

# FISHERY ASSESSMENT REPORT

## IFFO GLOBAL STANDARD FOR RESPONSIBLE SUPPLY OF FISHMEAL AND FISH OIL



<b>FISHERY:</b>	Atlantic menhaden ( <i>Brevoortia tyrannus</i> )
<b>LOCATION:</b>	USA (Virginia, New Jersey, North Carolina)
<b>DATE OF REPORT:</b>	5 <sup>th</sup> May 2014
<b>ASSESSOR:</b>	Sam Peacock

Global Trust Certification Ltd, 3<sup>rd</sup> Floor, Block 3, Quayside Business Park, Mill Street, Dundalk, Co. Louth, Ireland Tel: 042 932 0912 Fax 042 938 6864

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1. APPLICATION DETAILS AND SUMMARY OF THE ASSESSMENT OUTCOME			
Name:			
Address:			
Country:		Zip:	
Tel. No.		Fax. No.	
Email address:		Applicant Code	
Key Contact:		Title:	
Certification Body Details			
Name of Certification Body:		Global Trust Certification Ltd.	
Assessor Name	Peer Reviewer	Assessment Days	Initial/Surveillance/ Re-certification
Sam Peacock	Dave Garforth	5	Initial
Assessment Period	May 2014		
Scope Details			
1. Scope of Assessment		IFFO Global Standard for Responsible Supply – Issue 1	
2. Fishery		Atlantic menhaden ( <i>Brevoortia tyrannus</i> )	
3. Fishery Location		USA (Virginia, New Jersey, North Carolina)	
4. Fishery Method		Purse seine	
Outcome of Assessment			
5. Overall Fishery Compliance Rating		High	
6. Sub Components of Low Compliance		None	
7. Information deficiency		None	
8. Peer Review Evaluation		Ensure D1 and D3 are reviewed at surveillance.	
9. Recommendation		Approve fishery with conditions (see below)	

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<b>2. QUALITY OF INFORMATION</b>			
Good; primarily scientific reports (stock assessments) and fishery management plans.			
<b>3. COMPLIANCE LEVEL ACHIEVED</b>			
High			
<b>Recommendation</b>			
Approve fishery on the following condition:			
<ul style="list-style-type: none"> <li>Adherence to the newly-introduced TAC should be monitored at the first surveillance.</li> </ul>			
<b>4. GUIDANCE FOR ONSITE ASSESSMENT</b>			
None			
<b>Based on HIGH compliance findings</b>			
<b>Based on MEDIUM compliance findings</b>			
<b>Based on LOW compliance findings</b>			
<b>5. ASSESSMENT DETERMINATION</b>			
<p>The Atlantic menhaden reduction sector is managed as a component of the broader fishery conducted along the majority of the east coast of the USA. As most landings are from state waters, management of the fishery is the primary responsibility of state governments, facilitated by the inter-state Atlantic States Marine Fisheries Commission. In general, the level of management achieved by these organisations is good, with consideration of a wide range of variables, frequent fishery management plan review, and effective administrative, control and enforcement activities.</p> <p>However, there has been little historical effort to restrict total landings and this appears to have resulted in considerable overfishing and sub-optimal SSB indicators. The assessment team considers this to be best reflected in a medium compliance rating for the following two reasons. Firstly, the current overfishing status is primarily a result of a recent change in the reference points used in the management of the fishery, which have been adjusted to be considerably more conservative. Secondly, a TAC was introduced in 2012 with the objective of returning biomass levels to a more sustainable level, and was adhered to during the 2013 season. Future assessments should take particular care to examine the efficacy of the TAC and ensure that it is reflected in the landings data.</p>			
<b>HIGH Compliance</b>			
A1, A2, A3, B1, B2, C1, D2, D3, E1, E2			
<b>MEDIUM Compliance</b>			
D1 – Carry out review of TAC adherence and appropriateness at surveillance audit.			
<b>LOW Compliance</b>			
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SUMMARY OF LEVEL OF COMPLIANCE					
	The Management Framework and Procedures	Stock assessment procedures and management advice	Precautionary approach	Management measures	Implementation
legal and administrative basis	A1				
Fisheries management should be concerned with the whole stock unit	A2				
Management actions should be scientifically based	A3				
Research in support of fisheries conservation and management should exist		B1			
Best scientific evidence available should be taken into account when designing conservation and management measures		B2			
The precautionary approach is applied in the formulation of management plans			C1		
The level of fishing permitted should be set according to management advice given by research organisations				D1	
Where excess fishing capacity exist, mechanisms should be in established to reduced capacity				D2	
Management measures should ensure that fishing gear and fishing practices do not have a significant impact on non-target species and the physical environment				D3	
A framework for sanctions of violation of laws and regulations should be efficiently exists					E1
A management system for fisheries control and enforcement should be established					E2

**KEY:**                      Low Compliance:                        Medium Compliance:                        High Compliance:  

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**6. RATIONALE OF THE ASSESSMENT OUTCOME**

**A. THE MANAGEMENT FRAMEWORK AND PROCEDURE**

**LEVEL OF COMPLIANCE**

*A1. The management of the fishery must include a legal and administrative basis for the implementation of measures and controls to support the conservation of the fishery.*

<b>LOW</b>	An administrative framework that ensures an efficient management of the fishery for its conservation is not established.
<b>MEDIUM</b>	An administrative framework that ensures an efficient management of the fishery for its conservation is somehow established, but there is evidence of not being efficient to ensure the conservation of the stock.
<b>HIGH</b>	A legal and administrative framework that ensures an efficient management of the fishery for its conservation is established and works efficiently toward the conservation of the stock.

