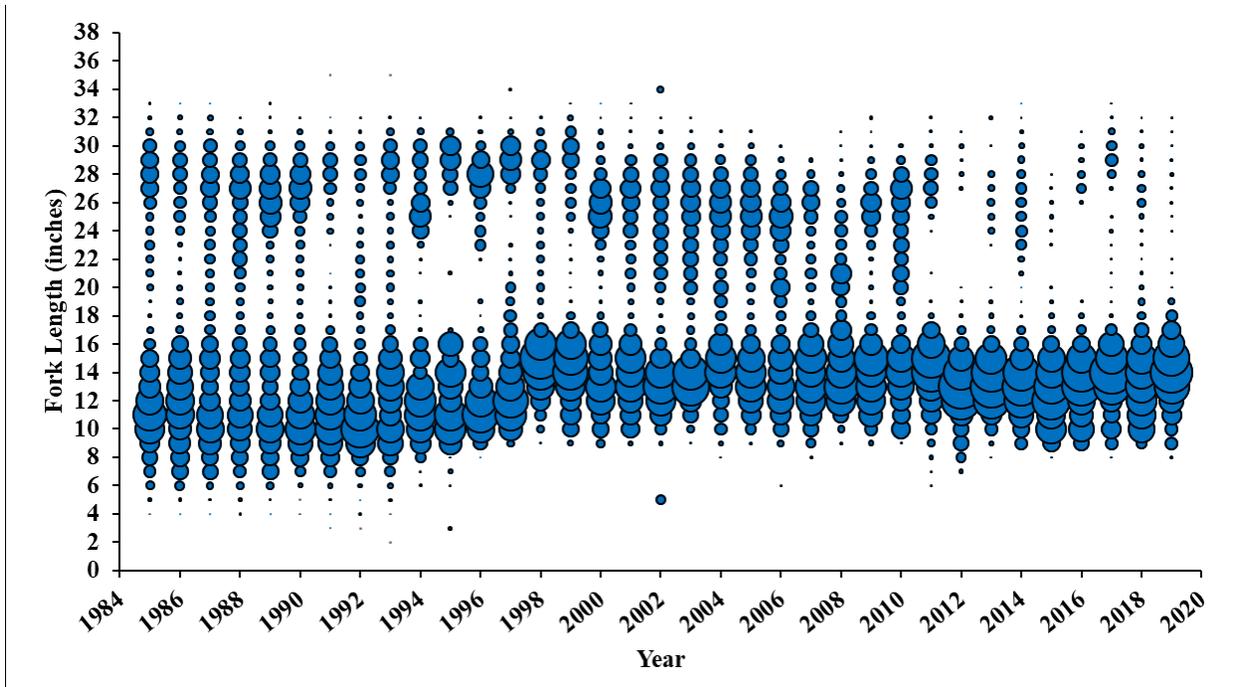


Figure 6. Commercial length frequency of bluefish harvested from 1985 to 2019. Bubbles represent fish harvested at length and the size of the bubble is equal to the proportion of fish at that length.

