



Massachusetts Division of Marine Fisheries  
Technical Report TR-21

# Technical Report

## 2003 Massachusetts Striped Bass Monitoring Report

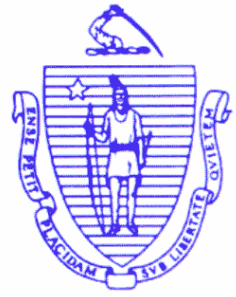
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Massachusetts Division of Marine Fisheries  
Department of Fisheries, Wildlife and Environmental Law Enforcement  
Executive Office of Environmental Affairs  
Commonwealth of Massachusetts

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# **2003 Massachusetts Striped Bass Monitoring Report**

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Dave Peters, Commissioner  
Executive Office of Environmental Affairs  
Ellen Roy Herzfelder, Secretary  
Commonwealth of Massachusetts  
Mitt Romney, Governor

## **Summary**

During 2003, the commercial fishery for striped bass in Massachusetts harvested about 55,433 fish weighing 1,055,439 pounds. Total losses due to commercial harvesting (including release mortality) were 63,623 fish weighing 1,132,322 pounds. The recreational fishery harvested about 402,201 striped bass weighing over 5.1 million pounds. Total losses due to recreational fishing (including release mortality) were 746,758 fish weighing 7.0 million pounds. Combined losses were 810,381 fish weighing 8.1 million pounds, which reflects a 1.3 decrease in numbers lost and an 11% decrease in weight lost compared to 2002 (821,242 fish; 9,194,902 pounds). The majority of losses, 92% by number and 86% by weight, was attributed to the recreational fishery.

## Acknowledgements

The collection and quality of striped bass data would suffer greatly without the efforts of many DMF employees. Tom Hoopes, Micah Dean, and Kim Lundy assisted with the Oracle database of commercial landings and wrote SQL code to summarize the landings data. Kristen Ferry developed and coordinated the volunteer recreational angler data collection program. John Boardman aged all scale samples. John Boardman, Paul Caruso, and John Shepherd conducted the commercial sampling of stripers. Paul Caruso coordinated the tagging study. Beth Shanks entered the data from catch reports.

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## Introduction

This report summarizes the commercial and recreational striped bass fisheries conducted in Massachusetts during 2003. 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 3 of the Atlantic States Marine Fisheries Commission's (ASMFC) Fisheries Management Report No. 41 (Amendment #6 to the Interstate Fishery management Plan for Atlantic Striped Bass (IFMP)).

## Commercial Fishery

Season: July 6-August 10. No landings were permitted on Thursday-Saturday.

Harvest: 1,055,439 pounds (against a harvest quota of 1,036,880 pounds).

Allowable Gear Type: Hook and line.

Minimum Size: 34 inches total length.

Trip Limit: 40 fish per day.

## Licensing, Reporting, and Estimation of Landings

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 any type) and a special striped bass fishing endorsement to sell their catch. They are 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. Many fishermen voluntarily provide daily fishing logs.

## 2003 Landings

The estimate of landings used here comes from dealer phone transactions. Commercial landings in 2003 were 1,055,439 pounds (55,433 fish) (Table 1). Most striped bass were sold in Barnstable, Bristol and Suffolk counties of Massachusetts (Figure 1).

**Table 1.** *Attributes of the Massachusetts Striped Bass Commercial Fishery: 1990-2003.*

SEASON		HARVEST		DEALER PERMITS	FISHING PERMITS
SEASON	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
2002	21	924.9	44.9	132	4,587
2003	21	1055.4	55.4	151	4,858

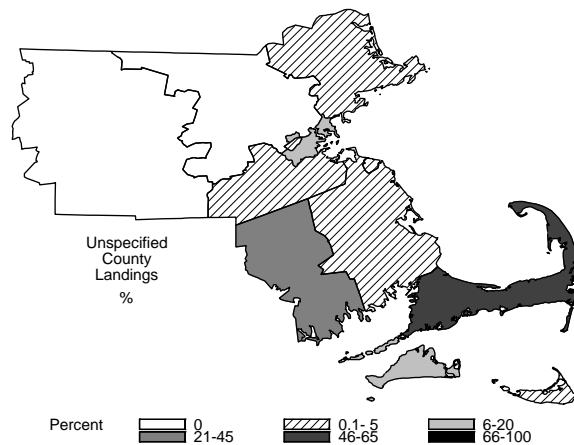


Figure 1. Percentage of total numbers of striped bass sold by commercial fishermen in Massachusetts counties during 2003.

