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**ATLANTIC MENHADEN DECLINE
CAUSED BY RECRUITMENT OVERFISHING**

**August 16, 2006
Crystal City, Virginia**

**ATLANTIC MENHADEN MANAGEMENT BOARD
ATLANTIC STATES MARINE FISHERIES COMMISSION**



PREPARED BY:

CHESAPEAKE BAY ECOLOGICAL FOUNDATION, INC.

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**ATLANTIC MENHADEN DECLINE CAUSED BY RECRUITMENT
OVERFISHING**

The Chesapeake Bay Ecological Foundation (CBEF) first presented information concerning the decline of Atlantic menhaden and its effect on striped bass health to the Atlantic States Marine Fisheries Commission's (ASMFC) Menhaden Management Board in 1997. The presentation was made at the request of the Maryland Department of Natural Resources (MD-DNR) and resulted in ASMFC conducting its first Menhaden Peer Review in Baltimore, MD, on November 16-18 1998. CBEF continues to comprehensively review the way menhaden are being managed and has found that during two periods (1960s and 2000s) landings of older menhaden age-5+ were at record low levels and the menhaden stock demonstrated signs of collapse due to recruitment overfishing. In 2004, CBEF initiated a Predator Prey Monitoring Program to determine the age structure of Atlantic menhaden being consumed by large striped bass and to evaluate the impact striped bass were having on the menhaden population along the Atlantic coast.

During the mid-1970s to the late 1980s, a period of low striped bass abundance and reduced predation, menhaden recruitment was high and landings increased. However,

the menhaden population was under heavy fishing pressure and unable to attain the age structure that existed prior to the mid 1960s. Older age-5+ menhaden are potentially the most important component of the spawning stock, because they produce up to ten times more eggs than first-spawning age-3 females. Large numbers of older fish were decimated by the purse seine fishery on their summer feeding grounds in the Gulf of Maine from 1988 to 1993 leading to the northern fishery's collapse. Since then reduction and bait landings of age-5+ menhaden have continued to decline while the fishery, now concentrated in the mid-Atlantic region, continued to harvest large numbers of first spawning age-3 fish. At the same time, predation on age-1+ menhaden increased as the number of older striped bass recovered to record high levels and menhaden reduction landings declined to historic lows (Figure 1). Atlantic menhaden older than age-6 have been rare since 1965, although catch records show that age-8 fish were fairly common and age-10 fish were present in the spawning stock during the 1950s. Since the 1970s, fishing pressure has increased on pre-spawning menhaden in the Mid-Atlantic region, recruitment of young menhaden has declined in all major nursery areas (Figure 2) and the proportion (numbers) of spawning stock in reduction fishery landings has continued to increase (Figure 3); thereby, preventing the population from replacing itself. Annual reduction landings of age-5+ menhaden averaged about one million since 2000 compared to the annual average of 63 million from 1955 to 1963 (Figure 4) when the stock was ecologically healthy and capable of meeting striped bass prey demand. Since the early 1990s, menhaden recruitment has remained at historic lows in Maryland, Virginia and North Carolina; these states account for approximately 85% of the nursery area. Menhaden no longer fulfill their critical ecological role along the Atlantic coast because overfishing has severely depleted the population and adversely affected numerous species nutritionally dependent on both young and old menhaden.

NMFS developed an index in the 1980s which indicated that older menhaden in the New England region had the potential to contribute 39% of the menhaden egg production. Decimation of the menhaden spawning stock in the Gulf of Maine severely reduced egg production, although recent signs of improved recruitment have been noted in some minor nursery areas north of the Chesapeake Bay. Total menhaden bait landings also declined 98% in the New England region during the early 1990s followed by about a 50% decline in New Jersey bait landings since the mid-1990s. The broad geographic decline in landings throughout this region indicates the magnitude of overfishing that has occurred on these older fish. The bait fishery targets older fish than the reduction industry, and has grown to 20% of the total harvest by weight and accounts for about 35% of the older age 4+ menhaden landed. Virginia now accounts for more than 50% of the bait harvest following the collapse of the New England bait fishery.

