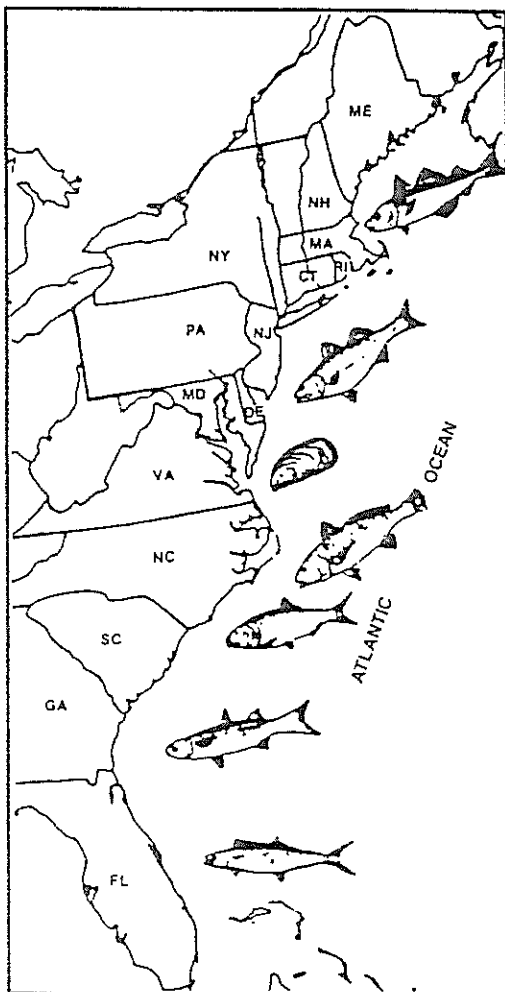


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Special Report No. 28
of the
**ATLANTIC STATES MARINE
FISHERIES COMMISSION**



STRIPED BASS
(Morone saxatilis)

STOCKING

SUMMARY

1985-1992

December 1993

ATLANTIC STATES MARINE FISHERIES COMMISSION
STRIPED BASS STOCKING SUMMARY
1985-1992

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Striped Bass Stocking Technical Advisory Committee
December 1993

Preface

Since 1985, the Atlantic coastal states in cooperation with the U.S. Fish and Wildlife Service have initiated programs to determine the feasibility of using artificial propagation as a restoration tool for rebuilding Atlantic coast striped bass stocks. In addition to the enhancement of the striped bass population, the tagging of stocked striped bass with coded wire tags may provide insights regarding pre-recruit mortality rates, the young of the year index, and other stock considerations. The ASMFC striped Bass Stocking Technical Advisory Committee serves as a forum for the development and implementation of various stocking plans and has recommended a coordinated tag, release and recovery system for Chesapeake Bay and the Atlantic coast. This report highlights the progress and summarizes coastwide stocking efforts since 1985. The report was originally developed and funded by a cooperative agreement (grant no. 14-48-0009-93-1256) with the U.S. Fish and Wildlife Service Federal Aid in Sportfish Restoration Program.



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INTRODUCTION

The Striped Bass Stocking Technical Advisory Committee (Stocking Committee) was established in 1985 under the auspices of the Atlantic States Marine Fisheries Commission (ASMFC) as part of coastwide efforts to restore and manage striped bass. The Technical Advisory Committee operates under the direction of the ASMFC Striped Bass Board and conducts an annual review of striped bass stocking efforts in the states from Maine to North Carolina. The goals of these stocking efforts vary from state to state and include purposes such as supplementing spawning stocks (eg. MD/VA/USFWS cooperative program), mitigation (eg. New York) and restoration of populations to their historical range (eg. Maine and Delaware). The Committee has addressed the following issues:

1. The legal status of possession, culture, and sale of striped bass and hybrids in Atlantic coast states;
2. The number of striped bass stocked in state waters from 1985 to 1992, the method of tagging, and point of release;
3. A review of the striped bass plan recommendations concerning the use of stocking in striped bass restoration efforts; and
4. The development of a complete program to evaluate the use of stocking programs in striped bass restoration and management.

The four issues with a statement of the problem, status, and actions are presented in this report.