### Size Composition

Information from biological sampling, catch reports and voluntary logs is used to characterize disposition of the catch, catch weight, and size composition by catch category. Data from 1,593 fish sampled from the 2003 commercial harvest and 2000 DMF diet study were used to construct a length-to-weight equation that was used to estimate weight-at-size for individual bass. The following geometric regression was derived:

$$\log_{10}(W) = -3.5005 + 3.0338 * \log_{10}(L),$$

$$RMS = 0.00229$$

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:

$$W = 10^{(-3.5005 + 3.0338 * \log_{10}(L) + RMS / 2)}$$

Size composition of the commercial catch by category of disposition is presented in Appendix Tables 1A (numbers of fish) and 1B (pounds of fish). About 40% of the fish from the total catch had lengths  $\geq 34$  inches.

### Age and Sex Composition

Six hundred and twenty-eight striped bass sampled from the 2003 commercial harvest were used to sex and age the harvested fish. The proportion that each age comprised the total samples was estimated from a sub-sample of 250 fish which guaranteed a precision of  $\pm 10\%$  at  $\alpha = 0.05$ . Weighted proportions at age were generated by weighting the age proportions sampled in each county by county landings. Age was determined from scales and sex was determined by visual inspection of gonadal tissue (Sykes Method). Age ranged from 7 to 17 years, and 99.7% were females. Approximately 87% of the sub-sample consisted of individuals from the 1991-1995 year classes (ages 8-12) (Table 2).

Table 2. Age composition of 2003 commercial harvest.

Age	Year Class	Number	Weighted %	Mean Length (in.)	Mean Weight (lbs)
7	1996	18	7.4	34.1	13.6
8	1995	44	17.9	35.7	16.2
9	1994	74	29.6	36.5	17.4
10	1993	43	17.0	37.2	23.0
11	1992	29	11.4	38.8	21.7
12	1991	28	11.1	40.1	24.3
13	1990	11	4.7	41.4	26.5
14	1989	0	0.0		
15	1988	1	0.5	43.7	32.5
16	1987	0	0.0		
17	1986	1	0.5	48.9	40.6

### Estimation of Effort

Total hours fished from standard catch reports in 2003 were used to estimate effort. The estimate of total hours fished was increased by 18%, the fraction of non-reporters who fished. Effort during the 21-day season amounted to 95,067 h fished and trip duration averaged 4.7 h. These figures imply that 20,148 trips were conducted. This reflects an increase in effort from 2002 levels (Table 3). The commercial CPUE in 2003 was the highest observed in the time series (Fig. 2).

*Table 3. Commercial CPUE Index based on number of fish harvested and number of trips.*

Year	Harvest (Numbers)	Trips	CPUE
1991	10,400	14,223	0.73
1992	11,300	13,331	0.85
1993	13,000	15,709	0.83
1994	10,400	14,704	0.71
1995	41,200	23,918	1.72
1996	38,300	24,946	1.54
1997	44,800	27,751	1.61
1998	45,300	24,175	1.87
1999	40,838	23,124	1.77
2000	40,256	18,527	2.17
2001	40,248	16,992	2.37
2002	44,897	19,155	2.34
2003	55,433	20,148	2.75

### Characterization of Other Losses

Release mortality was estimated by using a hook-release mortality rate of 8% applied against the released fish in Appendix Tables 1A and 1B. Total losses due to release mortality were 8,190 fish weighing approximately 76,883 pounds.

### **Recreational Fishery**

Season: None

Daily Bag Limit: Two fish per person

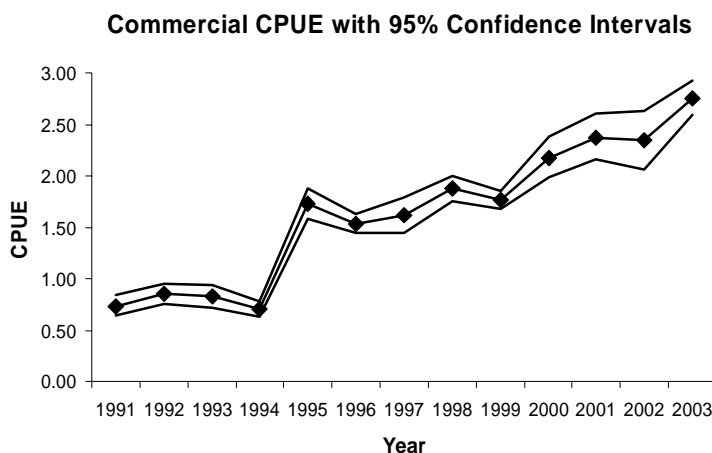
Allowable Gear Type: Hook and Line

Minimum Size: 28 inches total length

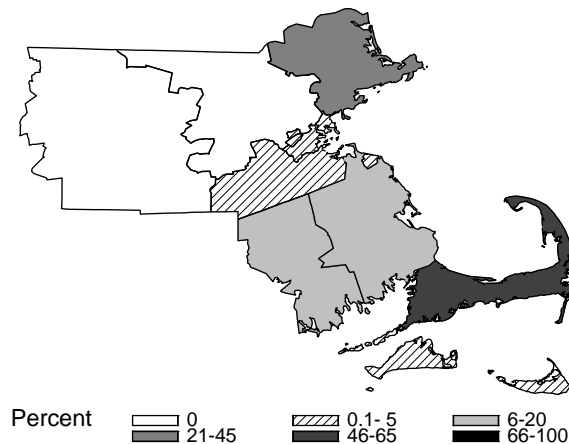
Licensing and Reporting Requirements: None