The Chesapeake Bay is the center for both purse seine bait and reduction industry fisheries in terms of harvest. Since the 1950s, the portion of total Atlantic coast menhaden purse seine reduction landings from the Chesapeake Bay has increased from about 20% to 60%. The massive harvest of immature menhaden from the Chesapeake Bay, mostly ages 1 and 2, raises concern because these are the same age classes that serve as forage for the Bay's older

striped bass. Total reduction landings have now declined from an average of 290,000 metric tons (mt; 1985 to 2000) to 165,470mt (2002 to 2005). The total numerical harvest of age-2 menhaden, the age class upon which the reduction fishery largely depends, declined 73% from 1993 to 2005. In “Habitat Requirements for Chesapeake Bay Living Resources” (1991) R.L. Lippson (NMFS) stated: *“There is some concern on the part of biologists and resource managers that menhaden should be allowed to mature and spawn ... before they are harvested”*. In 2005, about 72% of the reduction harvest by number was ages 0-2 sub-adult menhaden that had not reached spawning age.

The ASMFC relies too heavily on single species modeling even though stock assessment data indicate menhaden have been overfished and an ecologically healthy population no longer exists (page 4). Renowned fishery scientist, John Boreman, as quoted in “Striper Wars”, (2005), *“The biggest danger for (fish) population modelers is when you start to believe your own models. And not take them for what they really represent, which is just ... your hypothesis about whats happening out there ... But you can get so wrapped up in the model ... you start to believe its truth, no matter what, instead of ... questioning whether the data and assumptions hold up”*. The harvest-data dependent model now relies solely on menhaden purse seine landings from the Mid-Atlantic Bight, and has not been sensitive to a significant contraction of their historic range as “fisheries dependent sources strongly suggest” (ASMFC 1998 Peer Review Panel). The model uses assumed age-specific fixed natural mortality rates that have not been adjusted for changes in predation mortality over time. **Since 2003, striped bass diet studies that examined more than 1,000 fish over 28” show predation on age-1+ menhaden to be significant; however, menhaden older than age-4 were rarely found, indicating few fish from these older age classes still survive.** Earlier studies by Hartman and Brandt (“Predatory demand & impact of striped bass, bluefish & weakfish in the Chesapeake Bay”, 1995) had concluded: *“...management measures that permit increased escapement and presumably increased migration of age-1 and older menhaden to the Chesapeake Bay will benefit the production of striped bass, bluefish and weakfish”*. Striped bass diet studies over the past half century show that since the early 1990s the declining menhaden population can no longer meet the prey demand of Chesapeake Bay striped bass.

Concern that the stock was being overfished appeared in “Marine Fisheries Review” (“Assessment and Management of Atlantic & Gulf Menhaden Stocks”, D.S. Vaughan & J.V. Merriner, 1991). The summary cautioned: ***“The expansion of fishing on the spawning stock in New England waters concurrently with increasing fishing pressure on pre-spawning menhaden off Virginia and North Carolina in the fall prompts concern for maintenance of the Atlantic menhaden resource”***. Since the early 1990s, schools of adult menhaden have been scarce in the New England region, heavy fishing pressure on adult menhaden has reduced egg production, poor recruitment has persisted in the major nursery areas and in 2005 reduction landings declined to the lowest level since NMFS began keeping records in 1940. Nonetheless, **ASMFC continues to state: “Menhaden are not overfished and overfishing is not occurring on a coastwide basis”** because technically the overfishing targets in their Menhaden Fishery Management Plan (FMP) were not exceeded. Menhaden have been overfished for decades according to NOAA’s definition of **growth overfishing**

(when fishing pressure on smaller fish is too heavy to allow the fishery to produce its maximum poundage) and **recruitment overfishing** (when fishing pressure is too heavy to allow a fish population to replace itself). ASMFC's Menhaden FMP fails to comply with the first national standard (prevent overfishing while achieving optimum yield) which is the heart of any FMP according to NOAA. ASMFC is not required to comply with national standards defining overfishing as specified in the Magnuson Stevens Act. **However, striped bass studies and stock assessment data show that menhaden have been ecologically overfished and according to NOAA's overfishing definitions menhaden are being overfished and overfishing is occurring on a coastwide basis.**