THE LEGAL STATUS OF POSSESSION, CULTURE, AND SALE OF STRIPED BASS AND HYBRIDS IN ATLANTIC COAST STATES

Many state laws and regulations address only striped bass and make no mention of hybrid bass or of farm-reared products including striped bass. The issues surrounding these regulations are expected to become more important as the consumer demand for fishery products continues to increase and stimulates production of farm-raised fish in several states.

To begin to address some of these issues, the Committee gathered information on the legal status of possession, culture, and sale of striped bass and hybrid bass in a number of states as of 8/1/92. Two tables -- one for striped bass and one for hybrids -- were compiled for states involved in interstate striped bass management (Table 1 and 2).

Table 1. Status of Regulations for Wild-Caught and Farm-Reared Striped Bass in Atlantic Coast States. [legal (+), illegal (-), or no regulations (NR)] in 1991

State	Wild-caught		Farm-reared		Commercial Producers
	Possession	Sale	Possession	Sale	
Maine	+	-	+	-	0
New Hampshire	+	-	+	-	0
Massachusetts	+	+			0
Rhode Island	+	+	NR	NR	0
Connecticut	+	+	(a)	-	0
New Jersey	+	-	+	-	0
Delaware	+	+	+	+	2
New York	+	+	+	+	2
Pennsylvania	+	+	(b)	NR	NR
Maryland	+	+	+	+	30 (c)
Virginia	+	+	+	+	0
North Carolina	+	+	+	+	0

(a) Legal to sell if not taken in the state while still CT size limits

(b) Legal to sell if not caught in Pennsylvania

(c) Includes production of both striped bass and hybrid striped bass

Table 2. Status of Regulations for Wild-Caught and Farm-Raised Hybrid Striped Bass in Atlantic Coast States. [Legal (+), illegal (-), or no regulations (NR)] in 1991

State	Wild-caught		Farm-reared		Commercial producers
	Possession	Sale	Possession	Sale	
Maine	+	-	+	-	0
New Hampshire	NR	NR	NR	NR	0
Massachusetts			+	+	1
Rhode Island	NR	NR	NR	NR	0
Connecticut		-	+	+	0
New Jersey	+	+	+	+	0
Delaware	+	-	+	+	2
New York	+	+	+	+	0
Pennsylvania	+	+	+	+	2
Maryland	+	+	+	+	30 (b)
Virginia	+	+	+	+	15
North Carolina	+	+	+	+	10

(a) Legal to sell if not caught in Pennsylvania.

(b) Includes striped bass and hybrid striped bass production.

THE NUMBER, LOCATION, AND TAGGING OF STRIPED BASS STOCKED IN COASTAL WATERS OF EACH STATE

For any fish stocking program to be properly evaluated, managers must know when, where, and how many fish are released. Thus, the Committee has compiled summary tables for stocking activities from 1985 through 1992. Large scale stocking of striped bass began through a MD/USFWS cooperative effort in Chesapeake Bay in 1985 when nearly 195,000 phase II fish were stocked with coded wire tags. In addition to this effort, a small scale program already had been established in North Carolina and a mitigation effort was ongoing in New York. The New York mitigation stocking program began in 1983 and had resulted in the release of a total of 493,088 fish (3 inch fingerlings with coded wire tags) by the end of 1985.

Hatchery-reared striped bass were stocked in coastal waters of Maine, New Jersey, New York, Maryland, and North Carolina in 1986 (Table 4). A total of nearly 78,000 phase I and 1,050,000¹ phase II fish (grand total of 1.13 million fish) were stocked and approximately 1 million of these were marked or tagged. Binary-coded wire tags marked 95% of the tagged fish and others were marked with Floy tags, fin clips, or a freeze brand.

In 1987, nearly 260,000 phase I and 1,170,000 phase II fish, a total of over 1.4 million, were stocked in coastal waters of New York, New Jersey, Maryland, and North Carolina (Table 5). Pennsylvania also stocked 225,000 phase I fish in Conowingo Pool. Coded wire tags were used to mark 1.14 million of all fish stocked. An additional 9,154 were branded and 5,000 were marked with Floy anchor tags.

In 1988, the states of North Carolina, Maryland, Virginia, Delaware, New Jersey, New York, Pennsylvania, and Maine were involved in stocking activities (Table 6).

