



# Atlantic States Marine Fisheries Commission

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## MEMORANDUM

October 5, 2016

**To: Atlantic Striped Bass Management Board**

**From: Atlantic Striped Bass Technical Committee**

**RE: Performance Evaluation of Addendum IV Regulatory Measures in 2015**

In August 2015, following implementation of Addendum IV which required states to implement regulations that will reduce harvest and bring fishing mortality down to the target-level, the Technical Committee estimated 2015 harvest based on the new state regulations (M15-062).

In August 2016, the Atlantic Striped Bass Plan Review Team conducted a preliminary analysis on the performance of Addendum IV regulatory measures by comparing actual harvest in 2015 to the reference period (2013 for the ocean and 2012 for the Chesapeake Bay). Results indicated that the estimated harvest was very close to the observed harvest for commercial fisheries and on a coastwide scale, however, the recreational fisheries in the ocean and in the Chesapeake Bay diverged significantly from the estimated values.

Following review, the Board directed the Technical Committee to investigate the impacts of a number of variables to shed light on the large differences between actual harvest and those estimated for the ocean and Bay recreational fisheries. Enclosed is the Technical Committee report evaluating the performance of Addendum IV regulatory measures in 2015.

Enclosed: Performance Evaluation of Addendum IV Regulatory Measures in 2015

CC: Striped Bass Technical Committee

M16-087

## Atlantic Striped Bass Addendum IV Performance Review

### Introduction:

The 2013 benchmark stock assessment update for Atlantic striped bass found that while overfishing was not occurring and the stock was not overfished in 2012, fishing mortality (F) was above the F target and spawning stock biomass was below the SSB target. This triggered management action, and Addendum IV to the Atlantic Striped Bass Fishery Management Plan was adopted in October 2014.

The goal of Addendum IV is to bring F back down to the target level in 2016. Addendum IV required a 25% reduction in harvest from 2013 levels for the ocean<sup>1</sup> fisheries and a 20.5% reduction in harvest from 2012 levels for the Chesapeake Bay fisheries. To achieve this for the commercial sector, Amendment 6 quota allocations were reduced by 25% for the ocean fisheries, and the Chesapeake Bay commercial quota was set at 20.5% less than that harvested from the Bay in 2012. For the recreational sector, ocean fisheries implemented a one fish bag limit and a 28" minimum size limit. Chesapeake Bay recreational fisheries implemented a suite of management measures that were projected to achieve the F target. States could implement alternative measures for ocean recreational fisheries through the conservation equivalency process. States were required to implement the above regulations prior to the 2015 fishing season.

The anticipated reduction in harvest from these management changes was calculated by the Atlantic Striped Bass Technical Committee (TC) based on the available recreational harvest pattern data from 2011-2013 from MRIP and state programs (see memo M15-062). As 2015 was the first year under these new regulations, the Plan Review Team (PRT) reviewed the performance of these measures during the annual FMP review process to determine whether the target reductions in harvest had been achieved<sup>2</sup> in each region and sector.

On the coastwide level, the predicted harvest reduction for 2015 was nearly the same as the observed harvest; the estimated and realized reduction in harvest across all regions and fisheries was 25.8% and 25.9%, respectively. The commercial harvest reduction for both the ocean and Bay fisheries was close to the predicted reductions (Table 1). However, the recreational fisheries in the ocean and in the Chesapeake Bay diverged significantly from the predicted values (Table 2 and 3).

The estimated reductions for the recreational fisheries rely on the assumption that effort, angler behavior, and the size composition of fish available to anglers will remain constant. The TC looked at a number of factors to explain the difference between the predicted and realized reductions, including: (1) changes in effort, (2) changes in the proportion of fish released alive vs. retained,

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<sup>1</sup> The "ocean" fishery includes harvest from Delaware Bay and other technically non-ocean locations, but the majority of removals are from ocean waters. It is referred to as the ocean fishery as opposed to the "coastal" fishery to distinguish it from the Chesapeake Bay fishery and avoid confusion with coastwide reference points.

<sup>2</sup> MRIP estimates have been updated since the release of the 2016 FMP Review. Based on the new estimates, all ocean recreational fisheries, including New Jersey, achieved the target harvest reduction in 2015 as described above.

and (3) changes in the size and age structure of the recreational catch. In addition, the Board requested an analysis of differences in harvest by mode, wave, and state to look at potential changes in angler behavior and the prosecution of the fishery.

## **Results:**

### *Changes in Size and Age Structure of the Catch:*

Age-4 fish make up a larger proportion of the harvest in both the Chesapeake Bay (Bay) and the ocean fisheries in 2015 than in their respective reference years (Figure 1). The unusually strong 2011 year class was not available to the fishery in 2012 and 2013, the reference years. At age 4 in 2015, they are nearly fully recruited to the Bay fisheries, but only partially recruited to the ocean fisheries as striped bass typically don't begin to migrate out of the Bay until age 3 or older, with older animals migrating farther along the coast.

Similarly, the recreational harvest length-frequency in the Bay showed a shift towards 20-inch fish in 2015 in both total numbers and proportions, away from the 18-19 inch peak in 2012 (Figure 2). Overall numbers of harvested fish were lower for almost all lengths in the ocean recreational length frequency. The proportion of fish in the 22-25 inch range was slightly higher in 2015 than in 2013, possibly reflecting the beginning of the coastal migrations of the 2011 year class.

