

# ATLANTIC STATES MARINE FISHERIES COMMISSION

## REVIEW OF THE INTERSTATE FISHERY MANAGEMENT PLAN

FOR ATLANTIC MENHADEN  
(*Brevoortia tyrannus*)

2016 FISHING YEAR



Prepared by the Plan Review Team

Approved by the Atlantic Menhaden Management Board  
May 2017

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

## Management Summary

<u>Date of FMP:</u>	Original FMP: August 1981
<u>Amendments:</u>	Plan Revision: September 1992 Amendment 1: July 2001 Amendment 2: December 2012 Amendment 3: Draft in progress
<u>Management Unit:</u>	Maine through Florida
<u>States With Declared Interest:</u>	Maine – Florida
<u>Additional Jurisdictions:</u>	Potomac River Fisheries Commission, National Marine Fisheries Service, United States Fish and Wildlife Service
<u>Active Boards/Committees:</u>	Atlantic Menhaden Management Board, Advisory Panel, Technical Committee, Stock Assessment Subcommittee, Plan Review Team, Plan Development Team, Biological Ecological Reference Point Work Group
<u>Stock Status:</u>	Not overfished, and overfishing is not occurring (benchmark assessment; SEDAR 2015)

### I. Status of the Fishery Management Plan

Atlantic menhaden management authority is vested in the states because the vast majority of landings come from state waters. All Atlantic coast states and jurisdictions, with the exception of the District of Columbia, have declared an interest in the Atlantic menhaden management program.

The first coastwide fishery management plan (FMP) for Atlantic menhaden was passed in 1981 (ASMFC 1981). The 1981 FMP did not recommend or require specific management actions, but provided a suite of options should they be needed. In 1992, the plan was revised to include a suite of objectives intended to improve data collection and promote awareness of the fishery and its research needs (ASMFC 1992).

Amendment 1, passed in 2001, provided specific biological, social/economic, ecological, and management objectives for Atlantic menhaden. No recreational or commercial management

measures were implemented as a result of Amendment 1; however, subsequent addenda instituted a harvest cap on the reduction fishery in the Chesapeake Bay, based on average landings from 2001-2005. Two addenda (Addendum I and V) revised the biological reference points for menhaden and specified that stock assessments are to occur every three years.

Amendment 2, approved in December 2012, established a 170,800 metric ton (mt) total allowable catch (TAC) for the commercial fishery beginning in 2013. This TAC represented a 20% reduction from average landings between 2009 and 2011. The 2009-2011 time period was also used to allocate the TAC among the jurisdictions. In addition, the Amendment established requirements for timely reporting and required states to be accountable for their respective quotas by paying back any overages the following year. The amendment included provisions that allowed for the transfer of quota between jurisdictions and a bycatch allowance of 6,000 pounds per trip for non-directed fisheries that operate after a jurisdiction's quota has been landed. Further, it reduced the Chesapeake Bay reduction fishery harvest cap by 20% to 87,216 metric tons.

At its May 2015 meeting, the Board established a 187,880 mt TAC for the 2015 and 2016 fishing years. This represented a 10% increase from the 2013 and 2014 TAC. In October 2016, the Board approved a TAC of 200,000 mt for the 2017 fishing year, representing a 6.45% increase from the 2015 and 2016 fishing years.

In August 2016, the Board approved Addendum I which added flexibility to the current bycatch provision by allowing two licensed individuals to harvest up to 12,000 pounds of menhaden bycatch when working together from the same vessel using stationary multi-species gear. The intent of this Addendum was to accommodate cooperative fishing practices that traditionally take place in the Chesapeake Bay.

In May 2013, the Board approved Technical Addendum I which established an episodic events set aside program. This program set aside 1% of the coastwide TAC for the New England states (ME, NH, MA, RI, CT) to harvest Atlantic menhaden when they occur in higher abundance than normal. In order to participate in the program, a state must reach its individual quota prior to September 1, implement daily trip level harvester reporting, restrict harvest to state waters, and implement a daily trip limit no greater than 120,000 pounds/vessel. At its October 2013 meeting, the Board extended the episodic event set aside program through 2015, adding a provision that re-allocated unused set aside as of October 31 to the coastwide states based on the same allocation percentages included in Amendment 2. At its May 2016 meeting, the Board again extended the episodic events program until final action on Amendment 3 and added New York as an eligible state to harvest under the program.

At its February 2014 meeting, the Board passed a motion to manage cast net fisheries for Atlantic menhaden under the bycatch allowance for 2014 and 2015, with the states bearing responsibility for reporting. At its November 2015 meeting, the Board approved a motion to continue the management of cast net fisheries under the bycatch allowance for 2016. In

February 2017, the Board extended management of the cast net fishery under the bycatch provision until implementation of Amendment 3.

