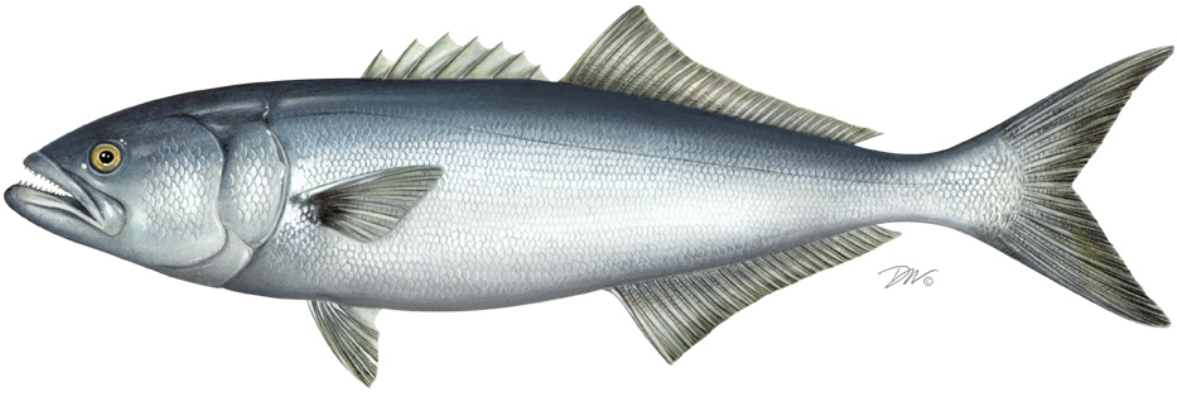
Atlantic States Marine Fisheries Commission

Amendment 2 to the Interstate Fishery Management Plan for Bluefish

Bluefish Allocation and Rebuilding Amendment



August 2021

(MAFMC Amendment approved by NOAA Fisheries on November 24, 2021)

Sustainable and Cooperative Management of Atlantic Coastal Fisheries

Amendment 2 to the Interstate Fishery Management Plan for Bluefish

Prepared by

Atlantic States Marine Fisheries Commission and
Mid-Atlantic Fishery Management Council Fishery Management Action Team

Fishery Management Action Team Members:
Mike Celestino, New Jersey Division of Fish and Wildlife
Dustin Colson Leaning, Atlantic States Marine Fisheries Commission
Cynthia Ferrio, National Marine Fisheries Service
Matthew Cutler, Northeast Fisheries Science Center
Ashleigh McCord, National Marine Fisheries Service
Danielle Palmer, National Marine Fisheries Service
Matthew Seeley (Chair), Mid-Atlantic Fishery Management Council
David Stevenson, National Marine Fisheries Service
Samantha Werner, Northeast Fisheries Science Center
Tony Wood, Northeast Fisheries Science Center

This is a report of the Atlantic States Marine Fisheries Commission pursuant to U.S. Department of Commerce, National Oceanic and Atmospheric Administration Award No. NA20NMF4740012.

EXECUTIVE SUMMARY

Statement of the Problem

At the December 2017 joint meeting, the Atlantic States Marine Fisheries Commission's Bluefish Board (Board) and the Mid-Atlantic Fishery Management Council (Council) initiated Amendment 2 to the Fishery Management Plan (FMP) for Bluefish to revisit commercial and recreational sector allocations, state commercial allocations, and provide an opportunity for stakeholders to provide input on areas of bluefish management that needed updating. During the Amendment's initial development, the 2019 operational assessment for bluefish indicated the stock was overfished, and developing a rebuilding plan became a top priority for inclusion in this Amendment.

Management Unit

Bluefish fisheries are managed cooperatively by the Commission in state waters (0-3 miles), and by the Council and NOAA Fisheries in federal waters (3-200 miles). The management unit for bluefish in U.S. waters is the western North Atlantic Ocean from Florida northward to the US-Canadian border.

Description of Resource

Bluefish are a migratory, pelagic species found throughout the world in most temperate coastal regions, except the eastern Pacific. Evidence from tagging studies suggests that bluefish form three distinct seasonal migratory groups. The first travels north to New England in the spring and summer as water temperatures rise and move south in autumn and winter to the South Atlantic Bight. A second group make the same north/south seasonal migration, but the migration is contained within the Mid-Atlantic Bight. The third group has an inshore-offshore migration along Florida's Atlantic coast. Interestingly, migration patterns appear to be size-related because bluefish generally school by size, with schools covering up to tens of square miles.

Bluefish are fast growers and opportunistic predators, feeding voraciously on almost any prey they can capture. Over 70 species of fish have been found in their stomach contents, including butterfish, mackerel, and lobster. Razor sharp teeth and a shearing jaw movement allow bluefish to ingest large parts, which increases the maximum prey size bluefish can catch. Bluefish live up to 12 years and may exceed 39 inches and 31 pounds. Bluefish reach sexual maturity at age two and spawn offshore from Massachusetts through Florida.

Description of Fishery

Bluefish are predominantly managed as a recreational fishery with an active but much smaller commercial fishery, with 86% of the acceptable biological catch (ABC) allocated to the recreational fishery and 14% to the commercial fishery. As bluefish migrate seasonally along the Atlantic coast, anglers from Maine to Florida target these voracious predators near inlets, shoals, and rips, where they come to feed on large schools of bait. The species' aggressive feeding behavior and the fight it puts up on the line make it a very popular sportfish. Recreational harvest peaked at 170 million pounds in 1981, but quickly declined in the 1980s

and 90s to its current ten year average recreational harvest of 26 million pounds. Recreational harvest from 2018-2020 are the lowest three years in the time series, a result of low availability and a reduced bag limit. Instead of landing bluefish for consumption, many anglers target bluefish for sport. Catching and releasing bluefish also contributes to fishing mortality because an estimated 15% of released bluefish don't survive. As a result, recreational dead discards comprise on average 22% of total recreational removals over the last ten years.

Commercial fishermen target bluefish using a variety of gears including trawls, gillnets, haul seines, and pound nets. Commercial landings decreased from 16.5 million pounds in 1981 to 7.1 million pounds in 1999. Since a state-specific quota system was implemented in 2000, commercial landings have averaged around 5.8 million pounds annually. 2020 marked a commercial landings time series low of 2.4 million pounds as a result of the reduced quota set in response to the overfished stock status. North Carolina, Rhode Island, and New York's commercial fisheries landed the most bluefish in 2020.

Goals and Objectives

The goals of Amendment 2 are to conserve the bluefish resource and provide fair and equitable access to the fishery across all user groups throughout the management unit by maintaining sustainable recreational fishing and commercial harvest. The goals are supported through the implementation of a rebuilding plan, promoting release practices that reduce mortality, effective coordination between agencies, compliance and enforcement, monitoring and data collection, and consideration of the needs and priorities of all stakeholders.

Stock Status

The 2019 Northeast Fisheries Science Center (NEFSC) bluefish operational stock assessment indicates the stock was overfished and overfishing was not occurring in 2018 relative to the biological reference points. Spawning stock biomass (SSB) was estimated at 200.7 million pounds, approximately 46% of its target and 92% of the threshold. Fishing mortality is estimated to be 0.146 in 2018, below the fishing mortality threshold (0.183). Although fishing mortality was below the threshold in 2018, fishing mortality exceeded the updated threshold every year from 1985 to 2017. Recruitment over the last decade has been below the time series average of 46 million fish, except for 2013 where recruitment was slightly above average. A research track stock assessment is scheduled for November of 2022

Monitoring Program Specifications

Quota Monitoring – States are required to maintain mandatory, trip-level reporting of all commercially harvested bluefish, with fishermen and dealers required to report standardized data elements for each trip by the 10th of each month. States are also required to monitor bluefish landings in order to maintain sustainable harvest and minimize the potential for quota overages. Recreational landings monitoring is conducted through the Marine Recreational Information Program.

Biological Data Collection – The states of Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Virginia, North Carolina, and Florida are required to collect a minimum of 100

bluefish ages with a target of collecting 50 from January through June and 50 from July through December. Age samples are primarily collected from fishery-dependent sources, although supplementary samples collected from fishery-independent sources are sometimes utilized as needed to fulfill this requirement.

Commercial and Recreational Allocation

The commercial and recreational bluefish fisheries are managed with sector-specific annual catch limits. This Amendment allocates 14% of the ABC to the commercial annual catch limit (ACL) and 86% to the recreational harvest limit (RHL).

Commercial Allocations to the States

The coastwide commercial quota for bluefish is managed with state-by-state quotas. Each state is allocated a 0.1% fixed minimum quota and the remainder of the coastwide quota is allocated based on a ten-year average of historic landings from 2009-2018. This Amendment phases-in the allocation changes over seven years in order to reduce short-term economic impacts to the affected commercial fishing industries. State commercial allocations will be reviewed by the Commission and Council within five years of implementation. The revised allocations are shown below:

State	2022	2023	2024	2025	2026	2027	2028
Maine	0.59%	0.51%	0.43%	0.35%	0.27%	0.19%	0.11%
New Hampshire	0.39%	0.36%	0.33%	0.30%	0.27%	0.24%	0.22%
Massachusetts	7.20%	7.69%	8.17%	8.66%	9.14%	9.63%	10.12%
Rhode Island	7.21%	7.61%	8.01%	8.41%	8.81%	9.21%	9.61%
Connecticut	1.24%	1.22%	1.19%	1.16%	1.14%	1.11%	1.09%
New York	11.72%	13.06%	14.40%	15.74%	17.08%	18.42%	19.76%
New Jersey	14.68%	14.54%	14.40%	14.26%	14.12%	13.98%	13.85%
Delaware	1.68%	1.48%	1.29%	1.09%	0.89%	0.69%	0.49%
Maryland	2.85%	2.69%	2.54%	2.38%	2.23%	2.07%	1.92%
Virginia	11.02%	10.16%	9.30%	8.44%	7.58%	6.72%	5.87%
North Carolina	32.06%	32.05%	32.05%	32.04%	32.04%	32.03%	32.03%
South Carolina	0.04%	0.05%	0.06%	0.07%	0.08%	0.09%	0.10%
Georgia	0.02%	0.04%	0.05%	0.06%	0.08%	0.09%	0.10%
Florida	9.31%	8.55%	7.80%	7.04%	6.29%	5.53%	4.78%
Total*	100.01%	100.01%	100.02%	100.00%	100.02%	100.00%	100.05%

Rebuilding Plan

This Amendment implements a rebuilding plan that uses a constant fishing mortality model to rebuild the stock in seven years. Management track assessments will be conducted every two years to reassess the bluefish stock. Following the release of management track assessments, the biological reference points will shift and rebuilding projections will be rerun to reflect the updated status of the stock. The seven year constant fishing mortality rebuilding plan specifies that the fishing mortality rate be set constant across the remaining duration of the rebuilding

period every time projections are rerun, with a rebuilding date set for 2028. Council and Commission staff will work with the NOAA Fisheries Greater Atlantic Region Fisheries Office and the Council's Scientific and Statistical Committee (SSC) to identify how these new projections will be translated into future specifications.

Quota Transfer
Each year during the setting or review of ACLs, the Council and Board have the ability to recommend a transfer of quota between the recreational and commercial sectors, affecting the final commercial quota and RHL. The Council and Board can recommend a transfer from the commercial fishery to the recreational fishery or from the recreational fishery to the commercial fishery. Any transfer from one sector to the other is capped at 10% of the ABC.

Management Uncertainty
This Amendment modifies the management uncertainty tool within the fishery management plan to a sector-specific approach. It allows the Council and Board to apply a buffer to either sector, in the form of a quota reduction, to account for management uncertainty during specifications. This modified approach allows managers to better target areas of uncertainty within one sector without reducing the quota or harvest limit in the other sector.

This change necessitated adjustments to the specifications process by establishing ACLs for each sector and allowing for sector-specific reductions for management uncertainty to calculate the recreational and commercial annual catch targets. The revised flowchart is displayed in Figure 12 (page 42).

Other Management Measures
This Amendment does not completely replace Amendment 1 to the Bluefish FMP, nor does it list the comprehensive set of management measures. For example, permit requirements for commercial and party/charter vessels may be found in Section 3.1.1.3 of Amendment 1. In addition, the Council has implemented several Amendments and Frameworks, which contain pertinent details on the joint management of bluefish. A complete list of federal Amendments and Frameworks with links to the management documents may be found here.

Implementation Schedule
This Amendment will be effective January 1, 2022.

TABLE OF CONTENTS

1.0 INTRODUCTION

Bluefish (*Pomatomus saltatrix*) fisheries are managed under the Bluefish Fishery Management Plan (FMP) that was prepared cooperatively by the Mid-Atlantic Fishery Management Council (Council) and the Atlantic States Marine Fisheries Commission (ASMFC or Commission). The Commission, under the authority of the Atlantic Coastal Fisheries Cooperative Management Act, is responsible for managing bluefish in state waters (0-3 miles). The Council develops regulations for federal waters (3-200 nautical miles from shore), with final review and approval conducted by NOAA Fisheries.

1.1 BACKGROUND INFORMATION

In December 2017, the Board and Council initiated development of Amendment 2 to revisit commercial and recreational sector allocations as well as other management issues in the Bluefish FMP. An initial round of scoping was conducted in the summer of 2018 to gather public input on topics of interest for bluefish management. After initial scoping, the 2019 bluefish operational assessment incorporated the recalibrated Marine Recreational Information Program (MRIP) recreational catch estimates and the updated biological reference points indicated bluefish were overfished. Given the overfished designation, the Board and Council recommended including the rebuilding plan into Amendment 2.

The Board and Council approved the Supplemental Scoping and Public Information Document for public comment in December 2019. Eleven scoping hearings were held from Massachusetts through Florida between February and March 2020 to solicit public input. The hearings were attended by approximately 208 people and public comment was provided by 159 individuals and organizations in person at the hearings or in writing.

Based on the summary of public input, comments from the Advisory Panels (APs), and recommendations from the Fishery Management Action Team (FMAT), the Board and Council supported reviewing and potentially revising several management issues including 1) FMP goals and objectives, 2) the allocation of quota between the commercial and recreational sectors, 3) commercial allocations to the states, 4) a rebuilding plan for the overfished stock, 5) allocation transfers between sectors, 6) regional commercial allocations, 7) state-to-state transfers of commercial quota, and 8) separate allocations for the for-hire and private sectors of the recreational fishery.

At the August 2020 joint meeting, the Board and Council determined that revisions to the state-to-state quota transfer process and exploration of separate allocations for the for-hire and private sectors of the recreational fishery should be removed from consideration in this Amendment. ASMFC Administrative Commissioners agreed that communication and cooperation between states could improve upon inefficiencies in the commercial quota transfer process that had proved challenging for some states. The Board and Council also recommended that the Recreational Reform Initiative would be better suited to address the for-hire sector separation issue, especially because this issue was simultaneously under consideration for the Summer Flounder, Scup, and Black Sea Bass FMP as well. At the October 2020 joint meeting,

the Board and Council decided to remove consideration of regional commercial allocations when several concerns regarding state autonomy and flexibility were raised.

In October 2020, the Board and Council took final action on Amendment 2 on the following issues:

1. FMP Goals and Objectives *Section 2.5*
2. Commercial and Recreational Allocation *Section 4.1*
3. Commercial Allocations to the States *Section 4.2*
4. Rebuilding Plan *Section 4.3*
5. Quota Transfers *Section 4.4*
6. Management Uncertainty *Section 4.5*

1.1.1 Statement of Problem

1.1.1.1 Bluefish Commercial/Recreational Allocation

In 2000, Amendment 1 established an 83% allocation of total allowable landings (TAL) to the recreational sector and a 17% allocation to the commercial sector based on landings data from 1981-1989. In 2011, the Council Amendment to the Bluefish FMP changed the plan from a landings-based allocation to a catch-based allocation with the establishment of an annual catch limit (ACL), which replaced the TAL. This was done to increase sector accountability for discards.

In July 2018, MRIP released a revised time series of catch and harvest estimates based on adjustments to its angler intercept methodology (used to estimate catch rates) and its effort estimation methodology (namely, a transition from a telephone-based effort survey to a mail-based effort survey). These revisions resulted in much higher recreational catch estimates compared to previous estimates, affecting the entire time series of data going back to 1981. The 2018 MRIP recalibration increased recreational catch estimates from 1985-2017 by an average of 116% (from 29.9 million lb to 64.6 million lb), ranging from +63% in 1986 to +291% in 2017.

The recreational data revisions not only impacted catch accounting, but also significantly affected the understanding of the population level for the bluefish stock. Due to the fixed commercial/recreational allocation percentages defined in the FMP, the allocation percentages in the FMP did not reflect the revised understanding of recent and historic proportions of catch and landings from the two sectors. As such, the Board and Council determined to review whether the allocations were still appropriate and meeting the objectives of the FMP.

1.1.1.2 Commercial Allocations to the States

Amendment 1 established commercial state allocations of quota based on 1981-1989 landings data. Since then, several states consistently requested transfers of quota from other states that did not fully utilize their commercial allocation. This suggested the state commercial allocations were not meeting the needs of all states' commercial fisheries. These allocations were reevaluated and compared to more recent years of data to determine an equitable and economically efficient distribution of quota across states.

1.1.1.3 Rebuilding Plan

The 2019 operational assessment for bluefish indicated that the stock is overfished, but overfishing was not occurring in 2018. The incorporation of revised MRIP estimates impacted the estimated stock biomass, the biological reference points, and resulting catch limits. However, the revised MRIP data were one of several factors that influenced the overfished designation and the resulting catch limits. For example, almost all indices of abundance showed a decrease from 2017 to 2018. The Magnuson-Stevens Fishery Conservation and Management Act (MSA) requires that the Council implement a rebuilding plan within two years of the overfished designation. The MSA requires the Council to implement regulations consistent with the plan to rebuild the stock biomass back to the biomass target. As such the Council and the Board were required to develop a plan to rebuild the stock as fast as possible, while taking into consideration the socioeconomic impacts of rebuilding on the bluefish fisheries.

1.1.1.4 Quota Transfers

Quota transfers are a frequently utilized management tool that offers the potential for increased fishing opportunities for the commercial or recreational sectors. Amendment 1 established the ability to transfer quota, subject to a 10.5 million lb cap, from the recreational sector to the commercial sector. The decision to transfer quota and the size of the transfer is considered annually through the specifications setting process (i.e., the annual process of setting or reviewing catch and landings limits for the upcoming fishing year). During the amendment scoping process, the Board and Council received several comments in support of changing the one-way transfer of quota into a bi-directional option to also allow for transfers of quota from the commercial sector to the recreational sector. The sector transfer cap was reevaluated to ensure its applicability to a bi-directional transfer. Stakeholders have expressed a desire for an updated transfer process that provides an expedient response to a potential future pressing need for increased recreational fishing opportunities.

1.1.1.5 Management Uncertainty

The Monitoring Committee (MC) annually identifies and reviews the relevant sources of management uncertainty in the commercial and recreational bluefish fisheries. Upon determining sources of uncertainty, the MC can recommend that the Board and Council revise down the annual catch target (ACT) through the specifications process. In effect, this provides a buffer to reduce the probability of overfishing. Prior to Amendment 2, the Bluefish FMP did not allow for a targeted application of management uncertainty to one specific sector. Instead uncertainty was applied indiscriminately to both the recreational and commercial sectors.

1.1.2 Benefits of Implementation

Amendment 3 contains a management program that takes into consideration changes in bluefish abundance, distribution, and the health of the stock. Reevaluation of bluefish management processes helps to ensure fair and equitable access to all fishery participants. In addition, the implementation of the rebuilding plan promotes sustainable use of the bluefish resource moving forward.

1.1.2.1 Ecological Benefits

Bluefish are opportunistic feeders that inhabit a key ecological role in the coastal marine food chain. Bluefish will often feed on schools of forage fish including menhaden, herring, and weakfish, but are also preyed upon by larger predators at all life stages. Commercially and recreationally important species such as striped bass, summer flounder, and tuna as well marine mammals frequently feed upon adult bluefish. Rebuilding the stock back to its target level will help to ensure that bluefish maintain their ecological role.

1.1.2.2 Social and Economic Benefits

Recreational and commercial fisheries for bluefish extend along the entire Atlantic coast. Despite bluefish's historic low price per pound, there are several commercial fishing ports that rely on bluefish landings as an important source of revenue. While bluefish are not often described as a primary target species for the for-hire recreational industry, many for-hire captains from the Mid-Atlantic region will assert that bluefish are an important "fallback" species that will help to save a charter trip when other fish are not biting. Bluefish also provide cultural value to the many private anglers that target bluefish from the shore and piers along the coast. Addressing the revised MRIP information, recent fishing trends, and the needs of the commercial and recreational fisheries to inform the allocation between the two sectors and the allocations between states may enhance social and economic benefits by increasing economic returns and increasing access to the bluefish resource. This in turn could increase resilience in fishery-dependent communities along the Atlantic coast.

1.2 DESCRIPTION OF THE RESOURCE

Bluefish are a migratory, pelagic species found throughout the world in most temperate coastal regions, except the eastern Pacific. In the western North Atlantic, the population ranges from Nova Scotia to Florida. Bluefish travel in schools of like-sized individuals and undertake seasonal migrations, moving into the Mid-Atlantic Bight (MAB) during the spring, and south or farther offshore during the 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). Bluefish live to age 12 or greater (Salerno et al. 2001), and may reach a length of 3.5 ft, and a weight of 27 lb (Bigelow and Schroeder 2002).

Bluefish eat a wide variety of prey. The species has been described by Bigelow and Schroeder (2002) 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. More recent studies suggest that spawning is a single, continuous event, but natural mortality increases during the middle portion of the spawning period resulting in the appearance of a split season. As a result of the bimodal size structure of juveniles, young are referred to as the spring-spawned cohort or summer-spawned cohort. In the MAB, the spring cohort appears to be the primary source of fish that recruit into the adult population.

In August 2019, a bluefish operational assessment, which included revised bluefish MRIP estimates, changed the stock status and biological reference points from the 2015 benchmark stock assessment. The updated biological reference points for bluefish include a fishing mortality threshold of $F_{MSY} = F_{35\%}$ (as the F_{MSY} proxy) = 0.183, and a biomass reference point of $SSB_{MSY} = SSB_{35\%}$ (as the SSB_{MSY} proxy) = 438.10 million lbs (198,717 mt). The minimum stock size threshold (1/2 SSB_{MSY}), is estimated to be 219.05 million lbs (99,359 mt). SSB in 2018 was 200.71 million lbs (91,041 mt) (Figure 1).

Operational assessment results indicate that the bluefish stock was overfished and overfishing was not occurring in 2018 relative to the biological reference points. Fishing mortality (*F*) on the fully selected age 2 fish was 0.146 in 2018, 80% of the updated *F* threshold reference point (Figure 2). There is a 90% probability that *F* in 2018 was between 0.119 and 0.205.

The bluefish stock has experienced a decline in SSB over the past decade, coinciding with an increasing trend in F. Recruitment has remained fairly steady, fluctuating just below the time-series mean of 46 million fish. Both commercial and recreational fisheries had poor catch in 2016 (44.91 million lbs or 20,370 mt), and 2018 (24.89 million lbs or 11,288 mt), resulting in the second lowest and lowest catches on record, respectively. As a result of the very low catch in 2018, fishing mortality was estimated below the reference point for the first time in the time-series. These lower catches are possibly a result of availability. Anecdotal evidence suggests larger bluefish stayed offshore and remained inaccessible to most recreational fishery participants during the past two years (NEFSC 2019).

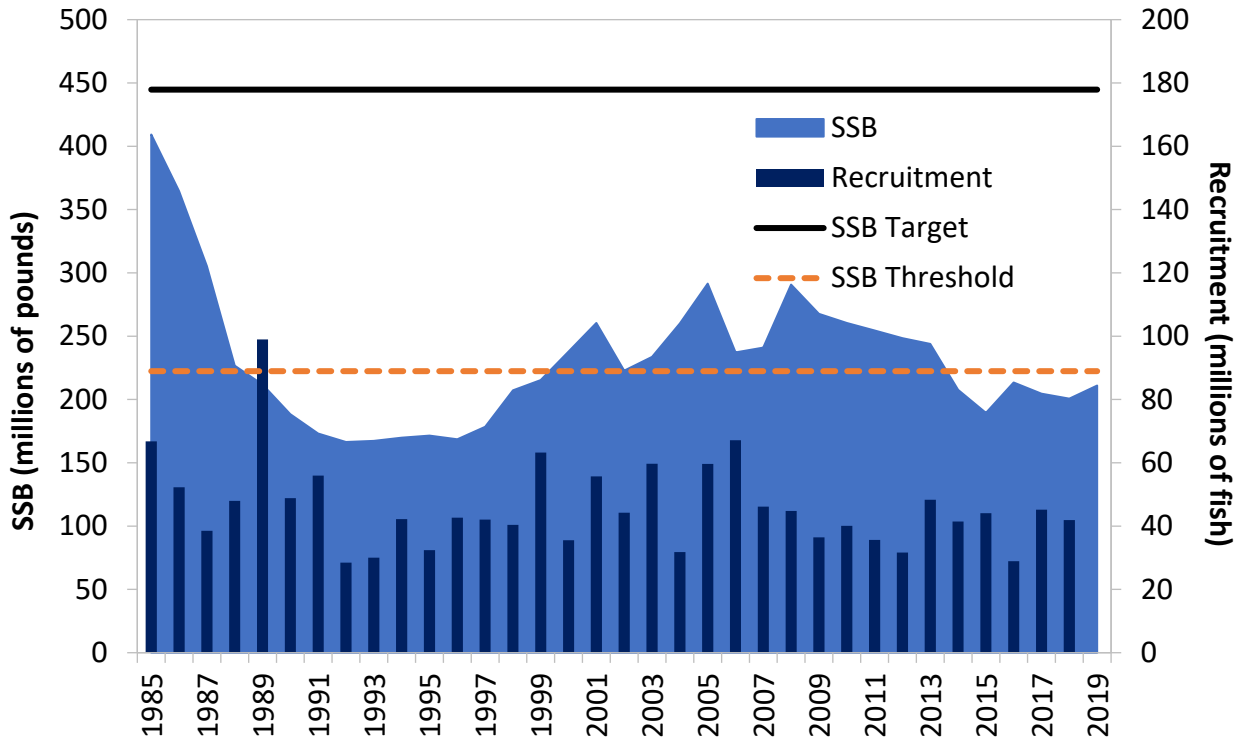


Figure 1. Bluefish spawning stock biomass and recruitment at age 0 by calendar year. The yellow horizontal dashed line is the updated biomass target $SSB_{MSY\ proxy}$ = $SSB_{40\%}$ = 198,717 mt, and the dotted black line is the $SSB_{Threshold}$ = 99,359 mt. Source: 2019 Bluefish Operational Stock Assessment, NEFSC.

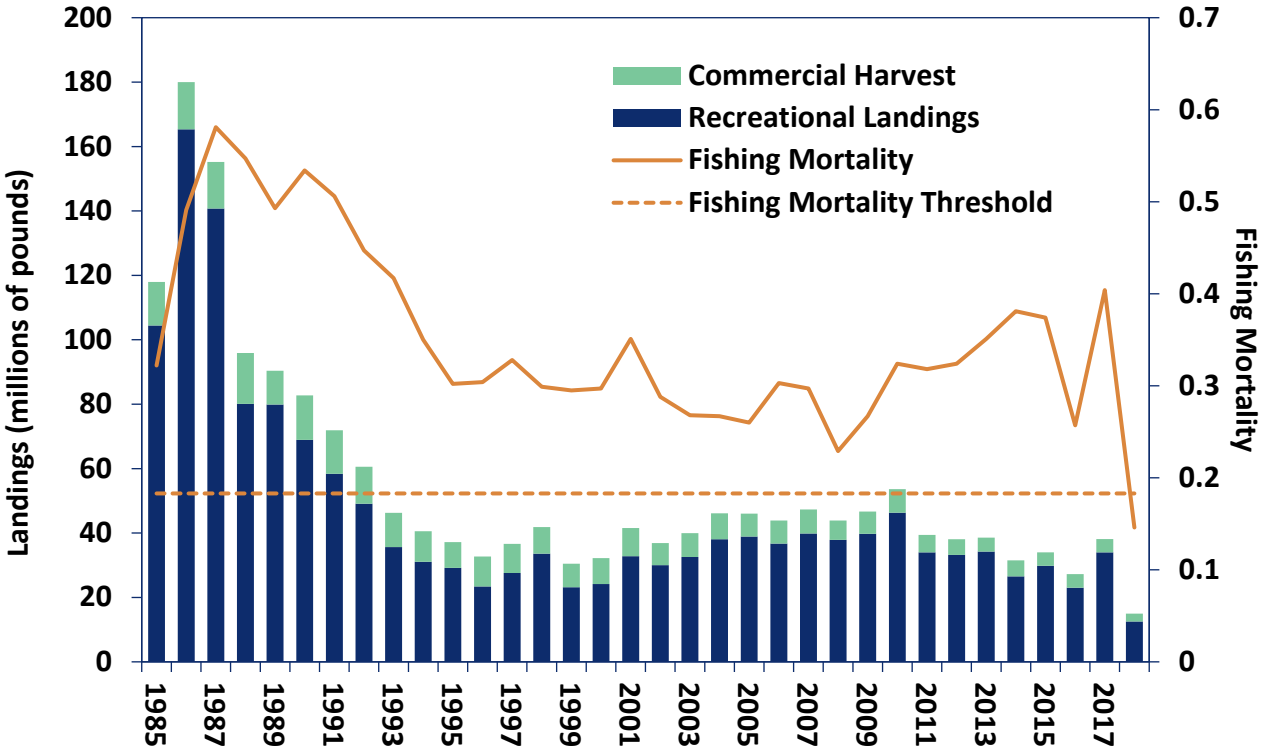


Figure 2. Commercial and recreational landings and fishing mortality for bluefish. The horizontal dashed line is the updated F_{MSY} proxy = $F_{35\%}$ = 0.183. Source: 2019 Bluefish Operational Stock Assessment, NEFSC.

