2007 Biennial Report to Congress on the Progress and Findings of Studies on Striped Bass Populations

Submitted to the:
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United States House of Representatives
and
Committee on Commerce,
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of the United States Senate

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LIST OF ACRONYMS

ACCSP	Atlantic Coastal Cooperative Statistics Program
ASMFC	Atlantic States Marine Fisheries Commission
B	Biomass
EEZ	Exclusive Economic Zone
EFH	Essential Fish Habitat
EO	Executive Order
F	Fishing Mortality Rate
FMP	Fishery Management Plan
FWS	U.S. Fish and Wildlife Service
ISFMP	Interstate Fishery Management Program
M	Natural Mortality Rate
MSY	Maximum Sustainable Yield
mt	metric tons
NEFSC	Northeast Fisheries Science Center
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
OY	Optimal Yield
P.L.	Public Law
PRA	Paperwork Reduction Act
SARC	Stock Assessment Review Committee
SAW	Stock Assessment Workshop
SEAMAP	Southeast Area Monitoring and Assessment Program
SSB	Spawning Stock Biomass

DEFINITIONS

Commission: Unless otherwise noted, refers to the Atlantic States Marine Fisheries Commission.

Committee: Unless otherwise noted, refers to the Atlantic States Marine Fisheries Commission's Atlantic Striped Bass Technical Committee.

Striped Bass: Refers to Atlantic striped bass (*Morone saxatilis*).

Striped Bass Act: Refers to the Atlantic Striped Bass Conservation Act as amended in 1997.

EXECUTIVE SUMMARY

Introduction

The 1997 reauthorization of the Atlantic Striped Bass Conservation Act (Striped Bass Act) mandated biennial reports to Congress and to the Atlantic States Marine Fisheries Commission (Commission) from the secretaries of the Department of Commerce and the Department of the Interior concerning the progress and findings of studies of Atlantic striped bass (*Morone saxatilis*). The Striped Bass Act specifically requests updates on studies that include, but are not limited to: annual stock assessments, investigations on the causes of fluctuations in Atlantic striped bass populations, the effects of environmental factors on the recruitment, spawning potential, mortality, and abundance of Atlantic striped bass populations, and investigations of interactions between Atlantic striped bass and other fish. This document is the fifth such report to Congress and includes data available through 2007 with emphasis on the 2005 and 2006 calendar years.

Status of the Stock

- Striped bass are not overfished.
- Overfishing is not occurring on striped bass.
- Total commercial catch and discards in 2005 and 2006 were 1.75 million and 1.26 million fish, respectively.
- Total recreational catch and discards in 2005 and 2006 were 3.85 million and 4.85 million fish, respectively.
- Total striped bass harvest (commercial and recreational catch and discard) in 2005 and 2006 is estimated at 5.6 million fish and 6.1 million fish, respectively. This is a 14% increase over 2003 and 15% increase over 2004 catch estimates.

Habitat and Environmental Quality

- In May 2006, a workshop was hosted by the United States Geological Survey and NOAA on mycobacteriosis, a chronic progressive bacterial disease prevalent in Chesapeake Bay striped bass. The workshop concluded that research efforts should be in the areas of: (1) Standardized approaches and unified databases; (2) Socioeconomic considerations; and (3) Specific research in: (a) Population level impacts and distribution, (b) Mycobacterial ecology and routes of exposure, and (c) Impacts of environmental stressors.

Management Changes

- In October 2007, President George W. Bush issued an executive order further strengthening existing striped bass conservation and enforcement in the EEZ and calling for a prohibition of the sale of striped bass caught in the EEZ.
- In November of 2007, the Commission adopted an addendum to Amendment 6 of the striped bass interstate fisheries management plan to implement a bycatch monitoring and research program.

Conclusions

Atlantic striped bass stocks are at high levels of abundance and continue to support increased landings, primarily in the recreational fisheries. The number of fish in the population has remained stable due to moderate fishing mortality and a pattern of consistent production of juvenile fish punctuated by years of high juvenile survival. Overall, the Atlantic stocks of striped bass appear capable of producing strong incoming year classes and are being fished at levels within the bounds of the current Fishery Management Plan. Studies documenting striped bass habitat requirements at all life stages are continuing. Disease in striped bass continues to be of concern, but studies are continuing to make progress on identifying the impacts and causes. At this time, current studies regarding Atlantic striped bass are providing important data to successfully manage this fishery.

INTRODUCTION

In response to precipitous declines in Atlantic striped bass landings during the 1970s, Congress passed, and President Carter enacted, an amendment (P.L. 96-118) to the Anadromous Fish Conservation Act in 1979. The amendment specified that an emergency striped bass study be conducted to determine the status of striped bass stocks and causes for the decline in striped bass populations. This study was conducted each year from 1980 through 1994, and a report was submitted to Congress presenting results of the various research activities that were a part of the study. The last such report was prepared in 1995 for the 1994 study year. In 1981 the Atlantic States Marine Fisheries Commission (Commission) developed a coastwide management plan for Atlantic striped bass to be implemented by its member states. In 1984 Congress passed, and President Reagan enacted, the Atlantic Striped Bass Conservation Act (Striped Bass Act) to support and encourage the development, implementation, and enforcement of the interstate fisheries management plan for Atlantic striped bass. When the Striped Bass Act was amended in 1997, it mandated that the Secretaries of Commerce and the Interior provide biennial reports to Congress and the Commission on studies of the Atlantic striped bass resource.

The Commission maintains an Atlantic striped bass technical committee (Committee) comprised of state, federal, Regional Fishery Management Council, Commission, university and/or other specialized personnel with scientific and technical expertise and knowledge of the striped bass fishery. The Committee principally reviews the status of the stock and other technical assignments per the request of the Commission's Atlantic Striped Bass Management Board on a regular basis. Data for stock assessments and other analyses are collected and submitted by individual states, the National Marine Fisheries Service, and the U.S. Fish and Wildlife Service for use by the Committee.

STATUS OF THE STOCK

In November 2007, the 46th Northeast Regional Stock Assessment Workshop (46th SAW) conducted at NOAA's National Marine Fisheries Service (NMFS), Northeast Fisheries Science Center, concluded that Atlantic striped bass is not overfished, nor is overfishing occurring. The assessment estimates that the spawning stock biomass (SSB) is at 55 million pounds, well above the SSB target and threshold levels of 38.6 and 30.9 million pounds, respectively (Figure 1). The fishing mortality rate (on age 8-11 fish) was estimated to be F=0.31, which is below the fishing mortality of F=0.41 established in 2003. Retrospective analysis of the assessment model, as well as tag-based estimates of fishing mortality, indicate that the 2006 fishing mortality is also below the fishing mortality target of 0.30. Recruitment of age 1 fish, although below the large 2003 year class, continues to be strong through 2005 (Table 4, Figures 2-3).

Commercial Catch

Commercial catch (landings and dead discards) in 2005 totaled 1.75 million fish and was the highest catch since 2000. The 2006 catch declined slightly to 1.26 million

fish. Commercial landings have remained fairly level over the past 10 years (Tables 1-2). Most of the commercial landings come from the states of Maryland and Virginia, which together account for approximately 70% of the commercial catch in 2005 and 2006. Table 3 details state landings data.

Recreational Catch

Recreational catch (landings and dead discards) in 2005 totaled 3.85 million fish, which was the lowest catch since 2002. The 2006 catch increased to 4.85 million fish, the highest catch since 1982. Hook and line discard mortality is estimated at 8% of released fish. Recreational landings occur primarily in the states of Massachusetts, New York, New Jersey, Maryland, and Virginia. Maryland has the most recreational landings by numbers of fish, 20.99% and 23.80%, for 2005 and 2006, respectively. Table 3 details recreational landings data for 2005 and 2006.