### *Changes in Harvest Patterns by Wave and Mode:*

Overall, there did not seem to be consistent patterns in the differences in harvest by wave or mode between 2015 and the reference period (Table and Table ). Some states saw increases in some waves or modes, and some saw decreases.

### *Changes in Effort:*

Overall, total effort in the Bay and ocean declined with 13% fewer angler-trips taken in 2015 relative to the reference periods (Table 6). Every state in the ocean recreational fishery also saw a decrease in the total number of trips targeting striped bass in 2015 compared to 2013 with the exception of New Jersey which experienced a 2% increase (Table 7). However, for the Chesapeake Bay recreational fishery, both Maryland and Virginia experienced an increase in the total number of trips targeting striped bass by 58% and 28% respectively (Table 7).

The number of trips taken in 2015 compared to the reference years where striped bass was a primary or secondary target, showed no distinct pattern by wave or by mode. Some states experienced an increase in the number of trips in some waves or modes, and some saw decreases (Table 8 and Table 9).

### *Changes in Proportions of Fish Released Alive:*

Every state in both the ocean and Chesapeake Bay recreational fishery experienced an increase in the proportion of striped bass released alive vs. total catch in 2015 compared to the reference year with the exception of Maryland (Table 10). Maryland experienced a small decrease (<1%) in the proportion of released alive vs. total catch in the Chesapeake Bay. Additionally, Maine, Massachusetts, Connecticut, New Jersey and North Carolina in the ocean recreational fishery all experienced a change in the proportion of striped bass released alive vs. total catch of less than 10%. For these states, releases decreased equally in proportion to total catch. For the remaining

states, there was a larger change in total catch between the reference year and 2015 compared to fish releases alive.

**Discussion:**

The focus of this review is to identify the variables contributing to the difference in the 2015 harvest estimates for the ocean and Chesapeake Bay recreational fisheries from those estimated by the TC. Recreational fisheries in the ocean saw a greater reduction than estimated by the TC, while the recreational fisheries in the Bay experienced an increase in harvest relative to the reference period.

As noted throughout the development and implementation of Addendum IV, size and bag limit analyses are limited by the assumption that effort, angler behavior, catch-per-unit-effort, and the size composition and distribution of fish available to anglers will be the same in the future. If those assumptions are violated, the estimated changes in harvest may be different from what is observed once those management options are implemented.

Specifically, changes in effort and changes in the size, age structure, and the distribution of the 2011 year class along the coast relative to the Chesapeake Bay, are thought to be the most significant variables contributing to the large differences in the realized harvest compared to those estimated by the TC. The 2011 year class led to the largest recruitment event since 2004, and was nearly fully available to the Bay recreational fisheries in 2015 (age 4), whereas these fish were only partially available to the ocean recreational fisheries (i.e., due to age at first migration, there was a greater proportion of the 2011 year class in the Bay relative to the ocean in 2015). This, coupled with the length of those fish in 2015 relative to the Bay's and ocean's minimum size limits (Figure 1 and 2), led to increased catch rates of striped bass in the Bay.

Although total effort in the ocean and Bay decreased, the number of trips that targeted striped bass increased in the Bay, which may have also contributed to higher catch rates in that fishery. Differences in harvest in 2015 compared to the reference period by mode and wave by state did occur, but the changes were variable without trend; some states saw increased effort and harvest in particular waves or modes, while other states saw decreases.

The TC notes that the proportion of fish released alive to the total catch increased for about half of the state fisheries which is most likely due to the emergence of the 2011 year class in the catch data and the changes in regulations (i.e., bigger size limits, and smaller bag limits). Increased release mortality is always a concern with more restrictive regulations, but given the relatively high survival rate of striped bass, more releases likely still corresponds to lower removals.

Although the Bay recreational fisheries did not meet the target harvest reduction, the TC notes that the goal of Addendum IV was achieved; F in 2015 was estimated to be below the target level. The TC also notes that when considering the increasing trend in recreational harvest in 2012 (the lowest harvest estimate on record) to 2014, harvest in the Bay in 2015 was undoubtedly lower than it would have been had regulations remained status quo.

Table 1: Estimated and realized harvest reductions for striped bass commercial fisheries. Source: Annual state compliance reports.

<b>Ocean (Commercial – Pounds of fish)</b>							
	<b>Amd. 6 2013 Quota</b>	<b>2013 Harvest</b>	<b>Add. IV 2015 Quota</b>	<b>2015 harvest</b>	<b>Estimated Reduction from 2013 Quota</b>	<b>Actual Reduction from 2013 Quota</b>	<b>Actual Reduction from 2013 Harvest</b>
Ocean Total	3,806,275	2,532,870	2,854,706	1,902,363	-25.0%	-50.0%	-24.9%
<b>Chesapeake Bay (Commercial – Pounds of fish)</b>							
		<b>2012 Harvest</b>	<b>Add. IV 2015 Quota</b>	<b>2015 harvest</b>	<b>Estimated Reduction from 2012 Harvest</b>	<b>Actual Reduction from 2012 Harvest</b>	
Chesapeake Bay Total		3,924,372	3,120,247	2,940,291	-20.5%	-25.1%	

Table 2: Estimated and realized changes in removals for striped bass recreational fisheries. Removals includes angler harvest (A + B1) plus dead discards (9% of B2). Source: MRIP.

