

Massachusetts 1998 Striped Bass
Fisheries Monitoring Report

Prepared by
Paul Diodati, Jason Stockwell and David McCarron

*Massachusetts Division of Marine Fisheries
Annisquam River Marine Fisheries Station
Gloucester, Massachusetts 01930
(508) 282-0308*

Introduction

This report characterizes the commercial and recreational striped bass fisheries conducted in Massachusetts during 1998. 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).

Massachusetts' striped bass fishery regulations in 1997 and 1998 were identical. The recreational harvest level in 1998 remained similar to the previous year's level, but numbers of fish caught and released increased significantly. The numbers of fish caught and released exceeded 7 million fish, representing over half of the coastwide total number of fish caught and released in 1998. The 1998 commercial harvest (822,000 pounds) exceeded the ASMFC allowable quota of 802,000 pounds during one of Massachusetts' shortest fishing seasons on record (28 days). Fishing effort in both fisheries appeared to have remained constant between 1997 and 1998, suggesting that other factors contributed to 1998's increased catch rates.

Harvest and Losses

Commercial Fishery

Season: 28 d between July 6 - August 9 (the fishery operated under an open (21d) - closed (7d) sequence until the quota was reached).

Harvest: 822,000 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. Informations from catch reports and voluntary logs are 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 650 fish sampled from the Division of Marine Fisheries' 1998 Striped Bass Bioenergetics Study was used to conduct a functional geometric regression of weight on length. The following weight-length relationship was derived:

$$(1) \quad W = 0.0003894 * L^{2.967257}$$

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 822,000 pounds (45,314 fish) were harvested during 1998 (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. This category (RELLEG) represented 6.8% of the total catch by number of fish in 1998 as compared to 11.6% in 1997. About 30% 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
1998	28	822.0/45.3	180	5,540

Age and Sex Composition

Samples of 537 and 553 striped bass from the 1998 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, 95% were females. Over 95% of striped bass sampled consisted of individuals from the 1986-1991 year classes (ages 7-12) (Box 2).

Box 2. Age and Size Composition of Striped Bass Sampled
From the Massachusetts 1998 Commercial Harvest.

YEAR CLASS	NO.	%	MEAN LENGTH	MEAN WEIGHT
1991	39	7.3	35	15
1990	124	23.1	35	15
1989	156	29.1	36	17
1988	96	17.9	37	18
1987	66	12.3	39	22
1986	31	5.8	40	25
1985	12	2.2	41	26
1984	5	0.9	43	28
1983	4	0.7	44	31
1982	3	0.6	44	31
1981	1	0.2	47	40

Estimation of Effort

Total hours fished and average hours per trip from voluntary logs were used to estimate effort. Effort during the 28-day season (July 6-July 26 & Aug 3-Aug 9) amounted to 114,349 h fished and trip duration averaged 5.7 h. These figures imply that 20,061 trips were conducted. This level of effort is very similar to what was observed during the 1997 season (112,178 h and 20,621 trips in 1997). The commercial CPUE for striped bass has increased at a rate of 22% per year between 1991 and 1998 (Box 3)

Box 3. Commercial CPUE Index Based on Number of Fish Harvested and Number of Fishing trips.

YEAR	HARVEST (Nos)	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	2.21

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 Table 1. Average weights in Table 1A were used to estimate weight. Total losses due to release mortality were 10,211 fish weighing approximately 87,056 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. The American Littoral Society’s 1998 Massachusetts’ release data was used to estimate size distribution of the sub-legal catch.

The preliminary estimate of total catch (including fish released alive) is 7,417,311 striped bass, which is considerably higher than the estimates of the previous two years (3,300,000 in 1996 and 5,636,761 in 1997) (Table 2). The preliminary estimate of total harvest is 206,567 striped bass, which differed little from the 1997-harvest level of 200,000 fish. Weight of the total catch exceeded 42 million pounds; recreational harvest was nearly 4 million pounds (Table 2A).

Estimation of Effort

Information from commercial catch reports, excluding those fishermen that fished during the commercial season, and information from volunteer logs was used to estimate total hours fished and average hours per trip. These estimates show that 5,345,182 h was spent fishing for striped bass and trip duration averaged 4.9 h. These figures imply that 1,090,853 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 but are similar to effort levels observed during 1997.

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 and legal-size fish was 576,860 fish (3,168,641 pounds).

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 1995-1998 and observed only incidental catches of striped bass. Limited sampling and low catch rates make it unreasonable to extrapolate sample information. Other anecdotal information characterized several additional net fisheries in 1998, some taking place in the EEZ, to be troublesome with respect to having relatively high bycatch of striped bass. DMF will continue to monitor and investigate potential sources of striped bass bycatch during future years.

Estimated Total Losses

Total estimated loss of striped bass during 1998 was 836,952 fish weighing 7,051,967 pounds (Box 4), which reflects an increase over 1997 losses of 691,913 fish, 6,517,393 pounds). The majority of losses, 94% by number and 87% by weight, were attributed to combined losses in the recreational fishery.