The 1988 coast wide stocking results include over 350,000 phase I and over 1 million phase II fish for a total of 1.4 million fish. Of the total fish stocked, 1,030,000 were marked with binary coded wire tags, 22,133 with cinch tags, 7,500 with Ft-4 cinch-up tags, and 1,250 with Floy tags (total of over 1,060,000 were marked or approximately 75% of all stocked fish were marked).

In 1989, the states of North Carolina, Maryland, Virginia, Delaware, New Jersey, New York, Pennsylvania, and Maine were involved in stocking activities (Table 7). This was the final

¹The 3 inch fish stocked in New York were counted as phase II in this report.

year of stocking for New Jersey which will begin evaluating its stocking efforts in its own river systems in 1990.

The 1989 coast wide stocking results included 343,000 phase I and 1,278,000 phase II fish for a total of over 1.6 million fish. Of the total fish stocked, 1.21 million were marked (about 75% of the total). The great majority of fish were marked with binary coded wire tags with the remainder having Ft-4 cinch-up tags (2,700) and freeze brands (3,100).

In 1990, the states of North Carolina, Maryland, Virginia, Delaware, New York, Pennsylvania, and Maine were involved in stocking activities (Table 8). The coast wide stocking summary indicates that only phase II fish were released except for 155,000 phase I fish in Pennsylvania. Of the total 1,492,000 fish stocked, 1,085,000 were marked. The great majority of tagged fish were marked with binary coded wire tags (1,080,000) with the remainder having Ft-4 cinch-up tags (2,992) or anchor tags (2,000). In addition, some of the Maryland and Virginia fish (14,432) were marked with both CWTs and external anchor tags as part of a variety of evaluation studies.

In 1991, the states of Maine, New York, Maryland, Virginia, and North Carolina were involved in stocking activities (Table 9). Coast wide, both phase I and phase II fish were released. Of the total 1.2 million fish stocked, 759,000 were marked. The great majority of marked fish had binary coded wire tags (754,000) with the remainder having Ft-4 cinch-up tags (1,000) or anchor tags only (3,994). In addition, some of the Maryland and Virginia fish with coded wire tags (13,441) were also tagged with external anchor tags as part of hatchery evaluation studies.

In 1992 the states of Maryland, New York, Delaware, Virginia and North Carolina stocked nearly 1.5 million striped bass. The state of Maryland stocked 283,195 phase I and 271,283 phase II striped bass in the Patuxent River, and 98,067 phase I and 236,072 phase II striped bass in the Nanticoke River. All Maryland releases were marked with coded wire tags. New York also stocked 210,815 phase II fish, all of which were tagged with coded wire tags. Delaware stocked 40,702 phase II fish in Delaware Bay, and marked all fish with coded wire tags. The state of Virginia stocked 286,957 phase II striped bass, all of which were tagged with coded wire tags. North Carolina stocked 141,006 fish of which 4,993 were tagged with anchor tags. The states of Maine and New Jersey did not stock fish in 1992.

Table 3. Coastal Striped Bass Stocking Activities - 1985

<i>State & Location</i>	<i>Stocked</i>		<i>Marked</i>		<i>Coor-¹ dinated</i>
	<i>Number</i>	<i>Size</i>	<i>Number</i>	<i>Tag</i>	
New York					
Hudson R.	284,578	3 inch	284,578	CWT ²	Yes
Maryland					
Patuxent R.	100,261	phase I	0	-	-
Patuxent R.	125,612	phase II	99,767	CWT	Yes
Nanticoke R.	58,186	phase II	52,256	CWT	Yes
Upper Bay	60,474	phase II	42,905	CWT	Yes
MD Total	100,578	phase I	0	-	
	244,272	phase II	194,928	CWT	