## **II. Status of the Stock**

Threshold reference points are the basis for determining stock status. When the fishing mortality rate ( $F$ ) exceeds the  $F$ -threshold, overfishing is occurring. When the reproductive output measure, in this case population fecundity ( $FEC$ ), falls below its threshold, then the stock is overfished, meaning there is insufficient egg production to replenish the stock.

Amendment 2 (2013) implemented maximum spawning potential (MSP) based reference points that relate current stock conditions as a percent of unfished conditions. Considering the modeling and data input changes that occurred in the 2015 Benchmark Stock Assessment, the TC and Peer Review Panel recommended new MSP based reference points that are applicable to the results of the assessment (SEDAR 2015). These new reference points were accepted by the Board in 2015.

As recommended by the Peer Review Panel, and accepted by the TC, the value of fishing mortality reference points is to be the geometric mean of fishing mortality on ages-2 to -4. These ages represent the fully selected fishing mortality rates depending upon the year and fishery (i.e., bait and reduction). The fecundity ( $FEC$ ) reference points match the  $F$  reference points meaning they are equal to the fecundity estimated when  $F$  reaches equilibrium at its target and threshold MSP levels, respectively.

As a result, the fishing mortality reference points are  $F$ -target ( $F_{57\%MSP}$ ) = 0.38 and  $F$ -threshold ( $F_{26\%MSP}$ ) = 1.26. Associated reference points for population fecundity are  $FEC$ -target ( $FEC_{57\%MSP}$ ) = 189,270 (billions of eggs), and  $FEC$ -threshold ( $FEC_{26\%MSP}$ ) = 86,821 (billions of eggs). Based on the 2015 stock assessment, overfishing is not occurring because fishing mortality for the terminal year (2013) is estimated to be  $F = 0.22$  ( $F_{70\%MSP}$ ), below both the target and the threshold. Additionally, the stock is not overfished because fecundity for 2013 is estimated to be  $FEC = 170,536$  billion eggs, above the threshold and just below the target.

The next stock assessment will be an update assessment in 2017.

## **III. Progress of the Biological Ecological Reference Point Work Group**

The Biological Ecological Reference Point Work Group (BERP Work Group) has been tasked with developing menhaden-specific ecosystem reference points that account for the abundance of menhaden and the species role as a forage fish. An Ecosystem Management Objectives Workshop (EMOW) was held in 2015 to identify management goals and performance measures for the menhaden-specific ERPs. With these objectives in mind, the BERP Work Group is currently evaluating a suite of multispecies models to determine which models should be pursued and forwarded to peer review. These candidate models include a Bayesian surplus production model with a time-varying population growth rate, a Steele-Henderson model which permits non-fisheries effects (predation and environment) to be quantified and incorporated

into the single species stock assessments, and a multispecies statistical catch-at-age model in which single species models are linked to provide a predator-prey feedback between the population models. An Ecopath with Ecosim model is also being evaluated; however, the application of this model is for strategic planning (to explore tradeoffs), not quota setting advice.

In 2016, the BERP Work Group met in-person in July for a modeling workshop which focused on the Steel-Henderson model. In December, the group met via conference call to review changes made to the Steel-Henderson model and receive updates on the other modeling approaches. It is expected that a peer-review of the menhaden-specific ERP models, as well as a review of the current single-species model, will be conducted in the fall of 2019.

#### **IV. Development of Amendment 3**

At their May 2015 meeting, the Board initiated the development of Amendment 3 to the Atlantic Menhaden FMP to pursue the development of ecological reference points (ERPs) and revisit allocation methods.

As a part of the 2015 Benchmark Stock Assessment, the peer review report listed the development of ERPs as a high priority for Atlantic menhaden management. Menhaden serve an important role in the marine ecosystem as they convert phytoplankton into protein and, in turn, provide a food source to a variety of species including larger fish (e.g., weakfish, striped bass, bluefish, cod), birds (e.g., bald eagles, osprey), and marine mammals (e.g., humpback whales, bottlenose dolphin). As a result, changes in the abundance of menhaden may have implications for the marine ecosystem. ERPs provide a method to assess the status of menhaden not only in regard to their own sustainability, but also in regard to their interactions with predators and the status of other prey species. The benefit of this approach is that it allows fishery managers to consider the harvest of menhaden within a broad ecosystem context, which includes other fish, birds, mammals, and humans who utilize and depend on marine resources.