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 estimate of total catch (including fish released alive) in 2003 was 4,709,166 striped bass, which is lower than the 2001 and 2002 estimates (Table 4). The estimate of total harvest



*Figure 2. Annual commercial CPUE for striped bass with associated 95% confidence intervals.*



**Figure 3.** Percentage of total numbers of striped bass landed by recreational anglers in each county of Massachusetts during 2003.

was 402,201 striped bass, which is higher than the 2001 (288,032 fish) and 2002 (309,582 fish) estimates. Total pounds harvested was over 5 million in 2003 (Table 4).

The MRFSS estimates were post-stratified by county to determine where harvested bass were being landed by recreational anglers. Most landings (83%) occurred in Barnstable, Essex, and Bristol counties (Figure 3). Only 17% of landings

occurred in Dukes/Nantucket, Suffolk and Norfolk counties (Figure 3).

#### Size Composition

The length distribution of harvested fish was estimated from biological sampling conducted by the MRFSS program in Massachusetts. For released fish, volunteer recreational anglers were

**Table 4.** MRFSS estimates of striped bass harvested (in number and pounds), released, and total catch. Standardized trips were estimated from total catch and catch rates.

Year	Harvest (A+B1)		Released (B2)	Total (A+B1+B2)		Standardized Trips
	Numbers	Weight (lbs)		Numbers	Numbers	
1986	29,434	298,816	442,298	471,732		NA
1987	10,807	269,459	93,660	104,467		348,298
1988	21,050	421,317	209,632	230,682		911,467
1989	13,044	295,227	193,067	206,111		694,775
1990	20,515	319,092	339,511	360,026		1,400,784
1991	20,799	440,605	448,735	469,534		1,900,572
1992	57,084	972,116	779,814	836,898		2,906,426
1993	58,511	1,113,446	833,566	892,077		2,258,420
1994	74,538	1,686,049	2,102,514	2,177,052		3,379,223
1995	73,806	1,504,390	3,280,882	3,354,688		3,678,719
1996	68,300	1,291,706	3,269,746	3,338,046		3,534,670
1997	199,373	2,891,970	5,417,751	5,617,124		5,761,648
1998	207,952	2,973,456	7,184,358	7,392,310		4,824,353
1999	126,755	1,822,818	4,576,208	4,702,963		3,852,524
2000	181,295	2,618,216	7,382,031	7,563,326		6,521,433
2001	288,032	3,644,561	5,410,899	5,698,930		6,455,962
2002	308,749	4,304,883	5,718,984	6,027,733		6,604,700
2003	402,201	5,120,554	4,306,965	4,709,166		4,294,377



solicited to collect length and scale samples from striped bass that they captured each month (May-October). Each person was asked to collect a minimum of 5 scales from at least 10 fish per month and record the disposition of the each fish (released or harvested) and fishing mode. Over 2,200 samples were received from over 100 anglers. The size frequencies of measured fish are shown in Figure 4 by disposition and mode. The size frequency of released fishes was used to allocate MRFSS release numbers by mode among size classes. Numbers-at-length and weight-at-length data by disposition are summarized in Appendix Tables 2A and 2B.

### Age Composition

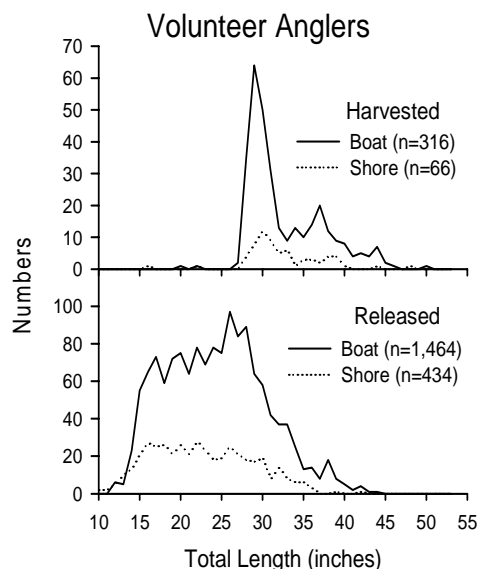
A sub-sample of 575 fish was aged and combined with commercial and tagging samples to produce an age-length key used to convert the MRFSS size distribution in to age classes. Recreational samples were selected using a weighted random design based on the total number of striped bass caught in each wave and mode stratum (as determined by MRFSS).

