

Massachusetts 1997 Striped Bass Fisheries Monitoring Report

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Introduction

This report characterizes the commercial and recreational striped bass fisheries conducted in Massachusetts during 1997. Statewide monitoring programs, 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)), were used to collect this information. Several data sources were used to estimate harvest, total catch (which include fish caught but released alive), and catch composition (size, sex, and age). These included, Massachusetts Division of Marine Fisheries (DMF) and National Marine Fisheries Service (NMFS) based programs (Diodati, 1990).

The Massachusetts striped bass commercial fishery in 1997 was very similar to that in 1996. The striped bass recreational fishery, however, changed significantly as a result of the change in minimum allowable size from 34 inches to 28 inches. The drop in minimum size was permitted by the IFMP and has been already implemented by most other states since 1995. Total number of recreationally harvested striped bass increased by about 290% from 1996 to 1997.

Harvest and Losses

Commercial Fishery

Season: 42 d between July 7 - August 22 (the fishery operated under an open (21d) - close (7d) sequence until the quota was reached).

Harvest: 785,942 pounds (the harvest quota allowed by Amendment #5 was 802,000 pounds but Massachusetts regulatory action reduced that amount to 750,000 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 in the fishery. Catch reports collected from 66% of the total licensed commercial fishermen were used to characterize the disposition of the catch, the catch weight, and size composition by catch category.

Information from 2,105 fish sampled from the 1994-1997 commercial harvest was used to conduct a functional geometric

regression of weight on length. The following weight-length relationship was derived:

$$W = .000393L^{2.9694} \quad (1)$$

where W equals weight in pounds and L equals total length in inches. Expression (1) was used to estimate any missing length or weight values.

Harvest Levels and Catch Composition

Dealer transcripts show 785,942 pounds (44,841 fish) were harvested during 1997 (Box 1). Size composition of the commercial catch by category of disposition is presented in Tables 1 (numbers of fish) and 2A (pounds of fish). The CONSUM category represents what commercially licensed anglers harvested for personal use and is counted as a recreational loss later in this report. Some commercial license holders, as in past years, reported releasing legal-size fish during the commercial season; RELLEG - 11.6% of the total catch. About 29% of the total catch exceeded the legal minimum of 34 inches.

Box 1. Attributes of the Massachusetts Striped Bass Commercial Fishery: 1990-1997.

SEASON	SEASON LENGTH (D)	HARVEST (LBs/NOs) 000s	DEALER PERMITS	FISHING PERMITS
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

Age and Sex Composition

Sub-samples of 468 and 495 striped bass sampled from the 1997 commercial harvest were used to estimate age and sex, respectively. Age was determined from scales and sex was determined by visual inspection of gonadal tissue (Sykes Method). Age ranged from 7 to 17 years, 87% were females. Approximately 94% of the sub-sample consisted of individuals from the 1984-1989 year classes (ages 8-13) (Box 2).

Box 2. Age and Size Composition of Striped Bass Sampled From the Massachusetts 1997 Commercial Harvest.

YEAR CLASS	NO.	%	MEAN LENGTH	MEAN WEIGHT
1990	15	3.2	35	14
1989	111	23.7	35	15
1988	121	25.9	36	16
1987	90	19.2	37	17
1986	63	13.5	38	20
1985	35	7.5	39	22
1984	21	4.5	41	26
1983	9	1.9	42	30
1982	2	0.4	44	35
1981	1	0.2	44	36

Estimation of Effort

Total hours fished from standard catch reports and average hours per trip from voluntary logs were used to estimate effort. Estimates were increased by 33%, the fraction of non-reporters. Effort during the 42-day season (July 7-July 27 & Aug 2-Aug 22) amounted to 112,178 h fished and trip duration averaged 5.44 h. These figures imply that 20,621 trips were conducted. This

reflects a decrease in effort from 1996 levels when hours and trips totaled 148,964 and 28,647, respectively.

Characterization of Other Losses

Release mortality was estimated by using a hook-release mortality rate of 8% applied against the RELSUB and RELLEG catch in Tables 1 and 1A. Total losses due to release mortality were 12,131 fish weighing approximately 95,450 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

Preliminary 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 same sources of information described in previous sections were used to estimate the length distribution of the recreational catch except that data collected during the commercial season was excluded. Size distribution of the sub-legal catch was supplemented using information provided by the state's of Maine and New Hampshire, Flagg 1997 and New Hampshire Annual State Rpt 1997, respectively.