<b>Recreational Fisheries (Numbers of fish)</b>					
<b>Region</b>	<b>Reference Removals Estimate*</b>	<b>2015 Removals Estimate</b>	<b>2015 Removals</b>	<b>Estimated Change in Removals</b>	<b>Actual Change in Removals</b>
Ocean	2,153,773	1,517,063	1,141,556	-29.6%	-47.0%
Chesapeake Bay	538,111	419,726	852,524	-22.1%	+58.4%

\* 2013 for Ocean, 2012 for Bay

Table 3: Realized changes in removals for striped bass recreational fisheries. Source: MRIP.

<b>Region</b>	<b>Sector</b>	<b>Reference Level</b>	<b>2015 Removals</b>	<b>Change in Removals</b>
Chesapeake Bay	Recreational Harvest (A+B1)	330,380	500,465	+51%
	Recreational Release Mortality (9% B2)	207,731	352,059	+69%
Ocean	Recreational Harvest (A+B1)	1,618,015	735,438	-55%
	Recreational Release Mortality (9% B2)	535,758	406,118	-24%

Table 4: Changes in removals by state and wave. Increases in harvest relative to the reference year are highlighted. Source: MRIP. Some cases (e.g., charter boat estimates) have been excluded from the table due to insufficient sample sizes.

Ocean						
	Harvest (Type A+B1)			Release Mortality (9% B2)		
	2013	2015	Difference (2015-2013)	2013	2015	Difference (2015-2013)
<b>Maine</b>						
MARCH/APRIL	0	0	0	0	0	0
MAY/JUNE	5,307	2,884	-2,423	3,939	9,017	5,078
JULY/AUGUST	7,025	1,771	-5,254	12,338	8,902	-3,436
SEPTEMBER/OCTOBER	8,990	65	-8,925	20,548	1,338	-19,210
NOVEMBER/DECEMBER	0	0	0	0	0	0
<b>New Hampshire</b>						
MARCH/APRIL	0	0	0	0	0	0
MAY/JUNE	8,851	456	-8,395	1,943	1,183	-761
JULY/AUGUST	7,178	1,372	-5,806	2,279	3,720	1,441
SEPTEMBER/OCTOBER	196	0	-196	2,691	144	-2,548
NOVEMBER/DECEMBER	0	0	0	0	0	0
<b>Massachusetts</b>						
MARCH/APRIL	0	0	0	0	0	0
MAY/JUNE	135,827	77,849	-57,978	78,429	75,710	-2,719
JULY/AUGUST	138,573	53,820	-84,753	44,921	27,811	-17,110
SEPTEMBER/OCTOBER	24,545	39,102	14,557	28,500	35,628	7,128
NOVEMBER/DECEMBER	0	0	0	342	0	-342
<b>Rhode Island</b>						
MARCH/APRIL	0	0	0	0	0	0
MAY/JUNE	171,973	22,555	-149,418	19,517	35,829	16,312
JULY/AUGUST	24,130	8,358	-15,772	19,789	6,061	-13,729
SEPTEMBER/OCTOBER	14,531	8,944	-5,587	21,650	5,327	-16,322
NOVEMBER/DECEMBER	0	0	0	13,146	211	-12,935
<b>Connecticut</b>						
MARCH/APRIL	0	0	0	5,066	0	-5,066
MAY/JUNE	14,503	18,286	3,783	11,733	35,510	23,777
JULY/AUGUST	60,047	22,579	-37,468	25,473	4,583	-20,890
SEPTEMBER/OCTOBER	51,750	4,050	-47,700	19,719	9,754	-9,965
NOVEMBER/DECEMBER	0	0	0	3,737	1,245	-2,492
<b>New York</b>						
MARCH/APRIL	8,701	0	-8,701	1,130	0	-1,130
MAY/JUNE	215,951	40,640	-175,311	34,097	11,740	-22,357
JULY/AUGUST	186,884	18,483	-168,401	13,070	3,274	-9,796
SEPTEMBER/OCTOBER	75,066	15,931	-59,135	13,839	3,992	-9,847
NOVEMBER/DECEMBER	4,252	11,328	7,076	26,945	17,134	-9,812
<b>New Jersey</b>						
MARCH/APRIL	80,265	25,560	-54,705	9,367	9,122	-245
MAY/JUNE	39,789	55,045	15,256	8,076	2,682	-5,395
JULY/AUGUST	10,345	43,744	33,399	20,916	21,295	379
SEPTEMBER/OCTOBER	21,492	27,347	5,855	13,554	18,170	4,616
NOVEMBER/DECEMBER	151,596	132,561	-19,035	43,135	26,081	-17,054
<b>Delaware</b>						
MARCH/APRIL	1,827	646	-1,181	330	363	33
MAY/JUNE	4,249	306	-3,943	593	1,174	581
JULY/AUGUST	6,694	597	-6,097	1,579	272	-1,307
SEPTEMBER/OCTOBER	314	0	-314	3,119	1,599	-1,520
NOVEMBER/DECEMBER	6,437	1,551	-4,886	1,894	535	-1,360
<b>Maryland</b>						
MARCH/APRIL	0	0	0	0	0	0
MAY/JUNE	1,216	0	-1,216	32	0	-32
JULY/AUGUST	0	0	0	456	501	45
SEPTEMBER/OCTOBER	0	0	0	0	0	0
NOVEMBER/DECEMBER	8,654	1,761	-6,893	0	0	0
<b>Virginia</b>						
MARCH/APRIL	0	0	0	0	0	0
MAY/JUNE	761	0	-761	142	0	-142
JULY/AUGUST	0	0	0	87	0	-87
SEPTEMBER/OCTOBER	0	0	0	82	89	7
NOVEMBER/DECEMBER	0	0	0	0	0	0
<b>North Carolina</b>						
MARCH/APRIL	0	0	0	25	0	-25
MAY/JUNE	0	0	0	71	0	-71
JULY/AUGUST	0	0	0	0	0	0
SEPTEMBER/OCTOBER	0	0	0	0	0	0
NOVEMBER/DECEMBER	0	0	0	0	0	0