***Determination: The Atlantic menhaden reduction fishery is prosecuted in the state waters of Virginia, North Carolina and New Jersey, plus the US EEZ. Management is coordinated by the ASMFC, but management measures are applied and enforced by the individual states. Effective legal and administrative frameworks are in place in each state and at the inter-state and federal levels.*** H

*Overview*

Atlantic menhaden is distributed throughout the coastal western Atlantic, from Nova Scotia to Florida. Bait fisheries for Atlantic menhaden occur along the entire east coast of the USA; however, the reduction fishery is prosecuted primarily in Virginia, with some seasonal catches in North Carolina and New Jersey. Although the management of the Atlantic menhaden stock is co-ordinated by the Atlantic States Marine Fisheries Commission (ASMFC), management measures are implemented and enforced by individual states. Additionally, while there are some landings from the federal waters between 3-200nm from shore, management authority is vested in the states because the large majority of menhaden are caught in the state waters within 3nm of shore (as per the Atlantic Coastal Fishery Conservation and Management Act). In addition to the data collection and analysis conducted by individual states and the ASMFC, further scientific support is provided by the federal National Oceanic and Atmospheric Administration (NOAA). This assessment covers the reduction fishery only, and considers management at state, inter-state and federal levels as appropriate for each section.

*Federal management*

Atlantic menhaden is not fished in the federal waters between 3nm and 200nm from shore, and therefore does not fall under federal jurisdiction in the USA. However, the NOAA Chesapeake Bay Office provides objective scientific support on the regional management of Atlantic menhaden, and has funded a variety of research projects. These include projects to determine menhaden abundance in Chesapeake Bay, where the majority of reduction catch is taken; to estimate menhaden removal by predation; to determine the flux of menhaden between the estuarine and coastal systems; and to understand larval recruitment dynamics in the Chesapeake Bay and waters of the mid-Atlantic.

*Atlantic States Marine Fisheries Commission*

The ASMFC was formed in 1942 by Interstate Compact between the 15 Atlantic states with the objective, *“to promote the better utilization of the fisheries, marine, shell and anadromous, of the Atlantic seaboard by the development of a joint program for the promotion and protection of such fisheries, and by the prevention of the physical waste of the fisheries from any cause”*. It currently coordinates the conservation and management of 25 near-shore fish species including Atlantic menhaden, and is funded by a combination of member state dues and state and federal grants. The ASMFC develops, agrees and

publishes Interstate Fishery Management Plans (IFMPs) for each fish species. The current ASMFC vision statement is, “Healthy, self-sustaining populations for all Atlantic coast fish species or successful restoration well in progress by the year 2015”. Although the Commission is made up of representatives of all member states, seasons, catch limits and other management measures must generally be approved by the governmental bodies in each applicable state before they are implemented. In other words, the ASMFC does not have direct control over states’ fishery management measures.

*Virginia*

Management of commercial and recreational fisheries in Virginia’s coastal waters is the responsibility of the Virginia Marine Resources Commission (VMRC). In particular, the Fisheries Management Division of the VMRC collects fisheries statistics and data, develops fishery management plans, and participates in fisheries management at the inter-state level, including with the ASMFC. The VMRC is also responsible for licencing, control and enforcement in Virginia waters. Important state fisheries legislation informing the operation of the VMRC includes the Virginia Wetlands Act (1972), the Marine Patrol Act (1979), and the Fishery Management Policy Act (1984).

*North Carolina*

The North Carolina Division of Marine Fisheries (DMF), part of the Department of Environment and Natural Resources (DENR), is responsible for the management and conservation of the state’s marine and estuarine resources. Agency policies are established by the 9-member Marine Fisheries Commission and the Secretary of the DENR. The DMF is divided into nine sections, including Fisheries Management, Marine Patrol, License & Statistics, and Habitat Protection. Important legislation includes the Fisheries Reform Act (1997) and Chapter 3 of the NC Administrative Code 2013.

*New Jersey*

Management of marine fish stocks in New Jersey’s state waters falls under the jurisdiction of Bureau of Marine Fisheries (BMF), part of the NJ Division of Fish and Wildlife (DFW), which itself is a component of the Department of Environmental Protection. The objective of the BMF is to conduct fisheries research, develop and implement management plans, and to protect and enhance fish stocks and habitats. Legislation is generally contained within Title 23 of the New Jersey Permanent Statute (Fish and Game, Wild Birds, and Animals).

R1-R10.

LEVEL OF COMPLIANCE	
<i>A2. Fisheries management should be concerned with the whole stock unit over its entire area of distribution and take into account fishery removals and the biology of the species.</i>	
<b>LOW</b>	Fisheries management is not concerned with the whole stock unit over its entire area of distribution and do not take into account any of the matters listed in 'A1'.
<b>MEDIUM</b>	Fisheries management is concerned with matters listed in 'A1' but not entirely. Fisheries, in relation to 'A1' statement, should improve to ensure the long term conservation of the marine resource.
<b>HIGH</b>	Fisheries management should be concerned with the whole stock unit over its entire area of distribution and take into account: <ul style="list-style-type: none"> <li>All fishery removals</li> <li>The biology of the species</li> </ul>

**Determination: The management unit accurately reflects the current scientific understanding of the biological stock, all fishery removals are considered by managers (or have been deemed to be insignificantly small), and biological characteristics feature heavily in both stock assessments and the IFMP.**

Atlantic menhaden is distributed along the eastern coast of the USA from Maine to Florida (see figure 1), although the highest concentrations are usually found between Massachusetts and North Carolina. The management unit is defined as “throughout the range of the species within U.S. waters of the northwest Atlantic Ocean from the estuaries eastward to the offshore boundary of the EEZ”. Historically there has been some debate over whether Atlantic menhaden in USA waters exists as a single stock or is divided into a northern and a southern population. A paper published in 1991 noted that although a number of menhaden spawning cohorts exist, they appear to mix rapidly as a result of their extensive migratory movements and are virtually inseparable in the commercial fishery. More recent genetic studies also support the single-stock hypothesis, and so the management unit for Atlantic menhaden is in line with the current best scientific understanding of the biological stock.

