

Historical Review of Commercial Fishery Regulations for Striped Bass (*Morone saxatilis* Walbaum) in Massachusetts

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Abstract - Since the arrival of Pilgrims in 1620, *Morone saxatilis* (Striped Bass) has been an important commercial fish species for residents of Massachusetts. Early attempts by the Plymouth Colony to develop fishery commerce by selling Striped Bass products to Spain failed. Viable domestic markets for Striped Bass were established by the 18th century and continue to present day. Application of laws to control the commercial harvest of Striped Bass to address local declines in abundance first appeared in the *Massachusetts Acts and Resolves* in the late 18th century, and most laws restricted the taking of Striped Bass by seines. In 1945, a temporary Massachusetts law prohibiting the taking of Striped Bass by any method other than hook-and-line was made permanent. More-restrictive size and quota regulations were not imposed until the early 1980s as inter-state conservation efforts responded to the declining trends in coastal stocks. In present day, the Striped Bass commercial fishery in Massachusetts is regulated by minimum size and quotas established under the Atlantic States Marine Fisheries Commission's Striped Bass Management Plan and by state no-take days and daily bag limits.

Introduction

Morone saxatilis (Walbaum) (Striped Bass) is an economically important anadromous fish species along the US Atlantic coast from Maine through North Carolina (Setzler et al. 1980). Portions of the Striped Bass stocks from Chesapeake Bay, Delaware Bay, and the Hudson River migrate north in spring and south in fall along the Atlantic coast where they are captured by recreational and multi-gear commercial fisheries. Historically, Striped Bass has been the focus of fisheries from North Carolina to New England and have played an integral role in the development of numerous coastal communities (ASMFC 1998). In what was to become Massachusetts, Striped Bass had been an important seasonal resource for residents even before European settlers arrived (Karr 1999, Morison 1956) and, in 2014, commercial landings of Striped Bass in the state were worth over 4.8 million dollars.

Massachusetts is unique in that a major portion of the migratory stocks is believed to summer in state waters (based on recreational catches; ASMFC 2016) likely due to abundant prey resources (Nelson et al. 2003) and optimal water temperatures (Nelson et al. 2010). As a result, major fluctuations in abundance of the migratory stocks have historically impacted the viability of the commercial fishery for Striped Bass in Massachusetts (Bigelow and Welsh 1924, Koo 1970, Richards and Rago 1999). Application of laws to control the harvest of Striped Bass have been imposed since colonial times, and the current regulations in Massachusetts are

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the product of over 250 years of legislative attempts to control local and coast-wide declines in landings and to address conflicts among user groups in the face of major fluctuations in Striped Bass abundance.

Proper management of the Striped Bass resource in Massachusetts is impossible without full appreciation and understanding of the actions of the past. This paper provides a historical review of the Massachusetts commercial fishery for Striped Bass with emphasis on the changes in regulations which have occurred since colonial times, and the necessary historical background for understanding of the current management regime.

Early History and Regulations

The recorded history of the commercial fishery for Striped Bass begins when the Pilgrims first colonized Massachusetts. However, it has been noted that Native Americans traded fish among tribes (Karr 1999), and the Plymouth Colony's second governor, William Bradford, on a visit to a Wampanoag tribe in the area which is now the town of Raynham, witnessed the Native Americans using a fish weir to catch Striped Bass (Morison 1956). Thus, based on Webster's Dictionary definition of commerce—"the exchanging or buying and selling of commodities", the Native Americans were probably the first to have a commercial fishery for Striped Bass in Massachusetts.

It is no surprise that Striped Bass would be targeted for harvest by European settlers. Plymouth colony records noted that Striped Bass were plentiful during summer in rivers surrounding the new Colony, and Pilgrims used them as a staple food during their first 3 years of the settlement (Morison 1956). Records by traders and adventurers from the 1630s described how Striped Bass were abundant in New England rivers, and how the flesh of Striped Bass was an excellent food resource:

"I myselfe, at the turning of the tyde, have seene such multitudes passe out of a pounce, that it seemed to me, that one might goe over their backs drishod."

"The Basse is an excellent Fish, both fresh and Salte one hundred whereof salted (at market) have yielded 5.p. They are so large, the head of one will give a good eater a dinner, & for daintinesse of diet, they excell the Mary-bones of Beefe. There are such multitudes, that I have seene stopped into the river close adjoining to my howse with a sand at one tide, so many as will load a ship of 100 tonnes."

"Other places have greater quantities in so much, as wagers have bin layed, that one should not throw a stone in the water, but that hee should hit a fish."

Thomas Morton ([1632] 1883:222)

"The basse is one of the best fishes in the Country, and though men are soon wearied of other fish, yet they are never with basse. It is a delicate, fine, fat fast fish ... sweet and good, pleasant to the pallat and wholesome to the stomach."

William Wood ([1634] 1994:chapter 9, p. 55)

Although a 1623 law gave the Plymouth Colony the right to regulate fisheries (Commonwealth of Massachusetts 1887), the development of fisheries commerce did not begin until after surpluses of goods were produced (Morison 1956). In an attempt to begin trade with Spain, Plymouth colonists tried to market Striped Bass as a pickled (preserved in vinegar) product, but this effort failed because the demand for *Gadus morhua* L. (Atlantic Cod) was very high in Europe (Morison 1956). In the Massachusetts Bay colony, a law passed in 1639 to promote fishery commerce with Europe exempted anyone involved in fisheries from duties and taxes for 7 years and banned the use of Atlantic Cod and Striped Bass as fertilizer to encourage commercial development (Hutchinson [1764] 1936, McFarland 1911).

