



**Massachusetts Division of Marine Fisheries
Technical Report TR-11**

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**2001 Massachusetts
Striped Bass Monitoring Report**

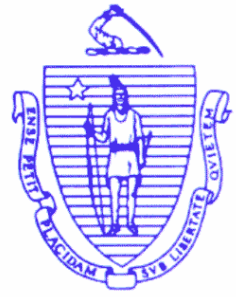
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**Massachusetts Division of Marine Fisheries
Department of Fisheries, Wildlife and Environmental Law Enforcement
Executive Office of Environmental Affairs
Commonwealth of Massachusetts**

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Executive Summary

During 2001, the commercial fishery for striped bass in Massachusetts harvested about 40,248 fish weighing 815,054 pounds. Total losses due to commercial harvesting (including release mortality) were 52,131 weighing 933,410 pounds. The recreational fishery harvested about 288,032 striped bass weighing over 3.6 million pounds. Total losses due to recreational fishing (including release mortality) were 720,904 fish weighing 6.8 million pounds. Combined losses were 773,038 fish weighing 7,800,929 pounds, which reflects a 3% decrease in numbers lost but is a 19.6% increase in weight lost compared to 2000 (800,847 fish; 6,534,831 pounds). The majority of losses, 93% by number and 88% by weight, was attributed to the recreational fishery.

Introduction

This report summarizes the commercial and recreational striped bass fisheries conducted in Massachusetts during 2001. Data sources used to characterize the state fisheries come from monitoring programs of the Massachusetts Division of Marine Fisheries (DMF) and National Marine Fisheries Service (NMFS), which are considered to be essential elements of the long-term management approach described in Section 5 of the Atlantic States Marine Fisheries Commission's (ASMFC) Fisheries Management Report No. 24 (Amendment #5 to the Interstate Fishery management Plan for Atlantic Striped Bass (IFMP))(Diodati, 1990).

Harvest and Losses

Commercial Fishery

Season: July 3-September 4 (fishery closed on August 21). No landings were permitted on Thursday-Saturday.

Harvest: 815,054 pounds (against a harvest quota of 802,000 pounds).

Allowable Gear Type: Hook and line.

Minimum Size: 34 inches total length.

Licensing and Reporting: To purchase striped bass directly from fishermen, fish dealers are required to obtain special authorization from the DMF in addition to standard seafood dealer permits. Dealer reporting requirements include weekly telephone reports of all striped bass purchases; DMF administers a toll-free number and an interactive voice response system for this purpose. Following the close of the season, dealers are also required to provide a written transcript consisting of purchase dates, number of fish, pounds of fish, and names and permit numbers of fishermen from whom they purchased.

Fishermen must have a DMF commercial fishing permit (of some type) and a special striped bass fishing permit to sell their catch. They are also required to file catch reports at the end of the season, which include the name of the dealer(s) that they sell to and extensive

information describing their catch composition and catch rates on a monthly basis. In addition, many fishermen voluntarily provide daily fishing logs.

Methods: The dealer telephone survey is used to gauge the distance to the harvest cap, while the dealer written transactions are used to estimate the final harvest. Information from catch reports and voluntary logs is used to characterize effort, disposition of the catch, catch weight, and size composition by catch category

Data from 1,522 fish sampled from the 2001 commercial harvest and 2000 DMF diet study were used to construct a length-to-weight conversion equation. The following geometric regression was derived:

$$\log_{10}(W) = -3.4766 + 3.0159 * \log_{10}(L), \quad RMS = 0.00263$$

where W equals weight in pounds, L equals total length in inches, and RMS is the residual mean square error. This equation was used to estimate the arithmetic average weight for given lengths by back-transforming the geometric weight as follows:

$$W = 10^{(-3.4766 + 3.0159 * \log_{10}(L) + RMS / 2)}$$

Harvest Levels and Catch Composition

Box 1. Attributes of the Massachusetts Striped Bass Commercial Fishery: 1990-2001

