FISHERY MANAGEMENT PLAN UPDATE
BLUEFISH
AUGUST 2023

STATUS OF THE FISHERY MANAGEMENT PLAN

Fishery Management Plan History

FMP Documentation:	1990	
	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
	Framework 4	2020
	Framework 5	2020
	Amendment 7	2021
	Framework 6	2023
Comprehensive Review:	2022	

The Fishery Management Plan (FMP) for bluefish was developed through a 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 coast-wide 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. Framework 4 established a requirement for commercial vessels with federal permits for any species managed by the Mid-Atlantic and New England Councils to submit vessel trip reports electronically within 48 hours after entering port at

the conclusion of a trip. Framework 5 modified the Council's acceptable biological catch (ABC) control rule and risk policy. The revised risk policy is intended to reduce the probability of overfishing as stock size falls below the target biomass while allowing for increased risk and greater economic benefit under higher stock biomass conditions. This action also removed the typical/atypical species distinction currently included in the risk policy. Amendment 7, the Bluefish Allocation and Rebuilding Amendment, revised the goals and objectives of the fishery management plan, reallocated quota between the commercial and recreational fisheries, reallocated commercial quota among the states, implemented a rebuilding plan, revised the sector quota transfer process, and revised how management uncertainty is applied during the specifications process. Amendment 7 took effect on January 1, 2022. Framework 6 established a new process for setting recreational bag, size, and season limits (i.e., recreational measures) for summer flounder, scup, black sea bass, and bluefish. This action also modified the recreational accountability measures for these species. Framework 6 took effect on March 9, 2023. The bluefish FMP, associated amendment documents, and framework information can be found at https://www.mafmc.org/bluefish.

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 2022a).

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 except for Pennsylvania and the District of Columbia.

Goal and Objectives

Amendment 7 revised the goals and objectives of the bluefish FMP to the following:

- Goal 1: Conserve the bluefish resource through stakeholder engagement to maintain sustainable recreational fishing and commercial harvest.
    - Objective 1.1: Achieve and maintain a sustainable spawning stock biomass and rate of fishing mortality.
    - Objective 1.2: Promote practices that reduce release mortality within the recreational and commercial fishery.
    - Objective 1.3: Maintain effective coordination between the National Marine Fisheries Service, Council, Commission, and member states by promoting compliance and to support the development and implementation of management measures.

- Objective 1.4: Promote compliance and effective enforcement of regulations.
- Objective 1.5: Promote science, monitoring, and data collection that support and enhance effective ecosystem-based management of the bluefish resource.

- Goal 2: Provide fair and equitable access to the fishery across all user groups throughout the management unit.
  - Objective 2.1: Ensure the implementation of management measures provides fair and equitable access to the resource across all user groups within the management unit.
  - Objective 2.2: Consider the economic and social needs and priorities of all groups that access the bluefish resource in the development of new management measures.
  - Objective 2.3: Maintain effective coordination with stakeholder groups to ensure optimization of economic and social benefits.

DESCRIPTION OF THE STOCK

Biological Profile

Bluefish (*Pomatomus saltatrix*) are a 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). 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. 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). Bluefish can exceed 39 inches and 31 pounds (NCDMF 2022b). Bluefish usually reach sexual maturity by age two around a length of 13 inches (Robillard et al. 2008). They spawn offshore from Massachusetts through Florida. Bluefish born each year typically fall into two distinct size classes, suggesting that there are two distinct spawning events, with one group spawning during the spring and a second spawning during the summer (Lassiter 1962). However, more recent research suggests that bluefish spawning is a single, continuous event that occurs as they migrate northward during the spring and summer, but that bluefish spawned in the middle of this time period do not have high survivability, resulting in two distinct size groups (Smith et al. 1994; Robillard et al. 2008).

Stock Status

The 2021 management track stock assessment, which included data through 2019, determined that bluefish are overfished but are not experiencing overfishing (NMFS 2021).

Stock Assessment

Estimates from the 2021 management track stock assessment show that spawning stock biomass (SSB) decreased from 2008 to 2018 but showed an increase from 2018 to 2019. SSB was below the SSB threshold in 2019 and has been below the SSB threshold since 2014 (Figure 1). SSB in 2019 was estimated to be 95,742 MT, which is 47.5% of the target reference point (NMFS 2021).

A bluefish research track stock assessment underwent peer review in December 2022 and will serve as the basis for the upcoming 2023 management track assessment. This management track assessment will use data through 2022 and be the basis for management in 2024-2025.

DESCRIPTION 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. These regulations have been in effect since 2020. Commercial fishery landings are monitored and if necessary, trip limits are implemented to prevent exceeding the annual quota. The commercial fishery was opened on January 1, 2022, with no possession limit and remained so through the end of 2022.

