FISHERY MANAGEMENT PLAN UPDATE
ATLANTIC STRIPED BASS
AUGUST 2024

STATUS OF THE FISHERY MANAGEMENT PLAN

Fishery Management Plan History

Original FMP Adoption:	October 1981	
Amendments:	Amendment 1	1984
	Amendment 2	1984
	Amendment 3	October 1985
	Amendment 4	October 1989
	Addendum I	1991
	Addendum II	1992
	Addendum III	1993
	Addendum IV	1994
	Amendment 5	March 1995
	Addendum I	January 1997
	Addendum II	October 1997
	Source Document	January 1998
	Addendum III	October 1998
	Addendum IV	October 1999
	Addendum V	January 2001
	Amendment 6	February 2003
	Addendum I	November 2007
	Addendum II	November 2010
	Addendum III	August 2012
	Addendum IV	October 2019
		Revised April 2021
	Addendum VI	October 2019
	Amendment 7	May 2022
	Addendum I	May 2023
	Addendum II	January 2024
Comprehensive Review:	2024	

Increased fishing pressure in the 1970s, coupled with degradation and loss of habitat, led to stock collapse and promoted the development of a cooperative interstate fisheries management plan (FMP). While a notable first step, the first FMP (1981) and Amendments 1 and 2 to the plan (1984) only provided recommendations on how to manage the resource. States could take voluntary actions under these management plans but there was no statutory requirement that ensured unified management actions by all the involved states. The passage of the Atlantic Striped Bass Conservation Act in 1984 (Striped Bass Act) changed this by requiring the states, through the Commission, to develop and implement management plans that included mandatory conservation measures. Amendment 3 (1985) was the first plan under the Striped Bass Act with such measures, including regulations to protect the 1982-year class, the first modestly sized cohort for nearly a decade. Some states elected for an even more conservative approach and imposed a total moratorium to protect the 1982-year class. The Amendment contained a mechanism to relax fishery regulations based on a juvenile abundance index. The mechanism

was triggered with the recruitment of the 1989-year class and led to the implementation of Amendment 4 (1989), which aimed to rebuild the resource rather than maximize yield. In 1995, with adoption of Amendment 5, the Commission declared Atlantic coastal striped bass stocks fully recovered.

Amendment 6 (2003) introduced a new set of biological reference points based on female spawning stock biomass (SSB), and a suite of management triggers based on the reference points. It also restored the commercial quota for the ocean fishery to 100% of average landings during the 1972-1979 historical period, and recreational fisheries were constrained by a 2-fish bag limit and a minimum size limit of 28 inches, except for the Chesapeake Bay fisheries, Albemarle-Roanoke (A-R) fisheries, and fisheries with approved conservation equivalency proposals. From 2007 to 2014, a series of four Addenda (I–IV) to Amendment 6 were implemented. These addenda addressed a range of issues, including implementation of a bycatch monitoring program, modifying the definition of recruitment failure, implementation of a mandatory commercial harvest tagging program, and establishing one set of F reference points for the coastal migratory population in all management areas. Addendum IV (2014) also formally deferred management of the A-R stock to the State of North Carolina, under the auspices of the Commission, since the A-R stock was deemed to contribute minimally to the coastal migratory population.

In 2019, a new benchmark assessment which used updated recreational catch estimates, changed our understanding of stock status. The benchmark assessment found the stock to be overfished and experiencing overfishing. As a result, Addendum VI to Amendment 6 was initiated to end overfishing, and bring F to the target level in 2020. Specifically, the Addendum reduced all state commercial quotas by 18%, and implemented a 1-fish bag limit and a 28" to less than 35" recreational slot limit for ocean fisheries and a 1-fish bag limit and an 18" minimum size limit for Chesapeake Bay recreational fisheries. These measures were implemented in 2020 and designed to achieve at least an 18% reduction in total removals at the coastwide level.

In November 2022, the Board reviewed the results of the 2022 Atlantic Striped Bass Stock Assessment Update. The 2022 assessment indicated the resource is still overfished but no longer experiencing overfishing relative to the updated reference points. The updated fishing mortality reference points took into account the period of low recruitment the stock has experienced in recent years.

As it considered its actions under Addendum VI, the Management Board also discussed the development of a new Amendment to the FMP, one that reflected our understanding of the resource and the fisheries that depend on it. This led to the development and approval of Amendment 7 in 2022.

Currently, Atlantic striped bass is managed under Amendment 7 to the Interstate Fishery Management Plan, which consolidates Amendment 6 and its associated addenda into a single document. Amendment 7 establishes new requirements for the following components of the FMP: management triggers, conservation equivalency, additional measures to address recreational release mortality, and the stock rebuilding plan. This Amendment builds upon the Addendum VI to Amendment 6 action to address overfishing and initiate rebuilding in response to the overfished finding from the last stock assessment, requiring the Board to rebuild the stock by 2029. Amendment 7 strengthens the Commission's ability to reach the rebuilding goal by implementing a more conservative recruitment trigger, providing more formal guidance around uncertainty in the conservation equivalency process, and implementing measures intended to increase the chance of survival after a striped bass is released alive in the recreational fishery. All provisions

of Amendment 7 are effective May 5, 2022, except for gear restrictions. States must implement new gear restrictions by January 1, 2023.

Amendment 7 also maintains the same recreational and commercial measures specified in Addendum VI to Amendment 6, which were implemented in 2020. As such, all approved Addendum VI conservation equivalency programs and state implementation plans are maintained until such measures are changed in the future.

In May 2023, the Board approved an emergency action to change the recreational size limit, effective immediately for 180 days from May 2, 2023, through October 28, 2023. This action responds to the unprecedented magnitude of 2022 recreational harvest, which was nearly double that of 2021, and new stock rebuilding projections, which estimate the probability of the spawning stock rebuilding to its biomass target by 2029 drops from 97% under the lower 2021 fishing mortality rate to less than 15% if the higher 2022 fishing mortality rate continues each year.

The Board implemented the emergency 31-inch total length (TL) maximum size limit for 2023 to reduce harvest of the strong 2015-year class. The 31-inch TL maximum size limit applies to all existing recreational fishery regulations where a higher (or no) maximum size applies, excluding the May Chesapeake Bay trophy fisheries which already prohibit harvest of fish less than 35 inches. All bag limits, seasons, and gear restrictions will remain the same. Jurisdictions are required to implement the required measure as soon as possible but no later than July 2, 2023. If it deems necessary, the Board may extend the emergency action for two additional periods of up to one year each at a future Board meeting. The Commission is conducting four virtual public hearings between May 17 and May 31, 2023, to inform the public about the emergency action and identify next steps for management.