SEASON	SEASON	HARVEST		DEALER PERMITS	FISHING PERMITS
	LENGTH (D)	(Pounds) 000s	(Numbers) 000s		
1990	93	160.6	6.3	95	1,498
1991	59	234.8	10.4	92	1,739
1992	39	239.2	11.3	135	1,861
1993	35	262.6	13.0	152	2,056
1994	24	199.6	10.4	150	2,367
1995	57	782.0	41.2	161	3,353
1996	42	696.8	38.3	179	3,801
1997	42	785.9	44.8	173	5,500
1998	28	822.0	45.3	180	5,540
1999	40	788.2	40.8	167	3,577
2000	36	779.7	40.2	137	3,280
2001	29	815.0	40.2	164	4,241

Due to delinquent dealer transactions reports, the estimate of landings used here comes from dealer phone transactions. The estimate of commercial landings in 2001 was 815,054 pounds (40,248 fish) (Box 1). Size composition of the commercial catch by category of disposition is presented in Tables 1A (numbers of fish) and 1B (pounds of fish). Some commercial license holders, as in past years, reported releasing legal-size fish during the commercial season. This category represented 8% of the total catch. About 28.4% of the fish from the total catch had lengths ≥ 34 inches.

Age and Sex Composition

Five-hundred and forty striped bass sampled from the 2001 commercial harvest were used to sex the harvested fishes. The proportion that each age comprised the total catch was estimated from a sub-sample of 193 fish which, based on the method of Tortora (1978), guaranteed a precision of $\pm 10\%$ at $\alpha=0.05$. Age was determined from scales and sex was determined by visual inspection of gonadal tissue (Sykes Method). Age ranged from 7 to 16 years, and 97.8% were females. Approximately 93% of the sub-sample consisted of individuals from the 1988-1993 year classes (ages 8-13) (Box 2).

Box 2. Age and size composition of striped bass sampled from the Massachusetts 2001 Commercial Harvest

Age	Year Class	Number	%	Mean Length (in.)	Mean Weight (lbs)
7	1994	9	4.7	35	14.6
8	1993	34	17.6	36	15.7
9	1992	32	16.6	37	18.2
10	1991	40	20.7	38	20.3
11	1990	44	22.8	39	21.6
12	1989	19	9.8	39	23.0
13	1988	11	5.7	40	25.4
14	1987	3	1.6	46	37.3
15	1986	0	0.0	0	0.0
16	1985	1	0.5	50	40.5

Box 3. Commercial CPUE Index based on number of fish harvested and number of fishing trips.

Year	Harvest (Numbers)	Trips	CPUE
1991	10,400	17,827	0.58
1992	11,300	13,722	0.82
1993	13,000	10,593	1.23
1994	10,400	7,455	1.40
1995	41,200	28,455	1.45
1996	38,300	28,647	1.34
1997	44,800	20,621	2.17
1998	45,300	20,061	2.26
1999	40,838	25,929	1.57
2000	40,256	18,467	2.18
2001	40,248	16,899	2.38

Estimation of Effort

Total hours fished from standard catch reports and average hours fished per trip from voluntary logs in 2000 (only 20 logs were submitted for 2001) were used to estimate effort. The estimate of total hours fished was increased by 51%, the fraction of non-reporters who fished. Effort during the 29-day season amounted to 101,395 h fished and trip duration averaged 6.0 h. These figures imply that 16,899 trips were conducted. This reflects a decrease in effort from 2000 levels (Box 3). However, the commercial CPUE in 2001 was the highest observed in the time series (Box 3; Fig. 1A).

Characterization of Other Losses

Release mortality was estimated by using a hook-release mortality rate of 8% applied against the released sub-legal and legal-sized fish in Table 1A and 1B. Total losses due to release mortality were 11,883 fish weighing approximately 118,356 pounds.