Commercial Fishery

In North Carolina, bluefish have been harvested commercially using a variety of gears including estuarine long haul, ocean trawl, pound net, ocean beach seine, ocean gill net, and estuarine gill net. Capture methods have shifted primarily to gill nets over the last few decades. Gill nets, especially estuarine gill nets, have been the primary mode of harvest. Estuarine and ocean gill nets combined represent the largest commercial landings of bluefish, accounting for 98% of the harvest in 2022 (Figure 4). Bluefish commercial landings have fluctuated annually since 1972 (Table 1; Figure 2); however, landings in recent years have been lower than average. The commercial quota allocated to North Carolina for 2022 was 1,133,855 pounds. North Carolina did not receive any commercial quota transfers from other states in 2022. North Carolina's 2022 commercial bluefish landings totaled 872,041 pounds at a dockside value of $513,425.

Recreational Fishery

Bluefish are caught recreationally from shore, pier, and boat and can be targeted with lures as well as live and dead bait. Discards are a large part of the Bluefish fishery as they are not highly sought after for eating. In 2022, almost 86% of landed fish were released (Table 1). 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). Recreational landings for bluefish have been annually variable but relatively stable for the last few decades (Figure 2).

The DMF offers award citations for exceptional catches of bluefish. Bluefish exceeding 15 pounds are eligible for an award citation. The number of citations awarded was highest in 1991 (n=187), with fewer citations awarded in the last 20 years, compared to the 1990's (Figure 3). Since 2017,

the DMF has offered an additional citation for released bluefish that exceed 34 inches in length. Approximately 62% of the citations awarded since 2017 have been for released fish.

MONITORING PROGRAM DATA

Fishery-Dependent Monitoring

Commercial bluefish landings from a broad range of gears are sampled through the Division's fish house sampling programs. Information collected includes location, gear type and gear-specifics, soak time, and water depth. Commercial catches are also subsampled to collect biological information on bluefish including fork length (FL) and aggregate weight (kg) by market grade. Trip ticket information (total weight of catch) is also recorded and reported to DMF by licensed dealers. A total of 3,945 bluefish were measured from commercial landings in 2022 (Table 2). Mean fork length was 14 inches and ranged from 4 to 31 inches. Size ranges have varied minimally over the last few decades.

The number and size of fish harvested as well as number of fish released recreationally is characterized through NOAA Fisheries' Marine Recreational Information Program (MRIP). In 2022, approximately 1.6 million pounds of bluefish were recreationally harvested. The mean length of fish harvested and measured by MRIP in the recreational fishery in 2022 was 12 inches and ranged from 7 to 29 inches fork length (Table 3). 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 (>20 inches) have been less common in recent years in both the commercial and recreational fisheries. See https://www.fisheries.noaa.gov/topic/recreational-fishing-data for more information on the collection of recreational fishing data.

Fishery-Independent Monitoring

The Division's Pamlico Sound Independent Gill Net Survey was initiated in May of 2001 and has been sampled continuously through 2019. 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 coastwide 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 22-year time-series (Figure 8). The relative abundance index in 2022 was 6.8, which is slightly below the time-series average (5.5). It should be noted that the index in 2021 is calculated from samples collected from Jul.-Dec while the index for all other years was calculated for Feb.-Dec. Sampling in this program was suspended in February 2020 due to COVID-19 restrictions and protected species interactions but resumed July 2021.

North Carolina is one of the states subject to compliance of the biological monitoring program implemented under Addendum I to Amendment 1. To comply with these monitoring requirements, DMF must collect at least 100 aging structures from bluefish each year. When possible, at least 50 fish are collected from January-June and 50 fish from July-December. In most years, 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 2022, 1,210 age samples were collected (Table 4). The maximum age in 2022 was 8 years of age. The maximum age over the time-series is 12 years

of age. Bluefish length increases with age, although the size at a given age can be quite variable (Figure 9).

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.
- 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.

MANAGEMENT STRATEGY

Bluefish in North Carolina are jointly managed by ASMFC and MAFMC under Amendment II of the FMP. Amendment II uses annual catch limits (ACLs) for both the recreational and commercial sectors. The recreational quota is a coast-wide quota while the commercial quota is further divided into state-specific quotas. Amendment II allows quota transfers between states and between sectors. Additionally, daily limits are used to manage recreational harvest and trip limits can be implemented for commercial fishermen if needed to prevent exceeding North Carolina's commercial quota.

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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) in North Carolina, 1985–2022.

	Recreational			Commercial	
Year	Number Landed	Number Released	Weight Landed (lb)	Weight Landed (lb)	Total Weight (lb)
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	3,298,640	4,651,084
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	804,094	4,558,671
2016	4,489,223	6,802,960	3,356,049	1,148,643	4,504,692
2017	3,173,218	8,255,510	3,634,502	1,544,053	5,178,555
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	1,108,205	4,119,685
2020	2,108,296	6,557,751	2,124,224	1,113,009	3,237,233
2021	982,389	3,539,333	1,031,760	1,051,026	2,082,786
2022	1,533,911	9,336,045	1,645,410	872,041	2,517,451
Mean	2,876,909	4,391,671	3,568,342	2,595,097	6,163,439

Table 2. Summary of fork length (inches) data sampled from all sources of length data (harvest and bait) from the bluefish commercial fishery in North Carolina, 1985–2022.