Addendum I to Amendment 7 was approved in May 2023 to allow for voluntary ocean commercial quota transfers contingent on stock status. When the stock is overfished, no quota transfers will be allowed. When the stock is not overfished, the Board can decide every one-to-two years whether it will allow voluntary transfers of ocean commercial quota. The Board can also set criteria for allowable transfers, including a limit on how much and when quota can be transferred in a given year, and the eligibility of state to request a transfer based on its landings.

Addendum II to Amendment 7 was approved in January 2024 to reduce fishing mortality in 2024 and support stock rebuilding. For the ocean recreational fishery, the Addendum implements a 28" to 31" slot limit, 1-fish bag limit, and maintains 2022 season dates for all fishery participants; this maintains the same ocean recreational measures adopted under the 2023 emergency action. For the Chesapeake Bay recreational fishery, the Addendum implements a 19" to 24" slot limit, 1-fish bag limit, and maintains 2022 season dates for all fishery participants. For the commercial fishery, the Addendum reduces commercial quotas by 7% in both the ocean and Chesapeake Bay. To address concerns about recreational filleting allowances and compliance with recreational size limits, the Addendum establishes two requirements for states that authorize filleting of striped bass: racks must be retained and possession limited to no more than two fillets per legal fish. Finally, to enable an expedited response process to upcoming stock assessments, the Addendum establishes a mechanism allowing the Board to respond to a stock assessment via Board action if the stock is not projected to rebuild by 2029. All Addendum II measures are required to be implemented by the states no later than May 1, 2024.

To ensure compliance with interstate requirements, North Carolina also includes striped bass in the North Carolina FMP for Interjurisdictional Fisheries (IJ FMP). The goal of the IJ FMP is to adopt FMPs, consistent with N.C. law, approved by the Mid-Atlantic Fishery Management Council, South Atlantic Fishery Management Council, or the ASMFC by reference and implement

corresponding fishery regulations in North Carolina to provide compliance or compatibility with approved fishery management plans and amendments, now and in the future. The goal of these plans, established under the Magnuson-Stevens Fishery Conservation and Management Act (federal council plans) and the Atlantic Coastal Fisheries Cooperative Management Act (ASMFC plans) are like the goals of the Fisheries Reform Act of 1997 to "ensure long-term viability" of these fisheries (NCDMF 2015).

Management Unit

The management unit includes all coastal migratory striped bass stocks on the East Coast of the United States, excluding the Exclusive Economic Zone (3–200 nautical miles offshore), which is managed separately by NMFS. The coastal migratory striped bass stocks occur in the coastal and estuarine areas of all states and jurisdictions from Maine through North Carolina.

Striped bass in the Chesapeake Bay are part of the coastal migratory stock and are assessed as part of the coastal migratory striped bass management unit. However, Amendment 7 implements a separate management program for the Chesapeake Bay due to the size availability of striped bass in this area.

The Albemarle Sound-Roanoke River (Albemarle-Roanoke) stock is currently assessed and managed separately by the State of North Carolina under the auspices of the ASMFC. The Albemarle-Roanoke stock is not included in the coastwide assessment and management program because it contributes minimally to the coastal migratory stock.

In North Carolina the striped bass stocks in the Tar-Pamlico, Neuse, and Cape Fear rivers are considered estuarine and non-migratory, and are not managed through the ASMFC FMP, rather they are managed under the N.C. Estuarine Striped Bass FMP.

Goal and Objectives

The Goal of Amendment 7 is to perpetuate, through cooperative interstate fishery management, migratory stocks of striped bass (*Morone saxatilis*); to allow commercial and recreational fisheries consistent with the long-term maintenance of a broad age structure, a self-sustaining spawning stock; and to provide for the restoration and maintenance of their essential habitat.

In support of this goal, the following objectives are specified:

1. Manage striped bass fisheries under a control rule designed to maintain stock size at or above the target female spawning stock biomass level and a level of fishing mortality at or below the target exploitation rate.
2. Manage fishing mortality to maintain an age structure that provides adequate spawning potential to sustain long-term abundance of striped bass populations.
3. Provide a management plan that strives, to the extent practical, to maintain coastwide consistency of implemented measures, while allowing the States defined flexibility to implement alternative strategies that accomplish the objectives of the FMP.
4. Foster quality and economically viable recreational, for-hire, and commercial fisheries.
5. Maximize cost effectiveness of current information gathering and prioritize state obligations in order to minimize costs of monitoring and management.
6. Adopt a long-term management regime that minimizes or eliminates the need to make annual changes or modifications to management measures.

7. Establish a fishing mortality target that will result in a net increase in the abundance (pounds) of age 15 and older striped bass in the population, relative to the 2000 estimate.

DESCRIPTION OF THE STOCK

Biological Profile

Striped bass are the largest member of the Moronidae family, the temperate basses, which also includes white perch, white bass and yellow bass. Striped bass are a riverine and estuarine dependent species native from the St. Lawrence River in Canada down to the St. Johns River in Florida, and through the Gulf of Mexico, although some taxonomists suggest the striped bass found in the Gulf of Mexico warrant description as a subspecies (GSMFC 2006). The migratory striped bass stocks from Maine through the A-R stock in North Carolina are managed under the jurisdiction of the ASMFC. Striped bass stocks south of the Albemarle Sound are considered estuarine and non-migratory and are not under ASMFC jurisdiction.

Atlantic striped bass under ASMFC jurisdiction are anadromous, meaning they spend most of their adult life in ocean waters, but return to their natal rivers to spawn in the spring. The rivers that feed the Chesapeake Bay, and the Delaware and Hudson rivers are the major spawning grounds for the coastal migratory population. Female striped bass typically grow larger and heavier than males. There are two distinct life history strategies for striped bass from the Chesapeake Bay, Delaware, Hudson, and A-R stocks. One group consists of mostly females and participate in extensive coastal migrations. Fish travel north as far as Maine and Canada in the spring after spawning takes place, then as water temperatures drop, they move south in the winter where they overwinter off the VA/NC coast before going to their natal rivers to spawn again in the spring. The other group is mostly resident fish and the majority are males, inhabiting the estuaries and near-shore ocean within their natal systems.

Based on sampling efforts from the Chesapeake Bay, 45% of female striped bass mature at age 6 and 100% mature by age 9. The latest maturity study for the A-R stock determined 29% of female striped bass are mature at age 3, 97% are mature at age 4, and 100% are mature at age 5 (Boyd 2011). The oldest striped bass on record is 31 years old, but they would likely live longer than that in the absence of fishing pressure. The oldest fish observed in the Albemarle-Roanoke stock is also 31 years old.

