

Appendix A14. Miscellaneous Tables Pertaining to Tagging Data

Tag release and recapture data are exchanged between the USFWS office in Annapolis, MD, and the cooperating tagging agencies. The USFWS maintains the tag release/recovery database and provides rewards to fishermen who report the recapture of tagged fish. From 1985 through July 2007, a total of 469,896 striped bass have been tagged and released, with 84,544 recaptures reported and recorded in the USFWS database (Tina McCrobie, personal communication).

These data were used to develop the following descriptive statistics of reported fish:

- length frequency distributions of releases, measured as total length (TL);
- age frequency distributions of recaptures; and
- annual catch rates.

Annual catch rates were developed for both ≥ 18 inch fish and ≥ 28 inch fish and were estimated as follows:

$$(R / 0.43) / M \qquad \text{Eqn 1.}$$

where:

- R = number of fish recovered;
- 0.43 = reporting rate; and
- M = number of fish marked.

The data are used in both Program MARK and the IRCR model as program-specific matrices of releases and recaptures occurring in each year over the time series (Appendix 11). The number of twice-recaptured fish was examined to ensure that this phenomenon did not cause a bias in model results. Of 84,544 recaptured fish in the database, only 3,542 fish were recorded as twice recaptured. Since this was less than 5%, it was considered inconsequential. Length frequencies (total length) of fish tagged in 2006 were tabulated by program (Table 1). Length represents the length of fish at the time of tagging.

Age distributions of fish recaptured in 2006 were tabulated by program (Table 2). Age distributions are based on a subsample of the total number of tagged fish (all programs do not age all tagged fish). Ages are read from scales taken at time of tagging and are adjusted to the recovery date.

Geographic distributions of 2006 recaptures (from fish tagged and released during the full time series) were organized by state and month for each tagging program (Table 3).

Annual catch rates for fish ≥ 28 inches show more variability among the programs over the time series, with values for most programs between 0.1 and 0.4 since the late 1990's. In particular, VARAP shows high (up to 0.6) and erratic values. There is no clear trend (Table 4).

Annual catch rates for ≥ 18 inch fish have shown a very slight steady decrease since the mid 1990's, with all values for all programs between 0.1 and 0.3 except for one. The 2006 values were unusually closely grouped from 0.14 to 0.20 (Table 5).

Catch rate for both length groups (≥ 18 inches and ≥ 28 inches) peaked in late 1990's and values for the past few years are similar to values seen in the earliest part of the time series.

The difference between the total catch rate and the exploitation rate suggests that the live release rate was approximately 5 %. This rate has been fairly constant since the mid-1990's. This estimate could be biased low because anglers may be less likely to notice tags on fish they have released. They could also be less likely to recover tags they do notice, since they are releasing the fish.

Appendix A14 Tables

Table 1. Total length frequencies of fish tagged in 2006 by program.

TL	<u>Coast Programs</u>				<u>Producer Area Programs</u>			
	MADFW	NYOHS	NJDEP	NCCOOP	DE/PA	MDCB	VARAP	HUDSON
199								
249								
299						3		
349				1		36		
399		25		0	1	98		
449		204	1	4	139	141		
499		307	2	48	126	147	211	55
549		281	25	319	134	104	178	76
599	1	145	190	632	79	56	80	97
649	15	109	495	646	61	35	15	96
699	35	47	469	544	20	25	4	76
749	53	20	153	535	20	24	16	114
799	60	6	65	431	21	33	19	143
849	83	1	37	492	29	54	35	147
899	69	2	18	430	36	48	36	148
949	48	2	10	222	33	39	41	94
999	19	1	2	93	21	45	25	43
1049	4			46	14	16	6	28
1099	2			7	4	12	1	14
>1099	1			9	9	8	1	3
Total	390	1150	1467	4459	747	924	668	1134

Table 2. Age frequencies of tagged fish recaptured in 2006 by program.

AGE	<u>Coast Programs</u>				<u>Producer Area Programs</u>			
	MADFW	NYOHS	NJDEP	NCCOOP	DE/PA	MDCB	VARAP	HUDSON
1								
2								
3	1	19	1		1			
4	0	11	2		5		21	
5	0	28	46		9		19	
6	2	38	69		19		8	
7	4	8	31		9		4	
8	9	10	46		7		6	1
9	8	3	37		7	1	9	0
10	17	10	29		11	1	8	0
11	10	9	12		9	2	7	3
12	2	4	12		6	5	4	2
13	6	4	7		7	8	3	4
14	2	3	5		3	3	5	1
15	4	0	2		4	0		5
16	1	0	4		3	0		6
17	0	1	2		3	0		3
18	1	1	1		2	0		3
19	0	1	1			0		0
20	0					1		0
21	0							0
22	1							0
23								1
Total	68	150	307		105	21	94	29

Table 3. Distribution of tag recaptures by state (program) and month.