In addition to ERPs, the Board also initiated Amendment 3 to revisit the allocation methods prescribed in Amendment 2 given concerns that the approach may not strike a balance between gear types and regions. Specifically, some states have expressed concern that under the current allocation method, increases in the TAC result in limited benefits to small-scale fisheries. In addition, concerns have been expressed that the current allocation method does not provide a balance between the present needs of the fishery and future growth opportunities. Given improvements in the condition of the Atlantic menhaden stock, the three-year period of historical catch on which allocation is based may limit states who currently have minimal quota from participating in the growing fishery. Some states have also found evidence of unreported landings during the reference period, meaning the quota system may have reduced their fisheries to a greater extent than originally intended.

A Public Information Document (PID) for Amendment 3 was approved by the Board in October 2016 and public comment was collected between November and December 2016. In February 2017, the Board reviewed the comments provided on the PID and tasked the Plan Development Team with drafting Amendment 3. It is expected that Draft Amendment 3 will be approved by the Board in August 2017 and the Board will take final action on the document in November 2017.

## **V. Status of the Fishery**

### **Recreational**

Menhaden are important bait in many recreational fisheries; some recreational fishermen employ cast nets to capture menhaden or snag them with hook and line for use as bait, both dead and live. Recreational harvest is not well captured by the Marine Recreational Information Program (MRIP) because there is not a known identified direct harvest for menhaden, other than for bait. MRIP intercepts typically capture the landed fish from recreational trips as fishermen come to the dock or on the beach. Since menhaden caught by recreational fishermen are used as bait during their trip, they will not be a part of the catch that is typically seen by the surveyor completing the intercept.

The preliminary MRIP estimate of Atlantic menhaden harvest in 2016 is 1,863,159 pounds. This is significantly higher than the 931,921 pounds that were recreationally harvested in 2015.

### **Commercial**

Total commercial Atlantic menhaden landings in 2016, including reduction, bait, bycatch, and episodic event set aside (EESA) landings, was 397.86 million pounds. The bycatch landings<sup>1</sup> of 2.18 million pounds do not count toward the coastwide commercial TAC of 414.2 mil pounds. The non-bycatch landings total was 395.69 million pounds, representing a 4.5% underage of the coastwide TAC in 2016, and a 3.9% decrease from the 410.8 mil pounds landed in 2015.

### ***Reduction Fishery***

The 2016 harvest for reduction purposes was 302.9 million pounds. This represents a 4.2% decrease from 2015 reduction landings, and a 6% decrease from the previous 5-year (2011-2015) average of 321.9 mil pounds (Figure 1). Omega Protein's plant in Reedville, Virginia, is the only active Atlantic menhaden reduction factory on the Atlantic coast.

### ***Bait Fishery***

The preliminary estimate of the coastwide directed bait harvest for 2016 is 94.96 million pounds; this is a 6.0% decrease from the 2015 bait harvest, and a 10.1% decrease from the average harvest of the previous five years (2011-2015), 106.1 mil pounds (Figure 1). New Jersey (48%), Virginia (33%), Maryland (5.5%), Maine (4.7%), and Massachusetts (3.2%) landed the five largest shares.

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<sup>1</sup> Landed under the 6,000 pound bycatch allowance

### *Bycatch Landings*

Bycatch landings in 2016 totaled 2.2 million pounds, which represents a 63% decrease from 2015 bycatch landings. The 2016 bycatch landings accounted for approximately 0.55% of the coastwide landings, but do not count towards the coastwide TAC. In 2016, the states of Maryland, Virginia, New York, and Maine comprised 78% of the bycatch landings with Rhode Island, New Jersey, Delaware, PRFC, and Florida accounting for the remaining 22% (Table 1). The predominant gears used from 2013-2016 include pound nets (61%) and anchored/staked gill nets (23%), which together accounted for 84% of the average landings from 2013 through 2016 (Table 1).

A total of 1908 trips landed bycatch of Atlantic menhaden in 2016. A majority of the bycatch trips (69%) landed less than 1,000 pounds from 2013 through 2016 (Table 2).

### *Episodic Events Set Aside Program*

One percent of the TAC is set aside for episodic events. Episodic events are defined as any instance when a qualified state has reached its individual state quota, prior to September 1, and has information indicating the presence of unusually large amounts of menhaden in its state waters. In 2016, New York, Rhode Island, and Maine declared participation in the set aside. While not a New England state, New York was approved by the Board in May 2016 to harvest under the set aside program. In total, 3.81 million pounds were harvested under the set aside. The remaining roughly 331,895 pounds were re-allocated to all the coastal states on November 1, 2016 using the allocation percentages from Amendment 2.