Chesapeake Bay						
	Harvest (A+B1)			Release Mortality (9% B2)		
	2012	2015	Difference (2015-2012)	2012	2015	Difference (2015-2012)
<b>Maryland</b>						
MARCH/APRIL	21,561	12,595	-8,966	18,270	1,476	-16,794
MAY/JUNE	72,516	133,322	60,806	27,580	30,863	3,283
JULY/AUGUST	71,973	97,392	25,419	76,752	47,316	-29,436
SEPTEMBER/OCTOBER	76,342	84,512	8,170	70,799	67,962	-2,838
NOVEMBER/DECEMBER	17,927	76,790	58,863	5,185	132,462	127,277
<b>Virginia</b>						
MARCH/APRIL	0	212	212	0	219	219
MAY/JUNE	1,065	10,340	9,275	1,653	2,674	1,021
JULY/AUGUST	0	1,750	1,750	3,929	5,066	1,137
SEPTEMBER/OCTOBER	3,686	13,340	9,654	768	11,463	10,695
NOVEMBER/DECEMBER	65,310	56,031	-9,279	2,794	49,658	46,864

Table 5: Changes in removals by state and mode. Increases in harvest from the reference year are highlighted. Source: MRIP.

	Ocean						
	Harvest (Type A+B1)			Release Mortality (9% B2)			
	2013	2015	Difference (2015-2013)	2013	2015	Difference (2015-2013)	
<b>Maine</b>							
CHARTER BOAT	1,953	355	-1,598	1,113	519	-594	
PARTY BOAT	0	0	0	0	0	0	
PRIVATE/RENTAL BOAT	11,387	3,739	-7,648	35,355	14,048	-21,307	
SHORE	9,934	625	-9,309	1,470	4,689	3,219	
<b>New Hampshire</b>							
CHARTER BOAT	1,045	857	-188	477	504	27	
PARTY BOAT	132	0	-132	30	0	-30	
PRIVATE/RENTAL BOAT	15,742	970	-14,772	5,752	4,160	-1,592	
SHORE	350	0	-350	1,132	382	-750	
<b>Massachusetts</b>							
CHARTER BOAT	58,491	21,236	-37,255	1,613	3,813	2,200	
PARTY BOAT	0	0	0	33	2	-31	
PRIVATE/RENTAL BOAT	231,716	97,845	-133,871	129,322	87,696	-41,626	
SHORE	8,738	51,688	42,950	21,225	47,637	26,413	
<b>Rhode Island</b>							
CHARTER BOAT	6,401	8,954	2,553	279	698	419	
PARTY BOAT	0	0	0	0	0	0	
PRIVATE/RENTAL BOAT	207,711	29,315	-178,396	25,557	16,971	-8,586	
SHORE	2,922	1,587	-1,335	48,545	29,759	-18,786	
<b>Connecticut</b>							
CHARTER BOAT	14,057	29,923	15,866	4,044	8,958	4,914	
PARTY BOAT	541	393	-148	40	29	-11	
PRIVATE/RENTAL BOAT	115,896	44,303	-71,593	56,643	47,571	-9,072	
SHORE	9,863	217	-9,646	9,045	3,492	-5,554	
<b>New York</b>							
CHARTER BOAT	333,695	67,924	-265,771	28,177	17,168	-11,010	
PARTY BOAT	16,156	7,932	-8,224	567	585	18	
PRIVATE/RENTAL BOAT	131,649	72,797	-58,852	30,150	27,573	-2,577	
SHORE	9,355	5,652	-3,703	30,186	7,981	-22,205	
<b>New Jersey</b>							
CHARTER BOAT	97,981	112,927	14,946	1,547	13,647	12,100	
PARTY BOAT	6,650	2,667	-3,983	881	296	-585	
PRIVATE/RENTAL BOAT	216,619	165,996	-50,623	57,420	58,224	804	
SHORE	80,219	2,669	-77,550	36,747	5,181	-31,566	
<b>Delaware</b>							
CHARTER BOAT	526	0	-526	23	46	23	
PARTY BOAT	0	0	0	0	0	0	
PRIVATE/RENTAL BOAT	17,586	3,100	-14,486	4,339	1,502	-2,837	
SHORE	1,409	0	-1,409	3,152	2,394	-758	
<b>Maryland</b>							
CHARTER BOAT	0	0	0	0	0	0	
PARTY BOAT	0	0	0	0	0	0	
PRIVATE/RENTAL BOAT	8,654	1,761	-6,893	456	473	17	
SHORE	0	0	0	32	28	-4	
<b>Virginia</b>							
CHARTER BOAT	0	0	0	0	0	0	
PARTY BOAT	0	0	0	0	0	0	
PRIVATE/RENTAL BOAT	0	0	0	0	0	0	
SHORE	636	0	-636	311	89	-222	
<b>North Carolina</b>							
CHARTER BOAT	0	0	0	1	0	-1	
PARTY BOAT	0	0	0	0	0	0	
PRIVATE/RENTAL BOAT	0	0	0	0	0	0	
SHORE	0	0	0	94	0	-94	