1.3 DESCRIPTION OF THE FISHERIES

Bluefish are targeted by commercial and recreational fishermen[1] throughout Southern New England, the Mid-Atlantic, and the South Atlantic. The commercial and recreational fisheries in each state are driven by the seasonal availability of bluefish. During the summer, concentrations of bluefish are found in waters from Maine to Cape Hatteras, North Carolina. During winter's colder months they tend to be offshore between Cape Hatteras and Florida. Data for commercial landings, recreational landings, and recreational dead discards are available back to 1981. Dead discards are considered negligible within the commercial fishery, and as such, are assumed to be zero for the purposes of this Amendment. Bluefish are predominately a recreational fishery with recreational landings accounting for 73% of the total catch by weight since 1981, with recreational dead discards accounting for 13%, and commercial landings about 14%. Over the more recent time period of 2015-2019, the comparable percentages are 69% recreational landings, 20% recreational dead discards, and 11% commercial landings (Figure 3).

[1] The term fishermen in this document is used to describe both men and women who fish.

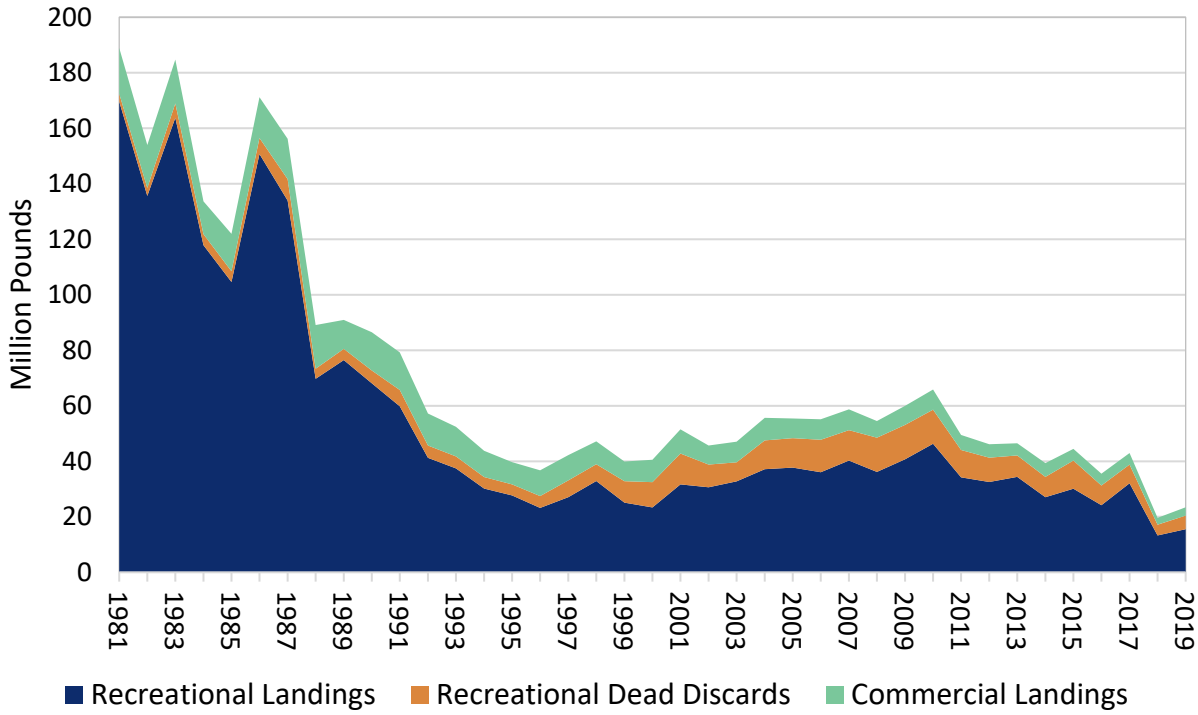


Figure 3. Commercial and recreational bluefish landings and recreational dead discards, 1981-2019. Source: ACCSP Data Warehouse.

Bluefish Commercial Fishery

The commercial quota is divided among the states based on the allocation percentages established in the FMP. States set measures to achieve their state-specific commercial quotas. In 2019, commercial fishermen landed 2.99 million pounds of bluefish, about 39% of the total commercial quota of 7.71 million pounds. Over the past two decades, total bluefish ex-vessel revenue ranged from a low of $1.9 million in 2000 to a high of $3.5 million in 2015. Total ex-vessel value in 2019 was $2.37 million, resulting in an average price per pound of $0.85. In general, the price of bluefish tends to be lower when landings are higher, and vice versa. This relationship is not linear and many other factors besides landings also influence price. The highest average price per pound over the past two decades was $0.95 in 2018, and the lowest average price per pound was $0.35 in 2004. All revenue and price values were adjusted to 2019 dollars to account for inflation (Figure 4).

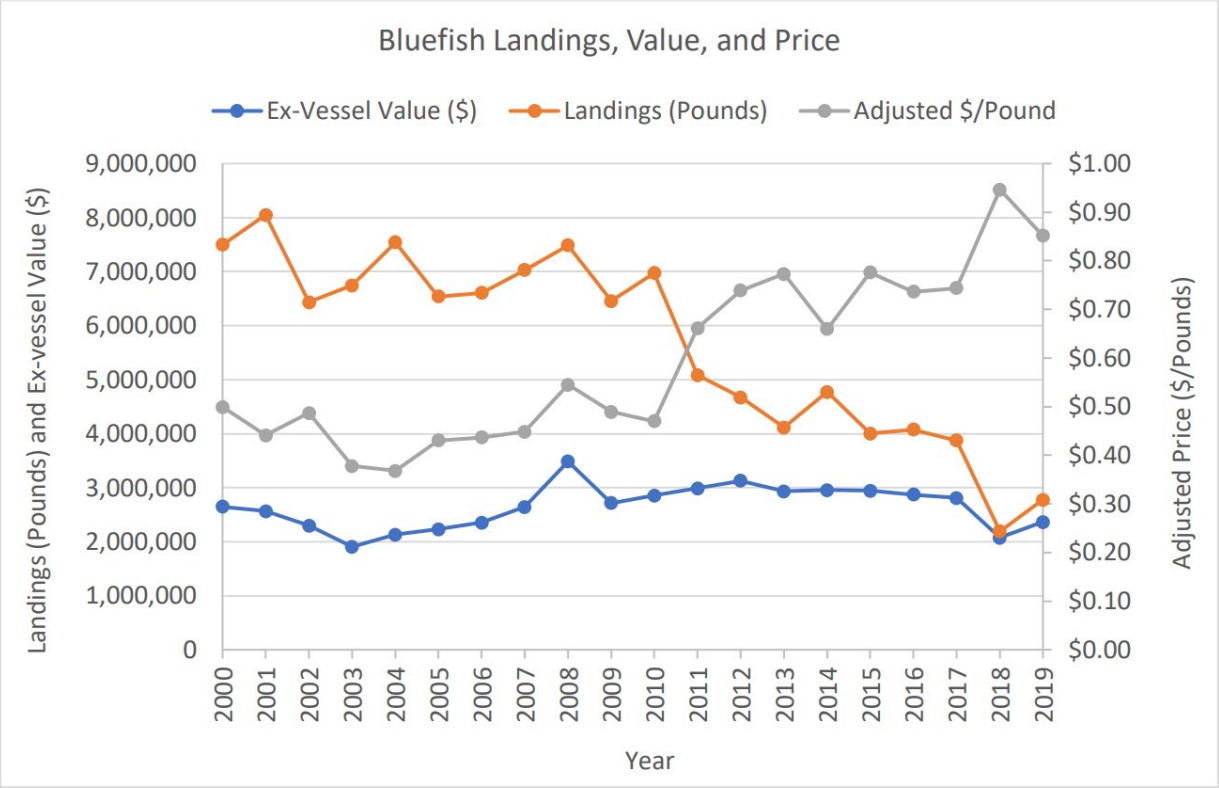


Figure 4. Landings, ex-vessel value, and price for bluefish landed on the Atlantic coast, 2000-2019. Ex-vessel value and price are inflation-adjusted to 2019 dollars using the Gross Domestic Product Price Deflator. Source: Unpublished NOAA Fisheries commercial fish dealer data (i.e., "DERS"), which include both state and federal dealer data).

Table 1 shows commercial landings of bluefish by state in 2015-2019. State landings have decreased in recent years, which is most likely attributable to low availability due to the overfished stock status. North Carolina comprises the majority contribution to the coastwide total landings with New York, Rhode Island, New Jersey, Massachusetts, and Florida comprising the bulk of the remaining landings in that order. Commercial bluefish landings from Maine, New Hampshire, South Carolina, and Georgia are confidential and are not displayed in the table. The landings from these states are also minimal, if they occur at all.

Table 1. State Commercial Bluefish Landings in lbs. (2015-2019). C = confidential data Source: ACCSP Data Warehouse, which includes both state and federal dealer data.

State	2015	2016	2017	2018	2019
Maine	C	C	C	C	C
New Hampshire	C	C	C	C	C
Massachusetts	600,883	499,627	364,862	195,378	184,171
Rhode Island	514,223	463,419	647,257	237,121	415,809
Connecticut	40,305	68,290	42,023	54,239	35,551
New York	954,419	917,279	717,559	538,168	594,842
New Jersey	710,610	669,316	305,552	56,206	203,272
Delaware	72,664	15,667	12,317	6,070	17,166
Maryland	94,376	66,720	39,997	18,985	22,776
Virginia	192,317	199,281	195,349	96,165	124,681
North Carolina	804,094	1,148,643	1,544,037	910,262	1,107,902
South Carolina	C	C	C	C	C
Georgia	C	C	C	C	C
Florida	240,463	240,976	266,728	316,425	284,696
Total	4,225,548	4,289,429	4,135,725	2,429,191	2,866,208

VTR data suggest that NOAA Fisheries statistical areas 611, 539, 613, 626 and 632 were responsible for the largest percentage of commercial bluefish catch in 2019. Statistical area 611, within the Long Island Sound, had the highest number of trips which caught bluefish (Table 2; Figure 5).

Table 2. Statistical areas which accounted for at least 5% of the total commercial bluefish catch (by weight) in 2019, with associated number of trips. Source: Unpublished NOAA Fisheries dealer data (i.e., "AA tables", which include both state and federal dealer data).

Statistical area	% of 2019 commercial bluefish catch	Number of trips
611	18%	1,667
539	18%	1,051
613	14%	727
626	9%	84
632	6%	27

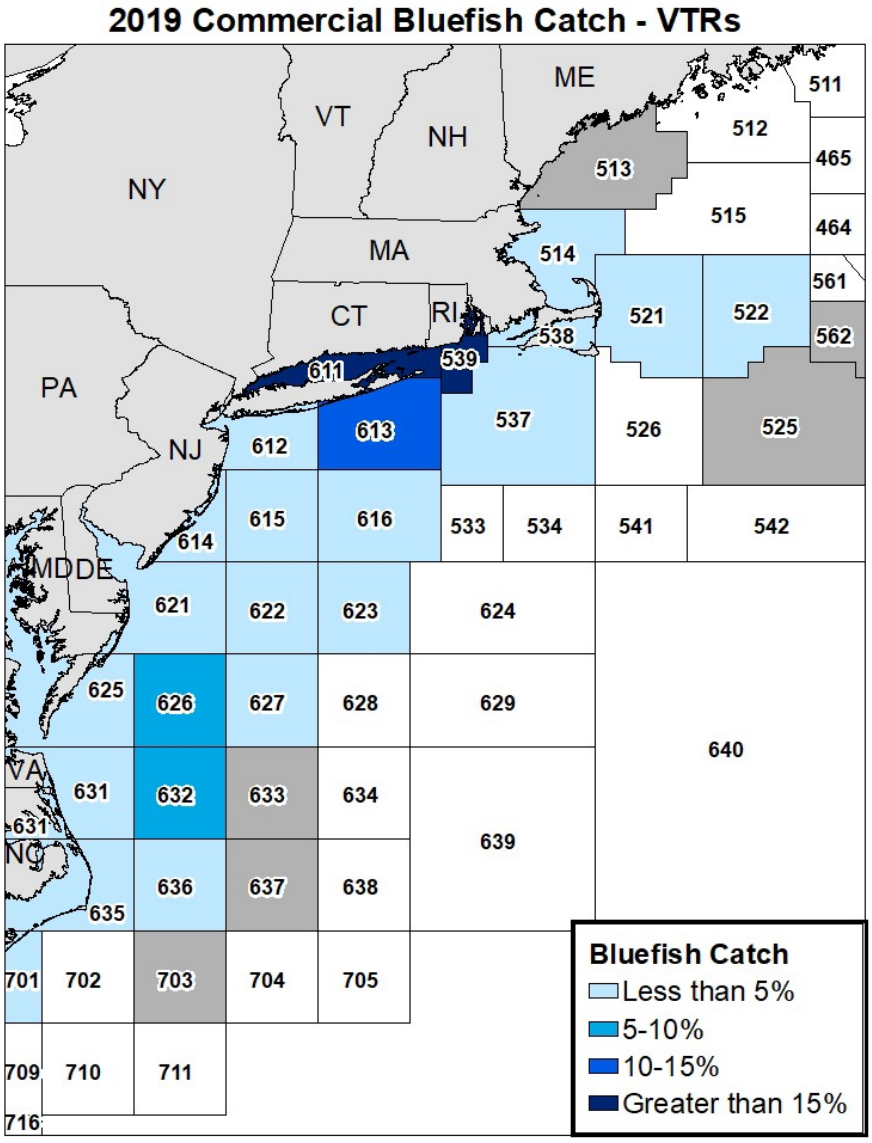


Figure 5. Proportion of bluefish catch by statistical area in 2019 based on federal VTR data. Statistical areas marked "confidential" are associated with fewer than three vessels and/or dealers. Statistical areas with confidential data collectively accounted for less than 1% of commercial catch reported on VTRs in 2019. Source: Unpublished NOAA Fisheries Vessel Trip Report data.

The commercial bluefish fishery in state and federals waters is predominantly a gill net fishery. On average about 59% of the commercial bluefish landings (by weight) reported by state and federal dealers were caught with gill nets over the period 2000 to 2019. Over the same period, trawls accounted for about 10% of landings, hook and line accounted for 6% of landings, pound nets accounted for 6% of landings, and seines accounted for 1% of landings, while all other gear types accounted for 2% or less of the commercial bluefish landings. Sixteen percent of landings

reported by dealers during 2000 to 2019 were of an unknown gear type (Figure 6). Many of the commercial fisheries do not fish exclusively for bluefish, but instead target a combination of species including croaker, mullet, Spanish mackerel, spot, striped bass, and weakfish.

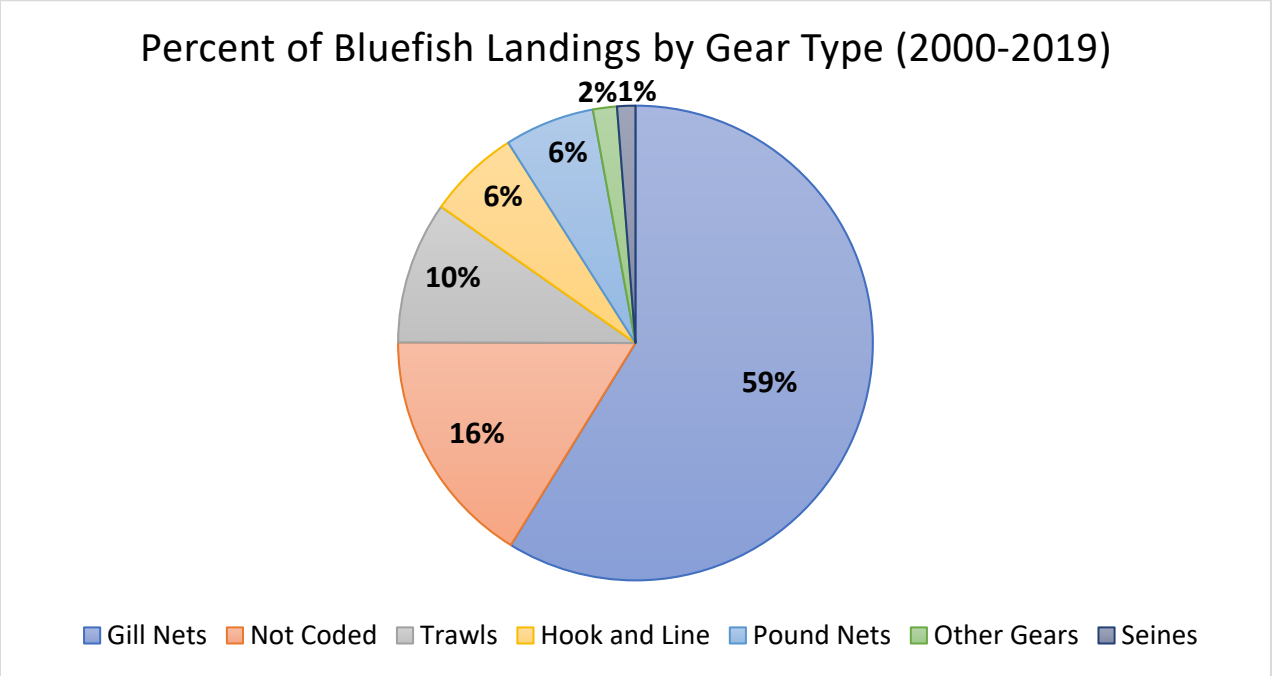


Figure 6. Proportion of bluefish caught by gear type over the period 2000-2019. Source: ACCSP Data Warehouse

At least 100,000 pounds of bluefish were landed by commercial fishermen in 6 ports in Rhode Island, New York and North Carolina in 2019. These ports accounted for approximately 72% of all 2019 commercial bluefish landings. Hatteras, North Carolina was the leading port, both in terms of landings and number of vessels landing bluefish (Table 3).

Table 3. Ports reporting at least 100,000 pounds of commercial bluefish landings in 2019, based on dealer data.

Port	Bluefish landings (lb)	% of total commercial bluefish landings	Number of vessels landing bluefish
Hatteras, NC	393,056	28%	127
Point Judith, RI	283,941	21%	76
Wanchese, NC	273,277	10%	36
Montauk, NY	269,418	7%	52
Hampton Bays, NY	147,959	4%	19
Little Compton, RI	111,107	2%	7

Bluefish Recreational Fishery

NOAA Fisheries has conducted recreational fishing surveys since 1979 to obtain estimates of participation, effort, and catch by recreational anglers in marine waters. Prior to 2004, recreational data were generated by the Marine Recreational Fishery Statistics Survey (MRFSS). Recreational data for 2004 and later are available from MRIP. Note that MRIP has recently undergone major changes in its collection of effort data[2], as well as changes to its angler intercept methods for private boat and shore anglers.[3] As such, major changes to the time series of recreational catch and landings were released in July 2018. A more detailed description of the revisions to the MRIP sampling methodology may be found in *Section 1.1.1.1*.

The 2018 MRIP recalibration increased recreational catch estimates from 1985-2017 by an average of 116% (from 29.9 million lb to 64.6 million lb), ranging from +63% in 1986 to +291% in 2017 (NEFSC 2019). The revised MRIP data is used in describing the characteristics of the bluefish recreational fishery in the paragraphs below.

Bluefish are a migratory species that school by size. Schools of bluefish can extend over a kilometer, often pursuing schools of baitfish. Bluefish abundance is also tied to season. The majority of recreational bluefish catch occurs in Florida during the winter, followed by North Carolina in the spring, then New York and New Jersey in the summer, and North Carolina again in the fall. However, bluefish can be unpredictable and their north/south and inshore/offshore migration patterns can vary year to year.

From 1981-2019, recreational catch and landings of bluefish on the Atlantic coast peaked in 1981 at 75.76 million (catch) and 65.35 million (landings) fish. Recreational catch was lowest in 1995 with an estimated 25.08 million bluefish were caught, but landings reached a time series low in 2018 when only 10.25 million bluefish were landed. Recreational anglers along the Atlantic coast from Maine through Florida caught an estimated 38.63 million bluefish and landed 12.14 million bluefish (about 15.56 million pounds) in 2019 (Table 4).

Bluefish are one of the most popular sport fish along the Atlantic coast. While many anglers do catch bluefish for consumption, many others do not due to its strong flavor and its tendency to spoil quickly. The digestive enzymes of bluefish are powerful, and their meat can go bad if not put on ice or cooked soon after capture. Approximately 65% of total recreational catch is comprised of releases in numbers of fish for the period 2010 to 2019. Scientific studies indicate that on average 15% of recreationally released bluefish die, which means that recreational dead discards have accounted for approximately 21% of the total recreational catch in weight over the same period.

Based on MRIP estimates, about 60% of recreational bluefish landings (in numbers of fish) in 2019 were from anglers fishing from shore, approximately 36% were from anglers fishing on

[2] See https://www.fisheries.noaa.gov/recreational-fishing-data/effort-survey-improvements

[3] See https://www.fisheries.noaa.gov/event/access-point-angler-intercept-survey-calibration-workshop

private or rental boats, and about 4% were from anglers fishing from party or charter boats (Figure 7).

The majority of recreational bluefish harvest occurs in state waters when the fish migrate inshore. Between 2017 and 2019, about 97% of recreational bluefish landings (in numbers of fish) occurred in state waters and about 3% occurred in federal waters (Figure 8). During this same time period New York (20.2%), New Jersey (14.4%), North Carolina (25.5%), and Florida (16.6%) have comprised the majority (78.7%) of the total coastwide landings in numbers of fish (Table 5).

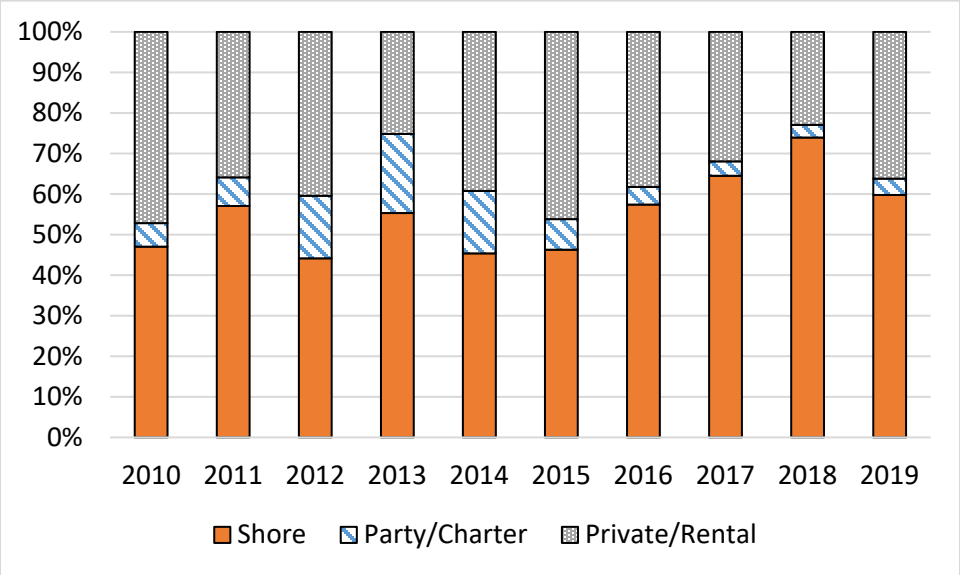


Figure 7. The percent of bluefish harvested by recreational fishing mode in numbers of fish, Maine through Florida, 2010-2019. Source: Personal Communication with the National Marine Fisheries Service, Fisheries Statistics Division, December 31, 2020

Table 4. Recreational bluefish landings, catch, and mean weight of landed fish, Maine through Florida, 1981-2019. Source: MRIP

Year	Catch (number of fish)	Landings (number of fish)	Landings (lbs)	Mean weight of landed fish (lb)
1981	75,758,405	65,354,727	169,626,286	2.60
1982	57,971,455	49,994,993	135,646,634	2.71
1983	65,692,855	53,273,556	163,756,917	3.07
1984	65,363,811	52,644,496	117,871,513	2.24
1985	50,820,919	40,993,554	104,585,434	2.55
1986	58,208,887	47,496,866	150,748,617	3.17
1987	54,036,164	40,310,965	133,966,553	3.32
1988	24,866,437	19,679,223	69,739,293	3.54
1989	53,652,330	38,850,679	76,442,812	1.97
1990	43,895,414	30,936,948	68,090,997	2.20
1991	41,416,279	27,317,927	59,792,834	2.19
1992	29,447,521	20,180,576	41,217,702	2.04
1993	27,427,204	15,369,463	37,415,745	2.43
1994	28,624,143	13,063,625	30,145,683	2.31
1995	25,084,131	11,532,806	27,710,089	2.40
1996	25,864,667	11,126,336	23,207,235	2.09
1997	30,448,294	12,400,977	27,039,376	2.18
1998	28,511,672	13,397,306	32,880,414	2.45
1999	52,596,232	16,878,789	25,106,096	1.49
2000	47,102,862	12,879,478	23,357,123	1.81
2001	60,512,249	18,048,645	31,654,980	1.75
2002	49,810,121	17,607,380	30,654,388	1.74
2003	37,746,239	16,411,936	32,758,672	2.00
2004	49,239,084	18,631,909	37,133,464	1.99
2005	48,482,666	18,341,456	37,742,809	2.06
2006	54,310,045	19,397,265	36,081,959	1.86
2007	56,313,394	19,189,747	40,239,102	2.10
2008	46,044,998	14,845,431	36,166,828	2.44
2009	49,866,591	18,085,387	40,731,434	2.25
2010	62,350,106	21,929,515	46,302,792	2.11
2011	58,290,651	20,814,882	34,218,751	1.64
2012	50,658,371	18,578,840	32,530,916	1.75
2013	53,494,668	19,975,053	34,398,326	1.72
2014	55,093,760	21,510,648	27,044,278	1.26
2015	42,148,960	13,725,107	30,098,650	2.19
2016	42,528,751	14,899,733	24,155,299	1.62
2017	42,163,136	13,845,807	32,071,431	2.32
2018	30,928,701	10,245,712	13,270,863	1.30
2019	38,631,938	12,137,295	15,555,892	1.28

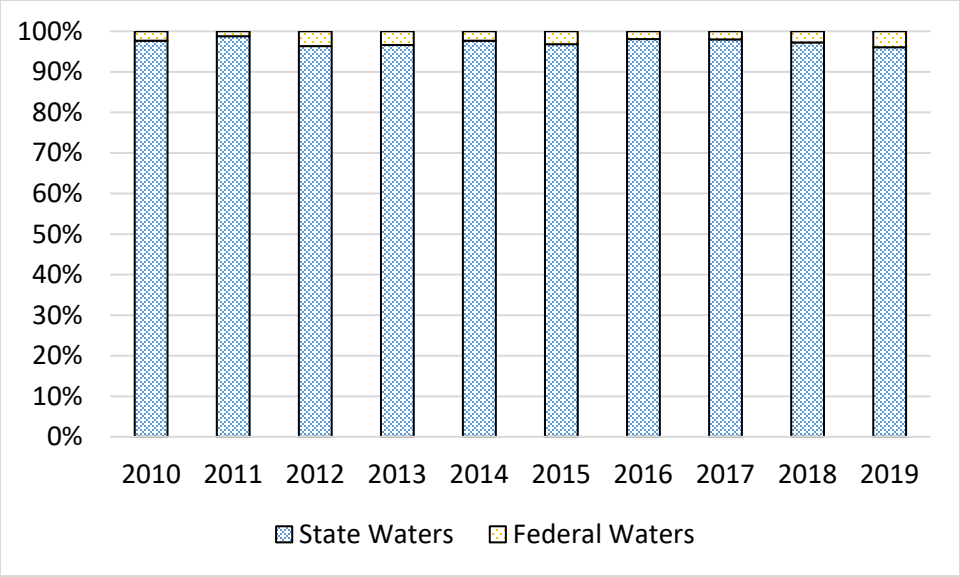


Figure 8. Estimated percentage of bluefish recreational landings (numbers of fish) in state vs. federal waters, Maine through Florida, 2010-2019. Source: Personal Communication with the National Marine Fisheries Service, Fisheries Statistics Division, December 31, 2020

Table 5. State contribution (as a percentage) to total recreational landings of bluefish (in numbers of fish), from Maine through Florida, 2017-2019. Source: Personal Communication with the National Marine Fisheries Service, Fisheries Statistics Division, December 31, 2020

State	2017	2018	2019	Avg 2017-2019
Maine	0.0%	0.0%	0.0%	0.0%
New Hampshire	0.0%	0.0%	0.0%	0.0%
Massachusetts	4.3%	1.8%	2.2%	2.9%
Rhode Island	3.0%	1.2%	3.1%	2.5%
Connecticut	4.2%	3.0%	5.5%	4.3%
New York	22.1%	11.7%	25.0%	20.2%
New Jersey	22.0%	13.9%	6.1%	14.4%
Delaware	1.9%	0.7%	1.2%	1.3%
Maryland	1.3%	2.7%	0.9%	1.6%
Virginia	1.3%	4.3%	6.2%	3.8%
North Carolina	22.9%	32.3%	22.7%	25.5%
South Carolina	5.4%	7.5%	7.2%	6.6%
Georgia	0.1%	0.9%	0.2%	0.3%
Florida	11.5%	20.0%	19.5%	16.6%
Total	100%	100%	100%	100%

1.3.4 Interactions with Other Fisheries

Non-target species are those species caught incidentally while targeting other species, in this case, while targeting bluefish. Some non-target species are occasionally retained, others are commonly discarded. This section describes the non-target species commonly caught in the commercial and recreational bluefish fisheries and summarizes their management status and stock status.