Landings and other sampling data for the reduction fishery have been recorded since 1955 and for the bait fishery since 1985. All landings are included in stock assessment models, and although discards and bycatch of Atlantic menhaden in other fisheries are not included they are considered to be trivial in comparison to the scale of landings. Managers also take extensive account of the biology of the species, and stock assessments contain sections covering migratory patterns, life history, habitats, environmental factors and other potential variables.

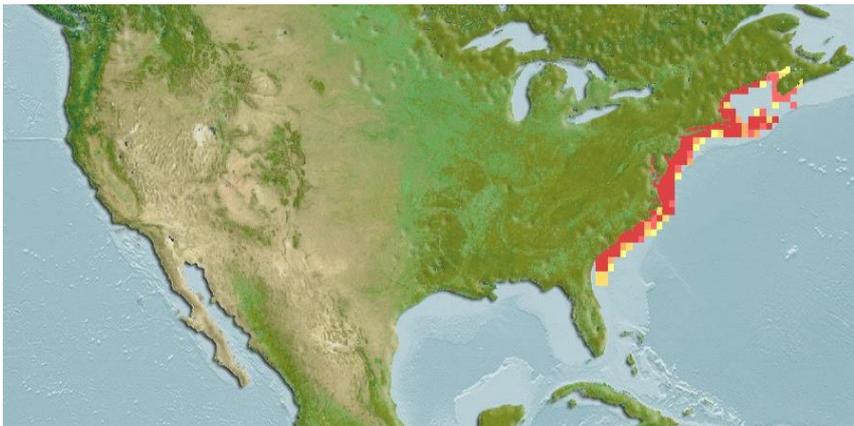


Fig. 1 – Atlantic menhaden native distribution (red and yellow areas). From the Fishbase species page (R1).

R1, R11

LEVEL OF COMPLIANCE	
<i>A3. Management actions should be based on long-term conservation objectives</i>	
<b>LOW</b>	Management actions are not based on long term management objectives.
<b>MEDIUM</b>	Management actions are based on long term management objectives. However the actions are not scientifically formulated.
<b>HIGH</b>	Management actions are based on long term management objectives, and actions are science based.
<p><b><i>Determination: Atlantic menhaden are managed according to the contents of a frequently-updated Interstate Fishery Management Plan, which has been in place since 1981. Objectives include target and limit reference points for fishing mortality and biomass, and also commitments to improve data collection, conduct thorough stock assessments, and further develop an ecosystems-based approach to management.</i></b></p> <p>Management actions are grounded in an Interstate Fishery Management Plan developed, published and regularly updated by the ASMFC. The plan was first put in place in August 1981, but has been subject to a number of addendums and additions since that time, most recently in December 2012. The stated objectives of the most recent version of the IFMP are as follows:</p> <p><i>“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...To minimize the chance of a population decline due to overfishing, reduce the risk of recruitment failure, reduce impacts to species which are ecologically dependent on Atlantic menhaden, and minimize adverse effects on participants in the fishery”.</i></p> <p>The early versions of the IFMP did not stipulate specific management actions nor objectives, but successive revisions and addenda have progressively added and adjusted the aims of the plan. Amendment 1, passed in 2001, provided specific biological, socio-economic, ecological and management objectives for the fishery. The 2010 stock assessment noted that Atlantic menhaden abundance and recruitment had been low for a number of years, prompting the development of Amendment 2 in 2012.</p> <p>Reference points for the stock are set relative to Maximum Spawning Potential (MSP), where 100% MSP is the situation in a completely unfished stock. As of the introduction of Amendment 2 (2012), the overfishing threshold is set at <math>F_{15\%MSP}</math> with a target of <math>F_{30\%MSP}</math>. Target biomass is likewise <math>SSB_{30\%MSP}</math> with a limit reference point of <math>SSB_{15\%MSP}</math> – based on the 2012 stock assessment update, these translate to <math>SSB_{target} = 61,100</math> and <math>SSB_{threshold} = 30,551</math> (units are billions of ova). The Menhaden Management Board develops management actions based on the status of the stock in relation to the reference points. For example, the IFMP states that if the current F-value exceeds the threshold (<math>F_{15\%MSP}</math>), the Board will take steps to reduce F to the target level. One example of such action is the introduction by Amendment 2 of an annual TAC across all prosecuting states. The initial TAC, for 2013, was set at 170,800t, representing a 20% reduction on the average landings 2009-11. Similar actions are prescribed to be taken in relation to maintaining SSB above the target and limit reference points.</p> <p>Other explicitly-stated objectives of the IFMP include:</p> <ul style="list-style-type: none"> <li>• Maintain a uniform data collection system for the reduction fishery and develop new protocols for other harvesting sectors, including biological, economic, and sociological data.</li> <li>• Evaluate, develop, and improve approaches or methodologies for stock assessment including fishery-independent surveys and variable natural mortality at age or by area.</li> </ul>	

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- Improve understanding of menhaden biology, food web ecology and multispecies interactions that may bear upon predator-prey and recruitment dynamics.