Stock Status

The stock is currently overfished but no longer experiencing overfishing.

Stock Assessment

In November 2022, the Board reviewed the results of the 2022 Atlantic Striped Bass Stock Assessment Update, which uses the same model from the approved, peer-reviewed 2018 Benchmark Stock Assessment. The 2022 assessment indicated the resource is still overfished but no longer experiencing overfishing relative to the updated reference points. Female SSB in the terminal year (2021) was estimated at 143 million pounds, which is below the SSB threshold of 188 million pounds and below the SSB target of 235 million pounds. Fishing mortality (F) in 2021 was estimated at 0.14, which is below the F threshold of 0.20 and below the F target of 0.17. The updated fishing mortality reference points took into account the period of low recruitment the stock has experienced in recent years.

The assessment also indicated a period of strong recruitment (numbers of age-1 fish entering the population) from 1994–2004, followed by a period of lower recruitment from 2005–2011

(although not as low as the early 1980s, which likely contributed to the decline in SSB in recent years. Recruitment of age-1 fish was high in 2012, 2015, 2016, and 2019 (corresponding to strong 2011, 2014, 2015, and 2018 year classes), but estimates of age-1 striped bass were below the long-term average in 2018, 2020, and 2021. Recruitment in 2021 was estimated at 116 million age-1 fish, below the time series average of 135.7 million fish (Figure 1). Fishing mortality (F) was above the target 1995–2019, but had fallen back below the target for 2020 and 2021 (Figure 2).

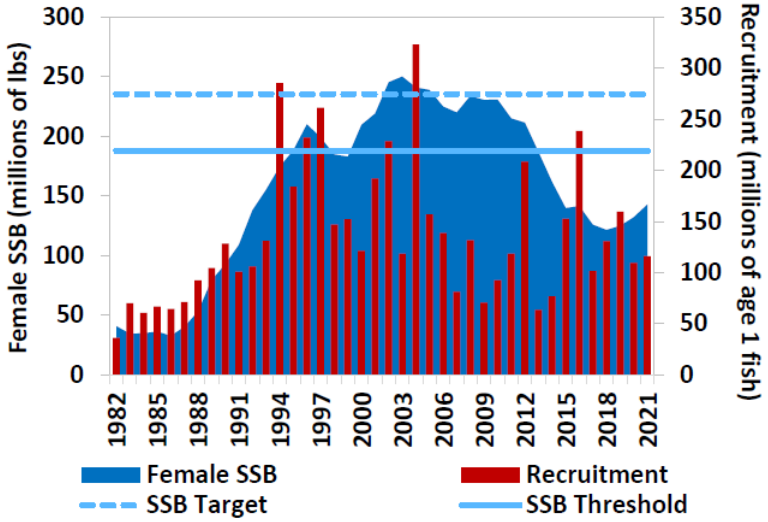

Figure 1. Atlantic striped bass female spawning stock biomass and recruitment (abundance of age-1). Source: ASMFC Atlantic Striped Bass Stock Assessment 2022.

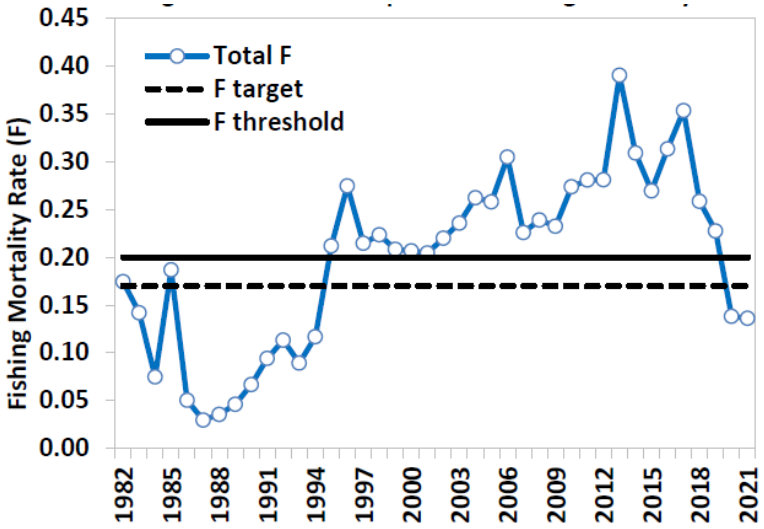

Figure 2. Atlantic striped bass estimates of fishing mortality and the fishing mortality target and threshold reference points. Source: ASMFC Atlantic Striped Bass Stock Assessment 2022.

DESCRIPTION OF THE FISHERY

Current Regulations

Striped bass regulations in the North Carolina coastal waters (0–3 miles) of the Atlantic Ocean are under the jurisdiction of ASMFC, while striped bass regulations in North Carolina's inshore coastal (i.e., estuarine), joint, and inland waters are under the jurisdiction of the North Carolina Division of Marine Fisheries and Wildlife Resources Commission. Striped bass regulations in the EEZ are under the jurisdiction of the NOAA Fisheries. Commercial and recreational harvest of striped bass is not allowed in the EEZ, which is 3–200 miles offshore. Striped bass cannot even be targeted for recreational catch-and-release fishing in the EEZ.

In North Carolina, commercial harvest is currently constrained by a 294,495-pound annual quota and a 28-inch TL minimum length size limit. The quota is split evenly between three gears: ocean beach seine, ocean gill net, and ocean trawl. Usually only one gear is open at a time and any quota overages in a gear are taken away from the offending gear during the next year. Atlantic striped bass overwinter in North Carolina ocean waters during the winter months, from December through February, therefore the quota year is set from December 1 through November 30 each year.

Recreational harvest is constrained by a one fish per person daily possession limit. It is also illegal to harvest striped bass less than 28 inches TL or greater than 31 inches TL. It is also unlawful to fish for or possess striped bass from the Atlantic Ocean for recreational purposes using hook and line gear with natural bait unless using a non-stainless steel, non-offset (inline) circle hook, regardless of tackle or lure configuration. Natural bait is defined as any living or dead organism (animal or plant) or parts thereof. Non-offset circle hook is defined as a hook with the point pointed perpendicularly back towards the shank and the point and barb are in the same plane as the shank. Striped bass may be taken seven days a week and the season is open year-round.