Year	Mean Fork Length	Minimum Fork Length	Maximum Fork Length	Total Number Measured
1985	15	4	33	5,351
1986	14	4	33	4,220
1987	16	4	33	3,902
1988	16	3	32	4,243
1989	16	4	33	5,701
1990	16	4	33	8,090
1991	14	4	35	6,068
1992	13	4	32	6,771
1993	16	3	35	3,796
1994	15	5	33	2,096
1995	15	3	32	2,095
1996	16	5	33	2,428
1997	14	4	35	4,355
1998	16	5	33	4,693
1999	18	5	34	7,063
2000	18	6	35	8,369
2001	18	4	35	11,748
2002	18	5	35	8,288
2003	19	6	34	7,861
2004	19	6	33	9,608
2005	19	5	33	9,766
2006	18	5	33	10,255
2007	15	6	33	8,856
2008	16	5	33	8,035
2009	18	6	34	7,471
2010	17	6	35	6,721
2011	16	6	33	5,768
2012	14	5	34	7,030
2013	14	6	33	6,928
2014	15	8	34	6,459
2015	14	7	31	6,100
2016	14	3	33	7,616
2017	16	7	35	5,580
2018	15	7	34	3,778
2019	15	8	33	4,812
2020	16	7	35	3,396
2021	16	8	34	4,203
2022	14	4	31	3,945

Table 3. Summary of fork length (inches) data sampled from the bluefish recreational fishery in North Carolina, 1985–2022.

Year	Mean Fork Length	Minimum Fork Length	Maximum Fork Length	Total Number Measured
1985	14	6	34	312
1986	18	6	38	420
1987	16	5	40	1,319
1988	7	0	38	1,117
1989	12	5	40	1,633
1990	13	5	34	2,413
1991	14	5	36	1,572
1992	13	7	33	1,044
1993	13	7	36	1,187
1994	14	7	36	1,174
1995	14	4	36	740
1996	15	6	38	1,177
1997	14	6	37	2,404
1998	13	6	40	1,624
1999	12	6	34	1,316
2000	12	6	34	1,356
2001	13	7	31	2,191
2002	13	7	34	999
2003	13	7	34	781
2004	13	6	40	1,149
2005	12	6	35	1,056
2006	12	6	36	1,028
2007	12	6	37	1,048
2008	12	5	35	894
2009	13	7	34	778
2010	12	6	38	1,323
2011	12	6	34	1,784
2012	12	7	35	1,190
2013	11	7	29	563
2014	12	7	29	660
2015	12	7	18	577
2016	11	8	23	732
2017	12	6	35	657
2018	11	6	30	846
2019	13	8	32	910
2020	12	8	32	713
2021	12	6	26	299
2022	12	7	29	433

Table 4. Summary of bluefish age samples collected in North Carolina from both dependent (commercial and recreational fisheries) and independent (surveys) sources, 1985–2022.

Year	Modal Age	Minimum Age	Maximum Age	Number of Samples
1985	1	0	11	548
1986	1	0	9	437
1987	1	0	9	380
1988	1	0	9	346
1989	1	0	9	320
1990	1	0	9	372
1991	1	0	8	289
1992	1	0	9	704
1993	1	0	10	722
1994	1	0	10	517
1995	1	0	9	634
1996	1	0	10	230
1997	1	0	10	446
1998	1	0	9	658
1999	1	0	10	442
2000	1	0	10	290
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	853
2020	2	0	12	244
2021	1	0	5	793
2022	1	0	8	1,210