Trends in Stock Size

Overall, since 2003 fishing mortality continues to have modest increases while spawning stock biomass has declined. However, it is expected that consistent strong recruitment into the fishery, punctuated by the exceptional 2003 year class (the largest year class since at least 1982), will offset declines in the spawning stock biomass. It is also important to note that the spawning stock biomass and fishing mortality remain well within established management thresholds (see Amendment 6 control rule pg. 10), thus no management action is warranted at this time.

HABITAT AND ENVIRONMENTAL QUALITY

Studies on striped bass habitat use and environmental quality have continued during the 2005-2006 time period. The U.S. Fish and Wildlife Service's South Atlantic Fisheries Coordination Office, in cooperation with the Commission, NMFS, and other partners, continues to gather data on nearshore striped bass abundances via the Southeast Area Monitoring and Assessment Program (SEAMAP) Cooperative Winter Tagging Cruises. A 20-year cruise report is expected to be released by late 2008. Selected information on striped bass habitat use on the wintering grounds off Virginia and North Carolina was provided in the stock assessment document (see the appendices of the 46th SAW document).

The FWS, NMFS, and the Commission are preparing a diadromous species habitat baseline source document that will document existing habitat use and establish habitat requirements for striped bass and other East Coast diadromous species under Commission management. A final document should be available in the summer of 2008.

Striped Bass Health

Disease issues continue to be an area of concern for Chesapeake Bay Striped Bass. Specifically, a chronic, progressive bacterial disease known as mycobacteriosis is affecting a large proportion of adult fish. The disease is caused by several species of the

genus *Mycobacterium.* Symptoms in striped bass include visceral lesions, appearing grossly as greyish-white nodules (granulomas) predominantly found in the spleen and kidney, and external lesions. The issue has been under investigation by area researchers since 1996, however many questions still remain.

In May 2006, a workshop was hosted by the United States Geological Survey and NOAA to establish the state of knowledge on mycobacteriosis, develop a research agenda, and identify mechanisms to optimize research efforts. Mycobacteriosis has been affecting striped bass since at least 1984, based on available archived tissues. However, the current high prevalence of disease (~50-70%) in adult Chesapeake Bay striped bass has led to much public concern. Multiple survey and experimental efforts conducted by state, federal and academic researchers contributing to the workshop suggest the following: 1) Disease development is age dependent with prevalence increasing through age 6 in Chesapeake Bay; 2) Temporal trends exist in the frequency of skin lesions, with highest occurrence in the fall (September – November); 3) Limited efforts outside of Chesapeake Bay have demonstrated the disease is present, but at lower prevalence in Delaware Bay and Roanoke River, NC; 4) Multiple species of Mycobacteria are involved, however their relative roles are not fully understood; 5) Little is known about the ecology of the mycobacterial species infecting striped bass, or how it is transmitted; 6) Stressors such as poor water quality or nutrition may play a role, however limited data is available addressing these hypotheses in wild fish. Poor nutrition has been demonstrated to enhance the severity and progression of disease in laboratory studies; and 7) Population level impacts are unknown and of top priority. The workshop concluded that research efforts should be in the areas of: (1) Standardized approaches and unified databases; (2) Socioeconomic considerations; and (3) Specific research in: (a) Population level impacts and distribution, (b) Mycobacterial ecology and routes of exposure, and (c) Impacts of environmental stressors. The full proceedings are available at http://www.lsc.usgs.gov/FHB/workshops/mycrobacteriosis.pdf.

STATUS OF MANAGEMENT

Atlantic striped bass management is based on the Atlantic Striped Bass Interstate Fishery Management Plan (FMP) of the Commission. The 14 coastal jurisdictions (12 States from Maine through North Carolina, Washington D.C. and the Potomac River Fisheries Commission), NMFS and FWS have principal management responsibility under this FMP. The ASMFC Striped Bass FMP, first adopted in 1981, has undergone six amendments through 2007. The initial FMP and its first four amendments provided a series of management measures that led to the rebuilding of the Atlantic striped bass stocks. In addition, several states closed their state waters to fishing for striped bass during the 1980s. Amendment 4, implemented in 1989, addressed the reopening of the fishery during the initial period of stock recovery. As the status of the stock continued to improve, the adaptive strategy of Amendment 4 allowed revisions to management measures addressing the changing circumstances, through adoption of six successive Addenda to Amendment 4, during 1989-1994. In addition, in November 1990, NMFS implemented a Federal ban on the harvest and possession of striped bass in the EEZ to support efforts of the Commission and to aid in the recovery of striped bass along the east coast. In 1995 the ASMFC adopted Amendment 5 to the FMP to reopen the fishery and

to reduce the likelihood of overfishing. Since 1995, the Commission adopted five addenda to respond to changing circumstances in the fishery. To address complexity of striped bass management, as well as several other concerns, the Commission developed, and in 2003 adopted Amendment 6 to the FMP.

Amendment 6, the current governing amendment to the FMP, introduced a control rule as a tool to determine the status of the striped bass population, establishing target and threshold values for fishing mortality rate and female spawning stock biomass. The threshold F is the fishing mortality rate that allows for maximum sustainable yield (Fmsy), currently estimated to be F=0.41. The target fishing mortality rate (F=0.30) provides a higher long-term yield from the fishery, maintains the current high level of spawning potential and provides adequate protection to increase the number of older striped bass in the population. The threshold female spawning stock biomass, 30.9 million pounds (14,000 mt), is slightly greater than the female spawning stock biomass at the time the population was declared restored in 1995 (30.7 million pounds). The target female spawning stock biomass is set at 125% of the spawning stock biomass threshold (38.6 million pounds, 17,500 mt).

Amendment 6 Control Rule

	FISHING MORTALITY RATE	FEMALE SPAWNING STOCK BIOMASS
TARGET	**F = 0.30***	**38.6 million pounds**
THRESHOLD	**F = 0.41**	**30.9 million pounds**

The target fishing mortality rate for the Chesapeake Bay and Albemarle-Roanoke stock is F=0.27

The management programs for the recreational and commercial fisheries are based on maintaining the control rule. In general, the recreational fisheries are constrained by a two fish creel limit and a 28-inch minimum size limit. Commercial fisheries are still regulated with size limits and an annual quota, but the quota allocated to each jurisdiction has been restored to its average landings during the 1972-1979 base period. The management programs for the Chesapeake Bay and Albemarle Sound fisheries were granted the flexibility to implement a commercial and recreational management program that utilizes a size limit no smaller than 18 inches and does not exceed a target fishing mortality rate of 0.27. Amendment 6 continues to permit conservation equivalency, allowing states to propose different size and bag limits as long as the overall management regime achieves the target F. States are also required to carry out specific fishery-dependent and fishery-independent monitoring programs.

In October 2007, in an effort to further strengthen existing striped bass conservation and enforcement in the EEZ, President George W. Bush issued an executive order stating that it is the policy of the United States to conserve striped bass for the recreational, economic, and environmental benefits. This Order encourages Federal and state management that supports state designation of striped bass as a gamefish where appropriate. Additionally, this Order called for action prohibiting the sale of striped bass caught in the EEZ.

In November of 2007 the Commission adopted Addendum 1 to Amendment 6. The purpose of this addendum was to implement a bycatch monitoring and research program as required by Amendment 6. The monitoring program was designed to increase the accuracy of data on striped bass discards from both the commercial and recreational fisheries. This addendum also recommended an angler education program to help decrease discard mortality in the recreational fishery.

