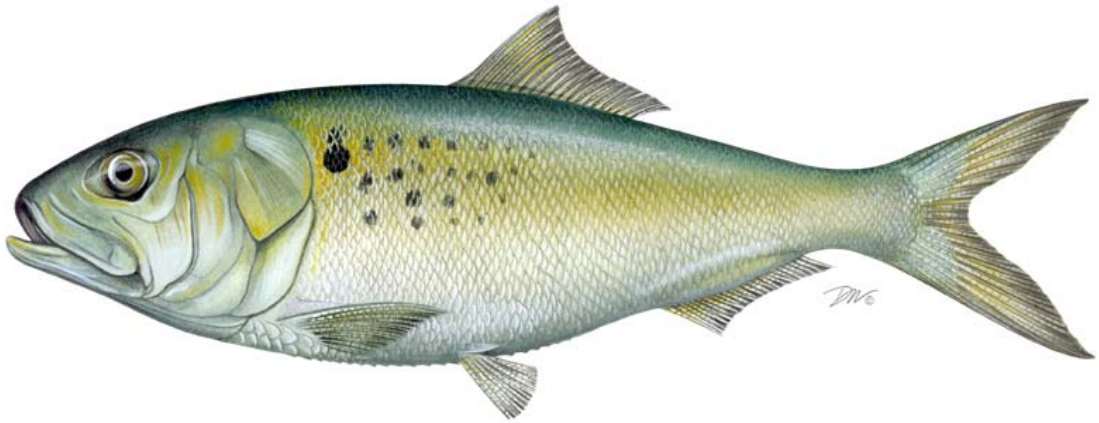
REVIEW OF THE INTERSTATE FISHERY MANAGEMENT PLAN AND STATE COMPLIANCE FOR THE 2009 ATLANTIC MENHADEN *(Brevoortia tyrannus)* FISHERY



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(Brevoortia tyrannus)

Management Summary

Date of FMP:	Original FMP: August 1981
Amendments:	Plan Revision: September 1992 Amendment 1: July 2001
Management Unit:	Maine through Florida
States With Declared Interest:	Maine – Florida, excluding Pennsylvania
Additional Jurisdictions:	Potomac River Fisheries Commission, National Marine Fisheries Service, United States Fish and Wildlife Service
Active Boards/Committees:	Atlantic Menhaden Management Board, Advisory Panel, Technical Committee, Stock Assessment Subcommittee, and Plan Review Team
Stock Status:	Coastwide stock is not overfished and overfishing is not occurring (ASMFC 2010)

I. Status of the Fishery Management Plan

Amendment 1 to the Interstate Fisheries Management Plan (FMP) for Atlantic Menhaden was approved at the 2001 Spring Meeting of the Atlantic States Marine Fisheries Commission (Commission). Management authority is vested in the states because the vast majority of landings come from state waters. All Atlantic coast states and jurisdictions except Pennsylvania and the District of Columbia have declared an interest in the menhaden management program. The goal of Amendment 1 is "to manage the Atlantic menhaden fishery in a manner that is biologically, economically, socially and ecologically sound while protecting the resource and those who benefit from it."

Amendment 1 was developed during 1999-2000 and established new overfishing/overfished definitions based on fishing mortality and spawning stock biomass. Addendum I to Amendment 1 was approved in August 2004. This addendum revised the biological reference points, changed the frequency of stock assessments, and updated the habitat section. The biomass target and threshold are based on Fecundity instead of Spawning Stock Biomass. A new fishing mortality target and threshold were also adopted. Stock Assessments take place every third year, however the Technical Committee is required to meet annually to review the previous year's landings and indices.

Addendum II, approved October 2005, initiated a research program that is aimed at examining the possibility of localized depletion of menhaden in Chesapeake Bay. Read more about the research in Section V of this report. Addendum III was approved in Fall 2006 and established a harvest cap for the reduction fishery in Chesapeake Bay. The annual total allowable harvest from the Chesapeake Bay by the reduction fishery is set at 109,020 metric tons. If harvest is greater than the cap in a given year, the cap will be reduced by the overage amount for the following year. Similarly, if harvest is less than the cap, the cap can be increased to a maximum of 122,740 metric tons for the following year. The cap established by Addendum III remains in effect through the 2010 fishing season. Addendum IV, approved in November 2009, extends the provisions of Addendum III through 2013.