Identification of Major Non-Target Species

It can be difficult to develop accurate quantitative estimates of catch of non-target species. The intended target species for any given tow or set is not always obvious. Fishermen may intend to target one or multiple species and the intended target species may change mid-trip. Given the mixed species nature of the bluefish fishery, incidental catch of non-target species does occur. Table 6 reports the commercial non-target species catch as a percentage of total catch on bluefish observed or captain reported hauls on a trip in 2019 using the observer database. All species reported represent 4% or greater of the observed or reported catch on a trip where bluefish was either the primary or secondary target species. Smooth and spiny dogfish, scup, striped bass, Atlantic bonito and black sea bass were the most commonly caught non-target species on commercial bluefish trips. Table 7 presents the most recent stock information for these species (SEDAR, 2015; NEFSCa, 2018; NEFSC, 2019; NEFSCb, 2018).

Table 6. Percent of commercial non-target species caught on an observed or captain reported haul where bluefish was either the primary or secondary target species in 2019.

Species	% of total catch on bluefish observed or reported trips, 2019
Smooth Dogfish	39.1%
Spiny Dogfish	11.8%
Scup	11.0%
Striped Bass	8.8%
Atlantic Bonito	4.3%
Black Sea Bass	4.0%
Other	20.9%

Table 7. Most recent stock status information for commercial non-target species identified in this action for the bluefish fishery.

	Stock Biomass Status	Fishing Mortality Rate Status
Smooth Dogfish	Not overfished	Overfishing not occurring
Spiny Dogfish	Not overfished	Overfishing not occurring
Scup	Not overfished	Overfishing not occurring
Striped Bass	Overfished; SSB_{2017} estimated at 68,476 mt compared to the $SSB_{Threshold}$ of 91,436 mt	Overfishing occurring; F_{2017} estimated at 0.307 compared to the $F_{Threshold}$ of 0.240
Atlantic Bonito	Unknown - ICCAT	Unknown - ICCAT
Black Sea Bass	Not overfished	Overfishing not occurring

Of all non-target species caught on hauls where bluefish was either the primary or secondary target species on a trip, striped bass is the only species with a concerning stock status and fishing mortality rate (overfished and overfishing occurring). Bluefish and striped bass utilize similar habitat and co-exist in waters throughout their life histories. However, striped bass are caught on only a limited number of bluefish trips, and by comparison to other species, these interactions remain low. Typically, bluefish are a fallback species for fishermen that are not catching their primary target and are often bycatch in other fisheries. Overall, the impact of the bluefish commercial fishery on the non-target species is low, but commercial bluefish fishing effort should continue to be monitored in relation to striped bass. In contrast, the overfished stock status of striped bass and bluefish may result in less directed trips for these two species due to fishermen preferring to target other more abundant demersal species.

A "species guild" approach was used to examine non-target species interactions in the recreational fishery for bluefish. This analysis identified species that were caught together on 5% or more of recreational trips in 2018. The Atlantic coast was split into two regions (Maine to Virginia and North Carolina to Florida) to more effectively classify species based on region. In the north, black sea bass and scup were highly correlated with bluefish in the recreational fishery. In the south, Spanish mackerel and spotted seatrout were highly correlated with bluefish. Other frequently caught non-target species included striped bass, paralichthys flounders, pinfish, and lizard fish (J. Brust, personal communication December 2019).

The status of recreational non-target species relevant to this action are summarized in Table 8. Scup and black sea bass are jointly managed by the MAFMC and the ASMFC. The 2019 operational stock assessments indicate the stocks are not overfished and overfishing was not occurring (NEFSC, 2019). Spanish mackerel is jointly managed by the South Atlantic Fishery Management Council and the Commission. The most recent stock assessment for Spanish mackerel at the 2012 Southeast Data, Assessment and Review indicated the stock is not overfished and overfishing is not occurring (SEDAR, 2012). Spotted sea trout have not been assessed coastwide, therefore their overfished and overfishing status is unknown.

Table 8. Most recent stock status information for non-target species in the recreational bluefish fishery.

Species	Biomass Status	Fishing Mortality Rate Status
Summer Flounder	Not overfished	Overfishing not occurring
Scup	Not overfished	Overfishing not occurring
Black Sea Bass	Not overfished	Overfishing not occurring
Spanish Mackerel	Not overfished	Overfishing not occurring
Spotted Sea Trout	Unknown (not assessed)	Unknown (not assessed)

1.4 HABITAT CONSIDERATIONS

1.4.1 Description of Physical Habitat

Bluefish are a migratory pelagic species found in most temperate and tropical marine waters throughout the world. Along the U.S. Atlantic coast, bluefish are commonly found in estuarine and continental shelf waters from the Gulf of Maine to the Dry Tortugas in Florida. Bluefish are a schooling species that migrate in response to seasonal changes, moving north and inshore during spring and south and offshore in the late autumn. The Atlantic bluefish fishery exploits what is considered to be a single stock of fish.

Information about the physical environment of the Gulf of Maine, Mid-Atlantic, and South Atlantic regions were adapted from Amendment 3 to the Interstate Fishery Management Plan for Atlantic Menhaden (2017), available here:
http://www.asmfc.org/uploads/file//5a4c02e1AtlanticMenhadenAmendment3_Nov2017.pdf

1.4.1.1 Gulf of Maine

The Gulf of Maine is a semi-enclosed sea of 36,300 mi2 (90,700 km2) bordered on the northeast, north and west by the coasts of Nova Scotia, New Brunswick, and the New England states. To the south and east, the Gulf is open to the North Atlantic Ocean; however, Georges Bank forms a partial southern boundary below about 165 ft (50 m). The interior of the Gulf of Maine is characterized by five major deep basins (>600 ft, 200 m) which are separated by irregular topography that includes shallow ridges, banks, and ledges. Basins make up about 30% of the floor area (Thompson, 2010). Retreating glaciers (18,000–14,000 years ago) left behind a variety of patchily distributed sediment types including silt, sand, clay, gravel, and boulders (NMFS, 2015). Major tributary rivers are the St. John in New Brunswick; St. Croix, Penobscot, Kennebec, Androscoggin, and Saco in Maine; and Merrimack in Massachusetts.

The predominantly rocky coast of Maine is characterized by steep terrain and bathymetry, with numerous islands, embayments, pocket beaches, and relatively small estuaries. Tidal marshes and mud flats occur along the margins of these estuaries. Farther south, the coastline is more uniform with few sizable bays, inlets, or islands, but with many small coves. Extensive tidal marshes, mud flats, and sandy beaches along this portion of the coast are gently sloped. Marshes exist along the open coast and within the coves and estuaries.

The surface circulation of the Gulf of Maine is generally counterclockwise, with an offshore flow at Cape Cod which joins the secondary, clockwise gyre on the northern edge of Georges Bank. The Northeast and Great South Channels, which bookend Georges Bank, serve as the primary inflow and outflow channels of marine waters, respectively. Some of the water entering the Northeast Channel flows into the Bay of Fundy; another portion turns west to feed the Maine Coastal Current, initiating the counterclockwise direction of flow. The counterclockwise gyre is more pronounced in the spring when river runoff adds to the southwesterly flowing coastal 16 current. Surface currents reach velocities of 1.5 knots (80 cm/sec) in eastern Maine but gradually diminish to 0.2 knots (10-20 cm/sec) in Massachusetts Bay where tidal amplitude is about 10 ft (3 m) (Thompson, 2010).

There is great seasonal variation in sea surface temperature in the Gulf, ranging from 4°C in March throughout the Gulf to 18°C in the western Gulf and 14°C in the eastern Gulf in August. The Gulf of Maine sea surface temperature has been warming steadily over the last 35 years. In the most recent decade, the warming trend (0.23 °C /year) was faster than 99 percent of the global ocean (Pershing et al., 2015). The warming is related to a northward shift in the Gulf Stream and to changes in the Atlantic Multidecadal Oscillation and Pacific Decadal Oscillation (Pershing et al., 2015). The salinity of the surface layer also varies seasonally, with minimum values in the west occurring during summer, from the accumulated spring river runoff, and during winter in the east under the influence of runoff from the St. Lawrence River (from the previous spring). With the seasonal temperature and salinity changes, the density stratification in the upper water column also exhibits a seasonal cycle. From well mixed, vertically uniform conditions in winter, stratification develops through the spring and reaches a maximum in the summer. Stratification is more pronounced in the southwestern portion of the Gulf where tidal mixing is diminished.

1.4.1.2 Mid-Atlantic Region

The coastal zone of the Mid-Atlantic states varies from a glaciated coastline in southern New England, to the flat and swampy coastal plain of North Carolina. Along the coastal plain, the beaches of the barrier islands are wide, gently sloped, and sandy, with gradually deepening offshore waters. The area is characterized by a series of sounds, broad estuaries, large river basins (e.g., Connecticut, Hudson, Delaware, and Susquehanna), and barrier islands. Conspicuous estuarine features are Narragansett Bay (Rhode Island), Long Island Sound and Hudson River (New York), Delaware Bay (New Jersey and Delaware), Chesapeake Bay (Maryland and Virginia), and the nearly continuous band of estuaries behind barrier islands along southern Long Island, New Jersey, Delaware, Maryland, Virginia, and North Carolina. The complex estuary of Currituck, Albemarle, and Pamlico Sounds behind the Outer Banks of North Carolina (covering an area of 2,500 square miles) is an important feature of the region. Coastal marshes border those estuaries along much of the glaciated coast from Cape Cod to Long Island Sound. Nearly continuous marshes occur along the shores of the estuaries behind the barrier islands.

At Cape Hatteras, the Continental Shelf extends seaward approximately 20 mi (33 km), and gradually widens northward to about 68 mi (113 km) off New Jersey and Rhode Island where it is intersected by numerous underwater canyons. Surface circulation north of Cape Hatteras is generally southwesterly during all seasons, although this may be interrupted by coastal in drafting and some reversal of flow at the northern and southern extremities of the area. Speeds of drift north of Cape Hatteras are on the order of six miles (9.7 km) per day. There may be a shoreward component to this drift during the warmer half of the year and an offshore component during the colder half. The western edge of the Gulf Stream meanders off Cape Hatteras, sometimes coming within 12 mi (20 km) of the shore; however, it becomes less 17 discrete and veers to the northeast above Cape Cod. Surface currents as high as 4 knots (200 cm/sec) have been measured in the Gulf Stream off Cape Hatteras.

Hydrographic conditions in the Mid-Atlantic region vary seasonally due to river runoff and changing water temperatures. The water column becomes increasingly stratified in the summer

and homogeneous in the winter due to fall-winter cooling of surface waters. In the winter, the mean range of sea surface temperatures is 0-7°C off Cape Cod and 1-14°C off Cape Charles (at the southern end of the Delmarva Peninsula). In the summer, the mean range is 15-21°C off Cape Cod and 20-27°C off Cape Charles. The tidal range averages slightly over 3 ft (1 m) on Cape Cod, decreasing to the west. Within Long Island Sound and along the south shore of Long Island, tide ranges gradually increase, reaching 6 ft (2 m) at the head of the Sound and in the New York Bight. South of the Bight, tide ranges decrease gradually to slightly over 3 ft (1 m) at Cape Hatteras. Prevailing southwest winds during the summer along the Outer Banks often lead to nearshore upwelling of colder bottom water from offshore, so that surface water temperatures can vary widely during that period (15-27°C over a period of a few days).

The waters of the coastal Mid-Atlantic region have a complex and seasonally dependent circulation pattern. Seasonally varying winds and irregularities in the coastline result in the formation of a complex system of local eddies and gyres. Surface currents tend to be strongest in late spring, due to river runoff, and during periods of highest winds in the winter. In late summer, when winds are light and estuarine discharge is minimal, currents tend to be sluggish, and the water column is generally stratified.

1.4.1.3 South Atlantic Region

The south Atlantic coastal zone extends in a large oceanic bight from Cape Hatteras south to Biscayne Bay and the Florida Keys. North of Florida, the south Atlantic coastal zone is bordered by a coastal plain that stretches inland for a hundred miles and a broad continental shelf that reaches into the ocean for nearly an equal distance. This broad shelf tapers down to a very narrow and precipitous shelf off the southeastern coast of Florida. The irregular coastline of North Carolina, South Carolina, Georgia, and eastern Florida is generally endowed with extensive bays and estuarine waters, bordered by nutrient-rich marshlands. Barrier beaches and dunes protect much of the shoreline. Along much of the southern coast from central South Carolina to northern Florida, estuarine salt-marsh is prominent. Most of the east coast of Florida varies little in general form. Sand beaches with dunes are sporadically interrupted by mangrove swamps and low banks of earth and rock.

The movements of oceanic waters along the South Atlantic coast have not been well defined. The surface currents, countercurrents, and eddies are all affected by environmental factors, particularly winds. The Gulf Stream flows along the coast at 6-7 miles per hour (10-11 km/hr). It is nearest to the coast off southern Florida and gradually moves away from the coast as it flows northward. Inshore of the Gulf Stream, there is a current that flows southward for most of the year in regions north of Cape Canaveral.

Sea surface temperatures during the winter increase southward from Cape Hatteras to Fort Lauderdale, Florida, with mean minimums ranging from 2-20oC and maximums ranging from 17-26°C. In the summer, the increases are more gradual, ranging north to south from minimums of 21-27°C to maximums of 28-30°C. Mean sea-surface salinity is generally in the range of 34 to 36 ppt year round. Mean tidal range is just over 3 ft (1 m) at Cape Hatteras and

increases gradually to about 6-7 ft (2 m) along the Georgia coast. Tides decrease south of Cape Canaveral to 3 ft (1 m) at Fort Lauderdale.

1.4.2 Anthropogenic Impacts on Bluefish and Their Habitat

A baseline fishing effects analysis is provided in the Mid-Atlantic Council's specification of management measures for the 2004 fishing year (MAFMC 2003). This analysis considered 1995-2001 as the baseline time period. Baseline conditions (i.e., the distribution and intensity of bottom otter trawling in the commercial bluefish fishery) have not changed significantly since 2001. The 2004 evaluation of the habitat impacts of bottom otter trawls, gillnets, and handlines used in the commercial bluefish fishery indicated that the baseline impact of the fishery was minimal and temporary in nature. Additionally, only these gear types which contact the bottom impact physical habitat. Consequently, adverse effects of the bluefish fishery on EFH did not need to be minimized. Since commercial landings of bluefish have remained stable since 2001, the adverse impacts of the bluefish fishery have continued to be minimal during the time period 2001-2018. The FMP limits recreational specifications for bluefish to possession limits and recreational harvest limits. The principal gears used in the recreational fishery for bluefish are rod and reel and handline. The potential adverse impacts of these gears on EFH for this federally managed species in the region is minimal (Stevenson et al. 2004).

Only those gear types which contact the bottom impact physical habitat. The actions in this Amendment are relevant to both the commercial and recreational bluefish fisheries. The recreational fishery is almost exclusively a hook and line fishery. Recreational hook and line gears generally have minimal impacts on physical habitat and EFH in this region (Stevenson et al. 2004). Weighted hook and line gear can contact the bottom, but the magnitude and footprint of any impacts resulting from this contact is likely minimal. Thus, the recreational fisheries are expected to have very minor or no impacts on habitat.

The limited commercial fishery for bluefish is primarily prosecuted with gill net gear (Figure 6) and has limited contact with the bottom. Thus, the magnitude and footprint of any impacts resulting from this contact is likely minimal.

Stevenson et al. (2004) compiled a detailed summary of several studies on the impacts of a variety of gear types on marine habitats. Conclusions relevant for this action are briefly summarized below with a focus on bottom trawl gear since this is the gear type used in commercial harvest that causes the greatest impact, when it occurs.

Otter trawl doors can create furrows in sand, mud, and gravel/rocky substrates. Studies have found furrow depths that range from 2 to 10 cm. Bottom trawl gear can also re-suspend and disperse surface sediments and can smooth topographic features. It can also result in reduced abundance, and in some cases reduced diversity, of benthic species such as nematodes, polychaetes, and bivalves. It can also have short-term positive ecological impacts such as increased food value and increased chlorophyll production in surface sediments. The duration of these impacts varies by sediment type, depth, and frequency of the impact (e.g., a single trawl tow vs. repeated tows). Some studies documented effects that lasted only a few months.

Other studies found effects that lasted up to 18 months. Impacts tend to have shorter durations in dynamic environments with less structured bottom composition compared to less dynamic environments with structured bottom. Shallower water, stronger bottom currents, more wave action, finer-grained sediments, and higher frequencies of natural disturbance are characteristics that make environments more dynamic (Stevenson et al. 2004).

1.4.3 Description of Programs to Protect, Restore, & Preserve Bluefish

The Council developed some fishery management actions with the sole intent of protecting marine habitats. For example, in Amendment 9 to the Mackerel, Squid, and Butterfish FMP, the Council determined that bottom trawls used in Atlantic mackerel, longfin and Illex squid, and butterfish fisheries have the potential to adversely affect EFH for some federally-managed fisheries (MAFMC 2008). As a result of Amendment 9, closures to squid trawling were developed for portions of Lydonia and Oceanographer Canyons. Subsequent closures were implemented in these and Veatch and Norfolk Canyons to protect tilefish EFH by prohibiting all bottom trawling activity. In addition, Amendment 16 to the Mackerel, Squid, and Butterfish FMP prohibits the use of all bottom-tending gear in fifteen discrete zones and one broad zone where deep sea corals are known or highly likely to occur (81 Federal Register 90246, December 14, 2016). In addition, section 4.3 details the rebuilding plan which aims to restore bluefish back to its biomass target.

1.5 IMPACTS TO THE FISHERY MANAGEMENT PROGRAM

The following sections provide a brief summary of biological, economic and social impacts that may result from the changes to the Bluefish FMP implemented through this Amendment. Impacts to the fisheries are first summarized generally in this Section and a more detailed discussion of each management change and their impacts can be found in *Section 4.6*. The MAFMC's Environmental Assessment provides a more comprehensive comparison impacts and analyses of the various management options considered during the Amendment's development.

1.5.1 Biological Impacts

Changes to the recreational/commercial sector allocations and the commercial state allocations affect the size of each sector's and state's landings limits. A decrease in the commercial quota could lead to increased regulatory discards of bluefish compared to recent levels. However, accountability measures are still in place and designed to prevent total removals, in the form of harvest and dead discards, from exceeding the overfishing threshold. None of the management changes are expected to change patterns in landings, discards, or fishing effort in such a way that they negatively impact stock status.

The 2019 operational stock assessment indicated the bluefish stock was overfished. This triggered the requirement under the MSA to submit a rebuilding plan within two years of the overfished designation. The MSA requires that an overfished stock be rebuilt in as short of a period as possible, and the duration be no longer than 10 years. The rebuilding plan implemented under this Amendment is projected to rebuild the stock within seven years. The Council, in coordination with the Bluefish Board, is required to reassess progress every two

years to ensure the stock remains on track to reach the target biomass level within the specified timeline. The biological implications of the rebuilding plan include the restoration of a robust stock and minimizing time that bluefish remain in a vulnerable overfished state.

1.5.2 Economic Impacts

Section 1.1.1 introduced the many management changes under this Amendment, all of which have direct or indirect impacts on stakeholder access to the bluefish resource. Access to the resource is managed differently for commercial versus recreational stakeholders, but bluefish fishery management is centered on the landing limits or quotas that each sector is allocated. Changes to a sector's allocation can significantly impact the economic activity associated with access to the bluefish resource.

For the recreational fishery, changes in the recreational harvest limit (RHL) may lead to a liberalization or restriction of recreational measures, which can impact angler access to the bluefish resource. Increased access could take the form of more fish to take home (under higher possession limits or lower minimum fish sizes), while decreased access could mean the ability to retain fewer fish and reduced opportunities to target bluefish (under a shorter open season). This can affect angler satisfaction, revenues for for-hire businesses (e.g., by impacting demand for party and charter trips), and revenues for support businesses such as bait and tackle shops.

For the commercial fishery, this Amendment implements changes to the overall commercial sector allocation as well as changes to the commercial allocations to the states. Commercial industry members may experience a change in revenue due to corresponding changes to quotas and potential landings of bluefish. Due to the complex interplay between all the management approaches under consideration, it is challenging to determine what the net effect of this Amendment will be on the economic welfare of individual commercial fishermen. However, qualitative descriptions of economic impacts associated with the implemented changes are discussed in more detail in *Section 4.6*.

1.5.3 Social Impacts

MSA National Standard 8 requires the Council to consider the importance of fishery resources to affected communities and provide those communities with continuing access to fishery resources, but it does not allow the Council to compromise the conservation objectives of the management measures. Thus, continued overall access to fishery resources is a consideration, but not a guarantee that fishermen would be able to use a particular gear type, harvest a particular species of fish, fish in a particular area, or fish during a certain time of the year.

A fundamental difficulty exists in forecasting social change relative to management changes, since communities or other societal groups are constantly evolving in response to external factors (e.g., market conditions, technology, alternate uses of waterfront, tourism). Certainly, fishery regulations influence the direction and magnitude of social change, but attribution is difficult with the tools and data available.

While the focus here is on the social impacts of the management changes, external factors may also influence change, both positive and negative, in the affected communities. External factors may lead to unanticipated consequences of a regulation, due to cumulative impacts. These factors contribute to a community's ability to adapt to new regulations. When examining potential social impacts of management measures, it is important to consider impacts on the following: the fishing fleet (vessels grouped by fishery, primary gear type, and/or size); vessel owners and employees (captains and crew); bluefish dealers and processors; final users of bluefish; community cooperatives; fishing industry associations; cultural components of the community; and fishing families. While some management measures may have a short-term negative impact on some communities, these should be weighed against potential long-term benefits to all communities which can be derived from a sustainable bluefish fishery.

Social Impact Factors

The social impact factors outlined below can be used to describe the Atlantic bluefish fishery, its sociocultural and community context, and its participants. These factors or variables are considered relative to the management changes. Use of these kinds of factors in social impact assessment is based on NOAA Fisheries guidance (NMFS 2007) and other texts (e.g., Burdge 1998). Longitudinal data describing these social factors region-wide and in comparable terms is limited. Qualitative discussion of the management changes to the factors characterizes the likely direction and magnitude of the impacts.

The social impact factors fit into five categories:

1. *Size and Demographic Characteristics* of the fishery-related workforce residing in the area; these determine demographic, income, and employment effects in relation to the workforce as a whole, by community and region.
2. The *Attitudes, Beliefs, and Values* of fishermen, fishery-related workers, other stakeholders and their communities; these are central to understanding the behavior of fishermen on the fishing grounds and in their communities.
3. The *Social Structure and Organization*; that is, changes in the fishery's ability to provide necessary social support and services to families and communities, as well as effects on the community's social structure, politics, etc.
4. The *Non-Economic Social Aspects* of the fishery; these include lifestyle, health, and safety issues, and the non-consumptive and recreational uses of living marine resources and their habitats.
5. The *Historical Dependence on and Participation in* the fishery by fishermen and communities, reflected in the structure of fishing practices, income distribution, and rights (NMFS 2007).

Community Fishing Engagement and Social Vulnerability Indicators

In addition to traditional economic indicators such as landings and revenue, fishing communities can also be understood in terms of overall engagement in the commercial and recreational fishery and other social and economic community conditions. NOAA Fisheries social scientists produce indicators of commercial and recreational fishing engagement, reliance, and other community characteristics for virtually all fishing communities throughout

the United States, referred to as the Social Indicators of Fishing Community Vulnerability and Resilience (Colburn and Jepson 2012). The Social Indicators are composite indices of factors that comprise community-level latent constructs, such as commercial fishing engagement or social vulnerability. The strength of these indicators is that they provide greater depth and contextualization to our understanding of fishing communities than the more commonly utilized landings and revenue statistics. The Social Indicators provide a more comprehensive view of fishing communities by including social and economic conditions that can influence the viability of commercial and recreational fishing activities, such as gentrification pressure, poverty, and housing characteristics, among other factors.

2009-2018 Recreational Engagement and Reliance

The Recreational Engagement Indicator is a numerical index that reflects the level of a community's engagement in recreational fisheries relative to other communities in the Northeast and Mid-Atlantic. This index was generated using a principal components factor analysis (PCFA) of variables related to recreational fishing activity from the NOAA Fisheries MRIP datasets. PCFA is a common statistical technique used to identify factors that are related, yet linearly independent, and likely represent a latent or unobservable concept when considered together, such as factors that contribute to the level of a community's social vulnerability or engagement in commercial fishing. The variables that were identified to best reflect community engagement in recreational fisheries included; 1) the total number of shore trips per community for each year; 2) the total number of charter trips per community for each year; and 3) the total number of private recreational trips per community for each year. The Recreational Reliance Indicator is calculated by dividing these three variables by the total community population obtained from the U.S. Census Bureau's American Community Survey (ACS). It should be noted that a high engagement score does not necessarily mean that a community or its fishery participants are solely dependent upon recreational fishing activities. There may be other fishing or economic activities that may sustain the livelihoods of individuals or entities within these communities that have relied on recreational fishing historically.

Figure 9 displays the factor scores for the Recreational Engagement Indicator for the fifteen communities that have the highest average recreational engagement between 2009 and 2018. The index factor scores are commonly categorized from low to high based on the number of standard deviations from the mean, which is set at zero. Categories rank from 0.00 or below as "low", 0.00 – 0.49 as "medium," and 0.50 – 0.99 as "medium-high," and 1 standard deviation or above as "high." All of the ports displayed in Figure 10 have "high" recreational engagement. However, there has also been substantial year-to-year variability in recreational engagement for many of these ports. For example, communities in Florida with high average engagement have seen large increases in engagement in recent years relative to the earlier part of the time series, whereas communities in New York and New Jersey have experienced wide fluctuations over time in their extent of recreational fishing engagement.

Figure 11 shows the factor scores for the Recreational Reliance Indicator for the fifteen communities that have the highest average recreational reliance between 2009 and 2018. A comparison of Figure 9 and Figure 11 reveals that some highly engaged communities may not

be as highly reliant on recreational fisheries due to the size of those communities and the accompanying opportunities for other social and economic activities. Among the five most highly reliant communities on recreational fisheries over the period of 2009 to 2018 were Barnegat Light, NJ, Topsail Beach, NC, Orient, NY, Hatteras (and all other communities throughout the Outer Banks), NC, and Montauk, NY. In recent years, Nags Head, NC, and Melbourne Beach, FL, have increased considerably in their reliance on recreational fisheries.