FACTS INDICATE AN ECOLOGICALLY HEALTHY MENHADEN STOCK DOES NOT EXIST

- After the menhaden spawning stock was severely overfished from 1988 to 1993 in the Gulf of Maine, ASMFC stated: "Schools of menhaden have been scarce in New England region since the early 1990s".
- The mean weight of individual age-3 menhaden has trended higher since 1992 and is approaching weights achieved during the 1960s to the 1970s when the spawning stock biomass was low.*
- The Potomac River pound net adult index used in ASMFC's Menhaden Stock Assessment has been showing a declining trend toward the historic low levels of the 1960s.*
- Reduction fishery landings of age-2 menhaden, the age class upon which the fishery largely depends, has declined 74% since 1993, and from 1998 to 2005 continued to decline following plant consolidation.*
- Menhaden Compliance Reports submitted by individual states to ASMFC show a significant decline in bait landings (predominately older/larger menhaden) since the mid-1990s along most of the Atlantic coast.
- Reduction landings of age-5+ menhaden continued declining after New England's fishery collapsed, annually averaging about 1 million since 2000 compared to an average of 63 million from 1955 to 1963. *
- Landings of age-4+ menhaden have declined in the bait and reduction purse seine fishery since 1998. *
- Since 1993, menhaden recruitment levels have been low in the major nursery areas along the coast.*
- Since 2003 diet studies on large numbers of older striped bass show predation on age-1+ menhaden to be significant but fish older than age-4 were rare, indicating few menhaden still exist from older age classes.
- Menhaden are no longer available in sufficient numbers to supply the increased forage demand of the Chesapeake Bay's striped bass population. Overton, A.S., (2003) Striped Bass Predator Prey Interactions in the Chesapeake Bay and Along the Atlantic Coast
- Overfishing during the 1950s and early 1960s changed the adult menhaden age

structure (3-10 year old fish) to predominately first-spawning age-3 females which produce approximately 90% less eggs than older age-5+ females.*

- Since the 1970s, fishing pressure has increased on pre-spawning menhaden in the Mid-Atlantic region, recruitment of young menhaden has declined in all major nursery areas and the proportion (numbers) of spawning stock in reduction fishery landings has continued to increase thereby, preventing the population from replacing itself.

*ASMFC Stock Assessment Report No. 04-01 (Supplement).

The ASMFC has encouraged the MD-DNR and CBEF to work closely with the Management Board and Technical Committee since 2000 to ensure that all relevant data is incorporated into the menhaden stock assessment, therefore this report is being presented to the Menhaden Management Board on August 16, 2006.

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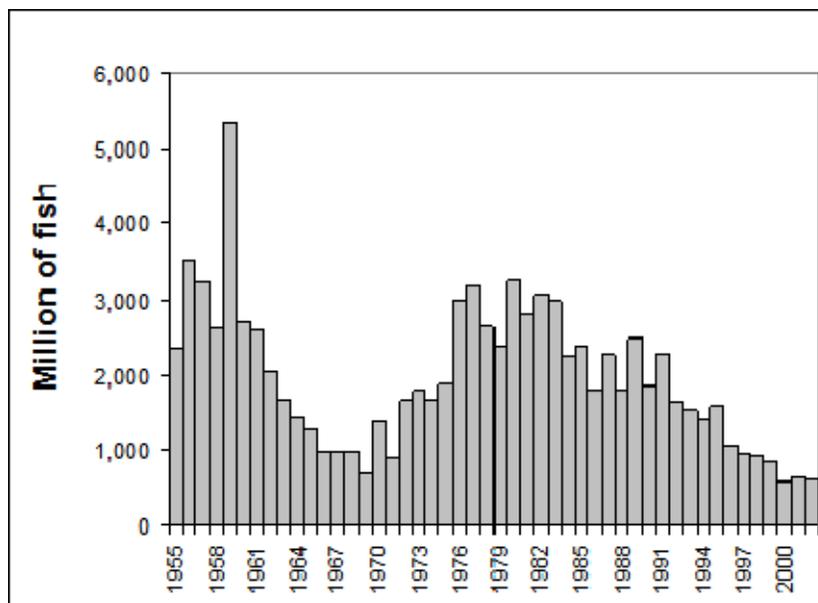


Figure 1. Numbers of Atlantic menhaden (ages 1+) landed by the reduction fishery.