SUMMARY AND CONCLUSIONS

Atlantic striped bass stocks are at high levels of abundance and continue to support increased landings, primarily in the recreational fisheries. The number of fish in the population has remained above target levels due to moderate fishing mortality and a pattern of consistent production of juvenile fish punctuated by years of high juvenile survival. Overall, the Atlantic stocks of striped bass appear capable of producing strong incoming year classes, and are being fished at levels within the bounds of the current Fishery Management Plan. The striped bass population has been considered recovered since January 1, 1995. Studies documenting striped bass habitat requirements at all life stages are continuing. Disease in striped bass continues to be of concern, but studies are continuing to make progress on identifying the impacts and causes of disease. At this time, current studies regarding Atlantic striped bass are providing important data to successfully manage this fishery.

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TABLES

Table 1. Atlantic Coast landings of striped bass in metric tons and numbers from 1981 to 2006 (recreational information not available prior to 1981).

Year	Commercial		Recreational			Total	
	metric tons	*number*	*metric tons*	*number*		*metric tons*	*number*
1982	992	428,630	1,144	217,256		2,135	645,886
1983	639	357,541	1,224	307,134		1,863	664,675
1984	1,104	870,871	582	117,993		1,685	988,864
1985	431	174,621	376	139,494		807	314,115
1986	63	17,681	502	115,576		565	133,257
1987	63	13,552	388	43,755		451	57,307
1988	117	33,310	578	92,499		694	125,809
1989	91	7,402	336	38,074		427	45,476
1990	313	115,636	1,010	163,242		1,323	278,878
1991	668	153,798	1,653	262,469		2,321	416,267
1992	650	230,714	1,830	300,530		2,480	531,244
1993	794	312,860	2,563	428,719		3,357	741,579
1994	806	307,443	3,083	565,671		3,889	873,114
1995	1,555	534,914	5,709	1,108,553		7,264	1,643,467
1996	1,541	766,518	6,040	1,199,957		7,581	1,966,475
1997	2,679	1,058,181	7,336	1,648,127		10,015	2,706,308
1998	2,936	1,223,828	5,850	1,457,057		8,786	2,680,885
1999	2,963	1,103,783	6,335	1,446,388		9,299	2,550,171
2000	3,038	1,057,711	8,060	2,025,113		11,099	3,082,824
2001	2,843	941,733	8,880	2,085,130		11,723	3,026,863
2002	2,740	654,062	8,449	1,973,171		11,189	2,627,233
2003	3,199	868,987	10,405	2,545,052		13,603	3,414,039
2004	3,332	907,501	12,596	2,615,629		15,928	3,523,130
2005	3,240	968,206	11,567	2,335,391		14,807	3,303,597
2006	3,073	1,049,587	13,814	2,774,542		16,887	3,824,129

Table 2. Total striped bass discard and harvest in numbers by fishery component, 2005 and 2006.

2005

Fishery Component	Harvest	Bycatch	Discards		Total Removals
Recreational	2,335,391	18,949,438	1,515,955		3,851,346
Commercial	968,206	6,059,353	776951		1,745,157
Total	3,303,597	25,008,791	2,292,906		5,596,503

2006

Fishery Component	Harvest	Bycatch	Discards		Total Removals
Recreational	2,774,542	25,904,169	2,072,334		4,846,876
Commercial	1,049,587	1,750,171	216,753		1,259,795
Total	3,824,129	27,654,340	2,282,542		6,106,671

Table 3. Commercial landings, recreational landings and recreational discard losses and total (excluding commercial discards) in number (000s of fish) for 2005 and 2006, by state.

	Commercial landings number (000s)		Recreational landings number (000s)		Recreational discards number (000s)		Total number (000s)	
	2005	**2006**	**2005**	**2006**	**2005**	**2006**	**2005**	**2006**
ME	-	-	68.6	73.4	241.9	325.6	310.6	399.0
NH	-	-	26.0	14.8	41.0	45.4	67.0	60.2
MA	60.0	70.0	368.4	345.1	387.2	693.0	815.6	1,108.1
RI	14.9	15.4	112.9	75.3	59.3	108.6	187.1	199.3
CT	-	-	115.0	83.8	137.1	134.7	252.0	218.4
NY	70.6	73.5	298.4	310.4	107.9	126.2	476.8	510.2
NJ	-	-	327.0	489.5	95.8	168.0	422.8	657.5
DE	26.3	30.2	20.0	18.7	18.0	19.6	64.3	68.5
MD	570.0	656.0	490.3	660.5	300.3	312.4	1,360.5	1,628.8
PRFC	80.6	92.3	-	-	-	-	80.6	92.3
VA	119.2	109.4	403.8	612.3	118.8	135.7	641.8	857.4
NC	26.6	2.8	105.0	90.8	8.8	3.0	140.3	96.6
Total	968.2	1,049.6	2,335.4	2,774.5	1,516.0	2,072.3	4,819.6	5,896.5

Table 4. Estimated population abundance, thousands at ages 1 to 13+, 1982-2006. Total in millions of fish.

Abundance (000s)

Age	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
1	1,785	4,304	3,579	3,527	3,275	4,434	5,267	6,466	9,166	7,647	8,076	10,436	20,589	13,237	14,959	16,493	9,837	9,329	7,421	12,792	15,122	7,700	22,279	8,237	10,038
2	1,433	1,534	3,699	3,077	3,029	2,815	3,813	4,527	5,560	7,885	6,578	6,948	8,978	17,711	11,384	12,847	14,158	8,448	8,015	6,371	10,986	12,989	6,610	19,120	7,067
3	1,453	971	1,059	2,700	2,612	2,581	2,410	3,251	3,869	4,729	6,714	5,613	5,915	7,630	14,978	9,627	10,824	11,973	7,165	6,764	5,388	9,301	10,945	5,555	16,037
4	1,258	820	567	682	2,228	2,181	2,188	2,015	2,739	3,187	3,910	5,593	4,636	4,857	6,149	12,212	7,759	8,824	9,848	5,804	5,513	4,408	7,500	8,752	4,416
5	408	690	467	358	541	1,807	1,821	1,779	1,664	2,183	2,556	3,179	4,480	3,674	3,726	4,794	9,322	6,048	6,990	7,587	4,523	4,325	3,367	5,643	6,515
6	182	223	392	294	273	426	1,487	1,440	1,439	1,299	1,719	2,047	2,497	3,473	2,733	2,797	3,495	6,995	4,641	5,162	5,692	3,424	3,157	2,407	3,974
7	146	99	127	247	217	210	346	1,150	1,146	1,112	1,013	1,365	1,592	1,915	2,544	1,999	1,976	2,556	5,253	3,330	3,773	4,205	2,423	2,178	1,632
8	100	80	56	80	177	164	169	263	904	881	863	802	1,058	1,215	1,393	1,831	1,385	1,422	1,894	3,702	2,395	2,747	2,919	1,636	1,443
9	79	54	45	35	56	133	131	127	205	694	683	683	620	805	881	993	1,255	988	1,046	1,321	2,639	1,729	1,886	1,947	1,069
10	78	43	31	29	25	42	106	98	99	158	537	540	527	472	583	625	677	890	723	725	937	1,895	1,180	1,249	1,263
11	68	42	25	19	20	18	33	79	76	76	122	424	417	401	341	413	424	479	650	500	513	671	1,289	778	807
12	90	37	24	15	13	15	15	25	61	58	59	96	328	317	290	241	280	300	349	449	353	367	456	849	502
13+	51	77	65	56	49	46	48	47	55	89	114	136	179	385	508	563	545	582	643	684	799	824	808	831	1,081
Total	7,129	8,976	10,134	11,119	12,515	14,872	17,836	21,266	26,982	29,998	32,945	37,862	51,815	56,091	60,469	65,435	61,937	58,834	54,636	55,193	58,632	54,584	64,818	59,182	55,844
8+	465	334	246	235	342	418	503	639	1,400	1,955	2,378	2,681	3,129	3,594	3,996	4,667	4,566	4,661	5,305	7,382	7,636	8,232	8,537	7,290	6,165

Total (millions)

7.1	9.0	10.1	11.1	12.5	14.9	17.8	21.3	27.0	30.0	32.9	37.9	51.8	56.1	60.5	65.4	61.9	58.8	54.6	55.2	58.6	54.6	64.8	59.2	55.8

Table 5. Fishing mortality at age and average across ages, 1982-2006 from catch at age model.

