Mid-Atlantic Fishery Management Council
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Michael P. Luisi, Chairman | G. Warren Elliott, Vice Chairman
Christopher M. Moore, Ph.D., Executive Director

MEMORANDUM

Date: July 30, 2018

To: Council

From: Matthew Seeley, Staff

Subject: 2019 Bluefish Specifications

To set 2019 specifications for bluefish, the Scientific and Statistical Committee (SSC) and Bluefish Monitoring Committee (MC) reviewed the most recent information available.

The following materials are enclosed on this subject:

1) Monitoring Committee Report
2) July 2018 Scientific and Statistical Committee Meeting Report (*behind Tab 16*)
3) Staff Memo on 2019 Bluefish Specifications
4) Bluefish Data Update for 2018
5) 2018 Bluefish Advisory Panel Fishery Performance Report
6) 2018 Bluefish Advisory Panel Information Document

Bluefish Monitoring Committee
Meeting Summary
July 24, 2018

Attendees: Matthew Seeley (Council Staff), José Montañez (MC Chair, Council Staff), Caitlin Starks (ASMFC), Mike Celestino (NJ-F&W), Richard Wong (DE-F&W), Eric Durrell (MD-DNR), Tiffany Vidal Cunningham (MA-DMF), and John Maniscalco (NY DEC).

Others in attendance: Julia Livermore (RI-DEM), Cynthia Hanson (GARFO), Kevin Sullivan (NH-Fish and Game) and Rusty Hudson (Directed Sustainable Fisheries Inc.).

Discussion: The Bluefish Monitoring Committee (MC) was presented with a summary of the Scientific and Statistical Committee's (SSC's) Allowable Biological Catch (ABC) recommendation for 2019. The SSC recommended no changes (status quo) to its ABC recommendation for bluefish of 9,895 mt (21.81 million pounds) from 2018 for 2019. The ABC recommendation reflects the results of the 2015 benchmark stock assessment for bluefish (SARC 60), which found that the bluefish stock is not overfished and overfishing is not occurring. The SSC reviewed the 2018 data update and reported that all indices except the NJ Trawl survey showed a decrease from 2016 values. In addition, the 2017 commercial length frequency distribution was similar to the previous two years; the 2017 recreational length frequency distribution was more spread out, not showing the bi-modal distribution seen in previous years. Next year, the SSC will review the most recent information from an operational assessment to be conducted in 2019 to develop ABCs for the next specifications cycle.

In addition, the Bluefish MC reviewed the Council Staff recommendations, the 2018 Bluefish Fishery Performance Report (FPR), and the 2018 Advisory Panel Information Document. The MC discussed various sources of management uncertainty in considering an adjustment from the annual catch limit (ACL) to the fishery-specific annual catch target (ACT). The MC discussed the history of reported fishery landings relative to harvest limits and year-to-year variability in recreational landings. It was noted that since 2000, the reported combined commercial and recreational landings have exceeded the total allowable landings (TAL) only once (2007). The commercial fishery has never exceeded the coastwide quota. The MC agreed there is no need for an additional reduction to "buffer" for management uncertainty at this time. However, the MC indicated management uncertainty adjustments may be required in future specification cycles to address the new Marine Recreational Information Program (MRIP) estimates and recent reports of increasing commercial discards (see commercial discard discussion under "Other issues" section). Staff confirmed with the MC that the National Marine Fisheries Service will continue to release uncalibrated (old) MRIP

estimates against which the MC can compare 2019 landings to judge fishery performance (e.g., accountability measures).

The MC recommended that for 2019, projected recreational landings be calculated using a single terminal year instead of the three-year average used in previous years. This recommendation was made due to the similar performance of using the most recent 1-year and 3-year landings in predicting future landings and is consistent with the Council and Management Board's decision during the previous specification cycle. The MC noted that in future specification cycles based on calibrated MRIP estimates, a different method may be used. The MC also recommended these landings be updated mid-year with new estimates once they become available from the Greater Atlantic Regional Fisheries Office (GARFO).

Transfers

The MC recommended a transfer from the recreational fishery to the commercial fishery be applied so the recreational harvest limit will equal expected landings, and the commercial fishery receives the maximum transfer amount possible. It was acknowledged that GARFO may adjust the transfer amount during the rulemaking process, incorporating the most current recreational harvest data from 2018.

Resulting Commercial Quota and RHL

The overall catch and landings limits recommended by the MC for the 2019 specifications cycle are presented in Table 1 with the basis for each recommendation. Further, the commercial quota is distributed amongst the states based on the allocation percentages in Table 2.

Recreational Bag Limit

The bluefish fishery has a 15-fish recreational bag limit in Federal waters. Bluefish bag limits for each state are presented in Table 3. The MC discussed the comments in the FPR regarding the recreational bag limits but agreed to recommend no change to the current 15-fish recreational bag limit. The MC noted that a change in the bag limit now, under the current stock status (the stock is not overfished, nor is overfishing occurring), while a Council Amendment initiative is underway, combined with a planned operational assessment in 2019 using updated MRIP estimates (either of which could result in management changes), could complicate the task of revising management measures in the future.

Discards

As with the projected recreational landings, the MC recommended using recreational discards from the terminal year (2017) for the same reasons listed above.

The MC discussed the values used to characterize the discards in the recreational fishery. When assessing recreational discards, the Council and MC have calculated the weight of the recreational discards assuming MRIP mean weight of fish landed or harvested, which may not provide the most accurate values. The NEFSC calculates discards in the recreational fishery using a length-weight relationship for released fish from numerous sources. The MC suggested using recreational discard values from the NEFSC to characterize recreational discards in the next specifications cycle. The group also recommended meeting again to discuss ways to improve consistency in calculations and estimates produced by the NEFSC, Council, and GARFO.

The MC discussed recent reports of increased commercial discards in the bluefish fishery. Commercial discards were not included in the benchmark stock assessment due to uncertainty in the discard estimates and the low level of commercial landings relative to total removals. Some MC members indicated that in recent years (i.e., since 2015) localized discards in the commercial fishery are increasing and may not be insignificant. Uncertainty around commercial discards may continue to increase in the future as states' landings are constrained by their quotas, especially during relatively low quota years when the availability of excess quota for state-to-state transfers decreases. MC members indicated that the upcoming 2019 operational assessment would be an appropriate time to explore estimating and incorporating commercial discards into the assessment. Future commercial discard estimates can be accounted for under "commercial discard adjustments" or "management uncertainty adjustments."

Other issues

The MC also indicated that work should continue to reconcile commercial bluefish landings reported under the NEFSC dealer reporting system (weighout data; which are used to manage the bluefish coastwide quota) with landings under the ACCSP reporting system. In past years there have been discrepancies in some states (due to lags in the reporting process, auditing, paper reporting, some state dealers not required to report to Federal system, etc.).

Table 1. Current (2018) management measures and MC recommended bluefish catch and landings limits for 2019.

Management Measure	2018		Basis	2019		Basis
	mt	M lb[1]		mt	M lb[1]	
ABC	9,895	21.81	Derived by SSC; Council P* policy	9,895	21.81	Derived by SSC; Council P* policy
ACL	9,895	21.81	Defined in FMP as equal to ABC	9,895	21.81	Defined in FMP as equal to ABC
Management Uncertainty	0	0	Derived by Monitoring Committee	0	0	Derived by Monitoring Committee
Commercial ACT	1,682	3.71	(ACL – Management Uncertainty) x 17%	1,682	3.71	(ACL – Management Uncertainty) x 17%
Recreational ACT	8,213	18.11	(ACL – Management Uncertainty) x 83%	8,213	18.11	(ACL – Management Uncertainty) x 83%
Commercial Discards	0	0	Value used in assessment	0	0	Value used in assessment
Recreational Discards	1,356	2.99	2015 discards	1,129	2.49	2017 discards
Commercial TAL	1,682	3.71	Commercial ACT – commercial discards	1,682	3.71	Commercial ACT – commercial discards
Recreational TAL	6,857	15.11	Recreational ACT – recreational discards	7,083	15.62	Recreational ACT – recreational discards
TAL Combined	8,539	18.82	Commercial TAL + recreational TAL	8,766	19.32	Commercial TAL + recreational TAL
Expected Rec Landings	5,253	11.58	2015 Recreational landings	4,318	9.52	2017 Recreational landings
Transfer	1,604	3.54	Calculated so the expected recreational landings equal the RHL	2,765	6.10	Calculated so the expected recreational landings equal the RHL
Commercial quota	3,286	7.24	Commercial TAL + transfer	4,447	9.80	Commercial TAL + transfer
RHL	5,253	11.58	Recreational TAL - transfer	4,318	9.52	Recreational TAL - transfer

[1] SSC recommendations are made in metric tons (mt) and thus, the management measures are developed using mt. When values are converted to millions of pounds (M lb) the numbers may slightly shift due to rounding. The conversion factor used is 1 mt = 2204.6226 pounds.

Table 2. Bluefish allocation formula for the commercial fisheries in each state.

State	Allocation (%)
ME	0.6685
NH	0.4145
MA	6.7167
RI	6.8081
CT	1.2663
NY	10.3851
NJ	14.8162
DE	1.8782
MD	3.0018
VA	11.8795
NC	32.0608
SC	0.0352
GA	0.0095
FL	10.0597
Total	100

Table 3. State-by-state bluefish bag limits.

State	Bag limit
ME	3
NH	10
MA	10
RI	15
CT	10
NY	15
NJ	15
DE	10
MD	10
VA	10
NC	15
SC	15
GA	15

SSC Report is behind
Tab 16

Mid-Atlantic Fishery Management Council
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Michael P. Luisi, Chairman | G. Warren Elliott, Vice Chairman
Christopher M. Moore, Ph.D., Executive Director

MEMORANDUM

Date: June 27, 2018 (Corrected on July 19, 2018)

To: Dr. Chris Moore, Executive Director

From: Matthew Seeley, Staff

Subject: 2019 Bluefish Specifications

Summary

This memo provides recommendations for setting bluefish specifications for one year (2019). For 2019, staff recommends an Acceptable Biological Catch (ABC) of 21.81 million pounds (9,895 mt).

Introduction

The Magnuson Stevens Act (MSA) as currently amended requires each Council's Scientific and Statistical Committee (SSC) to provide, among other things, ongoing scientific advice for fishery management decisions, including recommendations for acceptable biological catches (ABCs). The SSC recommends ABCs to the Mid-Atlantic Fishery Management Council (the Council) that address scientific uncertainty such that overfishing is unlikely to occur per the Council's risk policy. The Council's ABC recommendations to NMFS for the upcoming fishing year(s) cannot exceed the ABC recommendation of the SSC. As such, the SSC's ABC recommendations form the upper limit for catches of Council-managed species.

Once the SSC meets and decides on an ABC, the Bluefish Monitoring Committee will meet to discuss if changes to other management measures should be recommended based on the ABCs from the SSC as well as other management considerations. These measures include Annual Catch Limits (ACLs), Annual Catch Targets (ACTs), and Accountability Measures (AMs). Based on the SSC's and Monitoring Committee's recommendations, the Council will make recommendations to the NMFS Northeast Regional Administrator. Based on NMFS' evaluation of the Council's recommendations, NMFS will publish a Proposed Rule for specifications and then a Final Rule, which may change from the Proposed Rule based on public comment.

Current management measures and staff recommendations for 2019 are presented in Table 1.

Table 1. Current fishing year specifications (2018) and 2019 staff recommended specifications for bluefish.

Management Measure	2018 (Current Measures set in 2015, see FR)[1]		Basis	2019 (Staff recommended)	
	Million lbs	mt		Million lbs	mt
ABC	21.81	9,895	Derived by SSC; Council P* policy	21.81	9,895
ACL	21.81	9,895	Defined in FMP as equal to ABC	21.81	9,895
Management Uncertainty	0	0	Derived by Monitoring Committee	0	0
Commercial ACT	3.71	1,682	(ACL – Management Uncertainty) x 17%	3.71	1,682
Recreational ACT	18.11	8,213	(ACL – Management Uncertainty) x 83%	18.11	8,213
Commercial Discards	0	0	Value used in assessment	0	0
Recreational Discards	2.99	1,356	2015 discards	2.99	1,356
Commercial TAL (pre-transfer)	3.71	1,682	Commercial ACT – commercial discards	3.71	1,682
Recreational TAL (pre-transfer)	15.12	6,857	Recreational ACT – recreational discards	15.12	6,857
TAL Combined	18.83	8,539	Commercial TAL + recreational TAL	18.83	8,539
Expected Rec Landings	11.58	5,253	2015 recreational landings	11.58	5,253
Commercial quota	7.24	3,286	Commercial TAL + transfer	7.24	3,286
Recreational harvest limit	11.58	5,253	Recreational TAL - transfer	11.58	5,253

[1] Greater Atlantic Regional Fisheries Office adjusted values (https://www.greateratlantic.fisheries.noaa.gov/sustainable/species/bluefish/index.html) and FR notice: https://www.gpo.gov/fdsys/pkg/FR-2016-08-04/pdf/2016-18424.pdf.

Management System

The Council and the ASMFC work cooperatively to develop fishery regulations for bluefish off the east coast of the United States. The Council and Commission work with the National Marine Fisheries Service (NMFS), which serves as the federal implementation and enforcement entity. This cooperative management endeavor was developed because a significant portion of the catch is taken from both state waters (0-3 miles offshore) and federal waters (3-200 miles offshore, also known as the Exclusive Economic Zone or EEZ). The management unit for bluefish (*Pomatomus saltatrix*) is the U.S. waters in the western Atlantic Ocean. For bluefish, the ACT is split 83/17% into recreational and commercial ACTs, respectively, and the discarded component of that catch is deducted to arrive at recreational and commercial TALs. Additionally, landings above the expected recreational harvest can be "transferred" from the recreational to the commercial fishery as long as the final commercial quota does not exceed 10.5 million pounds.

Catch and Landings Update

A time series of recreational/commercial landings and recreational discards from 1985-2017 are presented in Figure 1.

Recreational landings in 2017 were 9.52 million lbs (4,318 mt), about 99% of the recreational harvest limit (9.65 million lbs or 4,377 mt). State landings are presented in Table 2.

Reported 2017 dealer landings in the commercial fishery were approximately 3.64 million lbs (1,651 mt), about 57% under the commercial quota of 8.54 million lbs (3,874 mt).

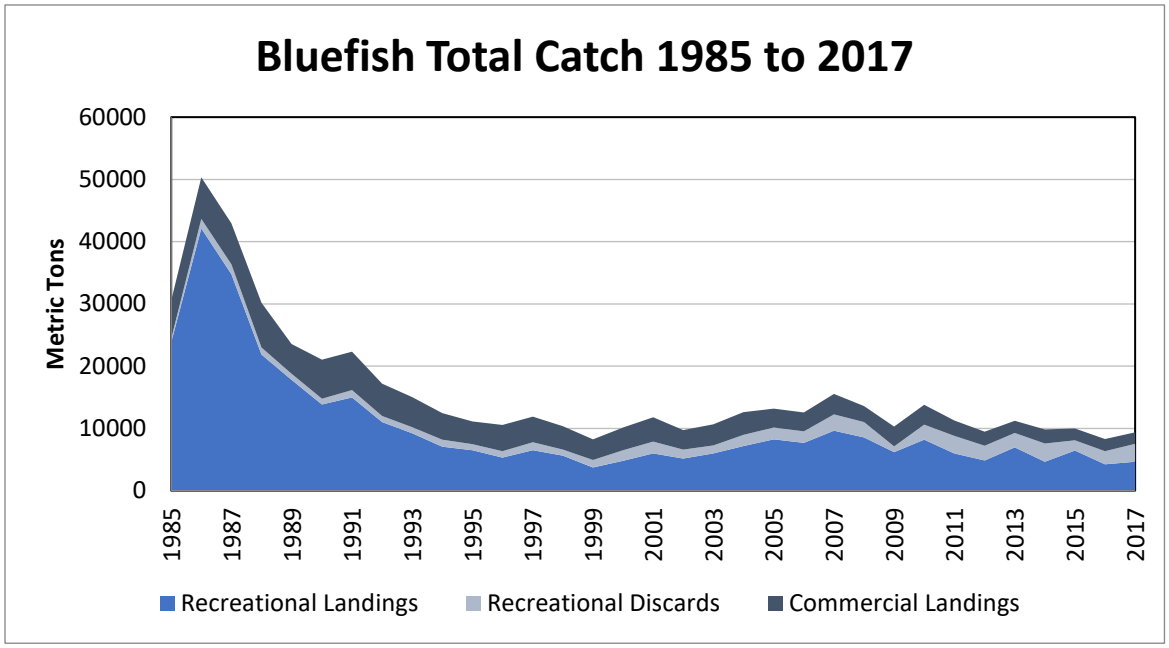


Figure 1. Bluefish recreational/commercial landings and recreational discards from 1985-2017.

Table 2. 2017 recreational/commercial landings, commercial quota, and percentage harvested of the commercial quota.

State	Recreational Landings (lbs)	Commercial Landings (lbs)	Commercial Quota (lbs)	Percentage of Commercial Quota (%)[2]
ME	69	0	57,105	0
NH	0	0	35,408	0
MA	619,746	364,810	573,755	64
RI	337,710	647,112	731,901	88
CT	597,122	33,088	108,170	31
NY	1,321,368	690,675	887,118	78
NJ	3,365,738	304,710	1,215,633	25
DE	770,820	5,679	160,440	4
MD	109,424	25,147	256,420	10
VA	45,055	36,251	1,014,435	4
NC	690,018	1,319,384	2,638,704	50
SC	84,593	0	3,007	0
GA	1,184	0	812	0
FL (East Coast)	1,576,897	209,864	859,322	24
Total	9,519,744	3,636,720	8,542,230	43

Biological Reference Points and Stock Status

The bluefish benchmark stock assessment was peer reviewed in June 2015 and approved for use by management at SAW/SARC 60. This benchmark assessment uses the model from the 2005 benchmark assessment (SAW 41; NEFSC 2005), which is a forward-projecting statistical catch-at-age model called ASAP (Age Structured Assessment Program), with updates to the way the catch-at-age matrices were constructed and change to model configuration. The catch-at-age matrices were completely reconstructed to incorporate new age data, including archived historical samples that had not been processed at the time SAW/SARC 41 was conducted, and to correct aging errors in the earlier years of the time series (NEFSC 2015). Documentation on this assessment and previous stock assessments, such as reports on stock status, including annual assessment and reference point update reports, Stock Assessment Workshop (SAW) reports, and Stock Assessment Review Committee (SARC) panelist reports, are available online at the NEFSC website: http://www.nefsc.noaa.gov/saw/.

The biological reference points estimated in the previous benchmark assessment (SAW/SARC 41) were MSY reference points for F and total biomass (F_{MSY}, B_{MSY}). However, MSY reference

[2] The percentage of initial commercial quota is based on the pre-transfer quotas.

points require a reliable stock-recruitment relationship. The stock-recruitment relationship for bluefish is poorly defined, due to the lack of information on recruitment at small stock sizes, with steepness estimated to be close to one for most model runs (NEFSC 2015). Therefore, in SAW/SARC 60, SPR-based (spawn per recruit) reference points were used as a proxy for MSY reference points.

