

*Atlantic States Marine Fisheries Commission*

**ADDENDUM II TO AMENDMENT 6  
TO THE ATLANTIC STRIPED BASS  
INTERSTATE FISHERY MANAGEMENT PLAN**

**Definition of Recruitment Failure**



*ASMFC Vision Statement:  
Healthy, self-sustaining populations for all Atlantic coast fish species or successful  
restoration well in progress by the year 2015*

**November 2010**

## **Acknowledgements**

This addendum was prepared by the Commission's Atlantic Striped Bass Plan Development Team composed of: Dr. Wilson Laney, U.S. Fish and Wildlife Service; Rob O'Reilly, Virginia Marine Resources Commission; Gary Shepherd, National Marine Fisheries Service; and Nichola Meserve (Chair), Atlantic States Marine Fisheries Commission. Development of the document benefited greatly from the input of the Atlantic Striped Bass Technical Committee and Atlantic Striped Bass Advisory Panel. The Atlantic Striped Bass Management Board approved Addendum II on November 9, 2010.

## **1.0 Introduction**

The Atlantic States Marine Fisheries Commission (ASMFC) has coordinated interstate management of Atlantic striped bass (*Morone saxatilis*) from 0–3 miles offshore since 1981. The management unit includes all coastal migratory stocks between Maine and North Carolina. Atlantic striped bass is currently managed under Amendment 6 to the Fishery Management Plan (FMP), approved February 2003, and Addendum I to Amendment 6, approved October 2007 and this Addendum. Management authority from 3–200 miles from shore lies with NOAA Fisheries.

The purpose of this Addendum is to revise the definition of striped bass recruitment failure.

During the development and approval of this Addendum, the Atlantic Striped Bass Management Board also considered increasing the coastal commercial quotas. The Board decided not to modify the quotas at this time. A summary of the information provided in the public hearing draft of this Addendum is included in this document as Appendix 1.

## **2.0 Management Program**

### **2.1 Statement of the Problem**

The Striped Bass Technical Committee recommended to the Striped Bass Management Board a revised definition for striped bass recruitment failure. Identifying periods of recruitment failure is the basis of the juvenile abundance index management trigger in Amendment 6. This trigger is used to evaluate when management action is needed to ensure a healthy population of striped bass.

### **2.2 Background**

#### **2.2.1 Juvenile Abundance Indices**

As part of the striped bass monitoring program, Section 3.1 of Amendment 6 lays out requirements for measurement and use of juvenile abundance indices. The following states are required to conduct juvenile abundance surveys on an annual basis: Maine for the Kennebec River, New York for the Hudson River, New Jersey for the Delaware River, Maryland for Chesapeake Bay tributaries, Virginia for Chesapeake Bay tributaries, and North Carolina for the Roanoke River and Albemarle Sound. The Striped Bass Technical Committee annually examines the juvenile abundance indices (JAIs) for recruitment failure. Under Amendment 6, recruitment failure is defined as an index value that is lower than 75% of all other values in its data set (i.e., below the first quartile). If any JAI shows recruitment failure for three consecutive years, the Technical Committee recommends appropriate action to the Striped Bass Management Board. Thus the JAIs are also the basis of one of the management triggers in Section 4.1 of Amendment 6. The Management Board annually reviews the trends in the JAIs as reported by the Technical Committee, and if three years of consecutive recruitment failure occurs in any JAI, it must review the cause and determine the appropriate management action. The Management Board is the final arbiter in all management decisions.

#### **2.2.2 Technical Committee Review of the JAIs**

In 2010, the Technical Committee completed a review of the JAIs, and the Amendment 6 definition of recruitment failure and the JAI management trigger. The Technical Committee

continued to support the use of the first quartile to define an index value as exhibiting recruitment failure, and the use of three consecutive years of recruitment failure to trigger a management recommendation from the Technical Committee for the Management Board's consideration. However, the Technical Committee recommended using a fixed time series appropriate to each JAI, rather than the full time series of each JAI, to estimate the first quartile.

Specifically, the Technical Committee recommended revising the start year of two JAIs time series to remove values prior to survey standardization: New Jersey's from 1980 to 1986 because of differences in environmental parameters in the earlier years of the survey; and Virginia's from 1967 to 1980 because of missing index values from 1974–1979 when no sampling was conducted. These revisions do not remove periods of recruitment failure from the time series, which are needed for reference. Second, the Technical Committee recommended fixing the terminal year for estimating the first quartile at 2009, so that the first quartile value is constant from year to year. Upon the accumulation of additional data for each survey, the Technical Committee may re-evaluate the time series used as a reference period for the determination of recruitment failure.

Table 4 provides the time series and associated first quartile values for defining recruitment failure for each JAI under the Amendment 6 definition and under the Technical Committee recommendation. Figures 4–11 illustrate the JAI management trigger analysis under both scenarios. Confidence intervals (95%) for index values are displayed when available to illustrate uncertainty, but are not utilized in the determination of recruitment failure. Revising the initial year in the time series for the New Jersey and Virginia indices results in several additional index values qualifying as recruitment failure that did not with the full time series (i.e., 1987, 1991, 2002, and 2006 for New Jersey, and 1983 and 1991 for Virginia). Use of either the Amendment 6 or the Technical Committee recommended definition for recruitment failure does not trigger consideration of management action in 2010 (for the 2007–2009 JAI indices).

### **2.3 Definition of Recruitment Failure**

Recruitment failure is defined as a value that is below 75% of all values in a fixed time series appropriate to each juvenile abundance index. The fixed time series and associated first quartile values for determining recruitment failure are provided in Table 1. This new definition modifies Amendment 6, Section 3.1.1 Requirements for Measurement and Use of Juvenile Indices, and Section 4.1 Planning Horizon.

### **3.0 Compliance**

Effective immediately, the revised definition of recruitment failure will be used in conjunction with the JAI management trigger included in Amendment 6. The Plan Review Team, Technical Committee, and the Management Board will use this new definition when reviewing the management triggers.

#### 4.0 Tables

Table 1. Method for determining recruitment failure under the Amendment 6 and the Technical Committee recommended definitions.