Recreational Fishery

Season: None

Daily Bag Limit: One fish per person

Allowable Gear Type: Hook and Line

Minimum Size: 28 inches total length

Licensing and Reporting Requirements: None

Harvest levels

Harvest (A+B1) and total catch (A+B1+B2) estimates were provided by the NMFS MRFSS. Massachusetts paid for approximately 4,000 additional intercept interviews which began during wave 3. A similar “add-on” has been conducted since 1988, however, prior to 1995 it began in wave 2. Reference should be made to Osborn and Salz (1994) for a description of the new trip estimation procedure and its affect on catch.

The length distribution of harvested fish was estimated from biological sampling conducted by the MRFSS program in Massachusetts. Estimates of the length frequencies of the sub-legal and legal-size releases were obtained from the American Littoral Society’s 2001 Massachusetts release data.

The estimate of total catch (including fish released alive) in 2001 is 5,698,930 striped bass, which is lower than the 2000 estimate (7,563,326 fish), but is higher than the 1999 estimate (4,702,963) (Table 2). The estimate of total harvest is 288,032 striped bass, which is also higher than the estimate in 1999 (126,755 fish) and in 2000 (181,295 fish). Total pounds of harvested fish was over 3.6 million (Table 2).

To examine trends in recreational angler catches, standardized catch rates (total number of fish per trip) for striped bass were calculated for all fish caught using a general linear model (GLM) which adjusts trip catches for the effects of year, wave, county, area fished, mode fished, numbers of anglers in party, and time spent fishing. Trip catches were transformed using $\ln(x+1)$. Only data for those anglers who said they targeted striped bass were used in the analyses.

Standardized catch rates (back-transformed geometric median) declined from 0.46 fish per trip in 1988 to 0.33 fish per trip in 1991, the lowest value observed in the time series (Fig. 1B). Catch rates began increasing in 1992 and peaked at 1.32 fish per trip in 1998. Since 1999, catch rates have declined, and in 2001, estimates reached 1995-1996 levels (Fig. 1B).

Estimation of Recreational Effort

Standardized effort (no. trips) for each year was calculated by dividing the total number of fish caught (A+B1+B2) by the arithmetic mean total catch rate derived from the GLM analysis. Effort has steadily increased from about 104,210 trips in 1987 to about 3.4 million trips in 1997-1998. Standardized effort dropped in 1999 to 2.3 million trips, increased to 4.1 million in 2000 and dropped in 2001 to 3.7 million trips.

Characterization of Losses

The same methods and rates previously described in the commercial fishery section were used to estimate recreational losses. Release mortality was 247,619 fish (1,239,998 pounds) for sub-legal size fish and 185,253 fish (1,982,949 pounds) for the legal-sized striper released.

Scientific Collections

Thirty-five fish were captured and released during scientific activities. The estimated number that died due to hook-and-release was 3 fish weighing 10 pounds 2001.

Bycatch in Other Fisheries

During 1994, DMF sea-sampling efforts identified striped bass as bycatch in a Nantucket Sound springtime trawl fishery directed at long-finned squid (*Loligo pealei*). Those bycatch estimates were about 3,100 fish (17,600 pounds). Anecdotal information was also reported for this fishery which suggested that striped bass bycatch ranged from 8,000 pounds per day, with up to single tows landing 19,000 pounds. DMF personnel have sea-sampled this fishery during 1995-2000 and have observed only incidental catches of striped bass. Limited sampling and low catch rates make it unreasonable to extrapolate sample information. DMF will continue to monitor and investigate potential sources of striped bass bycatch during 2002.

Estimated Total Losses

Total estimated loss of striped bass during 2001 was 773,038 fish weighing 7,800,929 pounds (Box 4), which is a 3% decrease in numbers lost but is a 19.6% increase in weight compared to 2000 (800,847 fish; 6,534,831 pounds). The majority of losses, 93% by number and 88% by weight, was attributed to combined losses in the recreational fishery.

Box 4. Preliminary estimates of striped bass losses occurring in Massachusetts waters during 2001.