FIGURES

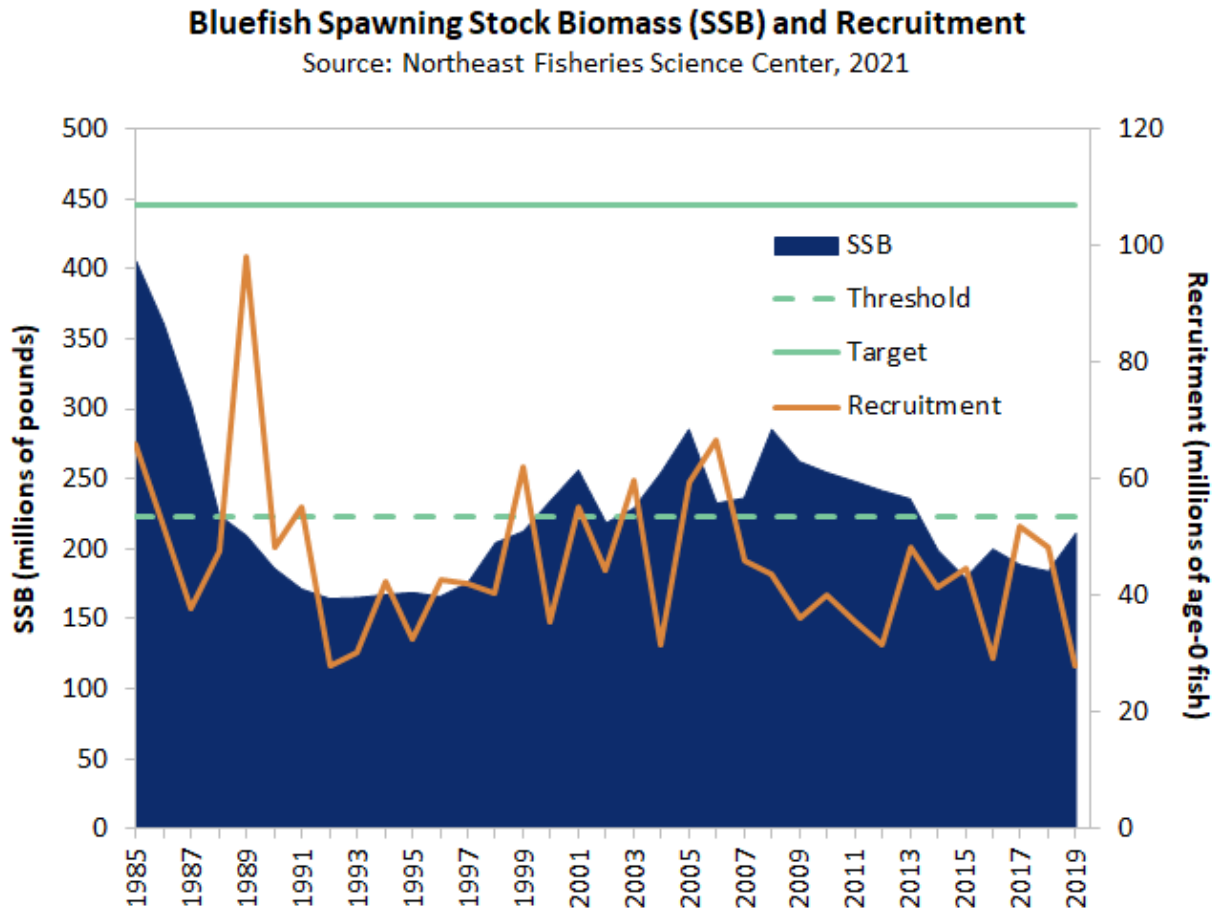

Figure 1. Bluefish spawning stock biomass and recruitment at age 0 by calendar year. The horizontal dashed green line is the SSBThreshold = 100,865 mt. Source: 2021 Bluefish Operational Stock Assessment, NEFSC (NMFS 2021).