Although foreign markets failed to develop, domestic markets were established for Striped Bass. The fishers used fish weirs and seines, often stretched across the entire width of a river or set from a boat, to capture Striped Bass:

“When they use to tide it in and out to the Rivers and Creekes, the English at the top of an high water do crosse the Creekes with long seanes or Basse Netts, which stop in the fish; and the water ebbing from them they are left on the dry ground, sometimes two or three thousand at a set, which are salted up against winter, etc.”

William Wood ([1634] 1994:chapter 9, p. 55)

In 1670, a law was passed that allowed lease fees from the Striped Bass, *Scomber scombrus* L. (Atlantic Mackerel), and *Clupea harengus* L. (Atlantic Herring) fisheries on Cape Cod to be used to support the first “free” (low-tuition) public school in the Plymouth Colony (Shurtleff 1856, Willison 1953).

As the colony and the country expanded, fisheries and landings in New England grew as well (McFarland 1911). Although very little information on the magnitude of the Striped Bass fishery from the 1700s is available, a statement by Bigelow and Welsh (1924:253) indicated declines in Striped Bass landings were of concern by the latter part of the century:

“Inexhaustible though the supply seemed in certain restricted localities, a decrease was reported as early as the last half of the eighteenth century. At first this was apparent only locally. For example, very few bass were seen in the Piscataqua [New Hampshire] after about 1792”.

In response to local depletion issues, one of the first laws in the Massachusetts Acts and Resolves restricting the taking of Striped Bass was passed for the town of Newbury in 1797 to ban the taking and selling of an unique population of over-wintering Striped Bass in the Rowley and Parker Rivers, possibly as a measure to protect the would-be spawners (e.g., Little 1995) (Table 1).

By the mid-1800s, declines in landings of Striped Bass and other species throughout New England were apparent. Goode (1884:427) wrote:

“It has already been seated that the Striped Bass are believed to be less abundant in the Gulf of Saint Lawrence than in former years; similar complaints are heard from the Bay of Fundy and from Cape Cod, where the period of

diminution is believed to date from the last advent of the Bluefish, about 1860”.

During 1871–1872, the United States Commission of Fish and Fisheries held hearings to receive testimony about the state of fisheries landings in southern New England (Baird 1873). The action was prompted by complaints of declines

Table 1. List of Massachusetts Acts and Resolves (<http://www.mass.gov/anf/research-and-tech/oversight-agencies/lib/acts-and-resolves.html>) pertaining to Striped Bass from 1797 to 1980.

Year(s)	Chapter(s)	Title	Action
1797	52	An act to prevent the destruction of the fish called bass, in the river Parker in Newbury, & in Rowley river, & in the streams & waters running into the same in the county of Essex	Prohibited the taking and selling of over-wintering Striped Bass from 1 December to 1 March.
1882	65	An act for the protection of Striped Bass and Bluefish in the waters of Edgartown	Prohibited the use of seines for taking Striped Bass and Bluefish in the waters of Edgartown (repealed 1885).
1931–1933	7,1,2	An act relative to the taking of Striped Bass from the waters of Parker river and its tributaries within the towns of Newbury, Rowley and Georgetown, by means of bowed net	Allowed unemployed to capture and sell over-wintering Striped Bass.
1937	349	An act regulating the taking by seines of Bluefish, Striped Bass and White Perch off the shores of Barnstable county	Prohibited the taking of Bluefish, Striped Bass, and White Perch by seines within three miles of the Barnstable county shore.
1938	32	Resolve providing for a special commission to investigate and study the laws relative to marine fisheries of the Commonwealth	In response to the 1937 law, special commission formed to study fisheries laws. Report published in 1939 (39H 2020).
1941	421	An act for the protection of Striped Bass	Temporary, emergency act that allowed only hook-and-line (except incidental catches in fish traps) for taking Striped Bass; set minimum size to 16 in. fork length.
1945	264	An act for the protection of Striped Bass	Temporary act became permanent.
1947	515	An act for the protection of Striped Bass	Slight word changes to 1945 act.
1975	129,130	An act prohibiting the taking of Striped Bass and Shad in fish traps	Prohibited the incidental taking of Striped Bass and <i>Alosa sapidissima</i> (Shad) from fish traps
1980	215	An act relative to the sale and possession of Striped Bass	Minimum size limit measurement changed from fork to total length.

in landings, accusations that net gears—mainly seines—were responsible for the declines, and the passage of many bills by state legislators to restrict the use of those gears for certain species, from selected areas, or during specific times of year (Fig. 1). One unsuccessful bill filed by a Cape Cod legislator in 1869 to ban the use of all weirs and pounds nets and the taking of Striped Bass with seines (Baird 1873) was the first record to suggest a hook-and-line-only gear restriction for Striped Bass. The first law banning the use of seines to capture Striped Bass (and *Pomatomus saltatrix* L. [Bluefish]) was passed in 1882 for the town of Edgartown on Martha’s Vineyard, but was later repealed in 1885 (Table 1).

The state of the Striped Bass fisheries continued to decline through the early part of the 20th century. Field (1924:65) reported Striped Bass still occurred in Massachusetts waters but “in greatly reduced numbers”, and Bigelow and Schroeder (1953) reported that Striped Bass abundance was low and that few Striped Bass were landed in Massachusetts and the Gulf of Maine between 1876 and 1935. Concerns over declining landings of other species were voiced publicly as well. A Boston Herald (Is the Atlantic ... 1907) newspaper headline from Sunday 18 August demonstrates the concerns of the time:

“Is the Atlantic Being Rapidly Fished Out? Statistics Gathered Indicate That the Cod, Mackerel, and Lobster Industries May Become Only a Memory”.