¹Tagging coordinated with USFWS

²Binary-coded wire tag placed in the cheek muscle

Table 4. Coastal Striped Bass Stocking Activities - 1986

State & Location	Stocked		Marked		Coor- ¹ dinated
	Number	Size	Number	Tag	
Maine					
Kennebec R.	26,676	phase II	1,900	Floy ²	No
Androscoggin R.	3,641	phase II	0	---	No
Eastern R.	1,000	phase II	0	---	No
Total	31,317		1,900		
New Jersey					
Navesink R.	13,300	phase I	0	---	No
Navesink R.	13,650	phase II	13,650	Clipped ³	
New York					
Hudson R.	529,563	3 inch	529,563	CWT ⁴	Yes
Pennsylvania⁵					
Conowingo Pool	54,000	phase I	0	---	No
Maryland					
Nanticoke R.	6,975	phase II	6,975 ⁶	Branded	Yes
Nanticoke R.	8,866	phase II	8,866	CWT	Yes
Patuxent R.	10,125	phase I	10,125	Branded ⁷	Yes
Patuxent R.	293,566	phase II	292,066	CWT	Yes
Upper Bay	59,282	phase II	59,282	CWT	Yes
	Totals	10,125	phase I	10,125	
		368,689	phase II	367,189 ⁸	
North Carolina	118,345	-----	4,999	Floy	Yes

¹Tagging coordinated with the USFWS.

²Floy, fine fabric anchor tag with 1-inch vinyl tubing.

³Fin clipped.

⁴Binary-coded wire tag placed in the cheek muscle.

⁵Due to a misunderstanding, 15,000 striped bass x white bass hybrids were stocked in 1986 into the Conowingo Pool.

⁶Swim bladders in 80% + of these fish were not inflated.

⁷Freeze Branded

⁸Internal anchor tags applied to 9,750 of the phase II fish with binary-coded tags

Table 5. Coastal Striped Bass Stocking Activities - 1987

<i>State & Location</i>	<i>Stocked</i>		<i>Marked</i>		<i>Coor-¹ dinated</i>
	<i>Number</i>	<i>Size</i>	<i>Number</i>	<i>Tag</i>	
Maine	0	----	-----	---	---
New Jersey					
Navesink R.	18,320	phase I	0	---	No
New York					
Hudson R.	324,800	3 inch	324,800	CWT ²	Yes
Pennsylvania³					
Conowingo Pool	26,000	phase I	0	---	No
Conowingo Pool	200,000	phase I	0	---	No
Maryland					
Choptank R.	324,529	phase II	324,529	CWT ⁴	Yes
Nanticoke R.	79,524	phase II	68,441	CWT	Yes
			9,154	Branded	Yes
Patuxent R.	15,806	phase I	15,806	CWT	Yes
Patuxent R.	377,242	phase II	377,242	CWT	Yes
Upper Bay	31,129	phase II	31,129	CWT	Yes
	Totals				
	15,806	phase I	15,806	CWT	
	812,424 ⁵	phase II	801,341	CWT	
		phase II	9,154	Branded	
Virginia	0	-----	-----	---	---
North Carolina					
Albermarle Sound	15,435	phase II	2,500	Floy	Yes
Pamlico R.	17,993	phase II	2,500	Floy	Yes

¹Tagging coordinated with USFWS

²Binary-coded wire tag placed in the cheek muscle.

³26,000 of the phase I were from Georgia and 200,000 phase I fish were supplied by Maryland

⁴Internal anchor tag used as a second tag on 10,000 fish marked with binary-coded tags.

⁵Total of all phase II fish.

Table 6. Coastal Striped Bass Stocking Activities - 1988

State & Location	Stocked		Marked		Coor- ¹ dinated
	Number	Size	Number	Tag	
Maine					
Kennebec R.	51,501	phase II	150	Floy ²	No
Androscoggin R.	15,442	phase II	1,100	Floy	No
New Jersey					
Navesink/ Swimming R.	29,393	phase I	0	----	No
New York					
Hudson R.	48,611 ³	3 inch	48,611	CWT ⁴	Yes
Pennsylvania					
Conowingo Res.	200,000	phase I	0	----	---
Conowingo Res.	21,400	phase II	21,400	CWT	---
Delaware					
C&D Canal	10,941	phase II	10,900	CWT	Yes
Maryland⁵					
Choptank R.	422,036	phase II	422,036	CWT	Yes
Nanticoke R.	33,042	phase II	33,042	CWT	Yes
Nanticoke R.	22,133	phase I	22,133	Branded ⁶	
Patuxent R.	100,435	phase I	100,435	CWT	Yes
Patuxent R.	171,693	phase II	171,693	CWT	Yes
Upper Bay	198,622	phase II	198,622	CWT	Yes
Matapeake	11,812	phase II	11,812	CWT	Yes
Totals	100,435	phase I	100,435	CWT	
	837,205	phase II	837,205	CWT	
	22,133	phase I	22,133	Branded	
			11,995	Floy/CWT	

¹Tagging coordinated with USFWS

²Floy Fine Fabric Anchor Tag

³The Hudson River striped bass mitigation hatchery experienced catastrophic dieoffs during 1988 resulting in low production.