		<b>ME – Kennebec R.</b>	<b>NY – Hudson R.</b>	<b>NJ – Delaware R.</b>	<b>MD – Chesapeake B. Tributaries</b>	<b>VA – Chesapeake B. Tributaries</b>	<b>NC – Albemarle S. /Roanoke R.</b>
<b>Amendment 6 Definition – first quartile of all values in the time series</b>	Time Series	1987–present	1979–present	1980–present	1957–present	1967–present	1955–present
	1st Quartile for 2010 trigger only*	0.05	8.60	0.35	1.60	3.40	1.33
<b>Recommended Definition – first quartile of a fixed time series appropriate to the index</b>	Time Series	1987–2009	1979–2009	1986–2009	1957–2009	1980–2009	1955–2009
	1st Quartile for 2010 trigger and all future years*	0.05	8.60	0.89	1.60	3.98	1.33

\* First quartile values subject to final review of 2009 JAI data; ME and NC values will also change if indices are converted to geometric mean values

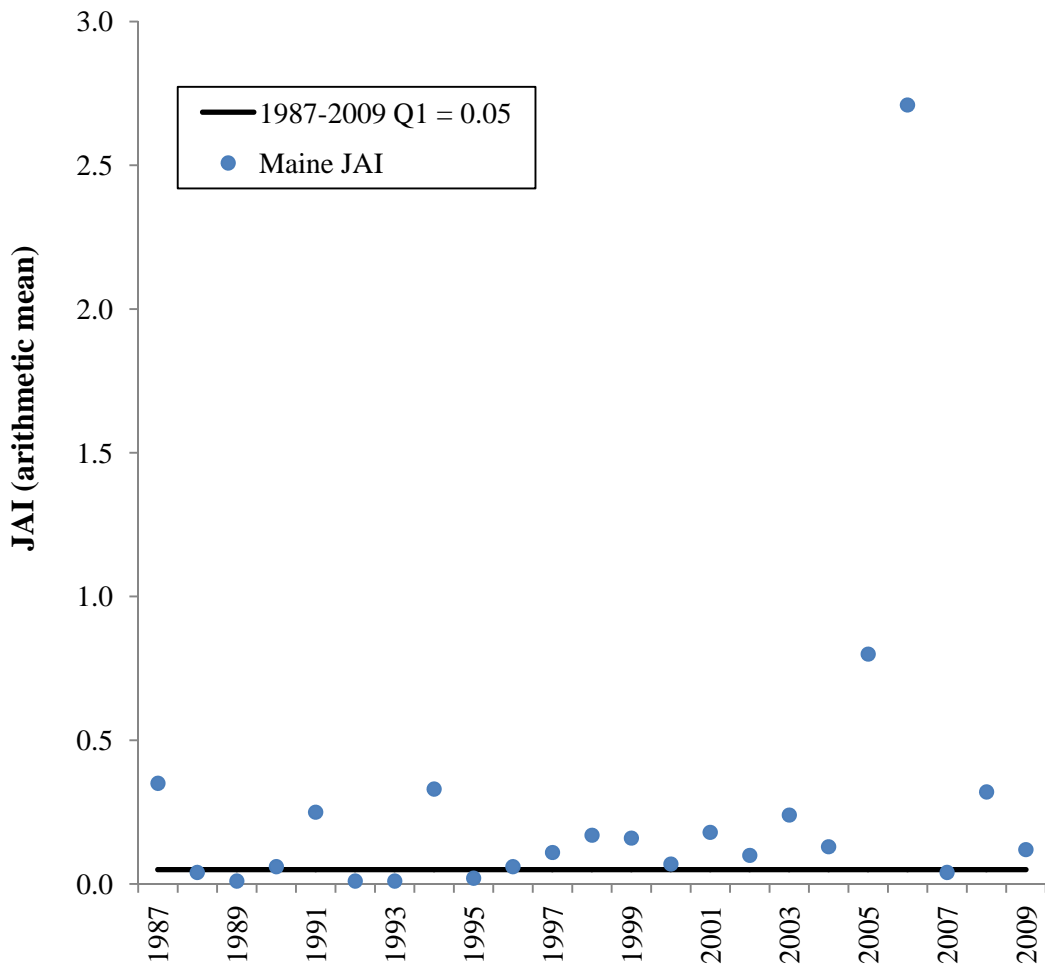
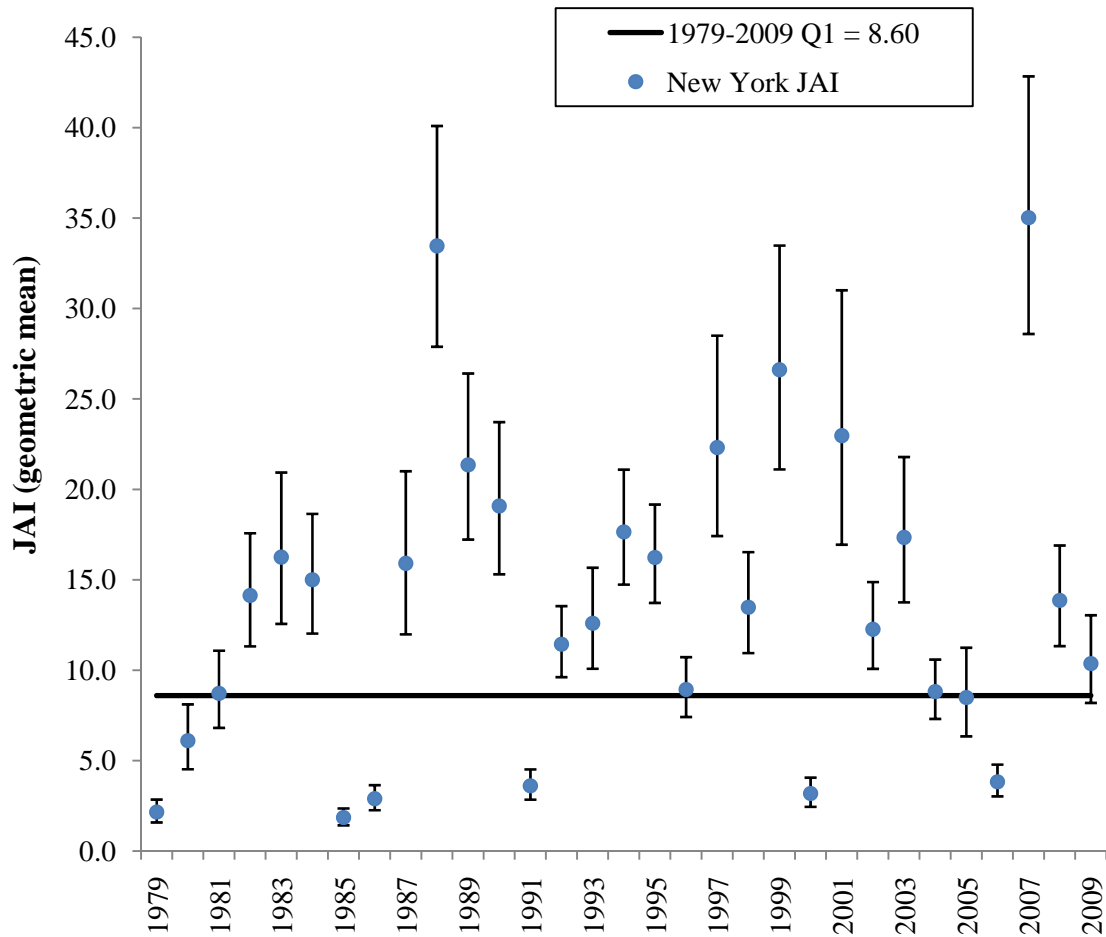


Figure 1. Maine juvenile abundance index (JAI) for the Kennebec River compared to the 1987–2009 1<sup>st</sup> quartile (Q1). Index values below 0.05 qualify as recruitment failure. This figure represents both the Amendment 6 definition and the Technical Committee recommendation of recruitment failure and the management trigger review for this year. However, under Amendment 6, the 2010 index would be compared to a newly calculated 1987–2010 first quartile and, under the Technical Committee recommendation, all future indices would be compared to the 1987–2009 first quartile.