## **VI. Status of Research and Monitoring**

### **Commercial fisheries monitoring**

**Reduction fishery** - The NMFS Southeast Fisheries Science Center Beaufort Laboratory in Beaufort, North Carolina, continues to monitor and process landings and bio sample data collected from the Atlantic menhaden purse-seine reduction fishery. The Beaufort Laboratory processes and ages all reduction samples collected on the East Coast. In addition, the purse-seine reduction fishery continues to provide Captains Daily Fishing Reports (CDFRs) to the Beaufort Laboratory where NMFS personnel enter data into a database for storage and analysis.

**Bait fishery** - Per Amendment 2, states are required to implement a timely quota monitoring system in order to maintain menhaden harvest within the TAC and minimize the potential for overages. The SAFIS daily electronic dealer reporting system allows near real time data acquisition for federally permitted bait dealers in the Mid-Atlantic and Northeast. Landings by Virginia's purse-seine for-bait vessels (snapper rigs) in Chesapeake Bay are tabulated (at season's end) using CDFRs maintained on each vessel during the fishing season. A bait-fishery sampling program for size and age composition has been conducted since 1994. The Beaufort Laboratory, and some states, age the bait samples collected. See *Section VII: Implementation*

for FMP Compliance Requirements for 2016 for further information on age and length sampling requirements.

### **Atlantic menhaden research**

The following studies relevant to menhaden assessment and management have been published within the last year:

- *Simpson, C. A., Wilberg, M. J., Bi, H., Schueller, A. M., Nesslage, G. M., and H. J. Walsh. 2016. Trends in Relative Abundance and Early Life Survival of Atlantic Menhaden during 1977-2013 from Long-Term Ichthyoplankton Programs. Transactions of the American Fisheries Society, 145(5): 1139-1151.*
  - Larval data from two large-scale sampling programs which span Nova Scotia, Canada to Cape Hatteras, North Carolina were used to develop an index of menhaden larval abundance. Overall, menhaden larval abundance increased from 1977 to 2013 and the trend closely corresponds to adult spawning stock biomass. In contrast, menhaden juvenile indices have declined during this time period. This study suggests that the decline in the juvenile abundance is not the result of reduced larval supply but is rather a result of limited survival between the larval and juvenile life stages.
- *Hilborn, R., Amoroso, R. O., Bogazzi, E., Jensen, O. P., Parma, A. M., Szuwalski, C., and C. J. Walters. In press. Fisheries Research.*
  - Literature on 11 forage species were reviewed to explore the impact of harvesting low trophic level species on predators such as fish, birds, and marine mammals. The paper contends that the impact of harvesting forage fish on predator species is less than previously estimated as current models do not account for the population variability of forage fish, the critical role of the environment in recruitment, the size distribution of forage fish, and the spatial distribution of these lower trophic species.
- *Houde, E. D., Annis, E. R., Harding, L. W., Malonee, M. E., and M. J. Wilberg. 2016. Factors affecting the abundance of age-0 Atlantic menhaden (*Brevoortia tyrannus*) in Chesapeake Bay. ICES Journal of Marine Science, 73(9): 2238-2251.*
  - The abundance of age-0 menhaden from seine and trawl surveys was analyzed to determine the impact of primary productivity and environmental variables on young of year menhaden. Results showed a positive relationship between recruit abundance and primary productivity between 1989 and 2004 but a negative relationship between the lengths of age-0 menhaden and abundance. This suggests that food and density-dependent factors may influence menhaden recruitment.
- *Buchheister, A., Miller, T. J., Houde, E. D., Secor, D. H., and R. J. Latour. 2016. Spatial and temporal dynamics of Atlantic menhaden (*Brevoortia tyrannus*) recruitment in the Northwest Atlantic Ocean. ICES Journal of Marine Science, 73(4): 1147-1159.*
  - Young of year indices from 1959 to 2013 were used to investigate spatial and temporal variability in menhaden recruitment. The study found two geographic



groups, one in the Chesapeake Bay and one in Southern New England. The Atlantic Multidecadal Oscillation was the best predictor of menhaden recruitment trends in both regions.

- *Anstead, K. W., Schaffler, J. J., and C. M. Jones. 2016. Coast-Wide Nursery Contribution of New recruits to the Population of Atlantic Menhaden. Transactions of the American Fisheries Society, 145(3): 627-636.*
  - Otolith chemistry was used to evaluate the relative importance of menhaden nursery grounds to the overall population. The Chesapeake Bay, while still contributing the highest proportion of age-1 recruits, showed a decline in recruitment over the last 20 years. In contrast, contributions from nursery grounds in New England have increased over time.