⁴Binary-coded wire tag placed in the cheek muscle

⁵Internal anchor tag used as second tag on 11,995 fish marked with coded wire tags in Maryland and on 295 fish in Virginia.

⁶Freeze Branded

Table 6 continued

*Virginia*⁵

<i>Mattaponi</i>	21,978	phase II	21,683 295	CWT Floy/CWT	Yes Yes
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North Carolina

<i>Albemarle Sound</i>	5,000	phase II	5,000	Cinch ⁷	
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⁵Internal anchor tag used as second tag on 11,995 fish marked with coded wire tags in Maryland and on 295 fish in Virginia

⁷FT-4 Cinch-up Tag

Table 7. Coastal Striped Bass Stocking Activities - 1989

State & Location	Stocked		Marked		Coor- ¹ dinated
	Number	Size	Number	Tag	
Maine					
Kennebec R.	58,935	phase II	0	---	No
Androscoggin R.	8,600	phase II	0	---	No
New York					
Hudson R.	202,069	3 inch	202,069	CWT ²	Yes
New Jersey					
Navesink R./ Swimming R.	30,967	phase I	0	---	No
Pennsylvania					
Conowingo Res.	210,025	phase I	0	---	---
Delaware					
Delaware R.	36,134	phase II	20,919	CWT	Yes
Maryland					
Choptank R.	256,251	phase II	256,251	CWT	Yes
Nanticoke R.	3,100	phase II	3,100	Branded ³	
Patuxent R.	101,987	phase I	101,987	CWT	Yes ⁴
Patuxent R.	196,355	phase II	196,355	CWT	Yes ⁵
Upper Bay	426,846	phase II	426,846	CWT	Yes
Totals MD	101,987	phase I	101,987		
	882,552	phase II	879,452		
Virginia					
Mataponi R.	4,830	phase II	4,830	CWT	Yes
North Carolina					
Albemarle Sound	3,289	phase II	1,400	Cinch	Yes
Cape Rear R.	77,242	phase II	1,300	Cinch	Yes

¹Tagging coordinated with USFWS

²Binary-coded wire tag placed in the cheek muscle

³Freeze branded

⁴Fish evaluated as part of a study on "Mortality and Population Estimate of Young-of-the-year Wild and Hatchery-reared Striped bass in the Patuxent River, Maryland." Dorazio, Florence, and Wooley, In draft.

⁵Internal anchor tag used as second tag on 8,895 fish marked with coded wire tags

Table 8. Coastal Striped Bass Stocking Activities - 1990

<i>State/Location</i>	<i>Stocked</i>		<i>Marked</i>		<i>Coor-¹ dinated</i>
	<i>Number</i>	<i>Size</i>	<i>Number</i>	<i>Tag</i>	
Maine					
<i>Kennebec R.</i>	58,497	phase II	0	---	No
<i>Androscoggin</i>	6,736	phase II	0	---	No
New York					
<i>Hudson R.</i>	234,387	3 inch	0	---	No
Pennsylvania					
<i>Conowingo Pool</i>	155,400	phase I	0	CWT	No
Delaware					
<i>Delaware R.</i>	92,547	phase II	56,395 ²	CWT	Yes
Maryland					
<i>Choptank R.</i>	54,814	phase II	52,314 2,500	CWT CWT/anchor ³	Yes
<i>Patuxent R.</i>	356,758	phase II	352,260 4,498	CWT CWT/anchor	Yes
<i>Upper Bay</i>	403,884	phase II	398,451 5,433	CWT CWT/anchor	Yes
Virginia					
<i>Mattaponi R.</i>	173,554	phase II	172,253 1,301	CWT CWT/anchor	Yes
<i>Pamunkey R.</i>	31,056	phase II	30,356 700	CWT CWT/anchor	Yes
North Carolina					
<i>Albemarle Sound</i>	2,000	phase II	2,000	Anchor ⁴	Yes
<i>Cape Fear R.</i>	77,242	phase II	1,300	Cinch ⁵	Yes