Box 4. Preliminary estimates of striped bass losses occurring in Massachusetts's waters during 1998.

COMMERCIAL HARVEST RELEASE MORTALITY	<u>NUMBER</u> 43,314 10,211	<u>POUNDS</u> 822,000 87,056	<u>MEAN WT.</u> 19.0 8.5
RECREATIONAL HARVEST RELEASE MORTALITY	206,567 576,860	2,974,270 3,168,641	14.4 5.5
TOTALS	836,952	7,051,967	8.4

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 employ minimum sizes of 28-34 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 has 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. Updated tag summary statistics are presented in Box 5.

Box 5. 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
1998	12	2	400	797	4.8	597	1055

Table 1. Estimated size distribution of the 1998 Massachusetts COMMERCIAL striped bass catch.
(NUMBERS OF FISH)

TL	RELSUB	SOLD	CONSUM	RELLEG	TOTAL	PERC.	CUM. PERC.
15					0	0.00	0.00
16					0	0.00	0.00
17	2,355				2,355	1.32	1.32
18	0				0	0.00	1.32
19	0				0	0.00	1.32
20	9,422				9,422	5.27	6.58
21	0				0	0.00	6.58
22	4,711				4,711	2.63	9.22
23	0				0	0.00	9.22
24	9,422				9,422	5.27	14.49
25	9,422			172	9,594	5.36	19.85
26	0			0	0	0.00	19.85
27	14,133		24	0	14,157	7.91	27.76
28	14,133		122	1,033	15,287	8.55	36.31
29	4,711		73	0	4,784	2.67	38.99
30	30,621		219	1,033	31,873	17.82	56.81
31	0		122	0	122	0.07	56.87
32	7,066		292	344	7,703	4.31	61.18
33	7,066	230	122	861	8,279	4.63	65.81
34	2,355	1,920	584	1,549	6,409	3.58	69.39
35		6,989	1,509	2,410	10,908	6.10	75.49
36		8,755	828	172	9,755	5.45	80.94
37		6,835	925	1,033	8,793	4.92	85.86
38		6,989	1,022	1,894	9,905	5.54	91.40
39		4,531	414	689	5,633	3.15	94.55
40		1,766	219	0	1,985	1.11	95.66
41		1,690	389	516	2,595	1.45	97.11
42		1,075	268	0	1,343	0.75	97.86
43		998	268	172	1,438	0.80	98.66
44		538	170	0	708	0.40	99.06
45		614	122	0	736	0.41	99.47
46		154	24	172	350	0.20	99.67
47		77	24	0	101	0.06	99.72
48		154	97	172	423	0.24	99.96
49			49		49	0.03	99.99
50			24		24	0.01	100.00
Totals:	115,417	43,314	7,911	12,222	178,864	100.00	
Ave. Size:	28.8	37.5	37.5	36.9	31.7		

Table 1A. Estimated size distribution of the 1998 Massachusetts COMMERCIAL striped bass catch.
(POUNDS OF FISH)

TL	RELSUB	SOLD	CONSUM	RELLEG	TOTAL	PERC.	CUM. PERC.
15	0				0	0.00	0.00
16	0				0	0.00	0.00
17	4,402				4,402	0.22	0.22
18	0				0	0.00	0.22
19	0				0	0.00	0.22
20	28,519				28,519	1.41	1.63
21	0				0	0.00	1.63
22	18,920				18,920	0.93	2.56
23	0				0	0.00	2.56
24	48,987				48,987	2.42	4.98
25	55,295				55,295	2.73	7.71
26	0				0	0.00	7.71
27	104,220				104,220	5.15	12.85
28	116,096				116,096	5.73	18.59
29	42,945		518		43,463	2.15	20.73
30	308,687		1,718	7,586	317,991	15.70	36.43
31	0		1,052	0	1,052	0.05	36.48
32	86,271		2,775	3,062	92,108	4.55	41.03
33	94,519	2,946	1,267	8,388	107,120	5.29	46.32
34	34,424	26,828	6,643	16,497	84,392	4.17	50.48
35	0	106,424	18,702	27,967	153,092	7.56	58.04
36	0	144,945	11,150	2,172	158,267	7.81	65.86
37	0	122,743	13,517	14,135	150,395	7.43	73.28
38	0	135,836	16,170	28,047	180,053	8.89	82.17
39	0	95,126	7,069	11,016	113,212	5.59	87.76
40	0	39,976	4,035	0	44,011	2.17	89.93
41	0	41,145	7,718	9,584	58,447	2.89	92.82
42	0	28,124	5,699	0	33,823	1.67	94.49
43	0	28,004	6,112	3,680	37,795	1.87	96.35
44	0	16,143	4,164	0	20,307	1.00	97.36
45	0	19,722	3,179	0	22,901	1.13	98.49
46	0	5,263	679	4,495	10,436	0.52	99.00
47	0	2,805	723	0	3,528	0.17	99.18
48	0	5,971	3,080	5,100	14,151	0.70	99.88
49	0		1,637	0	1,637	0.08	99.96
50	0		869	0	869	0.04	100.00
Totals:	943,284	822,000	118,475	141,728	2,025,488	100.00	
Ave. Size:	8.2	19.0	15.0	11.6	11.3		