Results from the most recent benchmark stock assessment indicate that the bluefish stock is not overfished, and overfishing was not occurring in 2014 relative to the biological reference points (BRPs) from the 2015 SAW/SARC 60. Modeling results indicated that the estimated that SSB was 190.77 million lbs (86,534 mt) in 2014 (78% of the accepted reference point SSB_{MSY} proxy = 245.21 million lbs or 111,228 mt). Spawning stock biomass declined since the beginning of the time series, from a high of 340.90 million lbs (154,633 mt) in 1985 to a low of 116.34 million lbs (52,774 mt) in 1997, before increasing again. The stock spawning biomass average for the time series is 175.15 million lbs (79,449 mt; Figure 2). Fully-selected fishing mortality in 2014 was estimated to be 0.157, below the F threshold ($F_{MSY\ proxy} = F_{40\%SPR} = 0.170$, which was later adjusted by the SSC to $F_{MSY\ proxy} = F_{35\%SPR} = 0.190$). Fully selected F peaked in 1987 at 0.477 and then declined gradually since then, with a time series average of 0.284 (Figure 3).

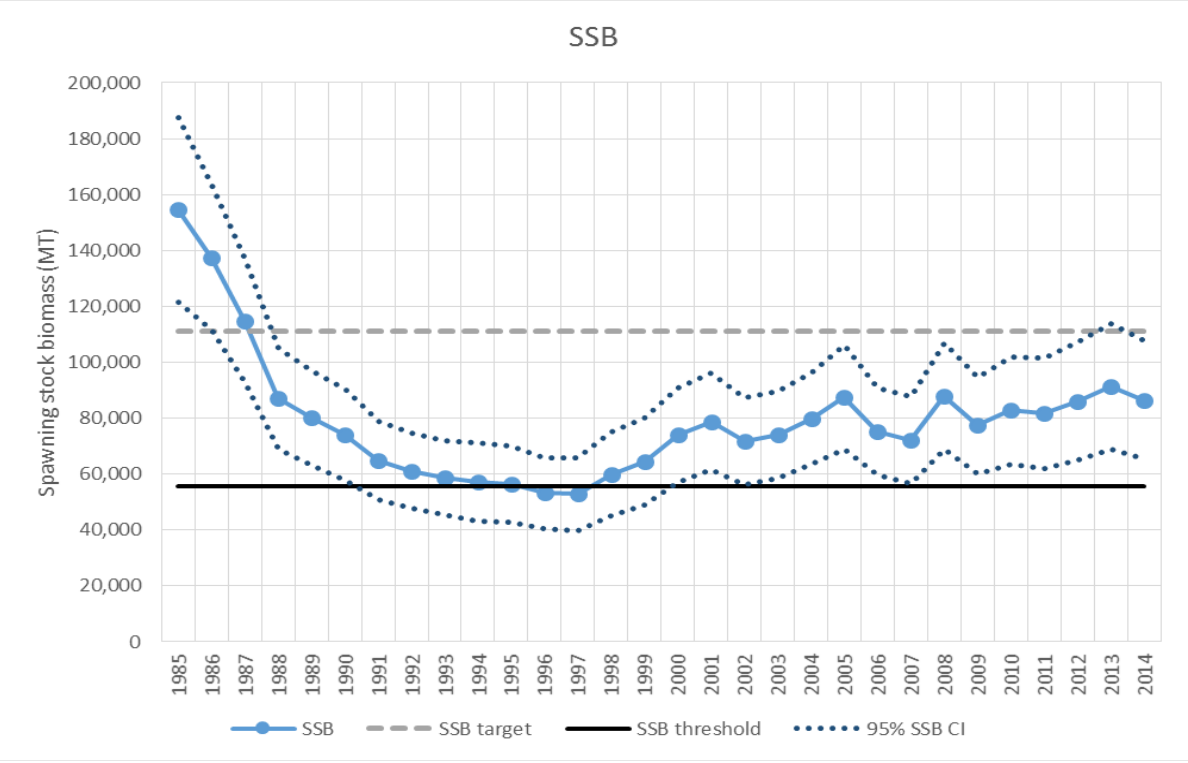


Figure 2. Total spawning stock biomass of bluefish plotted with thresholds and 95% confidence intervals. Source: NEFSC 2015.

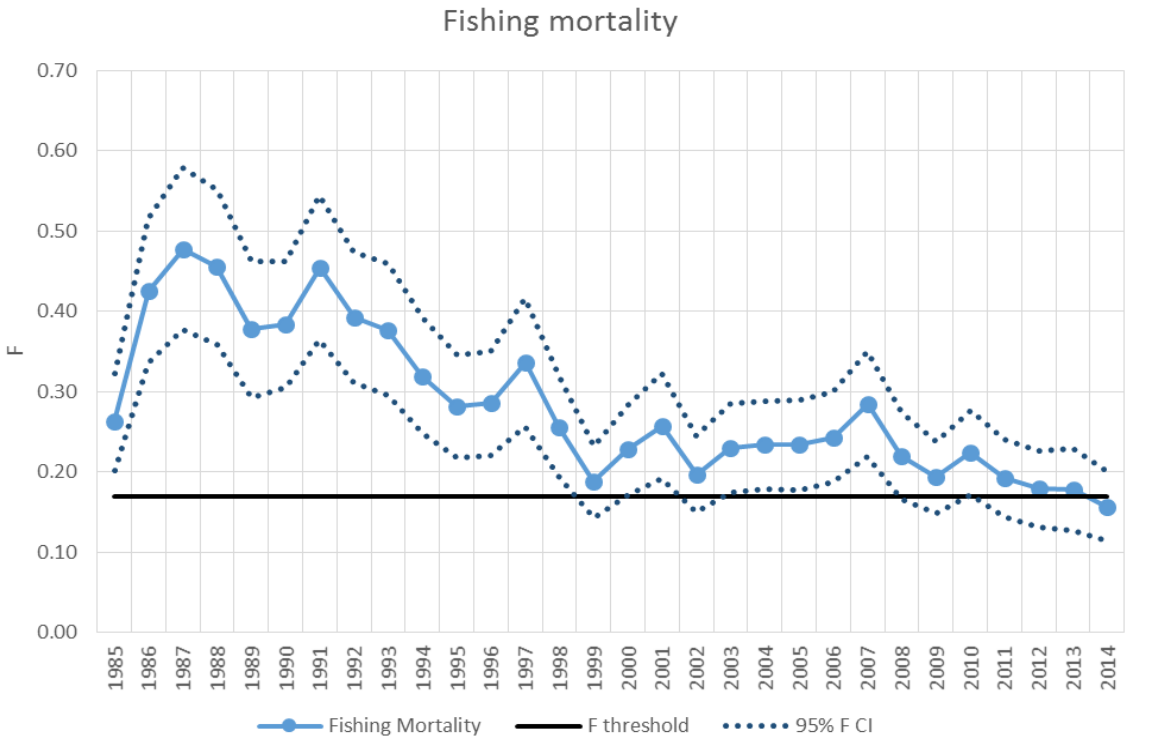


Figure 3. Fully selected fishing mortality of bluefish plotted with thresholds and 95% confidence intervals. Source: NEFSC 2015.

OFL/ABC Values Derived by the SSC

The most recent benchmark stock assessment was peer reviewed in June 2015. The SARC 60 benchmark assessment was a significant improvement over previous assessments. Many uncertainties were addressed regarding input data and there was a characterization of uncertainty in the OFL. The OFL was adjusted upward by 50% from the model output by the assessment team to account for un-modeled uncertainty. Despite these improvements, the SSC deemed the assessment uncertainty level that requires an SSC derived coefficient of variation (CV) for the OFL as the most appropriate for the new benchmark assessment.

The SSC noted that the F_{MSY} proxy of $F_{40\%}$ might be inappropriate for bluefish, a highly productive species. At the July 2015 SSC meeting, the SSC concluded that a proxy of $F_{35\%}$ is more precise for bluefish, as indicated by various published meta-analyses for the order perciformes.

Using $F_{35\%}$, the SSC recommended an OFL of:

2016: 25.76 million lbs (11,686 mt)
2017: 26.44 million lbs (11,995 mt)
2018: 27.97 million lbs (12,688 mt)

A CV of 60% was applied to the OFL, instead of the previously used CV of 100%, to reflect the much improved treatment of uncertainty in the current bluefish assessment. This is consistent with the rationale used by the SSC to determine CV for the summer flounder assessment OFL. The OFL levels for 2016-2018 were determined by assuming bluefish exhibit a typical life history and using $F_{35\%} = 0.19$. The SSBmsy is therefore 223.42 million pounds (101,343 mt) and $SSB_{2014} = 190.78$ million pounds (86,534 mt), so the SSB/SSBmsy = 0.85, with an SSB threshold of 111.71 million pounds (50,672 mt). The SSC applied the Council policy of P* = 0.307 in 2016. This results in an ABC of:

2016: 19.46 million lbs (8,825 mt) (P* = 0.307)
2017: 20.64 million lbs (9,363 mt) (P* = 0.328)
2018: 21.81 million lbs (9,895 mt) (P* = 0.327)

Catch and Landings Limit Recommendations

Staff recommend specifications be set for 1 year since updated recreational data will be available for 2020 bluefish measures. For 2019, staff recommends an Acceptable Biological Catch (ABC) of 21.81 million lbs (9,895 mt). According to the Bluefish Fishery Management Plan (FMP) flow chart (Figure 4), the annual catch limit (ACL) is equal to the ABC. Staff recommends that the recreational and commercial annual catch targets (ACTs) equal the ACL and ABC. Staff also recommends a recreational ACT of 18.11 million lbs (8,213 mt), and a commercial ACT of 3.71 million lbs (1,682 mt). After adjusting the ACTs for discards (2.99 million lbs or 1,356 mt recreational; zero commercial), the recreational and commercial total allowable landings would sum to 18.83 million lbs (8,539 mt; Table 1). The overall recommended commercial quota and recreational harvest limit are 7.24 million lbs (3,286 mt) and 11.58 million lbs (5,253 mt), respectively.

Staff do not recommend any change to the current recreational possession limit (15 fish per person per trip with no minimum size) at this time for 2019.

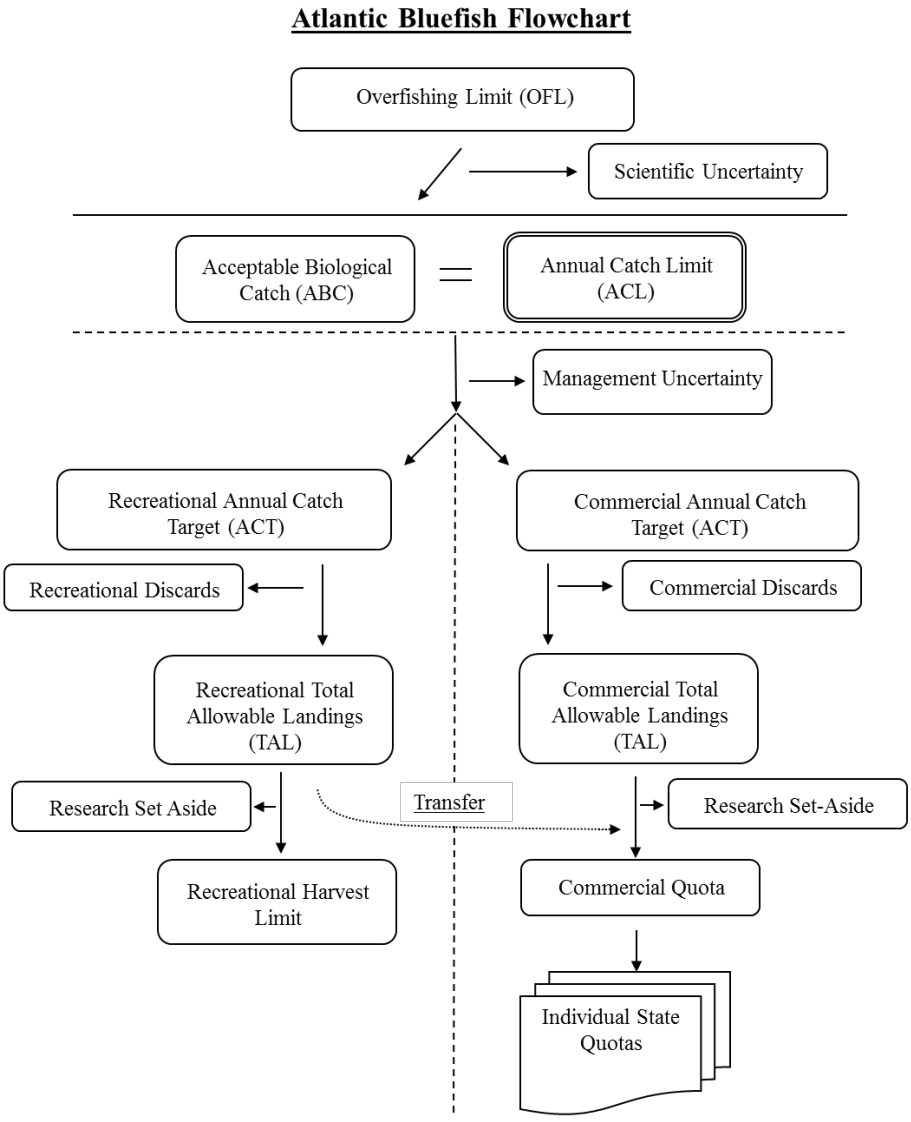


Figure 4. Bluefish specification process as described in Amendment 3 to the Bluefish FMP.

Bluefish 2018 Stock Assessment Update
Data Update Through 2017

Coastal/Pelagic Working Group

Northeast Fisheries Science Center

National Marine Fisheries Service

Woods Hole, MA

May 2018

Fishery Data

Commercial and recreational landings and recreational discards were updated for bluefish though 2017. Commercial discards are considered minimal for bluefish and are not included in this data update.

Reported commercial landings for bluefish were 1,873 MT (4.13 million lbs) in 2017 (Tables 1 and 2, Figure 1), which was 48% of the 2017 commercial quota (3,875 MT, 8.54 million lbs). Estimated recreational fishery landings were 4,649 MT (10.25 million lbs) in 2017 (Table 2, Figure 2), which was 106% of the 2017 recreational harvest limit (4,379 MT, 9.65 million lbs). Estimated recreational fishery discards were 2,857 MT (6.30 million lbs) and total recreational catch for 2017 was 7,506 MT (16.55 million lbs; Table 2, Figure 2). Total fishery catch for bluefish in 2017 was equal to 9,379 MT (20.68 million lbs; Table 2), which was 100% of the 2017 ABC (9,363 MT, 20.64 million lbs).

The commercial length frequency distribution of bluefish in 2017 was similar to the previous two years. There is a dominant peak at around 36cm with smaller extended peak of larger fish beginning at 51cm. (Figure 3). The recreational length frequency distribution of bluefish in 2017 is spread out, not showing the bi-modal distribution seen in previous years (Figure 4). Typically, the bulk of the discard lengths come from the American Littoral Society tagging program. However, these data were not available in time and this omission may be affecting the total recreational length frequency distribution. For this update, Volunteer Angler Survey (VAS) data from CT, RI, and NJ, as well as minimal information from MRIP, were used for the recreational discard lengths. The length frequency distribution of the total catch is presented in Figure 5.

Mean weight at age for bluefish remained steady for younger ages in 2017, decreased for ages 3, 4, and 5, and increased for ages 6+ when compared to 2016 values (Table 3, Figure 6). Final catch-at-age for both the commercial and recreational fishery are presented in Tables 4 and 5, respectively.

Surveys

A recreational catch-per-unit-effort index was updated for 2017 from the MRIP intercept data (Table 6, Figure 7). In addition, seven fishery-independent indices were updated through 2017. The NEFSC fall Bigelow index was not calculated for this update due to insufficient data.

In the fall of 2017 vessel repairs caused a significant delay in the survey, and as a result most of the southern survey strata were not sampled. The Age-0+ fishery-independent indices that were updated include the New Jersey ocean trawl survey, the Connecticut Long Island Sound trawl survey, the NEAMAP fall inshore trawl survey, and the North Carolina Pamlico Sound independent gillnet survey (Tables 7 to 11, Figures 8 to 12). Young-of-year indices included the SEAMAP fall trawl survey and a composite index developed from state seine indices from New Hampshire to Virginia (Tables 12 and 13, Figures 13 and 14). All indices except the NJ ocean trawl survey showed a decrease from 2016 values.

Table 1. 2017 Commercial bluefish landings (mt) by state groupings used in length expansions.

Year	State			**Total**
	ME - VA	NC	SC-FL	
1985	4201	1634	289	**6124**
1986	4560	1562	531	**6653**
1987	3806	2069	705	**6580**
1988	4278	2286	599	**7164**
1989	2793	1493	455	**4741**
1990	3685	2077	490	**6251**
1991	3710	1778	673	**6162**
1992	3424	1288	495	**5207**
1993	3040	1227	543	**4810**
1994	3072	809	424	**4305**
1995	2034	1366	229	**3629**
1996	2655	1497	62	**4214**
1997	2165	1816	129	**4110**
1998	2258	1327	155	**3740**
1999	1921	1253	157	**3331**
2000	2058	1526	64	**3648**
2001	2039	1845	63	**3946**
2002	2025	1055	37	**3117**
2003	1740	1574	45	**3359**
2004	1885	1707	56	**3648**
2005	1844	1122	71	**3037**
2006	1852	1146	45	**3043**
2007	2283	909	76	**3268**
2008	1767	763	57	**2586**
2009	1959	1096	97	**3152**
2010	1601	1463	143	**3207**
2011	1482	862	111	**2456**
2012	1810	347	81	**2238**
2013	1382	515	65	**1961**
2014	1247	916	69	**2232**
2015	1443	364	95	**1902**
2016	1313	521	94	**1928**
2017	1051	700	121	**1872**

Table 2. Commercial landings, recreational landings, recreational discard loss, and total catch for bluefish from Maine to Florida, 1985 to 2017.