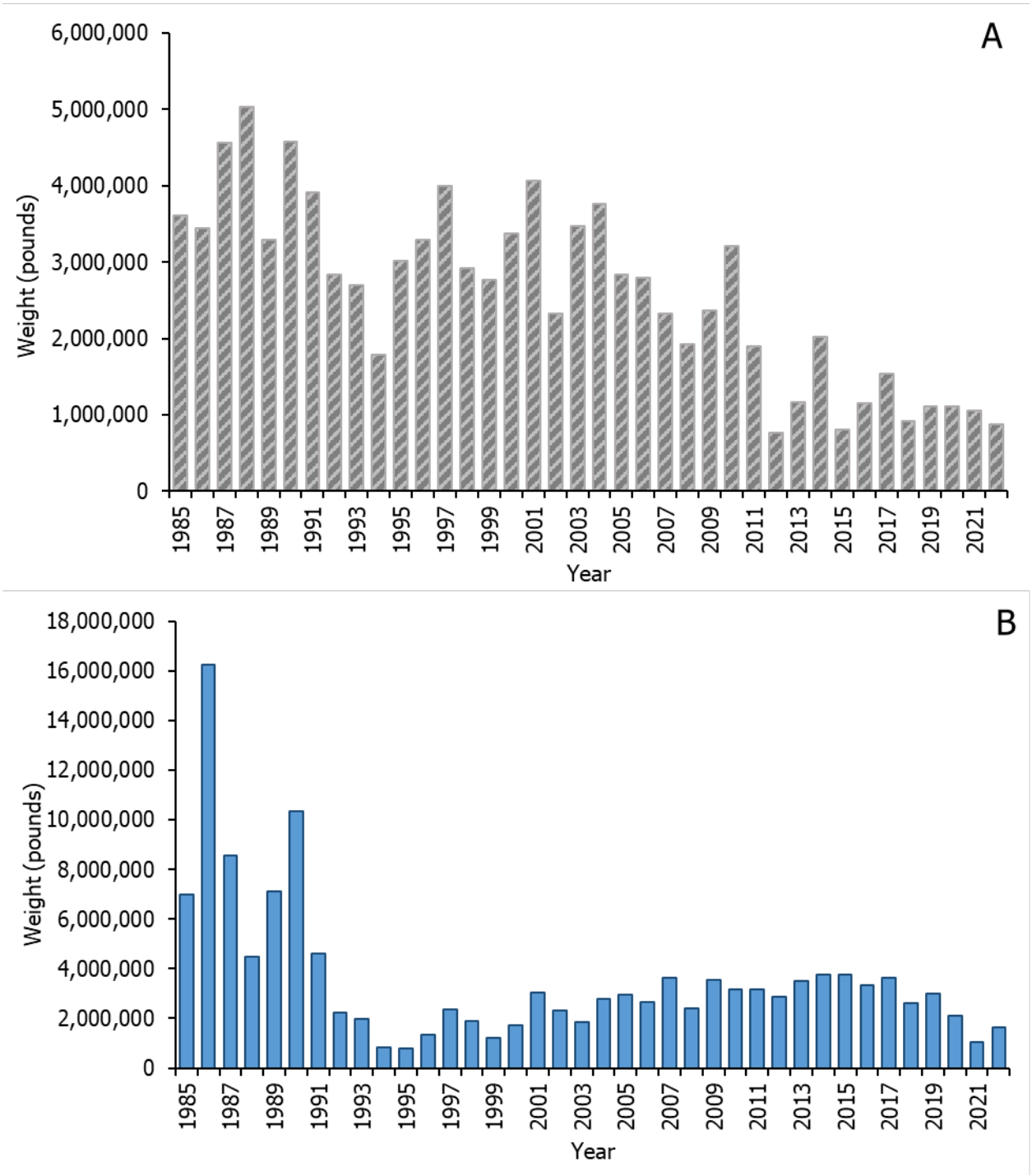

Figure 2. North Carolina commercial (A) and recreational (B) landings of bluefish, 1985–2022.

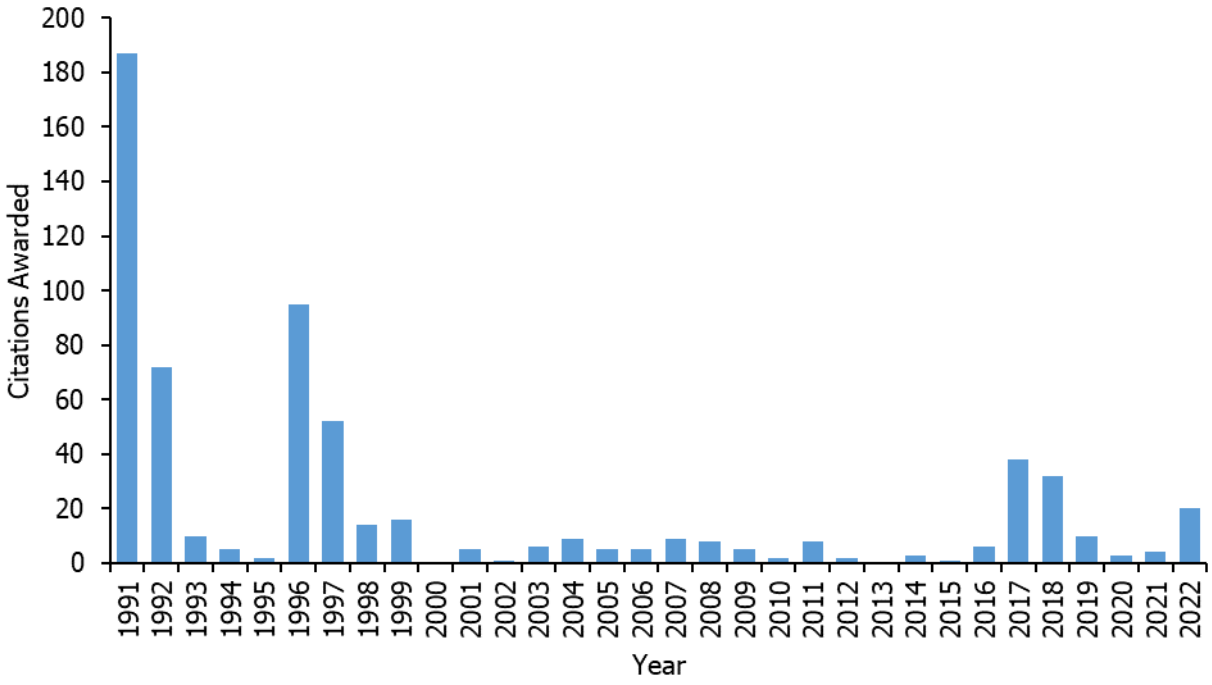

Figure 3. North Carolina recreational award citations for bluefish, 1991–2022.

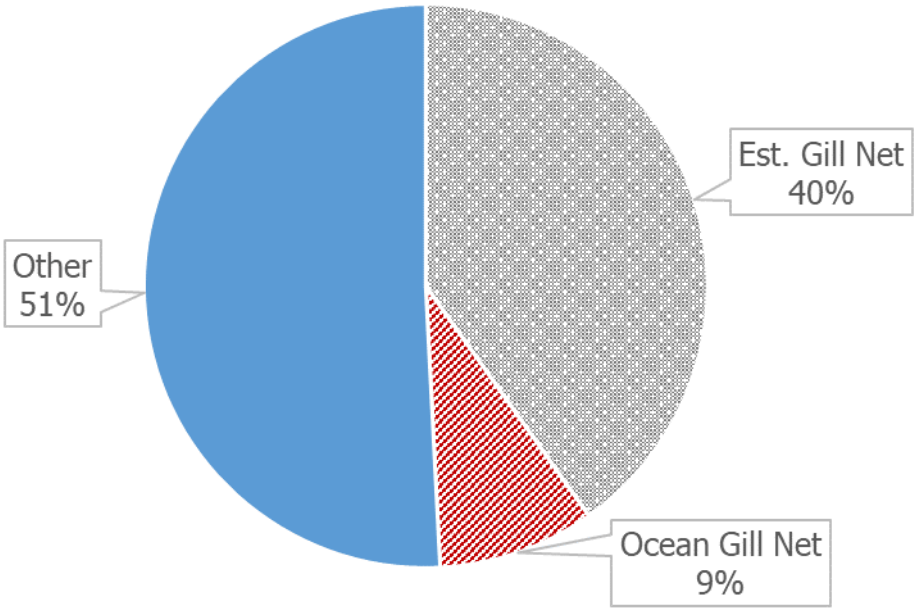

Figure 4. Commercial harvest of bluefish in North Carolina during 2022 by gear type.