## **VII. Implementation of FMP Compliance Requirements for 2016**

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

### *Quota Results*

The final state quotas for 2016 include an adjustment from the reallocation of unused episodic event set aside that occurred on November 1, as well as eight inter-state quota transfers (Table 3). Massachusetts transferred 35,986 pounds to Rhode Island. A second transfer of 100,000 pounds was made from Massachusetts to Rhode Island to allow for the harvest of menhaden in the fall, but since this transfer was not used, the full 100,000 pounds was transferred back to Massachusetts. North Carolina transferred 85,000 pounds to Florida, 492,823 pounds to New York (occurred over two transfers), and 300,000 pounds to Maine. Virginia transferred 1.5 million pounds to Maine. Table 3 contains state specific quotas and harvest that occurred in 2016. Table 4 displays the breakdown in directed versus bycatch landings by jurisdiction.

At their Annual meeting, the Board set the 2017 TAC at 200,000 mt (440.9 million pounds), a 6.45% increase from the 2016 TAC. State-specific quotas for the 2017 fishing year are displayed in Table 3. Florida's 2017 quota will be reduced by the amount of their overage in 2016 unless an inter-state quota transfer is processed.

### *Quota Monitoring*

Menhaden purse seine and bait seine vessels (or snapper rigs) are required to submit Captain's Daily Fishing Reports (CDFRs). Maine and Virginia fulfilled this requirement in 2016. New Jersey did not require purse seine vessels to fill out the specific CDFR but did require monthly trip level reporting on state forms that include complementary data elements to the CDFR. Rhode Island purse seine vessels must call in daily reports to RI DFW and fill out daily trip level logbooks. Massachusetts requires trip level reporting for all commercial fishermen.

Through Amendment 2, the Board approved timely quota monitoring programs for each state that were intended to minimize the potential for quota overages. Table 5 contains a summary of each state's approved quota monitoring system. Several states did exceed their quota and many pursued quota transfers to ameliorate this overage. In most cases, quota overages

resulted from the fact that there was a high and/or variable volume of landings over a short period of time relative to the size of the quota.

#### *Biological Monitoring Requirements*

Amendment 2 implemented monitoring requirements for non *de minimis* states as follows:

- One 10-fish sample (age and length) per 300 metric tons landed for bait purposes for ME, NH, MA, RI, CT, NY, NJ, and DE; and
- One 10-fish sample (age and length) per 200 metric tons landed for bait purposes for MD, PRFC, VA, and NC.

Table 6 provides the number of 10-fish samples required for 2016. These are based on the best available 2016 total bait landings data (including bycatch and episodic events) provided to the Commission by the states. Table 6 also provides the number of ages and lengths collected by the states in 2016, and an indication of the gear type sampled during collections. All states met the biological monitoring requirements of Amendment 2 in 2016.

#### *Adult CPUE Index Requirement*

Amendment 2 required that, at a minimum, each state with a pound net fishery must collect catch and effort data elements for Atlantic menhaden as follows; total pounds landed per day, number of pound nets fished per day. These are harvester trip level ACCSP data requirements. In May of 2013, the Board approved North Carolina's request to omit this information on the basis that it does not have the current reporting structure to require a quantity of gear field by harvesters or dealers. All other states with a pound net fishery met this requirement.

#### *Chesapeake Bay Reduction Fishery Cap*

Amendment 2 implemented a change to the Chesapeake Bay Cap for the reduction fishery, starting in 2013 and continuing indefinitely. The cap is set at 87,216 metric tons (a 20% reduction from 109,020 mt which was the average landings from 2001-2005). Harvest for reduction purposes shall be prohibited within the Chesapeake Bay when 100% of the cap is harvested from the Chesapeake Bay. A maximum of 10,976 mt of un-landed fish under the Cap can be rolled over into the subsequent year.

Reported reduction landings from the Chesapeake Bay for 2016 was less than 45,000 metric tons, which is below the Cap. As a result, the 2017 Chesapeake Bay Cap for the reduction fishery is 98,192 metric tons. The rollover applies to the following year only, and will not be carried for multiple years.

#### *De Minimis Status*

To be eligible for *de minimis* status, a state's bait landings must be less than 1% of the total coastwide bait landings for the most recent two years. State(s) with a reduction fishery are not eligible for *de minimis* consideration. If granted *de minimis* status by the Board, states are exempt from implementing biological sampling as well as pound net catch and effort data

reporting. The Board also approved a *de minimis* exemption for New Hampshire, South Carolina and Georgia from implementation of timely reporting

The states of New Hampshire, Pennsylvania, South Carolina, Georgia, and Florida requested and qualify for *de minimis* status for the 2017 fishing season. As a result, the PRT recommends that New Hampshire, Pennsylvania, South Carolina, Georgia, and Florida be granted *de minimis* status.