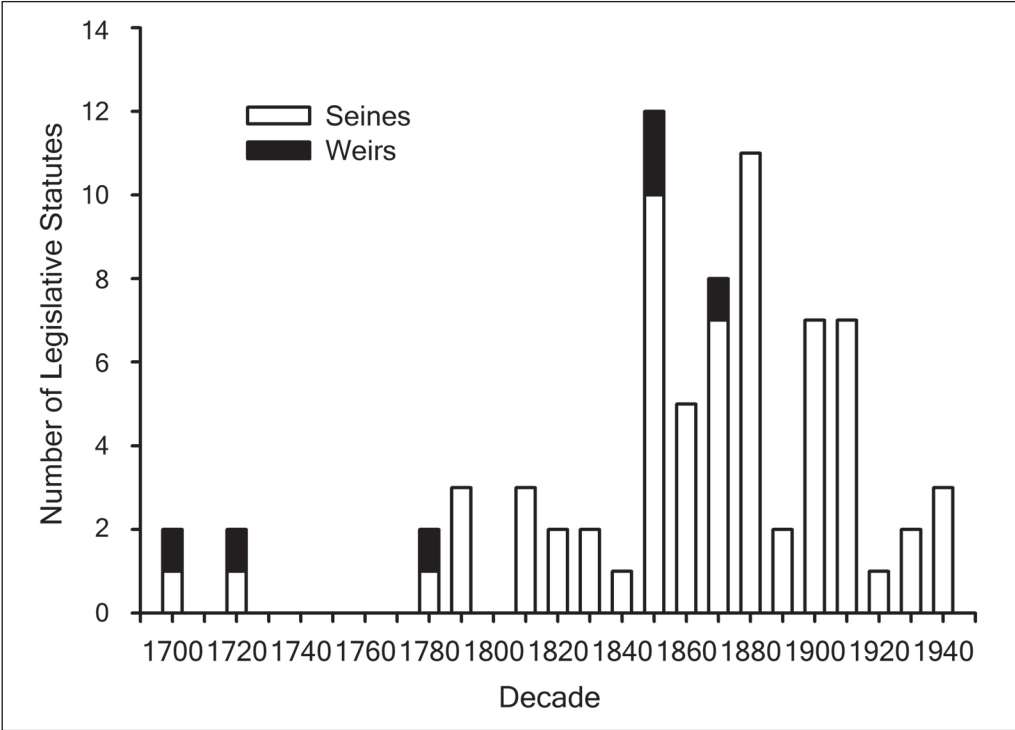


Figure 1. The number of legislative statutes in Massachusetts Acts and Resolves restricting the use of seines and weirs for taking any fish species in marine waters by decade from 1700 to 1950.

Although Striped Bass abundance was apparently low in Massachusetts waters through the early 1930s, the taking and selling of the over-wintering population of Striped Bass in the Parker River was allowed by permit to help people during the depression years of 1931–1937 (Table 1, Fig. 2). The permit allowed Striped Bass to be captured by using bow nets (prohibited since 1915) fished through the ice (Pearson 1933). Historical records show that fishers landed as much as 5000 lb (2268 kg) of Striped Bass from this river in one week. During the winter of 1934–1935, forty permits were issued and an estimated of 26 tons (23,587 kg) of bass were caught (Jerome et al. 1968). The bass fishery was not conducted during the winter of 1935–1936 because of poor ice conditions, and by the winter of 1936–1937, many fishers were employed by the federal Works Progress Administration and were no longer eligible to fish. The legal netting operations ended in 1938 (Jerome et al. 1968).

In 1936, landings of Striped Bass in Massachusetts began to increase slightly due to the recruitment of the abundant 1934 year-class (Merriman 1941). Size data collected from the 1937 Cape Cod Bay seine fishery showed that harvested fish were generally <22 inches (<55 cm) fork length (FL) and individuals as small as 8 inches (20 cm) were vulnerable to the fishery (Merriman 1941). However, the overall picture during this time was that Striped Bass abundance was still depressed, and blame was assigned to the seine fisheries for the depressed state (New England outdoors 1936). This anti-net sentiment was so strong that an act was passed in 1937 to ban the use of seines for taking Bluefish, Striped Bass, and *Morone americana* Gmelin (White Perch) from the shores of Cape Cod (Barnstable County)(Table 1).

In 1938, the Massachusetts House of Representatives resolved to form a special legislative commission to study the laws regarding marine fisheries (Table 1); apparently, the passage of the 1937 law against seining caused quite an uproar among factions of commercial fishermen, and between commercial fishermen and the growing sport-fishing sector. Legislators also saw the need to address the continual introduction of bills that attempted to severely curb harvest as complaints of dwindling fisheries resources grew. The commission's report, published in 1939, agreed that Striped Bass abundance was depleted, and that the species was more important for the sport-fishing sector (and the Massachusetts economy) because recreational anglers came to the Commonwealth to fish for Striped Bass, and few commercial landings of Striped Bass occurred during this time. They concluded that protection was required to help Striped Bass recover. The commission proposed that the 1937 law be amended into a new and more drastic law that would ban the use of nets to capture Striped Bass (and Bluefish and White Perch) in Massachusetts waters for 5 years and set the minimum size to 20 inches (50 cm) FL for Striped Bass.

The legislative commission's proposed regulations were not imposed until 1941, when "An Act For The Protection of Striped Bass" was passed as a temporary, emergency law (Table 1). The legislation banned the taking of Striped Bass with the use of any net directed towards the species, establishing a hook-and-line-only gear restriction throughout Massachusetts. The act did allow the incidental taking

PERMIT

Newbury, Mass.,1931

To

..... Massachusetts

PERMIT IS HEREBY granted to you to fish for, or take striped bass from Parker River and its tributaries in Newbury, Massachusetts, for the term ending March 31, 1931, under the following regulations adopted by the Selectmen of the town of Newbury.