### Trends in Catch Rates

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 delta-lognormal model which adjusts trip catches for the effects of year, wave, county, area fished, mode fished, and time spent fishing. Only data for those anglers who said they targeted striped bass were used in the analyses.

Standardized catch rates averaged 0.27 fish per trip during 1986-1992 and increased from 0.40 in 1993 to 1.53 in 1998 (Fig. 5). Catch rates declined through 2001, but have increased since 2002 (Fig. 5).

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 delta-lognormal model. Effort has steadily increased from about 348,000 trips in 1987 to about 6.5 million trips in 2000-2002. Effort dropped in 2003 to 4.3 million



**Figure 4.** Size distribution of striped bass caught by volunteer recreational anglers

trips (Table 4). Overall, the number of trips made by recreational anglers has been increasing since 1987.

### Characterization of Losses

The same methods and rates previously described in the commercial fishery section were used to estimate recreational losses. Release mortality was 344,557 fish (1,894,217 pounds).

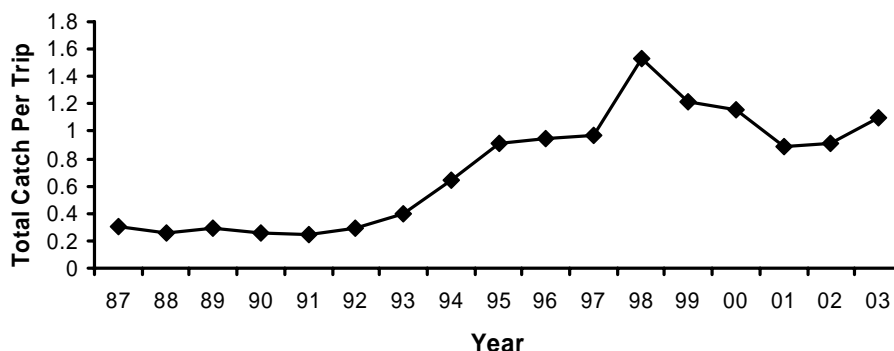
### **Scientific Collections**

No bass were captured or released during scientific activities in 2003.

### **By-catch in Other Fisheries**

During 1994, DMF sea-sampling efforts identified striped bass as by-catch in a Nantucket Sound springtime trawl fishery directed at long-finned squid (*Loligo pealei*). Those by-catch estimates were about 3,100 fish (17,600 pounds). Anecdotal information was also reported for this fishery which suggested that striped bass by-catch ranged from 8,000 pounds per day, with up to single tows landing 19,000 pounds. DMF person-

## Marine Recreational Fisheries Statistics Survey



**Figure 5.** Estimates of total catch rates (total numbers of fish caught per trip) of the recreational fishery for striped bass in Massachusetts waters,

nel sea-sampled this fishery during 1995-2000 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 potential sources of striped bass by-catch during 2004.

compared to 2002 (821,242 fish; 9,194,902 pounds). The majority of losses, 92% by number and 86% by weight, was attributed to combined losses in the recreational fishery.

### Removals-At-Age Matrix

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

### Estimated Total Losses

Total estimated loss of striped bass during 2003 was 810,381 fish weighing 8,150,093 pounds (Table 5), which is a 1.3% decrease in numbers lost and an 11% decrease in weight

**Table 5.** Estimates of striped bass losses occurring in Massachusetts during 2003.

FISHERY	NUMBER	POUNDS	MEAN WT.
<b>Commercial</b>			
Harvest	55,433	1,055,439	19.0
Release Mortality	8,190	76,883	9.4
<b>Recreational</b>			
Harvest	402,201	5,120,554	12.7
Release Mortality	344,557	1,897,217	5.5
<b>Scientific</b>	0	0	0.0
<b>Total</b>	810,381	8,150,093	

## **Required Fishery-Independent Monitoring Programs**

### **Massachusetts Tagging Study**

The Massachusetts Division of Marine Fisheries (DMF) joined the Striped Bass Cooperative State-Federal Coast-wide 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 coast-wide 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 fall by trolling artificial baits in shoal areas around Nantucket Island. Floy internal anchor tags provided by the USFWS are used. Total length of each fish is recorded. Scales are re-

moved from each fish for aging. The release data are made available to the Annapolis, Maryland office of the USFWS, which coordinates regional tagging programs of state-federal participants.