	<u>NUMBER</u>	<u>POUNDS</u>	<u>MEAN WT.</u>
Commercial			
Harvest	40,248	815,054	20.3
Release Mortality	11,883	118,356	10.0
Recreational			
Harvest	288,032	3,644,561	12.7
Release Mortality	432,872	3,222,948	7.4
Scientific (Rel. Mort)	3	10	3.5
Total	773,038	7,800,929	

Removals-At-Age Matrix

The removals (numbers) due to release mortality and harvest by the recreational and commercial fisheries, scientific activities and poaching are apportioned by age and mortality source in Box 6.

Box 6. Massachusetts Striped Bass Removals-At-Age Matrix of 2001 By Source

Age	Scientific	Recreational		Commercial		Poaching
		Release Mortality	Harvest	Release Mortality	Harvest	
2	2	6233	0	168	0	0
3	1	27455	0	948	0	0
4	0	75063	5058	1280	0	0
5	0	89902	6488	1737	0	0
6	0	74347	38087	1565	0	0
7	0	69146	85493	2658	1877	0
8	0	60716	71709	1788	7090	0
9	0	16978	41694	1170	6673	0
10	0	4439	14091	196	8342	0
11	0	4725	13709	215	9176	0
12	0	1979	6312	90	3962	0
13	0	1320	3948	53	2294	0
14	0	258	1442	11	626	0
15	0	0	0	0	0	0
16	0	310	0	3	209	0

Required Fishery-Independent Monitoring Programs

Massachusetts Tagging Study

The Massachusetts Division of Marine Fisheries (DMF) joined the Striped Bass Cooperative State-Federal Coastwide Tagging Study in 1991. The study's primary objective has been to develop an integrated database of tag releases and recoveries that will provide current information related to striped bass mortality and migration rates. The majority of striped bass tagged prior to 1991 (the tagging study began in 1986) have ranged from 18 to 28 inches in length. Since Atlantic coastal fisheries had employed minimum sizes of 28-36 inches, resulting mortality estimates from these data may understate the effects fishing has on larger striped bass. The Massachusetts tagging effort has therefore focused on the tag and release of larger fish that reach coastwide legal sizes. To accomplish this job, the DMF contracts several select charter boat captains to take DMF personnel on board to tag and release their catch during regularly scheduled fishing trips. Fish are caught in spring and fall by trolling artificial baits in shoal areas around Nantucket Island. Tag summary statistics are presented in Box 5.

Box 5. Tag summary statistics.

Year	Trips	Boats	Number Tagged	Ave. Length	SE	Length Range	
						Min	Max.
1991	17	4	388	817	5.4	534	1300
1992	29	3	899	798	4.2	524	1267
1993	15	2	678	784	4.8	515	1210
1994	13	2	377	735	4.8	548	1028
1995	11	2	449	767	5.2	470	1178
1996	8	2	203	748	4.5	541	1077
1997	10	2	321	773	6.4	485	1090
1998	12	2	382	797	4.8	597	1055
1999	16	2	471	777	4.4	594	1108
2000	25	4	1095	752	3.1	510	1204
2001	14	3	456	786	4.8	503	1110

Table 1A. Estimated size distribution of the 2001 Massachusetts *commercial* striped bass catch (numbers of fish).