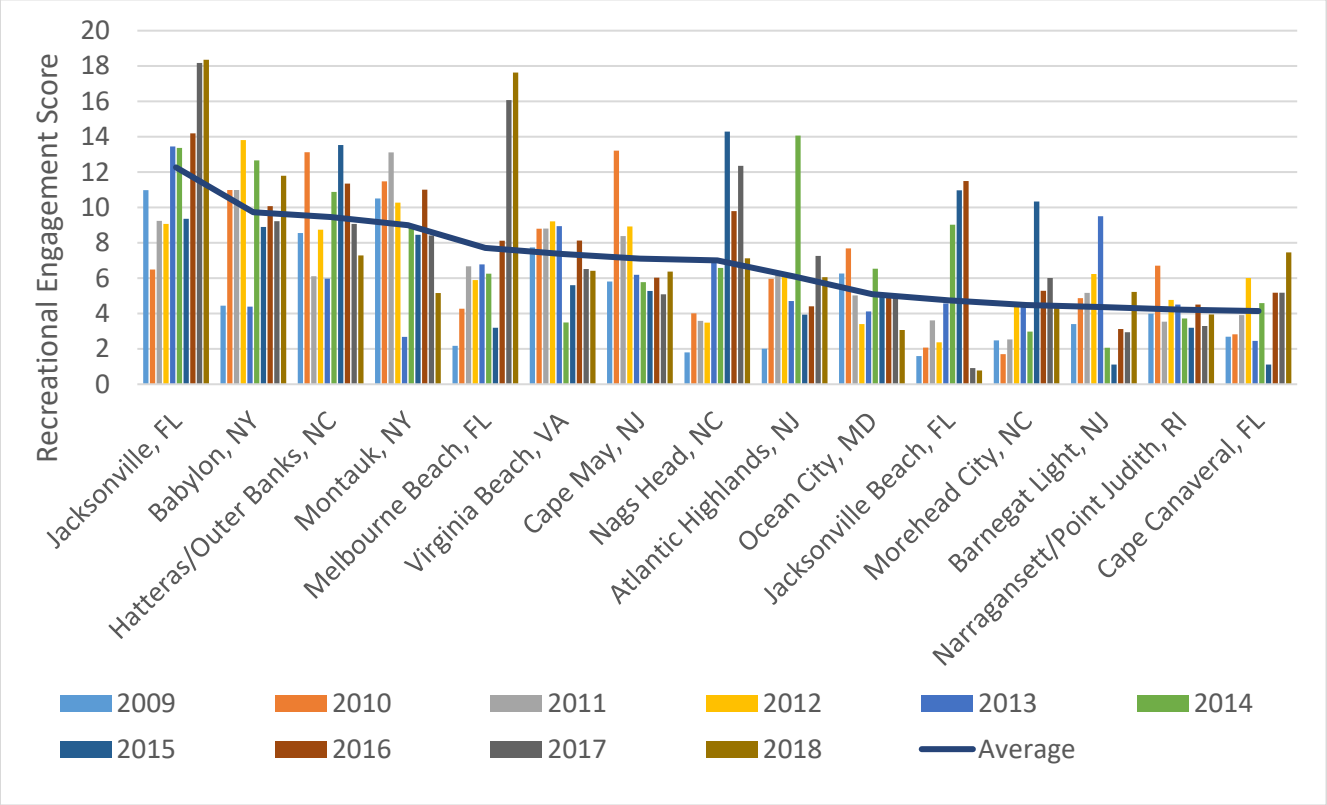


Figure 9. Recreational Fishing Engagement Scores by Community: Top Fifteen Communities in Average Engagement from 2009-2018.

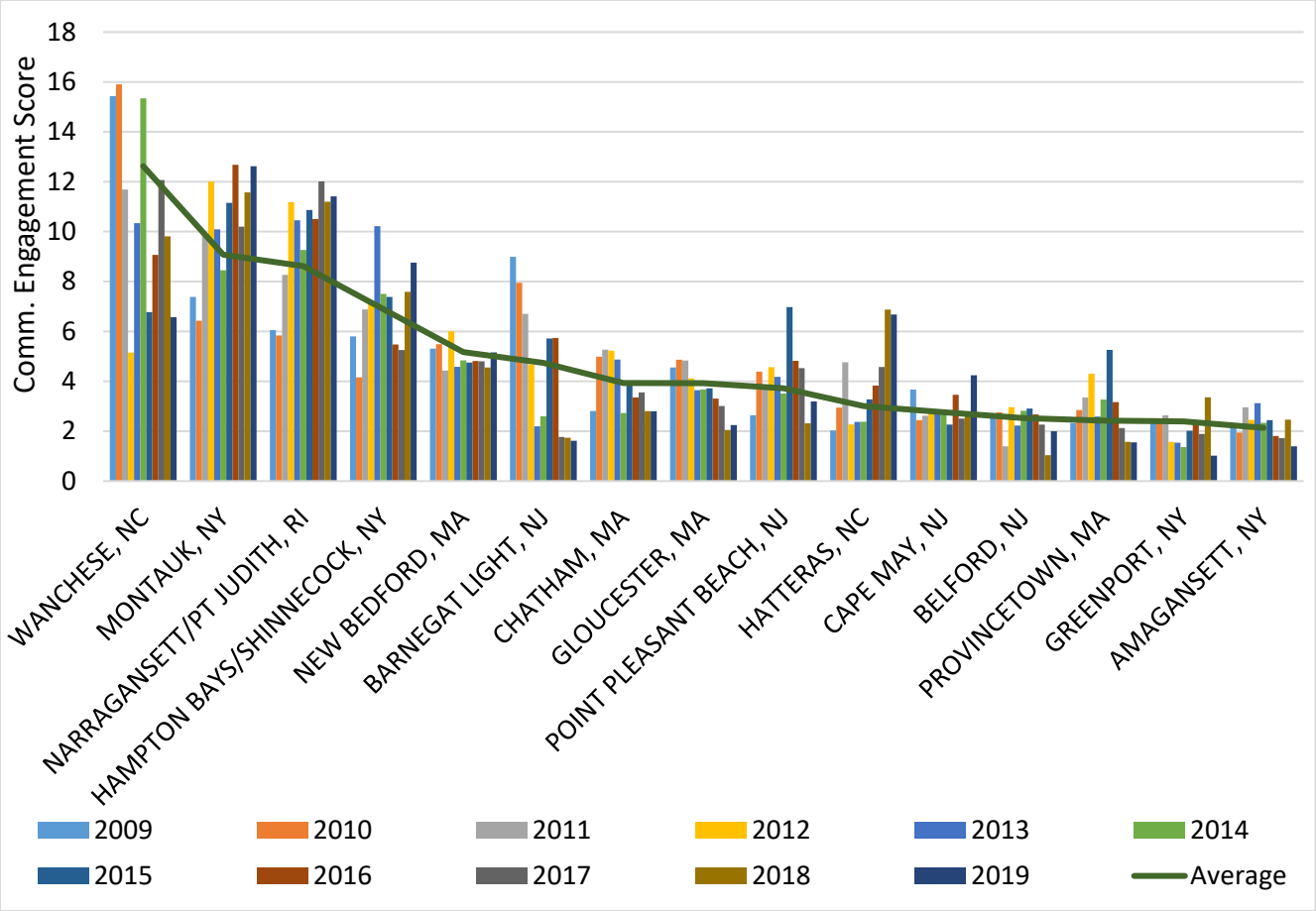


Figure 10. Commercial Bluefish Engagement Scores by Community: Top Fifteen Communities in Average Engagement from 2009-2019.

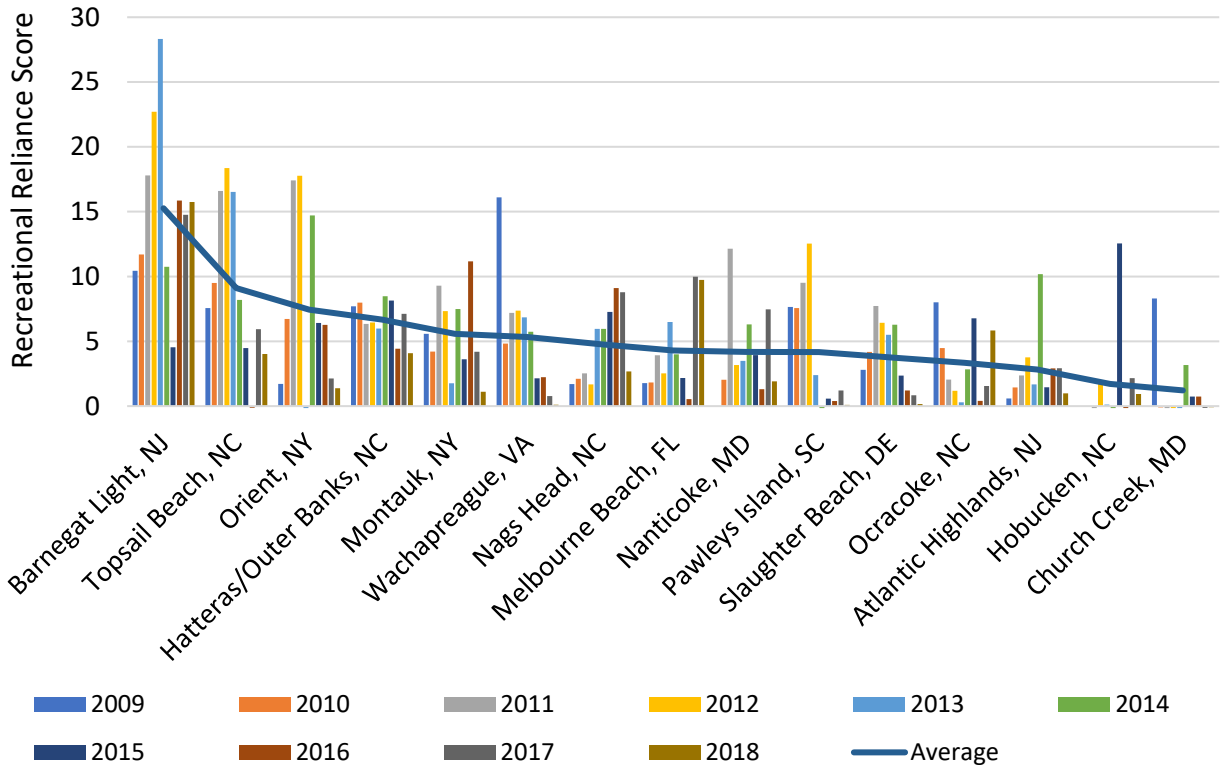


Figure 11. Recreational Fishing Reliance Scores by Community: Top Fifteen Communities in Average Reliance from 2009-2018.

Community Social Vulnerability Indicators

The Community Social Vulnerability Indicators (CSVI) include indices of labor force structure, housing characteristics, poverty, population composition, and personal disruption. The labor force structure index measures the makeup of the labor force and is reversed scored so that a higher factor score represents fewer employment opportunities and greater labor force vulnerability. The housing characteristics index measures vulnerability related to infrastructure and home and rental values. It is also reversed score so that a higher score represents more vulnerable housing infrastructure. The poverty index captures multiple different factors that contribute to an overall level of poverty in a given area. A higher poverty index score would indicate a greater level of vulnerability due to a higher proportion of residents receiving public assistance and below federal poverty limits. The population composition index measures the presence of vulnerable populations (i.e., children, racial/ethnic minorities, and/or single-parent, female-headed households) and a higher score would indicate that a community's population is composed of more vulnerable individuals. Finally, the personal disruption index considers variables that affect individual-level vulnerability primarily and include factors such as low individual-level educational attainment or unemployment. Higher scores of personal disruption likely indicate greater levels of individual vulnerability within a community, which can in turn impact the overall level of community social vulnerability.

Gentrification Pressure Indicators include housing disruption, urban sprawl, and retiree migration. The Housing Disruption Index combines factors that correspond to unstable or shifting housing markets in which home values and rental prices may cause residents to become displaced. The Urban Sprawl Index indicates the extent of population increase due to migration from urban centers to suburban and rural areas, which often results in cost of living increases and gentrification in the destination communities. The Retiree Migration Index characterizes communities by the concentration of retirees or individuals above retirement age whose presence often raises the home values and rental rates, as well as increase the need for health care and other services. These components of gentrification pressure influence the degree to which the current residents, communities, and local economies can remain in place, generally, and the extent to which those in the fishing industry in these communities are able to withstand or overcome changes to fisheries conditions and management, specifically. As places go through the process of gentrification, housing becomes less available and/or unaffordable for the existing population and the historically significant local fishing businesses and industries that had once thrived become displaced or replaced by new and emerging industries, such as tourism, finance, real estate, and service.

Data used to develop these indices come from multiple secondary data sources, but primarily the U.S. Census ACS at the place level (Census Designated Place and Minor Civil Division). More information about the data sources, methods, and other background details can be found online at https://www.st.nmfs.noaa.gov/humandimensions/social-indicators/.

Table 9 displays the CSVI categorical scores for all of the highly engaged and/or reliant communities on recreational fishing activities. Table 10 displays CSVI categorical scores for all highly engaged communities in commercial bluefish fishery activities.

Socioeconomic Survey of Hired Captains and Crew in New England and Mid-Atlantic Commercial Fisheries (Crew Survey)

The Socioeconomic Survey of Hired Captains and Crew in New England and Mid-Atlantic Commercial Fisheries (hereafter referred to as the Crew Survey) is an ongoing effort conducted by the Social Sciences Branch of the National Oceanic and Atmospheric Administration Fisheries Northeast Fisheries Science Center intended to gather general information about the characteristics and experiences of commercial fishing crew members (including hired captains) because little is known about this critical segment of the commercial fishing industry. Information collected by the survey include demographic information, wage calculations systems, well-being, fishing practices, job satisfaction, job opportunities, and attitudes towards fisheries management, among other subjects. There have been two waves of Crew Survey data collection thus far – Wave 1 in 2012-13 and Wave 2 in 2018-19.

Table 9. 2018 Community Social Vulnerability Indicator Categorical Scores for Recreational Fishing Communities.

Community	Poverty	Labor Force	Housing Characteristics	Population Composition	Personal Disruption	Housing Disruption	Retiree Migration	Urban Sprawl
Slaughter Beach, DE	Low	High	Low	Low	Low	High	High	Low
Cape Canaveral, FL	Low	Med-High	Med-High	Low	Low	Med-High	Med-High	Low
Jacksonville, FL	Medium	Low	Medium	Medium	Medium	Low	Low	Low
Jacksonville Beach, FL	Low	Low	Low	Low	Low	High	Low	Low
Melbourne Beach, FL	Low	Medium	Low	Low	Low	Medium	Med-High	Low
Church Creek, MD	Low	Low	Medium	Low	Medium	Medium	Low	Low
Nanticoke, MD	Low	Med-High	Low	Low	Low	Low	High	Low
Ocean City, MD	Low	Medium	Med-High	Low	Low	Med-High	Med-High	Low
Hatteras/Outer Banks, NC	Med-High	Low	Medium	Low	Med-High	Med-High	Medium	Low
Hobucken, NC	High	Low	Low	Low	Medium	Low	Med-High	Low
Morehead City, NC	Medium	Medium	Med-High	Low	Medium	Medium	Medium	Low
Nags Head, NC	Low	Low	Low	Low	Low	High	Low	Low
Ocracoke, NC	Med-High	Med-High	Low	Medium	High	Low	Med-High	Low
Topsail Beach, NC	Medium	Med-High	Low	Low	Low	Low	Med-High	Low
Atlantic Highlands, NJ	Low	Low	Low	Low	Low	Medium	Low	Medium
Barnegat Light, NJ	Low	High	Low	Low	Low	High	High	Med-High
Cape May, NJ	Low	Med-High	Low	Low	Low	High	High	Medium
Babylon, NY	Low	Low	Low	Low	Low	Med-High	Low	High
Montauk, NY	Low	Medium	Low	Low	Low	High	Med-High	Med-High
Orient, NY	Low	High	Low	Low	Low	High	High	Med-High
Narragansett/Point Judith, RI	Low	Medium	Low	Low	Low	Med-High	Medium	Low
Pawleys Island, SC	Low	High	Low	Low	Low	Medium	High	Low
Virginia Beach, VA	Low	Low	Low	Medium	Low	Medium	Low	Low
Wachapreague, VA	Low	Med-High	Medium	Low	Low	Low	Med-High	Low

Table 10: 2018 Community Social Vulnerability Indicator Categorical Scores for Commercial Bluefish Fishing Communities.

Community	Poverty	Labor Force	Housing Characteristics	Population Composition	Personal Disruption	Housing Disruption	Retiree Migration	Urban Sprawl
Chatham, MA	Low	High	Low	Low	Low	High	High	Medium
Gloucester, MA	Low	Low	Low	Low	Low	Medium	Low	Medium
New Bedford, MA	High	Low	Medium	Med-High	Med-High	Medium	Low	Med-High
Provincetown, MA	Low	Medium	Low	Low	Low	High	Med-High	Med-High
Hatteras, NC	Low	High	Low	Low	Low	Low	High	Low
Wanchese, NC	Low	Low	Med-High	Medium	Low	Medium	Low	Low
Barnegat Light, NJ	Low	High	Low	Low	Low	High	High	Med-High
Belford, NJ	Low	Low	Low	Low	Low	High	Low	Medium
Cape May, NJ	Low	Med-High	Low	Low	Low	High	High	Medium
Point Pleasant Beach, NJ	Low	Medium	Low	Low	Low	High	Medium	Med-High
Amagansett, NY	Low	Med-High	Low	Low	Low	High	Med-High	High
Greenport, NY	Low	Medium	Low	Medium	Medium	High	Medium	Med-High
Hampton Bays/Shinnecock, NY	Low	Low	Low	Medium	Low	High	Medium	Med-High
Montauk, NY	Low	Medium	Low	Low	Low	High	Med-High	Med-High
Narragansett/Pt Judith, RI	Low	Medium	Low	Low	Low	Med-High	Medium	Low

2.0 GOALS AND OBJECTIVES

2.1 HISTORY OF MANAGEMENT

The original Council-ASMFC FMP (1989) established a 10 fish bag limit for the recreational sector, a 20% allocation of total allowable catch to the commercial sector, state-by-state commercial quotas, permit requirements, a plan to begin annually reviewing the performance of management measures, and the ability to adjust gear regulations. Since then, six amendments have been approved. Amendment 1 was implemented jointly by the Commission and the Council, the remaining amendments were implemented by the Council.

Amendment 1 (2000) brought the FMP into compliance with new and revised National Standards and other required provisions of the Sustainable Fisheries Act, implemented a rebuilding plan, and required that a commercial quota and recreational harvest limit be based on projected stock size estimates as derived from the latest stock assessment information.

Amendment 2 (2007) implemented a standardized bycatch reporting methodology

Amendment 3 (2011) established annual catch limits (ACLs) and accountability measures (AMs)

Addendum I: Biological Monitoring Program (2012) Addendum I established a coastwide monitoring program for bluefish to improve the quantity and quality of age data used in bluefish stock assessments.

Amendment 4 (2013) modified the AMs for the Council's recreational fisheries.

Amendment 5 (2015) implemented a new standardized bycatch reporting methodology to address a legal challenge.

Amendment 6 (2017) implemented management measures to prevent the development of new, and the expansion of existing, commercial fisheries on certain forage species in the Mid-Atlantic.

Board revises Addendum I (2021) sampling program to include Florida among states required to collect bluefish age data for use in stock assessments.

2.2 JOINT MANAGEMENT

The Council and Commission work cooperatively to develop fishery regulations for bluefish off the East Coast of the United States. The Council and Commission work in conjunction with NOAA Fisheries, 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 (0-3 miles offshore) and federal waters (3-200 miles offshore, also known as the EEZ).

The Commission has primary authority for development of FMPs for state waters under the authority of the Atlantic Coastal Fisheries Cooperative Management Act (ACFCMA) of 1993. Recognizing the interjurisdictional nature of fishery resources and the necessity of the states and federal government coordination on regulations, under this act, all Atlantic coast states that are included in a Commission FMP must implement required conservation provisions of the plan or the Secretary of Commerce may impose a moratorium for fishing in the noncompliant state's waters.

The Council, under the MSA, has primary authority for developing federal FMPs for Council managed species. The Commission and the Council meet jointly at least twice a year to approve management measures for the fishery for the upcoming year or years. State fishery departments implement FMP measures under the ACFCMA, while NOAA Fisheries issues rules for the approved FMPs prepared by the Councils.

State regulations apply to vessels fishing in state waters; however, vessels with federal permits must abide by the federal regulations regardless of where they are fishing. If state and federal measures differ, the vessel must abide by whichever measure is more restrictive. Approved

regulations are enforced through cooperative actions of the U.S. Coast Guard, NOAA Fisheries Law Enforcement, and state authorities.

The Secretary of Commerce has the ultimate responsibility for federal measures. The Council's proposed FMPs and amendments are submitted to the Secretary of Commerce for approval, which in most cases is delegated to NOAA Fisheries. NOAA Fisheries typically prepares specifications and implements federal regulations for the fisheries based on the recommendations of the Council and Commission, if such recommendations are deemed to be consistent with the MSA and other applicable law. NOAA Fisheries publishes proposed rules in the *Federal Register* for public comment. As mentioned above, the Secretary of Commerce also has ultimate responsibility for determining whether individual state measures are consistent with the Commission's FMP. If the Commission finds a state out of compliance and is unable to rectify this issue, the Commission may notify the Secretary. Within 30 days of receiving the Commission's notice, the Secretary must decide whether the state is out of compliance, and if so, whether the noncompliance compromises the conservation of the resource. If it does, the Secretary can impose a moratorium on all fishing (commercial and recreational) for the species in question, until the Commission and the Secretary determine that the noncompliance has ceased.

2.3 MANAGEMENT UNIT

Bluefish fisheries are managed cooperatively by the Commission in state waters (0-3 miles), and by the Council and NOAA Fisheries in federal waters (3-200 miles). The management unit for bluefish in US waters is the western North Atlantic Ocean from Florida northward to the US-Canadian border.

2.4 PURPOSE AND NEED FOR ACTION

The Board and Council initiated this Amendment to consider modifications to the FMP goals and objectives, current allocations between the commercial and recreational sectors, current commercial allocations to the states, initiate a rebuilding plan, revise the quota transfer processes, and reconsider how the FMP accounts for management uncertainty.

The previous sector-based and commercial state-to-state allocations were set in 2000 using data from 1981-1989 and have not been revised since that time. Recreational catch and harvest data are provided by the Marine Recreational Information Program (MRIP). In July 2018, MRIP released revisions to their time series of catch and harvest estimates based on adjustments for a revised angler intercept methodology (used to estimate catch rates) and a new effort estimation methodology (namely, a transition from a telephone-based effort survey to a mail-based effort survey). These revisions resulted in much higher recreational catch estimates compared to previous estimates, affecting the entire time series of data going back to 1981. These data revisions have management implications due to the fixed commercial/recreational allocation percentages defined in the FMP. These allocation percentages do not reflect the current understanding of the recent and historic proportions of catch and landings from the two sectors. Since these allocation percentages are defined in the Council and Commission

FMPs, they cannot be modified without an FMP amendment. This amendment aims to align allocations with current fishery needs while meeting the objectives of the FMP.

Bluefish was deemed overfished with overfishing not occurring as a result of the 2019 Operational Assessment. Therefore, the Council is mandated to initiate a rebuilding plan within two years of notice by the Greater Atlantic Regional Fisheries Office (GARFO) Regional Administrator. Under a rebuilding plan, the stock will be considered rebuilt once spawning stock biomass reaches the target biomass (spawning stock biomass maximum sustainable yield proxy). The MSA requires the overfished stock to be rebuilt within ten years once the regional office notifies the Council of the overfished state.

Several other issues identified during scoping for this action were considered by the Council and Board for inclusion in this Amendment but have since been removed. Some of those issues will be taken up through other initiatives or actions. More information on removed issues is available in past meeting documents and meeting summaries for this Amendment, available at: https://www.mafmc.org/actions/bluefish-allocation-amendment.

2.5 GOALS AND OBJECTIVES

(This replaces section 1.1.3 Management Objectives of Amendment 1)
The FMP goals and objectives include two goal statements, each with several associated management objectives.

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, and Commission and its 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 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.

3.0 MONITORING PROGRAM SPECIFICATION

In order to achieve the goals and objectives of this Amendment, the collection and maintenance of quality data is necessary. All state fishery management agencies were encouraged to pursue full implementation of the standards of the Atlantic Coastal Cooperative Statistics Program (ACCSP).

3.1 COMMERCIAL CATCH AND LANDINGS PROGRAM

The reporting requirements for the bluefish commercial fishery are specified by two general permit types: 1) state issued commercial permits and 2) federal commercial permits. State commercial permits are issued to individuals, with qualification and reporting requirements varying by state. Weekly landings information including species landed by gear and state are submitted by the Atlantic coastal states through the Standard Atlantic Fisheries Information System (SAFIS). Landings information assembled in the SAFIS database include both state and federal landings data. ACCSP's standard for commercial catch and effort statistics requires mandatory, trip-level reporting of all commercial harvested marine species, with fishermen and/or dealers required to report standardized data elements for each trip by the 10th of each month. For federal permit holders, commercial landings information is collected from VTRs monthly and are submitted 15 days after the end of the reporting month. Discards are estimated from the NEFSC observer program, and, if needed, from the VTR data. The NEFSC weigh out program provides commercial age and length information.

3.2 RECREATIONAL FISHERY CATCH REPORTING PROCESS

MRIP provides estimated bluefish catch from 1981-2019. Recreational catch was previously collected through the MRFSS, which was a recreational data collection program used from 1981-2003. The MRFSS program was replaced by MRIP in 2004 and was designed to provide more accurate and timely reporting as well as greater spatial coverage. The MRFSS and MRIP programs were simultaneously conducted in 2004-2006 and this information was used to calibrate past MRFSS recreational harvest estimates against MRIP recreational harvest estimates.

In 2018, MRIP implemented the Fishing Effort Survey (FES) which used an improved methodology to address several concerns with the prior Coastal Household Telephone Survey. These concerns included under-coverage of the angling public, declining number of households with landline telephones, reduced response rates, and memory recall issues. Past estimates have been recalibrated to the FES. This calibration resulted in a much higher recreational catch estimates compared to previous estimates.

Recreational bluefish catch were downloaded from http://www.st.NOAA Fisheries.noaa.gov/st1/recreational/queries/index.html using the query option.

An online description of MRIP survey methods can be found here: http://www.st.NOAA Fisheries.noaa.gov/recreational-Fisheries/index#meth

3.3 SOCIAL AND ECONOMIC COLLECTION PROGRAMS

Data on a number of variables relevant to social and economic dimensions of bluefish fisheries are collected through existing ACCSP data collection programs and MRIP; however, no explicit mandates to collect socioeconomic data for bluefish currently exist. In addition to landed quantities, commercial harvesters and dealers may report ex-vessel prices or value, fishing and landing locations, landing disposition, and a variety of measures capturing fishing effort. MRIP regularly collects information on recreational fishing effort and landings, and occasionally gathers socioeconomic data on angler motivations and expenditures.

3.4 BIOLOGICAL DATA COLLECTION PROGRAMS

3.4.1 Fishery-Dependent Data Collection

Addendum I to Amendment 1 implemented a biological monitoring program to enhance age and length data used in bluefish stock assessments. Under Addendum I, states that account for more than 4% of total coastwide removals (sum of recreational and commercial landings and dead discards) for the 2010-2019 period are required to collect a minimum of 100 bluefish ages with a target of collecting 50 from January through June and 50 from July through December. Those states are Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Virginia, North Carolina, and Florida. Age samples are primarily collected from fishery-dependent sources (e.g., party/charter boats, fishing tournaments and volunteer anglers), although samples collected from fishery-independent sources are sometimes utilized as needed to fulfill this requirement.

3.4.2 Observer Program

As a condition of state and/or federal permitting, many vessels are required to carry at-sea observers when requested. A minimum set of standard data elements are to be collected through the ACCSP at-sea observer program (refer to the ACCSP Program Design document for details). Specific fisheries priorities will be determined by the Discard/Release Prioritization Committee of ACCSP.

3.4.3 Fishery-Independent Data Collection

Many states, Northeast Fisheries Science Center (NEFSC), National Marine Fisheries Service (NOAA Fisheries), the Northeast Area Monitoring and Assessment Program (NEAMAP), and the Southeast Area Monitoring and Assessment Program (SEAMAP) conduct fishery-independent surveys. New Hampshire, Rhode Island, Connecticut, New York, New Jersey, Maryland, Virginia, and South Carolina (SEAMAP) provide indices of juvenile bluefish abundance for stock assessment, and Connecticut, New Jersey, Virginia (NEAMAP), and North Carolina provide indices of adult abundance. Although not included in the 2019 operational assessment, Massachusetts, Delaware, Georgia and Florida also maintain indices of abundance from surveys that encounter bluefish. In addition, Rhode Island, Connecticut, and New Jersey collect release length data from voluntary angler surveys that help to characterize the length frequency distribution of recreationally released fish.