	Chesapeake Bay					
	Harvest (A+B1)			Release Mortality (9% B2)		
	2012	2015	Difference (2015-2012)	2012	2015	Difference (2015-2012)
<b>Maryland</b>						
CHARTER BOAT	112,212	90,131	-22,081	11,315	13,360	2,044
PARTY BOAT	181	88	-93	709	73	-636
PRIVATE/RENTAL BOAT	134,615	268,454	133,839	140,929	240,386	99,457
SHORE	13,313	45,939	32,626	45,634	26,260	-19,374
<b>Virginia</b>						
CHARTER BOAT	2,360	14,181	11,821	104	2,900	2,796
PARTY BOAT	108	19	-89	0	1	1
PRIVATE/RENTAL BOAT	66,911	75,183	8,272	8,851	63,578	54,727
SHORE	682	6,471	5,789	190	5,502	5,312

Table 6: Percent change in effort by state. Increases in effort from the reference year are highlighted. Effort is defined as all angler trips. Source: MRIP.

<b>Ocean</b>			
<b>Effort (All Angler Trips)</b>			
	<b>2013</b>	<b>2015</b>	<b>% Difference (2015-2013)/(2013)</b>
<b>Maine</b>	596,091	414,195	-31%
<b>New Hampshire</b>	313,275	221,376	-29%
<b>Massachusetts</b>	2,938,627	2,180,865	-26%
<b>Rhode Island</b>	1,229,342	878,586	-29%
<b>Connecticut</b>	1,209,820	1,340,590	<b>11%</b>
<b>New York</b>	3,872,555	3,235,218	-16%
<b>New Jersey</b>	4,364,247	4,287,444	-2%
<b>Delaware</b>	764,697	495,481	-35%
<b>Maryland</b>	134,157	154,742	<b>15%</b>
<b>Virginia</b>	476,476	249,509	-48%
<b>North Carolina</b>	4,967,753	4,645,659	-6%
<b>TOTAL</b>	<b>20,867,040</b>	<b>18,103,665</b>	<b>-13%</b>

<b>Chesapeake Bay</b>			
<b>Effort (All Angler Trips)</b>			
	<b>2012</b>	<b>2015</b>	<b>% Difference (2015-2012)/(2012)</b>
<b>Maryland</b>	2,195,025	2,164,254	-1%
<b>Virginia</b>	2,373,563	1,832,869	-23%
<b>TOTAL</b>	<b>4,568,588</b>	<b>3,997,123</b>	<b>-13%</b>



Table 7: Percent change in directed effort by state. Increases in effort from the reference year are highlighted. Directed effort is defined as trips where striped bass was a primary or secondary target. Source: MRIP.

<b>Ocean</b>			
<b>Effort (Trips Targeting Striped Bass)</b>			
	<b>2013</b>	<b>2015</b>	<b>% Difference (2015-2013)/(2013)</b>
<b>Maine</b>	401,072	273,038	-32%
<b>New Hampshire</b>	137,416	92,617	-33%
<b>Massachusetts</b>	1,693,635	1,211,500	-28%
<b>Rhode Island</b>	624,801	285,635	-54%
<b>Connecticut</b>	547,782	516,750	-6%
<b>New York</b>	1,175,588	690,470	-41%
<b>New Jersey</b>	1,196,706	1,222,484	<b>2%</b>
<b>Delaware</b>	123,131	46,884	-62%
<b>Maryland</b>	21,614	18,185	-16%
<b>Virginia</b>	21,043	14,140	-33%
<b>North Carolina</b>	98,347	46,033	-53%
<b>TOTAL</b>	<b>6,041,135</b>	<b>4,417,736</b>	<b>-27%</b>

<b>Chesapeake Bay</b>			
<b>Effort (Trips Targeting Striped Bass)</b>			
	<b>2012</b>	<b>2015</b>	<b>% Difference (2015-2012)/(2012)</b>
<b>Maryland</b>	535,628	844,826	<b>58%</b>
<b>Virginia</b>	188,712	241,176	<b>28%</b>
<b>TOTAL</b>	<b>724,340</b>	<b>1,086,002</b>	<b>50%</b>

Table 8: Changes in effort by state and wave. Increases in effort from the reference year are highlighted. Effort includes trips where striped bass was a primary or secondary target. Source: MRIP.