The preliminary estimate of total catch (including fish released alive) is 5,639,899 striped bass, which is considerably higher than the estimates of the previous two years (3,300,000 in 1996 and 3,351,000 in 1995) (Table 2). The preliminary estimate of total harvest is 200,000 striped bass, which is also considerably

higher than the estimates of the previous two years (69,000 in 1996 and 73,000 in 1995). Total pound of the catch exceeded 24 million pounds while harvest was nearly 4 million pounds (Table 2A).

Estimation of Effort

Information from commercial catch reports, excluding those fishermen that reported selling their catch, and information from volunteer logs was used to estimate total hours fished and average hours per trip. These estimates show that 5,182,067 h were spent fishing for striped bass and trip duration averaged 4.5 h. These figures imply that 1,151,571 trips were made where striped bass were caught. These estimates represent an increase in magnitude of more than 2.5 times over 1995 and 1996 estimates of effort.

Characterization of losses

The same methods and rates previously described (under "Characterization of losses" in the commercial fishery section) were used to estimate recreational losses. Release mortality of sub-legal size fish was 396,025 fish (950,459 pounds) and was 38,916 fish (700,492 pounds) for the legal-sized stripers released.

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 sea-sampled this fishery during 1995, 1996 and 1997 and 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 1998.

Estimated Total Losses

Total estimated loss of striped bass during 1997 was 691,913 fish weighing 6,517,393 pounds (Box 3), which is much higher than that of 1996 (375,300 fish, 4,786,600 pounds). The majority of losses, 92% by number and 86% by weight, was attributed to combined

losses in the recreational fishery.

Box 3. Preliminary estimates of striped bass losses occurring in Massachusetts waters during 1997.

COMMERCIAL HARVEST RELEASE MORTALITY	<u>NUMBER</u> 44,841 12,131	<u>POUNDS</u> 785,942 95,450	<u>MEAN WT.</u> 18.0 7.9
RECREATIONAL HARVEST RELEASE MORTALITY	200,000 434,941	3,985,049 1,650,952	19.9 3.8
TOTALS	691,913	6,517,393	9.4

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 vast 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 have contracted several select charter boat captains to take DMF personnel on board to tag and release their catch during regularly scheduled fishing trips. All fish are caught in the fall by trolling artificial baits in shoal areas around Nantucket Island.

Tag summary statistics are presented in Box 4. The release-recapture matrix and estimated survival rates are

presented in Boxes 5 and 6, respectively. Note, however, the Release-recapture and the estimated survival rates (Boxes 5 and 6) are the same as presented in the 1996 report because the recapture data have not been updated since then.

Box 4. Tag summary statistics.

YEAR	TRIPS	BOATS	NUMBER TAGGED	AVERAGE LENGTH	SE	LENGTH RANGE	
						MINIMUM	MAXIMUM
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	375	735	4.8	548	1028
1995	11	2	477	767	5.2	470	1178
1996	8	2	186	748	4.5	541	1077
1997	9	2	312	773	6.4	485	1090

Box 5. Release-recovery matrix (all sizes included).

Rel. Yr. No. Rel.	1992	1993	1994	1995	1996	1997
1991	388	28	23	10	17	5
1992	897		45	42	37	33
1993	677			39	28	39
1994	375				25	18
1995	433					41
1996	186					
1997	312					

Box 6. Estimates of Survival Rates from the SURVIV Analysis of Tag-Recapture Data.

SURVIVAL PERIOD	SIZE CLASS	S (SE)	MODEL TYPE		GOF P-val.
			SURV.	RECOV.	
11/91-11/96	ALL	0.822 (0.035)	CONST	CONST	0.1
	>=28	0.839 (0.041)	CONST	CONST	0.3
	>34	0.829 (0.063)	CONST	CONST	0.6

Table 1. Estimated size distribution of the 1997 Massachusetts COMMERCIAL striped bass catch.
(NUMBERS OF FISH)