**Figure 2.** New York juvenile abundance index (JAI), with 95% confidence intervals, for the Hudson River compared to the 1979–2009 first quartile (Q1). Index values below 8.60 qualify as recruitment failure. This figure represents both the Amendment 6 definition and the Technical Committee recommendation of recruitment failure and the management trigger review for this year. However, under Amendment 6, the 2010 index would be compared to a newly calculated 1979–2010 first quartile and, under the Technical Committee recommendation, all future indices would be compared to the 1979–2009 first quartile.

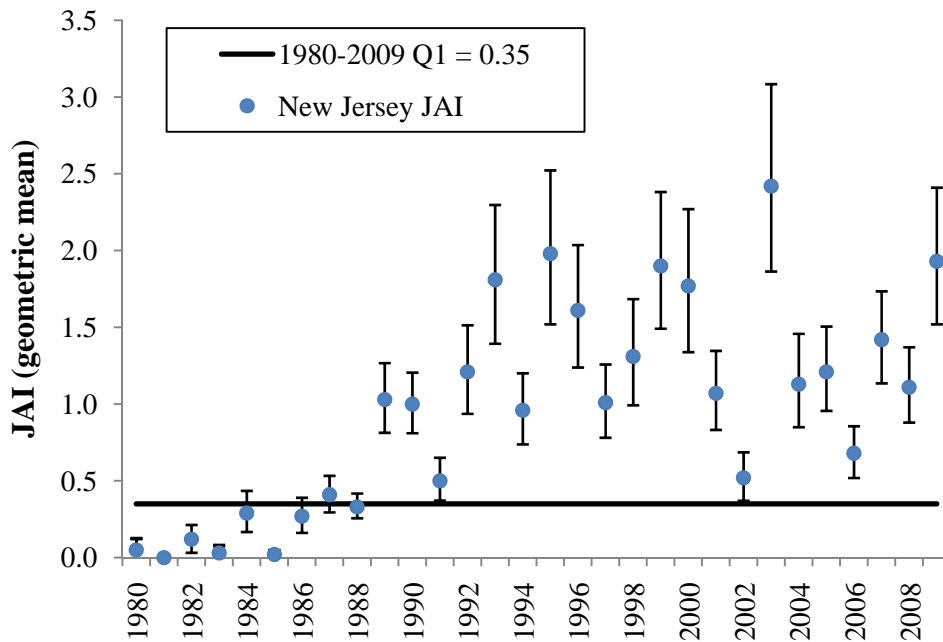


Figure 3. New Jersey juvenile abundance index (JAI), with 95% confidence intervals, for the Delaware River compared to the 1980–2009 first quartile (Q1). Index values below 0.35 qualify as recruitment failure. This figure represents the Amendment 6 definition of recruitment failure and the management trigger review. Under Amendment 6, the 2010 index would be compared to a newly calculated 1980–2010 first quartile.

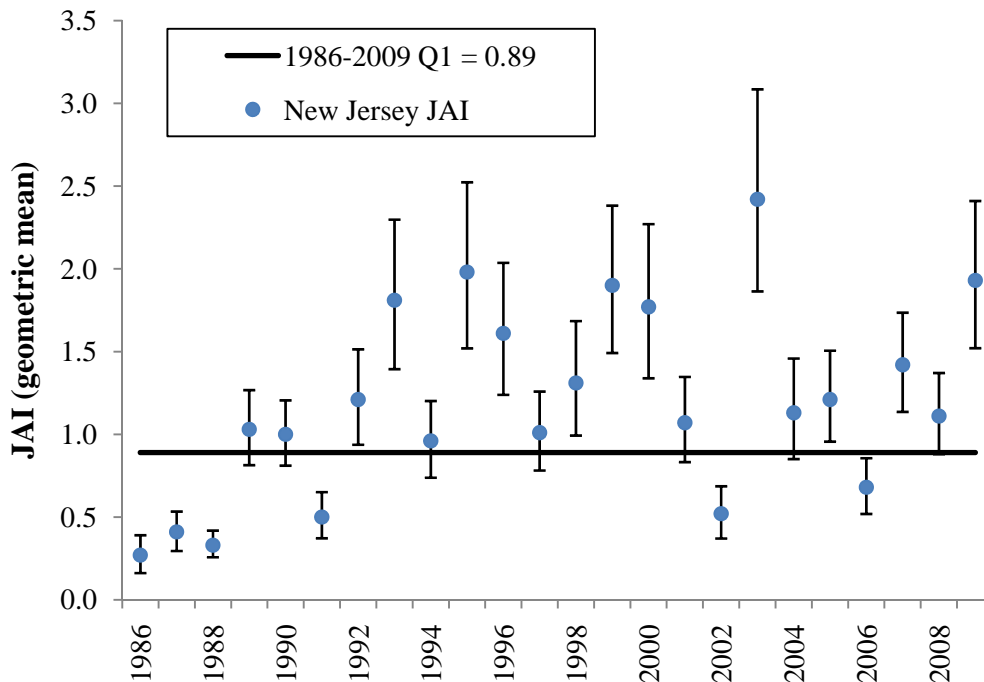


Figure 4. New Jersey juvenile abundance index (JAI), with 95% confidence intervals, for the Delaware River compared to the 1986–2009 first quartile (Q1). Index values below 0.89 qualify as recruitment failure. This figure represents the Technical Committee recommendation for defining recruitment failure and the management trigger review. Under the recommendation, all future indices would be compared to the 1986–2009 first quartile.