The Atlantic Ocean waters from about Oregon Inlet to the N.C./V.A. state line are the southernmost extension of the overwintering grounds for Atlantic striped bass. Therefore, annual landings are dependent on how far down and offshore striped bass stocks migrate each winter. Since 2011 striped bass have been farther north and offshore than in prior years. In recent years large schools of striped bass have been up to 30 miles offshore. Since 2012 there has been no commercial or recreational harvest of overwintering migratory striped bass in North Carolina's coastal ocean waters during the winter months.

Commercial Fishery

Commercial landings of striped bass in the Atlantic Ocean have been controlled by a quota since 1991. Due to the relatively small individual gear quota and the ability to harvest tens of thousands of pounds in just a single day, specific gear overages were common, but the overall quota was rarely exceeded. Landings reached the quota in most years and averaged 361,555 pound a year from 1995/1996–2006/2007. Starting in 2008/2009 shifting migratory patterns and decreasing stock abundance led to less availability of fish inside three miles. Since 2012/2013 no striped bass have been landed from the Atlantic Ocean because striped bass have stayed outside of three miles and in Virginia waters while overwintering (Tables 1 and 2; Figure 3).

Table 1. Recreational harvest (number of fish landed and weight in pounds) and releases (number of fish) and commercial harvest (weight in pounds) of striped bass from the Atlantic Ocean, North Carolina, 1982–2023. Recreational data presented from MRIP are for waves 1 (Jan–Feb) and 6 (Nov–Dec)

	Recreational			Commercial	
Year	Number Landed	Number Released	Weight Landed (lb)	Number Landed	Weight Landed (lb)
1982	0	0	0	3,200	92,462
1983	0	0	0	1,405	52,796
1984	0	0	0	532	14,501
1985	0	0	0	0	0
1986	0	0	0	0	0
1987	0	0	0	0	0
1988	510	0	0	0	0
1989	0	0	0	0	0
1990	0	0	0	803	9,797
1991	1,032	0	10,240	413	6,186
1992	2,680	928	0	1,745	27,702
1993	531	2,115	6,084	3,414	36,463
1994	6,543	6,340	89,819	7,956	139,672
1995	16,479	28,169	232,043	23,387	344,627
1996	31,709	98,285	391,588	3,289	58,217
1997	60,074	102,395	865,306	25,820	463,144
1998	41,236	130,531	636,090	14,213	272,969
1999	26,388	50,032	339,092	21,119	391,482
2000	18,108	41,812	276,814	6,465	162,369
2001	60,700	23,264	1,081,940	24,955	381,115
2002	56,330	47,328	997,649	23,242	441,018
2003	50,418	19,006	965,671	5,769	201,199
2004	323,239	246,671	6,655,565	31,041	605,356
2005	194,854	179,323	3,947,042	27,288	604,464
2006	134,184	37,204	2,975,348	2,718	74,189
2007	81,777	22,486	1,965,111	16,798	379,467
2008	36,877	26,405	749,673	13,369	288,410
2009	6,548	1,001	186,729	9,030	189,963
2010	67,144	51,400	1,197,988	13,664	276,435
2011	207,610	245,287	4,467,159	10,867	246,366
2012	0	0	0	333	7,281
2013	0	0	0	0	0
2014	0	0	0	0	0
2015	0	0	0	0	0
2016	0	39,248	0	0	0
2017	0	5,149	0	0	0
2018	0	3,490	0	0	0
2019	0	0	0	0	0
2020	0	0	0	0	0
2021	0	20,836	0	0	0
2022	0	34,518	0	0	0
2023	0	0	0	0	0
Mean	33,928	34,839	667,546	6,972	137,325

Table 2. Striped bass commercial harvest (pounds) by gear (North Carolina Trip Ticket Program) from the Atlantic Ocean, North Carolina, based on a fishing year beginning December 1 and ending November 30. The fishing year management strategy began with the implementation of a coastwide (states from Maine to North Carolina) commercial quota in 1991.

	Recreational			Commercial	
Year	Number Landed	Number Released	Weight Landed (lb)	Number Landed	Weight Landed (lb)
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1983	0	0	0	1,405	52,796
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1985	0	0	0	0	0
1986	0	0	0	0	0
1987	0	0	0	0	0
1988	510	0	0	0	0
1989	0	0	0	0	0
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2014	0	0	0	0	0
2015	0	0	0	0	0
2016	0	39,248	0	0	0
2017	0	5,149	0	0	0
2018	0	3,490	0	0	0
2019	0	0	0	0	0
2020	0	0	0	0	0
2021	0	20,836	0	0	0
2022	0	34,518	0	0	0
2023	0	0	0	0	0
Mean	33,928	34,839	667,546	6,972	137,325