II. Status of the Stock

A benchmark stock assessment was initiated in 2009. The results of the assessment were peer reviewed through SEDAR in March 2010. The information in this section is drawn from "Atlantic Menhaden Stock Assessment and Review Panel Reports (May 2010)" available on the ASMFC website at: http://www.asmfc.org/atlanticMenhaden.htm

Given the current benchmarks, status of stock was determined based on the terminal year (2008) estimate relative to its corresponding limit. Benchmarks have been estimated based on the results of the base run. The terminal year fishing mortality rate (*weighted by number average for ages 2+*) was estimated to be 0.93 year-1, which is 92% of its limit (and 195% of its target). Correspondingly, the terminal year estimate of population fecundity was estimated at 95% of its fecundity target (and 190% of its limit). Hence, the stock is not considered to be overfished, nor was overfishing occurring in 2008. However, annual variability and uncertainty in the F estimates and proximity of the terminal year estimates to its F_{LIMIT} raise concerns about frequent overfishing in the past and potential overfishing in 2008. In addition, other indicators of stock status, such as trends in recruitment and fishing mortality on fully recruited ages, raise concerns about the appropriateness of the current reference points for Atlantic menhaden.

Benchmarks for stock status were based on Addendum 1 to Amendment 1. F_{MED} (= F_{REP}) provides the reference value for judging overfishing (F-limit). The population fecundity (FEC_{TARGET}) corresponding to F_{MED} provides the proxy for B_{MSY}. FEC_{LIMIT} is one-half of FEC_{target}. A discussion of alternative benchmarks is provided in Section 8.2, including a discussion of the F_{MSY} concept, equilibrium yield-per-recruit and spawner-per-recruit reference points, and environmental variability. This latter issue resulted in some debate on poor recruitment during last the two decades and implication for benchmarks.

Data used in the assessment included abundance indices, recorded landings, and samples of annual size and age compositions from the landings. Juvenile abundance seine indices from seven states were developed (two more than in the last peer reviewed assessment in 2003). The pound net index from the PRFC was improved to reflect a better unit of fishing effort. Landings and catch-in-numbers-at-age data were updated from the reduction and bait fisheries, and reconstructed historically back to 1873 for use in an alternate model configuration. A matrix of

natural mortality at age was obtained from a recent update of the peer-reviewed MSVPA-X model (SARC 2005), allowing for age- and year-varying estimates of *M*.

Alternate assessment models were considered as potential base models. The statistical catch at age model developed at Beaufort was selected as the base assessment model. A base assessment model run was developed and sensitivity model runs were made to evaluate performance of the assessment model to different assumptions regarding input data and stock dynamics.

The next stock assessment is an update assessment planned for 2013.

III. Status of Assessment Advice

The peer review panel drafted a report including its conclusions of the assessment and recommendations for moving forward. Below is a summary of their findings.

- The Panel is comfortable with the results from the menhaden base run. The model results and the status determination are robust.
- The 2008 point estimate of fishing mortality (F) was below the estimated F threshold, the status determination is that overfishing was not occurring and the 2008 point estimate of fecundity was above the fecundity threshold and target, the status determination is that the stock is not overfished.
- The Panel was concerned that the 2008 F estimate was very close to the threshold. If uncertainty in the estimate was considered there is a significant probability that overfishing occurred in 2008.
- The Panel was also concerned about the use of F_{med} and the fecundity associated with it as reference points. The concern is that there is no information on the relationship of the target and threshold fecundity in relation to virgin fecundity levels. Projections were run to examine this, and the estimated annual fecundity since 1998 was only 5 to 10% of the virgin fecundity.
- The Panel recommends that a model specification similar to the Panel's reference run be considered for future assessments. This includes capped effective sample size at 200, allow the gaps in the pound net index and bait fishery age composition where data are not available, modification of the reduction and bait fleets to northern and southern fleets, and time-varying domed selectivity for the southern region.