4.0 MANAGEMENT PROGRAM

4.1 COMMERCIAL AND RECREATIONAL ALLOCATION

The commercial and recreational bluefish fisheries are managed with sector specific Annual Catch Limits (ACLs). This Amendment allocates 14% of the Acceptable Biological Catch (ABC) to the commercial ACL and 86% to the recreational ACL. These revised sector allocations are based on updated catch data from 1981-2018, and landings data from 2014-2018 and 2009-2018, as all three time series resulted in the same allocation.

4.2 COMMERCIAL ALLOCATIONS TO THE STATES

4.2.1 Commercial Allocations (*This replaces part of section 3.1.1.8.1 of Amendment 1)*
The coastwide commercial quota for bluefish is allocated annually to each state within the management unit from Maine to Florida based on a percentage determined in the FMP. The state-by-state quota allocations are based on recent 10 years of landings data (2009-2018) for the commercial fishery to reflect how the stock and fishing activity have shifted in recent years. The allocations also include a 0.1-percent minimum default allocation to ensure that no state in the management unit is excluded from the commercial fishery entirely. To allow industry and state managers to adjust more easily to these changes in commercial quota allocation, this Amendment phases in the changes over a period of seven years. The percent shift in allocation for each state is divided evenly over the phase-in period, so each state only experiences 1/7th of the change in allocation each year through 2028. Table 11 displays the state-by-state allocations for each year over the duration of the seven year phase-in period.

Table 11. State Commercial Allocations under Amendment 2

State	2022	2023	2024	2025	2026	2027	2028
Maine	0.59%	0.51%	0.43%	0.35%	0.27%	0.19%	0.11%
New Hampshire	0.39%	0.36%	0.33%	0.30%	0.27%	0.24%	0.22%
Massachusetts	7.20%	7.69%	8.17%	8.66%	9.14%	9.63%	10.12%
Rhode Island	7.21%	7.61%	8.01%	8.41%	8.81%	9.21%	9.61%
Connecticut	1.24%	1.22%	1.19%	1.16%	1.14%	1.11%	1.09%
New York	11.72%	13.06%	14.40%	15.74%	17.08%	18.42%	19.76%
New Jersey	14.68%	14.54%	14.40%	14.26%	14.12%	13.98%	13.85%
Delaware	1.68%	1.48%	1.29%	1.09%	0.89%	0.69%	0.49%
Maryland	2.85%	2.69%	2.54%	2.38%	2.23%	2.07%	1.92%
Virginia	11.02%	10.16%	9.30%	8.44%	7.58%	6.72%	5.87%
North Carolina	32.06%	32.05%	32.05%	32.04%	32.04%	32.03%	32.03%
South Carolina	0.04%	0.05%	0.06%	0.07%	0.08%	0.09%	0.10%
Georgia	0.02%	0.04%	0.05%	0.06%	0.08%	0.09%	0.10%
Florida	9.31%	8.55%	7.80%	7.04%	6.29%	5.53%	4.78%
Total*	100.01%	100.01%	100.02%	100.00%	100.02%	100.00%	100.05%

*Total column values do not sum to 100% due to rounding to the nearest hundredth.

4.2.2 Review of Commercial Allocations

The commercial state allocations will be reviewed by the Commission and Council within 5 years of implementation (2022). The review of commercial quota allocations does not mean that a new management document is needed; a management document should only be initiated if the Commission and the Council determine one is warranted.

4.3 REBUILDING PLAN

This Amendment implements a rebuilding plan that uses a constant fishing mortality model to rebuild the stock in seven years. This rebuilding plan was selected because it allows for minimal disruption to industry and minimizes negative socio-economic impacts while still rebuilding within the 10-year period required by the Magnuson-Stevens Act. However, because this model projects acceptable biological catch (ABC) values during rebuilding that are higher than those generated by the Council's risk policy, an exemption to the FMP's "most restrictive ABC" requirement is included with this amendment. This allows the Council's Scientific and Statistical Committee to recommend higher ABCs than the risk policy would typically generate during a rebuilding plan as long as they are consistent with the rebuilding plan, and the plan is projected to rebuild within the necessary time period. This rebuilding plan is scheduled to begin in 2022, and would be reviewed and revised as necessary every two years, as required by section 304(e)(7) of the Magnuson-Stevens Act.

Management track assessments will be conducted every two years to re-assess the bluefish stock. Following the release of management track assessments, the biological reference points will shift and rebuilding projections will be rerun to reflect the updated status of the stock. The seven year constant fishing mortality rebuilding plan specifies that the fishing mortality rate be set constant across the remaining duration of the rebuilding period every time projections are rerun, with a rebuild date set for 2028. Council and Commission staff will work with the NOAA Fisheries regional office and the Scientific and Statistical Committee (SSC) to identify how these new projections will be translated into future specifications.

4.4 QUOTA TRANSFER

4.4.1 Quota Transfer Process

Each year during the setting or review of annual catch limits, the Council and Board have the ability to recommend a transfer of quota between the recreational and commercial sectors, affecting the final commercial quota and RHL. The Council and Board can recommend a transfer from the commercial fishery to the recreational fishery or from the recreational fishery to the commercial fishery. Any transfer from one sector to the other is capped at 10% of the ABC. This allows quota transfers to scale with biomass. The size of the transfer cap will increase and decrease with changes in the acceptable biological catches that are associated with changes in the stock size.

Table 12 describes how the process of transfers works within the Council and Board's specifications process.

Table 12. Quota transfer process during a typical specifications cycle.

July: **Assess the need for a transfer**	Staff and the MC assesses the potential need for a transfer and develop recommendations to the Council and Board as part of the specifications setting or review process. The MC considers the expected commercial quota and RHL (pending Council and Board review/approval) in the coming year, and each sector's performance relative to landings limits in recent years. The MC has very limited data for the current year and is not able to develop precise current year projections of landings for each sector. The MC also considers factors including but not limited to: Projected changes in stock size, availability, or year class strength; recent or expected changes in management measures; recent or expected changes in fishing effort. The MC considers how these factors have different impacts on the commercial and recreational sectors. The effects of these considerations are largely difficult to quantify and there is currently no methodology that allows the MC to quantitatively determine the need for a transfer with a high degree of precision. The MC uses their best judgement to recommend whether a transfer furthers the Council and Board's policy objectives, using mostly recent trends by sector.
August: **Council and Board consider whether to recommend a transfer**	The Council and Board considers MC recommendations on transfers while setting annual catch and landings limits. Similar to the process for jointly setting catch limits, the Council and Board jointly agree on whether a need for a transfer exists, the direction of transfer, and the transfer amount.
October: **Council staff submits specifications package to NOAA Fisheries**	Council staff prepares and submits supporting documents if needed to modify catch limits or implement transfers.
Mid-December: **Recreational measures adopted**	The Council and Board adopt federal waters recreational measures and a general strategy for coastwide recreational management including any reductions or liberalizations needed in state waters. These recommendations are based on the expected post-transfer RHL which are not always implemented via final rule but have usually been recommended by the Council and Board and proposed to the public.
Late December: **Final specifications published**	NOAA Fisheries approves and publishes the final rule for the following year's catch and landings limits (if new or modified limits are needed), including any transfers.
January 1: **Fishing year specifications effective, including any transfers**	Fishing year specifications including any transfers would be effective January 1.

4.5 MANAGEMENT UNCERTAINTY

The specifications process for how the Board and Council account for management uncertainty is displayed in Figure 12. An ACL for each sector is established and allows for sector-specific reductions for management uncertainty to calculate the recreational and commercial ACTs. During the annual specifications process, the MC annually identifies and reviews the relevant sources of management uncertainty to recommend ACTs for the commercial and recreational fishing sectors. This targeted approach allows for the identification of sources of management uncertainty that are specific to one sector and are not present in the other.

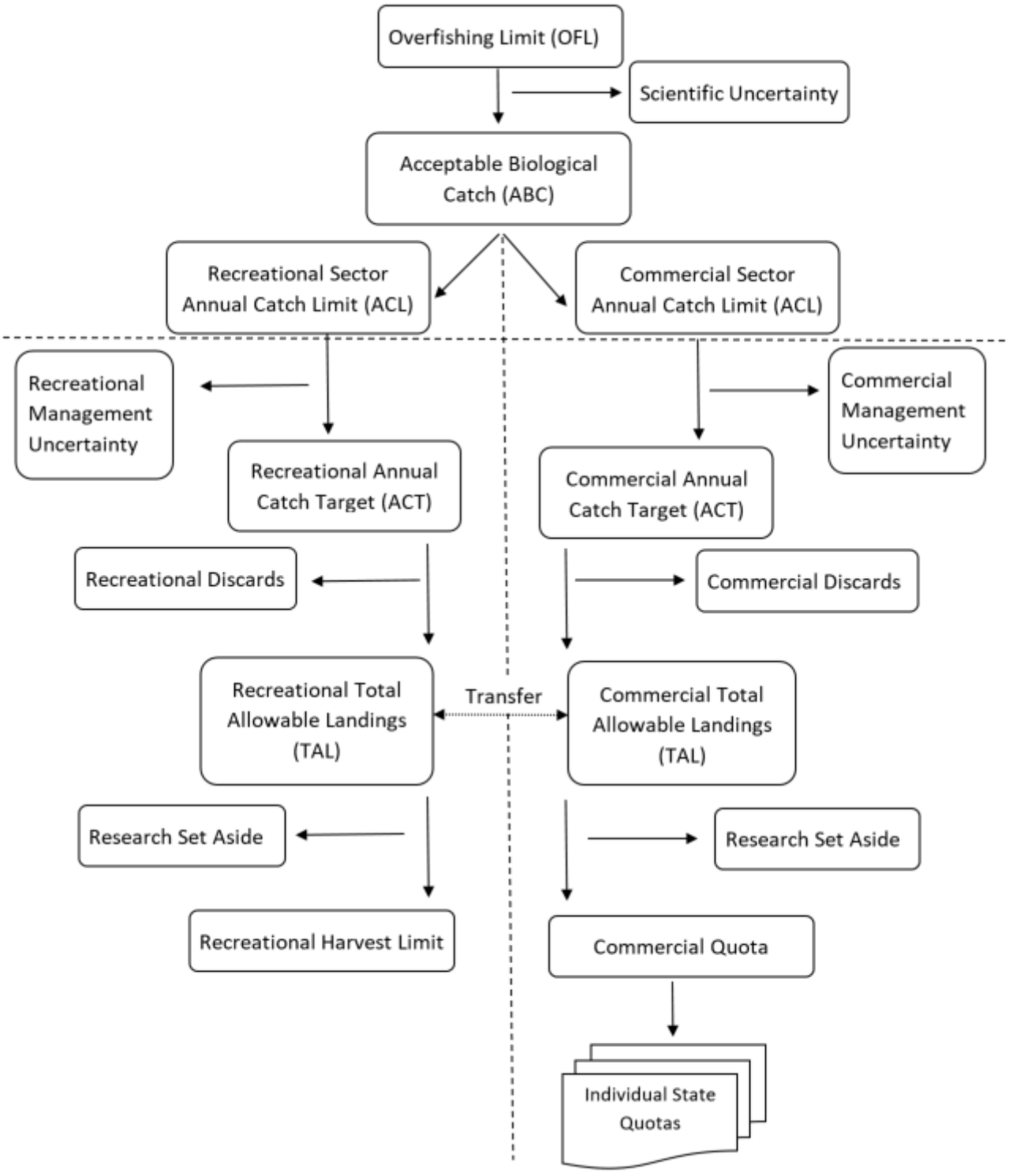


Figure 12. Revised bluefish flow chart including sector specific management uncertainty.

4.6 IMPACTS OF MANAGEMENT PROGRAM CHANGES

4.6.1 Impacts of Commercial/Recreational Allocation

An increase in the recreational allocation will likely result in increased RHLs. RHLs are tied to recreational measures such as possession limits, fish size restrictions, and open/closed seasons. These measures are adjusted as needed to allow the RHL to be achieved, but not exceeded. However, an increased recreational allocation may not allow for liberalized recreational management measures compared to recent years. Restrictive recreational measures may still be needed if the allocation increase is not enough to account for recent increases in the MRIP harvest estimates.

Liberalizing or restricting recreational measures can impact angler access to bluefish. Increased access could take the form of more fish to take home (under higher possession limits and/or lower minimum fish sizes) and more opportunities to target the species (under longer open seasons), while decreased access could mean the ability to retain fewer fish and reduced opportunities to target the species. This can affect angler satisfaction, revenues for for-hire businesses (e.g., by impacting demand for for-hire trips), and revenues for support businesses such as bait and tackle shops.

Social Impacts

Results from the Commercial Crew Survey indicate that the majority of crew and hired captains believe the rules and regulations in their respective commercial fisheries are too restrictive. Further reducing the commercial allocation could lead to negative impacts with respect to commercial fishers' attitudes towards management, as well as detrimental impacts on the ability of some fishers to continue to participate in the fishery. According to the Social Performance Indicators[4], the five most highly engaged communities in the commercial bluefish fishery from 2009 to 2019 are: 1) Wanchese, NC; 2) Montauk, NY; 3) Narragansett/Point Judith, RI; 4) Hampton Bays/Shinnecock, NY; and 5) New Bedford, MA (Figure 10). For commercial bluefish stakeholders located in these ports, the reduction in allocation to the commercial fishery may have the most substantial negative social impacts.

An increase in recreational allocation is likely to have positive impacts for recreational user groups, and in particular for those groups in communities that are highly engaged in and reliant upon recreational fisheries. The top fifteen communities in recreational fishing engagement and reliance are displayed in Figure 9 and Figure 11. Please note that the recreational fishing engagement and reliance scores are not bluefish specific, the metrics were based off of fishing engagement and reliance for all recreational species. For a more thorough introduction of community fishing engagement and social vulnerability indicators please reference *Section 1.5.3*.

These communities are likely to benefit, but some may see greater positive social impacts based on relative social vulnerabilities and reliance on the recreational industry. Communities in NC in particularly, such as Topsail Beach, Hatteras, and throughout the Outer Banks, have

[4] https://apps-nefsc.fisheries.noaa.gov/socialsci/pm/index.php.

high reliance on recreational fisheries while at the same time moderate to high poverty, labor force vulnerability, and housing vulnerability. Increasing recreational allocations for bluefish could improve economic opportunities and result in positive social outcomes for these communities in particular.

At the community level, impacts may be greatest for communities with or near recreational fishing sites, communities where for-hire businesses are based, and communities with tourism that is impacted by recreational fishing.

Economic Impacts

This Amendment results in a reduced allocation to the commercial sector, which is expected to decrease commercial quotas compared to the previous allocations. The commercial sector could experience a loss in revenue due to corresponding decreased quotas and a reduction in potential landings of bluefish. However, with the exception of 2020, the commercial sector has not fully utilized its post transfer quota in over a decade, so a decrease in allocation may not necessarily lead to a decrease in commercial landings or revenues in the long term.

Impacts from a reduction in commercial quota will not be uniform across all states and commercial industry participants. Commercial fishermen from states that fully utilize quota are more likely to experience losses in revenue, restrictive trip limits, and seasonal closures to account for the reduced commercial quota. States that have historically underutilized their quota may still be impacted in the medium- to long-term; reduced access to quota may inhibit the ability for market expansion in the future. These states could also be impacted in the near-term depending on the magnitude of allocation reduction.

It is difficult to identify and quantify the economic impacts stemming from increases in recreational bluefish quota. Without a demand model, it is impossible to estimate the changes in angler effort and expenditures resulting from quota increases. Qualitatively, increases in the recreational allocation is expected to have neutral or slightly positive economic impacts which result from increases in recreational sector quota. Increases in bag limits might increase angler satisfaction as well as recreational for-hire and independent angler trips which would result in increased expenditures and effort. However, the economic impacts resulting from increases in recreational quota could be neutral given the high catch and release nature of the sector—where the same number of trips may occur despite the changes in quota.

Biological Impacts

A decrease in the commercial quota could lead to altered fishing behavior and increased regulatory discards compared to recent levels. Actual changes will depend on many factors such as weather, availability of other target species, and market demand. Discards are also influenced by availability of bluefish, both overall abundance and by size class. For example, a new large year class can lead to high availability of fish smaller than some states' minimum size for a few years, which can lead to increased regulatory discards. Lower availability of legal-sized fish can lead to decreased discards. For these reasons, it is challenging to predict future discards based on changes in allocations.

In all cases, total dead catch will continue to be constrained by the overall ABC, which is set based on the best scientific information available and is intended to prevent overfishing. In this way, the change in sector allocations are not expected to change patterns in landings, discards, or fishing effort to such a degree that it negatively impacts stock status in the long term.

4.6.2 Impacts of Commercial Allocations to the States

Social Impacts

The socioeconomic impacts of the revised allocations vary from state to state. Some states reported negative economic impacts associated with the prior allocations due to a mismatch between their allocation and their fishery capacity and/or bluefish availability in their waters. Commercial fishermen that land bluefish within a state that consistently harvests less than its quota have the benefit of operating within an unconstrained fishery. Future fluctuations in stock size are less likely to restrict fishing effort and mitigate revenue losses within that state. Each state manages their fishery differently in terms of total number of participants, trip limits, seasons, and other measures. A restriction in one or more of these measures is the driver of the social and economic impacts to industry participants. For example, a restriction in the daily trip limit will likely have an outsized impact on larger vessels compared to smaller vessels which may already harvest bluefish under the newly imposed daily trip limit.

Under the revised allocations, a 10-year time series of landings data informs the distribution of state allocations of commercial bluefish. This scenario increases the allocations for RI (~3%), MA (~3%), and NY (~9%) considerably, but reduce allocations for VA and FL by a similarly substantial amount (~6%). The revised allocations provide relative benefits to most of the north Mid-Atlantic and New England user groups. Communities in FL and VA do not feature among the most highly engaged in commercial bluefish activity (Figure 10), whereas MA, RI, NY, and NJ all have several communities with relatively high engagement in commercial bluefish fishery activities.

Economic Impacts

The revised commercial allocations incorporate more recent data that are reflective of current state-specific performance and have the potential to increase economic efficiency. Nonetheless, any reduction in allocation may limit a state's potential for market expansion and future increases in landings and ex-vessel revenue. Revenue is also variable in nature and is influenced by fluctuations in costs and prices.

Through transfers, states which predict to land bluefish quantities above their allocated quota can request additional quota from states which are not expected to land their allocation. This transfer increases the requesting state's landings and revenues, overall. In addition, no incentives are given to the state transferring out quota. In theory, this transaction could be classified as a Pareto improvement, where the transfer of quota does not negatively impact either participating party. Given that these state-to-state transfer channels exist, the economic impacts of the reallocations at the state-level are expected to be marginal during years of higher bluefish population levels given that 1) allocations are based on realized landings/catch data and 2) states can transfer quota depending on their predicted performance in any given

year. However, in years when the coastwide commercial quota is low resulting from an overfished stock, there may not be a sufficient number of states with additional quota available to cover other states' needs. During these years, states with a small allocation relative to their share of recent coastwide landings are likely to be negatively impacted the most. In addition, there is opportunity cost in the form of time and effort associated with transfers. There is a decrease in economic efficiency linked with the processing and approving of transfer requests. The maximum economic benefits are associated with allocations which accurately capture a state's quota needs and minimizes the need for quota transfers.

Biological Impacts

Currently, bluefish discards in the commercial fishery are considered negligible. Depending on the scale of the allocation change in each state, a decrease in the commercial quota or additional restrictions on the commercial fishery could lead to increased regulatory discards compared to recent levels. Actual changes in discards will depend on many factors such as fishing behavior, weather, availability of other target species, and market demand. Discards are also influenced by availability of bluefish, both overall abundance and by size class. Therefore, it is challenging to predict future discards based on changes in state allocations.

Phase-in Impacts

This could mitigate to an extent the negative impacts by providing a buffer through smaller percentage changes over time, but also slow the realization of some states' increases in quota and their associated positive impacts.

4.6.3 Impacts of the Rebuilding Plan

The rebuilding plan will likely produce positive social and economic impacts in the long term with some negative social and economic impacts felt in the short term. The rebuilding plan will temporarily decrease opportunities for employment and income from the bluefish resource, but these opportunities will be regained over the long-term. The Board and Council selected a longer rebuilding period with more gradual changes to allowable catch to reduce the amount of uncertainty in fishing business decisions and thus mitigate potential negative social and economic impacts of a rebuilding plan.

Without a demand model, it is unclear how the rebuilding plan will impact recreational bluefish fishing effort. However, given the high catch and release nature of the fishery, there is likely to be little shift in the demand for recreational fishing given the projected changes in the ABCs associated with the rebuilding plan. Any increases in recreational TAL may have a slight positive economic impact in possibly more for-hire trips which may have higher value on catching and retaining fish. It is overall unclear to what degree recreational effort and angler expenditures will be impacted by the rebuilding plan.

4.6.4 Impacts of Sector Transfers

The impacts of quota transfers depend on the frequency of transfer, the amount transferred in each year, the direction of transfer between sectors, and to what extent each sector has been or is expected to achieve their limits. The impacts of a transfer are also dependent on the

marginal economic value of additional allowable landings for each sector (in terms of commercial and for-hire revenues and revenues for associated commercial and recreational businesses), as well as the positive or negative impacts on angler satisfaction that may arise from modifying or maintaining recreational measures. As described below, many additional factors can influence how the commercial and recreational fisheries may be impacted by a transfer, including market conditions, overall availability of the species, availability of substitute species, and trends in effort driven by external factors.

Commercial to Recreational Transfers

If the recreational fishery receives a transfer, they will experience positive socioeconomic impacts due to outcomes such as the potential for liberalized measures, the ability to maintain measures when a reduction may otherwise be needed, and a reduced risk of an RHL or ACL overage that may impose negative consequences in a future year. These outcomes are likely to result in maintained or increased revenues for recreational businesses as well as improved or maintained levels of angler satisfaction, compared to if no commercial to recreational transfer occurred.

In this scenario, the commercial sector would give up quota that is not expected to be fully utilized. In theory, if the decision to transfer is based on a pattern of underutilization in the commercial sector, the economic impacts to the commercial sector from such a transfer would be neutral. However, the commercial sector could experience a loss in revenue if the potential for underutilization is incorrectly evaluated. This could be due to a disconnect in the data used to evaluate the transfer and conditions in the relevant fishing year, possibly driven by changes in market conditions or fishery participation and effort.

Impacts to the commercial fisheries are not likely to be felt equally across states given different commercial quota management systems and differing quota utilizations by state. While coastwide commercial landings can frequently fall short of the total commercial quota, individual states vary considerably in utilizing or underutilizing their individual quotas. A coastwide projected underutilization could occur even if one or more states would be expected to fully utilize their quota in the upcoming year. This could have negative economic impacts to the commercial industries in states that regularly achieve their quotas.

Recreational to Commercial Transfers

If the commercial fishery receives a transfer, they will experience positive social and economic impacts in the year of the transfer due to increased revenue earning potential associated with higher potential landings. In general, quota increases tend to result in higher revenues, although some of these benefits may be partially offset by decreases in price per pound that can be associated with higher quotas. All else held constant, transfers from the recreational to commercial sector would lead to positive impacts for the commercial sector.

In theory, if the decision to transfer is based on a pattern of underutilization by the recreational sector, negative socioeconomic impacts to the recreational sector from such a transfer may not be realized. However, this would limit the potential for liberalizing recreational management

measures. Since recreational harvest is more difficult to predict and control than commercial harvest, recreational management measures are frequently adjusted in order to strike an appropriate balance between conservation and angler satisfaction.

Impacts of Transfers in Either Direction

The impacts of transfers are also influenced by annual reductions or increases in the overall ABC based on changes in projected stock biomass and the application of the Council's risk policy. The recipient of a transfer could have some negative socioeconomic impacts from ABC reductions mitigated by receiving a transfer, while the transferring sector may experience exacerbated negative economic impacts from ABC reductions. Conversely, if the ABC were increasing, this could offset negative impacts to the transferring sector and provide additional benefits to the sector receiving the transfer.

The impacts of transfers can also be impacted by the availability and management of substitute species for a particular sector. High availability and access to recreational or commercial substitute species help mitigate negative impacts of a transfer away from a given sector, while lower availability and access would compound these negative effects.

Economic Impacts

The commercial sector has historically utilized a portion of the additional transferred quota by increasing landings above the initial pre-transfer commercial allocation. The additional quota transferred from the recreational sector to the commercial sector may also contribute to increases in job opportunities and/or higher paying trips for crew members along with increases in revenues. A transfer from the commercial sector to the recreational sector, would only provide positive economic impacts to the recreational sector if a future quota transfer were large enough to allow for a liberalization of recreational measures. In the absence of an increase in the bag limit resulting from a higher post-transfer RHL, the recreational sector is likely to experience negligible economic impacts. Within the commercial sector, there is a slight negative economic impact associated with a commercial sector to recreational sector transfer which could result from miscalculations in projected commercial landings which could limit the quantity landed by the commercial sector.

Impacts of the Transfer Cap

The economic impacts of implementing a 10% cap on sector transfers on the recreational and commercial sectors of the bluefish fishery are expected to be negligible. Although, these caps would limit the transfer quantities between sectors, harvest, effort, and expenditures are not expected to be impacted greatly in the future unless the share of harvest across sectors differs significantly from the established allocation of catch between the commercial and recreational sectors.

4.6.5 Impacts of Management Uncertainty

Identifying sources of management uncertainty and applying a buffer to reduce the probability of exceeding an ACL is a helpful tool in the management toolkit. However, the previous methodology of accounting for management uncertainty allowed under Amendment 1 was

lacking in its inability to specifically target sources of uncertainty that are present in one sector and not the other. In the previous iteration, the management uncertainty buffer was applied to the fishery-level ACL prior to the sector split and as such had the unintended consequence of reducing both sector's ACLs regardless of the source of management uncertainty. The revised methodology is a more targeted approach, where management uncertainty can be addressed by reducing one sector's ACL to the ACT while leaving the other sector unaffected. Without the ability to apply sector specific management uncertainty buffers, Council and Board members were faced with the difficult decision of applying management uncertainty to both sectors indiscriminately, or not applying management uncertainty at all and risking potential overages in the fishery-level ACL or ABC.

4.7 ALTERNATIVE STATE MANAGEMENT REGIMES

4.7.1 General Procedures

A state may submit a proposal for a change to its regulatory program or any mandatory compliance measure under this Amendment to the Commission. Such changes shall be submitted to the Chair of the Plan Review Team (PRT), who shall distribute the proposal to appropriate groups, including the Board, the PRT, the Technical Committee (TC), and the AP.

The PRT is responsible for gathering the comments of the TC and the AP. The PRT is also responsible for presenting these comments to the Board for decision.

The Board will decide whether to approve the state proposal for an alternative management program if it determines that it is consistent with the target fishing mortality rate applicable as well as the goals and objectives of this Amendment.

In order to maintain consistency within a fishing season, new rules should be implemented prior to the start of the fishing season. Given the time needed for the TC, AP, and Board to review the proposed regulations, as well as the time required by an individual state to promulgate new regulations, it may not be possible to implement new regulations for the on-going fishing season. In this case, new regulations should be effective at the start of the following season after a determination to do so has been made.

4.7.2 Management Program Equivalency

The TC, under the direction of the PRT, will review any alternative state proposals under this section and provide its evaluation of the adequacy of such proposals to the Board via the PRT. The PRT can also ask for reviews by the Law Enforcement Committee (LEC) or the AP.

4.7.3 *De Minimis* Fishery Guidelines

The Commission's Interstate Fisheries Management Program Charter defines *de minimis* as a situation in which, under existing conditions of the stock and scope of the fishery, conservation and enforcement actions taken by an individual state would be expected to contribute insignificantly to a coastwide conservation program required by an FMP or amendment. Commission FMPs commonly include *de minimis* provisions to relieve regulatory and

monitoring burdens for states that meet predetermined conditions and follow a defined request process.

Any state with commercial landings less than 0.1% of the total coastwide commercial landings in the last preceding year for which data is available is eligible for *de minimis*. A state can apply annually for *de minimis* status and requests will be reviewed annually by the PRT. At this time, de minimis does not exempt states from any measures, but exemptions could be afforded by the Board in future actions.