1. No person shall fish for, or take from Parker River or its tributaries within the town of Newbury, striped bass by means of a bow net with mesh not less than three and one-half inches, excepting upon a permit from the Selectmen of Newbury, under the following terms and conditions:
2. No person shall take more than one hundred and fifty (150) pounds of striped bass per week, or any such bass under eight inches in length, and every person taking fish under such permit shall make a report, in writing, to the Selectmen of Newbury on each Saturday, of the number of pounds of fish taken in the week prior thereto.
3. No net or nets, either separately or in connection with other nets, shall be extended more than fourteen feet.
4. No wing nets, set nets or trap nets shall be permitted or used.
5. A violation of any of the terms of the permit of these regulations shall subject the violator to the penalties provided in G. L., sec. 131, c. 49, and upon such violation the Selectmen may revoke the permit of the violator, and thereupon the holder thereof shall surrender the same.
6. Such permits shall be granted to persons only who are listed by the unemployment committee of the town, as unemployed persons.
7. Nothing herein contained shall prevent the Board of Selectmen from revoking any permit granted for cause.

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} Selectmen of the
Town of Newbury.

Figure 2. Permit issued by town of Newbury to qualified individuals for taking over-wintering Striped Bass in the Parker River.

of Striped Bass in gears (e.g., fish weirs) directed towards other species, and it was the responsibility of the Commonwealth's marine fisheries agency to judge whether the gears were compliant. The law also established a minimum size limit of 16 inches (40 cm) FL instead of 20 inches as recommended by the commission. The law was made permanent in 1945 and is enforced today (Table 1). Only 2 significant changes to the Striped Bass protection act have occurred since 1945: the incidental taking of Striped Bass was banned in net gears directed towards other species in 1975, and the unit for size limit measurement was changed from FL to total length (TL) in 1980 (Table 1).

Despite the permanent enactment of the 1945 law, recreational angler groups in Massachusetts like the Massachusetts Striped Bass Association believed further conservation efforts were needed to preserve Striped Bass. Backed by those groups, legislators filed bills during the 1940s–1960s that would prohibit the sale of Striped Bass in Massachusetts (Banner 1947, 1948b) and ban all seining in the State because illegal seining of Striped Bass still occurred (Banner 1948a; Bill offered to ... 1953; Beatrice 1960a, 1960b; 19 Gloucester men ... 1953). None of the bills became law. Additionally, the recreational fishing groups attempted to have the minimum size limit raised to 20 inches (50.8 cm) FL, but the Massachusetts Division of Marine Fisheries (DMF), the state regulatory agency, saw no need to raise the limit (Beatrice 1961). Despite these attempts, no changes to state-imposed regulations for the commercial fishery occurred between the 1940s and early 1970s, except in 1967 when all persons who desired to sell any catches in Massachusetts were required to purchase a dealer's permit (Moore 1967).

The Atlantic State Marine Fisheries Commission and Massachusetts Regulations

During the 1950s–early 1970s, the Striped Bass resource in Massachusetts improved slowly as large year-classes were produced in Chesapeake Bay about every 2–4 years between 1954 and 1970, and Striped Bass abundance grew along the coast (Koo 1970, Richards and Rago 1999). The commercial fishery in Massachusetts responded, and landings increased dramatically (Fig. 3). Ninety-three percent of reported landings in the early 1960s came from hand-lines, and the remaining landings came from incidental capture in other gears (Koo 1970). Peak landings of 1.38 million lb (625,957 kg) occurred in 1973 (Fig. 3).

In the mid-1970s, strong year-classes failed to arise from Chesapeake Bay. The continued unrestrained fishing (no coastal state including Massachusetts limited harvest) drove the coast-wide population to its lowest levels by the late 1970s (Richards and Rago 1999). This decline was reflected in Striped Bass landings in Massachusetts (Fig. 3). Complaints of declining catches were voiced by recreational anglers and commercial fishers in Massachusetts (Montgomery 1972, 1973) and along the US Atlantic coast (Russell 2005). In Massachusetts, cries for preservation actions were raised (Moore 1973), and higher size limits and the implementation of daily bag limits were suggested (Montgomery 1978, 1979). In response, the Atlantic States Marine Fisheries Commission (ASMFC), a deliberative body of the Atlantic coastal states that coordinates conservation and

management of nearshore fish species, wrote its first Striped Bass management plan in 1981 (ASMFC 1981) and recommended that states voluntarily set higher minimum size limits for fish caught in nursery rivers and in coastal areas, and restrict fishing on spawning grounds during the spawning season.

Despite protest by some commercial fishermen (Chamberlain 1981), the Massachusetts Marine Fisheries Advisory Commission (MFC), a 9-member board representing commercial and recreational interests that approves or disapproves proposed DMF regulations, voted in 1981 to set the minimum size limit to 24 inches (60 cm) FL. However, the regulations still allowed the possession of 4 under-sized fish per day for all fishers, which created challenges for enforcement officers. Therefore, in 1982, the law was changed to eliminate the possession of fish below 24 inches FL (Chamberlain 1982) after receiving considerable public support to protect the declining coast-wide Striped Bass population (Russell 2005), but not without further protests by commercial fishers (Chamberlain 1983).