TL (in.)	Kept	Released Sub-legal	Released Legal	Total	Percent	Cumulative Percent
12	0	0	0	0	0.00	0.00
13	0	0	0	0	0.00	0.00
14	0	1,433	0	1,433	0.76	0.76
15	0	0	0	0	0.00	0.76
16	0	2,865	0	2,865	1.52	2.28
17	0	0	0	0	0.00	2.28
18	0	4,298	0	4,298	2.28	4.55
19	0	4,298	0	4,298	2.28	6.83
20	0	4,298	0	4,298	2.28	9.11
21	0	0	0	0	0.00	9.11
22	0	1,433	0	1,433	0.76	9.87
23	0	1,433	0	1,433	0.76	10.62
24	0	5,731	0	5,731	3.04	13.66
25	0	5,731	0	5,731	3.04	16.70
26	0	12,894	0	12,894	6.83	23.52
27	0	8,596	0	8,596	4.55	28.08
28	0	15,759	0	15,759	8.35	36.43
29	0	5,731	0	5,731	3.04	39.46
30	0	20,057	0	20,057	10.62	50.09
31	0	4,298	0	4,298	2.28	52.36
32	75	20,057	29	20,161	10.68	63.04
33	1,432	14,326	544	16,303	8.64	71.68
34	4,673	0	1,777	6,450	3.42	75.09
35	5,351	0	2,035	7,386	3.91	79.01
36	6,708	0	2,550	9,258	4.90	83.91
37	5,351	0	2,035	7,386	3.91	87.82
38	4,899	0	1,863	6,762	3.58	91.40
39	4,598	0	1,748	6,346	3.36	94.77
40	2,939	0	1,118	4,057	2.15	96.91
41	1,884	0	716	2,601	1.38	98.29
42	1,281	0	487	1,768	0.94	99.23
43	377	0	143	520	0.28	99.50
44	226	0	86	312	0.17	99.67
45	151	0	57	208	0.11	99.78
46	75	0	29	104	0.06	99.83
47	75	0	29	104	0.06	99.89
48	0	0	0	0	0.00	99.89
49	0	0	0	0	0.00	99.89
50	151	0	57	208	0.11	100.00
Total	40,248	133,235	15,302	188,785		
Avg. Size	37.2	27.6	37.2	30.4		

Table 1B. Estimated size distribution of the 2001 Massachusetts *commercial* striped bass catch (pounds).

TL (in.)	Kept	Released Sub-legal	Released Legal	Total	Percent	Cumulative Percent
12	0	0	0	0	0.00	0.00
13	0	0	0	0	0.00	0.00
14	0	1,500	0	1,514	0.07	0.07
15	0	0	0	0	0.00	0.07
16	0	4,488	0	4,529	0.20	0.26
17	0	0	0	0	0.00	0.26
18	0	9,603	0	9,691	0.42	0.69
19	0	11,304	0	11,407	0.50	1.18
20	0	13,195	0	13,315	0.58	1.77
21	0	0	0	0	0.00	1.77
22	0	5,863	0	5,917	0.26	2.02
23	0	6,704	0	6,765	0.30	2.32
24	0	30,490	0	30,768	1.34	3.66
25	0	34,485	0	34,799	1.52	5.18
26	0	87,334	0	88,129	3.85	9.03
27	0	65,241	0	65,836	2.87	11.90
28	0	133,474	0	134,690	5.88	17.79
29	0	53,954	0	54,446	2.38	20.16
30	0	209,170	0	211,075	9.22	29.38
31	0	49,481	0	49,932	2.18	31.56
32	955	254,116	363	257,385	11.24	42.79
33	19,908	199,163	7,569	220,885	9.64	52.44
34	71,084	0	27,026	121,869	5.32	57.76
35	88,839	0	33,777	136,346	5.95	63.71
36	121,237	0	46,094	190,196	8.30	72.02
37	105,049	0	39,939	114,411	5.00	77.01
38	104,226	0	39,627	144,812	6.32	83.33
39	105,783	0	40,219	105,783	4.62	87.95
40	72,998	0	27,754	120,374	5.26	93.21
41	50,411	0	19,166	50,411	2.20	95.41
42	36,864	0	14,016	50,585	2.21	97.62
43	11,640	0	4,425	11,640	0.51	98.12
44	7,485	0	2,846	7,485	0.33	98.45
45	5,340	0	2,030	22,236	0.97	99.42
46	2,853	0	1,085	2,853	0.12	99.55
47	3,044	0	1,157	3,044	0.13	99.68
48	0	0	0	0	0.00	99.68
49	0	0	0	0	0.00	99.68
50	7,337	0	2,790	7,337	0.32	100.00
Total	815,054	1,169,567	309,883	2,290,467		
Avg. Weight	20.3	8.8	19.3	12.1		

Table 2. MRFSS estimates of striped bass harvested (A+B1; in numbers and pounds), released (B2), and total catch from 1986-2001. Standardized trips were estimated from total catch and catch rates (see text).