The IFMP is also subject to an annual review, which examines the effectiveness of management measures and the level of compliance at state level.

R11-R13

**B. STOCK ASSESSMENT PROCEDURES AND MANAGEMENT ADVICE**

**LEVEL OF COMPLIANCE**

*B1. Research in support of fisheries conservation and management should exist.*

<b>LOW</b>	Research to support the conservation and management of the stock, non-target species and physical environment does not exist
<b>MEDIUM</b>	Research to support the conservation and the management of the stock, non-target species and physical environment exists, however research programmes could be significantly improved to decrease scientific advice uncertainty.
<b>HIGH</b>	Research to support the conservation and the management of the stock, non-target species and physical environment exist, and existent research is considered most adequate for the long term conservation of the target, non-target and physical environment

***Determination: Management of Atlantic menhaden is informed by a range of fishery-dependent and fishery-independent data sources which are adequate to enable the long-term conservation of the stock. Species-specific stock assessment surveys are not conducted, but this does not appear to represent an issue given the quantity of menhaden data collected incidentally during surveys targeting other species.***

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Management of the stock is informed by data collection at the state and inter-state levels, and by frequent stock assessments conducted by the ASMFC. The most recent stock assessment was conducted in 2011, but a stock assessment update was conducted in 2012 to update the benchmark with more recent fishery data. Both fishery-dependent and fishery-independent data are used to conduct stock assessments, and additional research is conducted into ecological aspects of the fishery and its impacts on non-target species and the physical environment. In addition to stock assessments, regular ASMFC board meetings, technical committee meetings and advisory panel meetings ensure that the available data are accurate and reliable, and used in the most effective way, and also help to direct state and inter-state research.

The 2012 stock assessment update concluded that overfishing is occurring ( $F > F_{15\%MSP}$ ) but that the stock is not currently overfished. However, the overfished status is based on reference points older than those currently in place, which were set lower than those introduced by Amendment 2 in 2012 and described in section A3 above. Based on the new reference points, and using the same biomass estimate, the stock would be both subject to overfishing and overfished. This directly led to the introduction of the interstate TAC described in sections A3 and D1. Table 1 lists the reference points used in the fishery before and after the 2012 Amendment, and the estimated stock status from the 2012 stock assessment update.

**Table 1 – Atlantic menhaden target and limit reference points, prior to 2012 and since 2012, plus stock assessment outcome for year end 2011.**

	F-target	F-limit	SSB-target <sup>1</sup>	SSB-limit <sup>1</sup>
2012 reference points before Amendment 2:	0.62	1.34	19,092	9,546
2012 reference points after Amendment 2:	0.62	1.34	61,100	30,551
Stock status end 2011:	F = 4.5		SSB = 13,334 <sup>1</sup>	

<sup>1</sup>SSB units are billions of viable ova.

*Fishery-dependent data*

Reduction fleet fishery-dependent data are largely collected and collated by federal fisheries research body the National Marine Fisheries Service (NMFS). Total landings by the reduction fleet each fishing year (March-Feb) have been maintained since 1955. Daily landings are recorded in thousands of standard fish. Port samples have also been conducted every year since 1955, including length, weight and age measurements. The NMFS has a full-time agent at the Reedville plant to conduct this sampling regime on all reduction landings. Vessels are also required to complete Captains Daily Fishing Records (CDFR) which record purse-seine setting locations and at-sea catch estimates.

Bait fishery data collection has a less consistent history, but landings have been recorded through a variety of state and federal systems since 1985. Data includes total landings, catch-at-age, and CPUE estimates. The Marine Recreational Fisheries Statistics Survey (MRFSS) and more recently the Marine Recreational Information Program (MRIP) collect recreational landings estimates.

*Fishery-independent data*

Several states conduct seine surveys to collect fishery-independent data on a range of species. Although menhaden is not the primary target of any such survey, the seine catch-per-haul data generated by such projects is sufficient to generate a menhaden juvenile abundance index (JAI) to inform stock assessment. Seine surveys used in the most recent Atlantic menhaden assessment include the North Carolina Alosine Seine Survey (monthly from June – October every year since 1972); the Virginia Striped Bass Seine Survey (seasonal monthly samples 1967-1973 and 1980-present); the New Jersey Seine Survey (June – November annually since 1980); the Connecticut Seine Survey (July – October annually since 1987); the Rhode Island Seine Survey (June – October annually since 1988); and the New York Seine Survey (May – October annually since 1984). The types of data collected during each survey vary, but include length and age estimates.

*Other research*

Research on Atlantic menhaden is also conducted by the NOAA and by various governmental and academic organisations at the state level. These include research projects to determine menhaden abundance in the Bay; estimate menhaden removal by predation; determine the flux of menhaden between the estuarine and coastal systems; and understand larval recruitment dynamics in the Chesapeake Bay and waters of the mid-Atlantic.