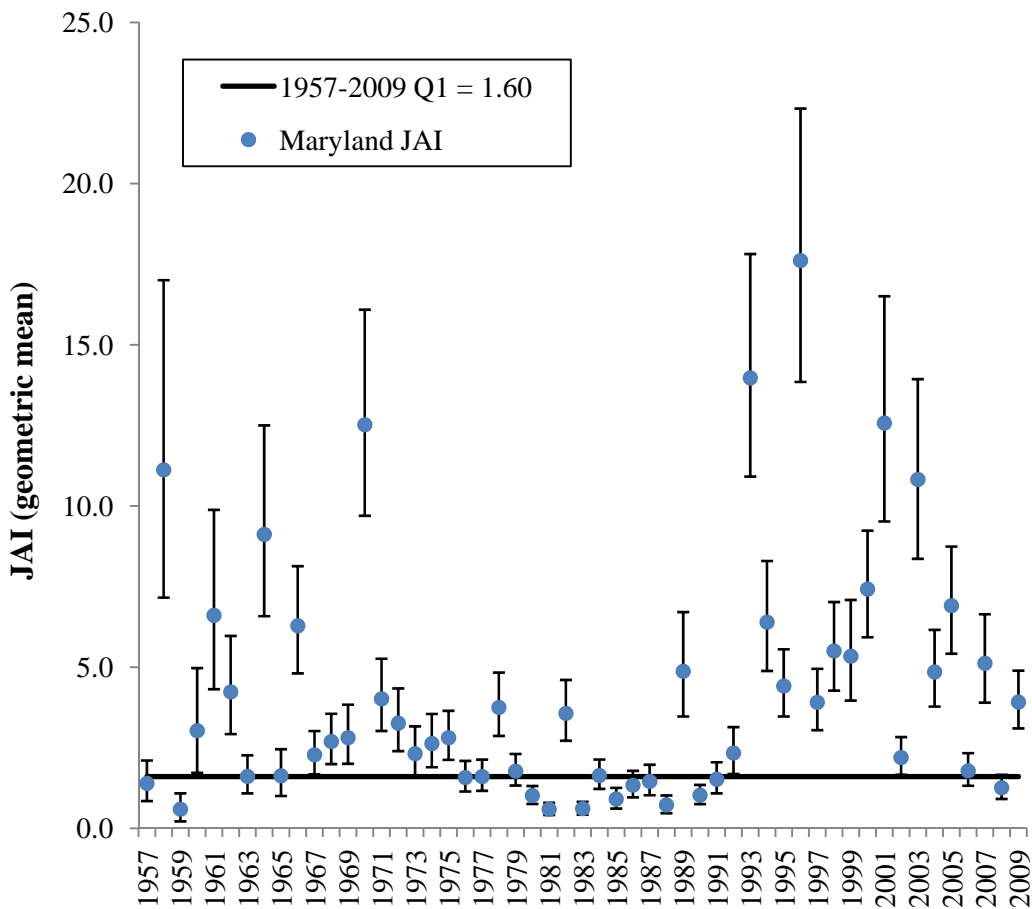
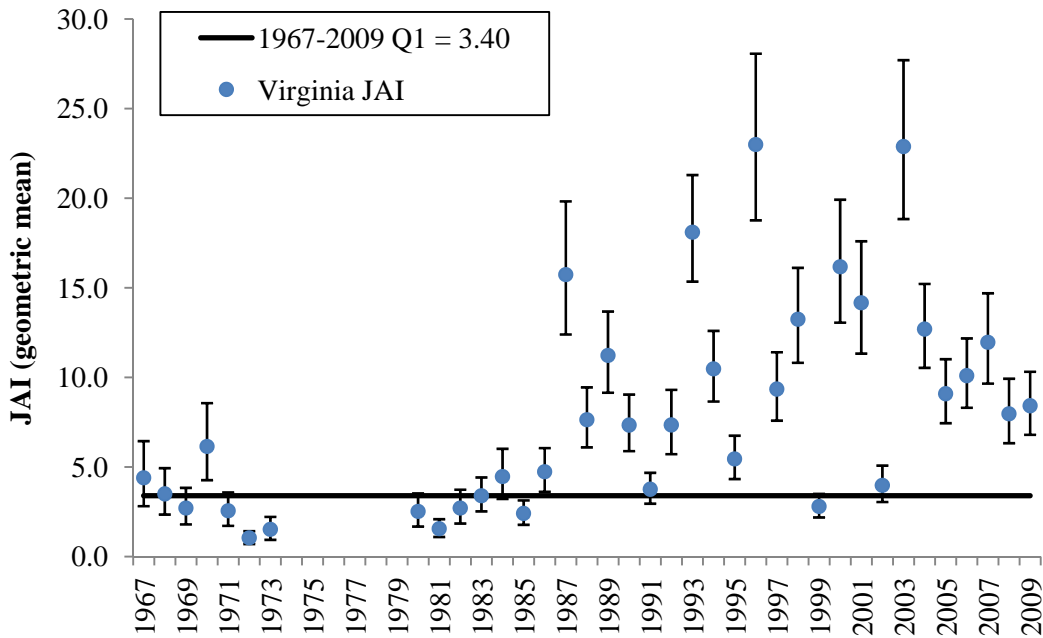
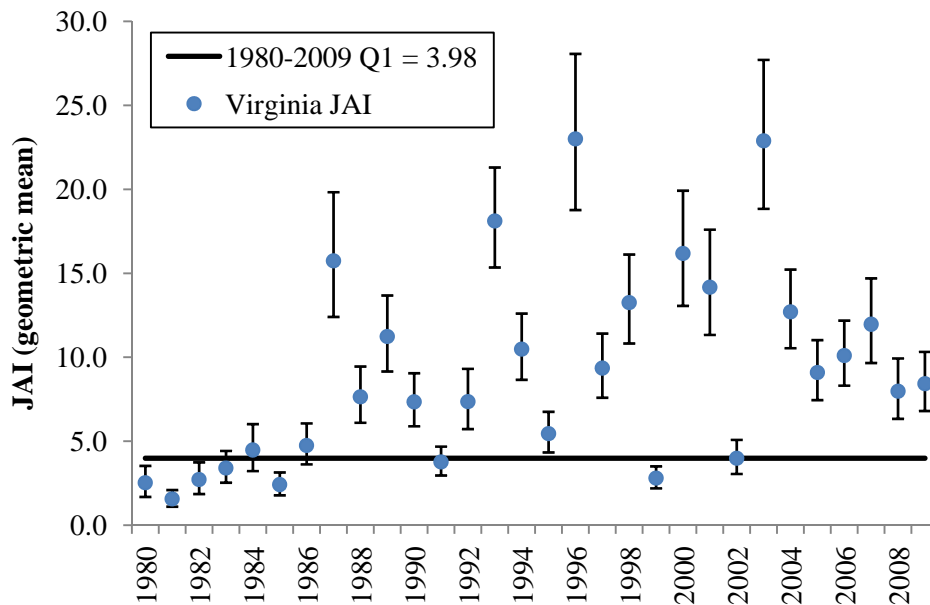


Figure 5. Maryland juvenile abundance index (JAI), with 95% confidence intervals, for Chesapeake Bay tributaries compared to the 1957–2009 first quartile (Q1). Index values below 1.60 qualify as recruitment failure. This figure represents both the Amendment 6 definition and the Technical Committee recommendation of recruitment failure and the management trigger review for this year. However, under Amendment 6, the 2010 index would be compared to a newly calculated 1957–2010 first quartile and, under the Technical Committee recommendation, all future indices would be compared to the 1957–2009 first quartile.



**Figure 6.** Virginia juvenile abundance index (JAI), with 95% confidence intervals, for Chesapeake Bay tributaries compared to the 1967–2009 first quartile (Q1). Index values below 3.40 qualify as recruitment failure. This figure represents the Amendment 6 definition of recruitment failure and the management trigger review. Under Amendment 6, the 2010 index would be compared to a newly calculated 1967–2010 first quartile.