  This model specification combines information of the bait and reduction fisheries occurring together regionally because they are essentially using the same gear but fishing on different age components of the stock in the two areas. Removing the estimated age composition and indices for years where it is absent is desirable because the data from years where it is available is providing the correct amount of information, from a statistical perspective, to the assessment model. Allowing domed selectivity of the fisheries in the southern region allows for the lack of availability of older fish in that region when the fishery is occurring. The reduction of effective sample sizes is intended to better reflect the actual information content of the age composition data (the residuals in the base model were inconsistent with the large assumed effective sample sizes). Also,

the time-varying selectivity in the southern region had the best AIC of comparable runs and reduced the undesirable pattern of residuals in the southern fishery.

IV. Status of the Fishery

The 2009 coastwide harvest of Atlantic menhaden (reduction and bait [preliminary]) was 181,700 metric tons; this is down 3.6% from the 188,467 metric tons landed in 2008. The 2009 harvest for reduction purposes only was 143,800 metric tons. This is up 1.9% from the 2008 landings of 141,133 metric tons, and down 10.5% from the previous 5-year (2004-2008) average of 160,667 metric tons (Figure 1). Omega Protein's plant at Reedville, Virginia, with ten or eleven vessels in 2009, is the only active menhaden reduction factory on the Atlantic coast.

The preliminary estimate of the coastwide bait harvest for 2009 is 37,874 metric tons; this is down 20% from the 2008 bait harvest of 47,334 metric tons, and down 1.2% from the average harvest of the previous five years (2004-2008) of 38,325 metric tons (Figure 1).

The decrease in bait landings in 2009 was most pronounced in the New England region. However, 2008 landings for the region were the highest since 1993 (Table 2). Bait landings in the Chesapeake Bay region for 2009 were below the previous couple years, but still the highest for any region. The Mid Atlantic region also saw a decrease in bait landings from 2008 to 2009. But 2009 landings are still above the time series average. The South Atlantic was the only region to report an increase in landings in 2009 over 2008.

V. Status of Research and Monitoring

The Sustainable Fisheries Branch of the NMFS Laboratory in Beaufort, North Carolina, has the principal monitoring responsibility for the Atlantic menhaden fishery. Its monitoring and analytical work is expected to continue. Several states have improved their juvenile monitoring programs, which include data on menhaden. The industry continues to cooperate by providing set-by-set data through the Captains Daily Fishing Reports (CDFRs). The NMFS Sustainable Fisheries Branch personnel enter current year and historical (since 1985) CDFR data into a database for analysis. In addition, the SAFIS daily electronic dealer reporting system is required for all federal permitted dealers. This system allows near real time data acquisition for federally-permitted bait dealers. A bait fishery sampling program has been conducted since 1994 in Massachusetts, New Jersey, Virginia, and North Carolina. Rhode Island and Maine have recently initiated similar programs.

In June 2005 the Technical Committee re-addressed the issue of research priorities to examine the possibility of localized depletion of Atlantic menhaden in Chesapeake Bay. The Board approved Addendum II that contained the following research priority areas:

A. Determine menhaden abundance in Chesapeake Bay
B. Determine the estimates of removal of menhaden by predators
C. Exchange of menhaden between Chesapeake Bay and coastal systems
D. Larval Studies (determining recruitment to Chesapeake Bay)

In 2009, the NOAA Chesapeake Bay Office (NCBO) held a Fisheries Science Symposium that showcased recent research it has funded. Many of the menhaden-related research projects fall under one or more of the priority areas mentioned above. In addition, the NCBO convened an external group of experts to conduct a review of its menhaden research program. The review panel wrote a report outlining progress that has been made and areas where work is needed. Funding for menhaden research in 2009 was limited and reserved for completing projects already in progress. Funding for research is 2010 is similar, and funding beyond that is uncertain.

VI. Status of Management Measures and Issues

Addendum IV was approved in Fall 2009. It extended the harvest cap on the reduction fishery in Chesapeake Bay through the 2013 fishing season. In addition, the overage and underage provisions of Addendum III were carried over to Addendum IV.