4.8 ADAPTIVE MANAGEMENT

The Board may vary the requirements specified in this Amendment as a part of adaptive management in order to conserve the bluefish resource. The elements that can be modified by adaptive management are listed in *Section 4.8.2*. The process under which adaptive management can occur is provided below.

4.8.1 General Procedures

The PRT will monitor the status of the fishery and the resource and report on that status to the Board annually or when directed to do so by the Board. The PRT will consult with TC, the Stock Assessment Subcommittee, and the AP in making such review and report, if necessary.

The Board will review the report of the PRT, and may consult further with the TC, or AP. The Board may, based on the PRT report or on its own discretion, direct the plan development team (PDT) to prepare an addendum to make any changes it deems necessary. The addendum shall contain a schedule for the states to implement the new provisions.

The PDT will prepare a draft addendum as directed by the Board, and shall distribute it to all states for review and comment. A public hearing will be held in any state that requests one. The PDT will also request comment from federal agencies and the public at large. After at least a 30-day review period, staff, in consultation with the PDT, will summarize the comments received and prepare a final version of the addendum for the Board.

The Board shall review the final version of the addendum prepared by the PDT, and shall also consider the public comments received and the recommendations of the TC, LEC, and AP. The Board shall then decide whether to adopt, or revise and then adopt, the addendum.
Upon adoption of an addendum by the Board, states shall prepare plans to carry out the addendum, and submit them to the Board for approval according to the schedule contained in the addendum.

4.8.2 Measures Subject to Change

The following measures are subject to change under adaptive management upon approval by the Board:

1. Minimum fish size
2. Maximum fish size
3. Gear restrictions

4. Gear requirements or prohibitions
5. Permitting restrictions
6. Recreational possession limit
7. Recreational seasons
8. Closed areas
9. Commercial seasons
10. Commercial trip limits
11. Commercial quota system including commercial quota allocation procedure and possible quota set asides to mitigate bycatch
12. Recreational harvest limit
13. Annual specification quota setting process
14. FMP Technical Monitoring Committee composition and process
15. Description and identification of essential fish habitat (EFH) and fishing gear management measures that impact EFH
16. Description and identification of habitat areas of particular concern
17. Overfishing definition and related thresholds and targets
18. Regional gear restrictions
19. Regional season restrictions (including option to split seasons)
20. Restrictions on vessel size (LOA and GRT) or shaft horsepower
21. Operator permits
22. Any other commercial or recreational management measure
23. Any other management measures currently included in the FMP
24. Set aside quotas for scientific research

4.9 EMERGENCY PROCEDURES

Emergency procedures may be used by the Board to require any emergency action that is not covered by, is an exception to, or a change to any provision in this Amendment. Procedures for implementation are addressed in the ASMFC Interstate Fisheries Management Program Charter, Section Six (c)(10) (ASMFC 2019).

4.10 MANAGEMENT INSTITUTIONS

4.10.1 Atlantic States Marine Fisheries Commission and ISFMP Policy Board

The Commission and the ISFMP Policy Board are generally responsible for the oversight and management of the Commission's Fisheries management activities. The Commission must approve all fishery management plans and amendments, including this Amendment. The ISFMP Policy Board reviews any non-compliance recommendations of the various Boards and, if it concurs, forwards them to the Commission for action.

4.10.2 Bluefish Management Board

The Board was established under the provisions of the Commission's ISFMP Charter (Section Four; ASMFC 2019) and is generally responsible for carrying out all activities under this Amendment.

The Board establishes and oversees the activities of the PDT, PRT, TC, and the AP. In addition, the Board makes changes to the management program under adaptive management, reviews state programs implementing the amendment, and approves alternative state programs through conservation equivalency. The Board reviews the status of state compliance with the management program annually, and if it determines that a state is out of compliance, reports that determination to the ISFMP Policy Board under the terms of the ISFMP Charter.

4.10.3. Bluefish Allocation and Rebuilding Amendment Fishery Management Action Team and Plan Development Team

The Fishery Management Action Team (FMAT) and the PDT are composed of personnel from state and federal agencies who have scientific knowledge of bluefish and management abilities. The FMAT/PDT is responsible for preparing and developing management documents, including amendments, using the best scientific information available and the most current stock assessment information. FMAT and PDT membership and purpose are identical, the key distinction is the FMAT is convened in accordance with MAFMC guidelines and the PDT is convened in accordance with the Interstate Fisheries Management Program Charter. For ease of reading, the PDT/FMAT is simply referred to as FMAT throughout this Amendment. The ASMFC FMP Coordinators are members of the FMAT/PDT. The FMAT/PDT will either disband or assume inactive status upon completion of this Amendment.

4.10.4 Bluefish Commercial/Recreational Allocation Amendment Plan Review Team

The Plan Review Team (PRT) is composed of personnel from state and federal agencies who have scientific and management ability and knowledge of bluefish. The PRT is responsible for providing annual advice concerning the implementation, review, monitoring, and enforcement of this Amendment once it has been adopted by the Commission. After final action on the amendment, the Board may elect to retain members of the PDT as members of the PRT, or appoint new members.

4.10.5 Bluefish Technical Committee

The Bluefish TC consists of representatives from state or federal agencies, Regional Fishery Management Councils, the Commission, a university, or other specialized personnel with scientific and technical expertise, and knowledge of the bluefish fisheries. The Board appoints the members of the TC and may authorize additional seats as it sees fit. The role of the TC is to assess the species' population, provide scientific advice concerning the implications of proposed or potential management alternatives, and respond to other scientific questions from the Board, PDT, or PRT.

4.10.6 Bluefish Advisory Panel

The Bluefish AP is established according to the Commission's Advisory Committee Charter. Members of the AP are citizens who represent a cross-section of commercial and recreational fishing interests and others who are concerned about bluefish conservation and management. The AP provides the Board with advice directly concerning the Commission's bluefish management program.

4.10.7 Federal Agencies

4.10.7.1 Management in the Exclusive Economic Zone

Management of bluefish in the EEZ is within the jurisdiction of one Regional Fishery Management Council (the Mid-Atlantic Fishery Management Council) under the Magnuson-Stevens Act (16 U.S.C. 1801 et seq.). The Council annually makes recommendations on catch and landings limits as well as gear modifications to the NOAA Fisheries through the specification process.

4.10.7.2 Federal Agency Participation in the Management Process

The Commission has granted U.S. Fish and Wildlife Service and NOAA Fisheries voting status on the ISFMP Policy Board and the Bluefish Management Board in accordance with the Commission's ISFMP Charter. NOAA Fisheries can also participate on the Bluefish FMAT, PRT, and TC.

4.10.7.3 Consultation with Fishery Management Councils

At the time of adoption of this Amendment, the Council is the only Regional Fishery Management Council to have implemented a management plan for bluefish; no other Councils have indicated an intent to develop a plan.

4.11 RECOMMENDATIONS TO THE SECRETARY OF COMMERCE FOR COMPLEMENTARY ACTIONS IN FEDERAL JURISDICTIONS

The Bluefish FMP is jointly managed between the Commission, Council, and NOAA Fisheries. The management changes in this Amendment will affect both state and federal permit holders operating in the commercial and recreational bluefish fisheries in both state and federal waters. The Atlantic states (through the Commission), the Council, and NOAA Fisheries through joint management coordinate to ensure consistency in management between state and federal waters. Therefore, a specific recommendation to the Secretary of Commerce for complementary action in federal jurisdictions is unnecessary at this time. The Board may consider further recommendations to the Secretary if changes to this Amendment occur through the adaptive management process (*Section 4.8*).

4.12 COOPERATION WITH OTHER MANAGEMENT INSTITUTIONS

The Board will cooperate, when necessary, with other management institutions during the implementation of this Amendment, including NOAA Fisheries and the New England, Mid-Atlantic, and South Atlantic Fishery Management Council.

5.0 COMPLIANCE

The full implementation of the provisions included in this Amendment is necessary for the management program to be equitable, efficient, and effective. States are expected to implement these measures faithfully under state laws. The Commission will continually monitor the effectiveness of state implementation and determine whether states are in compliance with the provisions of this fishery management plan.

The Board sets forth specific elements that the Commission will consider in determining state compliance with this fishery management plan, and the procedures that will govern the evaluation of compliance. Additional details of the procedures are found in the Commission's ISFMP Charter (ASMFC 2019).

5.1 MANDATORY COMPLIANCE ELEMENTS FOR STATES

A state will be determined to be out of compliance with the provision of this fishery management plan according to the terms of Section Seven of the ISFMP Charter if:

- Its regulatory and management programs to implement this Amendment have not been approved by the Board; or
- It fails to meet any schedule required by *Section 5.2*, or any addendum prepared under adaptive management (*Section 4.7*); or
- It has failed to implement a change to its program when determined necessary by the Board; or
- It makes a change to its regulations required under the Fishery Management Plan, without prior approval of the Board.

5.1.1 Regulatory Requirements

To be considered in compliance with this fishery management plan, all state programs must include a regime of restrictions on bluefish fisheries consistent with the requirements of *Section 3.1: Commercial Catch and Landings Programs; Section 3.4: Biological Data Collection Programs;* and *Section 4.0: Management Program*. A state may propose an alternative management program under *Section 4.7: Alternative State Management Regimes*, which, if approved by the Board, may be implemented as an alternative regulatory requirement for compliance. Bluefish key compliance items requested through the annual compliance review are listed below in *Section 5.3*.

5.2 COMPLIANCE SCHEDULE

This Amendment will be effective January 1, 2022.

5.3 COMPLIANCE REPORT CONTENT

Each state must submit to the Commission an annual report concerning its bluefish fisheries and management program for the previous year, no later than May 1st. A standard compliance report format has been prepared and adopted by the ISFMP Policy Board. States should follow this format in completing the annual compliance report.

The report shall cover:

- The previous calendar year's fishery and management program including mandatory reporting programs (including frequency of reporting and data elements collected), fishery dependent data collection, fishery independent data collection, regulations in effect, total harvest (including landings by gear type), *de minimis* requests, and future regulatory changes.

- The planned management program for the current calendar year summarizing regulations that will be in effect and monitoring programs that will be performed, highlighting any changes from the previous year.

5.4 PROCEDURES FOR DETERMINING COMPLIANCE

Detailed procedures regarding compliance determinations are contained in the ISFMP Charter, Section Seven (ASMFC 2019). In brief, all states are responsible for the full and effective implementation and enforcement of fishery management plans in areas subject to their jurisdiction. Written compliance reports as specified in the amendment must be submitted annually by each state with a declared interest. Compliance with this Amendment will be reviewed at least annually; however, the Board, ISFMP Policy Board, or the Commission may request the PRT to conduct a review of state's implementation and compliance with the amendment at any time.

The Board will review the written findings of the PRT within 60 days of receipt of a State's compliance report. Should the Board recommend to the Policy Board that a state be determined out of compliance, a rationale for the recommended noncompliance finding will be addressed in a report. The report will include the required measures of the FMP that the state has not implemented or enforced, a statement of how failure to implement or enforce required measures jeopardizes the species in question's conservation, and the actions a state must take in order to comply with requirements of the FMP.

The ISFMP Policy Board will review any recommendation of noncompliance from the Board within 30 days. If it concurs with the recommendation, it shall recommend to the Commission that a state be found out of compliance.

The Commission shall consider any noncompliance recommendation from the ISFMP Policy Board within 30 days. Any state that is the subject of a recommendation for a noncompliance finding is given an opportunity to present written and/or oral testimony concerning whether it should be found out of compliance. If the Commission agrees with the recommendation of the ISFMP Policy Board, it may determine that a state is not in compliance with the FMP, and specify the actions the state must take to come into compliance.

Any state that has been determined to be out of compliance may request that the Commission rescind its noncompliance findings, provided the state has revised its conservation measures.

5.5 ANALYSIS OF ENFORCEABILITY OF PROPOSED MEASURES

All state programs must include law enforcement capabilities adequate for successfully implementing that state's bluefish regulations. The LEC will monitor the adequacy of a state's enforcement activity.

6.0 MANAGEMENT AND RESEARCH NEEDS

The following lists of research needs have been identified to enhance knowledge of the bluefish resources. These research needs are drawn from the 2015 benchmark stock assessment; the MAFMC's Five Year Research Plan (2020-2024); and the Commission's Research Priorities and Recommendations to Support Interjurisdictional Fisheries Management. The list of research recommendations are classified into 1) stock assessment and population dynamics; 2) research and data needs.

6.1 STOCK ASSESSMENT AND POPULATION DYNAMICS

1. Explore a tag based assessment and associated costs compared to age based assessments to determine if it could supplement or replace other assessment techniques.
2. Characterize dynamics of older fish that are not well sampled by fishery independent trawl surveys by developing additional adult bluefish indices of abundance (e.g., broad spatial scale longline survey or gillnet survey).
3. Expand age structure of the SEAMAP index.
4. 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
5. Evaluate methods for integrating disparate indices produced at multiple spatial and temporal scales into a stock-wide assessment model.
6. Evaluate changes in selectivity of age-0 bluefish in fishery independent surveys due to shifting environmental conditions. Investigate trends in recruitment.

6.2 RESEARCH AND DATA NEEDS

1. Continue research on species interactions and predator-prey relationships.
2. Investigate the feasibility of alternative survey methods that target bluefish across all aged classes to create a more representative fishery-independent index of abundance.
3. Initiate sampling of offshore populations in winter months.
4. Initiate coastal surf zone seine study to provide more complete indices of juvenile abundance.
5. Conduct a post-release mortality study to determine if the recreational discard mortality rate has changed over time.
6. Investigate the assumption of zero discards in the commercial fishery.

7.0 PROTECTED SPECIES

In the fall of 1995, Commission member states, the National Marine Fisheries Service (NMFS; now, NOAA Fisheries) and the U.S. Fish and Wildlife Service (USFWS) began discussing ways to improve implementation of the Marine Mammal Protection Act (MMPA) and the Endangered Species Act (ESA) in state waters. Historically, these policies have been minimally enforced in state waters (0-3 miles). In November 1995, the Commission, through its ISFMP Policy Board, approved an amendment of its ISFMP Charter (Section Six (b)(2)) so that interactions between Commission-managed fisheries and species protected under the MMPA and ESA be addressed

in the Commission's fisheries management planning process. Specifically, the Commission's fishery management plans describe impacts of state fisheries on certain marine mammals and endangered species (collectively termed "protected species"), and recommend ways to minimize these impacts. The following section outlines: (1) the federal legislation which guides protection of marine mammals and sea turtles; (2) the protected species with potential fishery interactions; (3) the specific type(s) of fishery interactions; (4) population status of the affected protected species; and (5) potential impacts to Atlantic coastal state and interstate fisheries.

7.1 MARINE MAMMAL PROTECTION ACT (MMPA) REQUIREMENTS

Since its passage in 1972, one of the primary goals of the MMPA has been to reduce the incidental mortality and serious injury of marine mammals permitted in the course of commercial fishing operations to insignificant levels approaching a zero mortality and serious injury rate. Under the 1994 Amendments, the MMPA requires NOAA Fisheries to develop and implement a take reduction plan to assist in the recovery or prevent the depletion of each strategic stock that interacts with a Category I or II fishery. Specifically, a strategic stock is defined as a stock: (1) for which the level of direct human caused mortality exceeds the potential biological removal (PBR) level; (2) which is declining and is likely to be listed under the Endangered Species Act (ESA) in the foreseeable future; or (3) which is listed as a threatened or endangered species under the ESA or as a depleted species under the MMPA. Category I and II fisheries are those that have frequent or occasional incidental mortality and serious injury of marine mammals, respectively, whereas Category III fisheries have a remote likelihood of incidental mortality and serious injury of marine mammals. Each year, NOAA Fisheries publishes an annual List of Fisheries which classifies commercial fisheries into one of these three categories.

Under the 1994 mandates, the MMPA also requires fishermen participating in Category I and II fisheries to register under the Marine Mammal Authorization Program (MMAP), the purpose of which is to provide an exception for commercial fishermen from the general taking prohibitions of the MMPA for non-ESA listed marine mammals. All fishermen, regardless of the category of fishery they participate in, must report all incidental injuries and mortalities caused by commercial fishing operations within 48 hours.

Section 101(a)(5)(E) of the MMPA allows for the authorization of the incidental taking of individuals from marine mammal stocks listed as threatened or endangered under the ESA in the course of commercial fishing operations if it is determined that: (1) incidental mortality and serious injury will have a negligible impact on the affected species or stock; (2) a recovery plan has been developed or is being developed for such species or stock under the ESA; and (3) where required under Section 118 of the MMPA, a monitoring program has been established, vessels engaged in such fisheries are registered in accordance with Section 118 of the MMPA, and a take reduction plan has been developed or is being developed for such species or stock. Permits are not required for Category III fisheries; however, any mortality or serious injury of a marine mammal must be reported.

7.2 ENDANGERED SPECIES ACT (ESA) REQUIREMENTS

The taking of endangered sea turtles, fish, seabirds, and marine mammals is prohibited and considered unlawful under Section 9(a)(1) of the ESA. In addition, NOAA Fisheries or the USFWS may issue Section 4(d) protective regulations necessary and advisable to provide for the conservation of threatened species. The ESA defines take as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct." There are several mechanisms established in the ESA to allow exceptions to the take prohibition in Section 9(a)(1). Section 10(a)(1)(A) of the ESA authorizes NOAA Fisheries to allow the taking of 59 listed species through the issuance of research permits for scientific purposes or to enhance the propagation or survival of the species. Section 10(a)(1)(B) authorizes NOAA Fisheries to permit, under prescribed terms and conditions, any taking otherwise prohibited by Section 9(a)(1)(B) of the ESA, if the taking is incidental to, and not the purpose of, carrying out an otherwise lawful activity. Finally, Section 7(a)(2) requires federal agencies to consult with NOAA Fisheries to ensure that any action that is authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of critical habitat of such species. If, following completion of consultation, an action is found to jeopardize the continued existence of any listed species or cause adverse modification to critical habitat of such species, reasonable and prudent alternatives will be identified so that jeopardy or adverse modification to the species is removed and Section 7(a)(2) is met (see Section 7(b)(3)(A)). Alternatively, if, following completion of consultation, an action is not found to jeopardize the continued existence of any listed species or cause adverse modification to critical habitat of such species, reasonable and prudent measures will be identified that minimize the take of listed species or adverse modification of critical habitat of such species (see Section 7(b)(4)). Section (7)(o) provides the actual exemption from the take prohibitions established in Section 9(a)(1), which includes Incidental Take Statements that are provided at the end of consultation via the ESA Section 7 Biological Opinions.

7.3 ESA-LISTED SPECIES AND MMPA PROTECTED SPECIES

Numerous protected species inhabit the affected environment of the bluefish FMP (Table 13) and have the potential to be impacted by the management changes in this Amendment (*i.e.*, there have been observed/documented interactions in the fishery or with gear type(s) similar to those used in the fishery (hook and line, bottom trawl or gillnet gear)). These species are under NOAA Fisheries jurisdiction and are afforded protection under the Endangered Species Act (ESA) of 1973 and/or the Marine Mammal Protection Act (MMPA) of 1972.

Table 13. Species Protected Under the ESA and/or MMPA that May Occur in the Affected Environment of the Bluefish Fishery. Marine mammal species (cetaceans and pinnipeds) italicized and in bold are considered MMPA strategic stocks.[1]

Species	Status[2]	Potentially impacted by this action?
Cetaceans		
North Atlantic right whale (Eubalaena glacialis)	***Endangered***	***Yes***
Humpback whale, West Indies DPS (Megaptera novaeangliae)[3]	Protected (MMPA)	Yes
Fin whale (Balaenoptera physalus)	***Endangered***	***Yes***
Sei whale (Balaenoptera borealis)	***Endangered***	***Yes***
Blue whale (Balaenoptera musculus)	***Endangered***	***No***
Sperm whale (Physeter microcephalus	***Endangered***	***No***
Minke whale (*Balaenoptera acutorostrata*)	Protected (MMPA)	Yes
Pilot whale (Globicephala spp.)3	Protected (MMPA)	Yes
Risso's dolphin (*Grampus griseus*)	Protected (MMPA)	Yes
Atlantic white-sided dolphin (*Lagenorhynchus acutus*)	Protected (MMPA)	Yes
Short Beaked Common dolphin (*Delphinus delphis*)	Protected (MMPA)	Yes
Spotted dolphin (*Stenella frontalis*)	Protected (MMPA)	No
Bottlenose dolphin (Tursiops truncatus)[4]	***Protected (MMPA)***	***Yes***
Harbor porpoise (*Phocoena phocoena*)	Protected (MMPA)	Yes
Sea Turtles		
Leatherback sea turtle (*Dermochelys coriacea*)	Endangered	Yes
Kemp's ridley sea turtle (*Lepidochelys kempii*)	Endangered	Yes
Green sea turtle, North Atlantic DPS (*Chelonia mydas*)	Threatened	Yes
Loggerhead sea turtle (*Caretta caretta*), Northwest Atlantic Ocean DPS	Threatened	Yes
Hawksbill sea turtle (*Eretmochelys imbricate*)	Endangered	No
Fish		
Shortnose sturgeon (*Acipenser brevirostrum*)	Endangered	No
Atlantic salmon (*Salmo salar*)	Endangered	Yes
Atlantic sturgeon *(Acipenser oxyrinchus)*		
Gulf of Maine DPS	Threatened	Yes

New York Bight DPS, Chesapeake Bay DPS, Carolina DPS & South Atlantic DPS	Endangered	Yes
Cusk (*Brosme brosme)*	Candidate	Yes
Giant manta ray (*Brosme brosme*)	Threatened	Yes
Smalltooth sawfish (U.S. DPS) (*Pristis pectinata*)	Endangered	No
Oceanic Whitetip shark (*Carcharhinus longimanus*)	Threatened	No
Nassau grouper (*Epinephelus striatus*)	Threatened	No
Pinnipeds		
Harbor seal (*Phoca vitulina*)	Protected (MMPA)	Yes
Gray seal (*Halichoerus grypus*)	Protected (MMPA)	Yes
Harp seal (*Phoca groenlandicus*)	Protected (MMPA)	Yes
Hooded seal (*Cystophora cristata*)	Protected (MMPA)	Yes
Corals		
Elkhorn Coral (Acropora palmata)	Threatened	No
Staghorn Coral (Acropora cervicornis)	Threatened	No
Pillar Coral (Dendrogyra cylindrus)	Threatened	No
Rough cactus coral (Mycetophyllia ferox)	Threatened	No
Lobed star coral (Orbicella annularis)	Threatened	No
Mountainous star coral (*Orbicella faveolata)*	Threatened	No
Boulder star coral (*Orbicella franksi)*	Threatened	No
Seagrass		
Johnson's Sea Grass (*Halophila johnsonii)*	Threatened	No
Critical Habitat		
North Atlantic Right Whale	ESA (Protected)	No
Northwest Atlantic Ocean DPS of Loggerhead Sea Turtle	ESA (Protected)	No
Johnson's Sea Grass	ESA (Protected)	No
Elkhorn and staghorn corals	ESA (Protected)	No
Smalltooth sawfish (U.S. DPS)	ESA (Protected)	No

Notes:

[1] A strategic stock is defined under the MMPA as a marine mammal stock for which: (1) the level of direct human-caused mortality exceeds the potential biological removal level; (2) based on the best available scientific information, is declining and is likely to be listed as a threatened species under the ESA within the foreseeable future; and/or (3) is listed as a threatened or endangered species under the ESA, or is designated as depleted under the MMPA (Section 3, 1972).

[2] The status of the species is defined by whether the species is listed under the ESA as endangered (species are at risk of extinction) or threatened (species at risk of endangerment), or protected under the MMPA. Note, marine mammals listed under the ESA are also

protected under the MMPA. Candidate species are those species in which ESA listing may be warranted.

[3] There are two species of pilot whales: short finned (*G. melas melas*) and long finned (*G. macrorhynchus*). Due to the difficulties in identifying the species at sea, they are often just referred to as *Globicephala spp*.

[4] This includes all stocks of bottlenose dolphins except for the Florida Bay stock (see marine mammal stock assessment reports: https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessment-reports-region).

Cusk (Table 13), a NOAA Fisheries "species of concern," as well as a "candidate species" under the ESA, occurs in the affected environment of the bluefish fishery. Candidate species are those petitioned species that NOAA Fisheries is actively considering for listing as endangered or threatened under the ESA and also include those species for which NOAA Fisheries has initiated an ESA status review through an announcement in the FR. Once a species is proposed for listing, the conference provisions of the ESA apply (see 50 CFR 402.10); however, candidate species receive no substantive or procedural protection under the ESA. As a result, this species will not be discussed further in this section. However, for additional information on cusk and proactive conservation efforts being initiated for the species, visit:

http://www.greateratlantic.fisheries.noaa.gov/protected/pcp/soc/cusk.html.

7.1.1 Species and Critical Habitat Not Likely to be Impacted by the Action

Based on available information, it has been determined that this action is not likely to impact multiple ESA listed and/or marine mammal protected species or any designated critical habitat (Table 13). This determination has been made because either the occurrence of the species is not known to overlap with the area primarily affected by the action and/or based on the most recent 10 years of observer, stranding, and/or marine mammal serious injury and mortality reports, there have been no observed or documented interactions between the species and the primary gear type (i.e., hook and line, gillnet, and bottom trawl) used to prosecute the bluefish fishery (Greater Atlantic Region Marine Animal Incident Database, unpublished data ; Marine Mammal Stock Assessment Reports (SARs) for the Atlantic Region[5]; NEFSC observer/sea sampling database, unpublished data; NOAA Fisheries NEFSC reference documents (marine mammal serious injury and mortality reports): https://apps-nefsc.fisheries.noaa.gov/rcb/publications/center-reference-documents.html; MMPA List of Fisheries (LOF): https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-protection-act-list-fisheries; NMFS 2021a)[6]. In the case of critical habitat, this determination has been made because the action will not affect the essential physical and

[5]https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessment-reports-region

[6] For marine mammals protected under the MMPA the most recent 10 years of observer, stranding, and/or marine mammal serious injury and mortality reports are from 2007-2016; however, entanglement data is available through 2019. For ESA listed species, information on observer or documented interactions with fishing gear is from 2010-2019.

biological features of critical habitat identified in Table 13 and therefore, will not result in the destruction or adverse modification of any species critical habitat (NMFS 2021a).

7.1.2 Species Potentially Impacted by the Action

Table 13 has a list of protected species of sea turtle, marine mammal, and fish species present in the affected environment of the bluefish fishery, and that may also be impacted by the operation of this fishery; that is, have the potential to become entangled or bycaught in the fishing gear used to prosecute the fishery. To aid in the identification of MMPA protected species potentially impacted by the action, NMFS (2021b), the MMPA LOF, and marine mammal SARS and serious injury and mortality reports were referenced (see Marine Mammal SARS for the Atlantic Region: https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessment-reports-region; MMPA LOF: https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-protection-act-list-fisheries; NEFSC observer/sea sampling database, unpublished data; NMFS NEFSC reference documents (marine mammal serious injury and mortality reports): https://apps-nefsc.fisheries.noaa.gov/rcb/publications/center-reference-documents.html).

To help identify ESA listed species potentially affected by the action, the most recent 10 years of marine animal incidence (e.g., entanglement) and NEFSC observer data (i.e., 2010-2019; NEFSC observer/sea sampling database, unpublished data, Greater Atlantic Region Marine Animal Incident Database, unpublished data), as well as the 2013 Biological Opinion issued by NOAA Fisheries on the operation of seven commercial fisheries, including the bluefish FMP, was referenced (NMFS 2013). The 2013 Opinion, which considered the best available information on ESA listed species and observed or documented ESA listed species interactions with gear types used to prosecute the 7 FMPs (e.g., gillnet, bottom trawl), concluded that the seven fisheries may adversely affect, but was not likely to jeopardize the continued existence of any ESA listed species. The Opinion included an incidental take statement (ITS) authorizing the take of specific numbers of ESA listed species of sea turtles, Atlantic salmon, and Atlantic sturgeon. Reasonable and prudent measures and terms and conditions were also issued with the ITS to minimize impacts of any incidental take.

New information indicates that North Atlantic right whale abundance has been in decline since 2010 (Pace et al. 2017). This new information is different from that considered and analyzed in the 2013 Opinion and therefore, reveals effects from this fishery that were not previously considered. As a result, per an October 17, 2017, ESA 7(a)(2)/7(d) memo issued by NOAA Fisheries, the 2013 Opinion, as well as several other fishery Opinions, has been reinitiated. However, the October 17, 2017, ESA 7(a)(2)/7(d) memorandum issued by NOAA Fisheries, determined ".....For the consultations being reinitiated..... Allowing these fisheries to continue during the reinitiation period will not increase the likelihood of interactions with these species above the amount that would otherwise occur if consultation had not been reinitiated, because allowing these fisheries to continue does not entail making any changes to any fishery during the reinitiation period that would cause an increase in interactions with whales, sea turtles, sturgeon, or Atlantic salmon. Because of this, the continuation of these fisheries during the reinitiation period would not be likely to jeopardize the continued existence of any whale, sea

turtle, Atlantic salmon, or sturgeon species." Until replaced, the bluefish FMP is currently covered by the October 17, 2017, memorandum.