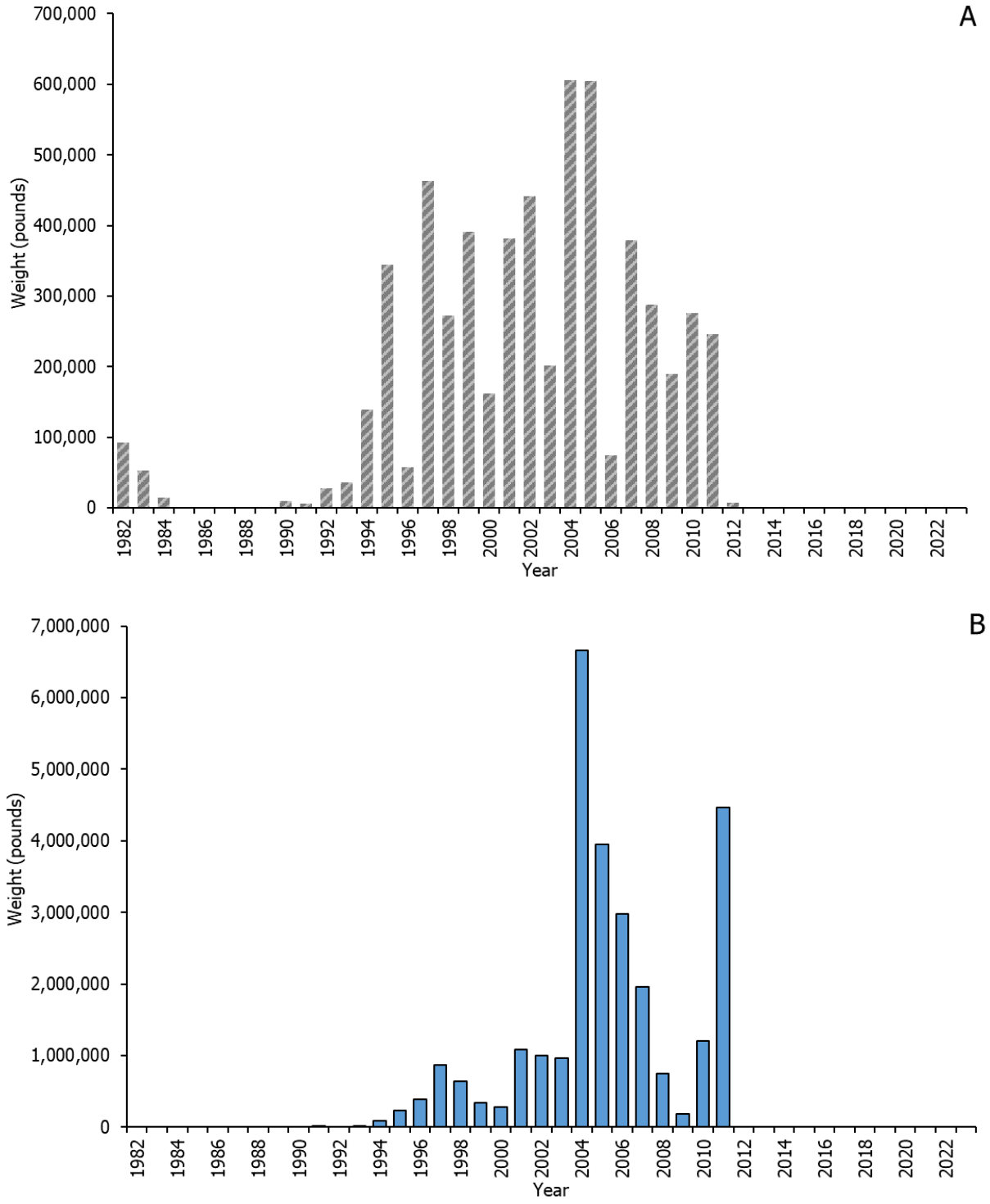

Figure 3. (A) Atlantic striped bass commercial landing (pounds) reported through the North Carolina Trip Ticket Program and (B) recreational landings (Type A + B1; pounds) estimated from the Marine Recreational Information Program survey for North Carolina, 1982–2023.

Recreational Fishery

Recreational landings were low through the early 2000s. As the Atlantic striped bass stock recovered and abundance increased, recreational landings increased as well, with peak landings of 6.6 million pounds in 2004 (Table 1; Figure 3). When striped bass are inside state coastal waters they form large schools that are easily accessed by anglers, and harvest can be significant and releases even larger. Landings have fluctuated since, often due to winter weather conditions and the migratory behavior in the near shore ocean during January and February. From 2001 to 2011 landings averaged about 2.3 million pounds. Due to the stocks being outside of three miles and not migrating down into North Carolina state waters in recent years, no recreational landings have occurred since 2012 (Table 1; Figure 3.).

The DMF offers award citations for exceptional catches of striped bass. Most citations are from fish caught in the Atlantic Ocean. Striped bass that measure greater than 45 inches total length or 35 pounds are eligible for an award citation. Citations peaked in 2004 at over 700 but have declined to near zero since 2011 due to shifting overwintering patterns (Figure 4).

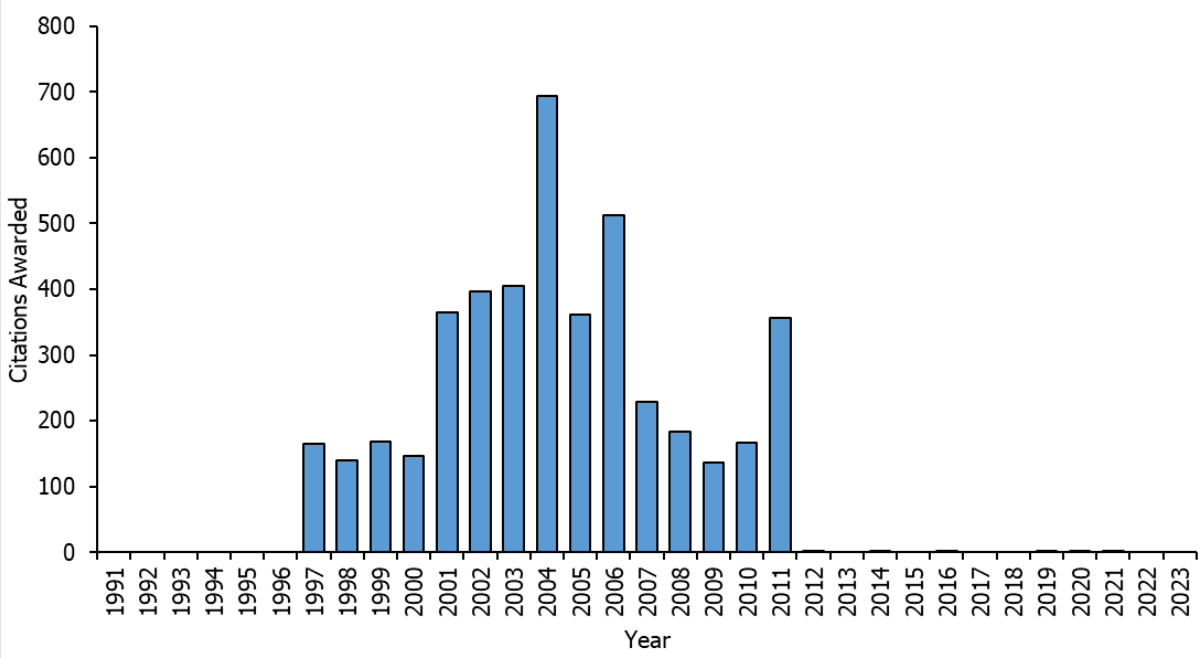

Figure 4. North Carolina Saltwater Fishing Tournament citations awarded for striped bass from the Atlantic Ocean, 1991–2022. Citations are awarded for striped bass greater than 35 pounds or 45 inches total length. Striped bass were removed from the citation program May 1, 2022.

MONITORING PROGRAM DATA

Fishery-Dependent Monitoring

The length, weight, sex, and age composition of the commercial harvest has been consistently monitored through sampling at fish houses conducted by the division since 1982. The annual harvest quota is split equally between three gear types, beach seine, gill net, and trawl. Any overages from one year are deducted from next year's quota (Table 2). Because of the 28-inch total length minimum size limit and gear regulations, most fish harvested average about 38-inches total length (Table 3; Figure 5).

Table 3. Summary of striped bass total length (inches) samples collected from commercial fisheries from the Atlantic Ocean, North Carolina, 1981/1982–2022/2023.