Age	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.24	0.22	0.16	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.01	0.02	0.02	0.02	0.02	0.02	0.03	0.03
3	0.42	0.39	0.29	0.04	0.03	0.02	0.03	0.02	0.04	0.04	0.03	0.04	0.05	0.07	0.05	0.07	0.05	0.05	0.06	0.05	0.05	0.07	0.07	0.08	0.09
4	0.45	0.41	0.31	0.08	0.06	0.03	0.06	0.04	0.08	0.07	0.06	0.07	0.08	0.12	0.10	0.12	0.10	0.08	0.11	0.10	0.09	0.12	0.13	0.15	0.16
5	0.45	0.42	0.31	0.12	0.09	0.04	0.08	0.06	0.10	0.09	0.07	0.09	0.10	0.15	0.14	0.17	0.14	0.11	0.15	0.14	0.13	0.16	0.19	0.20	0.22
6	0.45	0.42	0.31	0.16	0.11	0.06	0.11	0.08	0.11	0.10	0.08	0.10	0.12	0.16	0.16	0.20	0.16	0.14	0.18	0.16	0.15	0.20	0.22	0.24	0.26
7	0.45	0.42	0.31	0.18	0.13	0.07	0.12	0.09	0.11	0.10	0.08	0.11	0.12	0.17	0.18	0.22	0.18	0.15	0.20	0.18	0.17	0.22	0.24	0.26	0.29
8	0.45	0.42	0.31	0.20	0.14	0.07	0.13	0.10	0.11	0.10	0.09	0.11	0.12	0.17	0.19	0.23	0.19	0.16	0.21	0.19	0.18	0.23	0.26	0.28	0.31
9	0.45	0.42	0.31	0.21	0.15	0.08	0.14	0.10	0.12	0.11	0.09	0.11	0.12	0.17	0.19	0.23	0.19	0.16	0.22	0.19	0.18	0.23	0.26	0.28	0.31
10	0.45	0.42	0.31	0.21	0.15	0.08	0.15	0.11	0.12	0.11	0.09	0.11	0.12	0.17	0.20	0.24	0.20	0.16	0.22	0.20	0.18	0.24	0.27	0.29	0.32
11	0.45	0.42	0.31	0.22	0.15	0.08	0.15	0.11	0.12	0.11	0.09	0.11	0.12	0.17	0.20	0.24	0.20	0.17	0.22	0.20	0.18	0.24	0.27	0.29	0.32
12	0.45	0.42	0.31	0.22	0.16	0.08	0.15	0.11	0.12	0.11	0.09	0.11	0.12	0.17	0.20	0.24	0.20	0.17	0.22	0.20	0.19	0.24	0.27	0.29	0.32
13+	0.45	0.42	0.31	0.22	0.16	0.08	0.15	0.11	0.12	0.11	0.09	0.11	0.12	0.17	0.20	0.24	0.20	0.17	0.22	0.20	0.19	0.24	0.27	0.29	0.32
ages 8-13+	0.45	0.42	0.31	0.21	0.15	0.08	0.15	0.11	0.12	0.11	0.09	0.11	0.12	0.17	0.20	0.24	0.20	0.16	0.22	0.20	0.18	0.23	0.26	0.29	0.32
ages 3-8	0.45	0.41	0.31	0.13	0.09	0.05	0.09	0.07	0.09	0.08	0.07	0.09	0.10	0.14	0.14	0.17	0.14	0.11	0.15	0.14	0.13	0.16	0.19	0.20	0.22

FIGURES

Figure 1. Estimated striped bass abundance of age 8 and older fish for 1982 – 2006, total striped bass catch of fish ages 8 and older and striped bass fishing mortality for age 8 and older fish from 1982 to 2006. Abundance estimates are derived from 2007 catch at age model results.

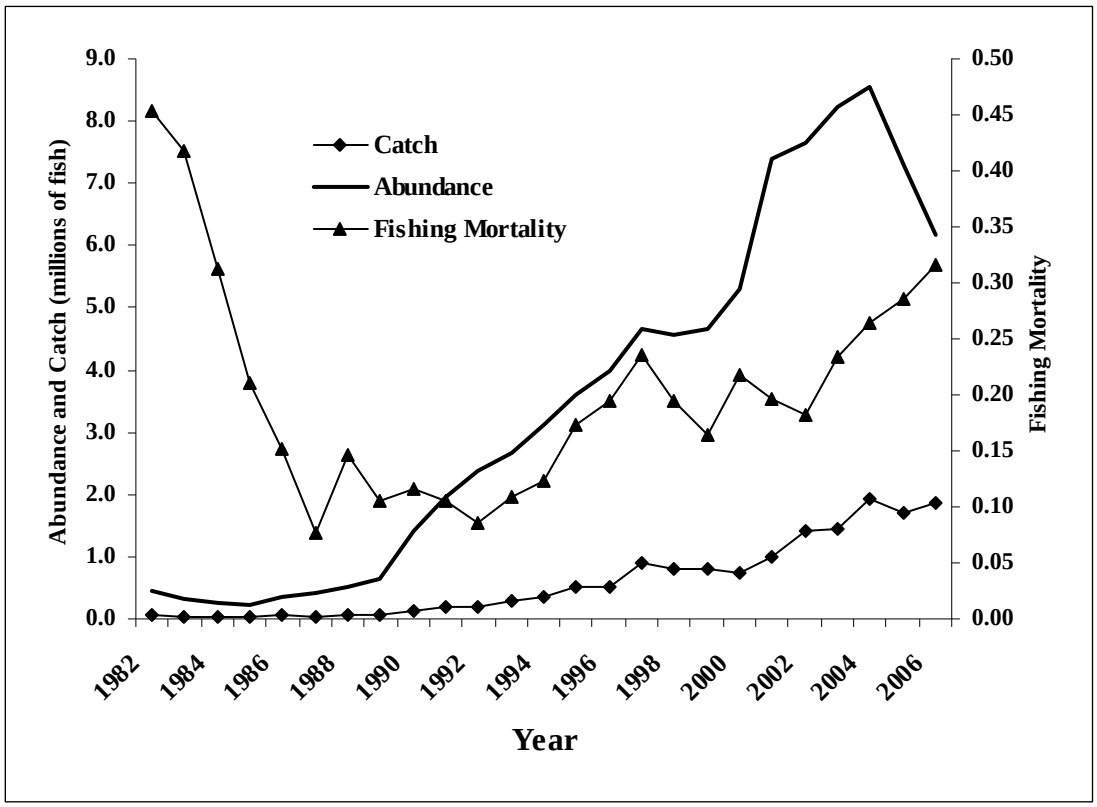
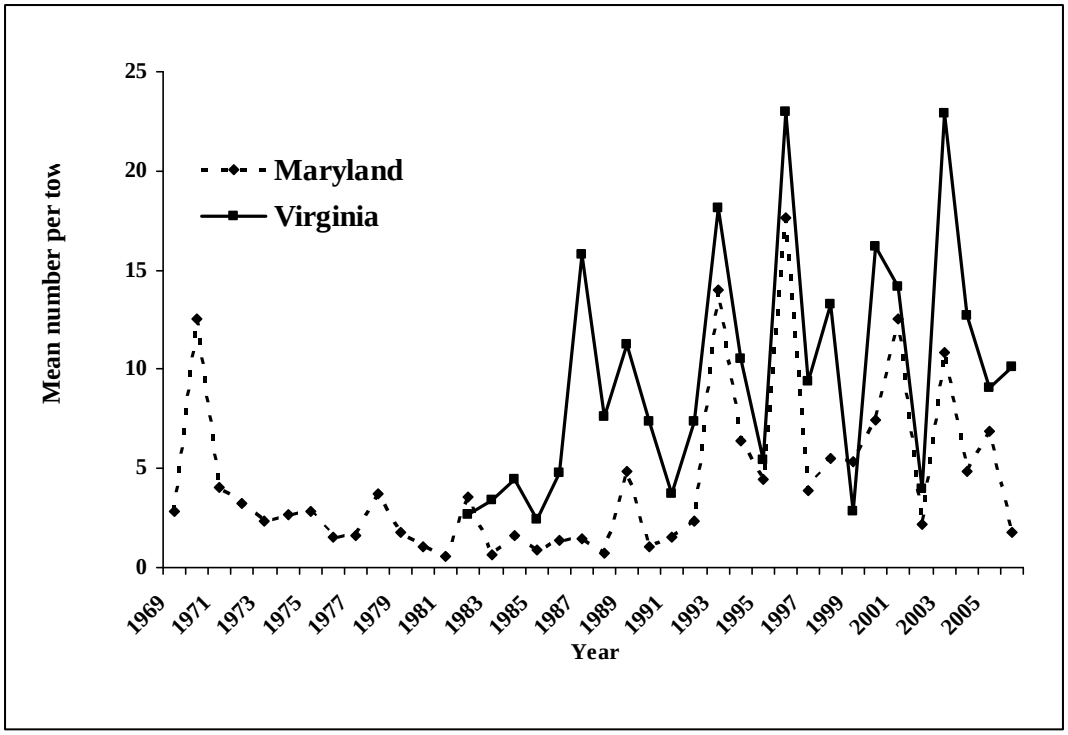