**Figure 7.** Virginia juvenile abundance index (JAI), with 95% confidence intervals, for Chesapeake Bay tributaries compared to the 1980–2009 first quartile (Q1). Index values below 3.98 qualify as recruitment failure. This figure represents the Technical Committee recommendation for defining recruitment failure and the management trigger review. Under the recommendation, all future indices would be compared to the 1980–2009 first quartile.

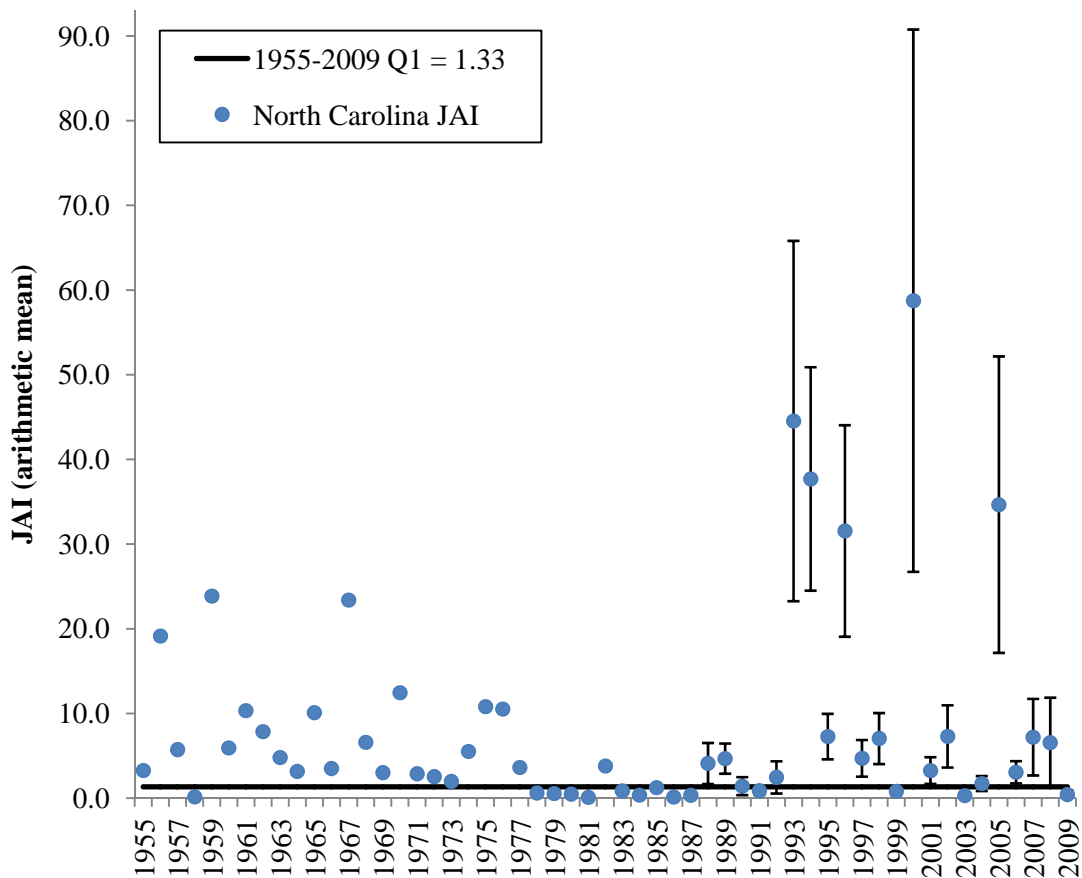


Figure 8. North Carolina juvenile abundance index (JAI), with 95% confidence intervals when available, for the Albemarle Sound and Roanoke River compared to the 1955–2009 first quartile (Q1). Index values below 1.33 qualify as recruitment failure. This figure represents both the Amendment 6 definition and the Technical Committee recommendation of recruitment failure and the management trigger review for this year. However, under Amendment 6, the 2010 index would be compared to a newly calculated 1955–2010 first quartile and, under the Technical Committee recommendation, all future indices would be compared to the 1955–2009 first quartile.

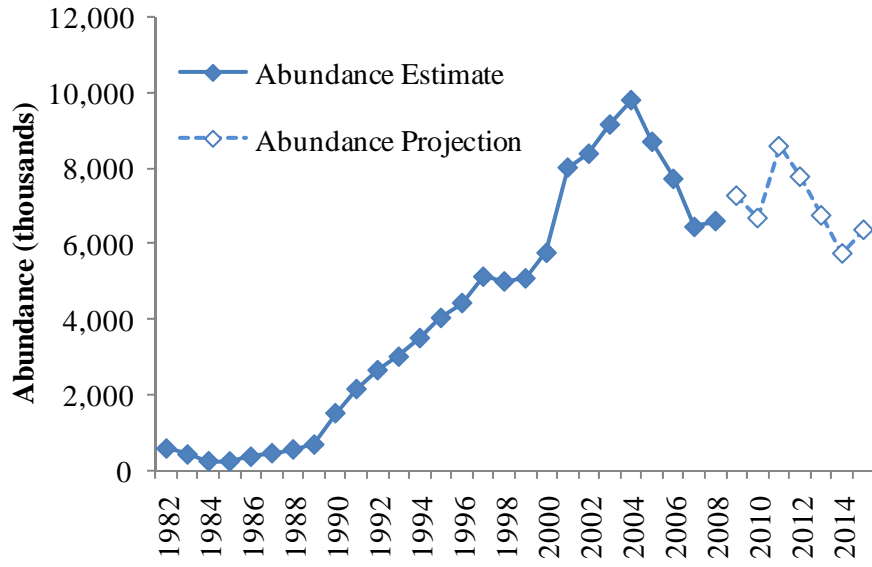


Figure 9. Projection of age 8+ striped bass abundance for 2009–2015.

## **Appendix 1.**

### **Background Information on Consideration of Increasing the Coastal Commercial Striped Bass Quotas for Atlantic Striped Bass through Addendum II**

#### **Statement of the Problem**

Although Amendment 6 established management programs for both the commercial and recreational fisheries based on the same target fishing mortality rate, the implementation of state-specific quotas for coastal commercial harvest (and not for recreational harvest) has prevented the commercial and recreational fisheries from responding equally to changes in striped bass population size. Options are presented to allocate additional striped bass to the commercial fleet through an increase in the coastal commercial harvest quota in order to increase equality between the two fleets.

#### **Background**

##### **Management Program**

Interstate fishery management measures for striped bass are based on target fishing mortality (F) rates. When the fishery reopened in 1990 under Amendment 4, regulations were designed to limit harvest to 20% of the average landings during a 1972–1979 reference period to achieve an  $F=0.25$ . In 1995, when the fishery was declared restored, Amendment 5 set regulations to allow harvest up to 70% of the average landings during the reference period to achieve an  $F=0.33$ . The amendment included commercial quotas for coastal area jurisdictions as well as the Delaware Bay and Chesapeake Bay that were flexible depending on the minimum size limit implemented.