Coast Programs

Massachusetts (recaptures in 2006 from fish tagged and released during 1992-2006)

State	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
ME													0
NH													0
MA					1	6	13	5	2				27
RI					1	1							2
CT					1		1			1			3
NY			1		15	2	2		2		2		24
NJ			1	1	6	5	1			3	5		22
DE				1									1
MD			1	12	5	1							19
VA	7	4	3									4	18
NC	3											1	4
PA				1									1
Total	10	4	6	15	29	15	17	5	4	4	7	5	121

New York - Ocean Haul Seine (recaptures in 2006 from fish tagged/release during 1988-2006)

State	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
ME							2						2
NH						1	1						2
MA					4	9	8	5	1				27
RI				1	3	2	3	3	4				16
CT					3	1	2	2	2		1		11
NY	1			3	13	5	4	3	6	5	4	1	45
NJ			1	9	6	4	1	1	1	1	3	8	35
PA													0
DE	1			1	1								3
MD		1		1	2						1		5
VA	2											2	4
NC	3				1							1	5
Total	7	1	1	15	33	22	21	14	14	6	9	12	155

Table 3 continued.

New Jersey - Delaware Bay (recaptures in 2006 from fish tagged/release during 1989-2006)

State	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
ME					1	2	2						5
NH						1			1				2
MA					4	13	25	17	15	4			78
RI					7	9	10	5	3	3			37
CT					2	4	4	2	2	1			15
NY				1	15	23	10	2	4	12	4	4	75
NJ	1	1		3	18	10	5		2	9	10	1	60
PA					1								1
DE	1			1							1	1	4
MD	1	1		4	6						1	1	14
VA	2	6	1									10	19
NC			1									1	2
Total	5	8	2	9	54	62	56	26	27	29	16	18	312

North Carolina - Winter Trawl Survey (recaptures in 2006 from fish tagged and released during 1992-2006)

State	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
ME							2	1	1				4
NH						1	1						2
MA				1	7	19	20	14	9	2			72
RI					1	5	5	4	2	1			18
CT					5	1	2	2	2	1			13
NY				4	28	19	12		9	12	5		89
NJ				4	11	10	2			7	12		46
PA													0
DE									1				1
MD		2	3	40	16	30	19	8	12	10	3	3	146
VA	4	10	6	5	8	3	3		1	5	20	23	88
NC	7	2	4	1									14
Total	11	14	13	55	76	88	66	29	37	38	40	26	493

Table 3 continued.

Producer Areas

Delaware / Pennsylvania - Delaware River (recaptures in 2006 from fish tagged and released during 1992-2006)

State	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
ME							1						1
NH							1						1
MA					1	3	2	2					8
RI						1		1					2
CT						1							1
NY					2	1	1	2		1	1		8
NJ					8	14	6	1	2		11	1	43
PA				1	3	2							6
DE					4	3	2		1	3	2		15
MD				4	2	3	2	2	3	2	4		22
VA									1			6	7
NC													0
Total	0	0	0	5	20	28	15	8	7	6	18	7	114

Maryland - Chesapeake Bay Spring Spawning Stock (recaptures in 2006 from fish tagged and released during 1992-2006)

State	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
ME													0
NH													0
MA					1	2	3	1	2	1			10
RI						1	1	2	2	1			7
CT						1		1	1				3
NY					4	3	1	2	2				12
NJ					2	1				3			6
PA													0
DE									2	1	1		4
MD	1	3	2	6	8	19	14	5	6	6	8		78
DC					3								3
VA	5		1		3	4	1	1		2	5	9	31
NC	1		1										2
Total	7	3	4	6	21	31	20	12	15	14	14	9	156

Table 3 continued.

Virginia - Rappahannock River (recaptures in 2006 from fish tagged and released during 1990-2006)

State	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
ME													0
NH													0
MA					1	4	3	3	1	1			13
RI													0
CT					1	1	1						3
NY					4	2		1	1	1			9
NJ					1	6						1	8
PA													0
DE													0
MD				1	2	7	3	2	3	2			20
VA	2	2		5	3	1	3		3	8	6	13	46
NC	3		1									1	5
Total	5	2	1	6	12	21	10	6	8	13	7	13	104

Hudson River (recaptures in 2006 from fish tagged and released during 1992-2006)

State	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
ME													0
NH													0
MA						3	11	8	3	3			28
RI						5	3	2	1	1			12
CT					2	9	7	1	5	2	2		28
NY				13	44	33	14	3	11	5	5	6	134
NJ	1			3	1	14	4	2	2		14	5	46
PA													0
DE													0
MD				1								2	3
VA	2	2	1									6	11
NC											1		1
Total	3	2	1	17	47	64	39	16	22	11	22	19	263

Table 4. R/M estimates of catch rates of ≥ 28 inch striped bass from tagging programs. Catch rate is the proportion of tagged striped bass that were caught, but may have been released (with reporting rate adjustment of 0.43).