Figure 2.

a. Young of year (YOY) indices for the Chesapeake stock, Maryland and Virginia surveys, 1981 to 2006.



b. Young of year (YOY) indices for the Hudson (NY) and Delaware Bay (NJ) stocks, 1981 to 2006.

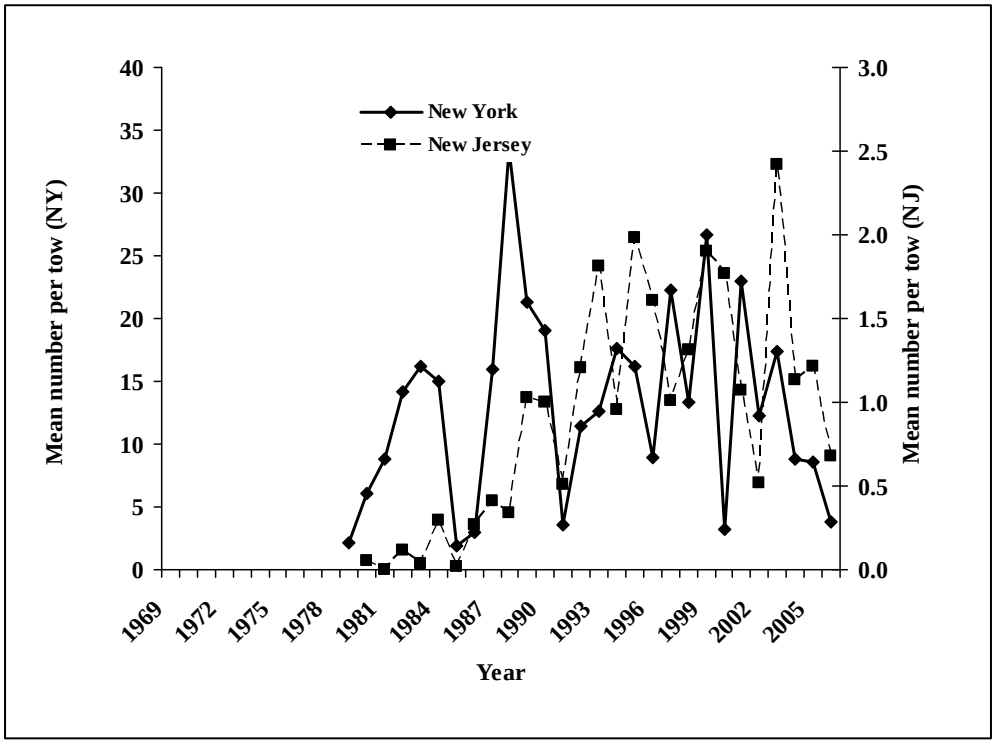
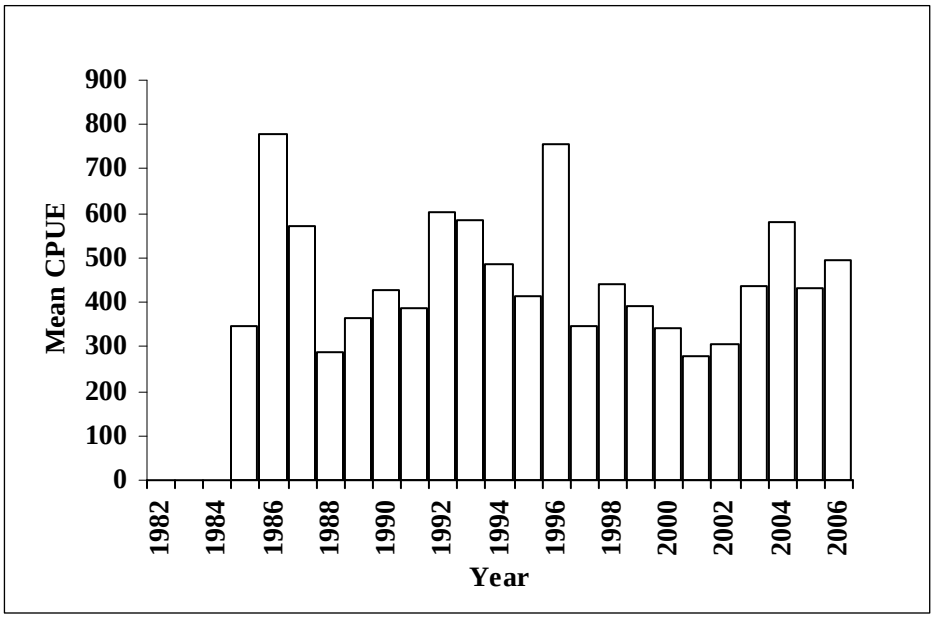
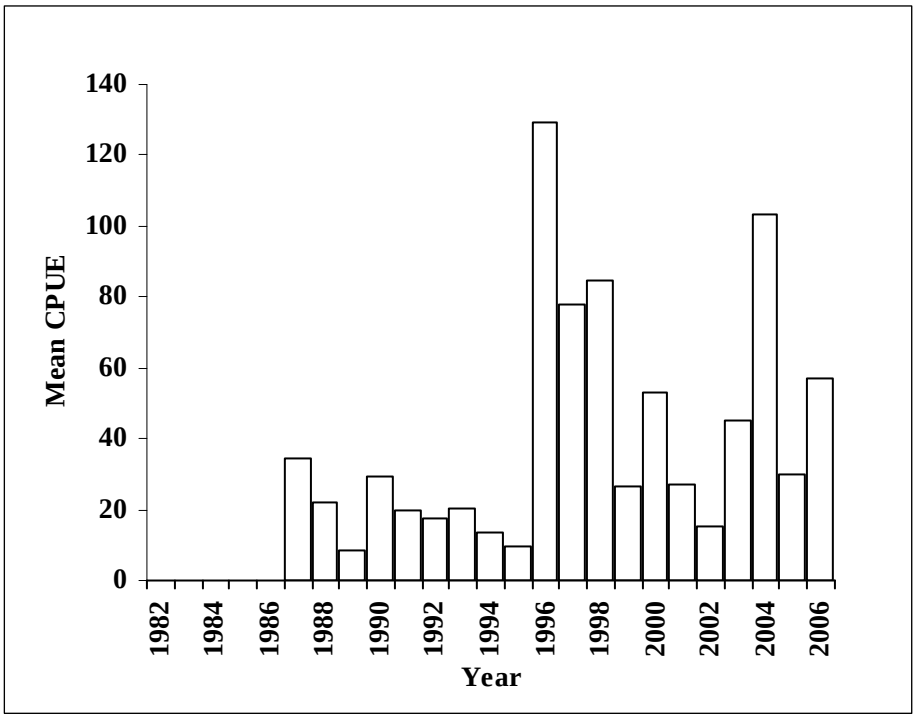