Year	Commercial Landings (mt)	Commercial Landings (000 lbs)	Recreational Landings (mt)	Recreational Discard (mt): 0.15 * B2	Recreational Catch (mt)	Total Landings (mt)	Total Catch (mt) (no comm. discards)
1985	6124	13501	23821	599	24420	29945	30544
1986	6653	14668	42133	1544	43677	48786	50330
1987	6580	14507	34769	1615	36384	41349	42965
1988	7164	15793	21873	1146	23019	29037	30183
1989	4741	10453	17808	989	18797	22549	23539
1990	6251	13782	13860	929	14789	20111	21041
1991	6162	13584	14967	1194	16161	21129	22322
1992	5207	11479	11011	979	11990	16218	17197
1993	4810	10604	9204	1013	10217	14014	15026
1994	4305	9491	7049	1128	8177	11354	12482
1995	3629	8000	6489	1003	7492	10118	11121
1996	4214	9289	5328	1010	6338	9542	10552
1997	4110	9061	6487	1287	7774	10597	11884
1998	3740	8244	5595	999	6594	9335	10334
1999	3331	7343	3744	1191	4935	7075	8265
2000	3648	8042	4811	1675	6486	8459	10134
2001	3946	8700	6001	1857	7858	9947	11805
2002	3117	6871	5158	1448	6606	8275	9722
2003	3359	7405	5958	1331	7289	9317	10648
2004	3648	8043	7179	1761	8940	10827	12588
2005	3037	6697	8225	1915	10140	11262	13178
2006	3043	6708	7663	1860	9523	10706	12566
2007	3268	7204	9608	2653	12261	12875	15528
2008	2586	5701	8573	2443	11016	11159	13602
2009	3152	6950	6161	960	7121	9313	10274
2010	3207	7071	8184	2409	10593	11391	13800
2011	2456	5414	5965	2856	8821	8421	11277
2012	2238	4933	4846	2383	7229	7084	9467
2013	1961	4324	6980	2281	9261	8941	11222
2014	2232	4920	4620	2961	7581	6852	9813
2015	1902	4192	6451	1623	8074	8353	9976
2016	1928	4251	4220	2141	6361	6148	8289
2017	1873	4130	4649	2857	7506	6522	9379

Table 3. Bluefish mean catch weight at age (kg) from 1985 to 2017

Year	Age						
	0	1	2	3	4	5	6+
1985	0.122	0.570	1.321	2.295	3.549	4.591	6.679
1986	0.093	0.585	1.323	2.266	3.369	4.392	6.160
1987	0.093	0.610	1.307	2.184	3.508	4.454	6.105
1988	0.159	0.588	1.126	2.314	3.094	3.960	5.743
1989	0.118	0.633	1.575	2.969	3.566	4.256	5.752
1990	0.152	0.503	1.192	2.372	3.971	4.389	6.208
1991	0.101	0.268	1.110	2.077	3.362	4.163	5.765
1992	0.070	0.462	1.036	2.113	3.192	4.278	5.843
1993	0.149	0.465	1.126	2.343	2.920	4.022	6.110
1994	0.104	0.482	1.073	2.095	3.360	4.147	6.641
1995	0.167	0.527	1.018	2.202	3.452	4.499	5.932
1996	0.129	0.621	1.010	1.793	2.927	4.356	5.563
1997	0.099	0.488	1.019	1.967	2.758	3.687	5.734
1998	0.132	0.508	0.881	2.609	3.703	4.036	6.201
1999	0.136	0.472	0.917	2.396	3.676	4.008	6.292
2000	0.163	0.414	0.856	2.869	3.602	3.859	6.207
2001	0.126	0.408	0.981	2.704	3.999	4.204	5.918
2002	0.128	0.504	1.092	1.901	2.736	3.637	5.066
2003	0.095	0.524	1.117	1.845	2.651	3.666	4.919
2004	0.112	0.484	1.281	2.149	2.866	3.632	4.754
2005	0.166	0.536	0.937	2.227	3.402	4.322	5.402
2006	0.122	0.491	0.934	1.811	2.756	3.126	4.076
2007	0.153	0.417	0.960	1.539	2.168	3.707	4.280
2008	0.164	0.475	1.279	1.921	3.141	3.560	4.871
2009	0.154	0.411	1.141	1.311	2.605	3.381	4.581
2010	0.120	0.373	1.014	0.938	2.500	3.689	5.175
2011	0.132	0.356	0.916	0.995	1.812	4.115	5.370
2012	0.114	0.368	0.843	1.133	2.580	4.188	5.464
2013	0.147	0.437	0.996	1.786	2.636	3.779	5.804
2014	0.142	0.413	0.963	1.873	2.891	3.873	5.144
2015	0.196	0.436	0.851	2.046	3.379	3.996	5.208
2016	0.143	0.447	0.983	2.019	3.615	4.362	5.652
2017	0.094	0.422	0.849	1.830	3.181	4.324	5.930

Table 4. Bluefish commercial catch at age (000s) from Maine to Florida, 1985 to 2017.

Year	Age							Total
	0	1	2	3	4	5	6+	
1985	607.2	3297.1	432.6	168.2	82.3	151.6	359.0	**5098.0**
1986	599.0	2297.6	729.8	197.2	295.0	285.6	278.0	**4682.2**
1987	209.2	1837.1	793.3	696.3	157.7	179.1	240.6	**4113.2**
1988	173.8	905.6	476.5	221.2	433.2	345.4	497.9	**3053.5**
1989	655.4	1505.7	163.6	182.6	193.9	326.1	162.0	**3189.3**
1990	1354.6	1267.6	2827.6	215.4	80.8	155.8	114.2	**6016.1**
1991	468.9	5026.4	425.3	16.1	48.9	62.9	798.6	**6847.2**
1992	89.1	8150.2	1014.7	95.6	24.8	24.4	71.0	**9469.7**
1993	571.9	1238.2	3001.7	74.2	31.6	22.1	86.9	**5026.5**
1994	34.1	1388.3	359.0	51.4	157.6	229.4	300.0	**2519.8**
1995	296.3	3761.3	704.0	7.0	6.5	49.3	132.2	**4956.6**
1996	178.7	1126.9	726.0	317.6	137.9	88.4	266.0	**2841.5**
1997	112.7	1096.9	509.7	183.2	134.2	75.2	402.9	**2514.8**
1998	192.4	2383.4	1360.2	178.4	31.3	120.6	82.9	**4349.1**
1999	495.0	1549.9	1106.4	183.4	15.4	124.3	129.6	**3604.0**
2000	284.4	2736.9	1013.6	143.5	20.7	283.5	46.5	**4529.0**
2001	68.7	851.7	1445.4	300.9	40.8	303.3	67.4	**3078.2**
2002	52.6	1575.1	708.4	136.7	137.7	123.0	149.8	**2883.3**
2003	37.8	966.4	704.2	222.7	168.2	142.5	176.6	**2418.5**
2004	30.9	1216.6	790.2	225.4	119.0	183.1	191.0	**2756.4**
2005	225.4	787.9	1112.0	224.7	167.0	90.4	55.5	**2662.9**
2006	143.2	924.6	563.3	352.2	133.2	159.6	251.9	**2528.1**
2007	242.7	648.4	1006.8	233.5	187.0	108.0	250.8	**2677.2**
2008	137.7	470.7	744.1	279.5	137.1	116.4	124.0	**2009.6**
2009	50.2	417.6	585.7	558.4	152.5	89.8	232.2	**2086.4**
2010	46.5	338.0	513.2	514.7	275.1	151.1	220.5	**2059.1**
2011	40.0	294.3	461.3	557.6	288.0	75.9	166.4	**1883.5**
2012	59.8	301.3	625.3	498.6	163.5	47.1	119.1	**1814.7**
2013	190.3	536.9	729.6	241.4	96.4	57.5	64.2	**1916.2**
2014	259.9	848.2	608.6	134.9	130.7	79.2	116.0	**2177.4**
2015	141.8	394.7	556.5	78.7	68.8	67.7	115.5	**1423.8**
2016	48.5	557.5	497.5	133.7	35.2	40.4	84.5	**1397.4**
2017	35.7	258.9	801.7	111.8	82.5	31.0	79.5	**1401.0**

Table 5. Bluefish recreational catch at age (000s) from Maine to Florida, 1985 to 2017.

Year	Age							Total
	0	1	2	3	4	5	6+	
1985	5731.8	6903.4	3542.6	915.2	631.9	461.2	1665.5	**19851.5**
1986	5466.7	3977.4	6494.3	2917.3	1517.4	1176.6	3084.5	**24634.1**
1987	4225.1	3783.6	3732.0	4642.1	1906.8	1012.2	1923.2	**21225.0**
1988	1319.6	1482.5	1260.3	1077.1	1589.0	913.6	1662.9	**9305.0**
1989	4945.8	2582.7	1582.1	571.3	370.8	902.3	1500.0	**12454.9**
1990	1665.4	5356.3	1462.8	430.2	259.5	469.5	1160.7	**10804.3**
1991	4111.3	2583.2	3827.4	545.5	233.5	288.8	1376.4	**12966.0**
1992	714.7	2178.3	1941.2	1641.0	433.9	219.2	788.3	**7916.6**
1993	757.7	1603.9	1178.6	935.7	1123.7	134.8	616.8	**6351.3**
1994	1569.6	2567.8	559.3	554.0	384.2	420.0	632.9	**6687.7**
1995	702.7	2869.9	923.3	326.9	289.3	341.2	553.3	**6006.6**
1996	933.4	1353.1	907.3	540.1	262.1	196.6	647.9	**4840.6**
1997	1146.8	2477.1	902.0	352.4	221.3	229.1	943.0	**6271.7**
1998	644.5	1458.6	1180.9	951.5	154.1	132.0	380.2	**4901.9**
1999	1333.1	1290.4	1041.7	560.3	150.4	88.0	261.4	**4725.2**
2000	418.8	2817.0	1583.9	975.0	226.2	295.6	244.2	**6560.8**
2001	1161.9	2780.0	2271.4	1117.9	163.7	318.1	380.8	**8193.7**
2002	445.6	3448.6	1505.1	327.2	138.7	202.3	433.1	**6500.6**
2003	580.0	2564.5	2447.6	689.9	311.1	304.8	504.6	**7402.6**
2004	554.0	4020.8	2485.3	783.0	329.7	407.6	484.1	**9064.5**
2005	1986.7	1844.5	3043.6	1623.1	521.9	391.8	398.2	**9809.8**
2006	1922.3	2258.7	1704.0	1307.1	388.5	571.6	743.5	**8895.8**
2007	1283.8	2187.9	3189.1	1501.6	1397.2	413.8	651.5	**10624.9**
2008	1290.9	1997.7	2616.8	1076.4	541.8	428.4	705.7	**8657.7**
2009	390.1	1509.2	1906.0	1520.6	479.7	188.9	467.3	**6461.8**
2010	961.7	1480.8	1758.8	1471.2	935.2	442.4	548.5	**7598.5**
2011	1028.3	1503.0	1199.5	1219.4	607.0	388.9	559.7	**6505.9**
2012	1537.6	1283.6	1407.6	1195.5	759.9	212.7	414.4	**6811.4**
2013	1342.6	1269.9	1674.8	1144.3	619.6	305.4	299.6	**6656.2**
2014	2290.1	2134.0	1275.6	736.1	343.2	240.0	306.4	**7325.4**
2015	778.5	1607.4	1207.6	472.0	374.8	350.6	484.1	**5275.0**
2016	1444.2	1888.8	932.3	469.1	150.6	130.6	389.0	**5404.6**
2017	1128.8	535.1	735.8	242.9	207.0	161.0	791.1	**3801.7**

Table 6. MRIP recreational catch per angler trip by age for bluefish from Maine to Florida, 1985 to 2017. Index was predicted from a Generalized Linear Model with a negative binomial transformation.

Year	Age							**Total**	**SE**
	0	1	2	3	4	5	6+		
1985	0.475	0.564	0.286	0.075	0.052	0.037	0.134	**1.623**	0.084
1986	0.373	0.269	0.438	0.197	0.102	0.080	0.209	**1.668**	0.087
1987	0.334	0.296	0.289	0.357	0.150	0.079	0.150	**1.655**	0.085
1988	0.137	0.155	0.132	0.113	0.166	0.096	0.174	**0.973**	0.050
1989	0.527	0.271	0.167	0.060	0.038	0.095	0.157	**1.315**	0.064
1990	0.143	0.517	0.215	0.069	0.046	0.062	0.170	**1.222**	0.060
1991	0.281	0.206	0.371	0.067	0.031	0.028	0.193	**1.177**	0.057
1992	0.057	0.198	0.188	0.252	0.066	0.034	0.131	**0.926**	0.045
1993	0.066	0.147	0.133	0.094	0.154	0.026	0.121	**0.741**	0.037
1994	0.144	0.293	0.076	0.108	0.058	0.082	0.126	**0.887**	0.044
1995	0.071	0.352	0.163	0.067	0.052	0.044	0.111	**0.860**	0.043
1996	0.099	0.212	0.174	0.152	0.084	0.050	0.193	**0.964**	0.050
1997	0.114	0.314	0.194	0.098	0.083	0.092	0.222	**1.117**	0.058
1998	0.083	0.224	0.216	0.247	0.045	0.035	0.095	**0.945**	0.050
1999	0.228	0.313	0.271	0.245	0.063	0.037	0.127	**1.284**	0.068
2000	0.048	0.390	0.281	0.281	0.115	0.085	0.098	**1.298**	0.071
2001	0.094	0.376	0.479	0.280	0.066	0.083	0.115	**1.493**	0.077
2002	0.046	0.507	0.343	0.091	0.045	0.047	0.106	**1.185**	0.063
2003	0.049	0.330	0.438	0.145	0.089	0.081	0.143	**1.275**	0.066
2004	0.059	0.472	0.477	0.152	0.085	0.085	0.114	**1.444**	0.075
2005	0.204	0.181	0.405	0.276	0.083	0.076	0.097	**1.322**	0.070
2006	0.177	0.258	0.305	0.311	0.088	0.125	0.154	**1.418**	0.076
2007	0.108	0.232	0.404	0.200	0.174	0.079	0.111	**1.308**	0.068
2008	0.161	0.213	0.431	0.175	0.120	0.077	0.111	**1.288**	0.068
2009	0.068	0.201	0.320	0.282	0.103	0.041	0.134	**1.149**	0.062
2010	0.096	0.141	0.361	0.230	0.171	0.092	0.111	**1.202**	0.062
2011	0.167	0.182	0.210	0.263	0.141	0.129	0.190	**1.282**	0.069
2012	0.188	0.199	0.279	0.258	0.234	0.065	0.134	**1.357**	0.072
2013	0.150	0.151	0.399	0.269	0.148	0.072	0.056	**1.245**	0.068
2014	0.220	0.247	0.357	0.261	0.102	0.060	0.075	**1.322**	0.072
2015	0.167	0.344	0.259	0.101	0.080	0.075	0.104	**1.130**	0.061
2016	0.339	0.444	0.219	0.110	0.035	0.031	0.091	**1.270**	0.067
2017	0.359	0.170	0.234	0.077	0.066	0.051	0.252	**1.210**	0.065

Table 7a. NEFSC bluefish indices by age using fall inshore strata and re-transformed $\log_e$ stratified mean number per tow, 1985 to 2008 (FV. Albatross IV).

Year	Age							**Total**	CV
	0	1	2	3	4	5	6+		
1985	15.340	1.946	0.239	0.126	0.036	0.012	0.038	**17.74**	0.145
1986	38.843	1.505	0.171	0.085	0.051	0.036	0.057	**40.75**	0.427
1987	5.639	1.247	0.126	0.192	0.102	0.045	0.095	**7.45**	0.311
1988	30.041	0.189	0.027	0.031	0.074	0.036	0.069	**30.47**	0.572
1989	90.171	0.953	0.046	0.019	0.015	0.032	0.036	**91.27**	0.188
1990	5.911	3.291	0.009	0.016	0.007	0.023	0.064	**9.32**	0.222
1991	15.294	0.333	0.109	0.048	0.009	0.001	0.001	**15.80**	0.232
1992	16.062	1.662	0.056	0.051	0.010	0.005	0.019	**17.87**	0.069
1993	1.625	0.189	0.075	0.020	0.045	0.013	0.011	**1.98**	0.209
1994	11.100	1.129	0.025	0.026	0.054	0.035	0.010	**12.38**	0.117
1995	6.801	2.449	0.057	0.013	0.011	0.033	0.023	**9.39**	0.190
1996	9.124	1.417	0.170	0.092	0.019	0.017	0.023	**10.86**	0.232
1997	4.757	0.448	0.315	0.138	0.010	0.005	0.023	**5.69**	0.156
1998	9.509	0.777	0.108	0.123	0.000	0.000	0.000	**10.52**	0.320
1999	22.926	1.452	0.077	0.103	0.000	0.000	0.012	**24.57**	0.324
2000	2.843	1.555	0.152	0.029	0.000	0.013	0.000	**4.59**	0.232
2001	17.817	1.274	0.286	0.046	0.000	0.008	0.003	**19.43**	0.147
2002	16.009	2.347	0.058	0.054	0.011	0.024	0.003	**18.51**	0.057
2003	32.926	2.582	0.160	0.001	0.010	0.018	0.024	**35.72**	0.171
2004	5.423	4.845	0.230	0.050	0.011	0.007	0.026	**10.59**	0.136
2005	34.503	0.684	0.133	0.151	0.040	0.056	0.019	**35.59**	0.065
2006	22.979	1.405	0.636	0.155	0.037	0.048	0.005	**25.27**	0.143
2007	12.428	2.214	0.533	0.026	0.014	0.004	0.008	**15.23**	0.128
2008	10.939	1.717	0.397	0.088	0.026	0.013	0.025	**13.20**	0.178

Table 7b. 2009 to 2017 (FV. H.B. Bigelow)

Year	Age							**Total**	CV
	0	1	2	3	4	5	6+		
2009	3.515	5.294	1.392	0.635	0.151	0.042	0.043	**11.07**	0.489
2010	3.872	2.078	0.384	0.378	0.176	0.057	0.088	**7.03**	0.228
2011	5.639	1.993	0.292	0.295	0.150	0.032	0.039	**8.44**	0.157
2012	2.571	1.370	0.689	0.441	0.080	0.013	0.009	**5.17**	0.203
2013	2.699	0.264	0.040	0.019	0.018	0.004	0.002	**3.05**	0.581
2014	2.631	1.199	0.047	0.020	0.012	0.001	0.000	**3.91**	0.239
2015	0.940	0.529	0.046	0.000	0.000	0.000	0.000	**1.51**	0.219
2016	1.204	0.697	0.036	0.003	0.001	0.000	0.000	**1.94**	0.178
2017	***No index: because of survey delays, southern strata were not sampled for the fall survey								

Table 8. Bluefish survey indices by age from the New Jersey trawl survey from 1990 to 2017 (stratified geometric mean number per tow).

	New Jersey				
Year	Age 0	1	2	**Total**	SE
1990	1.437	0.084	0.001	**1.523**	0.349
1991	1.087	0.010	0.014	**1.111**	0.131
1992	1.561	0.237	0.025	**1.823**	0.249
1993	0.844	0.037	0.032	**0.913**	0.095
1994	2.238	0.008	0.002	**2.248**	0.252
1995	3.163	0.153	0.058	**3.374**	0.335
1996	1.835	0.077	0.007	**1.919**	0.184
1997	0.901	0.025	0.010	**0.937**	0.196
1998	1.013	0.153	0.077	**1.243**	0.247
1999	0.637	0.103	0.013	**0.752**	0.193
2000	0.493	0.092	0.035	**0.619**	0.084
2001	0.293	0.028	0.063	**0.384**	0.100
2002	2.762	1.068	0.027	**3.857**	0.274
2003	2.676	0.070	0.019	**2.764**	0.239
2004	1.546	0.448	0.249	**2.243**	0.213
2005	3.606	0.130	0.098	**3.833**	0.216
2006	2.760	0.078	0.025	**2.863**	0.277
2007	3.307	0.585	0.148	**4.040**	0.322
2008	2.888	0.082	0.011	**2.981**	0.315
2009	1.624	0.029	0.005	**1.657**	0.193
2010	0.868	0.018	0.008	**0.894**	0.237
2011	4.562	0.835	0.020	**5.417**	0.377
2012	2.732	0.195	0.044	**2.972**	0.241
2013	1.269	0.020	0.000	**1.290**	0.341
2014	3.155	0.268	0.010	**3.433**	0.195
2015	1.382	0.073	0.001	**1.456**	0.154
2016	1.825	0.080	0.001	**1.907**	0.167
2017	4.287	0.193	0.000	**4.480**	0.431

Table 9. Bluefish survey indices by age from the CT Long-Island Sound Trawl Survey from 1985 to 2017 (stratified geometric mean number per tow).