## **VIII. Plan Review Team Recommendations**

### **Management Recommendations**

- That the Board approve the *de minimis* requests from New Hampshire, Pennsylvania, South Carolina, Georgia, and Florida.
- That jurisdictions which repeatedly, or grossly, exceed their quota implement more frequent reporting to avoid overages.

## **IX. Literature Cited**

- Atlantic States Marine Fisheries Commission (ASMFC). 1981. Fishery Management Plan for Atlantic Menhaden. 146 pp.
- ASMFC. 1992. Fishery Management Plan for Atlantic Menhaden 1992 Revision. 170 pp.
- . 2001. Amendment 1 to the Interstate Fishery Management Plan for Atlantic Menhaden. 146 pp.
- . 2004. Addendum I to Amendment 1 to the Interstate Fishery Management Plan for Atlantic Menhaden. 52 pp.
- . 2011. Addendum V to Amendment 1 to the Interstate Fishery Management Plan for Atlantic Menhaden. 17 pp.
- . 2012. Amendment 2 to the Interstate Fishery Management Plan for Atlantic Menhaden. 114 pp.
- . 2013. Technical Addendum I to Amendment 2 to the Interstate Fishery Management Plan for Atlantic Menhaden. 4 pp.
- . 2016. Addendum I to Amendment 2 to the Interstate Fishery Management Plan for Atlantic Menhaden. 12 pp.
- Southeast Data, Assessment, and Review (SEDAR). 2015. SEDAR 40 – Atlantic Menhaden Stock Assessment Report. SEDAR, North Charleston SC. 643 pp.

Table 1. Average landings under the bycatch allowance from 2013–2016 by gear type (stationary and mobile) and jurisdiction. Highlighted cells represent the gear type with the highest landings within a jurisdiction. (C) = confidential landings, and (-) = no landings. Total confidential landings are 183,747 pounds (i.e., the sum of all C's in the table below). Note that sum of pounds and percent of total columns do not include confidential data.

State/Jurisdiction	ME	RI	CT	NY	NJ	DE	MD	PRFC	VA	FL	Sum lbs (NonConf)	% of Total
<b>Stationary Gears While Fishing</b>												
Pound net	-	47,907	-	96,176	C	-	1,943,711	688,428	112,609	-	2,888,830	61.36%
Anchored/stake gill net	-	C	913	0	79,850	23,227	19,722	1,704	966,832	C	1,092,248	23.20%
Pots	-	-	-	C	-	C	C	-	-	C	-	0.00%
Fyke nets	-	-	-	-	C	-	C	26	77	-	103	0.00%
<b>Mobile Gears While Fishing</b>												
Cast Net	-	C	-	152,669	C	-	C	-	-	150,585	303,253	6.44%
Drift Gill net	-	-	-	24,443	83,697	53,381	12,061	-	62,189	-	235,771	5.01%
Purse Seine	C	-	-	-	-	-	-	-	-	-	-	0.00%
Seines Haul/Beach	-	-	-	177,173	-	-	C	35	3,840	-	181,048	3.85%
Trawl	-	C	C	6,565	C	-	-	-	-	-	6,565	0.14%
Hook & Line	-	C	C	-	-	-	C	-	-	C	-	0.00%
<b>Sum lbs (NonConf)</b>	-	47,907	913	457,025	163,547	76,608	1,975,494	690,193	1,145,547	150,585	4,707,818	
<b>% of Total</b>	0.00%	1.02%		9.71%	3.47%	1.63%	41.96%	14.66%	24.33%	3.20%		

Table 2. Total number of bycatch trips by year from 2013-2016 separated into 1,000 pound landings bins.

Bins (LBS)	2013 Trips	2014 Trips	2015 Trips	2016 Trips	Total Trips	% of Total Trips 2013-2016
1-1000	1,875	3,673	3,163	1,450	10,161	69%
1001-2000	252	517	582	148	1,499	10%
2001-3000	148	318	316	73	855	6%
3001-4000	110	190	139	48	487	3%
4001-5000	131	206	132	48	517	4%
5001-6000	158	265	196	108	727	5%
6000+	130	109	140	33	412	3%
<b>Total</b>	<b>2,804</b>	<b>5,278</b>	<b>4,668</b>	<b>1,908</b>	<b>14,658</b>	

Table 3. Results of 2016 quota accounting in pounds. Note, in this table, the 2016 landings do not include bycatch landings because they do not count towards the TAC. Unused episodic events set aside quota that was re-allocated to the states totaled 331,895 pounds. The 2017 quotas account for overages which occurred in the 2016 fishery.