Amendment 6 (2003) established target Fs of 0.30 for the coastal area and 0.27 for the Chesapeake Bay and Albemarle Sound–Roanoke River management areas. The Chesapeake and Albemarle–Roanoke areas have a lower target F rate as a result of being granted the ability to implement a lower minimum size limit (18 inches) than that required for the coastal area (28 inches). Under Amendment 6, the coastal commercial quotas were increased to allow 100% of the landings during the reference period (see section 2.2.2 below for more information). Amendment 6 did not determine commercial quotas for the Chesapeake or Albemarle–Roanoke areas; however, Maryland, the Potomac River Fisheries Commission, Virginia, and North Carolina establish quotas for these areas based on the target F rate and stock size. Each jurisdiction implements additional commercial regulations to restrict coastal commercial harvest to its coastal commercial quota, and, if applicable, Chesapeake Bay and Albemarle–Roanoke harvest to the area quotas. Recreational management measures include generally the same minimum size limits as in the commercial fishery, and a two fish creel limit. Amendment 6 did not establish quotas for striped bass harvested for recreational purposes.

Amendment 6 includes procedures by which a jurisdiction may be allowed to implement an alternative management regime. A jurisdiction may submit a proposal to implement measures that are conservational equivalents to the plan standards (e.g., a reduction in quota to compensate for implementing a lower minimum size limit) for the Striped Bass Management Board's consideration. Also, while a jurisdiction may not relax its regulatory program without prior approval, more restrictive measures can be implemented at any time.

### **Coastal Commercial Harvest Quotas**

Amendment 6 allocates each coastal jurisdiction in the management unit an annual<sup>1</sup> coastal commercial harvest quota in pounds (Table 1). Allocation of quota is based on 100% of each state's average coastal commercial landings during a base period of 1972–1979, except in Delaware where the state's 2002 commercial fishery quota was maintained<sup>2</sup>. The Amendment 6 allocation of coastal commercial quota is not based on striped bass abundance. Any quota overage must be subtracted from the quota in the subsequent year as a pay-back mechanism.

Several adjustments to the Amendment 6 quotas have occurred since 2003 due to the flexibility built into the plan. Currently, four states prohibit commercial harvest of striped bass, and three states have implemented equivalent management programs that resulted in quota reductions (Table 1). In New Jersey, commercial quota is transferred to the recreational fishery via a “Bonus Fish Program” in which qualified anglers are permitted one striped bass in addition to the normal possession limit; the resulting harvest is managed under the commercial quota.

### **Fishery Status**

Total and state-specific coastal commercial harvests<sup>3</sup> of striped bass have varied little from year to year since the implementation of Amendment 6 due to quota management (Table 2). Total coastal commercial harvests from 2003 to 2008 ranged between 2.83 and 3.07 million pounds (Table 2), and averaged 2.95 million pounds (Table 3). (These numbers change only slightly when New Jersey recreational harvest under the coastal commercial quota is included; for example, the 2003–2008 average harvest is 2.99 million pounds.) The total harvest counted towards the Amendment 6 coastal commercial quota has not exceeded the quota in any year (Figure 1). On an individual state basis, twelve quota overages have occurred between three states. These harvest overages generally exceed the quota by less than 6%, and each is paid back through a reduced quota the following year.

Coastal commercial harvest represents only a portion of the commercial striped bass landings (due to commercial harvest in the Chesapeake Bay) and an even smaller portion of the total (commercial plus recreational) landings<sup>4</sup>. From 2003 to 2008, coastal commercial harvest has contributed 39.4 – 45.2% (average 41.6%) to the total commercial landings, and 8.5 – 9.9% (average 9.1%) to the total striped bass landings (Table 3). During this six year period, coastal commercial harvest decreased by 3.6%, total commercial landings increased by 1.6%, total recreational landings increased by 13.7%, and total landings increased by 10.8%.

These trends cannot be extended further back because the breakdown of total commercial landings into coastal and non-coastal harvest is not available prior to 2003. Figure 2 compares

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<sup>1</sup> Annual quotas and harvests are based on a calendar year, except in North Carolina where quota and harvest are based on the state's fishing year from December to November, as authorized by prior Board action.

<sup>2</sup> Delaware's commercial quota was held at the 2002 level because using the state's average 1972–1979 landings would have resulted in a decrease of quota to 169,000 pounds, whereas all other state quotas were increased.

<sup>3</sup> All coastal commercial harvest numbers presented are from state compliance reports submitted to the ASMFC.

<sup>4</sup> Total commercial and recreational landings numbers presented are from personal communication with the NMFS Fisheries Statistics Division, in 2010. The Albemarle–Roanoke stock is not considered to be part of the migratory stock in Amendment 6. Thus coastwide landings numbers presented in this document do not include harvest from the Albemarle–Roanoke area.

commercial landings from 1950–2008 to recreational landings from 1982–2008<sup>5</sup>. The coastal commercial harvest can be no greater than the total commercial landings shown. Since the reopening of the fishery in 1990, commercial landings have been allowed to increase more than 8-fold, while recreational landings have been allowed to increase more than 10-fold.

### **Stock Status**

Based on the results of the 2009 update stock assessment, Atlantic coast striped bass are not overfished and overfishing is not occurring<sup>6</sup>.

The statistical catch at age (SCA) model estimates that the resource remains at a high level with female spawning stock biomass (SSB) at 55,500 metric tons (mt), well above the SSB target and threshold levels of 37,500 and 30,000 mt, respectively (Figure 3). Estimates of recruitment (age-1 abundance) in 2005–2007 decreased from the all time high in 2004 and were below the average for the post-recovery time period (1995–present), although the 2008 recruitment estimate is above that average (Figure 3). While biomass estimates have remained relatively stable from the continued growth of previous strong cohorts, stock abundance has declined since 2004, although there was a small increase from 2007 to 2008 (Figure 3). The decline, as reflected by landings, is more prevalent in areas largely dependent on the Chesapeake Bay stock than areas dominated by the Hudson River stock.

The SCA model estimated the 2008 fishing mortality rate (F) on age 8–11 fish to be  $F=0.21$ , which is well below the fishing mortality threshold and target levels of 0.34 and 0.30, respectively. Tag-based estimates of fishing mortality for striped bass 28 inches and greater along the coast and in the Hudson River, Delaware Bay, and Chesapeake Bay are all 0.20 or less in 2008. Based on the proportion of total removals by the recreational and commercial fleets in 2008, the F for age 8 and older fish from the recreational fishery is 0.18 and for the commercial fishery it is 0.03. Similarly, the F for ages 3–8 striped bass is 0.16 from the recreational fishery and 0.06 from the commercial fishery.

## **Management Options Presented in Public Hearing Draft of Addendum II**

### **Issue 1 Management Options**

The following options are proposed to consider an increase in the coastal commercial quota of striped bass. Adopting Option 2 would modify Amendment 6, Section 4.3.2.