Year	Age							**Total**	CV
	0	1	2	3	4	5	6+		
1985	16.978	0.952	0.627	0.246	0.146	0.022	0.039	**19.010**	0.614
1986	10.822	1.184	1.170	0.189	0.128	0.088	0.079	**13.660**	0.551
1987	12.167	1.006	0.508	0.384	0.132	0.058	0.065	**14.320**	0.499
1988	14.265	0.211	0.490	0.137	0.170	0.125	0.091	**15.490**	0.560
1989	24.998	0.575	0.460	0.042	0.020	0.068	0.087	**26.250**	0.612
1990	19.367	2.970	0.928	0.163	0.128	0.122	0.202	**23.880**	0.484
1991	28.494	1.279	3.267	0.121	0.056	0.050	0.164	**33.430**	0.399
1992	18.871	1.760	2.789	1.324	0.182	0.063	0.232	**25.220**	0.451
1993	16.776	0.110	1.032	0.321	0.566	0.030	0.084	**18.920**	0.529
1994	30.523	0.762	0.241	0.162	0.137	0.169	0.065	**32.060**	0.524
1995	21.696	1.962	0.597	0.055	0.045	0.041	0.065	**24.460**	0.529
1996	19.805	0.220	0.413	0.247	0.013	0.025	0.077	**20.800**	0.578
1997	36.592	0.602	0.477	0.074	0.067	0.028	0.060	**37.900**	0.496
1998	29.871	0.973	0.379	0.159	0.011	0.004	0.014	**31.410**	0.521
1999	41.878	2.892	0.224	0.203	0.050	0.008	0.056	**45.310**	0.395
2000	17.281	2.026	1.072	0.148	0.001	0.028	0.015	**20.570**	0.585
2001	21.472	1.126	1.403	0.184	0.020	0.011	0.024	**24.240**	0.429
2002	14.007	3.788	0.638	0.094	0.019	0.079	0.124	**18.750**	0.508
2003	27.338	0.425	0.603	0.073	0.021	0.032	0.038	**28.530**	0.523
2004	21.452	5.515	1.456	0.331	0.068	0.163	0.145	**29.130**	0.483
2005	17.769	0.087	0.655	0.207	0.088	0.045	0.038	**18.890**	0.613
2006	14.244	0.487	0.547	0.288	0.064	0.008	0.023	**15.660**	0.601
2007	27.262	1.984	0.719	0.428	0.110	0.068	0.089	**30.660**	0.574
2008	11.831	0.562	1.086	0.367	0.119	0.153	0.162	**14.280**	0.508
2009	15.686	0.520	0.432	0.812	0.297	0.068	0.295	**18.110**	0.475
2010	mechanical issues								
2011	10.208	0.234	0.210	0.174	0.164	0.046	0.063	**11.100**	0.655
2012	14.342	0.268	0.185	0.129	0.081	0.022	0.034	**15.060**	0.571
2013	8.889	0.032	0.411	0.185	0.089	0.040	0.064	**9.710**	0.603
2014	18.138	0.211	0.069	0.063	0.067	0.042	0.021	**18.610**	0.569
2015	8.252	0.022	0.060	0.013	0.022	0.032	0.019	**8.420**	0.744
2016	8.503	1.598	0.425	0.575	0.066	0.021	0.062	**11.250**	0.658
2017	7.929	0.040	0.030	0.034	0.010	0.000	0.007	**8.050**	0.795

Table 10. Bluefish survey indices by age from the NEAMAP Inshore Trawl Survey from 2007 to 2017 (stratified geometric mean number per tow).

Year	Age							**Total**	CV
	0	1	2	3	4	5	6+		
2007	3.878	0.318	0.063	0.015	0.009	0.004	0.002	**4.290**	0.076
2008	4.779	0.362	0.055	0.020	0.007	0.003	0.003	**5.230**	0.073
2009	5.095	0.090	0.024	0.013	0.004	0.002	0.002	**5.230**	0.068
2010	3.081	0.112	0.028	0.027	0.019	0.007	0.006	**3.280**	0.080
2011	3.471	0.439	0.052	0.047	0.005	0.003	0.004	**4.020**	0.072
2012	5.174	0.413	0.087	0.043	0.009	0.001	0.003	**5.730**	0.062
2013	3.617	0.054	0.023	0.012	0.002	0.000	0.002	**3.710**	0.082
2014	2.505	0.189	0.009	0.007	0.004	0.005	0.002	**2.720**	0.093
2015	3.221	0.149	0.002	0.001	0.002	0.002	0.002	**3.380**	0.071
2016	4.301	0.394	0.002	0.001	0.001	0.000	0.001	**4.700**	0.080
2017	4.569	0.046	0.001	0.001	0.001	0.001	0.000	**4.620**	0.068

Table 11. Bluefish survey indices by age from the NC Pamlico Sound Gillnet Survey from 2001 to 2017.

Year	Age							**Total**	SE
	0	1	2	3	4	5	6+		
2001	0.130	2.995	2.157	0.000	0.000	0.000	0.000	**5.282**	0.570
2002	0.127	2.861	1.290	0.009	0.000	0.000	0.000	**4.286**	0.570
2003	0.163	1.837	2.739	0.031	0.000	0.007	0.000	**4.777**	0.590
2004	0.162	2.993	1.991	0.047	0.000	0.000	0.000	**5.192**	0.730
2005	1.084	2.239	3.021	0.038	0.009	0.000	0.009	**6.399**	0.880
2006	0.532	2.972	1.854	0.441	0.096	0.050	0.111	**6.057**	0.970
2007	0.439	2.326	4.776	0.808	0.043	0.006	0.050	**8.448**	1.050
2008	1.213	2.886	2.307	0.227	0.012	0.029	0.037	**6.710**	0.740
2009	0.375	2.040	1.475	1.960	0.288	0.059	0.133	**6.330**	0.710
2010	0.469	1.571	1.356	1.845	0.392	0.044	0.003	**5.680**	0.580
2011	0.241	0.946	1.648	2.041	0.921	0.045	0.045	**5.887**	0.890
2012	0.206	1.113	1.615	0.909	0.163	0.008	0.044	**4.058**	0.520
2013	1.689	1.652	1.900	0.393	0.052	0.008	0.008	**5.702**	0.870
2014	0.741	2.282	1.291	0.105	0.004	0.003	0.016	**4.441**	0.500
2015	0.430	1.031	1.154	0.120	0.008	0.003	0.020	**2.766**	0.320
2016	0.001	1.176	2.746	0.227	0.002	0.002	0.000	**4.154**	0.720
2017	0.248	0.782	2.212	0.175	0.022	0.029	0.116	**3.583**	0.500

Table 12. SEAMAP Inshore trawl survey index for Age-0 bluefish from 1989 to 2017.

Year	Age 0	CV
1989	3.307	0.50408
1990	0.112	0.367886
1991	1.290	0.593679
1992	0.933	0.87238
1993	0.130	0.341276
1994	1.084	0.349111
1995	0.678	0.402328
1996	0.482	0.241391
1997	0.059	0.490054
1998	0.162	0.873772
1999	0.608	0.45056
2000	0.169	0.358003
2001	1.374	0.403755
2002	0.785	0.307955
2003	2.607	0.560615
2004	0.470	0.310982
2005	2.775	0.29657
2006	0.453	0.520533
2007	0.764	0.46794
2008	1.297	0.275843
2009	4.411	0.322063
2010	1.633	0.299091
2011	0.615	0.396699
2012	0.639	0.456195
2013	0.413	0.499522
2014	0.193	0.616233
2015	0.832	0.368894
2016	0.565	0.343857
2017	0.159	0.4122

Table 13. Composite seine survey index for Age-0 bluefish from 1985 to 2017.

Year	Age 0	CV
1985	1.334	0.715
1986	0.905	0.751
1987	2.081	0.566
1988	1.252	0.441
1989	2.153	0.434
1990	1.309	0.431
1991	1.403	0.434
1992	0.571	0.500
1993	0.279	0.480
1994	0.569	0.488
1995	0.436	0.438
1996	0.681	0.481
1997	1.381	0.468
1998	0.727	0.478
1999	1.860	0.526
2000	0.656	0.431
2001	1.084	0.422
2002	0.580	0.397
2003	0.468	0.427
2004	0.930	0.414
2005	1.164	0.381
2006	1.100	0.399
2007	0.987	0.405
2008	1.284	0.390
2009	0.503	0.442
2010	0.793	0.396
2011	0.608	0.422
2012	0.701	0.410
2013	1.080	0.402
2014	0.821	0.331
2015	0.722	0.418
2016	0.721	0.414
2017	0.456	0.454

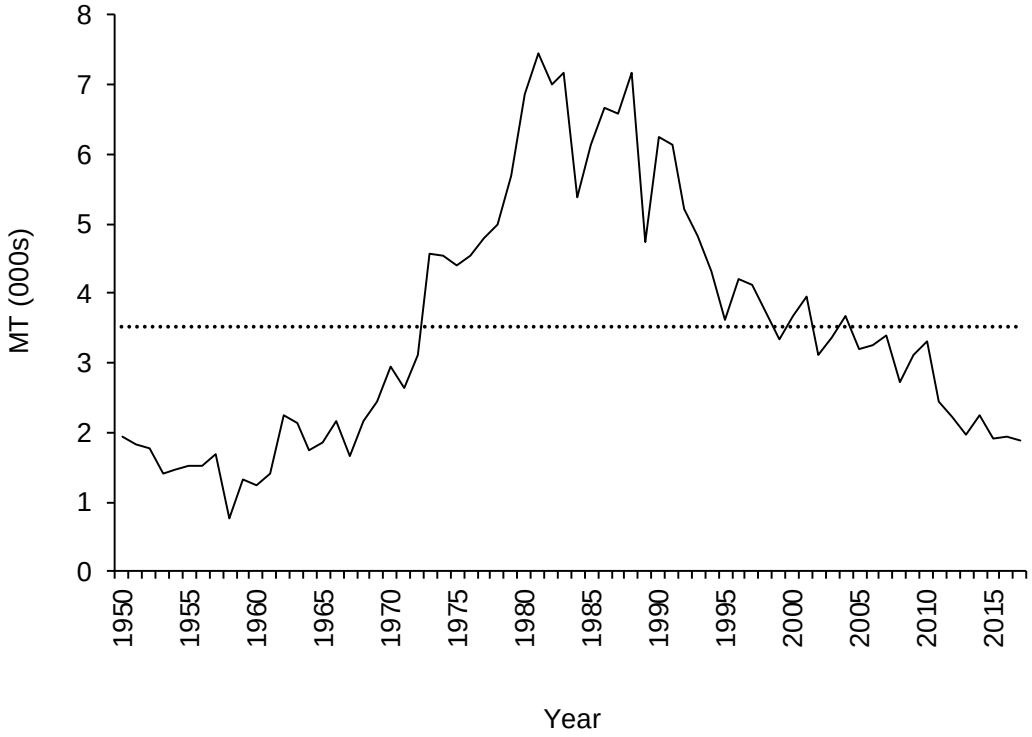


Figure 1. Times series of bluefish commercial landings (mt) along the Atlantic coast from 1950 to 2017. Dotted line represents the time-series average of 3,511 MT.

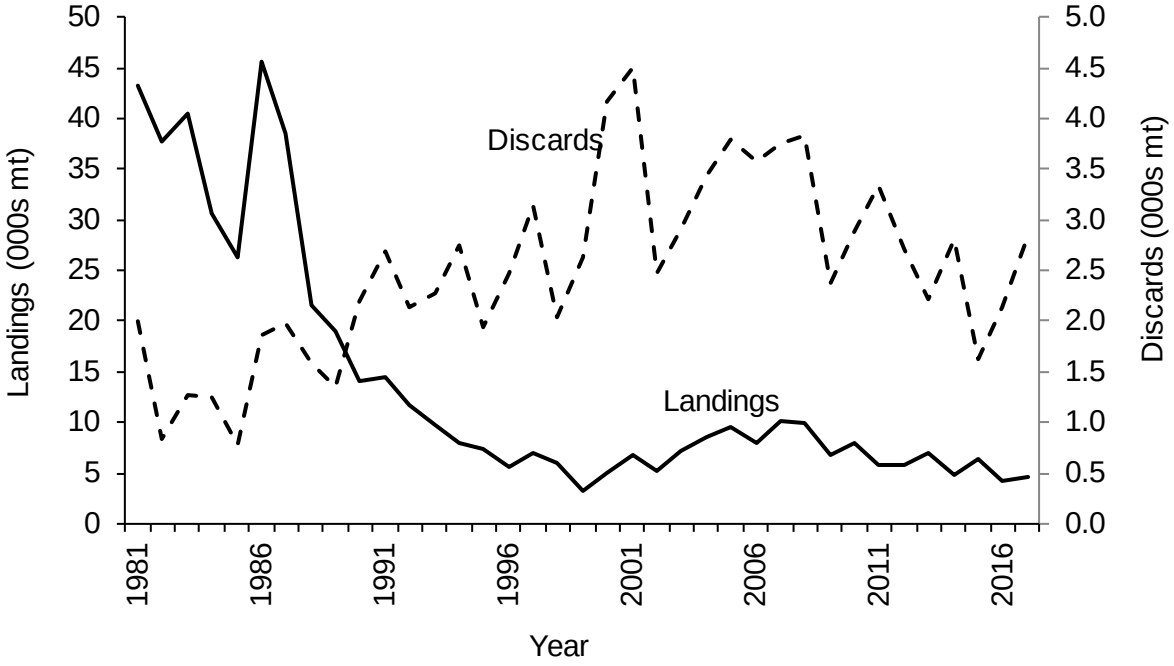
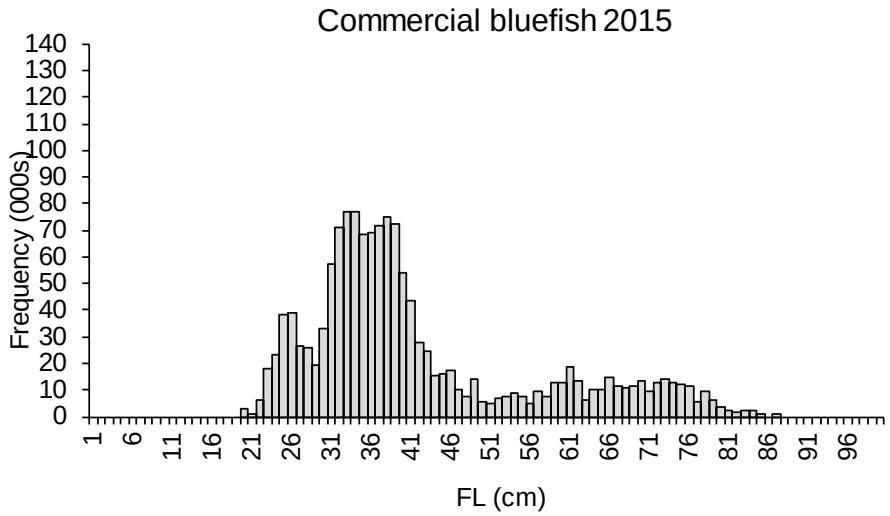
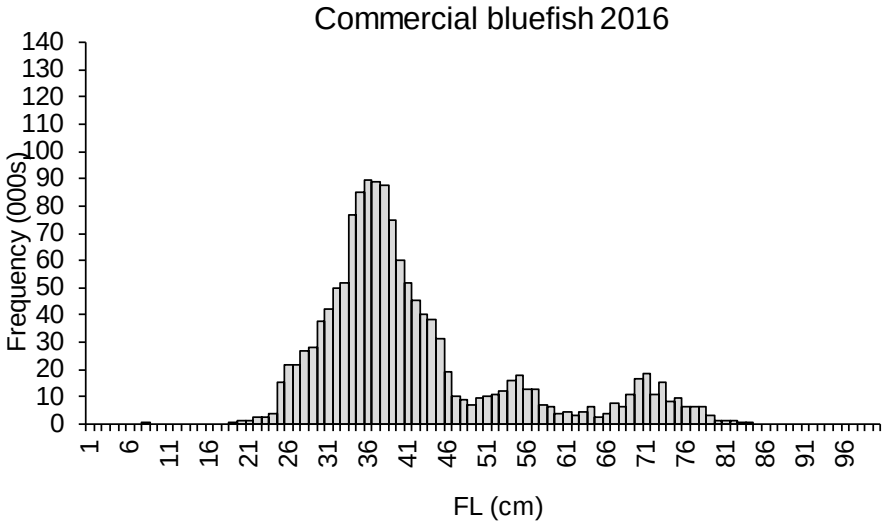


Figure 2. Recreational landings (mt) and recreational discards (MRIP B2 estimates*0.15) from Maine to Florida, 1981 to 2017.





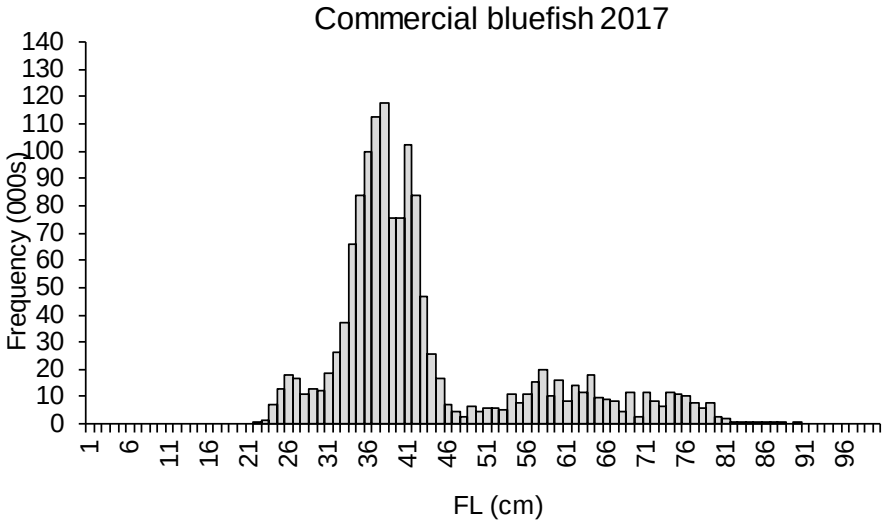


Figure 3. Length frequency distribution of commercial bluefish landings from Maine to Florida, 2015 to 2017.

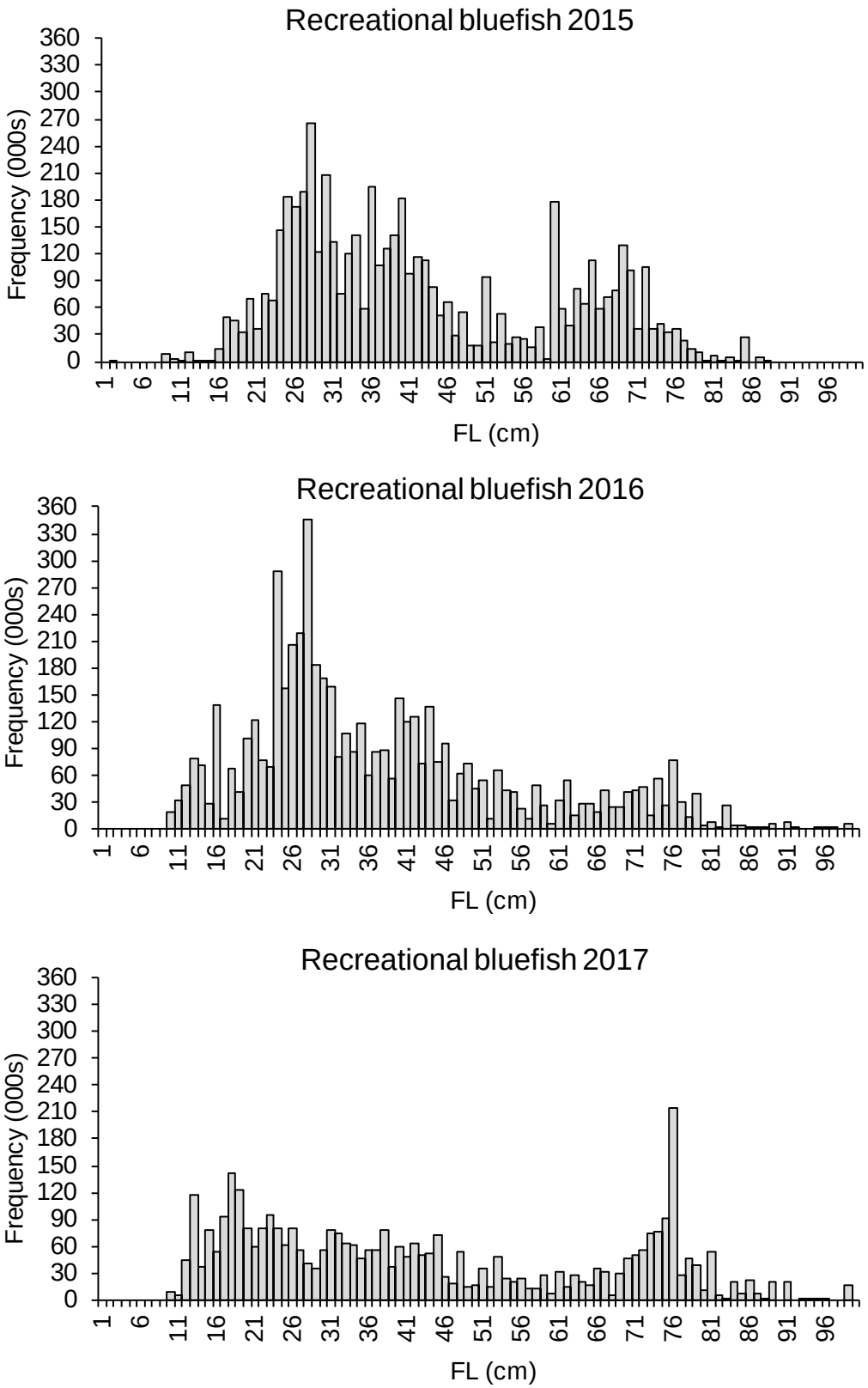


Figure 4. Length frequency distribution of recreational bluefish landings from Maine to Florida, 2015 to 2017.