For the analyses of survival, the ASMFC Tagging Subcommittee began using the MARK implementation of the Brownie et al. (1985) tagging models (White and Burnham 1997). The program MARK calculates maximum likelihood estimates of the multinomial parameters of survival and recovery based on an observed matrix of recaptures. The following passages were taken from ASMFC (2003) to describe the analyses of tagging data: "The analysis protocol involves the following series of steps. First, a full set of biologically-reasonable candidate models are identified prior to analysis. Various patterns of survival and recovery are used to parameterize the candidate models. These include models that allow parameters to be constant, time specific, or allow time to be modeled as a continuous variable. Other models allow time periods to coincide with changes in regulatory regimes established coastwide. These models are then fit to the tag recovery data and are arranged in order of fit by Akaike's Information Criteria (AIC). Annual survival is then calculated as a weighted average across all models, where the weight is a function of model fit. The lower the AICc (i.e., the better

**Table 6.** Massachusetts Removals-At-Age Matrix for 2003 by Source.

Age	Scientific	Recreational		Commercial	
		Release Mortality	Harvest	Release Mortality	Harvest
2	0	37165	0	76	
3	0	64855	0	325	
4	0	47719	1054	619	
5	0	60325	12768	1138	
6	0	32907	56844	1252	
7	0	49788	114243	2403	4089
8	0	27834	78203	1223	9897
9	0	12561	61659	609	16387
10	0	6262	35675	322	9417
11	0	2400	14440	101	6327
12	0	2001	15052	72	6164
13	0	606	7207	34	2625
14	0	80	1472	7	0
15	0	53	1792	6	263
16	0	0	0	0	0
17	0	0	1792	4	263

Table 7. Massachusetts 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
2002	12	3	239	764	6.7	487	1060
2003	15	3	655	825	3.6	602	1204

the fit), the higher the weight assigned to a specific model in the model averaging. Model averaging eliminates the need to select a single, best model, allowing the uncertainty of model selection to be incorporated into the variance of parameter estimates”.

Summary statistics compiled since the start of this study are shown in Table 7. The recapture matrix used in the MARK modeling is shown in Table 8. Release and recovery locations are shown in Figure 6. Estimates from the MARK modeling showed that striped bass survival was relatively stable prior to 1994, but it dropped after the ASMFC closures were lifted in 1995.

Survival was relatively stable from 1995-2000, but it increased in 2001 to 0.81 and has remained around that level (Figure 7).