#### **Option 1: Status Quo**

Under this option, the coastal commercial quotas in Amendment 6 would remain unchanged.

It should be noted that the current management regime permits the implementation of Management Board approved, alternative regulations that are conservation equivalents to the Amendment 6 standards (see Section 4.6 of Amendment 6). The Striped Bass Plan Review Team finds that the plan currently permits a state to propose an increase in its coastal commercial quota through an equivalent reduction in its commercial or recreational fishery (i.e., a revision to its

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<sup>5</sup> Recreational landings estimates are not available or are considered unreliable prior to 1982.

<sup>6</sup> See the 2009 Stock Assessment for Atlantic Striped Bass (ASMFC, 2009, Washington, DC, 281 p.), available at: <http://www.asmfc.org/speciesDocuments/stripedBass/reports/stockassmts/09StripedBassAssmtReport.pdf>

commercial or recreational regulations, such as a minimum size limit increase or closed season/area, to offset the effect on the striped bass population from an increased commercial quota). Any proposals will be reviewed by the Striped Bass Technical Committee, Advisory Panel, and Plan Review Team prior to Management Board review. The Technical Committee will consider proposals involving an exchange between the commercial and recreational fleets based on the availability of adequate data and evaluation methods. The Management Board is interested in public comment on the concept of such alternative management proposals.

#### Option 2: Increase Coastal Commercial Quotas

Under this option, the Management Board would select a specific percent increase to be applied to the coastal commercial quotas established in Amendment 6. Each jurisdiction would be responsible for deciding whether or not to implement the increased quota level. Jurisdictions with coastal commercial quotas that have been modified through conservation equivalency would be required to submit an updated proposal based on the increased quota level as part of their implementation plan.

#### **Technical Analysis of Issue 1 Management Options**

Overall, the Striped Bass Technical Committee concludes that whether or not to increase the coastal commercial quota is largely a management decision about allocation. To evaluate the risk to the stock associated with adopting Option 2, the Technical Committee simulated the effect that increasing the coastal commercial quotas by 20–50% in 2004 would have had on F and SSB from 2004 to 2008.

The hypothetical quota increase analysis uses the catch-at-age data compiled for the 2009 stock assessment. The original catch-at-age was first modified to simulate full utilization of the ~3.5 million coastal commercial quota in place from 2004 to 2008. This modified catch-at-age was then revised based on 20, 30, 40, and 50% quota increases beginning in 2004, and an assumption that the quotas were harvested in full each year. The SCA model was then rerun with the “original CAA”, “full quota utilization CAA”, and the four “coastal quota increase CAAs”. The effect on F and SSB from 2004 to 2008 is shown in Tables 5 and 6.

The average F on fish ages 8–11 in 2008 increased from 0.21 with the original CAA, to 0.24 with the full quota utilization CAA, and to between 0.26 and 0.29 with the coastal quota increase CAAs (Table 5). Spawning stock biomass in 2008 decreased from 55,500 mt with the original CAA, to 53,294 mt with the full quota utilization CAA, and to between 51,499 and 49,142 mt with the coastal quota increase CAAs (Table 6).

These simulated changes in F and SSB do not change the stock status of striped bass in 2008 (i.e., not overfished, not overfishing). However, the Technical Committee emphasized that they be viewed in relation to stock projections presented in the 2009 stock assessment report. Specifically, projections for age 8 and older striped bass, and consequently catch, show an overall decline from 2008 to 2015 (Figure 12). These projections assume current exploitation and recruitment levels. Age 8+ abundance is expected to fall because of the lower age-1 recruitment estimates in recent years (i.e., 2003, and 2005–2007; Figure 3).

It is important to note that the magnitude and trend of recruitment estimates are largely influenced by biotic and abiotic variables beyond fishery management control, now that the



management regime has resulted in a low and stable fishing mortality, high spawning stock biomass, and an age structure expanded well beyond age 12. Additional fishery management restrictions would not likely result in direct improvement to striped bass recruitment.

## **Tables**

**Table 2.** Amendment 6 coastal commercial harvest allocations and modified coastal commercial harvest quotas incorporating commercial prohibitions and management equivalencies.

<b>State</b>	<b>Amendment 6 Harvest Allocation (lbs)</b>	<b>Current Coastal Commercial Harvest Quotas (lbs)</b>
Maine	250	0 *
New Hampshire	5,750	0 *
Massachusetts	1,159,750	1,159,750
Rhode Island	243,625	239,963 †
Connecticut	23,750	0 *
New York	1,061,060	828,293 †
New Jersey	321,750	321,750 **
Delaware	193,447	193,447
Maryland	131,560	126,396 †
Virginia	184,853	184,853
North Carolina	480,480	480,480
<i>Total</i>	<i>3,806,275</i>	<i>3,534,932</i>

\* Commercial harvest/sale prohibited, with no re-allocation of quota.

\*\* Commercial harvest/sale prohibited, with re-allocation of quota to the recreational fishery.

† Quota reduced through management program equivalency; NY and MD beginning in 2004, RI beginning in 2007.

**Table 3.** Coastal commercial harvest (pounds) of striped bass by state, 2003–2008.

<b>Year</b>	<b>MA</b>	<b>RI</b>	<b>NY</b>	<b>NJ*</b>	<b>DE</b>	<b>MD</b>	<b>VA</b>	<b>NC**</b>	<b>Total Coastal Commercial Harvest (i.e., no NJ)</b>	<b>Total Harvest Counted Towards Quota</b>
<b>2003</b>	1,055,439	246,312	753,261	121,410	188,419	98,149	159,786	434,369	2,935,735	3,057,145
<b>2004</b>	1,206,305	245,204	741,668	81,870	181,974	115,453	160,301	421,645	3,072,550	3,154,420
<b>2005</b>	1,104,737	242,303	689,821	29,866	173,815	46,871	184,734	454,521	2,896,802	2,926,668
<b>2006</b>	1,312,168	238,797	688,446	23,656	185,987	91,093	194,934	352,036	3,063,461	3,087,117
<b>2007</b>	1,040,328	240,627	729,743	13,615	188,668	96,301	165,587	424,723	2,885,977	2,899,592
<b>2008</b>	1,160,122	245,988	653,100	7,345	188,719	118,005	164,400	299,162	2,829,496	2,836,841

\* NJ values reflect striped bass harvested recreationally via the Bonus Fish Program

\*\* NC values represent harvest during the December 1–November 30 fishing year

**Table 4.** Coastal commercial harvest compared to total commercial, total recreational, and total (commercial plus recreational) landings.