Year	Harvest (A+B1)		Released (B2)	Total (A+B1+B2)	Standardized
	Numbers	Weight (lbs)	Numbers	Numbers	Trips
1986	29,434	298,816	442,298	471,732	355,316
1987	10,807	269,459	93,660	104,467	104,210
1988	21,050	421,317	209,632	230,682	237,450
1989	13,044	295,227	193,067	206,111	241,308
1990	20,515	319,092	339,511	360,026	452,116
1991	20,799	440,605	448,735	469,534	579,552
1992	57,084	972,116	779,814	836,898	976,459
1993	58,511	1,113,446	833,566	892,077	917,765
1994	74,538	1,686,049	2,102,514	2,177,052	1,739,514
1995	73,806	1,504,390	3,280,882	3,354,688	2,184,768
1996	68,300	1,291,706	3,269,746	3,338,046	2,139,042
1997	199,373	2,891,970	5,417,751	5,617,124	3,467,027
1998	207,952	2,973,456	7,184,358	7,392,310	3,451,104
1999	126,755	1,822,818	4,576,208	4,702,963	2,361,169
2000	181,295	2,618,216	7,382,031	7,563,326	4,105,259
2001	288,032	3,644,561	5,410,899	5,698,930	3,784,456

Table 3A. Estimated size distribution of the 2001 Massachusetts recreational striped bass catch (numbers).

TL (in.)	Kept	Released Sub-legal	Released Legal	Total	Percent	Cumulative Percent
12	0	0	0	0	0.00	0.00
13	0	7,597	0	7,597	0.13	0.13
14	0	15,713	0	15,713	0.28	0.41
15	0	34,684	0	34,684	0.61	1.02
16	0	66,062	0	66,062	1.16	2.18
17	0	61,738	0	61,738	1.08	3.26
18	0	52,540	0	52,540	0.92	4.18
19	0	42,800	0	42,800	0.75	4.93
20	0	112,060	0	112,060	1.97	6.90
21	0	66,067	0	66,067	1.16	8.06
22	0	162,381	0	162,381	2.85	10.91
23	0	193,764	0	193,764	3.40	14.31
24	0	348,516	0	348,516	6.12	20.42
25	0	588,219	0	588,219	10.32	30.75
26	0	677,499	0	677,499	11.89	42.63
27	0	665,595	0	665,595	11.68	54.31
28	4,289	0	425,892	430,181	7.55	61.86
29	24,890	0	398,837	423,727	7.44	69.30
30	40,464	0	390,721	431,185	7.57	76.86
31	42,403	0	255,449	297,851	5.23	82.09
32	38,903	0	232,182	271,085	4.76	86.85
33	29,311	0	201,340	230,651	4.05	90.89
34	27,027	0	89,334	116,361	2.04	92.93
35	18,396	0	69,855	88,251	1.55	94.48
36	12,958	0	61,738	74,697	1.31	95.79
37	21,063	0	54,163	75,226	1.32	97.11
38	5,593	0	39,013	44,605	0.78	97.90
39	6,453	0	30,896	37,349	0.66	98.55
40	7,511	0	19,533	27,045	0.47	99.03
41	4,289	0	15,746	20,035	0.35	99.38
42	1,237	0	15,482	16,719	0.29	99.67
43	1,081	0	3,870	4,952	0.09	99.76
44	0	0	0	0	0.00	99.76
45	1,081	0	0	1,081	0.02	99.78
46	1,081	0	3,870	4,952	0.09	99.86
47	0	0	3,870	3,870	0.07	99.93
48	0	0	0	0	0.00	99.93
49	0	0	3,870	3,870	0.07	100.00
Total	288,032	3,095,234	2,315,662	5,698,928		
Avg. Size	33.1	24.2	31.3	27.5		

Table 3B. Estimated size distribution of the 2001 Massachusetts recreational striped bass catch (pounds).