After the passage of the federal Atlantic Striped Bass Conservation Act in 1984 that required states to comply with the ASMFC management plan (Richards and Rago 1999), Massachusetts regulations for Striped Bass commercial harvest mirrored options set forth by the ASMFC fishery management plan. To address further declines in the Striped Bass abundance, DMF approved regulations in 1984 to allow commercial sales only during 1 June–30 September, which essentially cut landings

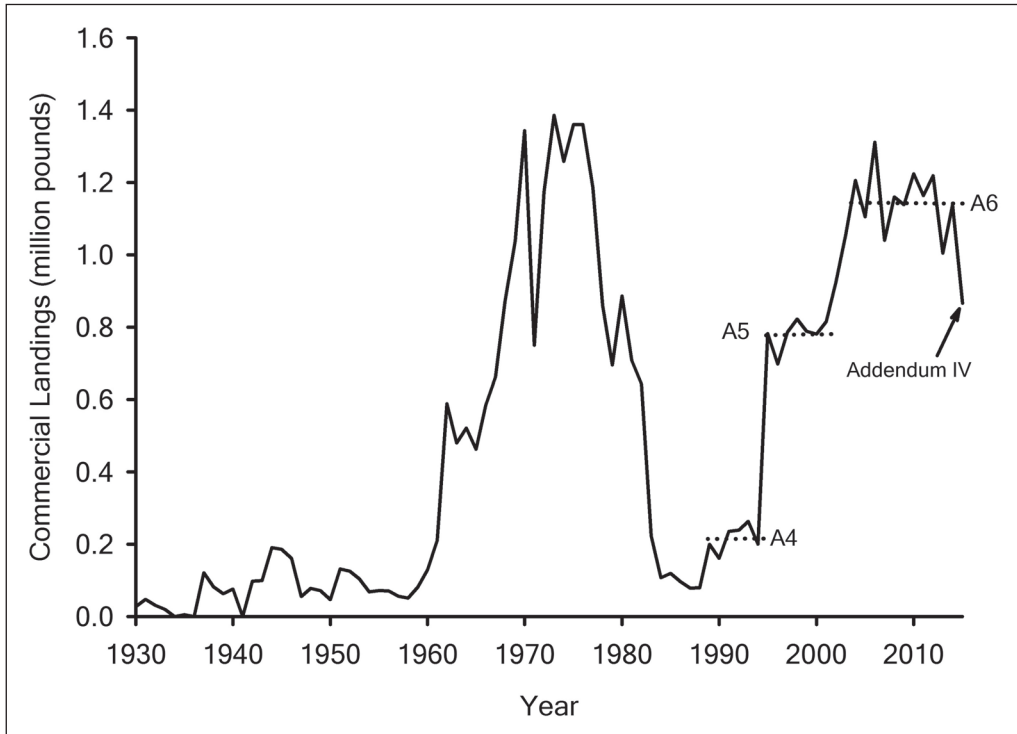


Figure 3. Pounds of Striped Bass landed in Massachusetts by the commercial fishery, 1930–2015. Quota levels for Amendments 4–6 are shown (e.g., A4).

almost in half to meet ASMFC measures (Fig. 3; Bamberger 1984). In 1985, the plan was amended (Amendment 3; ASMFC 1985) to protect females hatched in 1982 (a moderately sized year-class) until they had spawned at least once, and required states to either declare a moratorium on fishing or begin a progressive increase in minimum size limits to reach 38 inches (97 cm) TL by 1990. Most states chose the former option, but due to opposition by commercial fishers against a moratorium, Massachusetts DMF chose to maintain a commercial fishery and changed incrementally the size limit first to 30 inches (76 cm) TL in 1986, then to 33 inches (84 cm) TL in 1987 and 36 inches (91 cm) TL in 1989.

Under the Atlantic Striped Bass Conservation Act, the National Marine Fisheries Service (NMFS) is obligated to regulate Striped Bass in the Exclusive Economic Zone (EEZ) in a manner that is compatible with state management, which is set forth under the ASMFC's plan. To parallel the coast-wide moratorium, the federal government closed all waters in EEZ to Striped Bass fishing in 1990 (Atlantic bass ban ... 1990). This action forced the Striped Bass commercial fishery along the coast to occupy state waters only and, in Massachusetts, impacted fishers by limiting access to many offshore reefs and shoals fished historically. The EEZ closure is still enforced today.

Amendment 3 of the ASMFC's plan stipulated that regulations protecting the 1982 year class would remain in place until the 3-year moving average of the Maryland's Striped Bass juvenile index (a measure of year-class strength) exceeded the long-term arithmetic average of 8.0. This occurred in 1989 and consequently by October of the same year, Amendment 4 of the ASMFC's plan was adopted (ASMFC 1989). Under this amendment, states were allowed limited commercial and recreational fisheries starting in 1990 (Massachusetts was allowed to end the incremental increase in minimum size limit to 38 inches TL), and the minimum size limit along the coast could be reduced to 28 inches TL (Richards and Rago 1999). States were also required to impose harvest caps on commercial fisheries that were determined based on 20% of each state's landings during 1972–1979 (Richards and Rago 1999). Consequently, Massachusetts' quotas for landings were 160,000 lbs (72,575 kg) in 1990 (ASMFC reduced the quota from 232,000 lbs [105,233 kg] until differences in landings between dealers and fishers could be resolved) and 238,000 lbs (107,955 kg) in 1991 (Fig. 3). However, the size limit remained at 36 inches TL due to recreational anglers' concern that relaxation of regulations was premature (Chamberlain 1989, 1990a, 1990b; Robinson 1990; Radin 1991). In response to their disagreement over the liberalization of regulations, Strippers Unlimited—a recreational angler group—filed an initiative petition for a law to ban the sale of Striped Bass in Massachusetts (Lehigh 1991), which again failed to be enacted.