Year	Mean Length	Minimum Length	Maximum Length	Total Number Measured
1981/1982	43	38	48	53
1982/1983	43	35	50	221
1983/1984	44	29	52	7
1990/1991	31	27	38	203
1991/1992	33	28	51	241
1992/1993	31	24	46	135
1993/1994	33	26	51	351
1994/1995	35	30	39	51
1995/1996	35	22	43	211
1996/1997	35	28	45	358
1997/1998	33	28	40	183
1998/1999	36	29	42	191
1999/2000	37	30	44	290
2000/2001	35	28	43	256
2001/2002	38	29	47	249
2002/2003	36	23	43	573
2003/2004	37	29	47	400
2004/2005	38	29	46	717
2006/2007	38	28	48	843
2007/2008	39	29	49	317
2008/2009	39	30	49	175
2009/2010	37	28	50	456
2010/2011	36	28	48	388
2011/2012	38	34	47	21
2012/2013				0
2013/2014				0
2014/2015				0
2015/2016				0
2016/2017				0
2017/2018				0
2018/2019				0
2019/2020				0
2020/2021				0
2021/2022				0
2022/2023				0

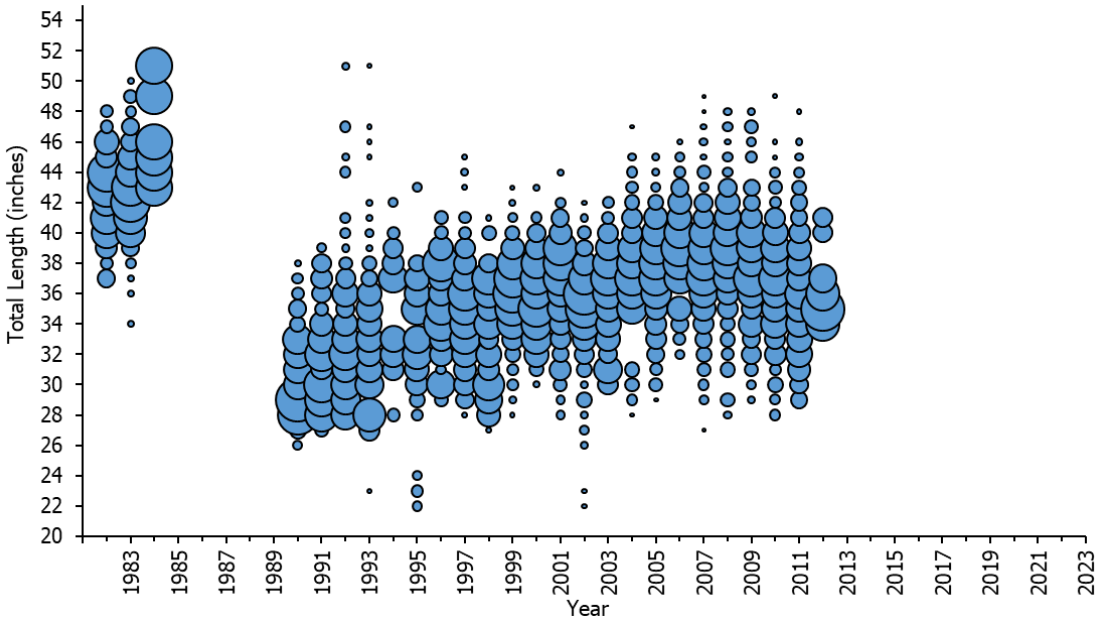

Figure 5. Commercial length frequency (total length, inches) of striped bass harvested from the Atlantic Ocean, 1982–2023. Bubbles represent fish at length and the bubble size is proportional to the number of fish at that length.

North Carolina also augments NOAA Fisheries Marine Recreational Information Program (MRIP) by providing additional funding for increased samplers, which estimates the annual harvest and releases of marine recreational fisheries. Mean total length is usually around 36-inches, with fish as large as 51-inches measured. Total number of fish measured for 2006–2011 ranged from 67 to 609. There has been no estimated harvest (and therefore no fish measured) since 2012 (Table 4; Figure 6).

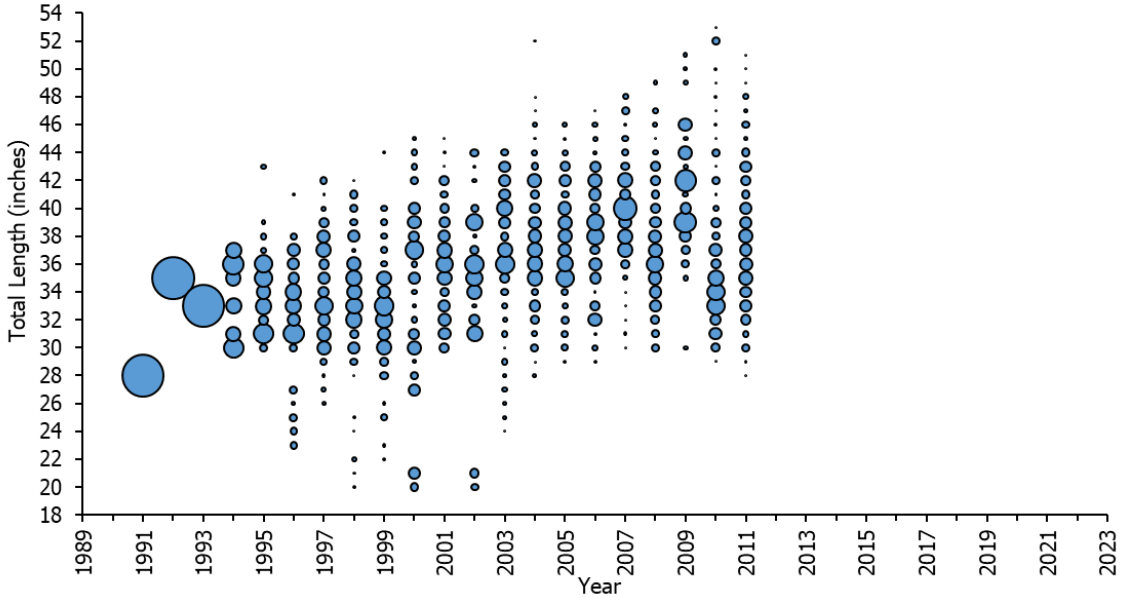

Figure 6. Recreational length frequency (total length, inches) of striped bass harvested from the Atlantic Ocean, 1989–2023. Bubbles represent fish at length and the bubble size is proportional to the number of fish at that length.

Table 4. Striped bass total length (inches) data from Marine Recreational Information Program recreational fishery samples, Atlantic Ocean, North Carolina, 1991–2023.