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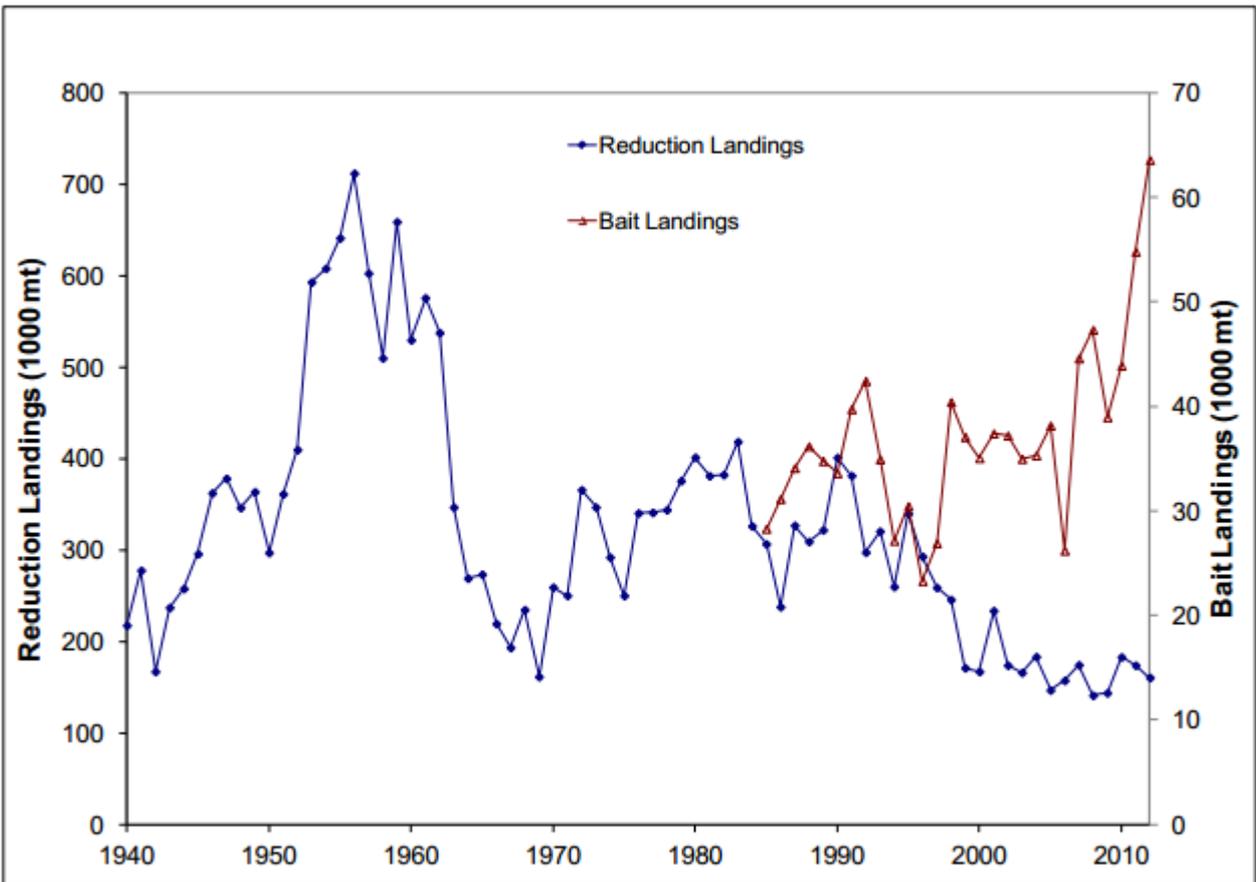


Fig. 2 – Atlantic menhaden landings in the reduction (1940 – 2012) and bait (1985 – 2012) fisheries. Note that reduction and bait landings have separate y-axis scales. From the 2013 menhaden FMP review (R13)

R4, R11, R14

LEVEL OF COMPLIANCE		
<i>B2. Best scientific evidence available should be taken into account when designing conservation and management measures.</i>		
<b>LOW</b>	Scientific advice is not taken into account when designing conservation and management measures.	
<b>MEDIUM</b>	Scientific advice is taken into account, when designing conservation and management measures. However some areas of discrepancy are identified that could have a significant impact in the long term conservation of the marine environment.	
<b>HIGH</b>	Scientific advice is taken into account, when designing conservation and management measures, in a comprehensively manner.	
<p><b>Determination: The design of conservation and management measures is rooted in the outcomes of stock assessments, IFMP reviews, and other scientific processes. The assessment team did not encounter any examples of scientific advice being ignored.</b></p> <p>ASMFC stock assessments form the basis for the development and amendment of management measures via the IFMP; as such, scientific evidence is the starting point for the management of the fishery and informs every stage of the process. Rapid and thorough response to changing scientific understanding is evidenced in a number of recent fishery management decisions, including:</p> <ul style="list-style-type: none"> <li>• The change in SSB reference points to ensure they are in line with fishing mortality reference points. It is particularly important to note that this change resulted in the fishery being categorised as overfished where previously it was not.</li> <li>• In response to the fishing mortality considerably in excess of target and limit reference points, the introduction of an annual TAC in December 2012. Additionally, Amendment 2 of the IFMP explicitly states that “the Board will set the TAC based on the best available science”.</li> <li>• Annual FMP and compliance reviews, which specifically seek to ensure the IFMP reflects best available science and is effective for achieving the long-term objectives described in section A3.</li> </ul> <p>R12</p>		H