Ocean			
Effort (Angler Trips)			
	2013	2015	Difference (2015-2013)
<b>Maine</b>			
MARCH/APRIL	0	0	0
MAY/JUNE	72,817	83,455	10,638
JULY/AUGUST	171,145	146,155	-24,990
SEPTEMBER/OCTOBER	157,111	43,428	-113,683
NOVEMBER/DECEMBER	0	0	0
<b>New Hampshire</b>			
MARCH/APRIL	0	0	0
MAY/JUNE	32,370	20,630	-11,740
JULY/AUGUST	38,258	59,140	20,882
SEPTEMBER/OCTOBER	66,787	12,847	-53,940
NOVEMBER/DECEMBER	0	0	0
<b>Massachusetts</b>			
MARCH/APRIL	8,172	14,545	6,373
MAY/JUNE	582,914	430,961	-151,953
JULY/AUGUST	696,144	458,215	-237,929
SEPTEMBER/OCTOBER	397,296	298,387	-98,909
NOVEMBER/DECEMBER	9,108	9,393	285
<b>Rhode Island</b>			
MARCH/APRIL	161	27,557	27,396
MAY/JUNE	335,692	110,473	-225,219
JULY/AUGUST	124,923	79,216	-45,707
SEPTEMBER/OCTOBER	131,834	64,969	-66,865
NOVEMBER/DECEMBER	32,191	3,421	-28,770
<b>Connecticut</b>			
MARCH/APRIL	9,381	76,247	66,866
MAY/JUNE	159,413	203,437	44,024
JULY/AUGUST	223,324	118,579	-104,745
SEPTEMBER/OCTOBER	124,680	108,215	-16,465
NOVEMBER/DECEMBER	30,984	10,272	-20,712
<b>New York</b>			
MARCH/APRIL	43,805	5,155	-38,650
MAY/JUNE	336,365	254,651	-81,714
JULY/AUGUST	356,875	153,066	-203,809
SEPTEMBER/OCTOBER	319,507	194,070	-125,437
NOVEMBER/DECEMBER	119,036	83,528	-35,508
<b>New Jersey</b>			
MARCH/APRIL	205,141	122,117	-83,024
MAY/JUNE	243,994	291,805	47,811
JULY/AUGUST	58,093	90,726	32,633
SEPTEMBER/OCTOBER	232,960	195,747	-37,213
NOVEMBER/DECEMBER	456,518	522,089	65,571
<b>Delaware</b>			
MARCH/APRIL	8,284	12,296	4,012
MAY/JUNE	27,135	15,895	-11,240
JULY/AUGUST	16,783	5,050	-11,733
SEPTEMBER/OCTOBER	30,874	4,313	-26,561
NOVEMBER/DECEMBER	40,055	9,330	-30,725
<b>Maryland</b>			
MARCH/APRIL	0	0	0
MAY/JUNE	224	0	-224
JULY/AUGUST	1,245	0	-1,245
SEPTEMBER/OCTOBER	9	1,049	1,040
NOVEMBER/DECEMBER	20,136	17,136	-3,000
<b>Virginia</b>			
MARCH/APRIL	0	0	0
MAY/JUNE	3,621	944	-2,677
JULY/AUGUST	939	0	-939
SEPTEMBER/OCTOBER	0	4,218	4,218
NOVEMBER/DECEMBER	16,482	8,978	-7,504
<b>North Carolina</b>			
JANUARY/FEBRUARY	13,770	14,467	697
MARCH/APRIL	21,125	2,735	-18,390
MAY/JUNE	0	708	708
JULY/AUGUST	7,568	590	-6,978
SEPTEMBER/OCTOBER	22,918	4,460	-18,458
NOVEMBER/DECEMBER	32,966	23,073	-9,893

Chesapeake Bay			
Effort (Angler Trips)			
	2012	2015	Difference (2015-2012)
<b>Maryland</b>			
MARCH/APRIL	71,934	55,536	-16,398
MAY/JUNE	144,479	233,684	89,205
JULY/AUGUST	128,003	166,949	38,946
SEPTEMBER/OCTOBER	128,631	156,851	28,220
NOVEMBER/DECEMBER	62,581	231,807	169,226
<b>Virginia</b>			
MARCH/APRIL	4,403	4,476	73
MAY/JUNE	10,817	37,103	26,286
JULY/AUGUST	3,928	2,659	-1,269
SEPTEMBER/OCTOBER	18,716	61,472	42,756
NOVEMBER/DECEMBER	150,849	135,465	-15,384

Table 9: Changes in effort by state and mode. Increases in effort from the reference year are highlighted. Effort includes trips where striped bass was a primary or secondary target. Source: MRIP.

Ocean				
Effort (Angler Trips)				
	2013	2015	Difference (2015-2013)	
<b>Maine</b>				
SHORE	165,053	130,557	-34,496	
PARTY BOAT	0	0	0	
CHARTER BOAT	6,437	6,688	251	
PRIVATE/RENTAL BOAT	229,583	135,793	-93,790	
<b>New Hampshire</b>				
SHORE	68,722	46,459	-22,263	
PARTY BOAT	2,486	10	-2,476	
CHARTER BOAT	2,574	2,407	-167	
PRIVATE/RENTAL BOAT	63,633	43,741	-19,892	
<b>Massachusetts</b>				
SHORE	523,201	549,902	26,701	
PARTY BOAT	1,263	424	-839	
CHARTER BOAT	73,676	48,111	-25,565	
PRIVATE/RENTAL BOAT	1,095,495	613,063	-482,432	
<b>Rhode Island</b>				
SHORE	323,065	119,729	-203,336	
PARTY BOAT	493	0	-493	
CHARTER BOAT	12,614	12,600	-14	
PRIVATE/RENTAL BOAT	288,629	153,307	-135,322	
<b>Connecticut</b>				
SHORE	107,204	255,597	148,393	
PARTY BOAT	8,190	9,240	1,050	
CHARTER BOAT	37,784	26,549	-11,235	
PRIVATE/RENTAL BOAT	394,604	225,364	-169,240	
<b>New York</b>				
SHORE	495,140	220,106	-275,034	
PARTY BOAT	44,271	16,840	-27,431	
CHARTER BOAT	225,959	151,102	-74,857	
PRIVATE/RENTAL BOAT	410,219	302,422	-107,797	
<b>New Jersey</b>				
SHORE	747,020	567,845	-179,175	
PARTY BOAT	33,918	21,308	-12,610	
CHARTER BOAT	41,158	96,471	55,313	
PRIVATE/RENTAL BOAT	374,609	536,860	162,251	
<b>Delaware</b>				
SHORE	60,326	30,631	-29,695	
PARTY BOAT	428	8	-420	
CHARTER BOAT	1,133	238	-895	
PRIVATE/RENTAL BOAT	61,244	16,007	-45,237	
<b>Maryland</b>				
SHORE	648	911	263	
PARTY BOAT	9	34	25	
CHARTER BOAT	0	0	0	
PRIVATE/RENTAL BOAT	20,958	17,239	-3,719	
<b>Virginia</b>				
SHORE	20,565	13,018	-7,547	
PARTY BOAT	0	0	0	
CHARTER BOAT	49		-49	
PRIVATE/RENTAL BOAT	429	1,122	693	
<b>North Carolina</b>				
MAN-MADE	2,344	8,035	5,691	
BEACH/BANK	3,159	116	-3,043	
CHARTER BOAT	0	1,271	1,271	
PRIVATE/RENTAL BOAT	92,843	36,610	-56,233	