State	2016 Quota	Returned Set Aside	Transfers	Total 2016 Quota	2016 Landings	Overage	2017 Quota
ME	161,466	131	1,800,000	1,961,597	1,090,050		171,882
NH	123	0		123	0		131
MA	3,438,630	2,783	(35,986)	3,405,427	3,069,433		3,660,454
RI	73,457	59	35,986	109,502	109,443		78,195
CT	71,537	58		71,595	66,957		76,152
NY	227,365	184	492,823	720,372	720,372		242,032
NJ	45,893,335	37,145		45,930,480	45,630,950		48,853,880
DE	54,153	44		54,197	54,153		57,646
MD	5,628,568	4,556		5,633,123	4,328,016		5,991,662
PRFC	2,545,595	2,060		2,547,655	2,399,154		2,709,809
VA	349,873,884	283,180	(1,500,000)	348,657,064	333,848,603		372,443,990
NC	2,020,645	1,635	(877,823)	1,144,457	397,725		2,150,995
SC	-	-		-	0		-
GA	-	-		-	0		-
FL	72,030	60	85,000	157,090	161,260	4,170	74,279
<b>Total</b>	<b>410,060,788</b>	<b>331,895</b>	<b>-</b>	<b>410,392,683</b>	<b>391,876,116</b>	<b>4,170</b>	<b>436,511,109</b>

Table 4. Directed, bycatch, and episodic landings (pounds) for 2016 by jurisdiction.

	<b>Directed</b>	<b>Bycatch</b>	<b>Episodic</b>
ME	1,090,050	C	C
NH			
MA	3,069,433		
RI	109,443	C	C
CT	66,957		
NY	720,372	C	C
NJ	45,630,950	195,523	
DE	54,153	21,085	
MD	4,328,016	870,638	
PRFC	2,399,154	105,669	
VA	333,848,603	296,861	
NC	397,725		
SC			
GA			
FL	161,260	111,165	
<b>Total</b>	<b>392,339,414</b>	<b>2,175,736</b>	<b>3,810,145</b>

Table 5: State quota reporting timeframes in 2016. The **bold** text indicates which reporting program (dealer or harvesters) the states use to monitor its quotas.

State	Dealer Reporting	Harvester Reporting	Notes
ME	monthly	<b>monthly/daily</b>	Harvesters landing greater than 6,000 lbs must report daily during episodic event
NH	<b>weekly</b>	monthly	Exempt from timely reporting. Implemented weekly, trip level reporting for state dealers.
MA	<b>weekly</b>	monthly/daily	Harvesters landing greater than 6,000 lbs must report daily
RI	<b>twice weekly</b>	quarterly/daily	Harvesters using purse seines must report daily
CT	<b>weekly/monthly</b>	monthly	No directed fisheries for Atlantic menhaden
NY	<b>Weekly</b>	monthly	Capability to require weekly harvester reporting if needed
NJ	<b>weekly</b>	monthly	All menhaden sold or bartered must be done through a licensed dealer
DE	—	<b>monthly/daily</b>	Harvesters landing menhaden report daily using IVR
MD	monthly	<b>monthly/daily</b>	PN harvest is reported daily, while other harvest is reported monthly.
PRFC	—	<b>weekly</b>	Trip level harvester reports submitted weekly. When 70% of quota is estimated to be reached, then pound netters must call in weekly report of daily catch.
VA	—	<b>monthly/weekly/daily</b>	Purse seines submit weekly reports until 97% of quota, then daily reports. Monthly for all other gears until 90% of quota, then reporting every 10 days.
NC	<b>monthly (combined reports)</b>		Single trip ticket with dealer and harvester information submitted monthly. Larger dealers (>50,000 lbs of landings annually) can report electronically, updated daily.
SC	<b>monthly (combined reports)</b>		Exempt from timely reporting. Single trip ticket with dealer and harvester information.
GA	<b>monthly (combined reports)</b>		Exempt from timely reporting. Single trip ticket with dealer and harvester information.
FL	<b>monthly/weekly (combined reports)</b>		Monthly until 50% fill of quota triggers implementation of weekly.

Table 6. Biological monitoring results in 2016. Note that total bait landings includes bycatch landings.