Figure 3.

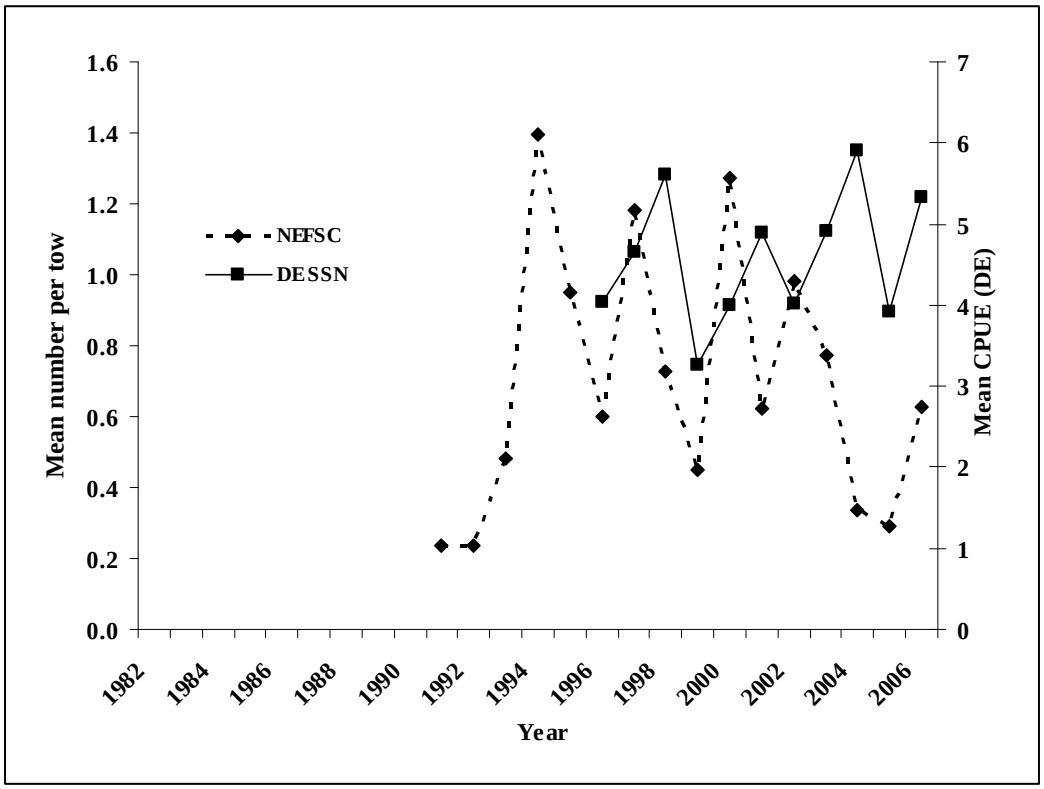
a. Maryland index of striped bass spawning stock abundance, ages 3 and older, 1985 to 2006.



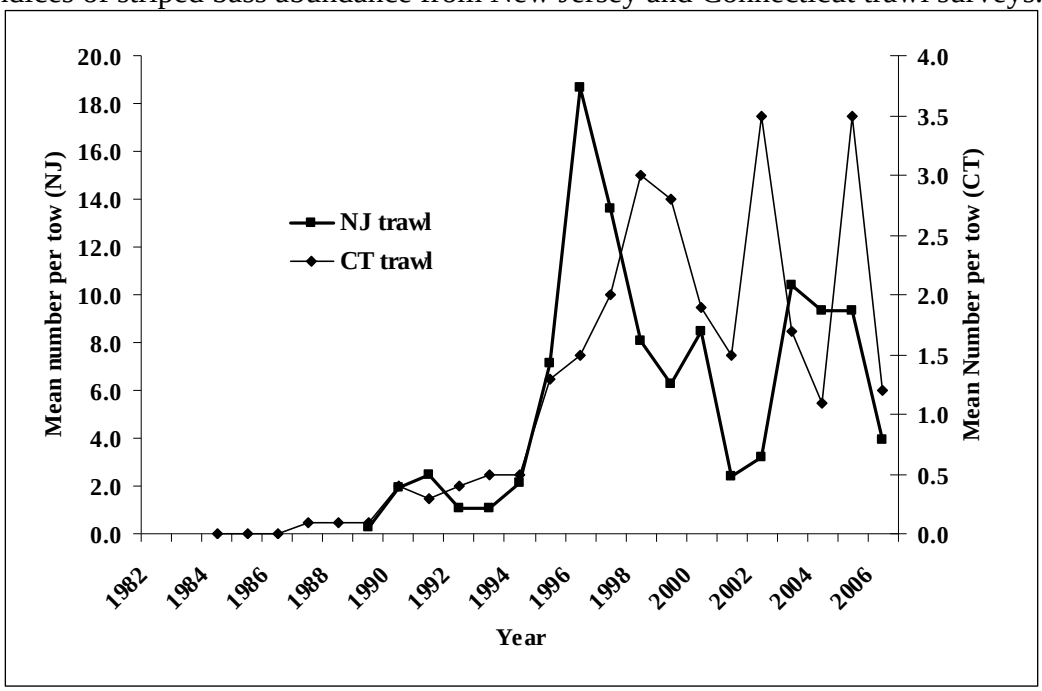
b. New York ocean haul seine index of striped bass abundance (catch per set), ages 3 and older.



c. NMFS/NEFSC bottom trawl survey index of striped bass abundance (mean number per tow), ages 2 through 9; Delaware River index of spawning stock abundance.



d. Indices of striped bass abundance from New Jersey and Connecticut trawl surveys.



e. Indices of age 1 striped bass abundance for western Long Island Sound and Maryland portion of the Chesapeake Bay.