TL (in.)	Kept	Released Sub-legal	Released Legal	Total	Percent	Cumulative Percent
12	0	0	0	0	0.00	0.00
13	0	5,570	0	5,570	0.01	0.01
14	0	14,407	0	14,407	0.03	0.05
15	0	39,155	0	39,155	0.09	0.13
16	0	90,603	0	90,603	0.21	0.34
17	0	101,661	0	101,661	0.23	0.57
18	0	102,790	0	102,790	0.23	0.81
19	0	98,566	0	98,566	0.22	1.03
20	0	301,240	0	301,240	0.69	1.72
21	0	205,757	0	205,757	0.47	2.18
22	0	581,883	0	581,883	1.32	3.51
23	0	793,957	0	793,957	1.81	5.32
24	0	1,623,641	0	1,623,641	3.70	9.01
25	0	3,099,379	0	3,099,379	7.06	16.07
26	0	4,018,048	0	4,018,048	9.15	25.21
27	0	4,423,322	0	4,423,322	10.07	35.28
28	31,810	0	3,158,437	3,190,247	7.26	42.54
29	205,189	0	3,287,994	3,493,184	7.95	50.50
30	369,492	0	3,567,845	3,937,337	8.96	59.46
31	427,444	0	2,575,079	3,002,523	6.83	66.29
32	431,577	0	2,575,724	3,007,301	6.85	73.14
33	356,786	0	2,450,783	2,807,569	6.39	79.53
34	359,979	0	1,189,854	1,549,833	3.53	83.06
35	267,409	0	1,015,408	1,282,817	2.92	85.98
36	205,062	0	977,007	1,182,070	2.69	88.67
37	362,037	0	930,965	1,293,002	2.94	91.61
38	104,178	0	726,715	830,893	1.89	93.50
39	129,999	0	622,426	752,425	1.71	95.21
40	163,328	0	424,737	588,064	1.34	96.55
41	100,480	0	368,848	469,328	1.07	97.62
42	31,165	0	390,005	421,171	0.96	98.58
43	29,244	0	104,672	133,916	0.30	98.89
44	0	0	0	0	0.00	98.89
45	33,542	0	0	33,542	0.08	98.96
46	35,840	0	128,282	164,122	0.37	99.34
47	0	0	136,878	136,878	0.31	99.65
48	0	0	0	0	0.00	99.65
49	0	0	155,209	155,209	0.35	100.00
Total	3,644,561	15,499,979	24,786,867	43,931,407		
Avg. Weight	12.7	5.0	10.7	7.7		