VII. Implementation of FMP Compliance Requirements for 2009

All states are required to submit annual compliance reports by April 1.

Amendment 1 to the Interstate FMP for Atlantic Menhaden requires all states to implement the reporting requirement contained in *Section 4.2.5.1*. All menhaden purse seine and bait seine vessels (or snapper rigs) are required to submit the Captain's Daily Fishing Reports (CDFRs). Existing reporting requirements may serve as an alternative to implementing this measure. Table 1 shows state compliance with this requirement and current regulations and reporting.

Table 1. Atlantic Menhaden Plan Review Team compliance review summary for 2009

State	Met Reporting Requirement of Section 4.2.5.1	Summary of Regulations and Reporting
ME	Yes	Reporting requirements cover all baitfish fisheries, including gillnets and purse seines.
NH	Yes	State law prohibits the use of mobile gear in state waters.
MA	Yes	No specific menhaden regulations. Purse seining prohibited in some areas (mostly nearshore). Mandatory dealer reporting (SAFIS).
RI	Yes	Menhaden harvest by purse seine for reduction (fish meal) purposes is outlawed. Mandatory dealer reporting (SAFIS).
CT	Yes	Purse seines prohibited in state waters. Menhaden can be caught by other gear and sold as bait.
NY	Yes	Mandatory reporting for all commercial food fish license holders, this includes all who harvest menhaden. Purse seines limited to certain times/areas.

NJ	Yes	Prohibited purse seining for reduction purposes in state waters. Mandatory reporting for purse seine (bait) fishery. Bait fishery subject to gear restrictions and closed seasons.
DE	Yes	Purse-seine fishery prohibited since 1992. No specific regulation of gillnetting for menhaden.
MD	Yes	Purse-seine fishing prohibited; menhaden harvested by pound net primarily.
PRFC	Yes	All trawling and purse nets are prohibited. Mandatory commercial fishing reporting.
VA	Yes	Implemented reporting requirement for bait seine/snapper rigs in 2002. The reduction fishery landings in VA are reported via daily catch records and CDFRs to the NMFS.
NC	Yes	Mandatory commercial fishery reporting (trip ticket). Combination of gear restrictions and seasonal and area closures (e.g., no purse seine fishing within 3 miles of coast of Brunswick Co. from May – October).
SC	Yes	Purse seines prohibited in state waters; mandatory dealer reporting; requests *de minimis* status.
GA	Yes	Mandatory commercial fishery reporting (trip ticket); state waters closed to purse seine fishing; requests *de minimis* status.
FL	Yes	Purse seines prohibited in state waters; primarily a cast net fishery; mandatory commercial fishery reporting (trip-ticket).

The cap for reduction landings from Chesapeake Bay was set at 122,740 metric tons for 2009. Reported reduction landings from Chesapeake Bay for 2009 were approximately 85,000 metric tons, similar to 2007 and 2008. The reported harvest was approximately 24,000 metric tons below the annual 109,020 metric tons cap. Therefore the underage is applied to the 2010 cap, which is set at 122,740 metric tons, the maximum allowed under Addendum III.

VIII. Research Needs/ PRT Recommendations

Compliance Recommendation

Georgia, South Carolina, and Florida have requested *de minimis* status for the 2010 fishing season. Amendment 1 does not exempt *de minimis* states from the compliance criterion (mandatory reporting for purse seine or bait seine vessels). All three states require mandatory reporting (South Carolina from dealers; Georgia and Florida from vessels), and purse seines are prohibited in their state waters. Annual compliance reports are required from all states, including those with *de minimis* status. The PRT Recommends that South Carolina, Georgia, and Florida be granted *de minimis* status.

Reporting Recommendations

The PRT requests that:

- all menhaden bait landings are reported to the Technical Committee, even though the compliance criteria is only related to purse seines.

- New York investigate whether the state gill net landings are included in the NMFS Commercial Database or ACCSP Data Warehouse figures.

- New York includes in its annual compliance reports a summary table of menhaden landings by major gear type for each year. Landings by minor gear types can be grouped into one column.