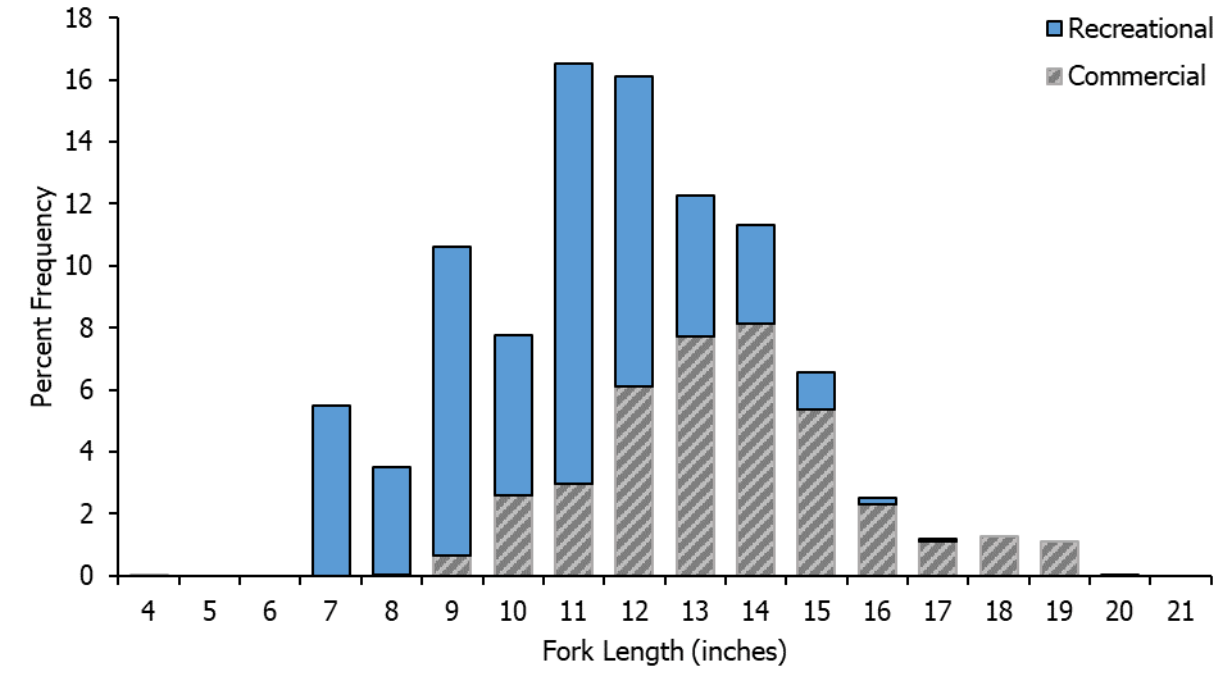

Figure 5. Commercial and recreational length frequency distribution from bluefish harvested in North Carolina, 2022.