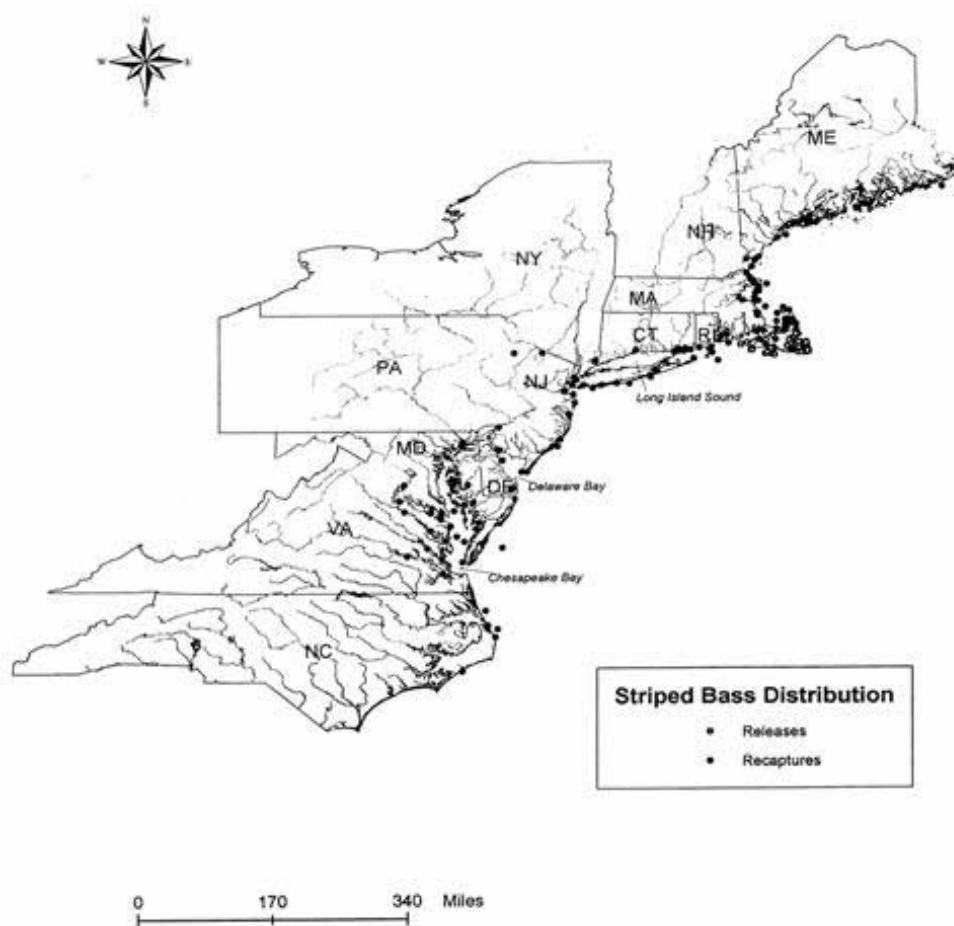
### Planned Management Programs in 2004

#### Regulations

Massachusetts’ recreational bag and minimum size limits will remain at 2 fish per day and 28-inches total length, respectively. For the commercial fishery, minimum size limit and quota will remain 34-inches and 1,159,750 pounds allowed under Amendment 6, respectively. How-

Table 8. Recapture matrix of striped bass  $\geq 28$  inches from 1991-2003 (Fall Tagging Only). A recapture year was defined as the beginning of tagging in year  $t$  to beginning of tagging in year  $t+1$ .

Year Tagged	Year Recaptured												Total Released
	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	
1991	16	25	11	14	8	3	1	3	3	1	1	0	329
1992		33	34	27	26	19	16	11	4	1	3	2	650
1993			20	23	29	20	17	7	2	3	2	1	462
1994				15	11	9	5	4	4	1	0	2	218
1995					21	12	16	9	10	2	2	2	274
1996						11	6	3	3	1	2	0	118
1997							14	20	8	6	4	5	219
1998								4	4	1	2	0	59
1999									10	4	8	3	163
2000										19	23	16	411
2001											25	14	353
2002												9	172

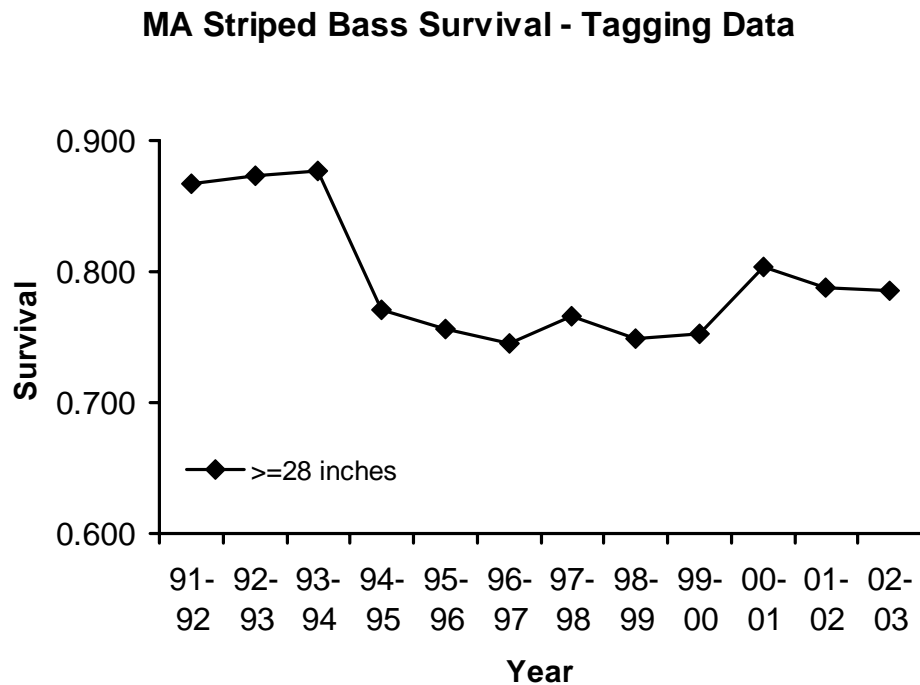


*Figure 6. Release and recovery locations of striped bass tagged in Massachusetts waters.*

ever, the quota in 2004 will be reduced by 18,559 pounds to account for the overage in 2003. The commercial fishery quota will be monitored using the IVR system. In addition, the commercial season will not open until July 11 and the trip limit of 40 fish per day will be reduced to 30 fish per day.

#### Monitoring Programs

All monitoring programs will continue in 2004.



*Figure 7. Estimated annual survival for striped bass off coastal waters of Massachusetts.*

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- Brownie, C., D.R. Anderson, K.P. Burnham, and D.R. Robson. 1985. Statistical Inference from Band Recovery - a handbook. 2<sup>nd</sup> ed. U.S. Fish Wildl. Serv. Resour. Publ. No 156.
- White, G.C., and K.P. Burnham. 1999. Program MARK - survival estimation from populations of marked animals. Bird Study 46: 120-138.