- Maine includes in its annual compliance reports a summary table of menhaden landings by year by major gear type for at least the past five, preferably ten, years.

IX. Literature Cited

Atlantic States Marine Fisheries Commission (ASMFC). 2010. Atlantic Menhaden Stock Assessment and Review Panel Reports. SAR No. 10-02. 325 pp.

Table 2. Menhaden Bait Landings by Region (1985 – 2009) [in 1,000s of metric tons]

Year	New England (ME – CT)	Mid-Atlantic (NY – MD Coast)	Chesapeake Bay (MD Bay, VA, PRFC)	South Atlantic (NC – FL)	Total (ME – FL)
1985	6.15	1.82	16.42	2.27	26.66
1986	13.75	1.33	10.46	2.44	27.98
1987	13.28	1.29	13.50	2.56	30.63
1988	19.73	1.21	12.43	2.88	36.25
1989	9.54	1.58	16.48	3.41	31.02
1990	11.19	4.49	11.06	4.07	30.80
1991	14.47	7.98	10.40	3.39	36.23
1992	12.44	13.04	10.45	3.10	39.03
1993	11.64	13.40	15.65	2.10	42.80
1994	0.43	17.81	17.72	3.17	39.14
1995	4.08	17.18	19.55	1.57	42.39
1996	0.04	16.20	18.49	0.58	35.31
1997	0.14	17.60	17.13	1.66	36.53
1998	0.21	15.34	22.49	1.33	39.37
1999	0.15	12.78	21.94	1.32	36.20
2000	0.19	14.50	19.65	0.97	35.30
2001	0.08	12.18	22.67	1.37	36.31
2002	0.69	11.50	23.73	1.14	37.06
2003	0.12	8.00	24.93	0.79	33.85
2004	0.03	9.60	25.33	0.50	35.47
2005	1.02	8.18	28.97	0.66	38.83
2006	1.56	9.89	14.50	0.51	26.45
2007	2.61	17.10	22.54	0.55	42.80
2008	7.78	17.55	21.15	0.31	46.79
2009	3.71	15	18.17	0.99	37.87