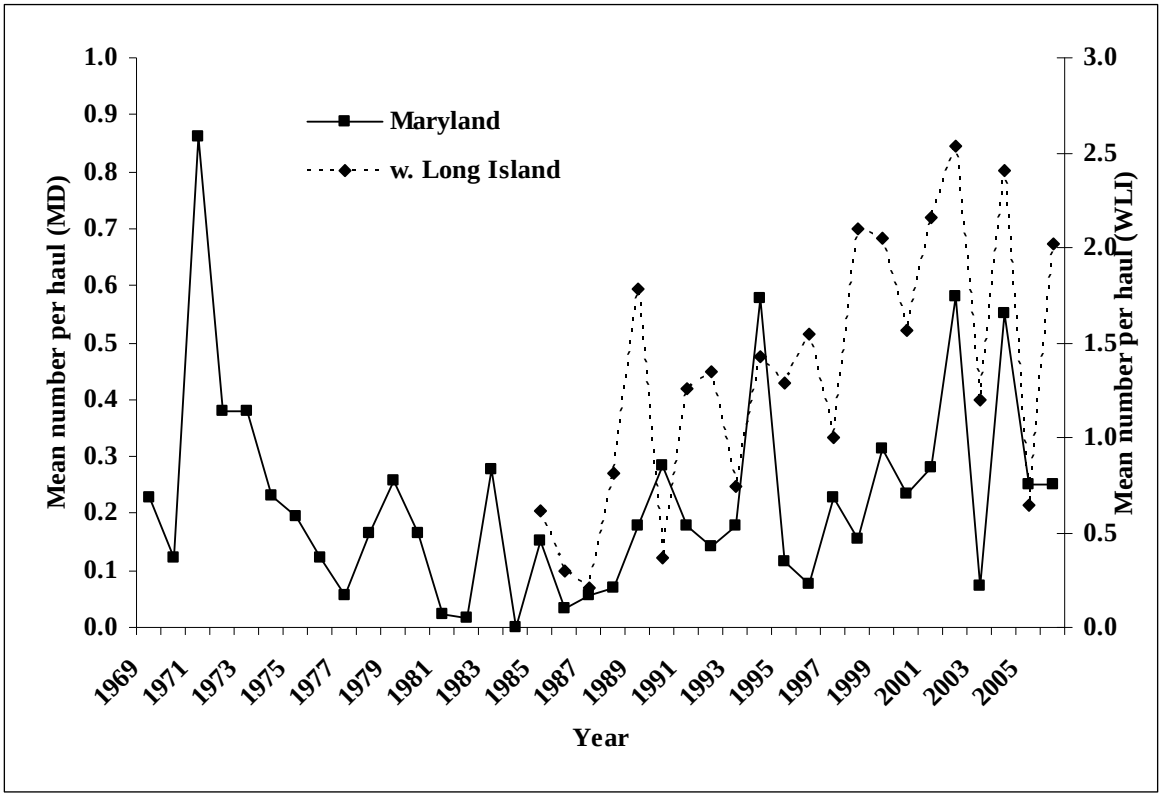
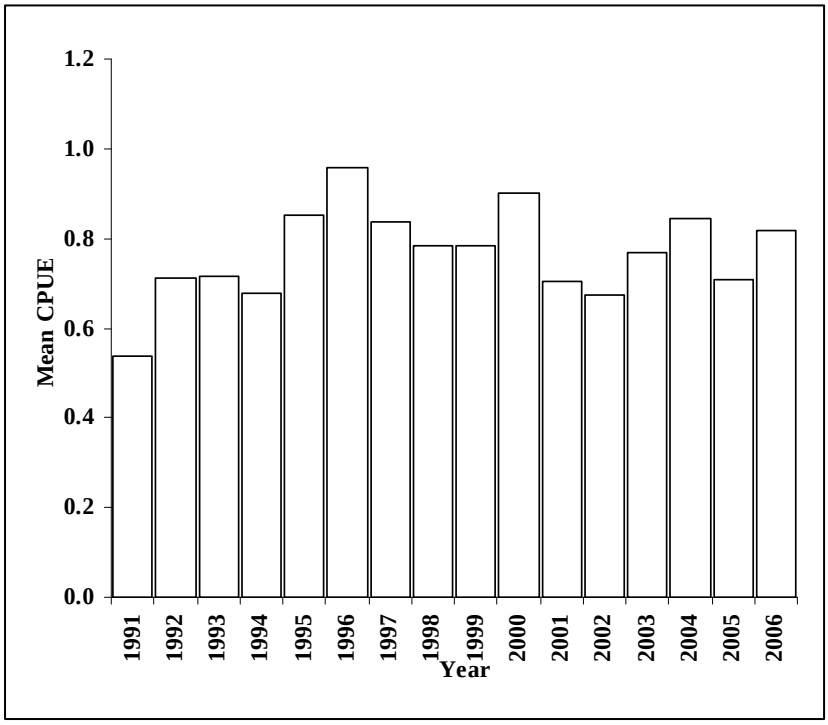


Figure 4.

a. Massachusetts commercial striped bass catch per unit effort, for fish age 7 and older, 1990 to 2006.



b. Connecticut volunteer angler striped bass catch per trip for 1981 to 2006.

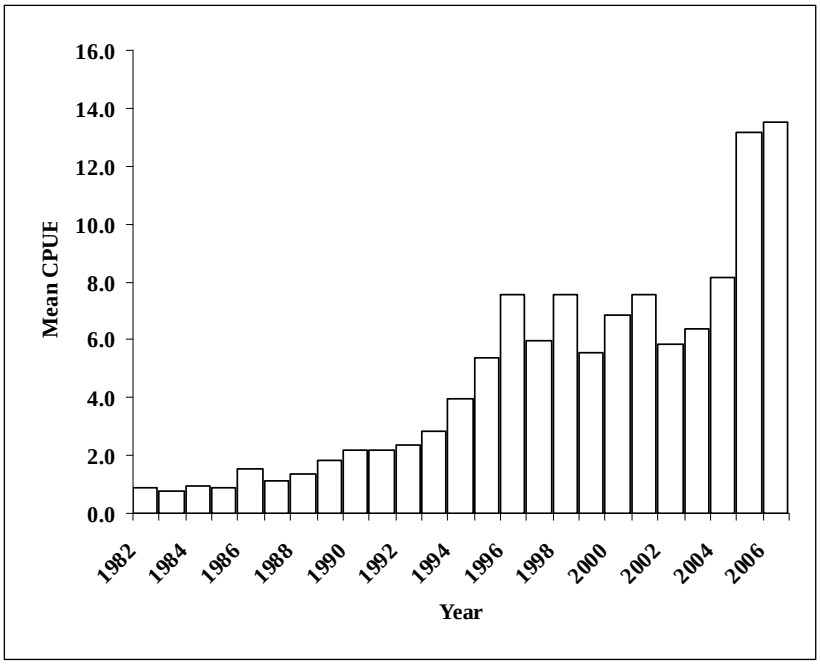
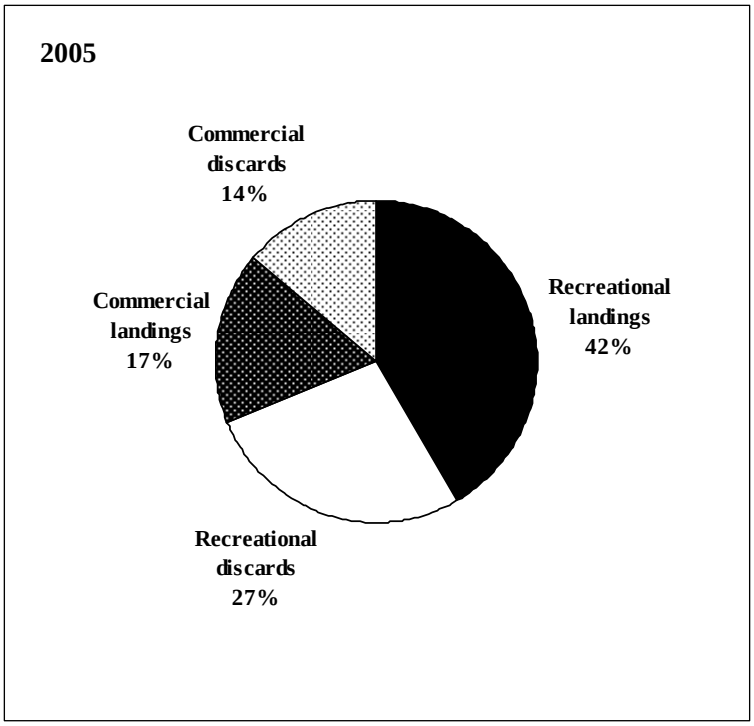


Figure 5. Percentage recreational and commercial catch (harvest and discard) in number for 2005 and 2006.