Chesapeake Bay				
Effort (Angler Trips)				
	2012	2015	Difference (2015-2012)	
<b>Maryland</b>				
SHORE	85,972	110,750	24,778	
PARTY BOAT	512	249	-263	
CHARTER BOAT	68,417	62,415	-6,002	
PRIVATE/RENTAL BOAT	380,728	671,413	290,685	
<b>Virginia</b>				
SHORE	15,010	3,841	-11,169	
PARTY BOAT	688	213	-475	
CHARTER BOAT	2,947	22,503	19,556	
PRIVATE/RENTAL BOAT	170,068	214,619	44,551	

Table 10: Changes in the percent of striped bass released alive (B2) vs. total catch (A+B1+B2).  
 Source: MRIP.

<b>Ocean</b>			
<b>Percent of total catch released alive</b>			
	<b>2013</b>	<b>2015</b>	<b>Difference (2015-2013)</b>
<b>Maine</b>	95%	98%	3%
<b>New Hampshire</b>	83%	97%	14%
<b>Massachusetts</b>	85%	90%	5%
<b>Rhode Island</b>	79%	93%	14%
<b>Connecticut</b>	85%	90%	5%
<b>New York</b>	67%	79%	12%
<b>New Jersey</b>	73%	75%	2%
<b>Delaware</b>	81%	93%	12%
<b>Maryland</b>	39%	76%	37%
<b>Virginia</b>	84%	100%	16%
<b>North Carolina</b>	86%	87%	1%

<b>Chesapeake Bay</b>			
<b>Percent of total catch released alive</b>			
	<b>2012</b>	<b>2015</b>	<b>Difference (2015-2012)</b>
<b>Maryland</b>	89%	88%	-1%
<b>Virginia</b>	59%	89%	30%

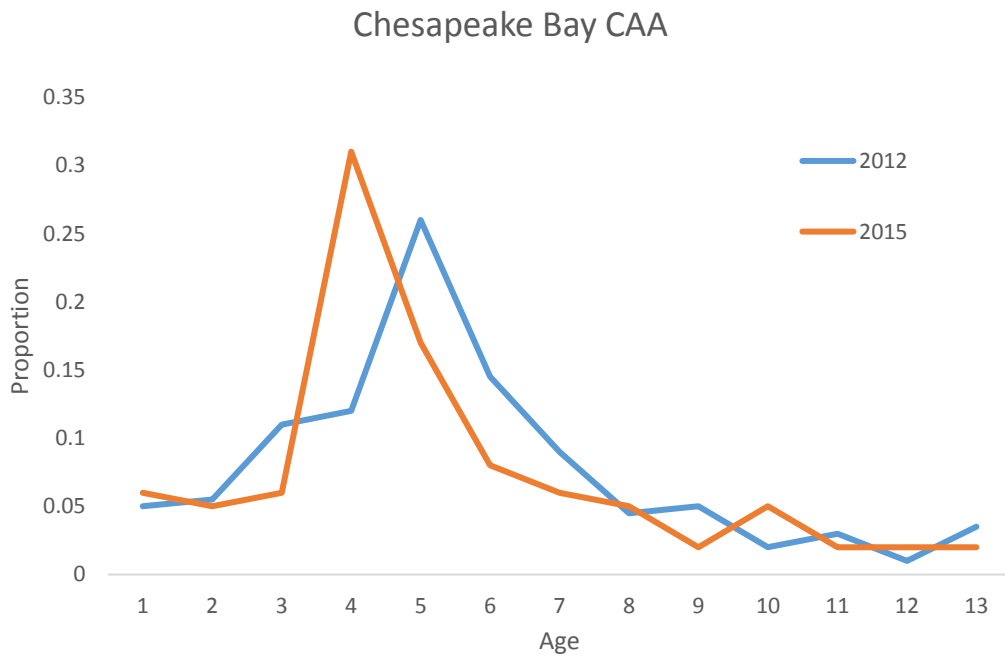
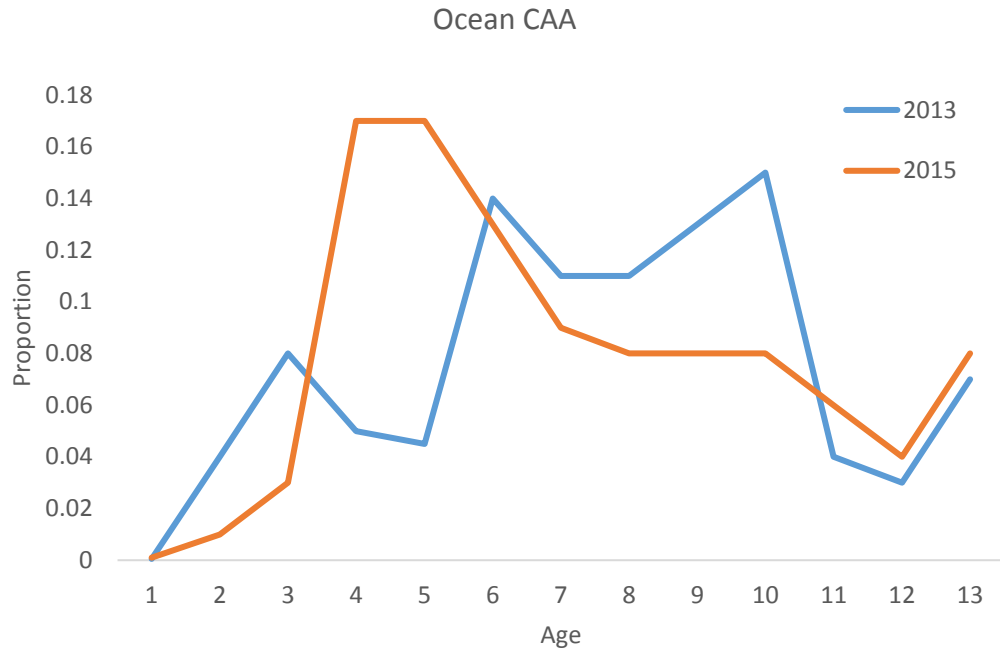