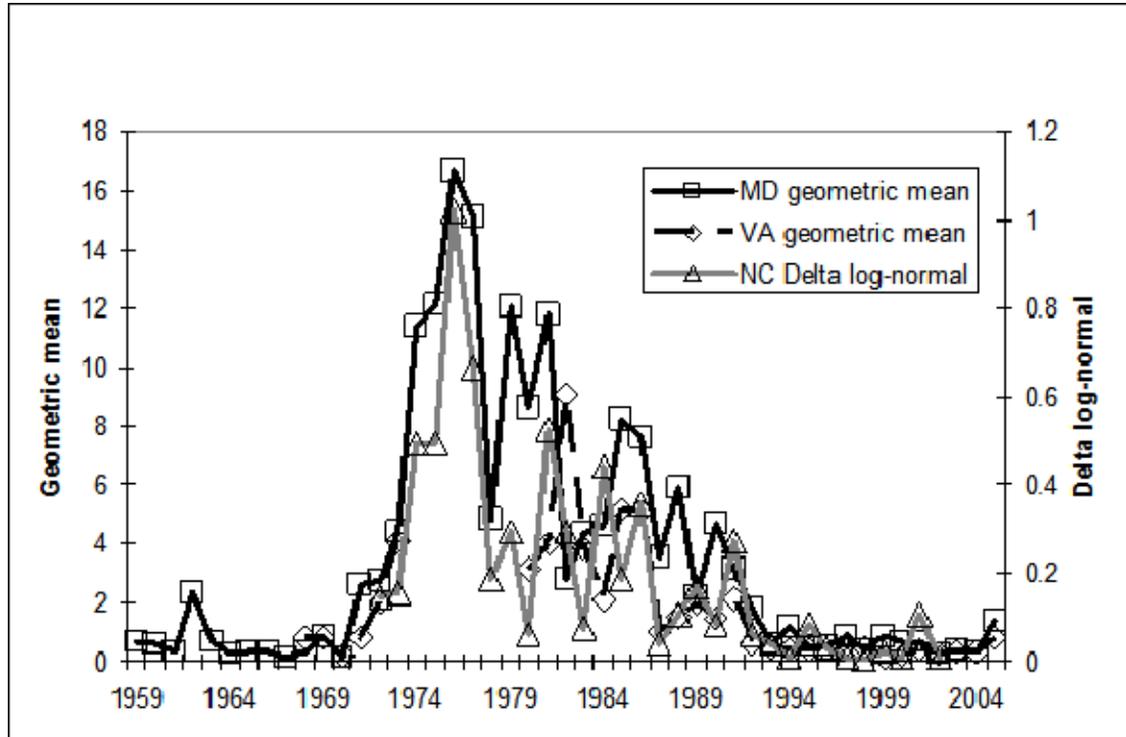


Figure 2. Atlantic menhaden juvenile indices in the major producer states (MD, VA, and NC).

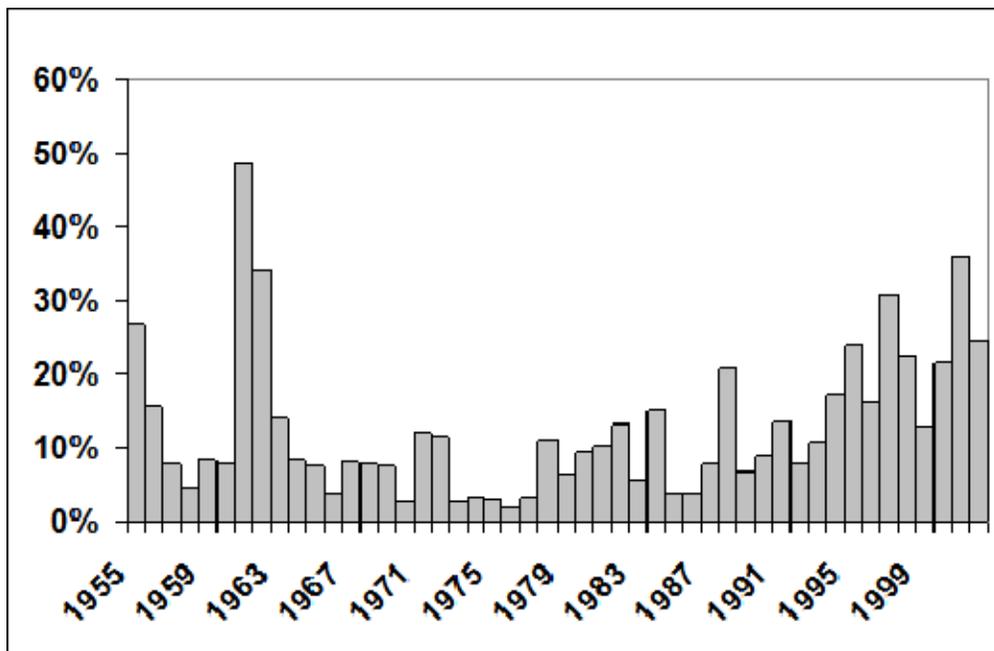


Figure 3. Percentage of age 3+ menhaden (completely mature fish) in reduction landings (number).