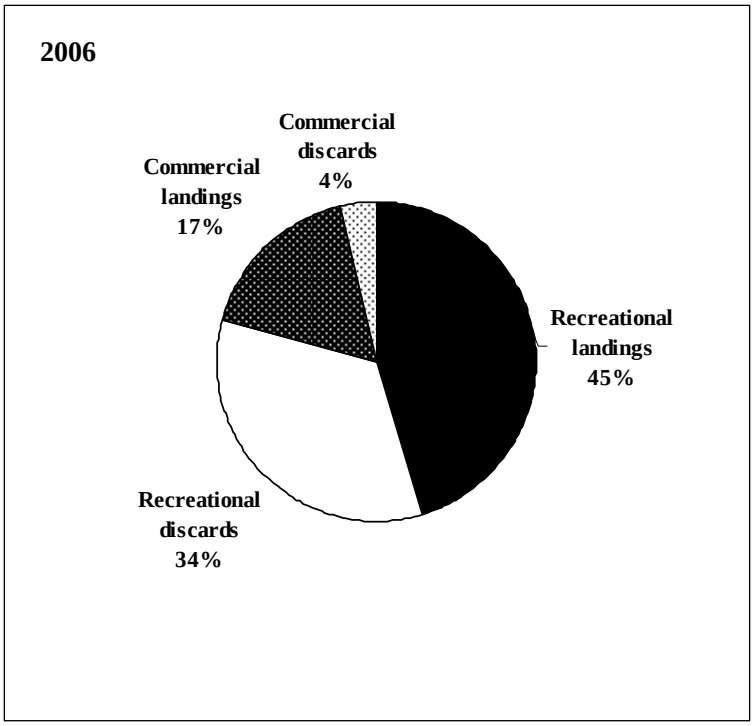


Figure 6. Striped bass population abundance (age 1 and older, and age 8 and older) from the 2007 catch at age model results.

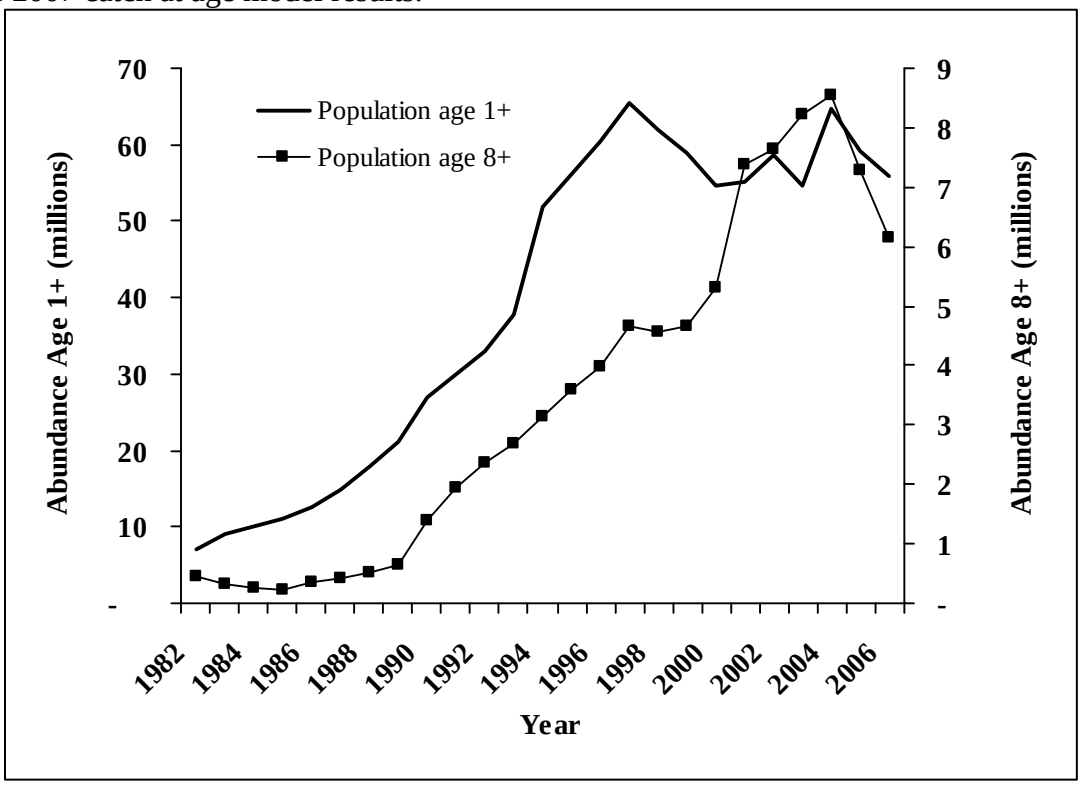
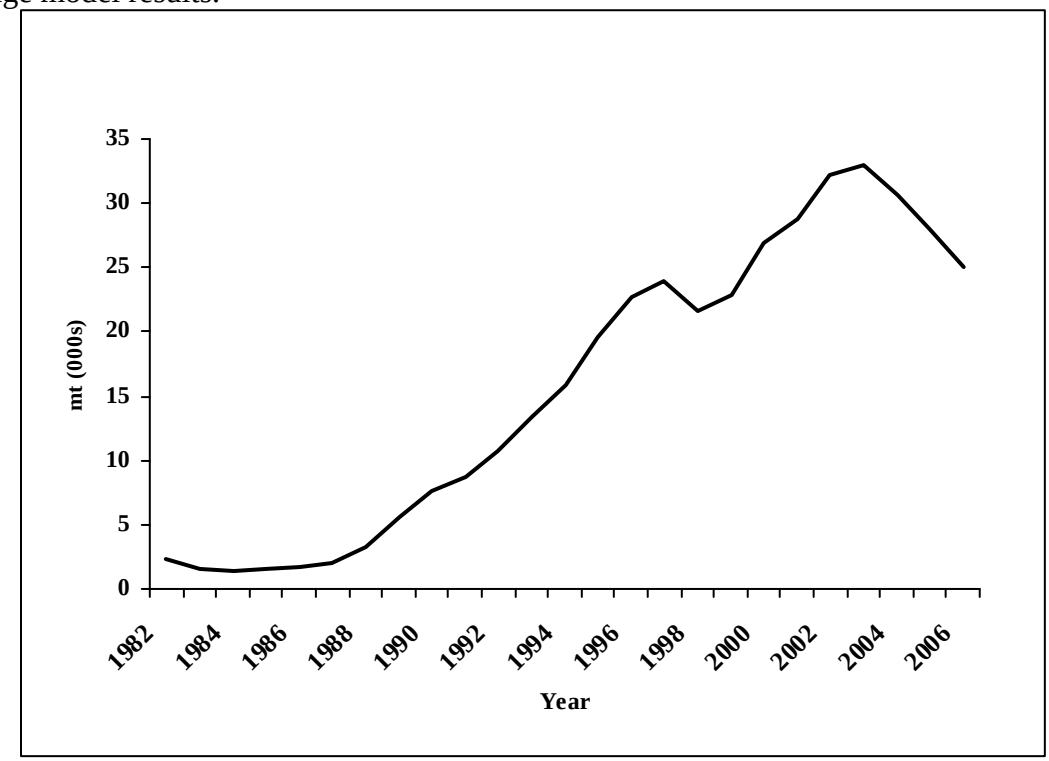



Figure 7. Trends in female spawning stock biomass, 1982 to 2006, from the 2007 catch at age model results.