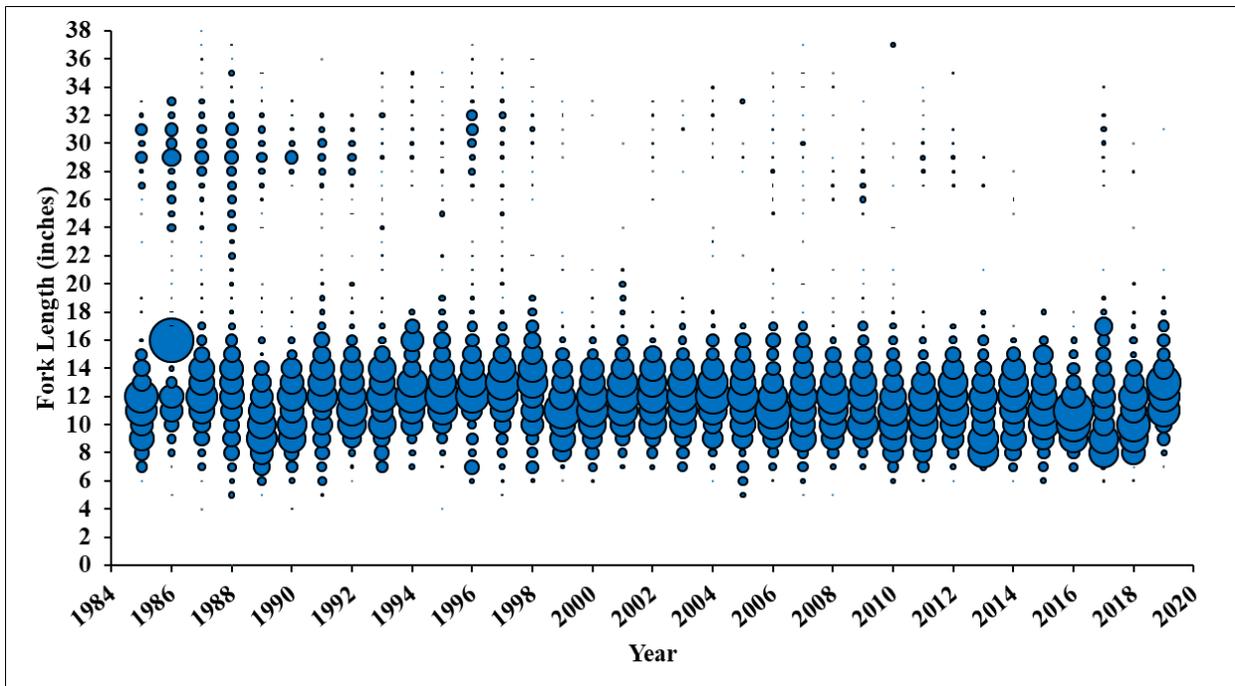


Figure 7. Recreational length frequency (fork length, inches) of bluefish harvested from 1985 to 2019. Bubbles represent fish harvested at length and the size of the bubble is equal to the proportion of fish at that length.