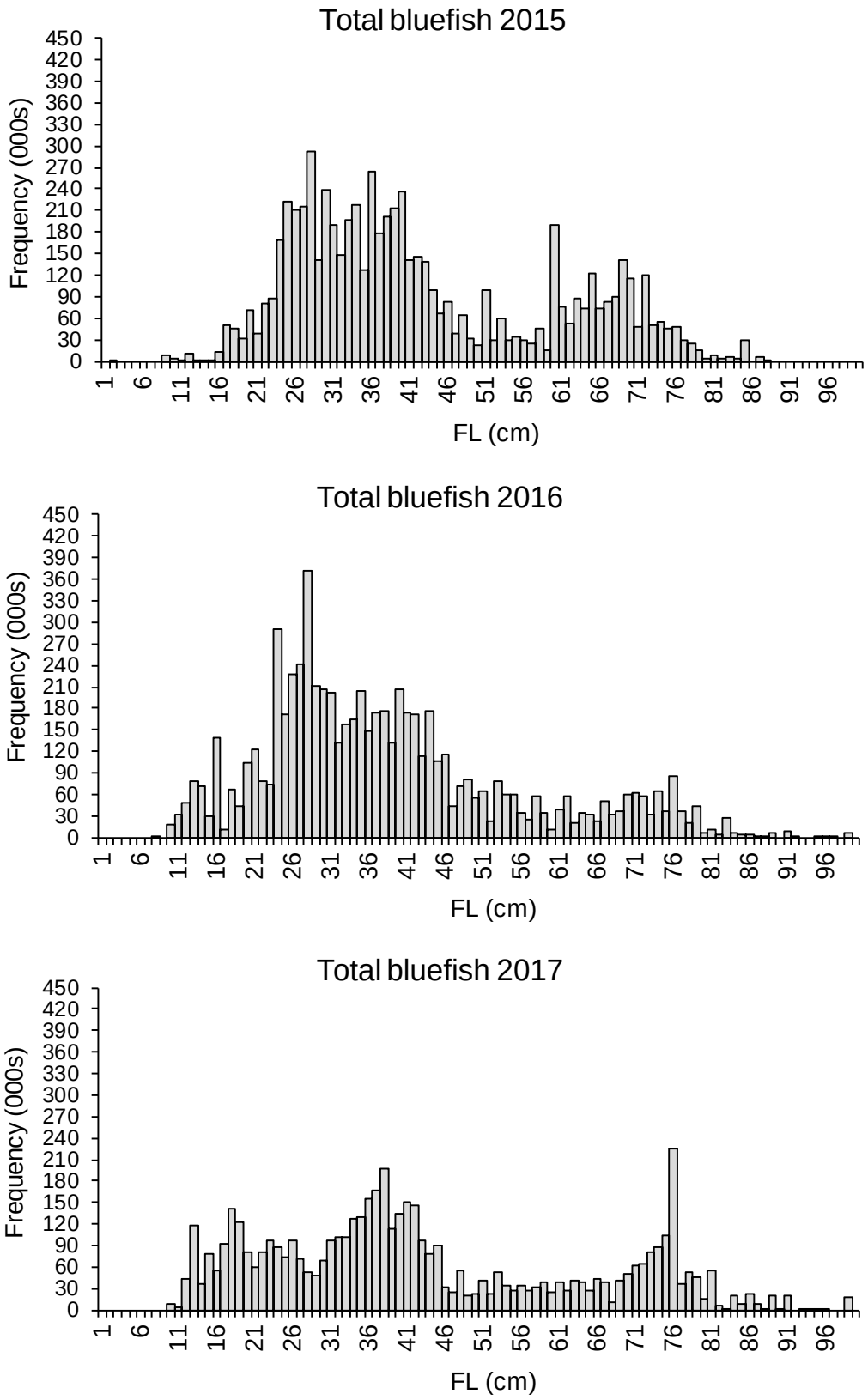


Figure 5. Length frequency distribution of total bluefish landings from Maine to Florida, 2015 to 2017.

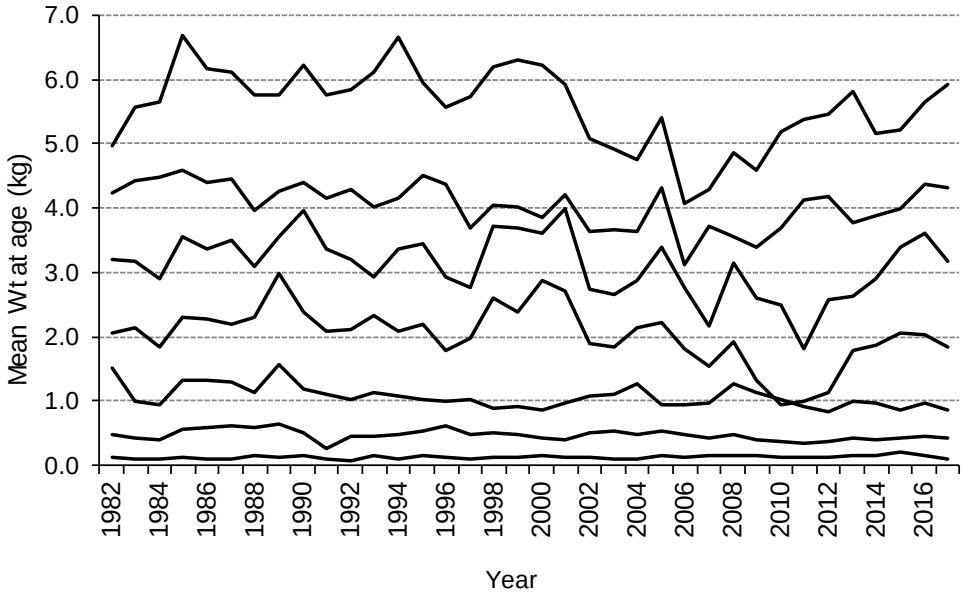


Figure 6. Bluefish mean weights (kg) at ages for age 0 (bottom) to age 6+ (top) from 1982 to 2017.

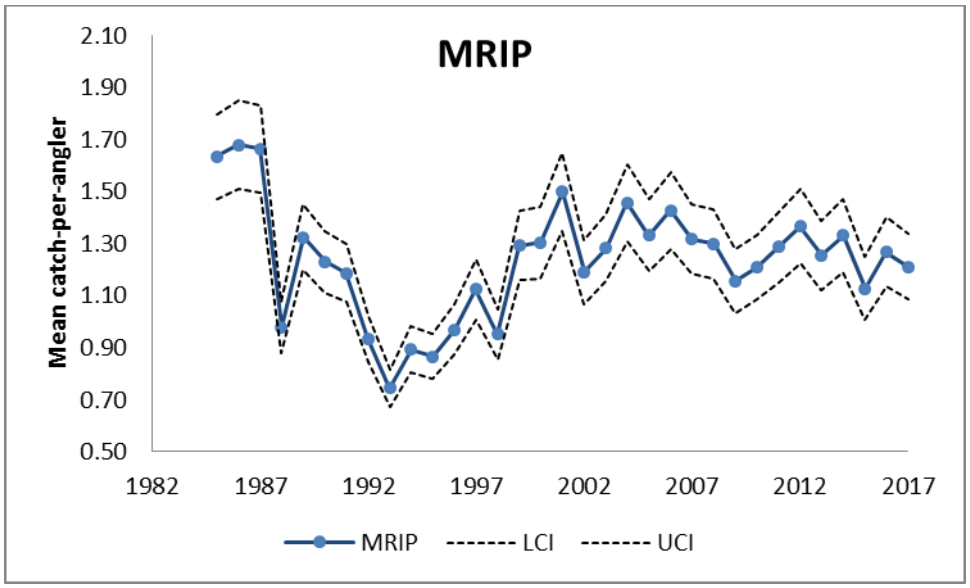


Figure 7. MRIP catch-per-angler for bluefish from 1985 to 2017.

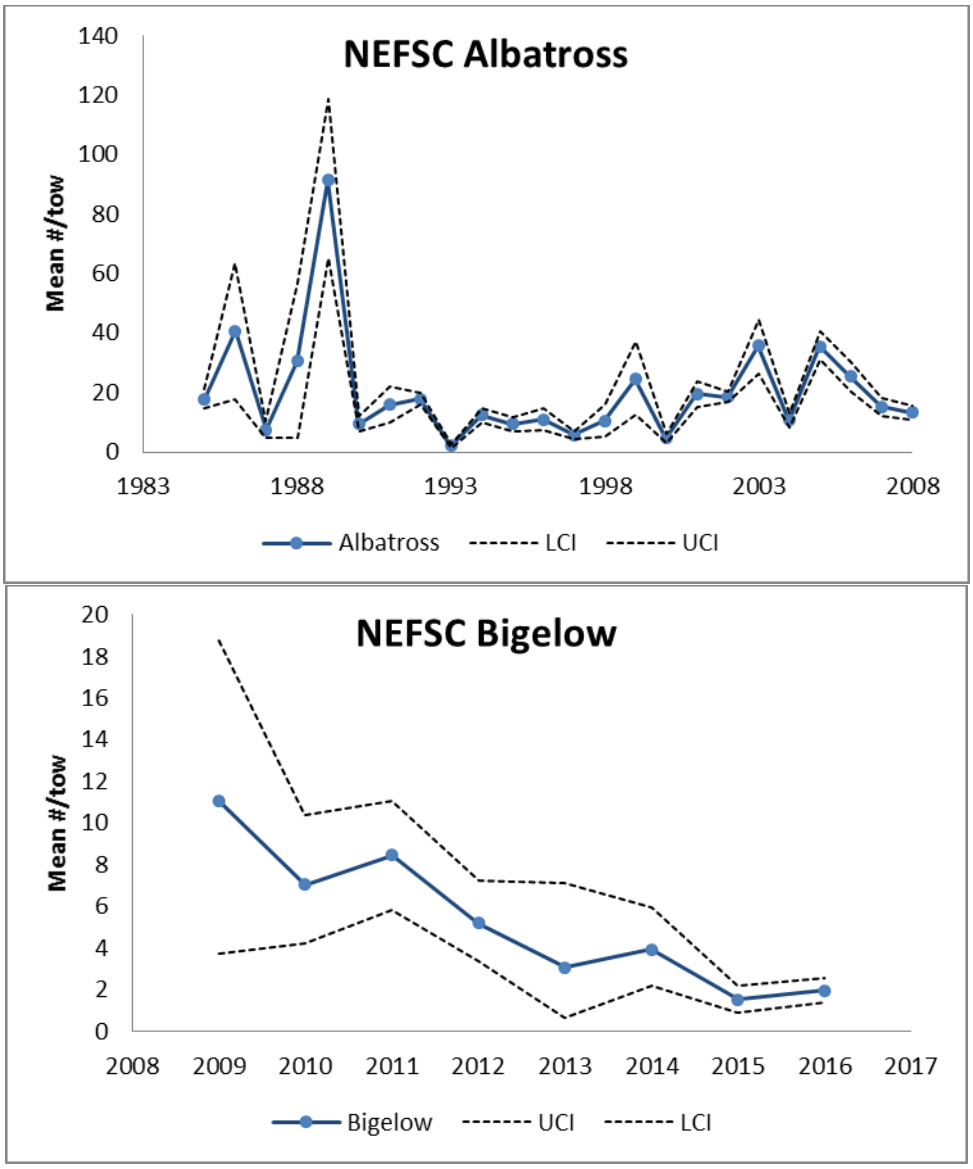


Figure 8. NEFSC Trawl survey indices for bluefish: Albatross from 1985 to 2008 and Bigelow from 2009 to 2017. *No survey index for 2017 due to mechanical issues.

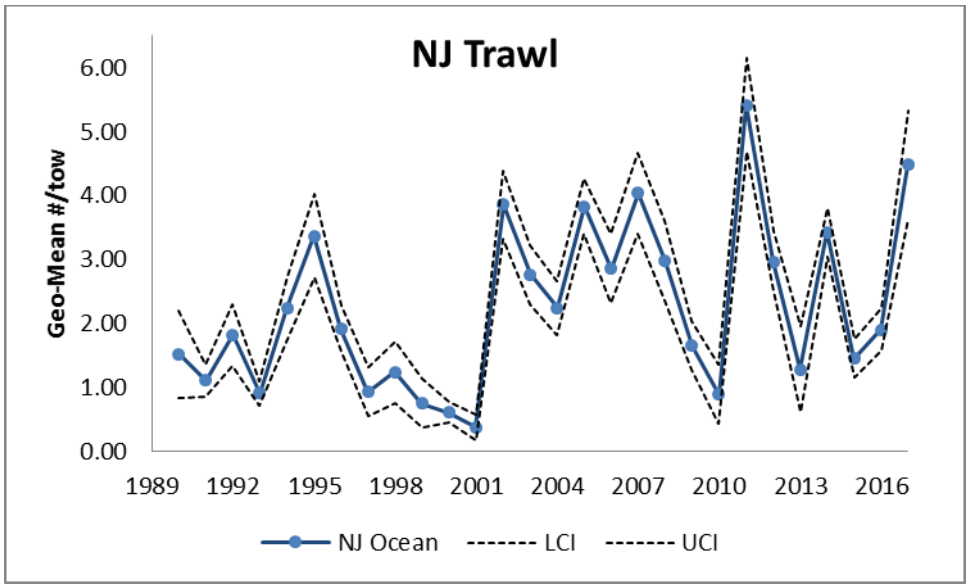


Figure 9. NJ Ocean trawl survey index for bluefish from 1990 to 2017.

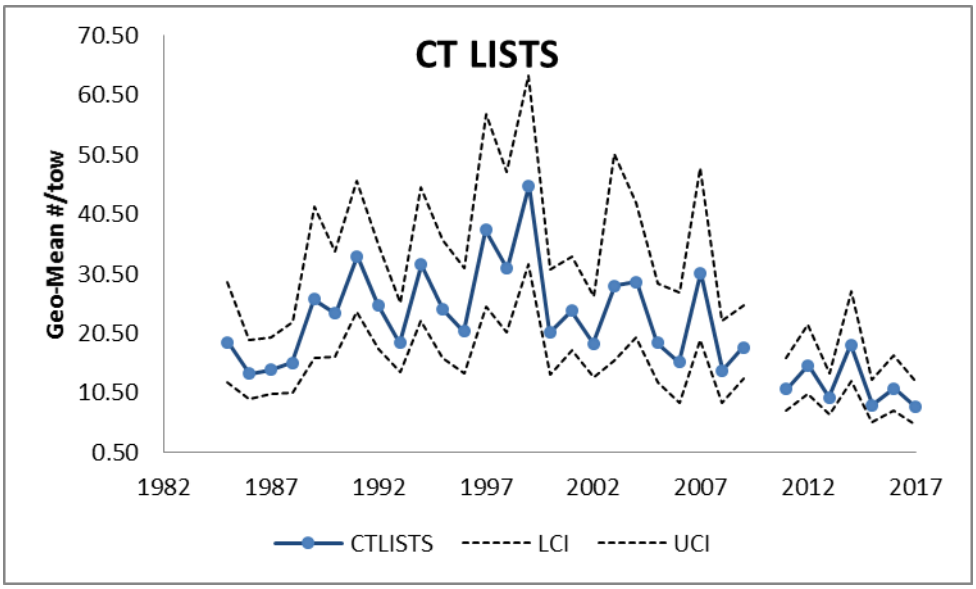


Figure 10. Connecticut Long-Island Sound Trawl survey index for bluefish from 1985 to 2017.

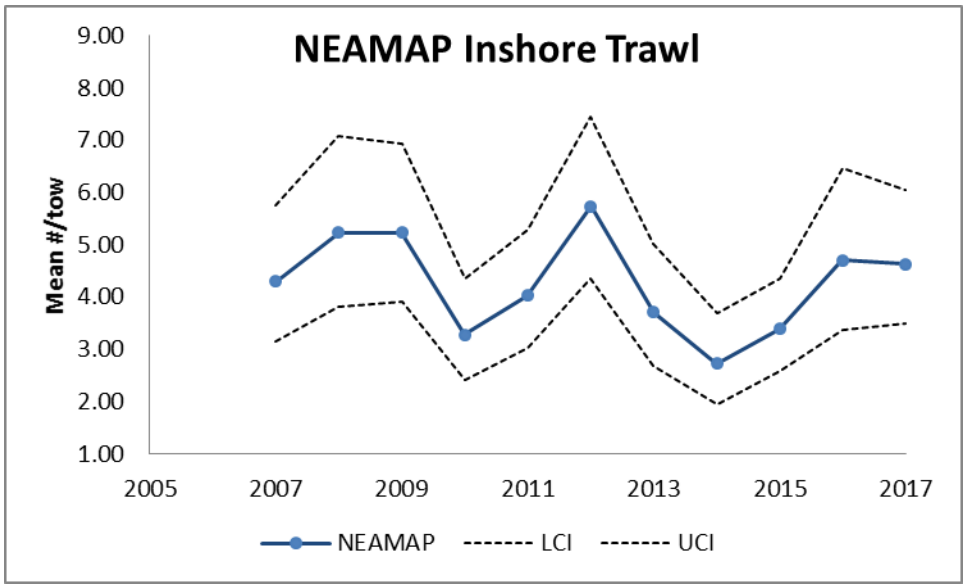


Figure 11. NEAMAP Inshore trawl survey for bluefish from 2007 to 2017.

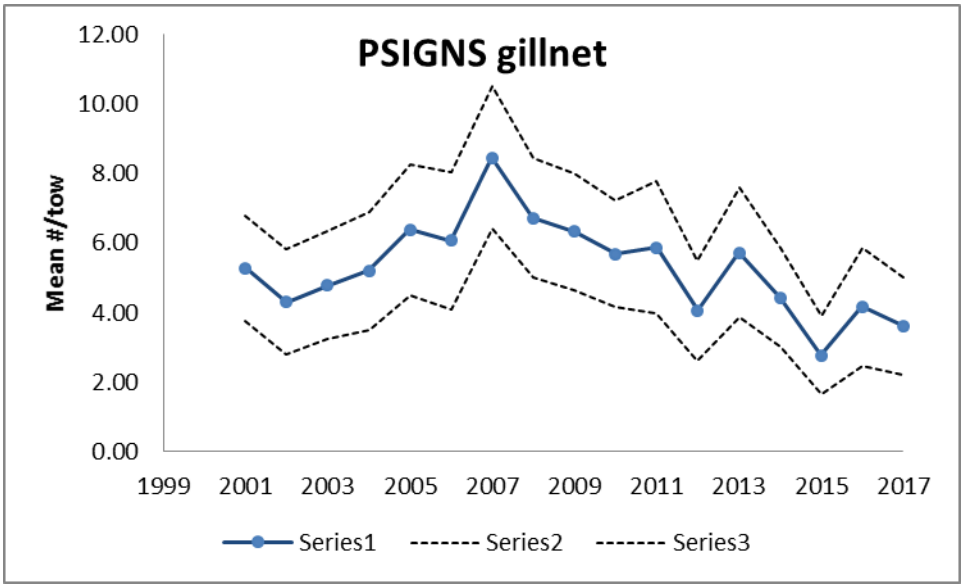


Figure 12. Pamlico Sound Independent Gillnet survey index for bluefish from 2001 to 2017.