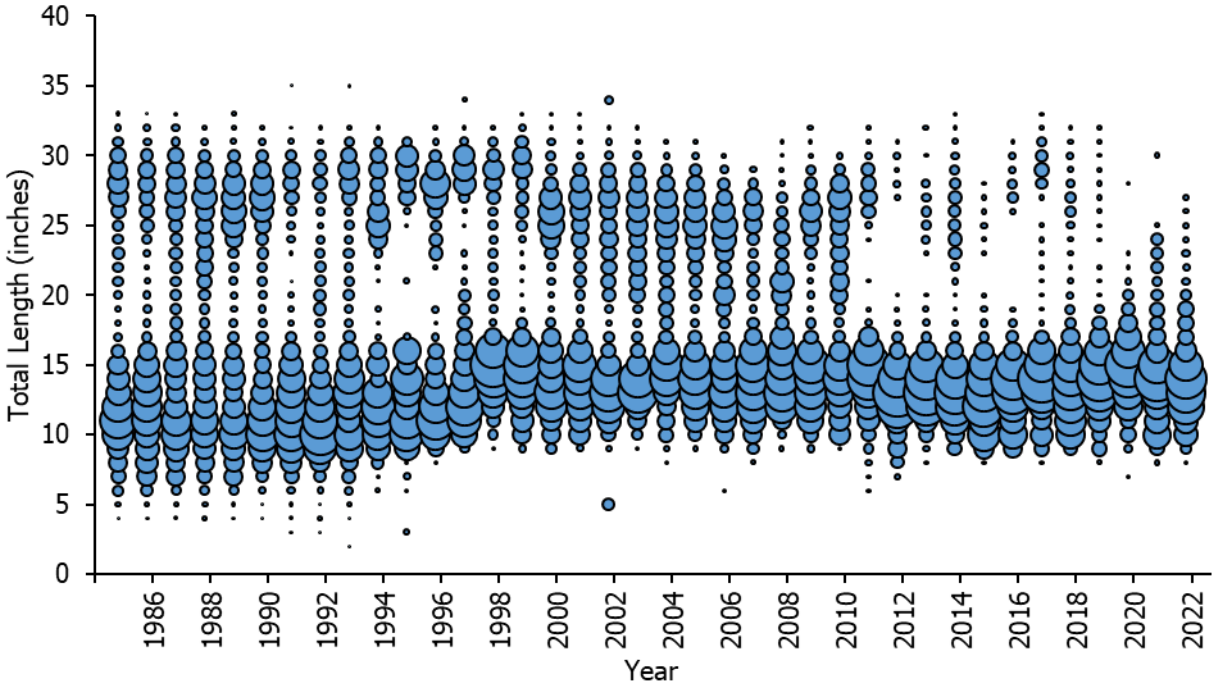

Figure 6. Commercial length frequency of bluefish harvested in North Carolina, 1985–2022. Bubbles represent fish at length and the bubble size is proportional to the number of fish at that length.

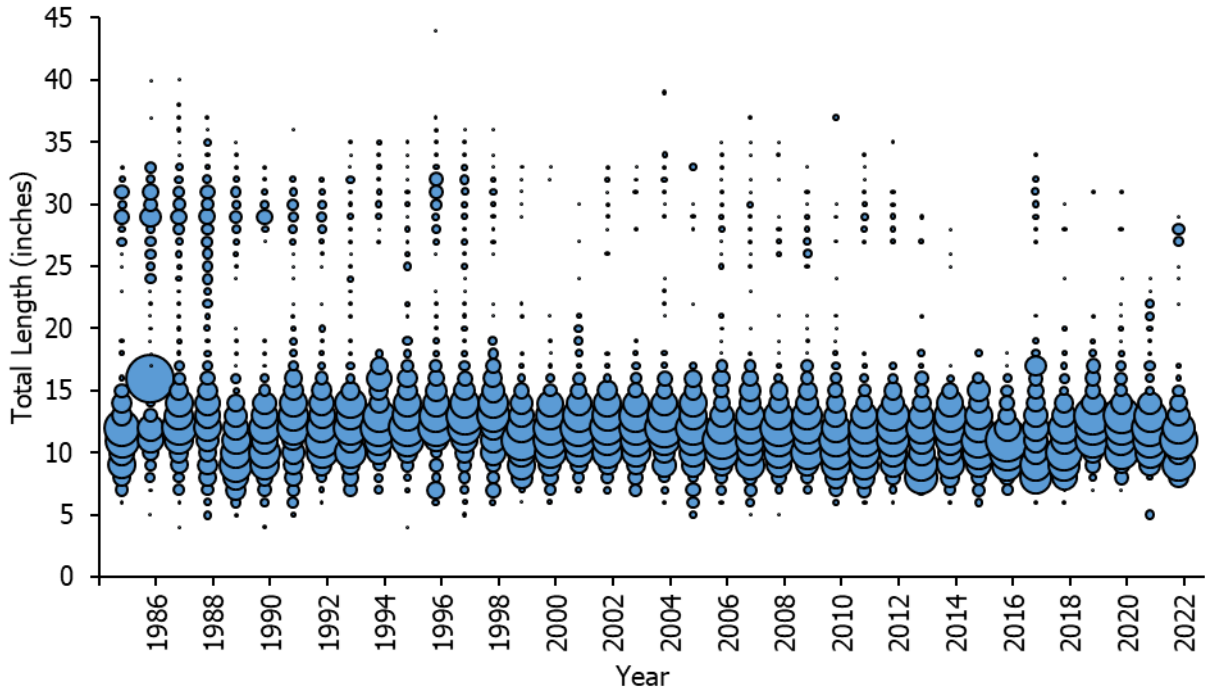

Figure 7. Recreational length frequency (fork length, inches) of bluefish harvested in North Carolina, 1985–2022. Bubbles represent fish at length and the bubble size is proportional to the number of fish at that length.