During 1992–1994, increases in the spawning stock size, successive high Maryland recruitment indices, and other favorable indicators of stock status prompted the ASMFC to declare in 1995 that the Atlantic coast Striped Bass population had recovered. Amendment 5 was then adopted to address management of the recovered stocks and broadened states' options for meeting management goals while retaining

the objectives of preventing overfishing and maintaining self-sustaining spawning stocks (ASMFC 1995). The amendment allowed some increase in commercial harvest, and the ASMFC presented a range of minimum size limits (24–34 inches TL) and associated quotas from which a state could choose. In 1995, DMF and MFC managers formed a special Striped Bass advisory panel of full-time commercial fishermen to help select the best ASMFC option for the commercial industry. The panel members favored the largest minimum size limit (34 inches TL) and associated quotas of 999,000 lbs (453,139 kg) for 1995 and 802,000 lbs (363,781 kg) for 1996. Interestingly, the option was not selected as a conservation measure but rather as a strategy to monopolize the harvest by the few fishermen who were adept at catching large Striped Bass (P. Diodati, former DMF Director, Andover, MA, pers. comm.). However, the quota was increased to only 750,000 lbs (340,191 kg; later increased to 802,000 lbs in 1999) as a compromise between commercial fishers and recreational anglers who were concerned further liberalization would harm the productivity of Striped Bass populations (MFC meeting minutes, 6 April 1995).

The 2000 ASMFC stock assessment for Striped Bass showed that the coastal population continued to grow and that large year-classes continued to be produced about every 3–5 years. In 2003, the ASMFC adopted Amendment 6 of the Striped Bass management plan, which endeavors to maximize the overall benefits of the available Striped Bass resource by managing exploitation to maintain an age structure that enhances spawning potential, implementing control rules to maintain stock size, and implementing a management regime that is flexible and broad based (ASMFC 2003). Prior to this time, the commercial industry complained about the inequitable distribution of landings because harvest by the recreational fishery had grown considerably as unconstrained participation increased. Amendment 6 allowed an additional increase in commercial quotas along the Atlantic coast and Massachusetts' quota increased to 1.15 million lbs (521,631 kg) while maintaining the minimum size limit at 34 inches TL (Fig. 3).

In response to declining female spawning stock biomass (SSB) as a result of below-average production of young in Chesapeake Bay during 2004–2010, Addendum IV of Amendment 6 was passed in October 2014 to reduce coast-wide recreational and commercial harvest by 25% (ASMFC 2014). The ASMFC offered various size and quota options to reach a 25% reduction, but Massachusetts DMF and MFC chose to reduce the commercial quota to 869,613 lbs (394,450 kg) in 2015 and to maintain the 34-in minimum size (Fig. 3). Since 2013, the ASMFC has required fishers and/or dealers in all Atlantic coast states that have commercial fisheries for Striped Bass to attach a commercial tag to any Striped Bass that will be sold as a measure to address illegal harvest (ASMFC 2012). In Massachusetts, ~44,000–46,000 tags are distributed annually to dealers free-of-charge for point-of-sale distribution. Based on recent interviews with fish dealers, ~40–70% of bass purchased from fishers are presently shipped out-of-state to New England (New Hampshire, Rhode Island and Connecticut) and Mid-Atlantic states (New York and Maryland) each year. All tags must be accounted for at the end of the fishing season, and any unused tags must be returned to DMF.

Regulations Addressing Dealer and Fisher Participation and Reporting

To manage the participation of fishers and to ensure accurate reporting of landings, DMF has established in-state regulations and reporting requirements for fishers and fish dealers who want to sell Striped Bass. Although the Striped Bass commercial fishery is open to all residents and non-residents, a fisherman must have a DMF commercial fishing permit and a special fishing endorsement (required since 1984) to sell. Since 1996, more than 3800 endorsements for Striped Bass have been sold each year, but only about 1500 to 2200 holders actually fish (based on renewal histories, some endorsement holders that do not fish are suspected to be individuals who believe permits might become a “commodity” if entry to fishery becomes limited; Fig. 4A). An endorsement holder is required to submit an annual catch report at the end of the season, which includes information on whether they fished, the name of the dealer(s) that they sold to, the areas fished, and the monthly pounds sold. Of those endorsements that fish, about 30% do not sell Striped Bass