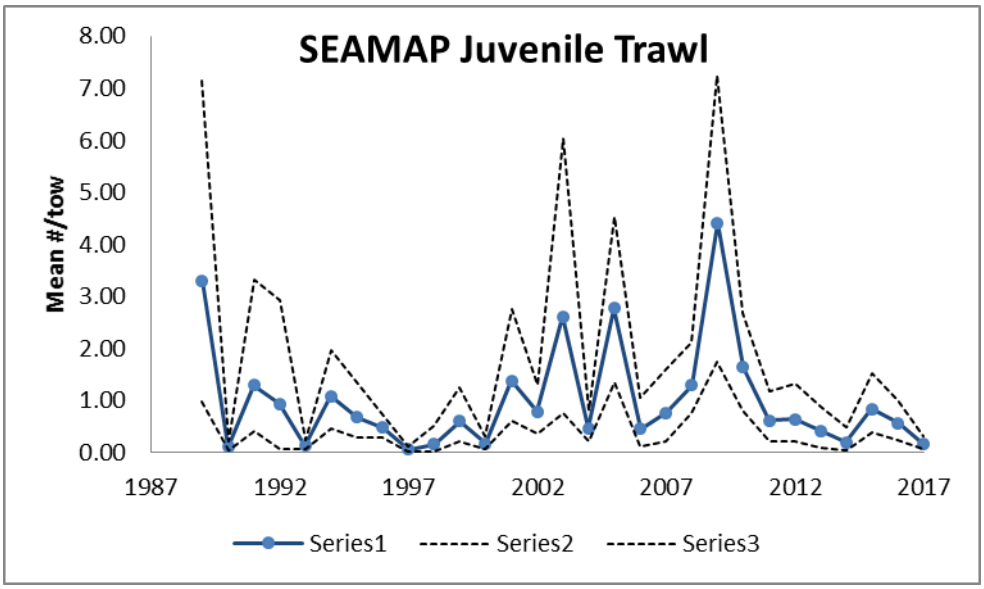


Figure 13. SEAMAP juvenile trawl survey index for bluefish from 1989 to 2017.

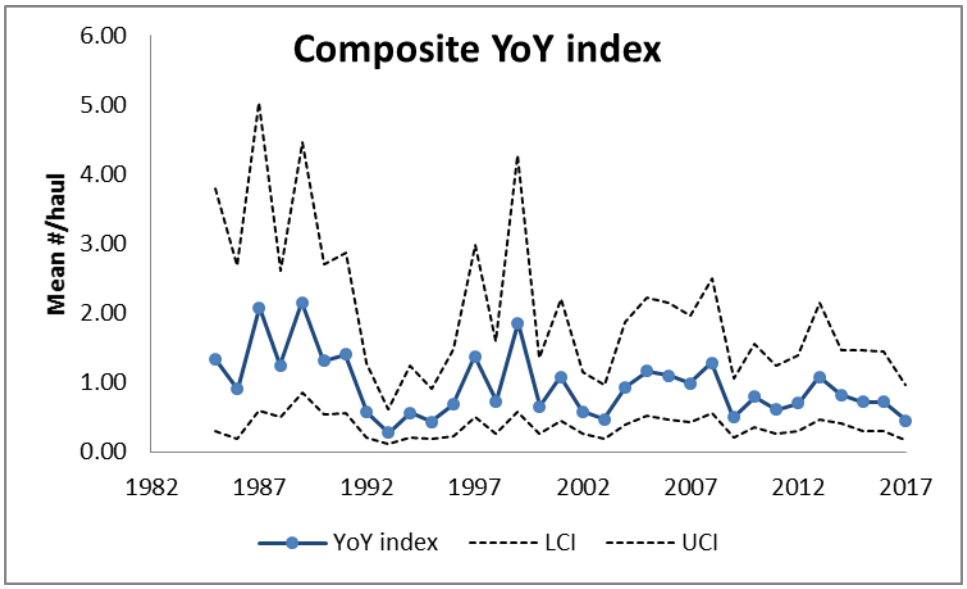


Figure 14. Composite young of the year seine index for bluefish from 1985 to 2017.

Bluefish Fishery Performance Report
June 2018

The Mid-Atlantic Fishery Management Council's (Council) Bluefish Advisory Panel (AP) met jointly with the Atlantic States Marine Fisheries Commission's (Commission) Bluefish AP on June 25, 2018 via webinar to develop a Fishery Performance Report (FPR) for consideration during the bluefish specification cycle. Advisors reviewed the Fishery Information Document and the 2017 data update prepared by the NEFSC for Bluefish to develop the 2018 Bluefish FPR based on advisor perspectives on catch and landings patterns and other trends in these fisheries. **Please note:** Advisor comments described below are not necessarily consensus or majority statements.

Attendance

Council Advisory Panel members present: Arnold Leo (NY commercial/East Hampton Baymen's Association), Greg Hurley (Williamsburg, VA), Kevin Wark (Barnegat Light, NJ), Skip Feller (Virginia Beach, VA), Steven Witthuhn (Greenlawn, NJ), Tom Roller (NC recreational for-hire), Phil Langley (Dameron, MD).
Council SSC members present: John Boreman (Chair) and Cynthia Jones
Others present: Matthew Seeley (Council Staff), Caitlin Starks (ASMFC Staff) and Mike Celestino (NJ Division of Fish and Wildlife).

Because of the localized nature of AP members' observations, remarks under each heading are attributed to the states represented on the AP.

Recreational Fishery Issues

NJ – This year was not as good as last year. Most bluefish seemed to be staying in the bay and the inlet. Thus, party boats have fished for bluefish in the estuaries and bays, due to the unusually large amount of large fish in those areas, as opposed to their normal offshore spots where they typically fish. This resulted in party boats not doing as well further offshore as in the previous years. Shark boats have reported large numbers of bluefish offshore (>30 miles) but party boats do not go that far to fish for blues. Additionally, large numbers of forage fish have also been reported near beach areas (menhaden and sand eels).

NC – Compared to previous years, we observed a lot less small fish. There was a run of big fish in the spring (big head, but small weight from early May to mid-June). Aside from observing less small fish, spatially, bluefish were present in similar locations to last year – way up the estuaries, piers, and shore. Targeting bluefish in these areas has become very popular. Overall, bluefish appear to have become more important as a target species to the recreational and for-hire fisheries in recent years, perhaps due to the lack of availability of state managed species. In the last few years, it seems that bluefish schools are smaller and a *little less* available.

NC – An important note for the for-hire; we saw a small run of larger fish (8-15 lbs) in the spring after seeing virtually none in the previous year. There was an incredible run of large fish from Wilmington to Cape Hatteras. Fish were well up the rivers into the sound. Some environmental condition(s) must be adding to this run of fish. Schools of smaller fish are *occasionally* present near shore, but there is a lot of pressure due to the concentrated commercial effort on them. At times, people are using these schools of fish for crab bait even though bluefish have become more accepted as a culinary target.

NY/NC/VA – For-hire is slightly down in recent years due to restrictive bag limits for species like striped bass, which leads to lower directed trips. Since a bluefish trip is any trip where a bluefish is harvested, lower party/charter trips will result in less bluefish for-hire trips. Yet, not all states are experiencing a decrease in the for hire.

VA/NC – Lots of 4-5-pound bluefish on the wrecks last year, but not this year (VA). Often, the for-hire fleet target Spanish mackerel, which will cross over with bluefish. If the Spanish mackerel fishing is really good (like it was last year, but not this year) then fishermen will not target bluefish as often.

NC – Need to be cautious even though abundance seems to be larger in recent years. AP members do not want to see bluefish targeted heavily now that bass or other species are down.

NY – East End of Long Island charter fishermen report very abundant bluefish runs, with all sizes of fish, from south shore ocean through Block Island Sound (east end of LI). Fishermen may be bringing in more bluefish at present (early summer) due to the very restricted limits on black sea bass, fluke, and striped bass. Bluefish fishing has been good for the past several years, but fishermen prefer other species when they are available and permitted. There seem to be about the same number of charter boats working this year as in the pasts couple of year.

NY – According to the Montauk charter fleet, the bluefish fishery is healthy and this year they had a run of very large fish in May, which were feeding on bunker. This was followed by a run of unusually small (1-1.5 lb fish feeding on sand eels). Then, the large bluefish came back in representing a very typical healthy fishery

NC – In recent years, there have been some good year classes for nearshore species (eg. Sea trout and red drum) in the fall. But, a hard winter on inshore species may direct more effort towards bluefish, but it will take the full year to see the impact. Typically, these species being available to fishermen results in less people targeting bluefish on party/charter vessels.

MD – A northern migration of striped bass drew fishermen further north and away from traditional bluefish targeted habitat. This resulted in a limited number of boats targeting bluefish. But, in the lower portion of the Chesapeake Bay, a patch of large bluefish remains the majority target species for vessels in the area.

NY – Bluefish are not as ubiquitous as they once were. The fishery needs to be monitored more closely and we need to identify research priorities to better answer the unknowns. Adjustments to

different management measures should be considered to help protect the bluefish fishery. (Comment submitted via email post meeting).

Commercial Fishery Issues

NY – Large runs of large (7-pound) bluefish arrived pretty much on normal schedule (third week of May) and were caught from Montauk up into Peconic Bay. The abundance of menhaden and sand eels likely draws the bluefish up into the bays. Most of the catch is by gill net.

NJ – Strong recruitment events over the last few years. Larger sizes of fish are represented in the landings/catch. Fishermen have observed strong recruitment events as indicated in the data from the NEFSC. Continuing to see unusually large fish in the back bays. This year on the third week of May, commercial fishermen have been targeting bluefish in the Cape Cod area, which is early. Habits and movement are inconsistent and unusual compared to historical habits and ranges. (pattern of northern movement may be due to bait availability. But, the fish that are around are most often seen further offshore and to the north. Areas 614 and 615 were the older hot spots.

NY – In the past several years, commercial landings have been above the allocation to the state, and the state had to get transfers from states that do not land their entire bluefish quota. It seems the quota is exceeded almost every year by some amount and we expect it to be exceeded this year.

NY – Prefer status quo management from 2017 to 2018; bluefish are no longer as ubiquitous as they once were. It is important to focus concerns on the young of the year. (Provided post meeting via email.)

NC – Lots of big bluefish being targeted in May. Thes fish are potentially for bait or consumption markets, but occasionally were not iced down (at times ~400-500 lbs being deck loaded). Proper care of bluefish is very important!

NJ – Appreciate that quota transfers can happen but does not want to see fleets disabled due to loss of quota.

Market / Economic Issues

NY – During the run of larger fish at the end of May, price dipped to $0.20-0.25 per pound, but with the current runs of 3-pound fish the price seems to stay around $0.50 - $0.70 per pound.

NC – Recreationally, the for-hire sector has seen less large bluefish in the spring. On average, they see smaller fish than in the northeast. Bluefish are becoming increasingly important to the recreational fishery, especially to the for-hire sector due to the decrease in abundance of other nearshore available species. Ultimately, when the large run of big fish occurs, it is a very good thing for the bluefish fishery.

NC/NJ/VA – Bluefish fishing has been good and we depend on them a lot. The species is very important and will continue to be. We do not want to see bluefish used as crab bait or being

compared to menhaden and mullet as a bait species. The price of menhaden has made other species targets for bait (i.e. bluefish, shad, hickory shad). We do not want to see food fish used as bait.

NY – Bluefish are sometimes bycatch in trawls. It is better to get some use out of dead fish that cannot go to market. We would rather use them than waste them. Advisors agree, but do not want bluefish to be directly targeted for bait.

NJ - Occasionally, bluefish are selling for over $1.00/lb. Over $1.00 indicates market demand, but we want to be careful to not saturate the market.

Environmental Issues

NJ/NC – Runs of large fish show up earlier and they stay around in in the inlets which is different than the past.

MD – Fish are moving north from where they used to be relatively stationary. Many Chesapeake Bay stations are no longer are valid since many bluefish seem to be further offshore. We observed this same pattern with bonito in the 80s.

Management Issues/Fishery Regulations

NY –The stock is not overfished and overfishing is not occurring according to the last benchmark stock assessment. The quotas may be too cautious considering the size/abundance of the stock [Council's Risk Policy is too strict]; the TAL is not caught up. New York commercial landings almost always exceeds the quota, so the New York quota should be increased to use up the TAL.

MD/RI/NC/NY – The current 15 fish bag limit was considered to be excessive. Few recreational fishermen are likely to keep more than 10 fish. AP members would like to see a reduction in the recreational bag limit. Reducing the bag limit (to 10 fish) will likely have minimal impacts on anglers, and would be more in line with state-specific bag limits

NC – Most recreational anglers do not keep a lot of bluefish. They throw back a mix of sizes depending on the individual. Need to protect the abundance in the fishery, this is very important for the viability of the recreational sector. In North Carolina there is a citation program (not a ticket) which allows anglers to fill out a form at a weigh station for bluefish they release. They can receive a certificate for large bluefish in the "release" category. This promotes catch-and-release fishing.

NC – While the commercial discards are considered to be insignificant in the assessment, there is some localized bycatch in some commercial fisheries (beach seine, different trawls, and ocean drop net and estuarine flounder net fisheries) and not zero. Additionally, the *commercial shrimp fishery* has become much larger and may lead to more bluefish discards in the commercial sector.

NY – We are unsure of the commercial discard rates, but they appear to still be very low. Gill netters use a certain size mesh to specifically target only market size bluefish.

NY/NC – Discard issues in the recreational fishery could be improved by implementing educational programs to minimize post-release fish mortality, to promote the phrase "catch what you are going to eat," and to stress the use of single hook and circle hook gear (e.g., inline), and its benefits.

Research Issues

The high recreational discards of bluefish (particularly small fish in MD/VA/NC) could be an issue. The Council and Commission should consider measures to address this especially if we continue to see the private recreational fishermen increase.

Investigate public stake holder perception of the recreational bluefish fishery in order to identify how the public would like this fishery to look like in years to come. Bluefish is an important recreational fishery and it is important to ask the recreational fishing community to investigate how they perceive this fishery in the future. Use for-hire log books to see what kind of data we can capture. We want to use that data to better understand where the fish are and how to characterize the recreational fishery. This could emerge into a good educational and outreach opportunity.

Need to better understand the dynamics between the inshore and offshore populations. More specifically, during the spring migration, there is another component of the stock that stays way offshore and does not appear to be the same as the fish taking part of the spring migration. This offshore component of the stock seems to miss the Mid-Atlantic Bight during the migration up north (towards Montauk). It is important to investigate this migration event in order to better understand the dynamics of the stock. What are the differences between the offshore and inshore bluefish populations?

Want to better understand what environmental or non-environmental factors bluefish cue in on? What is causing more species like bluefish to move out? Dredges? Sand mining? Mobile gear? Water quality?

Other Issues

Biological characteristics of bluefish life history need to be considered when developing catch and landings limits recommendations for this species. There is evidence that as bluefish migrate along the coast during the spring and summer there may be multiple spawning events. With a species as productive as bluefish, that matures early, and has the potential for multiple spawning events increases the possibility for recruitment and availability for this species. Recent observations are leading fishermen to believe what we think we know may be incorrect. Management should be tailor made for typical or atypical life histories, depending on the species under consideration.

Atlantic Bluefish Advisory Panel Information Document[1]
June 2018

The information in this document provides a brief overview of the management system, biology, stock conditions, and fishery performance for Atlantic Bluefish with an emphasis on 2017, the most recent complete fishing year.

Management System

The Mid-Atlantic Fishery Management Council (MAFMC) and the Atlantic States Marine Fisheries Commission (ASMFC) work cooperatively to develop fishery regulations for bluefish off the east coast of the United States. The Council and Commission work in conjunction with the National Marine Fisheries Service (NMFS), which serves as the federal implementation and enforcement entity. This cooperative management endeavor was developed because a significant portion of the catch is taken from both state waters (0-3 miles offshore) and federal waters (3-200 miles offshore, also known as the Exclusive Economic Zone or EEZ). The management unit for bluefish (*Pomatomus saltatrix*) is the U.S. waters in the western Atlantic Ocean.

The Bluefish Fishery Management Plan (FMP) was implemented in 1990 and established the Mid-Atlantic Fishery Management Council's (MAFMC) management authority over the fishery in federal waters. Amendment 1, implemented in 2000, addressed stock rebuilding and created the Bluefish Monitoring Committee which meets annually to make management measure recommendations to the Council. Amendment 3 incorporated the development of annual catch limits (ACLs) and accountability measures (AMs) into the specification process and Amendment 4 modified recreational accountability measures to accommodate uncertainty in recreational management and catch estimation. The original FMP and subsequent amendments and frameworks are available at: http://www.mafmc.org/fisheries/fmp/bluefish.

For bluefish, the annual catch target (ACT) is split 83 percent and 17 percent into recreational and commercial ACTs, respectively, and the discarded component of that catch is deducted to arrive at recreational and commercial total allowable landings (TAL). Additionally, landings above the expected recreational harvest can be "transferred" from the recreational to the commercial fishery as long as the final commercial quota does not exceed 10.5 million pounds.

The Council's Scientific and Statistical Committee (SSC) reviews assessment results and the Advisory Panel's fishery performance report, and determines the allowable biological catch (ABC) for the upcoming year. The Council's Bluefish Monitoring Committee develops and recommends

[1] This document was prepared by the MAFMC staff. Data employed in the preparation of this document are from unpublished National Marine Fisheries Service (NMFS) Dealer, Vessel Trip Reports (VTRs), and Permit databases, unless otherwise noted.

specific coastwide management measures (commercial quota, recreational harvest limit) that will achieve the catch target and makes further adjustments to total catch as needed based on management uncertainty. Finally, the Council and Board meet jointly to develop recommendations to be submitted to the NMFS.

Bluefish Biology

Bluefish are found worldwide in tropical and subtropical waters, but in the western North Atlantic range from Nova Scotia and Bermuda to Argentina. Bluefish travel in schools of like-sized individuals and undertake seasonal migrations, moving into the Middle Atlantic Bight (MAB) during spring and then south or farther offshore during fall. Within the MAB they occur in large bays and estuaries as well as across the entire continental shelf. Juvenile stages have been recorded in all estuaries within the MAB, but eggs and larvae occur in oceanic waters (Able and Fahay 1998). Growth rates are fast and they may reach a length of 3.5 ft and a weight of 27 pounds (Bigelow and Schroeder 1953). Bluefish live to age 12 and greater (Salerno et al. 2001).

Bluefish eat a wide variety of prey items. The species has been described by Bigelow and Schroeder (1953) as “perhaps the most ferocious and bloodthirsty fish in the sea, leaving in its wake a trail of dead and mangled mackerel, menhaden, herring, alewives, and other species on which it preys."