C. THE PRECAUTIONARY APPROACH		
LEVEL OF COMPLIANCE		
<i>C1. The precautionary approach is applied in the formulation of management plans.</i>		
<b>LOW</b>	The precautionary approach is not applied in the formulation of management plans.	
<b>MEDIUM</b>	The precautionary approach is applied, however not all uncertainties are taken into account.	
<b>HIGH</b>	The precautionary approach is applied, taking into account uncertainties relating to the dynamic of fish population (recruitment, mortality, growth and fecundity), and the impact of the fishing activities, such as discards and by-catch of non-target species as well as on the physical environment (Habitats).	
<p><b>Determination: Potential sources of error in the data used to conduct stock assessments are identified and form part of the analysis. In general, the management approach to in the Atlantic menhaden fishery appears precautionary and conservative.</b></p> <p>The regular Atlantic menhaden stock assessment includes consideration of potential sources of bias and uncertainty in all the data sources used to conduct the assessment, and in the results of the assessment itself. Reference points have recently been updated to be considerably more conservative than previously, and management actions have already been taken in response to the change in overfishing categorisation of the fishery as a result.</p> <p>Examples of bias and uncertainty include:</p> <ul style="list-style-type: none"> <li>• Underreporting of fishery removals is known to occur in the bait sector, with the greatest sources expected to be personal use harvest and direct sales to commercial and recreational fishermen. More comprehensive reporting criteria over the years have improved bait harvest estimates, and</li> </ul>		H

the level of underreporting is considered to be minimal relative to the magnitude of reported landings.

- Uncertainty associated with recreational landings is substantial, but is considered less significant as the recreational sector is extremely small compared to the reduction and bait sectors.
- In relation to the seine surveys used as a fishery-independent data source, because of the schooling nature of Atlantic menhaden combined with the fact that these seine surveys were originally designed to measure the abundance of other species, it is possible that the menhaden catch data are not truly representative abundance.

R14, R15

**D. MANAGEMENT MEASURES**

**LEVEL OF COMPLIANCE**

*D1. The level of fishing permitted should be set according to management advice given by research organisations.*

<b>LOW</b>	The level of fishing permitted is not set according to management advice given by research organisations.
<b>MEDIUM</b>	The level of fishing permitted is higher than management advice given by research organisations. However, the difference is not considered to have a significant impact of the sustainability of the stock
<b>HIGH</b>	The level of fishing permitted is set according to management advice given by research organisations.

***Determination: The total level of fishing permitted has only been limited by TAC since 2013; prior to this there was no management-instigated limit on fishing effort and catches were considerably higher than modern reference points. In response to the fishery being classified as overfished, a TAC was introduced and has been effective in its first year of implementation. Although managers are responsive to the scientific advice, the assessment team considers a medium compliance rating to be appropriate until the TAC is shown to be both set at an appropriate level, and adhered to every year.***

M

Historically, the Atlantic menhaden fishery has not been subject to direct restrictions on the total level of fishing permitted. Amendment 1, active since 2001, established definitions of overfishing/overfished based on fishing mortality and SSB. The original reference points have been revised a number of times since then, most recently by Amendment 2 in 2012. Figure 3 shows the historical fishing mortality and SSB index compared to the current overfishing reference points. Although the comparison is not entirely fair as for the majority of the fishery’s history the reference points were less conservative, it is illustrative of the effectiveness of historical management measures in ensuring the sustainability of the fishery.

The only explicit commitment to limiting fishing effort in the IFMP is that the Atlantic Menhaden Management Board will re-examine management measures whenever fishing mortality exceeds or SSB falls below the reference points. In other words, if the stock is subject to overfishing, the Board will take steps to reduce fishing mortality. If the stock is overfished, the Board will take steps to allow biomass levels to recover. There is recent evidence that this commitment is upheld as follows:

- The reduction fishery has been subject to a regional harvest cap in Chesapeake Bay since 2006. Initially this was 109,020t, but this has been reduced by 20% since the introduction of the stock-wide TAC introduced in 2012 (see below)
- Since the reduction of the SSB reference points in 2012, the stock has been categorised as overfished. In response, the Board introduced an annual TAC applicable across the entire stock of 170,800t, starting in the 2013 season. This TAC represents a 20% reduction from the average total landings 2009-11.

Total landings in 2013 were 131,000t, considerably below the TAC, and the NOAA reports that this was a direct result of a change in the behaviour of the fishing industry in response to the quota. At the time of this assessment there is no information available to determine what F-value this catch represents, and hence whether or not the fishery is currently above the target fishing mortality.