State	#10-fish samples required	#10-fish samples collected	Age samples collected	Length samples collected	Gear/Comments
ME	7	9	9	9	purse seine
MA	5	7	7	7	purse seine (2), cast net (5)
RI	0	5	60	60	floating fish trap
CT	0	1	5	5	gill nets
NY	2	9	90	90	seines
NJ	69	113	1130	1130	purse seine (100), and other gears (13)
DE	0	5	50	50	drift gill net
MD	12	19	247	732	pound net
PRFC	6	9	90	90	pound net
VA	71	82	820	820	pound net (16), gill net (64), haul seine (2)
NC	1	6	60	60	gillnet, seine
<b>Total</b>	<b>173</b>	<b>265</b>	<b>2568</b>	<b>3053</b>	



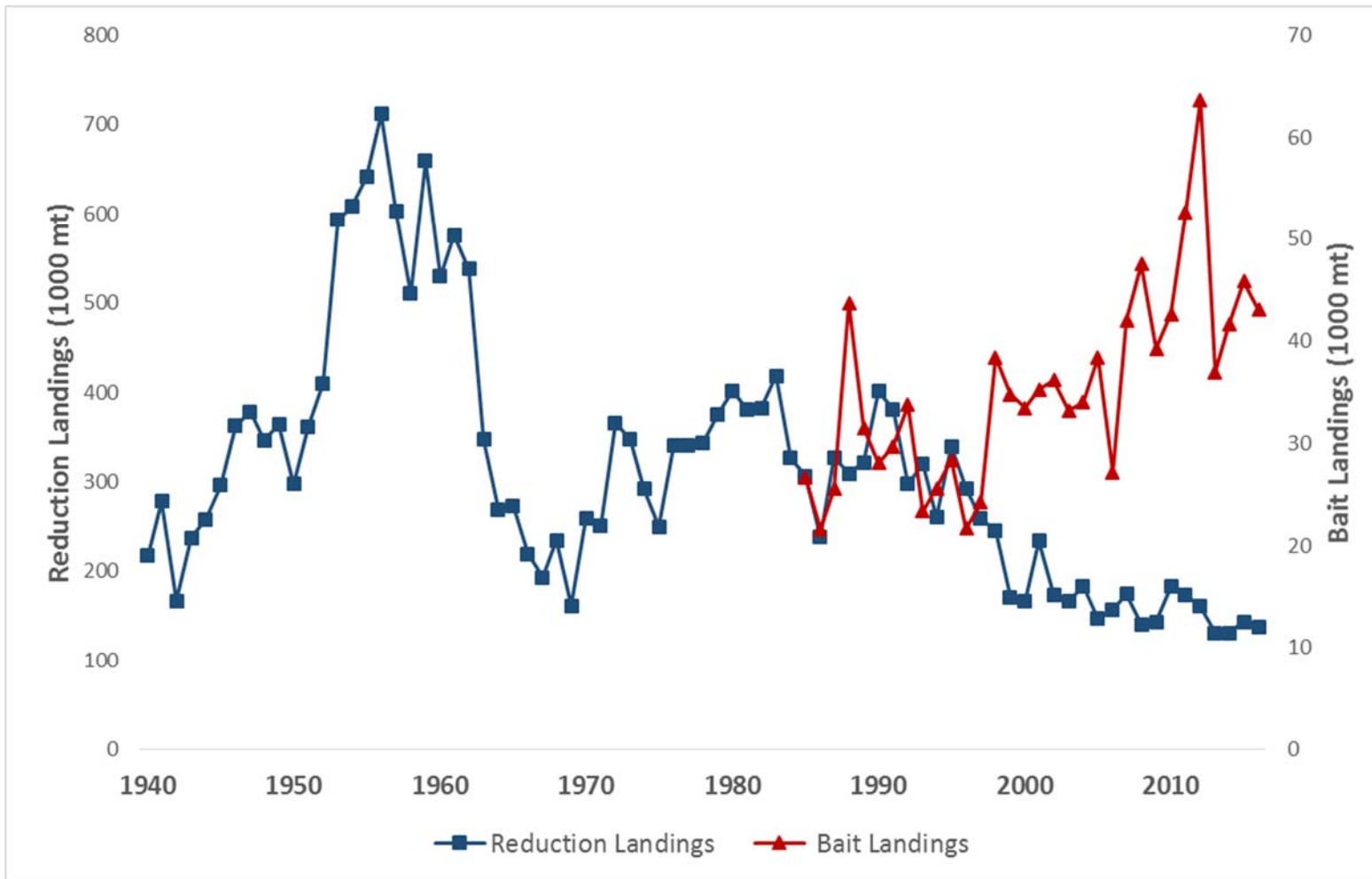


Figure 1. Landings from the reduction purse seine fishery (1940–2016) and bait fishery (1985–2016) for Atlantic menhaden. Note: there are two different scales on the y-axes.