

Atlantic Menhaden Technical Committee Report

January 8, 2002

Raleigh, North Carolina

The Atlantic Menhaden Technical Committee (TC) met on January 8, 2002 in Raleigh, NC to examine and respond to a number of issues that the Menhaden Management Board identified. The Technical Committee discussed each specific charge and developed recommendations for the Board, which are included in this report. Dr. Lance Garrison gave an excellent presentation on his work on the development of a multispecies assessment model, using Atlantic menhaden, striped bass, bluefish and weakfish. Although the numbers that the model produced were preliminary, the Technical Committee was impressed with the quantity and quality of work done on this project so far. A subcommittee was formed to evaluate the model and to provide further direction to Dr. Garrison on the model's development as related to Atlantic menhaden. The members of that subcommittee were: Doug Vaughan (NMFS), Behzad Mahmoudi (FL), Matt Cieri (ME), Alexei Sharov (MD), and Geoff White (ASMFC). A separate, preliminary report from the subcommittee should be available for the February Board meeting. On January 9, 2002 the Technical Committee met with the new Atlantic Menhaden Advisory Panel to discuss the Committee's report and recommendations.

Charge 1. Revisit the proposed change to the overfishing definition and provide a clear rationale for making this change.

The Atlantic Menhaden Technical Committee has recommended a revision of biological reference points pursuant to changes made to the 2000 menhaden assessment. At the May, 2001 stock assessment meeting, the Technical Committee reached scientific consensus that bait landings should be included in the catch-at-age matrix used in the Virtual Population Analysis (VPA). This was based on the observations that the estimate of bait landings have become more reliable in recent years, but more importantly, that the bait landings have been increasing in relative proportion to the reduction landings and now comprise a significant proportion of total landings. The Board (July 2001) has already accepted this revision to the catch-at-age matrix.

The inclusion of bait landings in the catch-at-age matrix significantly changed the output of the VPA. The reduction fishery primarily catches age 1-4 menhaden. In prior assessments, this catch was believed to be an unbiased sampling of fish. A lack of older age fish results in the VPA model estimating high F for older ages. The newly added bait landings however, contain significantly greater proportion of older, larger fish than in the reduction fishery landings. It is now apparent that the reduction fishery does not representatively sample older menhaden, likely because fishing effort is concentrated in CB rather than in areas where large fish are proportionately more abundant. Thus, the catch matrix prior to inclusion of the bait landings was biased towards younger menhaden.

When the VPA was run with the revised data, F was significantly lower and abundance was significantly higher relative to a model run that did not include the bait data (F = 0.6 and SSB = 90,100 with bait data; F = 1.1 and SSB = 33,200 without). The lower F and higher SSB are a result of the model catch input having a greater number of older, mature fish. These results were

due solely to changes in the input data and not to any changes in the VPA methodology. The consensus of the Technical Committee is that these estimates of F and SSB are the best available biological indicators of current stock status.

Because the new catch data resulted in the model estimating a new partial recruitment vector (a measure of how fully the various age classes are targeted by the various fisheries), it was necessary to re-estimate the biological reference points. Again, this was not a change in methodology but simply an update of the input data used in the calculations to estimate the F and SSB reference points. The new calculations lowered the F reference point slightly but raised the SSB reference point significantly:

	“Old Reference Point” (Reduction Landings only)	“New Reference Point” (Bait and Reduction Landings)
F_{target}	1.04	0.9
$F_{\text{threshold}}$	1.33	1.1
SSB_{target}	37,400	50,000
$SSB_{\text{threshold}}$	20,570	27,500

In summary, the Technical Committee did not use new methodologies to conduct the assessment. Rather, the best available input data were used and this resulted in a significant change in stock status. The reference points were recalculated to be consistent with the more accurate characterization of the fisheries. The Technical Committee strongly recommends the adoption of these revised reference points. It is the opinion of the Technical Committee that the revised catch matrix and reference points are significant improvements to the stock assessment.