Bluefish born in a given year (young of the year) typically fall into two distinct size classes suggesting that there are two spawning events along the east coast. Studies suggest, however, that spawning is a single, continuous event, but that young are lost from the middle portion resulting in the appearance of a split season (Smith et al. 1994). As a result of the bimodal size distribution, young are referred to as spring-spawned or summer-spawned. In the MAB, spring-spawned bluefish appear to be the dominant component of the stock.

Status of the Stock

The bluefish benchmark stock assessment was peer reviewed in June 2015 and approved for use by management at SAW/SARC 60. This benchmark assessment uses a forward-projecting statistical catch-at-age model called ASAP (Age Structured Assessment Program). For the most recent benchmark, the catch-at-age matrices were completely reconstructed to incorporate new age data, including archived historical samples that had not been processed at the time the last benchmark (SAW/SARC 41; 2005) was conducted, and to correct aging errors in the earlier years of the time series (NEFSC 2015).

The biological reference points estimated in the previous benchmark assessment (SAW/SARC 41) were MSY reference points for F and total biomass (F_{MSY}, B_{MSY}). However, MSY reference points require a reliable stock-recruitment relationship. The stock-recruitment relationship for bluefish is poorly defined, due to the lack of information on recruitment at small stock sizes, with steepness estimated to be close to one for most model runs (NEFSC 2015). Therefore, in SAW/SARC 60, SPR-based (spawn per recruit) reference points were used as a proxy for MSY reference points.

Results from the most recent benchmark stock assessment indicate that the bluefish stock is not overfished and overfishing was not occurring in 2014 relative to the biological reference points (BRPs) from the 2015 SAW/SARC 60. Modeling results indicated that the estimated SSB was 190.77 million pounds (86,534 mt) in 2014 (85 percent of the accepted reference point SSB_{MSY} proxy = $SSB_{35\%SPR}$ = 223.42 million pounds or 101,343 mt). Spawning stock biomass declined since the beginning of the time series, from a high of 340.90 million pounds (154,633 mt) in 1985 to a low of 116.34 million pounds (52,774 mt) in 1997, before increasing again. The stock spawning biomass average for the 1985-2014 time series is 175.15 million pounds (79,449 mt). Fully-selected fishing mortality in 2014 was estimated to be 0.157, below the F threshold ($F_{MSY\ proxy}$ = $F_{35\%SPR}$ = 0.19). Fully selected F peaked in 1987 at 0.477 and then declined gradually since then, with a time series average of 0.284.

Data Update

The NEFSC developed a bluefish data update through 2017. The update contains recent trends in the bluefish fishery, including commercial and recreational landings, updated trawl survey index and updated MRIP index, discards, and length frequency distributions. In addition, eight fishery-independent indices were updated through 2017. Age-0+ fishery-independent indices included the NEFSC fall Bigelow trawl survey, the New Jersey ocean trawl survey, the Connecticut Long Island Sound trawl survey, the NEAMAP fall inshore trawl survey, and the North Carolina Pamlico Sound independent gillnet survey. Young-of-year indices included the SEAMAP fall trawl survey and a composite index developed from state seine indices from New Hampshire to Virginia. All indices except the NJ Trawl survey and Bigelow (no survey index for 2017) showed a decrease from 2016 values. The update is available via the Mid Atlantic Fisheries Management Council Website. For more information please visit: http://www.mafmc.org/council-events/2018/joint-bluefish-ap-meeting.

Fishery Performance Relative to Management Measures

The recreational and commercial landings relative to specified management measures is provided in Table 1. Except for 2007, the bluefish fishery has never exceeded the TAL. In 2007, the recreational fishery exceeded the recreational harvest limit by about 2.69 million pounds, and although the commercial fishery underperformed by 1.18 million pounds, the combined landings (29.27 million pounds) were above the specified TAL (27.76 million pounds). In 2017, the recreational fishery landed 9.52 million pounds compared to the 9.65 million pounds RHL (a 0.13 million pound underage), and the commercial fishery landed 3.64 million pounds compared to the quota of 8.54 million pounds (a 4.9 million pounds underage). Combined landings for the recreational and commercial fisheries in 2017 (13.16 million pounds) resulted in an underage of 5.03 million pounds when compared to the TAL (18.19 million pounds). As of May 23, 2018, 0.55 million pounds of bluefish had been landed by the commercial fishery; this represents 8 percent of the 2018 commercial quota (7.24 million pounds). Commercial fishery landings in 2018 are behind the 2017 landings (Figure 1; as of May 23, 2018).

Table 1. Summary of bluefish management measures, 2000 – 2018 (Values are in million pounds).

Management Measures	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
TAC[1]/ **ABC**[2]	n/a	n/a	29.1	39.5	34.22	34.22	29.15	32.03	31.89	34.08	34.38	31.74	**32.04**	**27.47**	**24.43**	**21.54**	**19.45**	**20.64**	**21.81**
TAL[3]	35.33	37.84	26.87	37.29	31.85	30.85	24.8	27.76	28.16	29.36	29.26	27.29	28.27	23.86	21.08	18.19	16.46	18.19	18.82
Comm. Quota[4]	9.58	9.58	10.5	10.5	10.5	10.5	8.08	8.69	7.71	9.83	10.21	9.38	10.32	9.08	7.46	5.24	4.88	8.54	7.24
Comm. Landings[5]	8.05	8.7	6.88	7.41	8.06	7.04	6.98	7.51	6.12	7.1	7.55	5.61	4.66	4.12	4.77	4.02	4.1	3.64	-
Rec. Harvest Limit[4]	25.75	28.26	16.37	26.79	21.35	20.35	16.72	19.07	20.45	19.53	18.63	17.81	17.46	14.07	13.62	12.95	11.58	9.65	11.58
Rec. Landings[6]	10.61	13.23	11.37	13.14	17.32	19.86	16.65	21.76	19.79	14.47	16.34	11.5	11.84	16.46	10.46	11.67	9.54	9.52	-
Rec. Possession Limit (# fish)	10	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
Total Landings	18.66	21.93	18.25	20.55	25.38	26.9	23.63	29.27	25.91	21.57	23.89	17.11	16.5	20.58	15.23	15.69	13.64	13.16	-
Overage/Underage	-16.67	-15.91	-8.62	-16.74	-6.47	-3.95	-1.17	1.51	-2.25	-7.79	-5.37	-10.18	-11.77	-3.28	-5.85	-2.5	-2.82	-5.03	-
Total Catch[7]	22.35	26.02	21.44	23.48	29.71	31.55	28.08	35.12	31.83	25.10	27.93	20.39	19.26	24.06	17.96	18.65	16.09	15.65	-
Overage/ Underage	n/a	n/a	-7.66	-16.02	-4.51	-2.67	-1.07	3.09	-0.06	-8.98	-6.45	-11.35	-12.78	-3.41	-6.47	-2.89	-3.36	4.99	-

[1] Through 2011. [2] 2012 fwd. [3] Not adjusted for RSA. [4] Adjusted downward for RSA. [5] Dealer and South Atlantic Canvass data used to generate values from 2000-2011; Dealer data used to generate values from 2012-2014. [6] MRIP. [7] Recreational discards were calculated assuming MRIP mean weight of fish landed or harvested.

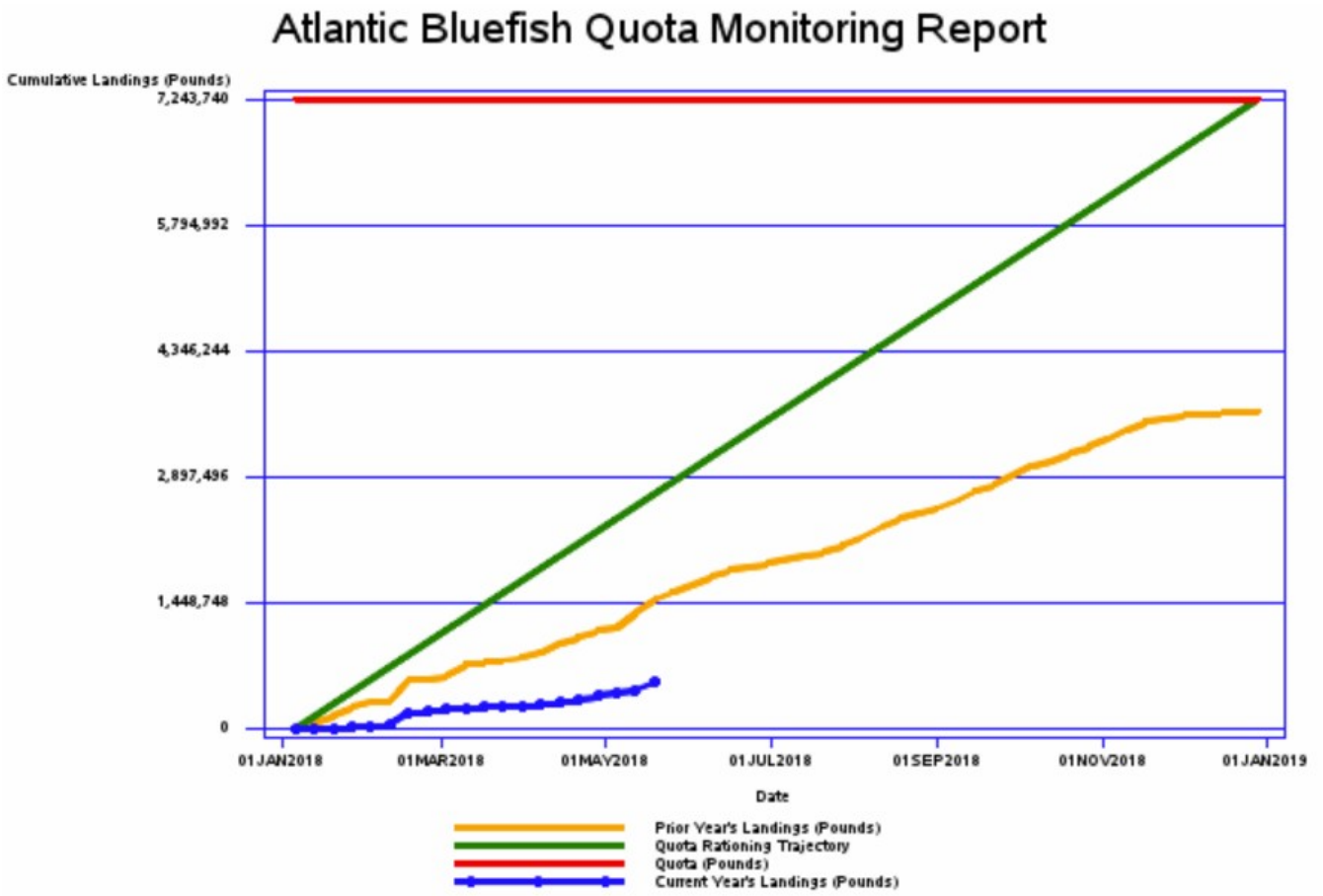


Figure 1. Atlantic bluefish commercial landings for 2018 fishing year to date (through May 23, 2018). http://www.nero.noaa.gov/ro/fso/reports/reports_frame.htm.

Landings History

Bluefish catches were estimated via the Marine Recreational Fisheries Statistic Survey (MRFSS) starting in 1981 thought 2003. Recreational data for years 2004 and later are available from the Marine Recreational Information Program (MRIP), the data collection that followed MRFSS.

From the early 1980s to the early 1990s, recreational landings declined by factor of about 70% (avg. 1981-1983 = 89.14 million pounds; avg. 1991-1993 = 25.85 million pounds). Recreational landings continued to decline at a somewhat slower rate until reaching their lowest level at 8.25 million pounds in 1999, but since have grown to a peak of 21.70 million pounds in 2007. There has been an overall decline of approximately 10 million pounds in recreational landings since 2007 to 11.50 and 11.84 million pounds in 2011 and 2012, respectively. According to MRIP, recreational landings increased to 16.46 million pounds in 2013 and decreased to 10.46 million pounds in 2014 even though total catch in numbers was stable. For 2016, recreational landings were estimated at 9.54 million pounds while 2017 landings were estimated at 9.52 million pounds. Recreational discards have increased from about 10% of the catch in the 1980s to much more than 20% of the catch in the early 2000s.

Commercial landings have been relatively stable throughout the landings history (Figure 2). Commercial discards are treated as insignificant and are not estimated in the current assessment.

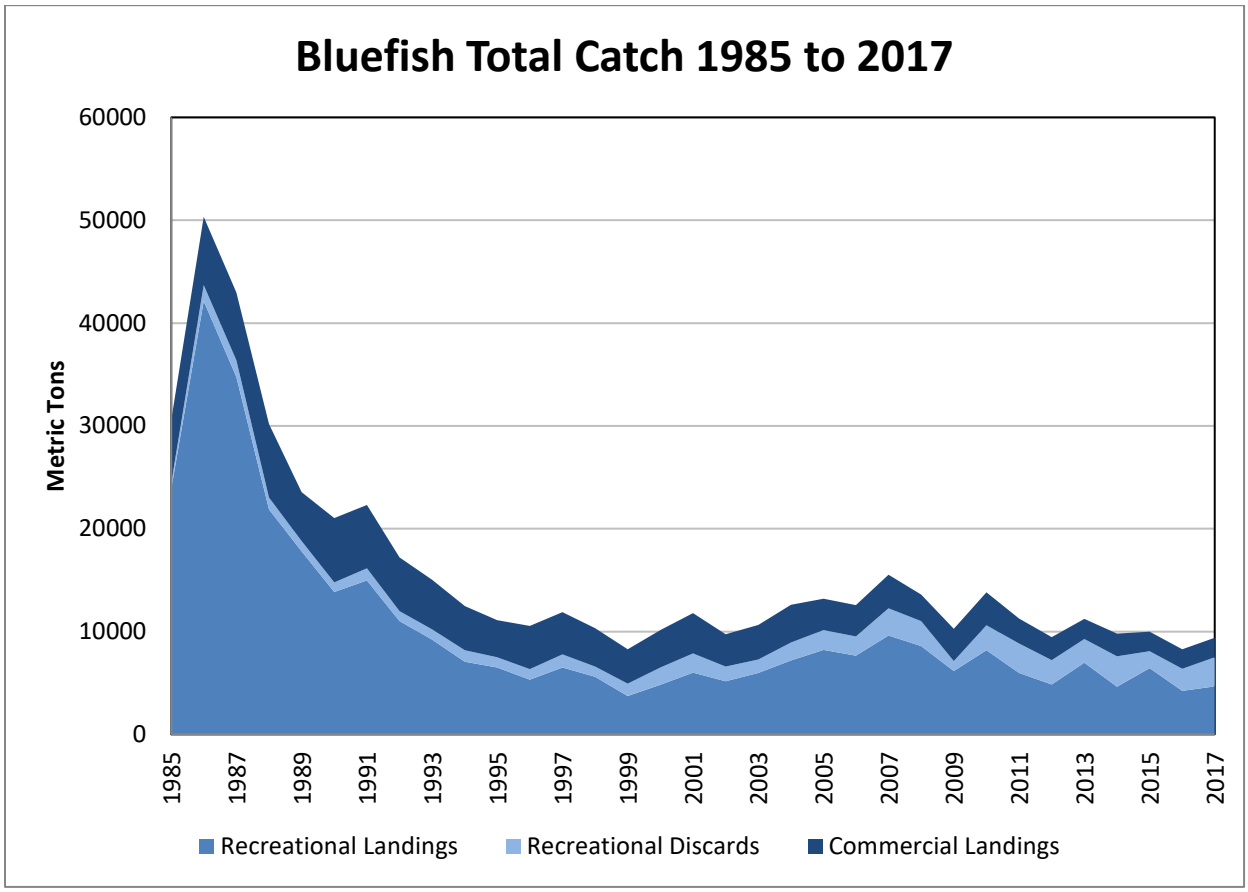


Figure 2. Bluefish catch (landings and discards), 1985-2017. (Source: Anthony Wood, Personal Communication 2018)

Recreational Fishery

Trends in recreational trips associated with targeting or harvesting bluefish from 1991 to 2016 are provided in Table 2. The lowest annual estimate of bluefish trips was 1.64 million trips in 2017. The highest annual estimate of bluefish trips in this timeframe was 5.95 million trips in 1991. For the last 5 years (2013-2017), bluefish trips have ranged from 1.64 million trips in 2017 to 2.40 million trips in 2014. Relative to total angler effort in 2017, bluefish were the primary target or harvested in 5.2 percent of all recreational angler trips.

Table 2. Number of bluefish recreational fishing trips, recreational harvest limit, and recreational landings from 1991 to 2017.

Year	Number of bluefish trips[a]	Recreational landings (N)	Recreational landings per "bluefish" trip
1991	5,948,808	11,942,608	2.0
1992	4,549,536	7,157,754	1.6
1993	4,269,162	5,725,355	1.3
1994	3,587,131	5,767,953	1.6
1995	3,608,325	5,167,979	1.4
1996	2,820,059	4,205,103	1.5
1997	2,384,133	5,413,036	2.3
1998	2,180,471	4,202,111	1.9
1999	1,727,175	3,681,841	2.1
2000	2,041,450	4,897,008	2.4
2001	2,661,032	6,663,237	2.5
2002	2,324,253	5,300,189	2.3
2003	2,647,840	6,045,062	2.3
2004	2,901,956	7,250,407	2.5
2005	3,240,410	7,949,179	2.5
2006	2,800,204	7,035,179	2.5
2007	3,620,374	8,373,899	2.3
2008	3,024,787	6,664,150	2.2
2009	2,088,857	5,194,242	2.5
2010	2,468,273	6,090,830	2.5
2011	2,128,166	5,061,391	2.4
2012	2,394,988	5,523,282	2.3
2013	1,811,087	5,743,970	3.2
2014	2,401,822	5,875,773	2.4
2015	1,710,020	3,996,803	2.3
2016	2,166,975	4,301,220	2.0
2017	1,638,890	3,013,668	1.8

[a] Estimated number of recreational fishing trips where the primary target was bluefish or bluefish were harvested regardless of target, Maine – Florida's East Coast. Source: MRFSS (1991-2003)/MRIP (2004 forward).

Recreational Landings by State

Recreational catch and landings by state for 2017 are provided in Table 3. The greatest overall catches (includes discards) were in New Jersey with 2.62 million fish, North Carolina with 1.44 million fish, New York with 1.26 million fish, and Connecticut with 0.9 million fish.

The greatest harvest (retained catch) of bluefish by weight occurred in New Jersey with 3.37 million pounds, followed by Florida (1.58 million pounds), New York (1.32 million pounds), and Delaware (0.77 million pounds). According to MRIP only 5 and 0 bluefish were caught in Maine and New Hampshire, respectively. Average weights, based on dividing MRIP landings in weight by landings in number for each state, suggest that bluefish size tends to increase toward the north along the Atlantic coast.

Table 3. MRIP estimates of 2017 recreational harvest and total catch for bluefish.

State	Harvest			Catch
	Pounds of fish	Number of fish	Average wt of fish (pounds)	Number of fish
ME	69	5	13.8	5
NH	0	0	0	0
MA	619,746	153,751	4.0	263,314
RI	337,710	129,159	2.6	199,104
CT	597,122	240,358	2.5	913,042
NY	1,321,368	488,433	2.7	1,262,686
NJ	3,365,738	878,465	3.8	2,615,586
DE	770,820	109,280	7.1	277,754
MD	109,424	61,381	1.8	136,509
VA	45,055	48,390	0.9	152,531
NC	690,018	524,072	1.3	1,436,765
SC	84,593	107,285	0.8	405,127
GA	1,184	1,343	0.9	11,584
FL (East Coast)	1,576,897	271,744	5.8	593,526
Total	9,519,744	3,013,666	3.2	8,267,533

Recreational Landings by Mode

Figure 3 reflects MRFSS/MRIP-based estimates of landings by mode (1991 through 2017) and indicates that the recent primary landing modes for bluefish are private boats and shore mode. About 45 percent of the landings of bluefish on a coastwide basis came from private/rental boats, followed by shore (44 percent) for the 1991 to 2017 period. For-hire mode is only about 11 percent of the total landings. For the last five years (2013-2017), 40 percent of the total bluefish landings came from private/rental boats, 37 percent from shore mode, and 23 percent from for-hire boats.