¹Tagging coordinated with USFWS

²Number stocked after subtracting mortality and tag loss

³Internal anchor tag used as a second tag on fish marked with coded wire tags

⁴FM-84 internal anchor tag, 5mm X 15mm

⁵FT-4 Cinch-up Tag

Table 9. Coastal Striped Bass Stocking Activities - 1991

State/Location	Stocked		Marked		Coor- dinated
	Number	Size	Number	Tag	
Maine					
Kennebec R.	9,893	Phase II	0	---	No
Androscoggin R.	1,049	Phase II	0	---	No
Totals	10,942	Phase II			
New York					
Hudson R.	256,631	Phase II	0	---	No
Pennsylvania					
Conowingo Res	54,000	Phase I	0	---	No
Maryland					
Patuxent R.	105,915	phase I	105,915	CWT	Yes
Patuxent R.	240,432	phase II	232,892	CWT	Yes
		phase II	7,540	CWT/Anchor ¹	
Choptank R.	108,130	phase I	108,130	CWT	Yes
Choptank R.	52,252	phase II	49,752	CWT	Yes
		phase II	2,500	CWT/Anchor	
Totals	214,045	phase I	214,045	CWT	
	292,684	phase II	282,644	CWT	
		phase II	10,040	CWT/Anchor	
Virginia					
Mattaponi R.	36,088	phase I	36,088	CWT	Yes
Mattaponi R.	128,580	phase II	126,645	CWT	Yes
		phase II	1,935	CWT/ Anchor	Yes
Pamunkey R.	82,994	phase II	81,528	CWT	Yes
		phase II	1,466	CWT/ Anchor	Yes
Totals	36,088	phase I	36,088	CWT	
	211,574	phase II	208,173	CWT	
		phase II	3,401	CWT/Anchor	
North Carolina					
Albemarle Sound	2,994	phase II	2,994	Anchor ²	Yes
Pamlico R.	30,801	phase II	1,000	Cinch ³	Yes
		phase II	1,000	Anchor	Yes

¹Internal anchor used as a second tag on fish marked with coded wire tags

²FM-84 internal anchor tag, 5mm X 15mm

³FT-4 Cinch-up Tag

Table 10. Coastal Striped Bass Stocking Activities - 1992

<i>State/Location</i>	<i>Stocked</i>		<i>Marked</i>		<i>Coor- dinated</i>
	<i>Number</i>	<i>Size</i>	<i>Number</i>	<i>Tag</i>	
<i>New York</i>					
<i>Hudson R.</i>	210,815	phase II	210,815	CWT	No
<i>Delaware</i>					
<i>Delaware R.</i>	40,702	phase II	40,702	CWT	Yes
<i>Maryland</i>					
<i>Patuxent R.</i>	283,195	phase I	283,195	CWT	Yes
<i>Patuxent R.</i>	271,283	phase II	271,283	CWT	Yes
<i>Nanticoke R.</i>	98,067	phase I	98,067	CWT	Yes
<i>Nanticoke R.</i>	236,072	phase II	236,072	CWT	Yes
Totals	381,262	phase I	381,262	CWT	
	507,355	phase II	507,355	CWT	
<i>Virginia</i>					
<i>Mattaponi R.</i>	133,213	phase II	133,213	CWT	Yes
<i>Pamunkey R.</i>	153,744	phase II	153,744	CWT	Yes
Totals	286,957	phase II	286,957	CWT	
<i>North Carolina</i>					
<i>Albemarle Sound</i>	2,465	phase II	2,465	Anchor ¹	
<i>Neuse R.</i>	21,720	(August 92)			
<i>Neuse R.</i>	116,820	phase II	2,527	Anchor	

¹FM-84 internal anchor tag, 5mm X 15mm

STRIPED BASS PLAN RECOMMENDATIONS CONCERNING THE USE OF STOCKING IN STRIPED BASS RESTORATION EFFORTS

The revised ASMFC Interstate Striped Bass Management Plan - Amendment 4 became effective on January 1, 1990. The primary goal of the plan is the conservation and preservation of the east coast migratory stocks of striped bass. The plan includes a section on the role of stocking in the management process and was based on guidelines developed by the Stocking Committee in 1987 (Parker and Miller 1987). The Committee reviewed and edited the stocking portion of the plan. This section has been included in Appendix A of this report.