Charge 2. Review current fishing practices, including the harvest of age-0 menhaden and discuss whether or not these practices are viewed as problematic. Include a discussion on whether the current removal rate of age-0 menhaden, or some higher rate of removal would cause a problem. Identify a rate of removal that would be of concern biologically. If this is identified as being a potential problem, develop a list of prioritized management alternatives to address this potential problem.

The reduction fishery has always harvested some age-0 menhaden, however, since 1993 the reduction industry has voluntarily reduced their take of age-0's (refer to Table 2.3 in 2001 Report). The reduction industry prefers the bigger, older fish, because they yield more oil and meal. The snapper rig bait fleet also prefers the larger fish, because that is what the crab and lobster potters want for bait. When there is high recruitment (abundant age-0) or very good fall weather, there will be some increase in the age-0 catch. The size of the age-0 year class contributes to the size of the catch. Recreational cast net fisheries have also been identified in

several states that do harvest age-0 menhaden, however, the extent of their harvest is unknown. The Technical Committee did not view any of these fishing practices as problematic at this time.

The magnitude of the harvest of age-0 menhaden has been raised as a concern in recent years and the Technical Committee believed it would be informative to examine the relative percentage of the age-0 harvest and the estimated size of the age-0 population by year. The following table illustrates the relative size of each.

Year	Age-0 Population	Age-0 Harvest	% Age-0 Population Harvested	Total Landings	% Age-0 in Total Landings
1990	4777.1	308.1	6.5	2157.9	14.3
1991	5424.0	881.8	16.3	3166.6	27.9
1992	4504.3	399.6	8.9	2052.5	19.5
1993	2974.9	67.9	2.3	1594.0	4.3
1994	3848.4	88.6	2.3	1492.1	5.9
1995	2014.2	56.8	2.8	1643.3	3.5
1996	2064.8	33.7	1.6	1091.9	3.1
1997	1991.1	25.2	1.3	995.9	2.5
1998	1740.9	72.8	4.2	1007.5	7.2
1999	1259.8	193.9	15.4	1056.3	18.4
2000	6030.5	77.8	1.3	657.4	11.8
2001	*	22.7	*	680.2	3

(in millions of fish; 2001 data are preliminary; * = VPA generated estimates)

Based on preliminary observations, the multispecies model demonstrated the relative magnitude of the impact of fishing versus natural mortality. Results indicated that the percentage of age-0 fish taken in the reduction fishery appears to be minimal compared to the effects of predation. The level of predation on age-0 menhaden was in fact one to two orders of magnitude higher than that taken by fishing. In light of this information, the consensus of the Technical Committee was that fishing practices related to age-0 menhaden are not a problem at this level. The Technical Committee will explore and identify higher rates of removal and evaluate potential problem areas with the multispecies model.

Charge 3. The current amendment includes a wide list of management options for future consideration. If the targets and thresholds in Amendment 1 are exceeded, i.e. the stock status falls into one of the “danger zones”, what options should be developed for implementation to restore the stock to healthier levels? Evaluate management options for stock restoration and develop a prioritized list for consideration by the Management Board.

The Technical Committee noted that the preferred management option identified in Amendment 1 (*Section 4.2.7*) is to control catch through the imposition of a Total Allowable Catch (TAC) by area of catch, should a need for additional management arise. The Technical Committee qualitatively examined a number of other options and provides their evaluation as follows:

Most likely to be effective:

- Total allowable catch by area of catch
- Closed seasons
- Area closures

Possibly effective:

- Gear limits

Not likely to be effective:

- Trip limits
- Days at sea restrictions

The Technical Committee noted that socio-economic impacts of all of these options should be taken into consideration before implementing any new management measures. An additional issue that the Technical Committee brought up was the evaluation of predation levels and the management regimes of various predator species such as striped bass, weakfish and bluefish. Preliminary examination of the multispecies model results indicates increased levels of predation on age-0 menhaden as a result of increases in the population size of these predators.