As the primary concern for both MMPA protected and ESA listed species is the potential for the fishery to interact (e.g., bycatch, entanglement) with these species it is necessary to consider (1) species occurrence in the affected environment of the fishery and how the fishery will overlap in time and space with this occurrence; and (2) data and observed records of protected species interaction with particular fishing gear types, to understand the potential risk of an interaction. Information on species occurrence in the affected environment of the bluefish fishery is below, while information on protected species interactions with specific fishery gear is in *Section 7.1.3*.

7.1.2.1 Sea Turtles

Below is a brief summary of the occurrence and distribution of sea turtles in the affected environment of the bluefish fishery. Additional background information on the range-wide status of affected sea turtles species, as well as a description and life history of each of these species, can be found in a number of published documents, including sea turtle status reviews and biological reports (NMFS and USFWS 1995; Hirth 1997; Turtle Expert Working Group [TEWG] 1998, 2000, 2007, 2009; NMFS and USFWS 2007a, 2007b; Conant et al. 2009; NMFS and USFWS 2013), and recovery plans for the loggerhead sea turtle (Northwest Atlantic DPS; NMFS and USFWS 2008), leatherback sea turtle (NMFS and USFWS 1992, 1998a), Kemp's ridley sea turtle (NMFS et al. 2011), and green sea turtle (NMFS and USFWS 1991, 1998b).

Hard-shelled sea turtles **-** In U.S. Northwest Atlantic waters, hard-shelled turtles commonly occur throughout the continental shelf from Florida to Cape Cod, MA, although their presence varies with the seasons due to changes in water temperature (Braun-McNeill et al. 2008; Braun & Epperly 1996; Epperly et al. 1995a,b; Mitchell et al. 2003; Shoop & Kenney 1992; TEWG 2009; Blumenthal et al. 2006; Braun-McNeill & Epperly 2004; Griffin et al. 2013; Hawkes et al. 2006; Hawkes et al. 2011; Mansfield et al. 2009; McClellan & Read 2007; Mitchell et al. 2003; Morreale & Standora 2005). As coastal water temperatures warm in the spring, loggerheads begin to migrate to inshore waters of the southeast United States and also move up the Atlantic Coast (Braun-McNeill & Epperly 2004; Epperly et al. 1995a,b,c; Griffin et al. 2013; Morreale & Standora 2005), occurring in Virginia foraging areas as early as late April and on the most northern foraging grounds in the GOM in June (Shoop & Kenney 1992). The trend is reversed in the fall as water temperatures cool. The large majority leave the Gulf of Maine by September, but some remain in Mid-Atlantic and Northeast areas until late fall (i.e., November). By December, sea turtles have migrated south to waters offshore of North Carolina, particularly south of Cape Hatteras, and further south, although it should be noted that hard-shelled sea turtles can occur year-round in waters off Cape Hatteras and south (Epperly et al. 1995b; Griffin et al. 2013; Hawkes et al. 2011; Shoop & Kenney 1992).

Leatherback sea turtles **-** Leatherbacks, a pelagic species, are known to use coastal waters of the U.S. continental shelf and to have a greater tolerance for colder water than hard-shelled sea turtles (James *et al.* 2005; Eckert *et al.* 2006; Murphy *et al.* 2006; NMFS and USFWS 2013b;

Dodge *et al.* 2014). Leatherback sea turtles engage in routine migrations between northern temperate and tropical waters (NMFS and USFWS 1992; James *et al.* 2005; James *et al*. 2006; Dodge *et al.* 2014). They are found in more northern waters (i.e., Gulf of Maine) later in the year (i.e., similar time frame as hard-shelled sea turtles), with most leaving the Northwest Atlantic shelves by mid-November (James *et al.* 2005; James *et al*. 2006; Dodge *et al.* 2014).

7.1.2.2 Large Whales

Humpback, North Atlantic right, fin, sei, and minke whales occur in the Northwest Atlantic. Generally speaking, large whales follow an annual pattern of migration between low latitude (south of 35°N) wintering/calving grounds and high latitude spring/summer/fall foraging grounds (primarily north of 41°N; see marine mammal SARs: https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessment-reports-region). This is a simplification of whale movements, particularly as it relates to winter movements. It is unknown if all individuals of a population migrate to low latitudes in the winter, although increasing evidence suggests that for some species, some portion of the population remains in higher latitudes throughout the winter (Clapham et al. 1993; Davis et at. 2017; Davis et al. 2020; Hayes et al. 2020; Swingle et al. 1993; Vu et al. 2012). Although further research is needed to provide a clearer understanding of large whale movements and distribution in the winter, the occurrence of large whales in low latitude foraging grounds in the spring/summer/fall is well understood. Large whales consistently return to these foraging areas each year, therefore these areas can be considered important areas for whales (Davis et al. 2017; Davis et al. 2020; Hayes et al. 2020; Payne et al. 1986; Payne et al. 1990; Schilling et al. 1992). For additional information on the biology, status, and range wide distribution of humpback, North Atlantic right, fin, sei, and minke whales, refer to the marine mammal SARs provided at: https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessment-reports-region.

7.1.2.3 Small Cetaceans and Pinnipeds

Table 13 lists the small cetaceans and pinnipeds that may occur in the affected environment of the bluefish fishery. Small cetaceans can be found throughout the year in the Northwest Atlantic Ocean (Maine to Florida); however, within this range, there are seasonal shifts in species distribution and abundance. Pinnipeds are primarily found throughout the year or seasonally from New Jersey to Maine; however, increasing evidence indicates that some species (e.g., harbor seals) may be extending their range seasonally into waters as far south as Cape Hatteras, North Carolina (35°N). For additional information on the biology and range wide distribution of each species of small cetacean and pinniped, refer to the marine mammal SARs provided at: https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessment-reports-region

7.1.2.4 Atlantic sturgeon

The marine range of U.S. Atlantic sturgeon extends from Labrador, Canada, to Cape Canaveral, Florida. All five DPSs of Atlantic sturgeon have the potential to be located anywhere in this marine range (ASSRT 2007; Dovel and Berggren 1983; Dadswell et al. 1984; Kynard et al. 2000;

Stein et al. 2004a; Dadswell 2006; Laney et al. 2007; Dunton et al. 2010, 2015; Erickson et al. 2011; Wirgin et al. 2012; Waldman et al. 2013; O'Leary et al. 2014; Wirgin et al. 2015a,b; ASMFC 2017b).

Based on fishery-independent and dependent data, as well as data collected from tracking and tagging studies, in the marine environment, Atlantic sturgeon appear to primarily occur inshore of the 50 meter depth contour (Stein et al. 2004 a,b; Erickson et al. 2011; Dunton et al. 2010); however, Atlantic sturgeon are not restricted to these depths, as excursions into deeper continental shelf waters have been documented (Timoshkin 1968; Collins and Smith 1997; Stein et al. 2004a,b; Dunton et al. 2010; Erickson et al. 2011). Data from fishery-independent surveys and tagging and tracking studies also indicate that Atlantic sturgeon may undertake seasonal movements along the coast (Dunton et al. 2010; Erickson et al. 2011; Wipplehauser 2012); however, there is no evidence to date that all Atlantic sturgeon make these seasonal movements and therefore, may be present throughout the marine environment throughout the year.

For additional information on the biology, status, and range wide distribution of each distinct population segment (DPS) of Atlantic sturgeon please refer to 77 FR 5880 and 77 FR 5914, as well as the Atlantic Sturgeon Status Review Team's (ASSRT) 2007 status review of Atlantic sturgeon (ASSRT 2007) and the Commission's 2017 Atlantic Sturgeon Benchmark Stock Assessment and Peer Review Report (ASMFC 2017).

7.1.2.5 Atlantic salmon

The wild populations of Atlantic salmon are listed as endangered under the ESA. Their freshwater range occurs in the watersheds from the Androscoggin River northward along the Maine coast to the Dennys River, while the marine range of the GOM DPS extends from the GOM (primarily northern portion of the GOM), to the coast of Greenland (NMFS and USFWS 2005, 2016; Fay et al. 2006). In general, smolts, post-smolts, and adult Atlantic salmon may be present in the GOM and coastal waters of Maine in the spring (beginning in April), and adults may be present throughout the summer and fall months (Baum 1997; Fay et al. 2006; USASAC 2013; Hyvarinen et al. 2006; Lacroix and McCurdy 1996; Lacroix et al. 2004, 2005; Reddin 1985; Reddin and Short 1991; Reddin and Friedland 1993; Sheehan et al. 2012; NMFS and USFWS 2005, 2016; Fay et al. 2006). For additional information on the on the biology, status, and range wide distribution of the GOM DPS of Atlantic salmon, refer to NMFS and USFWS (2005, 2016); Fay et al. (2006).

7.1.2.6 Giant Manta Ray

Based on the giant manta ray's distribution, the species may occur in coastal, nearshore, and pelagic waters off the U.S. east coast (Miller and Klimovich 2017). Along the U.S. East Coast, giant manta rays are usually found in water temperatures between 19 and 22 degrees Celsius (Miller and Klimovich 2017) and have been observed as far north as New Jersey. Given that the species is rarely identified in the fisheries data in the Atlantic, it may be assumed that populations within the Atlantic are small and sparsely distributed (Miller and Klimovich 2017).

7.1.3 Interactions between Gear and Protected Species

Protected species are at risk of interacting with various types of fishing gear, with interaction risks associated with gear type, quantity, soak or tow duration, and degree of overlap between gear and protected species. Information on observed or documented interactions between gear and protected species is available from as early as 1989 (Marine Mammal SARs: https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessment-reports-region; NEFSC observer/sea sampling database, unpublished data). As the distribution and occurrence of protected species and the operation of fisheries (and, thus, risk to protected species) have changed over the last 30 years, we use the most recent 10 years of available information to best capture the current risk to protected species from fishing gear. For marine mammals protected under the MMPA, this primarily covers the period from 2008-2017[7]; however, the Greater Atlantic Region (GAR) Marine Animal Incident Database (unpublished data) contains large whale entanglement reports through 2019. For ESA listed species, the most recent 10 years of data on observed or documented interactions is available from 2010-2019[8] (data. Available information on gear interactions with a given species (or species group) is provided in the sections below. The sections to follow are not a comprehensive review of all fishing gear types known to interact with a given species; emphasis is only being placed on the primary gear types used to prosecute the multispecies bluefish fishery (i.e., recreational: hook and line; commercial: sink gillnet and bottom trawl gear).

7.1.3.1 Recreational Fisheries Interactions

The recreational bluefish fishery is primarily prosecuted with rod and reel and handline (i.e., hook and line gear). In the absence of an observer program for recreational fisheries, records of recreational hook and line interactions with protected resources are limited. However, as a dedicated observer program exists for all commercial fisheries, there is a wealth of information on observed protected species interactions with all fishing gear types and years of data assessing resultant population level effects of these interactions. Other sources of information, such as state fishing records, stranding databases, and marine mammal SARs, provide additional information that can assist in better understanding hook and line interaction risks to protected species.

Large whales

Large whales have been documented entangled with hook and line gear or monofilament line (GAR Marine Animal Incident Database, unpublished data; Marine Mammal SARs: https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-

[7] Waring et al. 2015a; Waring et al. 2016; Hayes et al. 2017; Hayes et al. 2018; Hayes et al. 2019; Hayes et al. 2020; MMPA List of Fisheries (LOF): https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-protection-act-list-fisheries; NMFS NEFSC reference documents (marine mammal serious injury and mortality reports): https://nefsc.noaa.gov/publications/crd/.

[8] ASMFC 2017; GAR Marine Animal Incident Database, unpublished data; Kocik et al. 2014; Marine Mammal SARs: https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessment-reports-region; Miller and Shepard 2011; Murray 2015; Murray 2018; Murray 2020; NMFS NEFSC reference documents (marine mammal serious injury and mortality reports): https://nefsc.noaa.gov/publications/crd/; NEFSC observer/sea sampling database, unpublished data.

assessment-reports-region). In the most recent (2008-2017) mortality and serious injury determinations for baleen whales, the majority of cases identified with confirmed hook and line or monofilament entanglement did not result in the serious injury or mortality to the whale (84.8 % observed/reported whales had a serious injury value of 0; 15.2 % had a serious injury value of 0.75; none of the cases resulted in mortality; Cole and Henry 2013; Henry et al. 2017; Henry et al. 2020). In fact, 75.8 % of the whales observed or reported with a hook/line or monofilament entanglement were resighted gear free and healthy; confirmation of the health of the other remaining whales remain unknown as no resightings had been made over the timeframe of the assessment (Cole and Henry 2013; Henry et al. 2017; Henry et al. 2020). Based on this information, while large whale interactions with hook and line gear are possible, there is a low probability that an interaction will result in serious injury or mortality to any large whale species. Therefore, relative to other gear types, such as fixed gear, hook and line gear represents a low source serious injury or mortality to any large whale (Henry et al. 2020).

Small cetaceans and pinnipeds

Table 13 provides a list of small cetaceans and pinnipeds that will occur in the affected environment of the bluefish fishery. Reviewing the most recent 10 years of data provided in the marine mammal SARs (i.e., 2008-2017), of these species, only bottlenose dolphin stocks have been identified (primarily through stranding records/data) as entangled in hook and line gear (https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessment-reports-region). In some cases, these entanglements have resulted in the serious injury or mortality to the animal. Specifically, reviewing stranding data provided in marine mammal SARs from 2008-2017, estimated mean annual mortality for each bottlenose stock due to interactions with hook and line gear was approximately one animal (Palmer 2017; https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessment-reports-region). Based on this, although interactions with hook and line gear are possible, relative to other gear types, such as trawl gear, hook and line gear represents a low source serious injury or mortality to any bottlenose dolphin stock. For other species of small cetaceans or pinnipeds, hook and line gear is not expected to be a source of serious injury or mortality.

Sea turtles

Interactions between ESA listed species of sea turtles and hook and line gear have been documented, particularly in nearshore waters of the Mid-Atlantic (e.g., GAR Sea Turtle and Disentanglement Network, unpublished data; NMFS Sea Turtle Stranding and Salvage Network, unpublished data; Palmer 2017;). Interactions with hook and line gear have resulted in sea turtle injury and mortality and therefore, poses an interaction risk to these species. However, the extent to which these interactions are impacting sea turtle populations is still under investigation, and therefore, no conclusions can currently be made on the impact of hook and line gear on the continued survival of sea turtle populations.

Atlantic Sturgeon

Interactions between ESA-listed species of Atlantic sturgeon and hook and line gear have been documented, particularly in nearshore waters (ASMFC 2017). Interactions with hook and line

gear have resulted in Atlantic sturgeon injury and mortality and therefore, poses an interaction risk to these species. However, the extent to which these interactions are impacting Atlantic sturgeon DPSs is still under investigation and therefore, no conclusions can currently be made on the impact of hook and line gear on the continued survival of Atlantic sturgeon DPSs (NMFS 2011b; ASMFC 2017).

Atlantic salmon
Review of the most recent 10 years of data on observed or documented interactions between Atlantic salmon and fishing gear, there have been no observed/documented interactions between Atlantic salmon and hook and line gear (NEFSC observer/sea sampling database, unpublished data). Based on this information, hook and line gear is not expected to pose an interaction risk to any Atlantic salmon and therefore, is not expected to be source of injury or mortality to this species.

Giant Manta Ray
Review of the most recent 10 years of data on observed or documented interactions between giant manta rays and fishing gear, there have been no observed/documented interactions between giant manta rays and hook and line gear (NEFSC observer/sea sampling database, unpublished data). Based on this information, hook and line gear is not expected to pose an interaction risk to giant manta rays and therefore, is not expected to be source of injury or mortality to this species.

7.1.3.2 Commercial Fisheries Interactions
The bluefish commercial fishery uses gillnets, bottom otter trawls, and hook and line gear. Except for what has been provided in section 6.3.3.1, no additional information is available on commercial hook and line interactions with protected species. Gillnet and/or bottom otter trawls are known to interact with ESA-listed and MMPA species of marine mammals, fish, and sea turtles.

Marine Mammals
Depending on species, marine mammals have been observed seriously injured or killed in bottom trawl and/or sink gillnet gear. Pursuant to the MMPA, NOAA Fisheries publishes a List of Fisheries (LOF) annually, classifying U.S. commercial fisheries into one of three categories based on the relative frequency of incidental serious injuries and/or mortalities of marine mammals in each fishery (i.e., Category I=frequent; Category II=occasional; Category III=remote likelihood or no known interactions). In the Northwest Atlantic, the 2021 LOF (86 FR 3028 (January 14, 2021)) categorizes commercial gillnet fisheries (Northeast or Mid-Atlantic) as Category I fisheries and commercial bottom trawl fisheries (Northeast or Mid-Atlantic) as Category II fisheries.

Large Whales

Bottom Trawl Gear

With the exception of minke whales, there have been no observed interactions with large whales and bottom trawl gear[9]. In 2008, several minke whales were observed dead in bottom trawl gear attributed to the northeast bottom trawl fishery; estimated annual mortality attributed to this fishery in 2008 was 7.8 minke whales (Waring et al. 2015). Since 2008, serious injury and mortality records for minke whales in U.S. waters have shown zero interactions with bottom trawl (northeast or Mid-Atlantic) gear[10]. Based on this information, large whale interactions with bottom trawl gear are expected to be rare to nonexistent.

Fixed Fishing Gear (e.g., Sink Gillnet Gear)

Large whale interactions (entanglements) with fishing gear have been documented in the waters of the Northwest Atlantic.[11] Information available on interactions with large whales comes from reports documented in the Greater Atlantic Region (GAR) Marine Animal Incident Database (unpublished data). For instance, review of the databases' most recent ten years (i.e., 2010-2019) of validated data indicates that there have been a total of 112 North Atlantic right whale entanglements; these entanglements include those confirmed to country and unknown country of origin (Table 14).[12] The best available data also shows that fin, minke, humpback, and to a lesser extent, sei and sperm whales, have also been observed and documented entangled in fishing gear (see footnote 7).

[9] Refer to Greater Atlantic Region Marine Animal Incident Database (unpublished data); Marine Mammal SARs: https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessment-reports-region; NEFSC observer/sea sampling database, unpublished data ; MMPA LOF: https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-protection-act-list-fisheries; NMFS NEFSC reference documents (marine mammal serious injury and mortality reports): https://apps-nefsc.fisheries.noaa.gov/rcb/publications/center-reference-documents.html

[10] Refer to: Greater Atlantic Region Marine Animal Incident Database (unpublished data); Waring et al. 2016; Hayes et al. 2017; Hayes et al. 2018; Hayes et al. 2019; Hayes et al. 2020; Cole and Henry 2013; and, Henry et al. 2014, 2015, 2016, 2017, 2019, 2020; MMPA LOF: https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-protection-act-list-fisheries.

[11] **NMFS Atlantic Large Whale Entanglement Reports**: https://www.fisheries.noaa.gov/new-england-mid-atlantic/marine-mammal-protection/atlantic-large-whale-take-reduction-plan (for years prior to 2014, contact David Morin, Large Whale Disentanglement Coordinator, David.Morin@NOAA.gov; GAR Marine Animal Incident Database (unpublished data); **NMFS Marine Mammal** SARs **for the Atlantic Region** :https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessment-reports-region; **NMFS NEFSC Marine Mammal Serious Injury and Morality Reference Documents**: https://apps-nefsc.fisheries.noaa.gov/rcb/publications/center-reference-documents.html; **MMPA List of Fisheries**: https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-protection-act-list-fisheries

[12] The data included in Table 14, includes entanglement events categorized as serious injury, mortality, or a non-serious injury. These observed events are considered a minimum estimate and the actual entanglement rate is likely higher.

Table 14. Observed entanglements of North Atlantic right whales from 2010 through 2019 by country of origin. Entanglements resulting in SI/M are presented in the parentheses.

	Number of Entanglements	Confirmed Canada	Confirmed U.S.	Unknown Country of Origin
2010	6 (4)	0	1	5 (4)
2011	14 (5.5)	0	2	12 (5.5)
2012	12 (4)	0	1 (1)	11 (3)
2013	5 (0.75)	0	0	5 (0.75)
2014	17 (8)	1	1 (1)	15 (7)
2015	9 (3.5)	1	0	8 (3.5)
2016	15 (9.5)	3 (3)	1	11 (6.5)
2017	15 (6)	8 (3)	1	6 (3)
2018	12 (5.75)	3 (1)	1	8 (4.75)
2019	7(2)	2(2)	0	5(0)
Total	**112 (49)**	**18 (9)**	**8 (2)**	**86 (38)**

Based on the best available information, the greatest entanglement risk to large whales is posed by fixed gear used in trap/pot or sink gillnet fisheries (Angliss and Demaster 1998; Cassoff et al. 2011; Kenney and Hartley 2001; Knowlton and Kraus 2001; Hartley *et al*. 2003; Johnson *et al*. 2005;Whittingham *et al*. 2005a,b; Knowlton et al. 2012; NMFS 2014; Hamilton and Kraus 2019; Henry et al. 2014; Henry et al. 2015; Henry et al. 2016; Henry et al. 2017; Henry et al. 2019; Henry et al. 2020; Sharp et al. 2019; see Marine Mammal SARs: https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessment-reports-region). Specifically, while foraging or transiting, large whales are at risk of becoming entangled in vertical endlines, buoy lines, or groundlines of gillnet and pot/trap gear, as well as the net panels of gillnet gear that rise into the water column (Baumgartner et al. 2017; Cassoff et al. 2011; Hamilton and Kraus 2019; Hartley *et al*. 2003; Henry et al. 2014; Henry et al. 2015; Henry et al. 2016; Henry et al. 2017; Henry et al. 2019; Henry et al. 2020; Johnson *et al*. 2005; Kenney and Hartley 2001; Knowlton and Kraus 2001;Knowlton et al. 2012; NMFS 2014; Whittingham *et al*. 2005a,b; see NMFS Marine Mammal SARs: https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessment-reports-region).[13] Large whale interactions (entanglements) with these features of trap/pot and/or sink gillnet gear often result in the serious injury or mortality to the whale (Angliss and Demaster 1998; Cassoff et al. 2011; Henry et al. 2014, Henry et al. 2015, Henry et al. 2016; Henry et al. 2017; Henry et al. 2019; Henry et al. 2020; Knowlton and Kraus 2001, Knowlton et al. 2012; Moore and Van der Hoop 2012; NMFS 2014; Pettis et al. 2019; Sharp et al. 2019; van der Hoop et al. 2016; van der Hoop et al. 2017). As many entanglements, and therefore, serious injury or mortality events, go unobserved, and because the gear type, fishery, and/or country of origin for reported entanglement events are often not traceable, the

[13] Through the ALWTRP, regulations have been implemented to reduce the risk of entanglement in in vertical endlines, buoy lines, or groundlines of gillnet and pot/trap gear, as well as the net panels of gillnet gear. For ALWTRP regulations currently implemented: see https://www.fisheries.noaa.gov/action/atlantic-large-whale-take-reduction-plan-regulations-1997-2015.

rate of large whale entanglement, and thus, rate of serious injury and mortality due to entanglement, are likely underestimated (Hamilton et al. 2018; Hamilton et al. 2019; Knowlton *et al.* 2012; Pace et al. 2017; Robbins 2009).

Due to the incidences of interactions with vertical lines associated with gillnet and trap/pot gear, in addition to the endangered status of the species being affected most by these gear types (i.e., North Atlantic right and fin whales), pursuant to the MMPA, these large whale species were designated as strategic stocks. Section 118(f)(1) of the MMPA requires the preparation and implementation of a Take Reduction Plan (TRP) for any strategic marine mammal stock that interacts with Category I or II fisheries. As a result, to address and mitigate the risk of large whale entanglement in fixed fishing gear comprised of vertical lines, including gillnet gear, the Atlantic Large Whale Take Reduction Plan (ALWTRP or Plan) was implemented. The ALWTRP identifies gear modification requirements and restrictions for Category I and II gillnet fisheries in the Northeast, Mid-Atlantic, and Southeast regions of the U.S. (designated management areas); these fisheries must comply with all regulations of the Plan. For further details on the ALWTRP, specifically gear modification requirements, restrictions, and management areas under the ALWTRP, see: https://www.fisheries.noaa.gov/new-england-mid-atlantic/marine-mammal-protection/atlantic-large-whale-take-reduction-plan.

Small Cetaceans

Sink Gillnet and Bottom Trawl Gear

Small cetaceans and pinnipeds are vulnerable to interactions with bottom trawl gear.[14] Reviewing marine mammal stock assessment and serious injury reports that cover the most recent 10 years data (i.e., 2008-2017), as well as the MMPA LOF's covering this time frame (i.e., issued between 2016 and 2021), Table 15 provides a list of species that have been observed (incidentally) seriously injured and/or killed by MMPA LOF Category I (frequent interactions) gillnet and/or Category II (occasional interactions) bottom trawl fisheries that operate in the affected environment of the bluefish fishery. Of the species provided in Table 15, gray seals, followed by harbor seals, harbor porpoises, short beaked common dolphins, and harps seals are the most frequently bycaught small cetacean and pinnipeds in sink gillnet gear in the Greater Atlantic Region (GAR; Hatch and Orphanides 2014, 2015, 2016, 2019; Orphanides 2020). In terms of bottom trawl gear, short-beaked common dolphins, Risso's dolphins, and Atlantic white-sided dolphins are the most frequently observed bycaught marine mammal species in the GAR, followed by gray seals, long-finned pilot whales, bottlenose dolphin (offshore), harbor porpoise, harbor seals, and harp seals (Lyssikatos 2015; Chavez-Rosales et al. 2017, Lyssikatos et al. 2020).

[14] For additional information on small cetacean and pinniped interactions, see: Chavez-Rosales et al. 2017; Hatch and Orphanides 2014, 2015, 2016, 2019; Josephson et al. 2017; Josephson et al. 2019; Lyssikatos 2015; Lyssikatos et al. 2020; Orphanides 2020; Read *et al*. 2006; Waring et al. 2015b; Marine Mammal SARS: https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessment-reports-region; MMPA LOF at: https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-protection-act-list-fisheries.

Table 15. Small cetacean and pinniped species observed seriously injured and/or killed by Category I and II sink gillnet or bottom trawl fisheries in the affected environment of the bluefish fishery.

Fishery	Category	Species Observed or reported Injured/Killed
Northeast Sink Gillnet	I	Bottlenose dolphin (offshore)
		Harbor porpoise
		Atlantic white sided dolphin
		Short-beaked common dolphin
		Risso's dolphin
		Pilot whales
		Harbor seal
		Hooded seal
		Gray seal
		Harp seal
Mid-Atlantic Gillnet	I	Bottlenose dolphin (Northern Migratory coastal)
		Bottlenose dolphin (Southern Migratory coastal)
		Bottlenose dolphin (offshore)
		Harbor porpoise
		Short-beaked common dolphin
		Harbor seal
		Harp seal
		Pilot whales
		Atlantic white sided dolphin
		Risso's dolphin
		Gray seal
Northeast Bottom Trawl	II	Harp seal
		Harbor seal
		Gray seal
		Pilot whales
		Short-beaked common dolphin
		Atlantic white-sided dolphin
		Harbor porpoise
		Bottlenose dolphin (offshore)
Mid-Atlantic Bottom Trawl	II	Atlantic white-sided dolphin
		Short-beaked common dolphin
		Pilot whales
		Risso's dolphin
		Bottlenose dolphin (offshore)
		Gray seal
		Harbor seal

Source: MMPA 2012-2021 LOFs at: https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-protection-act-list-fisheries

MMPA Section 118(f)(1) requires the preparation and implementation of a TRP for any strategic marine mammal stock that interacts with Category I or II fisheries. Thus, the Harbor Porpoise TRP (HPTRP) and the Bottlenose Dolphin TRP (BDTRP) were developed and implemented for these species.[15] Also, due to the incidental mortality and serious injury of small cetaceans, incidental to bottom and midwater trawl fisheries operating in both the Northeast and Mid-Atlantic regions, the Atlantic Trawl Gear Take Reduction Strategy (ATGTRS) was implemented. Additional information on each TRP or Strategy is at: https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-take-reduction-plans-and-teams.