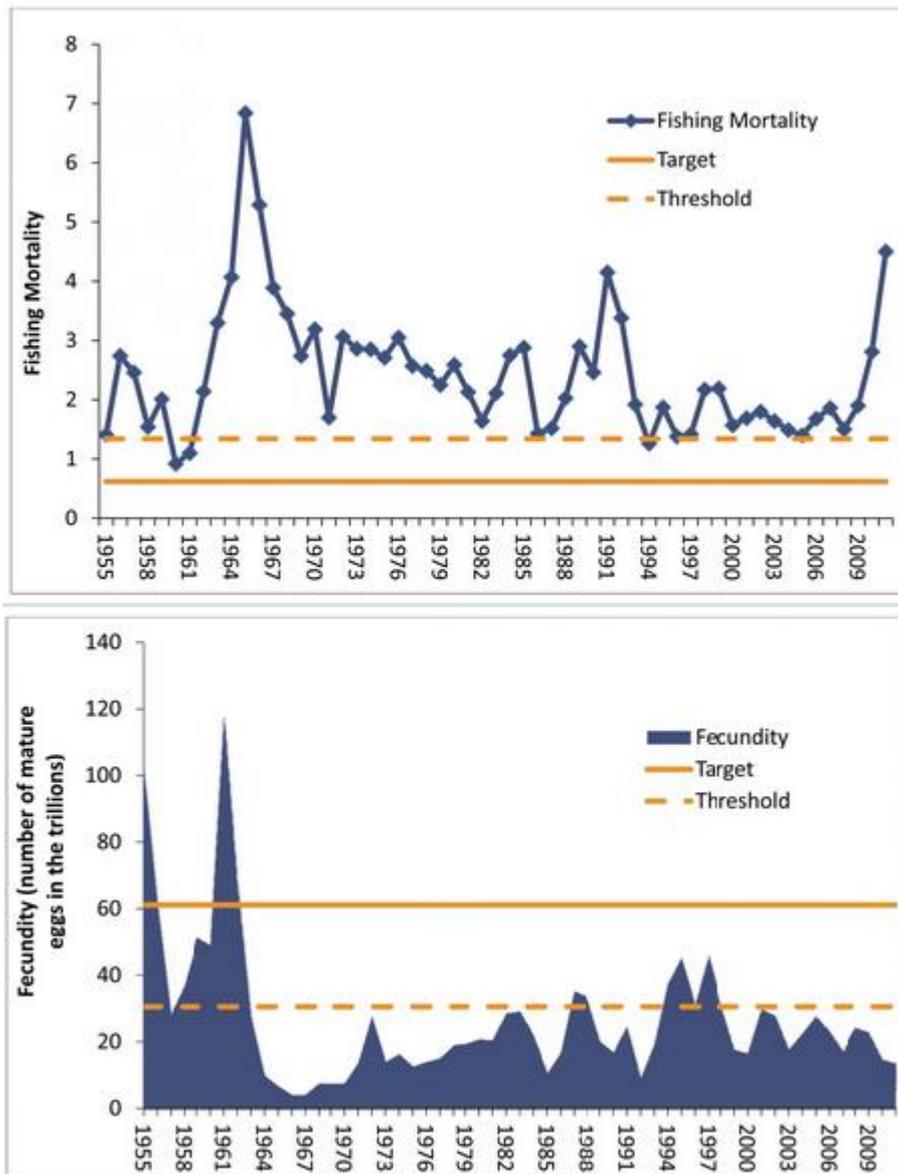


Fig. 3 – Atlantic menhaden stock status 1955 – 2011. Top: fishing mortality. Bottom: Fecundity. Fecundity target and threshold reference points are post-2012 (see text). From the 2012 stock assessment update (R14).

R12-R14, R25

LEVEL OF COMPLIANCE		
<i>D2. Where excess fishing capacity exist, mechanisms should be in established to reduced capacity to allow for the recovery of the stock to sustainable levels.</i>		
<b>LOW</b>	Mechanisms to allow for recovery of the stock to sustainable levels are not established.	
<b>MEDIUM</b>	Mechanisms to allow for recovery of the stock to sustainable levels are somehow established. However there is no evidence of the efficiency of the methods used.	
<b>HIGH</b>	Mechanisms are established to reduce capacity to allow for the recovery of the stock to sustainable levels and there are evidences of recovery.	
<p><b><i>Determination: Fishing capacity in US fisheries is monitored and reported upon by the NMFS, which as a range of management measures and direct approaches available to tackle excess capacity when it is found.</i></b></p> <p>In August 2004 the NMFS published the United States National Plan of Action for the Management of Fishing Capacity. The main pledges by NMFS set out within were as follows:</p> <ul style="list-style-type: none"> <li>• Establish and, when necessary and appropriate, revise the medium and long-term national capacity reduction targets</li> <li>• Prepare regular assessments of overcapacity in federally managed fisheries</li> <li>• Work with the regional fisheries Councils to reduce overcapacity in fisheries under their jurisdiction</li> <li>• Convene a national meeting in 2005 that addresses, among other things, the capacity issue, where NOAA Fisheries and its constituents can review progress and focus on future priorities</li> <li>• Help the Councils develop/ prioritize goals for capacity reduction in specific fisheries</li> </ul> <p>Management measures which have an effect on fishing capacity which have been implemented in the USA include limited entry, exclusive quota programs, individual transferrable quotas, community development quotas and fishing cooperatives. A final effective approach which has been taken in some fisheries is the implementation of buyout schemes.</p> <p>R15</p>		H

LEVEL OF COMPLIANCE		
<i>D3. Management measures should ensure that fishing gear and fishing practices do not have a significant impact on non-target species and the physical environment.</i>		
<b>LOW</b>	There are no management measures to prevent the impact of the fishing methods and fishing practices on non-target species and the physical environment.	
<b>MEDIUM</b>	There are management measures to prevent the impact of the fishing methods and fishing practices on non-target species and the physical environment. However it is not science based.	
<b>HIGH</b>	There are management measures to prevent the impact of the fishing methods and fishing practices on non-target species and the physical environment. Measures are based on scientific information.	
<p><b><i>Determination: The IFMP and menhaden science programs recognise and incorporate a wide range of factors in relation to non-target species, the broader ecosystem, and the physical environment.</i></b></p> <p><b>Non-target species</b></p> <p>Numerous past studies have shown that there is little or no bycatch in the menhaden purse seine fishery. Some states restrict bycatch to 1% or less of the total catch on a vessel by regulation. The Virginia Institute of Marine Science studied bycatch levels of finfish, turtles, and marine mammals in the Atlantic menhaden fishery. Results from that study indicated that bycatch in the 1992 Atlantic menhaden reduction fishery was minimal, comprising about 0.04% by number. The maximum percentage bycatch occurred in August (0.14%) and was lowest in September (0.002%). Among important recreational species, bluefish accounted</p>		H

for the largest bycatch, 1,206 fish (0.0075% of the total menhaden catch). No marine mammals, sea turtles, or other protected species were killed, captured, entangled or observed during sampling.