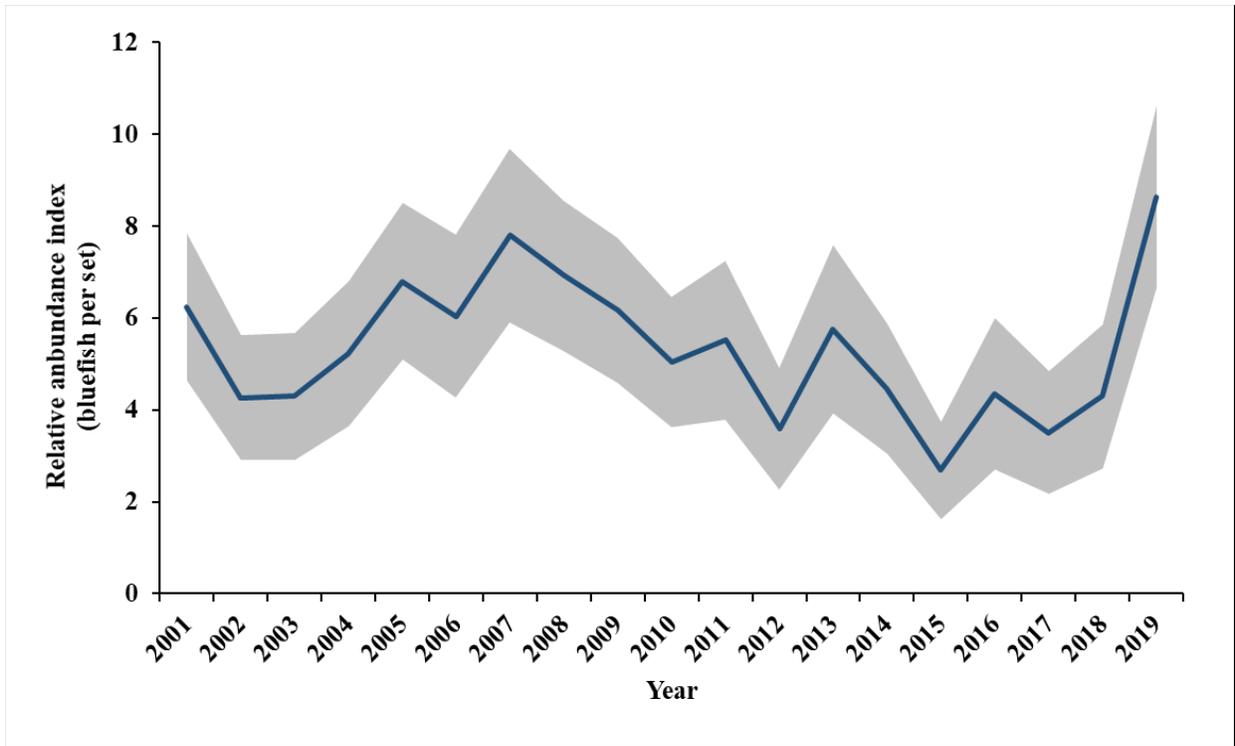


Figure 8. Relative abundance index of bluefish, from the Pamlico Sound Independent Gill net Survey from 2001 to 2019. Shading represents the standard error about the annual relative abundance index estimates.

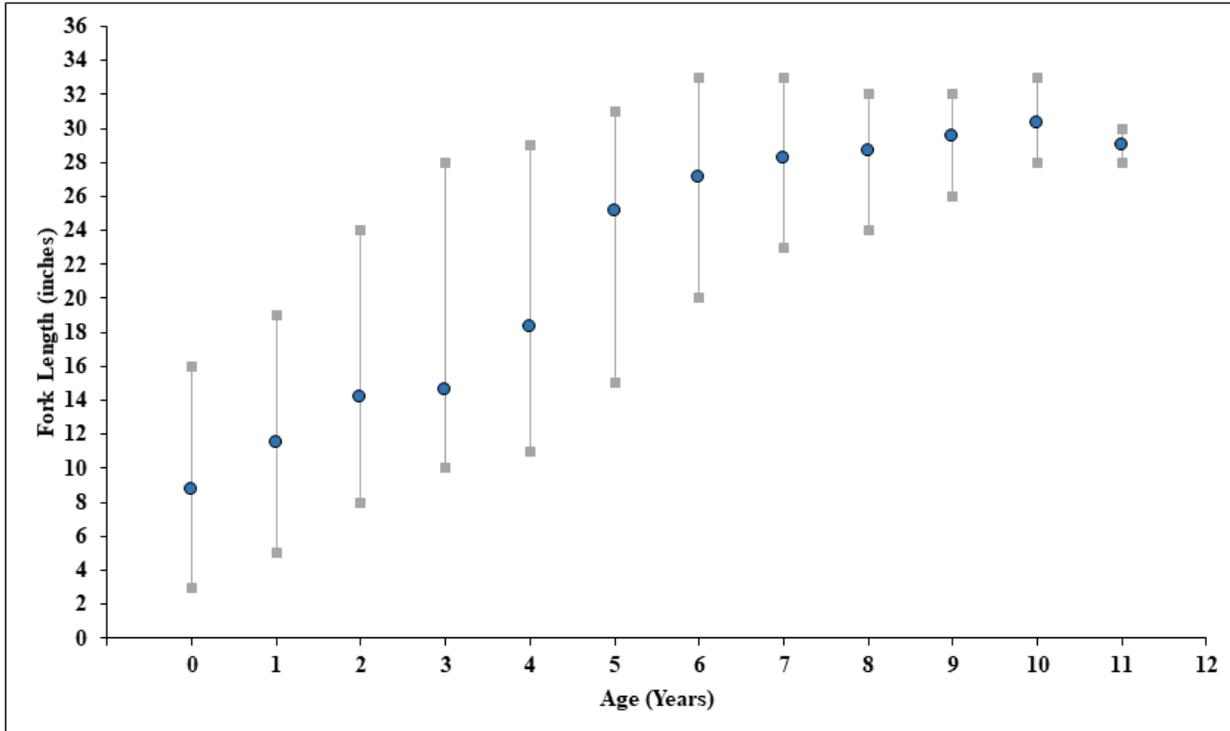


Figure 9. Bluefish length at age based on all age samples collected from 1983 to 2018. Blue circles represent the mean size at a given age while the grey squares represent the minimum and maximum observed size for each age.