Charge 4. Evaluate the current age structure of the population and identify, if possible, some future desired age structure as a goal. Concern has been raised regarding the coastwide age structure and the lack of adult menhaden in New England waters. The TC should evaluate why this condition exists and what could be done to restore or rectify this situation. Develop management alternatives that could address attaining a future goal regarding a desired coastwide age structure.

The Technical Committee discussed what an optimum age structure should look like and concluded that this was not practical. The Technical Committee noted that any population age structure is a result of the management regime imposed on a particular population. The current assessment estimated that F was below the target, therefore the resulting age structure should (under equilibrium conditions) approach an optimal age structure needed to sustain the spawning stock. As recent as three years ago, the spawning stock biomass was at a recent high, ~120,000 mt, and has since declined to about 90,000 mt. A number of successful series of year classes (mean recruitment to age-1 of about 2 billion fish) are needed to reverse the declining trend in SSB and to expand the species range once again. Environmental (oceanographic) factors appear to be more a determining factor as to where adult menhaden migrate north of Long Island. These boom and bust cycles for New England have been noted for at least the last 100 years based on reports in Bigelow and Schroeder (1953) as noted in the following sections as provided by Joe Smith.

These “boom and bust” cycles of menhaden abundance and scarcity in New England waters have been noted for at least the last 100 years as evidenced by reports in *Fishes of the Gulf of Maine* by H. B. Bigelow and W. C. Schroeder (1953. Fish. Bull.U.S. Fish and Wildl. Serv., Fish. Bull. 74, Vol. 53: pages 116-117). Passages from this volume are very informative relative to the Board’s Charge #4. For example:

"Perhaps the most interesting aspect of the menhaden in the Gulf of Maine is that it fluctuates tremendously in abundance there from year to year, periods of great plenty alternating with periods of scarcity or entire absence..."

"...they were extremely abundant off the coasts of Massachusetts and Maine, every summer, for some years prior to 1875... very few were taken in the Gulf during the cold summer of 1877... they were so scarce along the coast of Maine for the next six years that it caused comment when an occasional one was caught."

"...they were once more reported abundant off Maine and Massachusetts in 1886; they were plentiful in Maine waters in 1889... they were still so numerous in 1890 that four fertilizer factories were established... But this period of abundance was short-lived".

"...scarce again in the Gulf during the period 1895-1897, but abundant again in 1898,..."

"...rare north of Cape Cod from 1904 to 1921...They reappeared, however, in such abundance again in the southwest part of the Gulf in the summer of 1922 that 18 steamers fished for them successfully..."

"there were not enough menhaden in the Gulf to be of any commercial importance from the middle 1920s to the middle 1940s. But so many visited Massachusetts Bay, in 1946 and 1947 that local boards of health were forced to clean some of the bathing beaches of the fish that drifted ashore from schools netted for lobster bait."

The NMFS Beaufort Laboratory began coast wide sampling for Atlantic menhaden in 1955, shortly after Bigelow and Schroeder published their work. Almost five decades of fishery-dependent data collected by the NMFS supports the trends of scarcity and abundance of menhaden in New England waters during more contemporary times. Menhaden were abundant in New England during the mid-1950s to early 1960s with reduction plants active in Maine and Massachusetts. Fish were scarce north of the Middle Atlantic after the early 1960s, and most plants in New England went out of business due to a scarcity of menhaden. The stock rebuilt during early 1970s and 1980s. Menhaden again became abundant in New England waters, so much so that an Internal Waters Processing venture with the Russians evolved in southern Maine beginning in 1988. The IWP last operated in 1993 as adult menhaden once again disappeared from coastal New England. Commercial quantities of menhaden have not been seen north of Cape Cod since summer 1993.

Bait Fishery Landings

The Technical Committee reviewed the current status of bait fishery reporting by state and concluded that there was excellent coverage of the bait fisheries at this time. The majority (~85%) of bait landings are currently coming from NJ and VA and there was complete coverage of reporting from these states. The Technical Committee noted that there were reports of small-scale bait fisheries coastwide but at their current levels of harvest they were not significant in biasing any landings data.