*TL	RELSUB	SOLD	CONSUM	RELLEG	TOTAL	PERC.	CUM. PERC.
15	2,089				2,089	1.02	1.02
16	0				0	0.00	1.02
17	0				0	0.00	1.02
18	0				0	0.00	1.02
19	0				0	0.00	1.02
20	2,089				2,089	1.02	2.04
21	8,357				8,357	4.08	6.12
22	0				0	0.00	6.12
23	6,268				6,268	3.06	9.18
24	0				0	0.00	9.18
25	8,357				8,357	4.08	13.26
26	10,447				10,447	5.10	18.36
27	16,714				16,714	8.16	26.51
28	14,625				14,625	7.14	33.65
29	8,357		140	740	9,237	4.51	38.16
30	8,357		100	0	8,457	4.13	42.29
31	18,804		180	888	19,871	9.70	51.99
32	2,089	263	80	0	2,432	1.19	53.18
33	14,625	614	399	740	16,378	7.99	61.17
34	0	2,720	279	444	3,443	1.68	62.85
35	2,089	7,722	1,516	4,883	16,210	7.91	70.76
36	2,089	6,581	539	592	9,801	4.78	75.55
37	4,179	6,757	1,277	444	12,656	6.18	81.72
38	2,089	6,932	1,197	2,220	12,438	6.07	87.80
39	2,089	4,212	738	1,776	8,815	4.30	92.10
40	0	2,896	399	1,036	4,331	2.11	94.21
41	2,089	2,369	479	296	5,233	2.55	96.77
42		1,141	359	740	2,240	1.09	97.86
43		1,053	160	0	1,213	0.59	98.45
44		878	120	444	1,441	0.70	99.15
45		439	160	0	598	0.29	99.45
46		88	80	0	168	0.08	99.53
47		88	120	148	355	0.17	99.70
48		88	40	148	276	0.13	99.84
49			20	0	20	0.01	99.85
50			0	0	0	0.00	99.85
51			0	296	296	0.14	99.99
52			0		0	0.00	99.99
53			20		20	0.01	100.00
Totals:	135,805	44,841	8,397	15,833	204,876	100.00	
Ave. Size:	28.8	37.5	37.5	36.9	31.7		

*Size interval 15 contains fish measuring from 14.1 to 15, and so on...

Table 1A. Estimated size distribution of the 1997 Massachusetts COMMERCIAL striped bass catch.
(POUNDS OF FISH)

*TL	RELSUB	SOLD	CONSUM	RELLEG	TOTAL	PERC.	CUM. PERC.
15	2,021				2,021	0.10	0.10
16	0				0	0.00	0.10
17	0				0	0.00	0.10
18	0				0	0.00	0.10
19	0				0	0.00	0.10
20	4,750				4,750	0.22	0.32
21	21,960				21,960	1.03	1.35
22	0				0	0.00	1.35
23	21,578				21,578	1.02	2.37
24	0				0	0.00	2.37
25	36,853				36,853	1.74	4.11
26	51,756				51,756	2.44	6.55
27	92,630				92,630	4.36	10.91
28	90,294				90,294	4.25	15.17
29	57,263		1,040	4,734	63,036	2.97	18.14
30	63,328		821	0	64,149	3.02	21.16
31	157,059		1,629	6,924	165,612	7.80	28.96
32	19,176	2,831	796	0	22,803	1.07	30.04
33	147,076	7,239	4,359	6,948	165,622	7.80	37.84
34	0	35,028	3,334	4,555	42,917	2.02	39.86
35	25,022	108,371	19,728	54,608	207,729	9.79	49.65
36	27,205	100,420	7,620	7,197	142,443	6.71	56.36
37	59,023	111,837	19,593	5,855	196,308	9.25	65.61
38	31,943	124,197	19,883	31,687	207,711	9.79	75.40
39	34,505	81,513	13,244	27,383	156,644	7.38	82.78
40	0	60,415	7,718	17,220	85,353	4.02	86.81
41	40,029	53,191	9,966	5,294	108,480	5.11	91.92
42		27,510	8,029	14,218	49,757	2.34	94.26
43		27,232	3,827	0	31,059	1.46	95.73
44		24,297	3,073	9,794	37,164	1.75	97.48
45		12,987	4,380	0	17,366	0.82	98.29
46		2,772	2,338	0	5,110	0.24	98.54
47		2,955	3,738	3,971	10,664	0.50	99.04
48		3,146	1,326	4,227	8,699	0.41	99.45
49			705	0	705	0.03	99.48
50			0	0	0	0.00	99.48
51			0	10,122	10,122	0.48	99.96
52			0	0	0	0.00	99.96
53			890	0	890	0.04	100.00
Totals:	983,470	785,942	138,036	214,737	2,122,185	100.00	
Ave. Size:	7.2	17.5	16.4	13.6	10.4		

*Size interval 15 contains fish measuring from 14.1 to 15, and so on...

Table 2. Estimated size distribution of the 1997 Massachusetts RECREATIONAL striped bass catch.
(NUMBERS OF FISH)