Year	Mean Length	Minimum Length	Maximum Length	Total Number Measured
1991	27	27	27	1
1992	33	33	33	1
1993	32	32	32	1
1994	29	20	35	19
1995	32	28	42	69
1996	31	12	39	135
1997	31	19	40	229
1998	32	18	43	272
1999	30	19	42	182
2000	31	19	43	113
2001	33	19	43	267
2002	33	19	43	318
2003	36	23	45	614
2004	36	21	50	1,800
2005	36	28	46	1,106
2006	36	28	45	372
2007	38	28	46	375
2008	36	28	47	303
2009	40	29	49	67
2010	34	28	51	95
2011	36	27	49	609
2012				0
2013				0
2014				0
2015				0
2016				0
2017				0
2018				0
2019				0
2020				0
2021				0
2022				0
2023				0

Fishery-Independent Monitoring

North Carolina has no fishery independent sampling indices of abundance for Atlantic striped bass. However, we do participate in the coastwide striped bass tagging program administered through the United States Fish and Wildlife Service (USFWS). Tagging takes place in January and/or February on their overwintering grounds, usually in the vicinity of the VA/NC border. Although in recent years some trips have had to move to Ocean City MD because the striped bass did not move that far south. Dates and actual location of tagging are dependent on striped bass annual migration patterns. Tags used are USFWS tags and all tagging information is housed in the USFWS tagging database. The striped bass Winter Cooperative Tagging Program is a critical component of overall coastwide striped bass management, as it is the only tagging program that tags the mixed, migratory stock on their overwintering grounds. This means that fish from all producer areas, including Chesapeake Bay, Delaware River, Hudson River, and A-R stocks are

available for tagging. Tag returns provide managers with an estimate of the percent contribution of the individual producer areas to the migratory portion of the stock and fishing mortality on the stock. Length frequencies average about 37-inches total length, and about 1,000 fish are collected each year (Table 5). Nearly all of these fish are large, mature females that are staging on their overwintering grounds in preparation for the spring spawning run to their respective spawning grounds.

Table 5. Striped bass total length (inches) and tagging data from the Cooperative Winter Tagging Program, trawl and hook-and-line gear, 1988–2023.

	Number Tagged		Mean Length		Minimum Length		Maximum Length	
Year	H&L	Trawl	H&L	Trawl	H&L	Trawl	H&L	Trawl
1988		1,338		25		17		53
1989		1,156		27		20		46
1990		2,010		25		14		48
1991		1,780		28		20		40
1992		1,016		28		17		39
1993		530		26		17		39
1994		4,631		23		14		49
1995		644		29		15		42
1996		698		30		11		44
1997		1,356		29		16		45
1998		462		25		18		49
1999		277		30		3		43
2000		6,236		20		13		42
2001		2,447		25		15		44
2002		4,087		23		15		47
2003		1,908		31		11		48
2004		2,708		25		14		47
2005		4,263		23		12		44
2006		4,462		28		12		48
2007		370		32		19		48
2008		1,033		34		21		47
2009		146		32		22		45
2010		567		30		12		43
2011	*108	**	32		26		43	
2012	*6	**	36		25		46	
2013	1,114	893	37	33	26	24	49	47
2014	921	**	37		27		53	
2015	1,042	333	38	35	29	22	52	42
2016	1,241	110	39	38	23	24	48	43
2017	881	**	40		21		50	
2018	667	**	41		29		52	
2019	44	**	40		31		45	
2020	202	**	41		37		56	
2021	1,020	**	38		26		48	
2022	726	**	43		30		52	
2023	400	**	33		26		43	

In order to describe the age structure of harvest and indices, striped bass age structures are collected from various fishery independent (scientific surveys) and dependent (fisheries) sources throughout the year. The length at age data for striped bass display an increasing length at age

for striped bass up to about 40 inches in length, although the length at age overlaps between similar ages (Table 6; Figure 7).

Table 6. Summary of striped bass age samples collected from the Atlantic Ocean from both dependent (commercial and recreational fisheries) and independent (surveys) sources 1982–2023.

Year	Modal Age	Minimum Age	Maximum Age	Total Number Aged
1981	10	4	17	43
1982	12	5	18	98
1983	11	9	18	214
1984	6, 12	4	17	197
1985				0
1986				0
1987				0
1988				0
1989				0
1990	7	5	11	133
1991	9	6	13	90
1992	8	4	19	320
1993	8	3	17	638
1994	8	3	23	367
1995	7	3	13	475
1996	8	2	14	467
1997	9	3	15	787
1998	5	4	16	623
1999	9	5	12	449
2000	9	3	13	807
2001	8	2	14	536
2002	10	3	16	782
2003	8	4	18	401
2004	9	3	17	589
2005	10	2	17	614
2006	11	2	17	552
2007	9	4	16	627
2008	10	4	17	411
2009	11	7	17	179
2010	9	6	18	292
2011	8	6	17	226
2012	9	8	15	21
2013				0
2014				0
2015				0
2016				0
2017				0
2018				0
2019				0
2020				0
2021				0
2022				0
2023				0