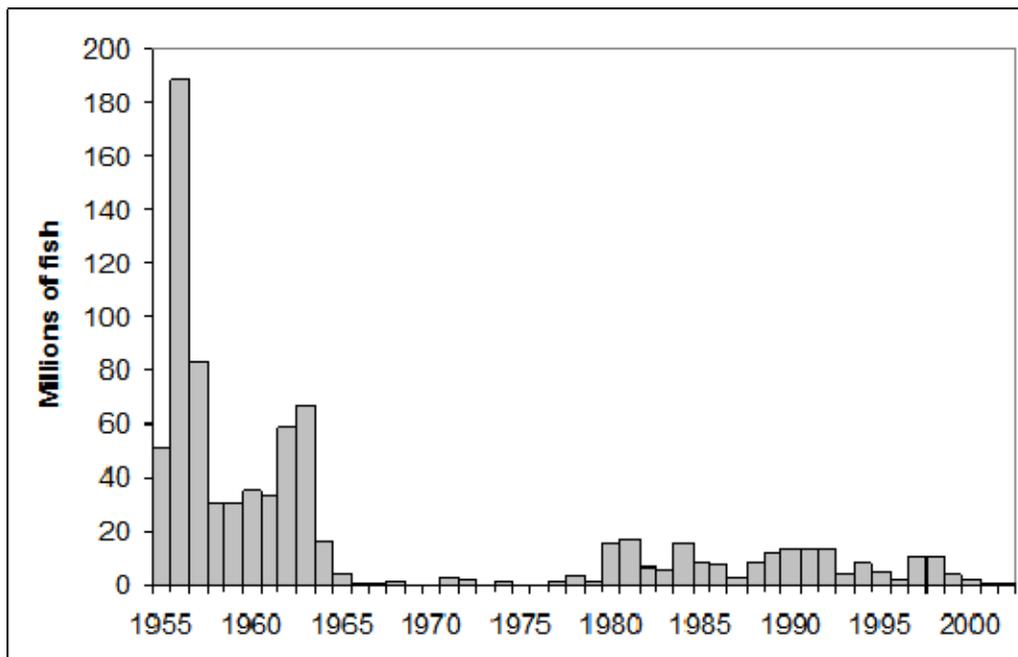


Figure 4. Sum of ages 5+ Atlantic menhaden (number) in reduction fishery landings.

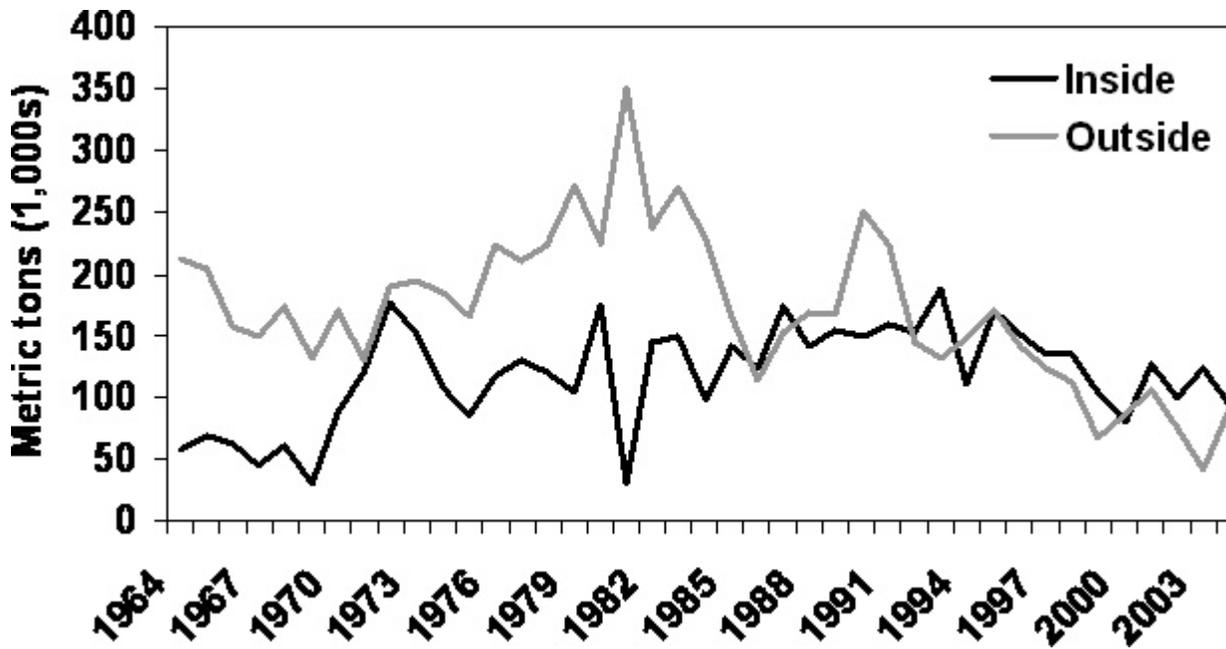


Figure 5. Atlantic menhaden reduction landings (weight in metric tons) from inside and outside Chesapeake Bay.

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