Year	NJDEL	NYOHS	NCCOOP	MADFW	VARAP	MDCB	DE/PA	HUDSON	MEAN
1987	*	*	*	*	*	0.08	*	*	0.08
1988	*	0.27	0.21	*	*	0.11	*	0.21	0.20
1989	0.24	0.24	0.13	*	*	0.10	*	0.25	0.19
1990	0.52	0.22	0.18	*	0.49	0.18	*	0.33	0.32
1991	0.58	0.25	0.20	*	0.58	0.28	*	0.24	0.36
1992	0.25	0.33	0.25	0.15	0.58	0.24	*	0.29	0.30
1993	0.20	0.28	0.28	0.13	0.57	0.21	0.24	0.33	0.28
1994	0.24	0.22	0.20	0.11	0.36	0.22	0.20	0.26	0.23
1995	0.24	0.35	0.27	0.16	0.55	0.27	0.21	0.25	0.29
1996	0.34	0.32	0.15	0.19	0.21	0.25	0.41	0.31	0.27
1997	0.36	0.45	0.24	0.34	0.44	0.28	0.29	0.37	0.34
1998	0.38	0.17	0.26	0.17	0.60	0.23	0.34	0.29	0.31
1999	0.29	0.36	0.27	0.24	0.37	0.38	0.19	0.30	0.30
2000	0.22	0.33	0.13	0.14	0.41	0.20	0.36	0.22	0.25
2001	0.24	0.20	0.21	0.12	0.35	0.15	0.28	0.20	0.22
2002	0.18	0.38	0.15	0.15	0.38	0.13	0.24	0.24	0.23
2003	0.24	0.21	0.16	0.12	0.36	0.16	0.26	0.22	0.22
2004	0.27	0.25	0.17	0.12	0.20	0.11	0.28	0.27	0.21
2005	0.30	0.33	0.10	0.11	0.22	0.14	0.23	0.24	0.21
2006	0.25	0.20	0.17	0.15	0.16	0.16	0.26	0.20	0.19

* Years when few or no striped bass were tagged and released.

Table 5. R/M estimates of catch rates of ≥ 18 " inch striped bass from tagging programs. Catch rate is the proportion of tagged striped bass that were caught, but may have been released (with reporting rate adjustment of 0.43).

Year	NJDEL	NYOHS	NCCOOP	MADFW	VARAP	MDCB	DE/PA	HUDSON	MEAN
1987	*	*	*	*	*	0.16	*	*	0.16
1988	*	0.18	0.19	*	*	0.10	*	0.15	0.16
1989	0.28	0.23	0.11	*	*	0.08	*	0.20	0.18
1990	0.44	0.21	0.16	*	0.38	0.15	*	0.59	0.32
1991	0.23	0.17	0.19	*	0.28	0.19	*	0.24	0.22
1992	0.21	0.19	0.25	0.16	0.54	0.25	*	0.24	0.26
1993	0.19	0.14	0.21	0.12	0.40	0.18	0.23	0.25	0.21
1994	0.19	0.17	0.17	0.12	0.37	0.22	0.25	0.21	0.21
1995	0.21	0.15	0.23	0.14	0.30	0.28	0.28	0.15	0.22
1996	0.26	0.18	0.14	0.18	0.26	0.27	0.26	0.27	0.23
1997	0.27	0.16	0.21	0.28	0.27	0.29	0.19	0.31	0.25
1998	0.29	0.15	0.24	0.18	0.24	0.28	0.26	0.25	0.24
1999	0.19	0.14	0.27	0.16	0.23	0.23	0.20	0.22	0.20
2000	0.20	0.14	0.15	0.11	0.24	0.23	0.24	0.20	0.19
2001	0.23	0.14	0.17	0.10	0.28	0.19	0.22	0.19	0.19
2002	0.14	0.18	0.18	0.15	0.27	0.17	0.19	0.18	0.18
2003	0.21	0.11	0.15	0.12	0.25	0.19	0.25	0.20	0.18
2004	0.26	0.14	0.17	0.11	0.16	0.16	0.18	0.22	0.18
2005	0.23	0.14	0.08	0.11	0.17	0.15	0.27	0.18	0.17
2006	0.19	0.16	0.16	0.14	0.16	0.20	0.21	0.17	0.17

* Years when few or no striped bass were tagged and released.