Sea Turtles

Bottom Trawl Gear

Bottom trawl gear poses an injury and mortality risk to sea turtles (Sasso and Epperly 2006; NMFS Observer Program, unpublished data). Since 1989, the date of our earliest observer records for federally managed fisheries, sea turtle interactions with trawl gear have been observed in the Gulf of Maine, Georges Bank, and/or the Mid-Atlantic; however, most of the observed interactions have been observed south of the Gulf of Maine (Murray 2008; Murray 2015b; Murray 2020; NMFS Observer Program, unpublished data; Warden 2011 a, b). As few sea turtle interactions have been observed in the Gulf of Maine, there is insufficient data available to conduct a robust model-based analysis and bycatch estimate of sea turtle interactions with trawl gear in this region. As a result, the bycatch estimates and discussion below are for trawl gear in the Mid-Atlantic and Georges Bank.

Murray (2020) provided information on sea turtle interaction rates from 2014-2018 (the most recent five-year period that has been statistically analyzed for trawls). Interaction rates were stratified by region, latitude zone, season, and depth. The highest loggerhead interaction rate (0.43 turtles/day fished) was in waters south of 37º N during November to June in waters greater than 50 meters deep. The greatest number of estimated interactions occurred in the Mid-Atlantic region north of 39º N, during July to October in waters less than 50 meters deep. Within each stratum, interaction rates for non-loggerhead species were lower than rates for loggerheads (Murray 2020).

Based on Murray (2020)[16], from 2014-2018, 571 loggerhead (CV=0.29, 95% CI=318-997), 46 Kemp's ridley (CV=0.45, 95% CI=10-88), 20 leatherback (CV=0.72, 95% CI = 0-50), and 16 green (CV=0.73, 95% CI=0-44) sea turtle interactions were estimated to have occurred in bottom trawl

[15] Although the most recent U.S. Atlantic and Gulf of Mexico Marine Mammal SARs (Hayes et al. 2020) no longer designates harbor porpoise as a strategic stock, HPTRP regulations are still in place per the mandates provided in Section 118(f)(1).

[16] Murray (2020) estimated interaction rates for each sea turtle species with stratified ratio estimators. This method differs from previous approaches (Murray 2008; Murray 2015b; Warden 2011a,b), where rates were estimated using generalized additive models (GAMs). Ratio estimator results may be similar to those using GAM or generalized linear models (GLM) if ratio estimators are stratified based on the same explanatory variables in a GAM or GLM model (Murray 2007, Murray and Orphanides 2013, Orphanides 2010).

gear in the Mid-Atlantic region over the five-year period. On Georges Bank, 12 loggerheads (CV=0.70, 95% CI=0-31) and 6 leatherback (CV=1.0, 95% CI=0-20) interactions were estimated to have occurred from 2014-2018. An estimated 272 loggerhead, 23 Kemp's ridley, 13 leatherback, and 8 green sea turtle interactions resulted in mortality over this period (Murray 2020).

Sink Gillnet Gear

Interactions between sink gillnet gear and green, Kemp's ridley, loggerhead, and leatherback sea turtles have been observed in the Greater Atlantic region since 1989 (NEFSC observer/sea sampling database, unpublished data). Specifically, sea turtle interactions with gillnet gear have been observed in the Gulf of Maine, Georges Bank, and/or the Mid-Atlantic; however, most of the observed interactions have been observed south of the Gulf of Maine (Murray 2009a,b; Murray 2013; Murray 2018; NEFSC observer/sea sampling database, unpublished data). As few sea turtle interactions have been observed in the Gulf of Maine, there is insufficient data available to conduct a robust model-based analysis and bycatch estimate of sea turtle interactions with sink gillnet gear in this region. As a result, the bycatch estimates and discussion below are for sink gillnet gear in the Mid-Atlantic and Georges Bank.

From 2012-2016 (the most recent five-year period that has been statistically analyzed for gillnets), Murray (2018) estimated that sink gillnet fisheries in the Mid-Atlantic and Georges Bank bycaught 705 loggerheads (CV=0.29, 95% CI over all years: 335-1116), 145 Kemp's ridleys (CV =0.43, 95% CI over all years: 44-292), 27 leatherbacks (CV =0.71, 95% CI over all years 0-68), and 112 unidentified hard-shelled turtles (CV=0.37, 95% CI over all years (64-321).[17] Of these, mortalities were estimated at 557 loggerheads, 115 Kemp's ridley, 21 leatherbacks, and 88 unidentified hard-shelled sea turtles. Total estimated loggerhead bycatch was equivalent to 19 adults. The highest bycatch rate of loggerheads occurred in the southern Mid-Atlantic stratum in large mesh gear during November to June. Though only one sea turtle was observed in this stratum, observed effort was low, leading to a high bycatch rate. Bycatch rates of all other species were lower relative to loggerheads. Highest estimated loggerhead bycatch occurred in the northern mid-Atlantic from July to October in large mesh gears due to the higher levels of commercial effort in the stratum. Mean loggerhead bycatch rates were ten times those of Kemp's ridley bycatch rates in large mesh gear in the northern Mid-Atlantic from July to October (Murray 2018). Although interactions between sink gillnet gear and green sea turtles have been observed (NEFSC observer/sea sampling database, unpublished data); green sea turtles were excluded from the bycatch rate calculations in Murray (2018) because the observed interaction occurred in waters of North Carolina, and therefore, outside the study region.

[17] Murray (2018) estimated interaction rates for each sea turtle species with stratified ratio estimators. This method differs from previous approaches (Murray 2009, 2013), where rates were estimated using generalized additive models (GAMs). Ratio estimator results may be similar to those using GAM or generalized linear models (GLM) if ratio estimators are stratified based on the same explanatory variables in a GAM or GLM model (Murray 2007, Murray and Orphanides 2013, Orphanides 2010).

Atlantic Sturgeon

Sink Gillnet and Bottom Trawl Gear

Since 1989, Atlantic sturgeon interactions (i.e., bycatch) with sink gillnet and bottom trawl gear have frequently been observed in the Greater Atlantic Region, with most sturgeon observed captured falling within the 100 to 200cm total length range; however, both larger and small individuals have been observed (ASMFC 2007; ASMFC 2017; Miller and Shepard 2011; NEFSC observer/sea sampling database, unpublished data; Stein et al. 2004). For sink gillnets, higher levels of Atlantic sturgeon bycatch have been associated with depths of less than 40 meters, mesh sizes of greater than 10 inches, and the months of April and May (ASMFC 2007). For otter trawl fisheries, the highest incidence of Atlantic sturgeon bycatch have been associated with depths less than 30 meters (ASMFC 2007). More recently, over all gears and observer programs that have encountered Atlantic sturgeon, the distribution of haul depths on observed hauls that caught Atlantic sturgeon was significantly different from those that did not encounter Atlantic surgeon, with Atlantic sturgeon encountered primarily at depths less than 20 meters (ASMFC 2017).

The ASMFC (2017) Atlantic sturgeon benchmark stock assessment represents the most accurate predictor of annual Atlantic sturgeon interactions in fishing gear (e.g., otter trawl, gillnet). The stock assessment analyzes fishery observer and VTR data to estimate Atlantic sturgeon interactions in fishing gear in the Mid-Atlantic and New England regions from 2000-2015, the timeframe which included the most recent, complete data at the time of the report. The total bycatch of Atlantic sturgeon from bottom otter trawls ranged between 624-1,518 fish over the 2000-2015 time series, while the total bycatch of Atlantic sturgeon from gillnets ranged from 253-2,715 fish. Focusing on the most recent five-year period of data provided in the stock assessment report[18], the estimated average annual bycatch during 2011-2015 of Atlantic sturgeon in bottom otter trawl gear is 777.4 individuals and in gillnet gear is 627.6 individuals.

Atlantic salmon

Sink Gillnet and Bottom Trawl Gear

Atlantic salmon are at risk of interacting with bottom trawl or gillnet gear (NEFSC observer/sea sampling database, unpublished data; Kocik *et al*. 2014). NEFOP data from 1989-2019 show records of incidental bycatch of Atlantic salmon in seven of the 31 years, with a total of 15 individuals caught, nearly half of which (seven) occurred in 1992 (NEFSC observer/sea sampling database, unpublished data).[19] Of the observed incidentally caught Atlantic salmon, ten were listed as "discarded," which is assumed to be a live discard (Kocik, pers comm.; February 11, 2013). Five of the 15 were documented as lethal interactions. The incidental takes of Atlantic salmon occurred in bottom otter trawls (4) and gillnets (11). Observed captures occurred in March (2), April (2), May (1), June (3), August (1), and November (6). Given the very low

[18] The period of 2011-2015 was chosen as it is the period within the stock assessment that most accurately resembles the current trawl fisheries in the region.

[19] There is no information available on the genetics of these bycaught Atlantic salmon, so it is not known how many of them were part of the GOM DPS. It is likely that some of these salmon, particularly those caught south of Cape Cod, may have originated from the stocking program in the Connecticut River. Those Atlantic salmon caught north of Cape Cod and/or in the Gulf of Maine are more likely to be from the GOM DPS.

number of observed Atlantic salmon interactions in gillnet and bottom trawl gear, interactions with these gear types are believed to be rare in the Greater Atlantic Region.

Giant Manta Ray

Giant manta rays are potentially susceptible to capture by bottom trawl and gillnet gear based on records of their capture in fisheries using these gear types (NEFSC observer/sea sampling database, unpublished data). Review of the most recent 10 years of NEFOP data showed that between 2010-2019, two (unidentified) Giant Manta Rays were observed in bottom trawl gear and two were observed in gillnet gear (NEFSC observer/sea sampling database, unpublished data). Additionally, all of the giant manta ray interactions in gillnet or trawl gear recorded in the NEFOP database (13 between 2001 and 2019) indicate the animals were encountered alive and released alive. However, details about specific conditions such as injuries, damage, time out of water, how the animal was moved or released, or behavior on release is not always recorded. While there is currently no information on post-release survival, NOAA Fisheries Southeast Gillnet Observer Program observed a range of 0 to 16 giant manta rays captured per year between 1998 and 2015 and estimated that approximately 89% survived the interaction and release (see NOAA Fisheries reports available at: http://www.sefsc.noaa.gov/labs/panama/ob/gillnet.htm).

8.0 REFERENCES

Able, K.W. and M.P. Fahay. 1998. The first year in the life ofestuarine fishes in the Middle Atlantic Bight. Rutgers University Press. New Brunswick, NJ. 342 p.

Atlantic States Marine Fisheries Commission. 2013. Research Priorities and Recommendations to Support Interjurisdictional Fisheries Management. Special Report # 89. ASMFC, Arlington, VA. 58pp

Bigelow, H.B. and W.C. Schroeder. 1953. Fishes of the Gulf of Maine. U.S. Fish Wildl. Serv., Fish. Bull. 74. 882 p.

Bloznelis, D. (2018). Short-term salmon price forecasting. Journal of Forecasting, 37(2), 151-169. DOI: 10.1002/for.2482 http://onlinelibrary.wiley.com/doi/10.1002/for.2482/epdf *(1) (PDF) Short-term salmon price forecasting*. Available from: [accessed Oct 16 2020].

Burdge, R. J. (2003). The practice of social impact assessment background. Impact Assessment and Project Appraisal, 21(2), 84-88.

Chavez-Rosales, S., M.C. Lyssikatos, and J. Hatch. 2017. Estimates of cetacean and pinniped bycatch in northeast and mid-Atlantic bottom trawl fisheries, 2011-2015. Northeast Fish Sci Cent Ref Doc. 17-16; 18 p.

Colburn, L. L., & Jepson, M. (2012). Social indicators of gentrification pressure in fishing communities: a context for social impact assessment. *Coastal Management*, *40*(3), 289-300.

Cole TVN, Henry AG. 2013. Serious injury determinations for baleen whale stocks along the Gulf of Mexico, United States East Coast and Atlantic Canadian Provinces, 2007-2011. Northeast Fish Sci Cent Ref Doc. 13-24; 14 p. Online at: https://repository.library.noaa.gov/view/noaa/4561

Clapham, P.J., L.S. Baraff, C.A. Carlson, M.A. Christian, D.K. Mattila, C.A. Mayo, M.A. Murphy and S. Pittman. 1993. Seasonal occurrence and annual return of humpback whales, *Megaptera novaeangliae*, in the southern Gulf of Maine. Can. J. Zool. 71: 440-443.

Davis, G.E., M.F. Baumgartner, J.M. Bonnell, J. Bell, C. Berchok, J.B. Thornton, S. Brault, G. Buchanan, R.A. Charif, D. Cholewiak, C.W. Clark, P. Corkeron, J. Delarue, K. Dudzinski, L. Hatch, J. Hildebrand, L. Hodge, H. Klinck, S. Kraus, B. Martin, D.K. Mellinger, H. Moors-Murphy, S. Nieukirk, D.P. Nowacek, S. Parks, A.J. Read, A.N. Rice, D. Risch, A. Širović, M. Soldevilla, K. Stafford, J.E. Stanistreet, E. Summers, S. Todd, A. Warde and S.M. Van Parijs. 2017. Long-term passive acoustic recordings track the changing distribution of North Atlantic right whales (Eubalaena glacialis) from 2004 to 2014. Sci. Rep. 7:13460.

Davis, G. E., M. F. Baumgartner, P. J. Corkeron, J. Bell, C. Berchok, J. M. Bonnell, J. B. Thornton, S. Brault, G. A. Buchanan, D. M. Cholewiak, C. W. Clark, J. Delarue, L. T. Hatch, H. Klinck, S. D. Kraus, B. Martin, D. K. Mellinger, H. Moors-Murphy, S. Nieukirk, D. P. Nowacek, S. E. Parks, D. Parry, N. Pegg, A. J. Read, A. N. Rice, D. Risch, A. Scott, M. S. Soldevilla, K. M. Stafford, J. E. Stanistreet, E. Summers, S. Todd, S. M. Van Parijs. 2020. Exploring movement patterns

and changing distributions of baleen whales in the western North Atlantic using a decade of passive acoustic data. Glob. Change. Biol. 26: 4812-4840.

Gordon, D.V., 2020. A Short-Run ARDL-Bounds Model for Forecasting and Simulating the Price of Lobster. *Marine Resource Economics*, *35*(1), pp.43-63.

Hayes, S.A., E. Josephson, K. Maze-Foley, and P.E. Rosel (2017). U.S. Atlantic and Gulf of Mexico marine mammal stock assessments 2016. NOAA Technical Memorandum NMFS-NE-241.

Hayes, S.A, E. Josephson, K. Maze-Foley, and P. Rosel (2018). U.S. Atlantic and Gulf of Mexico Marine Mammal Stock Assessment-2017. NOAA Technical Memorandum NMFS-NE-245.

Hayes, S.A., E. Josephson, K. Maze-Foley, and P. E. Rosel. 2020. US Atlantic and Gulf of Mexico Marine Mammal Stock Assessments – 2019. NOAA Technical Memorandum NMFS-NE-264.

Henry, A. E., & Olson, J. A. (2014). An overview of the survey on the socio-economic aspects of commercial fishing crew in the northeast. NOAA Technical Memorandum. NMFS-NE-230.

Henry AG, Cole TVN, Garron M, Ledwell W, Morin D, Reid A. 2017. Serious injury and mortality determinations for baleen whale stocks along the Gulf of Mexico, United States east coast, and Atlantic Canadian provinces, 2011-2015. Northeast Fish Sci Cent Ref Doc. 17-19; 57 p. Online at: https://doi.org/10.7289/V5/RD-NEFSC-17-19

Henry AG, Garron M, Morin D, Reid A, Ledwell W, Cole TVN. 2020. Serious injury and mortality determinations for baleen whale stocks along the Gulf of Mexico, United States East Coast, and Atlantic Canadian provinces, 2013-2017. Northeast Fish Sci Cent Ref Doc. 20-06; 53 p. Online at: https://doi.org/10.25923/fbc7-ky15

Josephson, E., F.Wenzel, and M.C. Lyssikatos. 2017. Serious injury determinations for small cetaceans and pinnipeds caught in commercial fisheries off the Northeast US coast, 2011-2015. Northeast Fish Sci Cent Ref Doc. 17-15; 32 p.

Josephson, E., F. Wenzel, and M.C. Lyssikatos. 2019. Serious injury determinations for small cetaceans and pinnipeds caught in commercial fisheries off the Northeast US Coast, 2012-2016. Northeast Fish Sci Cent Ref Doc. 19-05; 27 p.

Lyssikatos, M.C. 2015. Estimates of cetacean and pinniped bycatch in Northeast and mid-Atlantic bottom trawl fisheries, 2008-2013. Northeast Fish Sci Cent Ref Doc. 15-19; 20 p.

Lyssikatos MC, Chavez-Rosales S, Hatch J. 2020. Estimates of cetacean and pinniped bycatch in Northeast and Mid-Atlantic bottom trawl fisheries, 2013-2017. Northeast Fish Sci Cent Ref Doc. 20-04; 11 p. Online at: https://doi.org/10.25923/5we2-g460

MAFMC (Mid-Atlantic Fishery Management Council). 2003. 2004 Atlantic bluefish specifications. Dover, DE. 79 pp.

MAFMC (Mid-Atlantic Fishery Management Council). 2008. Amendment 9 to the Atlantic Mackerel, Squid, and Butterfish Fishery Management Plan. 461 p. Available at: http://www.mafmc.org/s/SMB_Amend_9_Vol_1.pdf.

MAFMC (Mid-Atlantic Fishery Management Council). 2019. Comprehensive Five-Year (2020-2024) Research Priorities, December 2019. 17 p. Available at: https://www.mafmc.org/research-priorities.

MAFMC (Mid-Atlantic Fishery Management Council) and ASMFC (the Atlantic States Marine Fisheries Commission). (2020). Bluefish Allocation and Rebuilding Amendment Scoping Comments
Summary. https://static1.squarespace.com/static/511cdc7fe4b00307a2628ac6/t/5ef373a9d57bcf1ee8f3bfff/1593013179226/3_BF+scoping+comment+summary_Final.pdf.

Murray, K. T. 2007. Estimated bycatch of loggerheaed sea turtles (*Caretta caretta*) in U.S. mid-Atlantic scallop trawl gear, 2004-2005, and in scallop dredge gear, 2005. National Marine Fisheries Service, Northeast Fisheries Science Center, 166 Water Street, Woods Hole, Massachusetts 02543, February 2007. Northeast Fisheries Science Center Reference Document No. 07-04. Report No. 07-04

Murray KT. 2009. Characteristics and magnitude of sea turtle bycatch in US mid-atlantic gillnet gear. Endang Species Res 8:211-224

Murray KT. 2013. Estimated loggerhead and unidentified hard-shelled turtle interactions in Mid-Atlantic gillnet gear, 2007-2011. US Dept Commer, NOAA Tech Memo. NMFS-NE225; 20 p

Murray, K. 2020. Estimated magnitude of sea turtle interactions and mortality in US bottom trawl gear, 2014-2018. NOAA Tech Memo NMFS NE. 260; 19 p.

Murray, K. T. and C. D. Orphanides. 2013. Estimating the risk of loggerhead turtle *Caretta* bycatch in the U.S. Mid-Atlantic using fishery-independent and -dependent data. Marine Ecological Progress Series **477**: 259-270

National Oceanic and Atmospheric Administration (NOAA). 1999. *Discounting and the Treatment of Uncertainty in Natural Resource Damage Assessment: Technical Paper 99-1.* Silver Spring, MD. Available at: https://casedocuments.darrp.noaa.gov/northeast/athos/pdf/NOAA%201999.pdf.

National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service (NMFS). 2007. "NOAA/NMFS Council Operational Guidelines – Fishery Management Process. Appendix 2(g) Guidelines for Assessment of the Social Impact of Fishery Management Actions." NATIONAL MARINE FISHERIES SERVICE INSTRUCTION 01-111-02. https://media.fisheries.noaa.gov/dam-migration/01-111-02.pdf.

NEFSC (Northeast Fisheries Science Center). 2015. Bluefish Benchmark Stock Assessment. 60th SAW Assessment Report. 870 p. Available at: http://www.asmfc.org/uploads/file/55d2392c2015BluefishBenchmarkStockAssessment.pdf.

NEFSC (Northeast Fisheries Science Center). 2018a. Update on the Status of Spiny Dogfish in 2018 and Projected Harvests at the Fmsy Proxy and Pstar of 40%. Report to the Mid-Atlantic Scientific and Statistical Committee. 82 p. Available at: http://www.mafmc.org/s/2018-Status-Report-for-spiny-dogfish.pdf

NEFSC (Northeast Fisheries Science Center). 2018b. 66th Northeast Regional Stock Assessment Workshop (66th SAW) Assessment Report: Part B. Striped Bass Stock Assessment. Northeast Fisheries Science Center Reference Document 19-08 (https://www.nefsc.noaa.gov/publications/crd/crd1908/)

NEFSC (Northeast Fisheries Science Center). 2019. Operational Assessment of the Black Sea Bass, Scup, Bluefish, and Monkfish Stocks, Updated Through 2018. Report to the Mid-Atlantic Scientific and Statistical Committee. 164 p. Available at: http://www.mafmc.org//Operational-Assessments-for-Black-Sea-Bass_Scup_Bluefish.pdf.

NMFS. 2015. Standardized Bycatch Reporting Methodology: An Omnibus Amendment to the Fishery Management Plans of the Mid-Atlantic and New England Regional Fishery Management Councils.

NMFS (National Marine Fisheries Service). 2021a. Endangered Species Act Section 7 Consultation on the: (a) Authorization of the American Lobster, Atlantic Bluefish, Atlantic, Deep-Sea Red Crab, Mackerel/Squid/Butterfish, Monkfish, Northeast Multispecies, Northeast Skate Complex, Spiny Dogfish, Summer Flounder/Scup/Black Sea Bass, and Jonah Crab Fisheries and (b) Implementation of the New England Fishery Management Council's Omnibus Essential Fish Habitat Amendment 2. National Marine Fisheries Service, Greater Atlantic Regional Fisheries Office, Gloucester, Massachusetts; May 2021.

NMFS (National Marine Fisheries Service). 2021b. Final Environmental Impact Statement, Regulatory Impact Review, and Final Regulatory Flexibility Analysis for Amending the Atlantic Large Whale Take Reduction Plan: Risk Reduction Rule. Prepared by: NOAA's National Marine Fisheries Service and Industrial Economics, Incorporated; June 2021. https://www.fisheries.noaa.gov/new-england-mid-atlantic/marine-mammal-protection/atlantic-large-whale-take-reduction-plan

Orphanides, C. 2010. Protected species bycatch estimating approaches: Estimating harbor porpoise bycatch in U.S. Northwestern Atlantic gillnet fisheries. Fish. Sci **42**: 55-76

Orphanides CD. 2020. Estimates of cetacean and pinniped bycatch in the 2017 New England sink and Mid-Atlantic gillnet fisheries. Northeast Fish Sci Cent Ref Doc. 20-03; 16 p. Online at: https://doi.org/10.25923/fkbm-jr56

Payne, P.M., J.R. Nicholas, L. O'Brien and K.D. Powers 1986. The distribution of the humpback whale, *Megaptera novaeangliae*, on Georges Bank and in the Gulf of Maine in relation to densities of the sand eel, *Ammodytes americanus*. Fish. Bull. 84: 271-277.

Payne, P.M., D.N. Wiley, S.B. Young, S. Pittman, P.J. Clapham and J.W. Jossi 1990. Recent fluctuations in the abundance of baleen whales in the southern Gulf of Maine in relation to changes in selected prey. Fish. Bull. 88: 687-696.

Pershing, A. J., Alexander, M. A., Hernandez, C. M., Kerr, L. A., Bris, A. L. Mills, K. E., Nye, J. A., Record, N. R., Scannell, H. A., Scott, J. D., Sherwood, G. D., and A. C. Thomas. 2015. Slow adaptation in the face of rapid warming leads to collapse of the Gulf of Maine cod fishery. Science, Vol. 350, Issue 6262: 809-812.

Salerno, D.J., J. Burnett, and R.M. Ibara. 2001. Age, growth, maturity and spatial distribution of bluefish, *Pomatomus saltatrix* (Linnaeus), off the northeast coast of the United States, 1985-96. J. Northwest Atl. Fish. Sci., 29: 31-39.

Sasso, C.R., and S.P. Epperly. 2006. Seasonal sea turtle mortality risk from forced submergence in bottom trawls. Fisheries Research 81:86-88.

Schilling, M. R., I. Seipt, M. T. Weinrich, S. E. Frohock, A. E. Kuhlberg, and P. J. Clapham. 1992. Behavior of individually-identified sei whales, *Balaenoptera borealis,* during an episodic influx into the southern Gulf of Maine in 1986. Fishery Bulletin 90:749–755.

SEDAR. 2012. SEDAR 28 – South Atlantic Spanish mackerel Stock Assessment Report. SEDAR, North Charleston SC. 438 pp.

SEDAR. 2015. SEDAR 39 Stock Assessment Report: HMS Atlantic smooth dogfish. North Charleston (SC): SEDAR.

Silva, Angela, Gentile, Lauren E., Cutler, Matthew J., and Colburn, Lisa L. (Forthcoming). A Comparison of Waves I (2012/2013) and II (2018/2019) of the Survey on the Socio-economic Aspects of Commercial Fishing Crew in the Northeast U.S." NOAA Technical Memorandum.

Stevenson, D., L. Chiarella, D. Stephan, R. Reid, K. Wilhelm, J. McCarthy, M. Pentony. 2004. Characterization of the fishing practices and marine benthic ecosystems of the Northeast U.S. Shelf, and an evaluation of the potential effects of fishing on Essential Fish Habitat. NOAA Technical Memorandum NOAA Fisheries -NE-181; 179 p.

Swingle, W.M., S.G. Barco, T.D. Pitchford, W.A. McLellan and D.A. Pabst. 1993. Appearance of juvenile humpback whales feeding in the nearshore waters of Virginia. Mar. Mamm. Sci. 9: 309-315.

Tai, T.C., Cashion, T., Lam, V.W., Swartz, W. and Sumaila, U.R., 2017. Ex-vessel fish price database: Disaggregating prices for low-priced species from reduction fisheries. *Frontiers in Marine Science*, *4*, p.363.

Thompson, C. 2010. The Gulf of Maine in Context: State of the Gulf of Maine Report. Fisheries and Oceans Canada. Dartmouth, NS

Vu, E., D. Risch, C. Clark, S. Gaylord, L. Hatch, M. Thompson, D. Wiley, and S. Van Parijs. 2012. Humpback whale song occurs extensively on feeding grounds in the western North Atlantic Ocean. Aq. Biol.14(2):175–183.

Waring, G.T., E. Josephson, K. Maze-Foley, and P.E. Rosel, editors. 2015a. U.S. Atlantic and Gulf of Mexico marine mammal stock assessments 2014.

Waring, G.T., E. Josephson, K. Maze-Foley, and P. E. Rosel. 2016. U.S. Atlantic and Gulf of Mexico marine mammal stock assessments 2015. NOAA Technical Memorandum NMFS-NE-238.

Waring, G.T., E. Josephson, M.C. Lyssikatos, and F.W. Wenzel. 2015b. Serious injury determinations for small cetaceans and pinnipeds caught in commercial fisheries off the Northeast U.S. coast, 2012. Northeast Fish Sci Cent Ref Doc. 15-12; 19 p.

APPENDIX I: ACRONYMS AND ABBREVIATIONS

ABC	Acceptable Biological Catch
ACL	Annual Catch Limit
ACT	Annual Catch Target
ACCSP	Atlantic Coastal Cooperative Statistics Program
ACFCMA	Atlantic Coastal Fisheries Cooperative Management Act
ACS	American Community Survey
AM	Accountability Measure
AP	Advisory Panel
ASMFC	Atlantic States Marine Fisheries Commission
Board	ASMFC Bluefish Management Board
Commission	Atlantic States Marine Fisheries Commission
Council	Mid-Atlantic Fishery Management Council
CSVI	Community Social Vulnerability Index
EEZ	Economic Exclusive Zone
EFH	Essential Fish Habitat
FMAT	Fishery Management Action Team
FMP	Fishery Management Plan
MC	Monitoring Committee
MAB	Mid-Atlantic Bight
MRFSS	Marine Recreational Fishery Statistics Survey
MRIP	Marine Recreational Information Program
MSA	Magnuson-Stevenson Act
NEFSC	Northeast Fisheries Science Center
PCFA	Principle Components Factor Analysis
PDT	Plan Development Team
PRT	Plan Review Team
RHL	Recreational Harvest Limit
SSB	Spawning Stock Biomass
SSC	Scientific and Statistical Committee
SFA	Sustainable Fisheries Act
TAL	Total Allowable Landings
TC	Technical Committee
VTR	Vessel Trip Report