TL	RELSUB	CONSUM	RELLEG	TOTAL	PERC.	CUM. PERC.
8	2,389			2,389	0.04	0.04
9	597			597	0.01	0.05
10	14,333			14,333	0.25	0.31
11	13,736			13,736	0.24	0.55
12	214,997			214,997	3.81	4.37
13	123,026			123,026	2.18	6.55
14	401,328			401,328	7.12	13.67
15	286,066			286,066	5.07	18.74
16	768,615			768,615	13.64	32.38
17	345,190			345,190	6.12	38.50
18	644,394			644,394	11.43	49.93
19	607,367			607,367	10.78	60.71
20	433,577			433,577	7.69	68.40
21	266,955			266,955	4.74	73.14
22	298,010			298,010	5.29	78.42
23	83,610			83,610	1.48	79.91
24	173,789			173,789	3.08	82.99
25	75,249			75,249	1.33	84.33
26	128,998			128,998	2.29	86.61
27	63,305			63,305	1.12	87.74
28	4,778			4,778	0.08	87.82
29		1,767	25,107	26,874	0.48	88.30
30		2,120	0	2,120	0.04	88.34
31		4,240	25,107	29,348	0.52	88.86
32		1,413	3,138	4,552	0.08	88.94
33		8,834	15,692	24,526	0.44	89.37
34		6,007	9,415	15,422	0.27	89.65
35		32,862	131,813	164,675	2.92	92.57
36		10,601	31,384	41,985	0.74	93.31
37		30,035	31,384	61,419	1.09	94.40
38		27,915	75,322	103,237	1.83	96.23
39		18,021	50,214	68,236	1.21	97.44
40		11,661	31,384	43,045	0.76	98.21
41		11,661	15,692	27,353	0.49	98.69
42		10,954	18,830	29,784	0.53	99.22
43		3,180	0	3,180	0.06	99.28
44		3,180	9,415	12,595	0.22	99.50
45		5,654	3,138	8,792	0.16	99.66
46		3,534	0	3,534	0.06	99.72
47		2,473	3,138	5,612	0.10	99.82
48		707	3,138	3,845	0.07	99.89
49		1,060	0	1,060	0.02	99.91
50		353	0	353	0.01	99.91
51		1,060	3,138	4,198	0.07	99.99
52		353		353	0.01	99.99
53		353		353	0.01	100.00
Totals:	4,950,308	200,000	486,453	5,636,761	100	
Ave. Size:	18.1	38.0	36.7	20.4		

Table 2A. Estimated size distribution of the 1997 Massachusetts RECREATIONAL striped bass catch.
(POUNDS OF FISH)

TL	RELSUB	CONSUM	RELLEG	TOTAL	PERC.	CUM. PERC.
8	451			451	0.00	0.00
9	160			160	0.00	0.00
10	5,250			5,250	0.02	0.02
11	6,677			6,677	0.03	0.05
12	135,315			135,315	0.55	0.60
13	98,205			98,205	0.40	1.00
14	399,213			399,213	1.63	2.63
15	349,256			349,256	1.42	4.06
16	1,136,619			1,136,619	4.64	8.69
17	611,147			611,147	2.49	11.19
18	1,351,918			1,351,918	5.52	16.70
19	1,496,148			1,496,148	6.10	22.81
20	1,243,763			1,243,763	5.07	27.88
21	885,173			885,173	3.61	31.49
22	1,134,522			1,134,522	4.63	36.12
23	363,216			363,216	1.48	37.60
24	856,673			856,673	3.49	41.10
25	418,732			418,732	1.71	42.80
26	806,489			806,489	3.29	46.09
27	442,711			442,711	1.81	47.90
28	37,222			37,222	0.15	48.05
29		15,276	217,088	232,364	0.95	49.00
30		20,273	0	20,273	0.08	49.08
31		44,693	264,631	309,324	1.26	50.34
32		16,370	36,349	52,719	0.22	50.56
33		112,104	199,135	311,239	1.27	51.83
34		83,297	130,556	213,853	0.87	52.70
35		496,643	1,992,078	2,488,721	10.15	62.85
36		174,186	515,687	689,872	2.81	65.67
37		535,357	559,396	1,094,753	4.47	70.13
38		538,571	1,453,189	1,991,759	8.13	78.26
39		375,564	1,046,474	1,422,038	5.80	84.06
40		261,985	705,112	967,098	3.95	88.01
41		281,916	379,378	661,294	2.70	90.70
42		284,475	489,023	773,498	3.16	93.86
43		88,567	0	88,567	0.36	94.22
44		94,824	280,731	375,555	1.53	95.75
45		180,209	100,035	280,243	1.14	96.90
46		120,226	0	120,226	0.49	97.39
47		89,708	113,823	203,531	0.83	98.22
48		27,284	121,166	148,450	0.61	98.82
49		43,511	0	43,511	0.18	99.00
50		15,400	0	15,400	0.06	99.06
51		48,999	145,064	194,063	0.79	99.85
52		17,302		17,302	0.07	99.93
53		18,309		18,309	0.07	100.00
Totals:	11,778,859	3,985,049	8,748,914	24,512,822	100.00	
Ave. Size:	2.4	19.9	18.0	4.3		