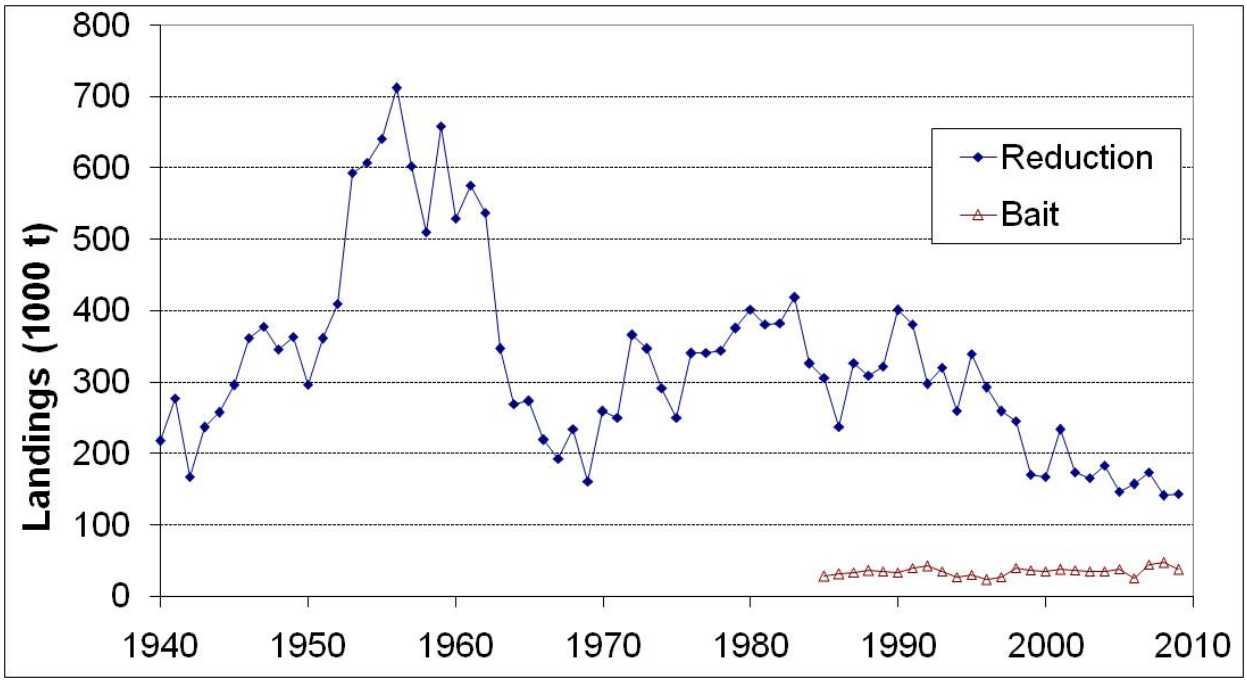

Figure 1. Landings from the reduction purse seine fishery (1940–2009) and bait fishery (1985–2009) for Atlantic menhaden.

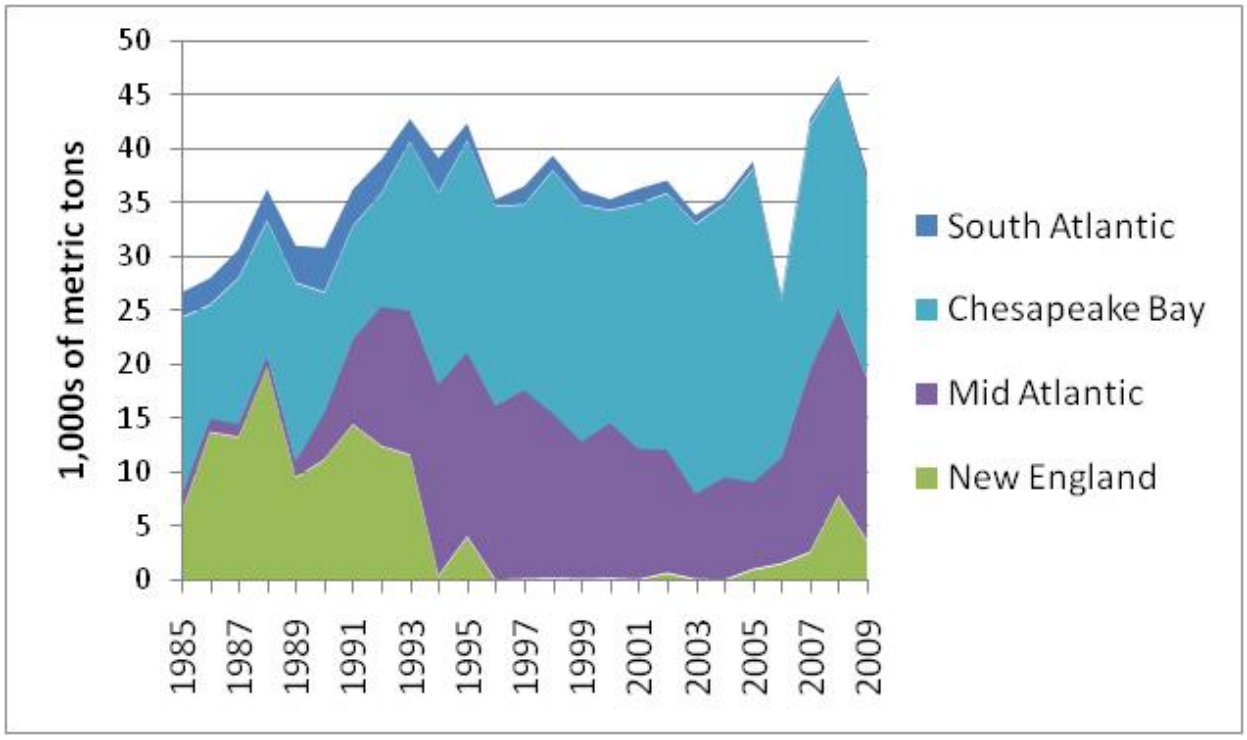

Figure 2. Annual landings by region from the Atlantic menhaden bait fishery, 1985–2009.