Appendix Table 1A. Estimated size distribution of the Massachusetts commercial striped bass catch (numbers of fish) in 2003.

TL (in.)	Kept	Released	Total	Percent	Cumulative Percent
11	0	137	137	0.09	0.09
12	0	0	0	0.00	0.09
13	0	137	137	0.09	0.17
14	0	137	137	0.09	0.26
15	0	274	274	0.17	0.43
16	0	274	274	0.17	0.61
17	0	0	0	0.00	0.61
18	0	1,370	1,370	0.87	1.48
19	0	411	411	0.26	1.74
20	0	2,877	2,877	1.82	3.56
21	0	1,507	1,507	0.95	4.51
22	0	2,740	2,740	1.74	6.25
23	0	1,233	1,233	0.78	7.03
24	0	6,439	6,439	4.08	11.11
25	0	4,493	4,493	2.85	13.96
26	0	8,754	8,754	5.55	19.51
27	0	5,740	5,740	3.64	23.14
28	0	7,630	7,630	4.84	27.98
29	0	6,315	6,315	4.00	31.98
30	0	12,274	12,274	7.78	39.76
31	0	8,931	8,931	5.66	45.42
32	211	9,986	10,197	6.46	51.88
33	2,359	10,219	12,578	7.97	59.85
34	7,514	3,191	10,705	6.78	66.63
35	7,063	739	7,802	4.94	71.58
36	8,756	2,369	11,125	7.05	78.62
37	7,278	876	8,154	5.17	83.79
38	6,097	986	7,083	4.49	88.28
39	5,002	123	5,125	3.25	91.53
40	2,955	863	3,818	2.42	93.95
41	3,692	493	4,185	2.65	96.60
42	1,521	370	1,891	1.20	97.80
43	1,066	123	1,189	0.75	98.55
44	609	123	732	0.46	99.01
45	924	0	924	0.59	99.60
46	0	0	0	0.00	99.60
47	263	123	386	0.24	99.84
48	0	0	0	0.00	99.84
49	123	0	123	0.08	99.92
50	0	0	0	0.00	99.92
51	0	0	0	0.00	99.92
52	0	123	123	0.08	100.00
Total	55,433	102,380	157,813		
Avg. Size	37.2	28.9	31.8		

Appendix Table 1B. Estimated size distribution of the Massachusetts commercial striped bass catch (pounds) in 2003.

TL (in.)	Kept	Released	Total	Percent	Cumulative Percent
11	0	63	63	0.00	0.00
12	0	0	0	0.00	0.00
13	0	105	105	0.01	0.01
14	0	132	132	0.01	0.01
15	0	324	324	0.02	0.03
16	0	394	394	0.02	0.05
17	0	0	0	0.00	0.05
18	0	2,819	2819	0.14	0.19
19	0	996	996	0.05	0.24
20	0	8,149	8149	0.40	0.64
21	0	4,950	4950	0.25	0.89
22	0	10,364	10364	0.51	1.40
23	0	5,337	5337	0.26	1.67
24	0	31,712	31712	1.57	3.24
25	0	25,048	25048	1.24	4.48
26	0	54,965	54965	2.73	7.21
27	0	40,413	40413	2.00	9.21
28	0	59,989	59989	2.97	12.19
29	0	55,223	55223	2.74	14.93
30	0	118,960	118960	5.90	20.83
31	0	95,621	95621	4.74	25.57
32	2,487	117,722	120209	5.96	31.53
33	30,531	132,262	162792	8.07	39.60
34	106,466	45,210	151676	7.52	47.12
35	109,275	11,439	120714	5.99	53.11
36	147,556	39,918	187474	9.30	62.41
37	133,279	16,048	149327	7.41	69.81
38	121,061	19,573	140634	6.97	76.79
39	107,462	2,647	110110	5.46	82.25
40	68,553	20,010	88564	4.39	86.64
41	92,314	12,324	104638	5.19	91.83
42	40,915	9,944	50859	2.52	94.35
43	30,797	3,560	34357	1.70	96.05
44	18,865	3,817	22682	1.12	97.18
45	30,643	0	30643	1.52	98.70
46	0	0	0	0.00	98.70
47	9,952	4,663	14615	0.72	99.42
48	0	0	0	0.00	99.42
49	5,282	0	5282	0.26	99.69
50	0	0	0	0.00	99.69
51	0	0	0	0.00	99.69
52	0	6,336	6336	0.31	100.00
Total	1,055,439	961,037	2,016,476		
Avg. Weight	19.0	9.4	12.8		



Appendix Table 2A. Estimated size distribution of the Massachusetts recreational striped bass catch (numbers of fish) in 2003.