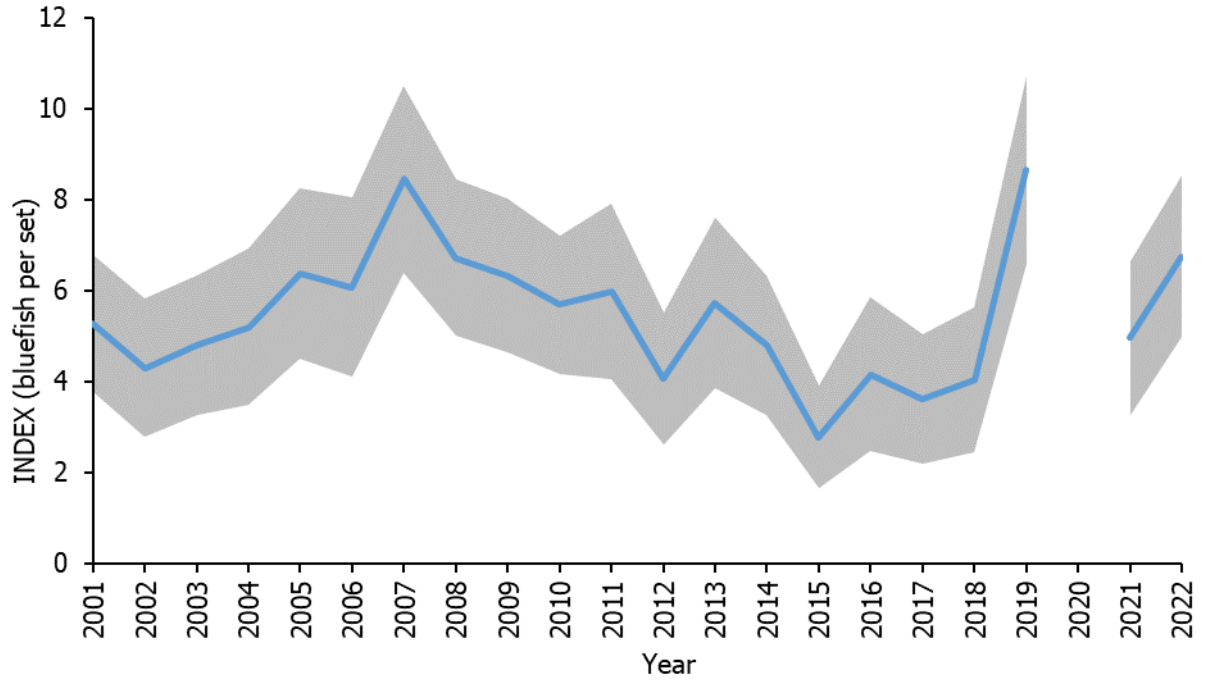

Figure 8. Relative abundance index of bluefish, from the North Carolina Pamlico Sound Independent Gill Net Survey, 2001–2022. Shading represents the standard error about the annual relative abundance index estimates. Pamlico Sound Independent Gill Net Survey sampling did not occur in 2020 and the first half of 2021.

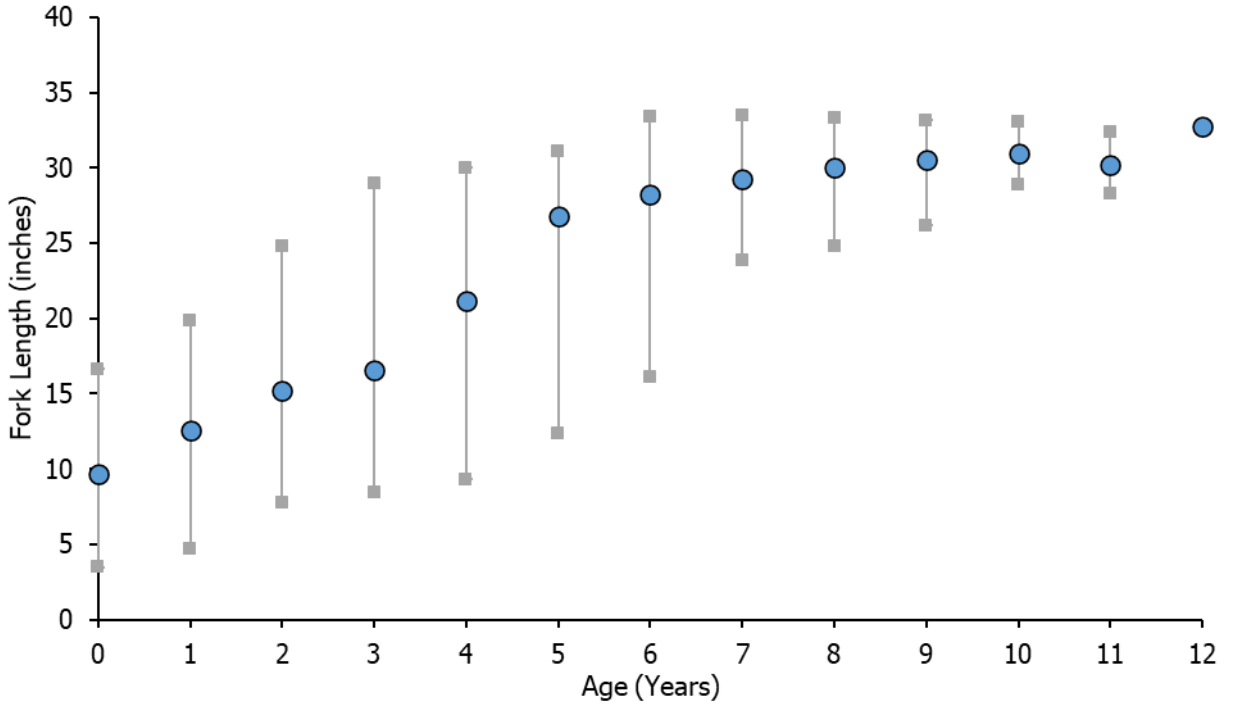

Figure 9. Bluefish length at age based on all age samples collected in North Carolina, 1985–2022. Blue circles represent the mean size at a given age while the grey squares represent the minimum and maximum observed size for each age.