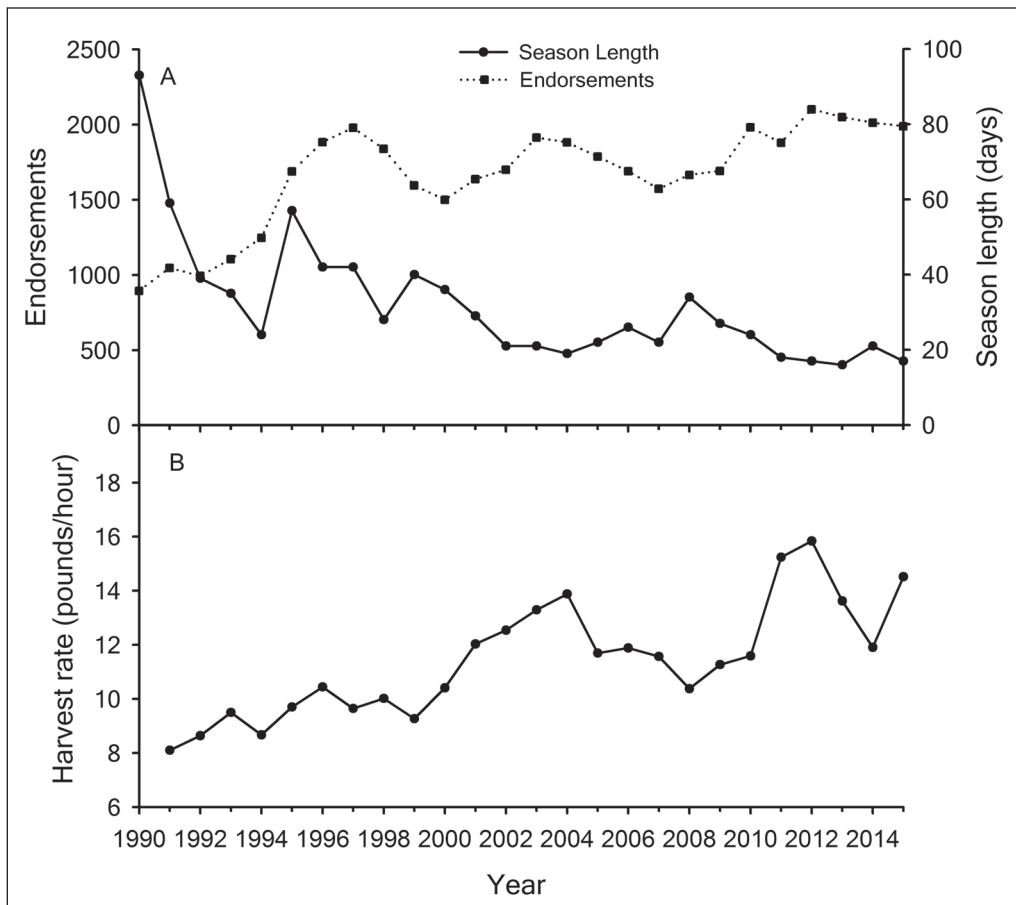


Figure 4. Trends in (A) number of endorsement holders (required to sell Striped Bass) that fished and season length (days) and (B) standardized commercial fishery harvest rates (see Nelson 2017).

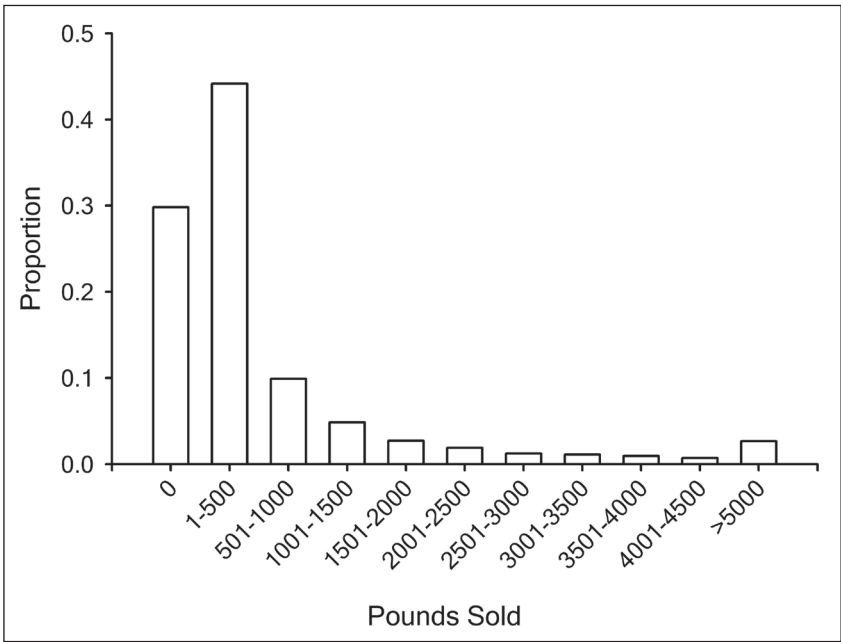
and about 45% sell less than 500 lbs (227 kg) per year (Fig. 5). The latter are typically endorsement holders that only fish weekends. Today, all fishers use electric or hand-cranked rod-and-reel gear to capture Striped Bass.

To purchase Striped Bass directly from commercial fishers, fish dealers are required to obtain special authorization from DMF in addition to standard seafood-dealer permits. Dealer reporting is required and includes weekly reporting to DMF or, since 2005, reporting through the on-line fisheries report system of the Atlantic Coastal Cooperative Statistics Program, a cooperative state–federal program designed to integrate commercial data from Atlantic coast states into a single data-management system. Quotas are monitored through the dealer records, and the close of the season is projected about a week in advance from dealer information. Following the close of the season, dealers are also required to provide a written transcript consisting of purchase dates, number and pounds of fish, and names and permit numbers of fishers from whom they purchased. If the quota is exceeded in a given year, which may occur because of late reporting by dealers or changes in fisher behavior near the close of the season, the overage is deducted from the following year’s quota.

Regulations Addressing Internal Conflicts in the Commercial Fishery

The Massachusetts Division of Marine Fisheries and the MFC have established state regulations to address specific needs of the commercial industry. As the number of participants in the Striped Bass fishery grew, the length of the Striped Bass season declined because quotas were reached more quickly (Fig. 4A), often creating market gluts. Prompted by fisher concerns, DMF instituted no-take days in an attempt to prolong quota utilization and extend the fishing season. From 1995 to

Figure 5. The proportion of endorsement holders that fished by the annual number of pounds sold during the 2010–2015 commercial seasons.



1998, a rotational schedule was used in which the fishery was open for 3 weeks and closed for 1 week. However, the length of the season became shorter after 1995 as more people entered the fishery (Fig. 4A). In response, DMF managers implemented no-take days (Thursday–Saturday) during every week of the season starting in 1999. There was an initial increase in the season length, but the metric continued to decline as participation and harvest rates increased (Fig. 4B; Nelson 2017). By 2004, the season length had declined to its lowest level (Fig. 4A). Full-time Striped Bass commercial anglers complained that the sale of Striped Bass by weekend (part-time) fishers often created market gluts on weekends and caused the price to drop during the week when selling was allowed from Sunday through Wednesday with a bag limit of 40 fish per day. The regulations were changed in 2005 to allow the taking and selling of Striped Bass on Sunday with a bag limit of 5 fish per day and on Tuesday–Thursday with a bag limit of 30 fish per day. From 2005–2008, the season length increased, possibly in response to the regulation change; however, declining harvest rates and participation may have also contributed to the increase (Fig. 4).