<b>Year</b>	<b>Coastal Commercial Harvest</b>	<b>Total Commercial Landings</b>	<b>Total Recreational Landings</b>	<b>Total Landings</b>	<b>Percent of Commercial Landings that are Coastal Commercial</b>	<b>Percent of Total Landings that are Coastal Commercial</b>
2003	2,935,735	7,072,686	22,585,869	29,658,555	41.5%	9.9%
2004	3,072,550	7,320,357	27,018,773	34,339,130	42.0%	8.9%
2005	2,896,802	7,134,538	25,309,954	32,444,492	40.6%	8.9%
2006	3,063,461	6,783,628	29,245,305	36,028,933	45.2%	8.5%
2007	2,885,977	7,050,692	22,578,010	29,628,702	40.9%	9.7%
2008	2,829,496	7,188,715	25,685,279	32,873,994	39.4%	8.6%
<b>Average</b>	2,947,337	7,091,769	25,403,865	32,495,634	41.6%	9.1%

**Table 5.** Estimates of the average F on ages 8–11 striped bass from 2004–2008 using six different catch-at-age (CAA) matrices.

<b>Year</b>	<b>Original CAA</b>	<b>Full Quota Utilization CAA</b>	<b>Coastal Quota Increase CAA</b>			
			<b>20%</b>	<b>30%</b>	<b>40%</b>	<b>50%</b>
2004	0.23	0.23	0.24	0.24	0.24	0.24
2005	0.24	0.23	0.24	0.24	0.25	0.25
2006	0.26	0.28	0.29	0.30	0.30	0.31
2007	0.22	0.24	0.26	0.27	0.27	0.28
2008	0.21	0.24	0.26	0.27	0.28	0.29

**Table 6.** Estimates of female spawning stock biomass (mt) from 2004–2008 using six different catch-at-age (CAA) matrices.

<b>Year</b>	<b>Original CAA</b>	<b>Full Quota Utilization CAA</b>	<b>Coastal Quota Increase CAA</b>			
			<b>20%</b>	<b>30%</b>	<b>40%</b>	<b>50%</b>
2004	61,588	61,554	61,531	61,521	61,511	61,502
2005	59,059	58,780	58,523	58,407	58,299	58,196
2006	54,514	54,436	53,821	53,542	53,280	53,033
2007	54,574	53,345	52,236	51,730	51,253	50,802
2008	55,500	53,294	51,499	50,672	49,887	49,142

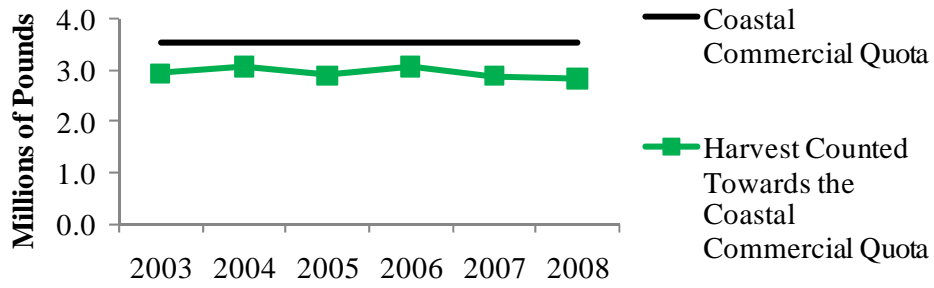


Figure 10. Comparison of the coastal commercial quota and harvest counted towards the coastal commercial quota, 2003–2008.

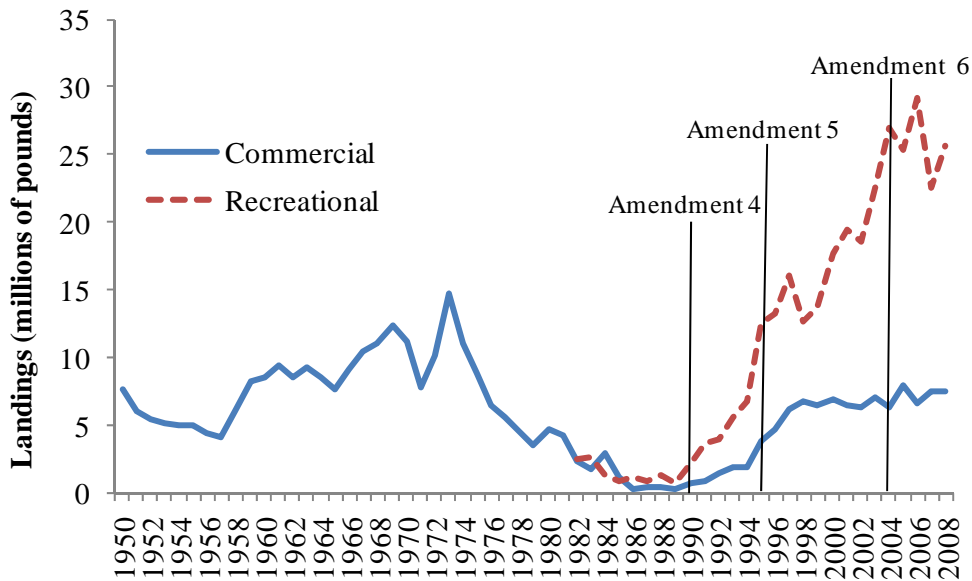


Figure 11. Annual striped bass landings, by fleet.

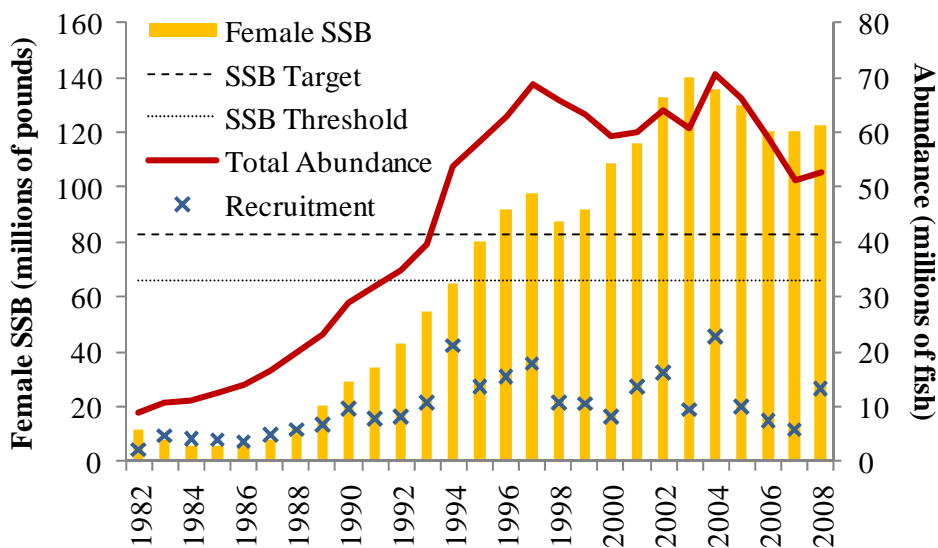


Figure 12. Estimated female spawning stock biomass (SSB), total abundance, and recruitment (age-1 abundance) of striped bass, from the 2009 statistical catch-at-age model.