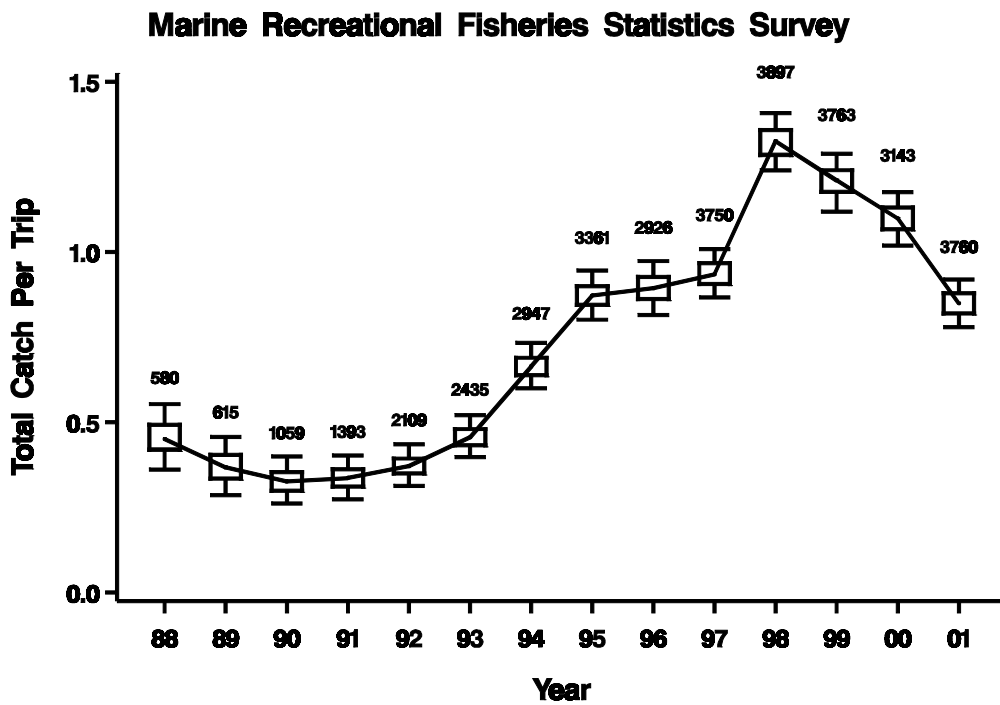
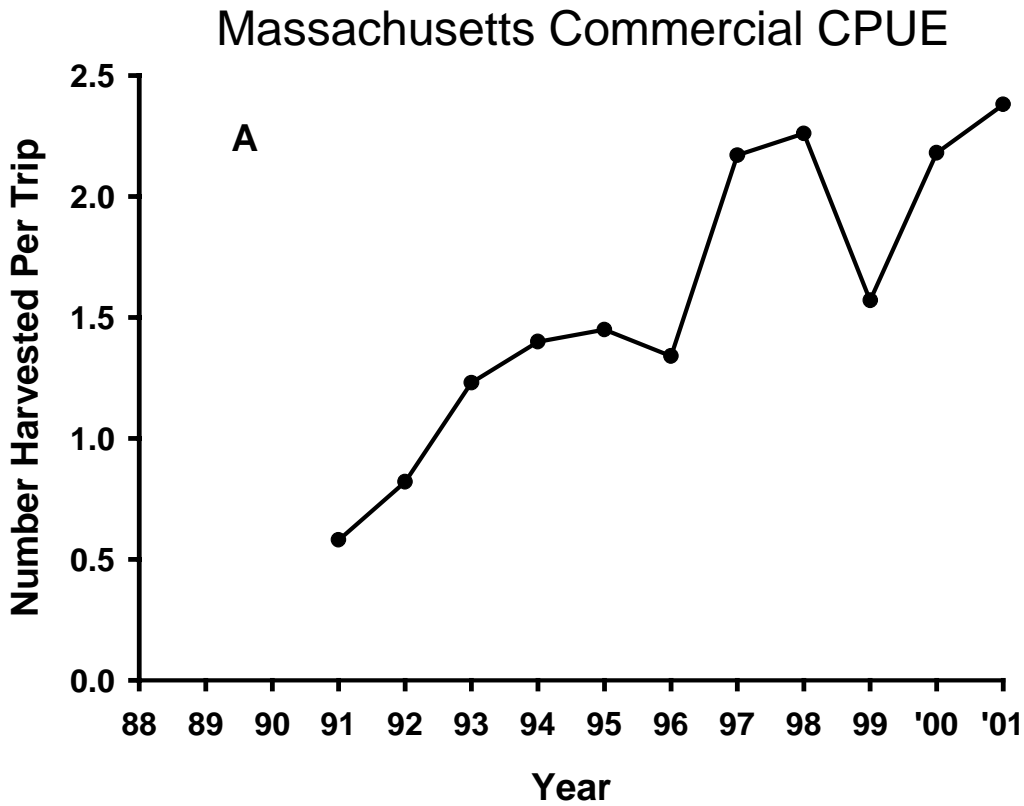


Figure 1. Estimates of A) harvest rates (numbers per trip) of the commercial fishery, 1986-2001 and B) total catch rates (total numbers of fish caught per trip) of the recreational fishery for striped bass in Massachusetts waters, 1988-2001. For the MRFSS plot, whiskers represent the 10th and 90th percentiles, horizontal edges of the box represent the 25th and 75th percentiles, and the horizontal bar represents the geometric median. The number of intercepts are shown above each box.