Season length again declined after 2008 as participation increased (Fig. 4A). In 2013, full-time Striped Bass commercial fishers complained of market gluts again and blamed the problem on individuals stockpiling their weekend catch to sell on Tuesday. Regulations were changed in 2014 to allow harvest on Monday and Thursday only and to reduce the bag limit to 2 fish per day for individual permits (mostly shored-based fishers) and 15 fish per day for boat permits. A slight increase in season length was observed in 2014, but it is unclear if the increase was due to the changes in regulations or related to a drop in harvest rates (Fig. 4).

Future of the Striped Bass Commercial Fishery in Massachusetts

The commercial fishery in Massachusetts will be facing several challenges in the near future to ensure its viability. The first challenge is that coast-wide commercial quotas were reduced by 25% in 2015 (Fig. 3) in response to declining female SSB. Population projections (ASMFC 2015) suggest SSB will likely recover due to the above-average 2011 and 2015 year-classes, but it may take several years for SSB to reach the SSB management target (ASMFC 2016) before quotas can be raised.

A second challenge will be the ability of the fishery to support more participants. It is the current policy of DMF for the Striped Bass commercial fishery to remain open access and to provide a “gateway” to any individual who wishes to become a commercial fisher. In 2014 and 2015, landings of Striped Bass in Massachusetts were worth generally >3 million dollars, and fishers were paid more than \$4.00 per pound on average during that time (Fig. 6). Such high monetary value will likely attract more participants if other state fisheries become more restricted. To that end, the MFC approved an 8 September 2013 control date for the commercial Striped Bass fishery. Any fisher who did not hold a Striped Bass permit prior to that date may be subject to future management actions including but not limited to different bag limits and limited entry.

A third challenge to the commercial Striped Bass fishery is its relationship with the expanding recreational fishery. Since the 1940s, recreational anglers along the Atlantic coast have been pursuing gamefish status for Striped Bass, which would eliminate commercial fishing for this species throughout its range. In support of this movement, on 20 October 2007, President George W. Bush signed an executive order which prevents commercial fishing for Striped Bass in the EEZ if those federal waters were opened to fishing in the future. More recently, Massachusetts legislators have submitted bills for vocal recreational groups like Stripers Forever to ban Striped Bass commercial fishing in Massachusetts and to force specific size and bag limits to conserve the large breeding female fish. None of the bills have yet passed mainly because many legislators believe the crafting of regulations should be the responsibility of DMF and the MFC who are charged with effectively managing Striped Bass.

The DMF managers are well-aware of the importance of Striped Bass to commercial fishers in Massachusetts and it is their intention to have a sustainable fishery that will continue to make fresh wild-caught Striped Bass available to end users in Massachusetts (G. Nelson, pers. observ.). I am confident they will continue to make prudent management decisions to ensure the viability of the resource continues and provides economic opportunities for future fishers as it has since colonial times.

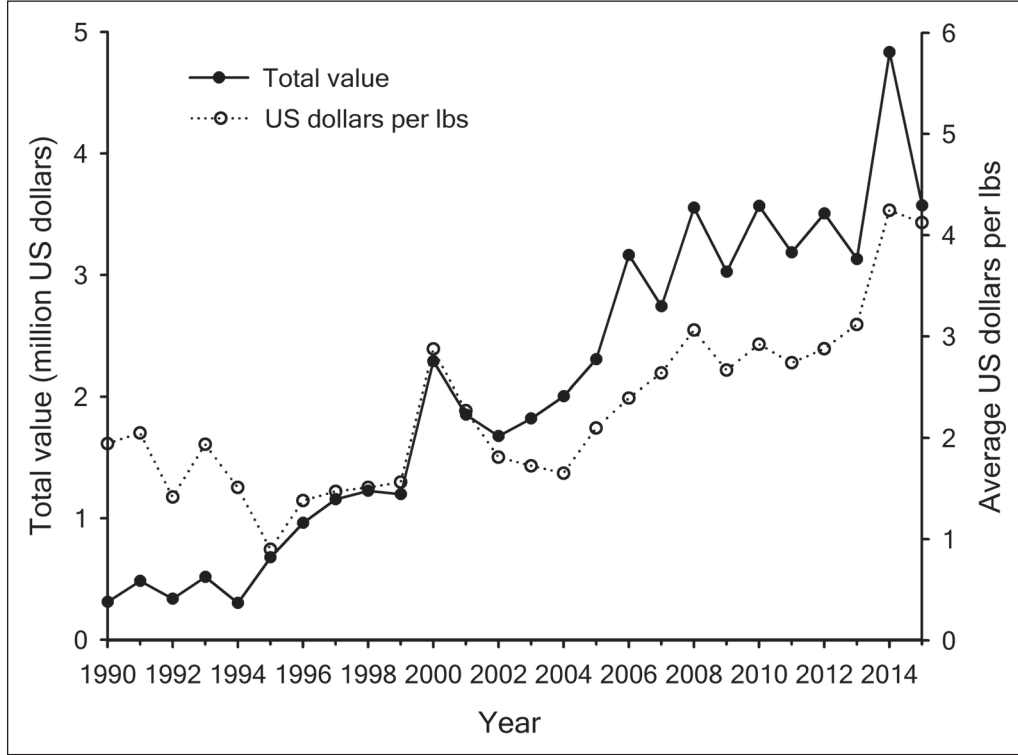


Figure 6. Total value (million US dollars) and average price per pound for the Massachusetts commercial fishery for Striped Bass (NMFS 2017).

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