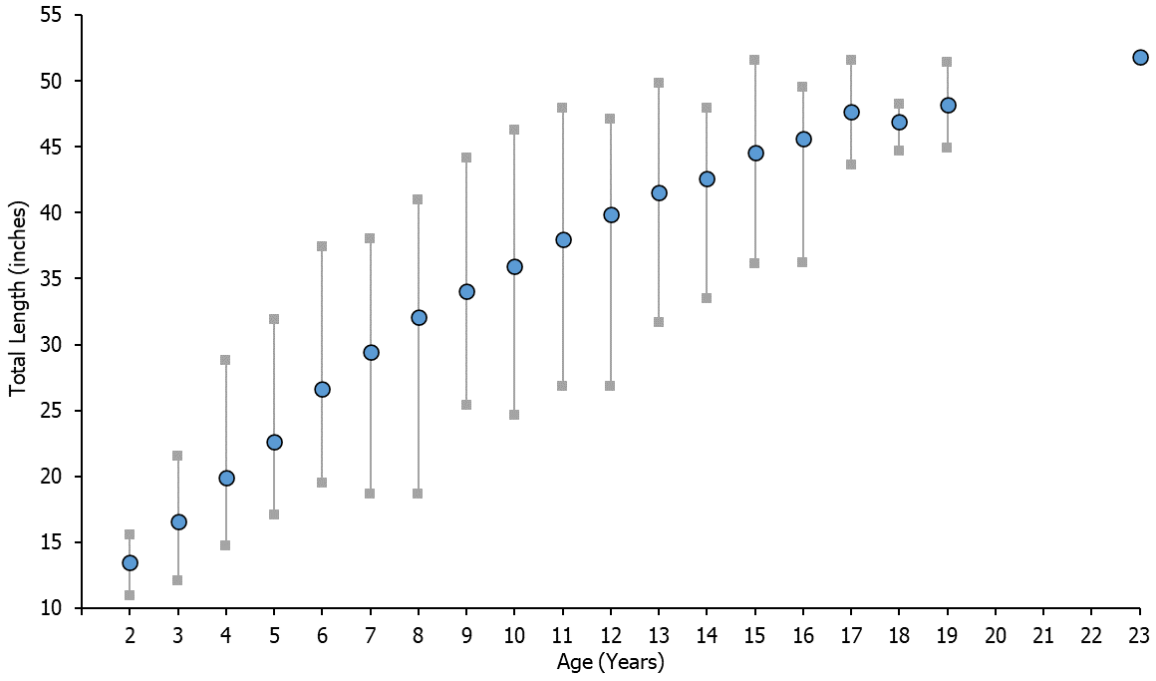

Figure 7. Striped bass length at age samples collected from both dependent (commercial and recreational fisheries) and independent (surveys) sources from the Atlantic Ocean, 1982–2023. Blue circles represent the mean size at a given age while the grey squares represent the minimum and maximum observed size for each age.

RESEARCH NEEDS

The following research recommendations were developed by the 2018 Benchmark Stock Assessment Subcommittee and the 66th SARC (NEFSC 2019).

- Continue collection of paired scale and otolith samples, particularly from larger striped bass, to facilitate development of otolith-based age-length keys and scale-otolith conversion matrices.
- Develop studies to provide information on gear specific (including recreational fishery) discard morality rates and to determine the magnitude of bycatch mortality.
- Conduct study to directly estimate commercial discards in the Chesapeake Bay.
- Collect sex ratio information on the catch and improve methods for determining population sex ratio for use in estimates of female SSB and biological reference points.
- Develop an index of relative abundance from the Hudson River Spawning Stock Biomass survey to better characterize the Delaware Bay/Hudson River stock.
- Improve the design of existing spawning stock surveys for Chesapeake Bay and Delaware Bay.
- Develop better estimates of tag reporting rates; for example, through a coastwide tagging study.
- Investigate changes in tag quality and potential impacts on reporting rate.
- Explore methods for combining tag results from programs releasing fish from different areas on different dates.

- Develop field or modeling studies to aid in estimation of natural mortality and other factors affecting the tag return rate.
- Compare M and F estimates from acoustic tagging programs to conventional tagging programs.
- Continue in-depth analysis of migrations, stock compositions, sex ratio, etc. using mark-recapture data.
- Continue evaluation of striped bass dietary needs and relation to health condition.
- Continue analysis to determine linkages between the Mycobacteriosis outbreak in Chesapeake Bay and sex ratio of Chesapeake spawning stock, Chesapeake juvenile production, and recruitment success into coastal fisheries.
- See Section 4.4 of Amendment 7 asmfc.org/species/atlantic-striped-bass for habitat conservation and restoration recommendations, which include reviewing striped bass habitat use and data (e.g., water quality criteria) to inform habitat conservation and restoration.

MANAGEMENT

Amendment 7 establishes new requirements for the following components of the FMP: management triggers, conservation equivalency, measures to address recreational release mortality, and the stock rebuilding plan. Amendment 7 strengthens the Commission's ability to reach the rebuilding goal by implementing a more conservative recruitment trigger, providing more formal guidance around uncertainty in the management process, and implementing measures designed to reduce recreational release mortality. This Amendment builds upon the Addendum VI action to address overfishing and initiate rebuilding in response to the assessment findings.

LITERATURE CITED

ASMFC (Atlantic States Marine Fisheries Commission). 2003. Amendment # 6 to the Interstate Fishery Management Plan for Atlantic Striped Bass. ASMFC, Washington, DC. Fisheries Management Report No. 41.

Atlantic States Marine Fisheries Commission (ASMFC). 2016. Atlantic Striped Bass Stock Assessment Update. A report prepared by the Atlantic Striped Bass Technical Committee. Arlington, VA.101 p.

Boyd, J. 2011. Maturation, Fecundity, and Spawning Frequency of the Albemarle/Roanoke Striped Bass Stock. (Under the direction of Dr. Roger Rulifson). Department of Biology, December 2011. 132 pp.

Dorazio, R.M. 1993. Mortality estimates of striped bass and recommendations for management of fisheries in Albemarle Sound, North Carolina. U.S. Fish and Wildlife Service, National fisheries Research Center, Kearneysville, West Virginia. 23 pp. + figures.

GSMFC (Gulf States Marine Fisheries Commission). 2006. The Striped Bass Fishery of the Gulf of Mexico, United states: A Regional Management Plan. GSMFC P.O. Box 726 Ocean Springs, Mississippi 39566-0726. 364 pp.

Hightower, J.E. 1994. Historical abundance and mortality of Albemarle Sound-Roanoke River striped bass. North Carolina Cooperative Fish and Wildlife Research Unit, N.C. State University, Raleigh, NC.

NCDMF (North Carolina Division of Marine Fisheries). 2015. Fishery Management Plan for Interjurisdictional Fisheries: Information Update. North Carolina Department of Environmental Quality. North Carolina Division of Marine Fisheries. Morehead City, North Carolina. 85 pp.

NCDMF and NCWRC (North Carolina Wildlife Resources Commission). 2014. November 2014 Revision to Amendment 1 to the North Carolina Estuarine Striped Bass Fishery Management Plan. NC Department of Environmental Quality, Division of Marine Fisheries, Morehead City, NC. 15 p.

NEFSC (Northeast Fisheries Science Center). 2013a. 57th Northeast Regional Stock Assessment Workshop. (57th SAW) Assessment Report. U.S. Department of Commerce Northeast Fish Science Center Reference Document. 13-14;39 pp. Available from: National Marine Fisheries Service, 166 Water Street, Woods Hole, MA. 02543-1026.

NEFSC. 2013b. 57th Northeast Regional Stock Assessment Workshop (57th SAW) Assessment Report. U.S. Department of Commerce Northeast Fish Science Center Reference Document. 13-16; 967 pp. Available from: National Marine Fisheries Service, 166 Water Street, Woods Hole, MA 02543-1026.

Richkus, W.A., P. Jacobson, D. Heimbuch, and H. Wilson. 1991. Evaluation of effects of fishing on Albemarle/Roanoke striped bass populations. Versar, Inc., Columbia, Maryland. Unpaginated.