Three general recommendations on stocking are addressed in the plan including:

- 1) *preservation of genetic integrity of striped bass stocks;*
- 2) *guidelines for coastal striped bass stocking programs; and,*
- 3) *protection of wild stocks from potential problems introduced through stocking of hatchery fish (both striped bass and striped bass hybrids).*

In addition to these recommendations, stocking guidelines are listed that address disease certification, tagging, and program evaluation.

PROGRAM EVALUATION - THE USE OF STOCKING IN STRIPED BASS RESTORATION AND MANAGEMENT

As the stocking programs mature, a greater emphasis will be placed on evaluating the effectiveness of stocking as a means of restoring and managing striped bass populations. A coast wide program to evaluate the results of stocking was initiated in early 1991 through a cooperative agreement between the USFWS, ASMFC, Maryland and other ASMFC member states. The agreement includes: 1) provisions for states to share tag detecting equipment; and, 2) the employment of a full time coordinator for recovery of coded wire tags.

As noted in the cooperative agreement, significant steps have been taken to develop a comprehensive assessment program. Twenty seven new wand tag detectors have been purchased by the USFWS and can now be shared by the ASMFC member states. A computer database has been designed and standard field data sheets are also being used by the cooperating states. State agencies and the USFWS began extensive sampling of Maryland recreational and commercial fisheries in 1990. Coded wire tag

detection has also been incorporated into a number of state stock monitoring programs in New York, New Jersey, Delaware, Virginia, and North Carolina. Initial recoveries of CWT positive fish number approximately 1,600 in 26,000 observations. These results are encouraging and suggest a relatively high contribution of hatchery fish in some river systems. Given the high number of tag recoveries, a full-time tag recovery coordinator was hired in May of 1992. The Striped Bass Stocking Committee 1993 meeting should be a good opportunity for the tag recovery coordinator and Committee members to review past efforts and to discuss future plans for the evaluation of stocking programs.

Concerns that may warrant further attention include:

- 1) *investigation of factors affecting survival of hatchery produced fish;*
- 2) *design and planning of research programs utilizing CWT hatchery fish;*
- 3) *cost/benefit analysis of hatchery production with respect to enhancement;*
- 4) *definition of local and coastal CWT program goals; and*
- 5) *to expand and improve CWT sampling on both a local and coast wide basis;*
- 6) *integration of the CWT database and other striped bass data sets.*

STOCKING

Because of the socioeconomic importance and desirability of striped bass, one response on the part of state and federal agencies to the decline of striped bass stocks has been to consider or initiate stocking programs. The objective of these programs has generally been to bolster existing depressed stocks until they have had an opportunity to recover to former levels. Stocking programs are currently underway in North Carolina, Chesapeake Bay, and the Hudson and Kennebec Rivers. Several other stocking programs, conducted by utilities which have facilities located on the Hudson River and Chesapeake Bay, are not formally being conducted as stock restoration programs. However, the activities have generally been coordinated with state and federal programs.

Many potential problems may arise with regard to the stocking of fish into open systems which already support native stocks and which also support numerous other species. Because of concern about such problems, the following recommendations are adopted.

Recommendation 1. Genetic integrity of Atlantic coast striped bass stocks from Maine to North Carolina should be maintained within river basins. Only progeny from native brood stock, when available should be stocked in river basins and coastal waters; progeny from brood stock from adjacent rivers or hydrologically similar systems should be used if native brood stock do not exist or are present in insufficient numbers to support a restoration program.

Recommendation 2. States conducting, initiating or permitting striped bass stocking programs in coastal waters from Maine through North Carolina should follow hatchery and stocking program guidelines presented in Table 9.1; program descriptions and plans should be provided to ASMFC for review to ensure that guidelines are being followed.