Table 2. Estimated size distribution of the 1998 Massachusetts RECREATIONAL striped bass catch.
(NUMBERS OF FISH)

TL	RELSUB	CONSUM	RELLEG	TOTAL	PERC.	CUM. PERC.
11	9,824			9,824	0.13	0.13
12	9,824			9,824	0.13	0.26
13	49,120			49,120	0.66	0.93
14	63,855			63,855	0.86	1.79
15	112,975			112,975	1.52	3.31
16	176,830			176,830	2.38	5.70
17	270,157			270,157	3.64	9.34
18	176,830			176,830	2.38	11.72
19	412,604			412,604	5.56	17.28
20	496,107			496,107	6.69	23.97
21	830,120			830,120	11.19	35.16
22	638,554			638,554	8.61	43.77
23	663,113			663,113	8.94	52.71
24	569,786			569,786	7.68	60.40
25	501,019			501,019	6.75	67.15
26	334,013			334,013	4.50	71.65
27	289,805			289,805	3.91	75.56
28		3,090	255,421	258,511	3.49	79.05
29		1,324	221,038	222,362	3.00	82.04
30		6,621	201,390	208,011	2.80	84.85
31		2,207	270,157	272,364	3.67	88.52
32		7,504	98,239	105,743	1.43	89.95
33		3,090	186,654	189,744	2.56	92.50
34		11,476	78,591	90,067	1.21	93.72
35		37,076	58,943	96,020	1.29	95.01
36		18,538	117,887	136,425	1.84	96.85
37		22,952	39,296	62,247	0.84	97.69
38		24,717	19,648	44,365	0.60	98.29
39		10,152	9,824	19,976	0.27	98.56
40		5,297	19,648	24,944	0.34	98.89
41		16,773	9,824	26,596	0.36	99.25
42		8,386	4,912	13,298	0.18	99.43
43		7,504	0	7,504	0.10	99.53
44		7,062	9,824	16,886	0.23	99.76
45		4,414	4,912	9,326	0.13	99.89
46		1,766		1,766	0.02	99.91
47		883		883	0.01	99.92
48		3,090		3,090	0.04	99.96
49		883		883	0.01	99.98
50		1,766		1,766	0.02	100.00
Totals:	5,604,536	206,567	1,606,208	7,417,311	100	
Ave. Size:	18.1	38.0	36.7	20.4		

Table 2A. Estimated size distribution of the 1998 Massachusetts RECREATIONAL striped bass
(POUNDS OF FISH)

TL	RELSUB	CONSUM	RELLEG	TOTAL	PERC.	CUM. PERC.
11	4,707			4,707	0.01	0.01
12	6,094			6,094	0.01	0.03
13	38,637			38,637	0.09	0.12
14	62,582			62,582	0.15	0.26
15	135,876			135,876	0.32	0.58
16	257,564			257,564	0.61	1.19
17	471,054			471,054	1.11	2.30
18	365,316			365,316	0.86	3.15
19	1,000,737			1,000,737	2.35	5.51
20	1,401,076			1,401,076	3.29	8.80
21	2,709,575			2,709,575	6.37	15.17
22	2,392,800			2,392,800	5.62	20.79
23	2,835,177			2,835,177	6.66	27.46
24	2,764,072			2,764,072	6.50	33.96
25	2,743,452			2,743,452	6.45	40.40
26	2,054,700			2,054,700	4.83	45.23
27	1,994,004			1,994,004	4.69	49.92
28		17,925	1,957,686	1,975,611	4.64	54.56
29		8,525	1,880,066	1,888,592	4.44	59.00
30		47,137	1,894,228	1,941,365	4.56	63.57
31		17,318	2,800,697	2,818,015	6.62	70.19
32		64,697	1,119,043	1,183,740	2.78	72.97
33		29,187	2,329,457	2,358,644	5.54	78.52
34		118,450	1,071,671	1,190,121	2.80	81.32
35		417,059	875,947	1,293,006	3.04	84.35
36		226,710	1,904,630	2,131,340	5.01	89.36
37		304,461	688,648	993,110	2.33	91.70
38		354,881	372,678	727,559	1.71	93.41
39		157,433	201,269	358,703	0.84	94.25
40		88,547	433,944	522,491	1.23	95.48
41		301,716	233,466	535,183	1.26	96.74
42		162,040	125,386	287,426	0.68	97.41
43		155,468	0	155,468	0.37	97.78
44		156,653	287,890	444,543	1.04	98.82
45		104,659	153,871	258,530	0.61	99.43
46		44,685		44,685	0.11	99.54
47		23,815		23,815	0.06	99.59
48		88,725		88,725	0.21	99.80
49		26,949		26,949	0.06	99.87
50		57,228		57,228	0.13	100.00
Totals:	21,237,425	2,974,270	18,330,578	42,542,273	100.00	
Ave. Size:	3.8	14.4	11.4	5.7		