TL (in.)	Kept	Released	Total	Percent	Cumulative Percent
12	0	35,092	35,092	0.75	0.75
13	0	32,753	32,753	0.70	1.44
14	0	88,900	88,900	1.89	3.33
15	0	177,800	177,800	3.78	7.10
16	0	215,231	215,231	4.57	11.67
17	0	229,268	229,268	4.87	16.54
18	0	198,855	198,855	4.22	20.77
19	0	217,571	217,571	4.62	25.39
20	0	236,287	236,287	5.02	30.40
21	0	198,855	198,855	4.22	34.63
22	0	247,984	247,984	5.27	39.89
23	0	215,231	215,231	4.57	44.46
24	0	224,589	224,589	4.77	49.23
25	0	219,910	219,910	4.67	53.90
26	0	285,415	285,415	6.06	59.96
27	3,499	250,323	253,822	5.39	65.35
28	28,235	250,323	278,558	5.92	71.27
29	50,154	189,497	239,652	5.09	76.36
30	34,227	180,139	214,367	4.55	80.91
31	48,827	116,974	165,801	3.52	84.43
32	54,136	119,313	173,449	3.68	88.11
33	27,068	105,276	132,344	2.81	90.92
34	16,691	72,524	89,215	1.89	92.82
35	32,779	44,450	77,229	1.64	94.46
36	29,320	39,771	69,091	1.47	95.93
37	16,530	18,716	35,246	0.75	96.67
38	22,805	42,110	64,915	1.38	98.05
39	12,589	21,055	33,644	0.71	98.77
40	4,384	11,697	16,081	0.34	99.11
41	1,931	4,679	6,610	0.14	99.25
42	5,872	11,697	17,569	0.37	99.62
43	3,298	2,339	5,638	0.12	99.74
44	0	2,339	2,339	0.05	99.79
45	5,751	0	5,751	0.12	99.91
46	0	0	0	0.00	99.91
47	0	0	0	0.00	99.91
48	0	0	0	0.00	99.91
49	2,051	0	2,051	0.04	99.96
50	0	0	0	0.00	99.96
51	0	0	0	0.00	99.96
52	0	0	0	0.00	99.96
53	2,051	0	2,051	0.04	100.00
Total	402,201	4,306,965	4,709,166		
Avg. Size	33.2	23.9	24.7		

Appendix Table 2B. Estimated size distribution of the Massachusetts recreational striped bass catch (pounds) in 2003.

TL (in.)	Kept	Released	Total	Percent	Cumulative Percent
12	0	15,162	15,162	0.05	0.05
13	0	18,345	18,345	0.06	0.12
14	0	68,691	68,691	0.24	0.35
15	0	188,572	188,572	0.65	1.01
16	0	274,723	274,723	0.95	1.96
17	0	360,087	360,087	1.25	3.21
18	0	360,050	360,050	1.25	4.46
19	0	487,348	487,348	1.69	6.16
20	0	606,765	606,765	2.11	8.26
21	0	595,829	595,829	2.07	10.33
22	0	846,855	846,855	2.94	13.27
23	0	848,361	848,361	2.95	16.22
24	0	1,045,210	1,045,210	3.63	19.85
25	0	1,148,523	1,148,523	3.99	23.84
26	0	1,676,242	1,676,242	5.82	29.66
27	22,584	1,622,344	1,644,928	5.71	35.37
28	203,490	1,880,431	2,083,921	7.24	42.61
29	402,076	1,545,517	1,947,593	6.76	49.37
30	304,115	1,592,996	1,897,111	6.59	55.96
31	479,215	1,202,248	1,681,462	5.84	61.79
32	585,043	1,261,863	1,846,905	6.41	68.21
33	321,145	1,294,706	1,615,851	5.61	73.82
34	216,804	967,564	1,184,368	4.11	77.93
35	464,911	601,389	1,066,300	3.70	81.63
36	452,957	637,358	1,090,315	3.79	85.42
37	277,505	359,135	636,640	2.21	87.63
38	415,096	876,143	1,291,239	4.48	92.11
39	247,933	446,398	694,331	2.41	94.53
40	93,234	284,360	377,594	1.31	95.84
41	44,251	122,583	166,834	0.58	96.42
42	144,805	295,153	439,958	1.53	97.94
43	87,347	70,820	158,167	0.55	98.49
44	0	75,935	75,935	0.26	98.76
45	174,852	0	174,852	0.61	99.36
46	0	0	0	0.00	99.36
47	0	0	0	0.00	99.36
48	0	0	0	0.00	99.36
49	80,743	0	80,743	0.28	99.64
50	0	0	0	0.00	99.64
51	0	0	0	0.00	99.64
52	0	0	0	0.00	99.64
53	102,446	0	102,446	0.36	100.00
Total	5,120,554	23,677,707	28,798,261		
Avg. Weight	12.7	5.5	6.1		