Recommendation 3. States conducting, initiating or allowing the stocking of striped bass or striped bass hybrids in coastal waters from North Carolina to Maine should provide adequate protection to wild stocks by rules, regulations or laws which will maintain genetic integrity of wild stocks, ensure protection from introduced diseases, and guard against the introduction of competing species; escapement of aquaculture species into the wild must be prevented.

Table 9.1 Guidelines for acceptable striped bass hatchery and stocking programs.

1. Disease Certification Programs
 - 1.1 Hatchery-reared striped bass which are to be released into any open system should be screened for IPN virus to prevent spread and dispersion of that virus
 - 1.2 Additional research should be conducted to determine the pathogenicity of the IPN virus isolated from striped bass to other warmwater and marine species, such as flounder, menhaden, shad, largemouth bass and catfish
 - 1.3 Researchers and managers should fully review the known facts about the pathogenicity and life history of suspected disease organisms in known hosts before attributing loss of fish to the presence of that organism in new hosts

2. Tagging Programs
 - 2.1 A sufficient number of fish to be stocked in coastal waters should be marked to allow for determination of survival and percentage contribution to natural stocks
 - 2.2 Binary coded wire tags are the preferred means of marking hatchery-reared fish to be released into coastal waters
 - 2.3 All fish should be marked if one-million or less are stocked; for greater numbers, the percentage to be marked should be calculated based on the number of fish released and the estimated number in the natural stock
 - 2.4 Tag codes should contain information sufficient to identify each lot of fish stocked

3. Evaluation of Stocking Programs
 - 3.1 Continue the stocking and evaluation program long enough to allow for maturation and return of adult females

Table 9.1. Continued

- 3.2 Continue to conduct research to determine the limiting factors affecting recruitment; this research should not be contingent upon the success or failure of the hatchery program
 - 3.3 Terminate stocking if restoration is successful as judged by return of young-of-year indices for a period of three years to levels determined to be acceptable, and by a decline in the ratio of marked hatchery fish to unmarked native fish*
 - 3.4 Terminate stocking if marked and stocked fish fail to return as brood fish*
 - 3.5 Terminate restoration program if fish return as brood fish but progeny fail to survive due to poor anthropogenic-related environmental conditions on the nursery grounds*
 - 3.6 The evaluation program should be established as part of any stocking program and should be budgeted at a value equal to that of the stocking program
 - 3.7 Monitoring of coded-wire tagged striped bass should be incorporated into all major existing fishery-dependent and fishery-independent monitoring programs. Attempts should be made to recover, decode and report CWTs to a centralized repository administered by the U.S. Fish and Wildlife Service. Percent composition of coded-wire tagged fish within samples should also be recorded. Special studies should also be conducted to assess survival, growth and distribution of hatchery-reared striped bass
4. Genetic Integrity
- 4.1 Genetic integrity of Atlantic coast striped bass should be maintained within river basins

* Decisions on time for termination of a non-restoration program should be made by the state agency having jurisdiction over the program

Table 9.1. Continued

- 4.2 Only progeny from native brood stock, when available, should be stocked in river basins and coastal waters
 - 4.3 Progeny from brood stock from adjacent rivers or hydrologically similar systems should be used if native brood stock do not exist
 - 4.4 Stocking of hybrids should be restricted to inland freshwater reservoirs or to other systems in which escapement and reproduction can, and will, be controlled
 - 4.5 Neither striped bass nor hybrids should be stocked in coastal or inland waters without notification and approval of the proper and official state fishery agencies
5. Stocking
- 5.1 Stocking of hatchery-reared fish should be recognized as only one tool available to resource managers and that the appropriateness of this tool will vary with circumstances
 - 5.2 Either Phase I or Phase II fish are acceptable for stocking provided all fish are tagged
6. Coordination of State Programs
- 6.1 Programs should be coordinated among and within states by adherence to these guidelines
 - 6.2 Each state should take appropriate regulatory or statutory action to insure that striped bass stocked by private entities into coastal waters be in accordance with these guidelines
 - 6.3 To avoid duplication, tagging programs involving potentially migratory stocks of striped bass should be coordinated on a coast-wide basis

Table 9.1. Continued

- 6.4 A central data base should be established for all tags used in coastal stocking programs
- 6.5 Coded wire tags should be placed only in the left operculum