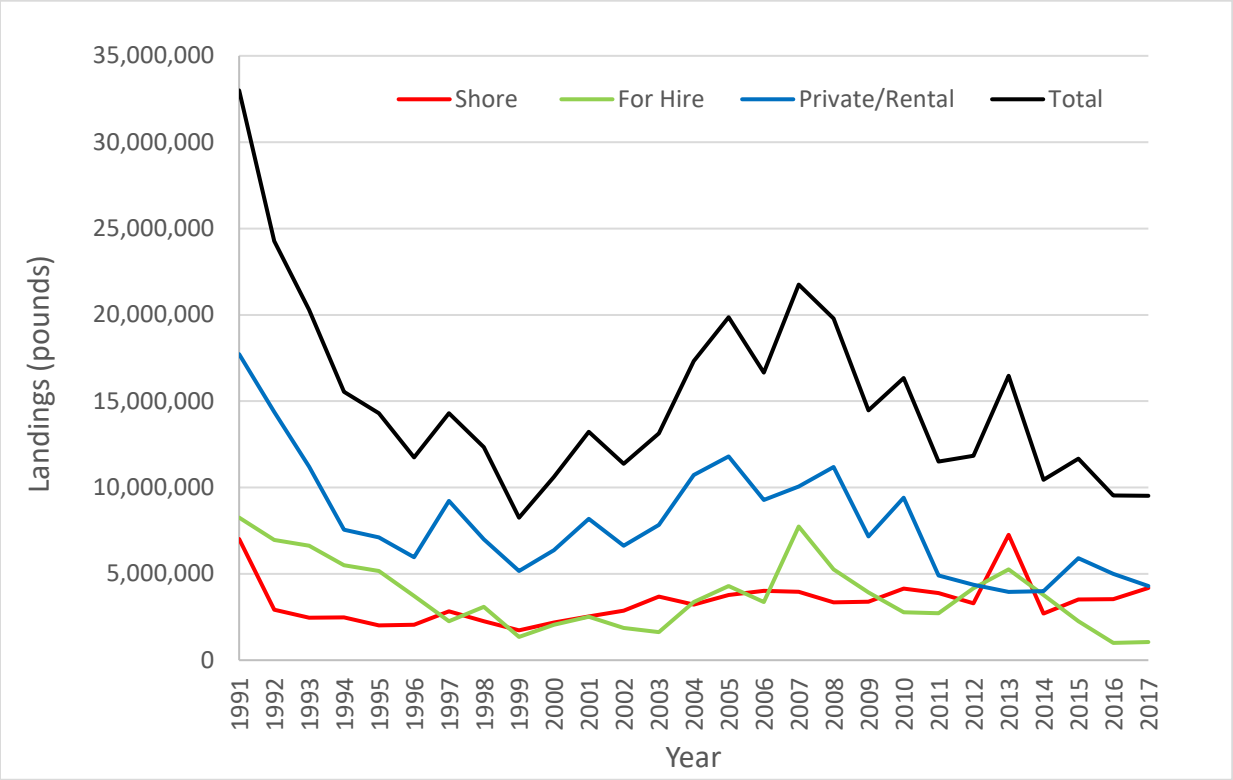


Figure 3. Bluefish landings (pounds) by recreational fishermen by mode, Atlantic Coast, 1991-2017.

Recreational Landings by Area

MRIP classifies catch into three fishing areas, inland, nearshore ocean (< 3 mi), and offshore ocean (> 3 mi). In 2017, about 51 percent of the landings of bluefish on a coastwide basis came from inland waters, followed by nearshore ocean (42 percent) (Figure 4). Offshore ocean is only about 7 percent of the total landings. Over the last five years (2013-2017), 51% of the total bluefish landings came from inland waters, 33% from nearshore ocean, and 9% from offshore ocean.

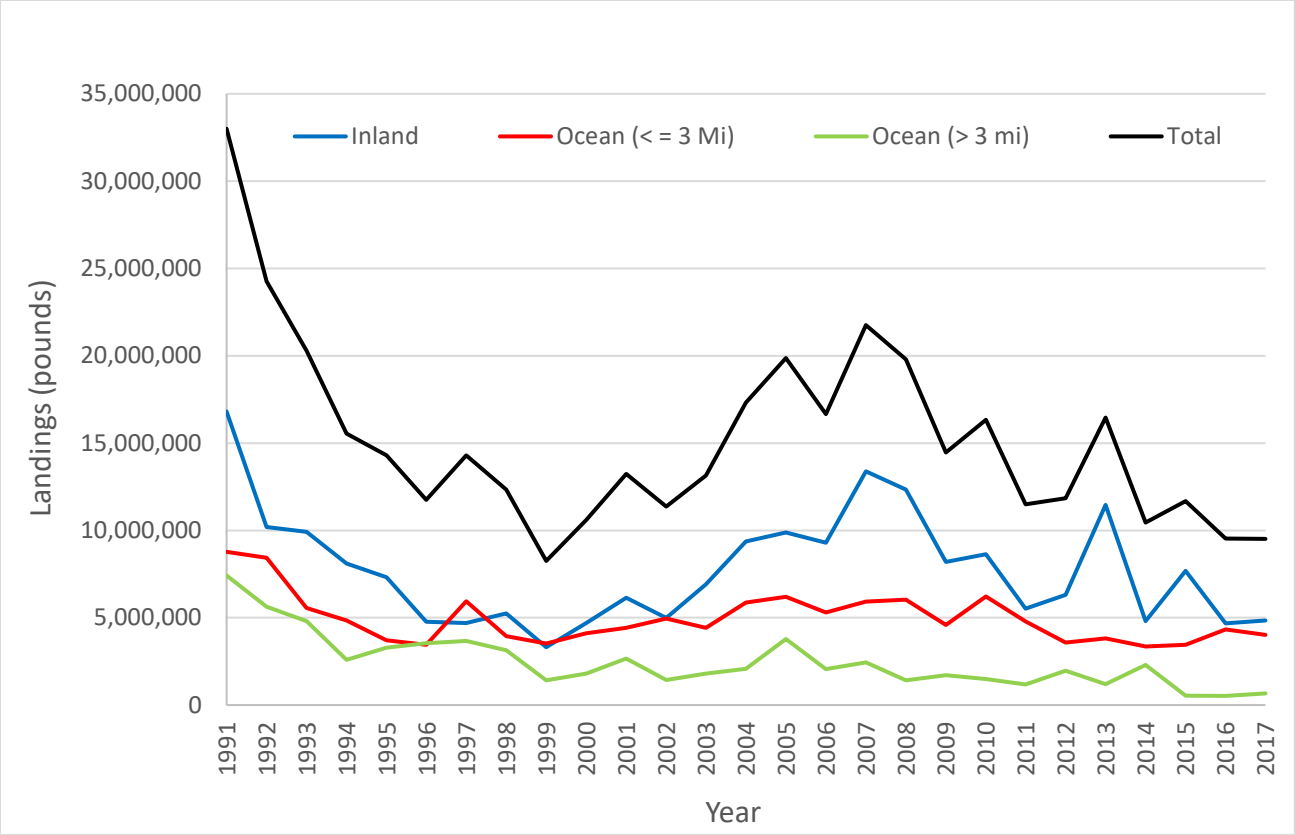


Figure 4. Bluefish landings (pounds) by recreational catch by area, Atlantic Coast, 1991-2017.

Commercial Fishery

Vessel and Dealer Activity

Federal permit data indicate that 2,510 commercial bluefish permits were issued in 2017.[2] A subset of federally-permitted vessels was active in 2017 with dealer reports identifying 611 vessels with commercial bluefish permits that actually landed bluefish. Of the 397 federally-permitted bluefish dealers in 2017, there were 158 dealers who actually bought bluefish.

Landings by Gear

Dealer data for 2017 indicate that the bulk of the bluefish landings were taken by gillnet (47 percent), followed by unknown gear (29 percent), handline (7 percent), otter trawl, bottom fish (10 percent), and pound net (4 percent).

[2]In addition, there were 897 party/charter bluefish permit issued in 2017. A subset of federally-permitted party/charter vessels was active in 2017 with VTR reports identifying 261 vessels with party/charter bluefish permits that actually landed bluefish.

Landings by Area

VTR data were also used to identify all NMFS statistical areas that accounted for 5 percent or more of the Atlantic bluefish catch or areas which individually accounted for 5 percent or greater of the trips which caught bluefish in 2017 (Table 4). Eight statistical areas accounted for approximately 86 percent of the VTR-reported catch in 2017. Statistical area 539 was responsible for the highest percentage of the catch, with statistical area 611 having the majority of trips that caught bluefish (Table 4). A map of the statistical areas that accounted for 5 percent or more of the Atlantic bluefish catch is shown in Figure 5.

Table 4. Statistical areas that accounted for at least 5 percent of the total Atlantic bluefish or 5 percent or greater of the trips which caught bluefish in 2017, with associated number of trips.

Statistical area	Pounds of bluefish caught	Percent of 2017 commercial bluefish catch	Number of trips	Percent of 2017 commercial bluefish trips that caught bluefish
539	351,538	20%	1166	18%
632	270,358	16%	33	1%
636	261,872	15%	79	1%
611	199,630	11%	1915	30%
612	186,976	11%	363	6%
613	95,171	5%	822	13%
635	88410	5%	127	2%
537	58,425	3%	589	9%

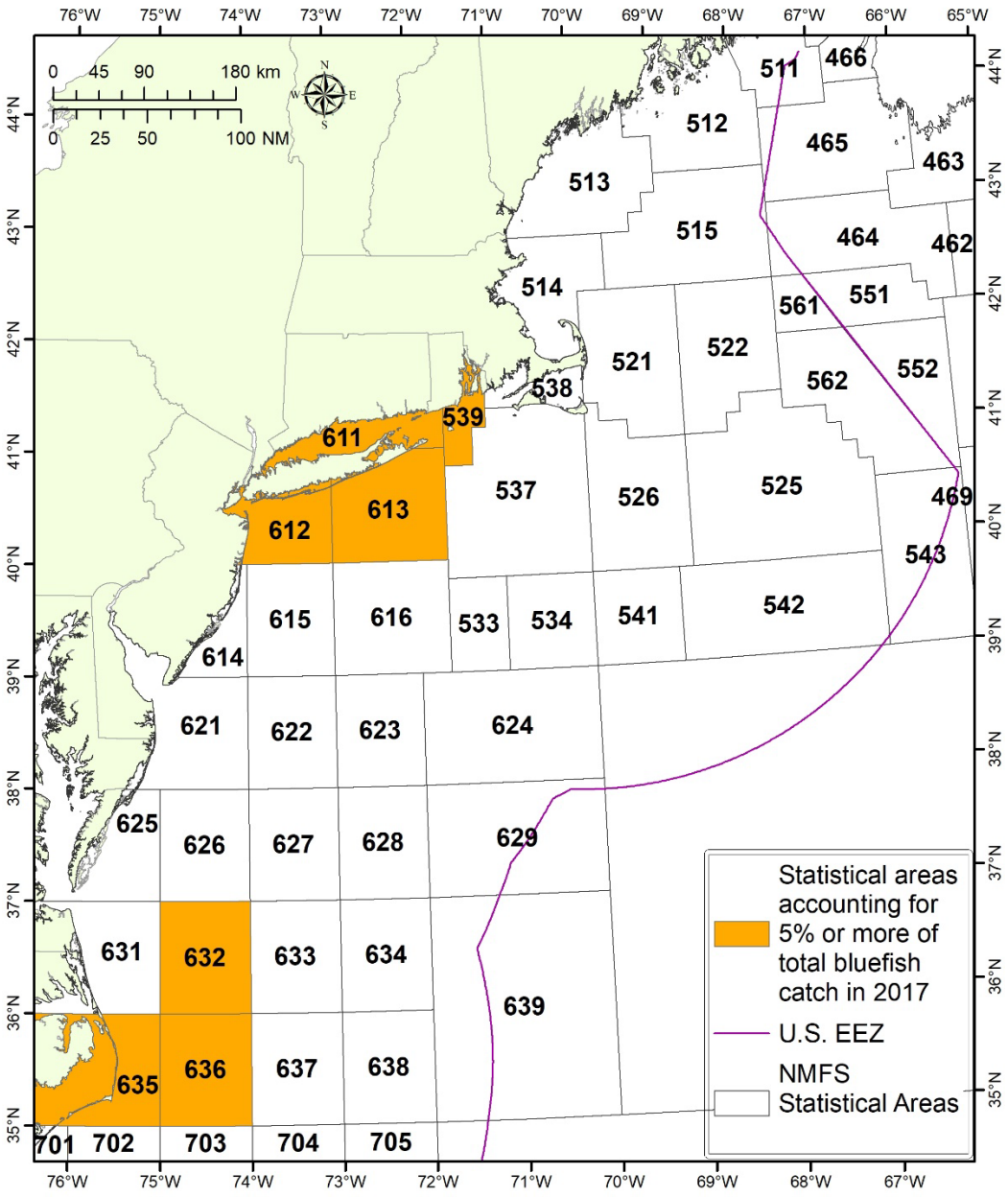


Figure 5. NMFS Statistical Areas, highlighting those that each accounted for 5% or more of the commercial bluefish catch in 2017.

The top commercial landings ports for bluefish in 2017 are shown in Table 5. Nine ports qualified as "top bluefish ports," i.e., those ports where 100,000 pounds or more of bluefish were landed. Wanchese, NC was the most important commercial bluefish port with over 700,000 pounds landed. The ports and communities that are dependent on bluefish are described in Amendment 1 to the FMP (available at http://www.mafmc.org/fisheries/fmp/bluefish). Additional information on "Community Profiles for the Northeast US Fisheries" can be found at http://www.nefsc.noaa.gov/read/socialsci/community_profiles/.

Table 5. Top ports of bluefish landings (in pounds), based on NMFS 2017 dealer data.

Port[a]	Pounds	% of total commercial bluefish landings	# vessels
Wanchese, NC	725,364	20%	36
Point Judith, RI	401,213	11%	122
Montauk, NY	331,895	9%	100
Hatteras, NC	302,256	8%	12
Little Compton, RI	202,097	6%	9
Point Pleasant, NJ	144,235	4%	29
Belford, NJ	123,619	3%	18
Engelhard, NC	114,913	3%	6
Greenport, NY	104,446	3%	1

[a] Since this table includes only the "top ports" (ports where landings of bluefish were > 100,000 pounds), it does not include all of the landings for the year.

Revenue

According to Dealer data, commercial vessels landed about 3.64 million pounds of bluefish valued at approximately $2.66 million in 2017. Average coastwide ex-vessel price of bluefish was $0.73 per pound in 2017, a 2% increase from the previous year (2016 price = $0.71 per pound). The relative value of bluefish is very low among commercially landed species, less than 1% of the total value, respectively of all finfish and shellfish landed along the U.S. Atlantic coast in 2017. A time series of bluefish revenue and price is provided in Figure 6.

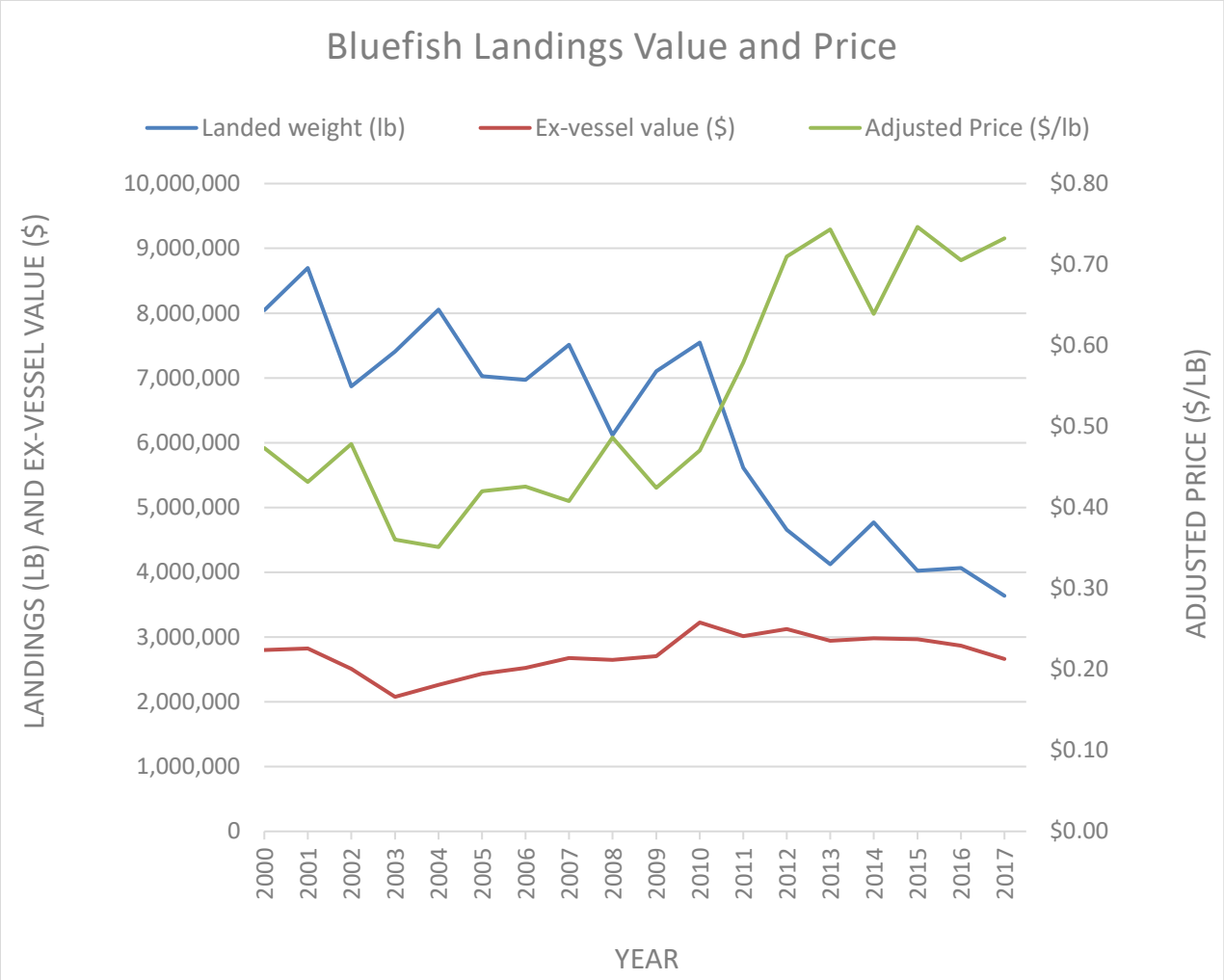


Figure 6. Landings, ex-vessel value, and price (adjusted to 2016 real dollars) for bluefish, 2000-2017.

Bycatch

The commercial fishery for bluefish is primarily prosecuted with gillnets and handlines, although there are other small localized fisheries, such as the beach seine fishery that operates along the Outer Banks of North Carolina that also catch bluefish. Many of these fisheries do not fish exclusively for bluefish, but target a combination of species including croaker, mullet, Spanish mackerel, spot, striped bass, and weakfish. Given the mixed-species nature of the bluefish fishery, incidental catch of non-target species is not directly attributable to the bluefish fishery.

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