Figure 1: Proportions of catch-at-age by year for the ocean (top) and Bay (bottom) fisheries. Age-4 is the 2011 year class. Source: MRIP.

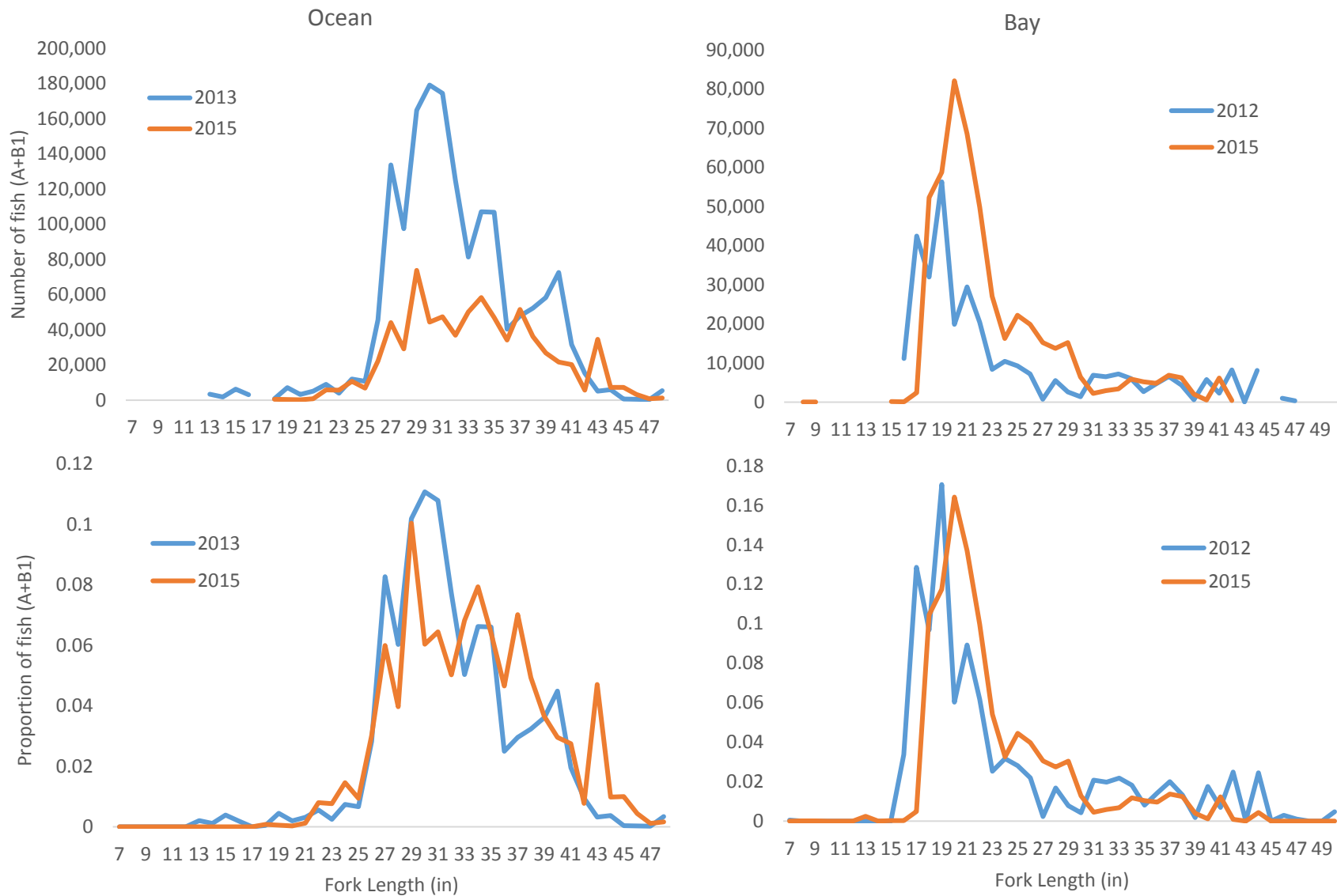


Figure 2: Total numbers and proportions of recreational harvest-at-length for the ocean (left) and Bay (right) fisheries. Source: MRIP.