**PET species**

The IFMP contains a substantial section detailing the relevant federal legal instruments in relation to PET species, and their impacts and requirements in relation to the Atlantic menhaden fishery. The Endangered Species Act of 1973 (ESA) provides for the conservation of species that are endangered or threatened throughout all or a significant portion of their range, and the conservation of the ecosystems on which they depend. The Marine Mammal Protection Act of 1972 (MMPA) requires the NMFS to develop and implement plans to reduce the impact of fisheries on specified marine mammals. 14 species fall under these laws in respect of the Atlantic menhaden fishery, including four whale species, three turtles, three seals, the harbour porpoise, and the bottlenose dolphin.

Amendment 2 of the IFMP states that a lack of sea sampling data in regards to protected species interactions in the domestic Atlantic menhaden fisheries was identified during the course of drafting the amendment. Additional observer coverage for these fisheries is needed to understand the level of interaction in the fisheries where there is no or limited data.

**Ecosystems**

Menhaden form a critical link between the lower and upper levels of the Chesapeake Bay food web, because they are a key forage species for fish such as striped bass, weakfish, and bluefish and are filter feeders, grazing on planktonic organisms such as algae and zooplankton. The stated goals of the Atlantic menhaden IFMP include:

- Protect fishery habitats and water quality in the nursery grounds to insure recruitment levels are adequate to support and maintain a healthy menhaden population.
- Improve understanding of menhaden biology, food web ecology and multispecies interactions that may bear upon predator-prey and recruitment dynamics.
- Protect and maintain the important ecological role Atlantic menhaden play along the coast.
- Improve understanding of climatic drivers of recruitment.

**Physical environment**

Habitat effects are generally low for purse seines, although occasional contact is known to occur and, in these cases, can cause damage to fragile ecosystems (e.g. corals), particularly when targeting benthic-pelagic schooling species such as menhaden. The risk of ghost fishing by lost gear is also very low for purse seines.

The IFMP also requires that member states identify and protect areas of habitat crucial to menhaden, including prohibiting the use of gears or practices which cause habitat damage or inflict bycatch mortality on menhaden.

R12, R13

E. IMPLEMENTATION		
LEVEL OF COMPLIANCE		
<i>E1. There should be a framework for sanctions of violation of Laws and regulations.</i>		
<b>LOW</b>	A framework for sanctions of violation of Laws and regulations do not efficiently exist.	
<b>MEDIUM</b>	A framework for sanctions of violation of Laws and regulations do exist but do not work efficiently.	
<b>HIGH</b>	A framework for sanctions of violation of Laws and regulations exists and is proven to be efficient.	
<p><b><i>Determination: All three of the states in which the Atlantic menhaden reduction fishery is conducted have a range of potential sanctions for fishery violations defined in state legislation. Although the range of sanctions appears limited in New Jersey, the large majority of reduction menhaden is caught in Virginian waters and as such a score of high compliance is appropriate.</i></b></p> <p>Sanctions for violations of fishery laws and regulations are in place in each of the three states in which the reduction fishery is conducted.</p> <p><i>Virginia</i></p> <p>Sanctions are described in the Code of Virginia (Title 28.2, Fisheries and Habitat of the Tidal Waters) under the relevant statute. For example:</p> <ul style="list-style-type: none"> <li>• 28.2-241 – (Violation of mandatory commercial fisher registration), civil penalty of \$500.</li> <li>• 28.2-319 – (Violation of fishing gear restrictions), “Any net, pot, or other fishing device or gear used in violation of any of the provisions of this article shall be seized and forfeited to the Commonwealth”.</li> <li>• 28.2-313 – (Use of explosives, drugs or poisons), Class 3 misdemeanour (fine of up to \$500).</li> </ul> <p>Sanctions include fines, seizure of equipment and catch, cancellation of fishing permits, and imprisonment.</p> <p><i>North Carolina</i></p> <p>North Carolina General Statutes § 113-187 (Penalties for violations of subchapter and rules) states that violations of the marine fisheries subchapter, or any rules created through it (including those put in place by the MFC for the purposes of fishery management) constitutes a Class A1 misdemeanour. A1 is the highest level of misdemeanour and can result in a range of penalties depending on the specific nature of the violation and any prior convictions. Potential penalties include unlimited fine, house arrest, community service, incarceration etc. Additional potential punishments are included elsewhere in the NC Code; for example, § 113-137 states that inspectors and law enforcement officers are permitted to confiscate fish, equipment and vessels whenever there is a violation of the law.</p> <p><i>New Jersey</i></p> <p>Sanctions are described in the New Jersey Statutes (Title 23, Fish and Game, Wild Birds and Animals) under the relevant section. For example:</p> <ul style="list-style-type: none"> <li>• 23:3-1 – (Fishing without a license), a fine of between \$10 and \$200 depending on the precise nature of the offence.</li> <li>• 23:5-7 – (Landing or selling fish below minimum size), a penalty of \$20 for each fish.</li> </ul> <p>Based on the information available to the assessment team, penalties appear to be limited to fines.</p> <p>R16-R20</p>		H

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LEVEL OF COMPLIANCE	
<i>E2. A management system for fisheries control and enforcement should be established.</i>	
<b>LOW</b>	A management system for fisheries control and enforcement is not established.
<b>MEDIUM</b>	A management system for fisheries control and enforcement is established but do not work efficiently.
<b>HIGH</b>	A management system for fisheries control and enforcement is established and work efficiently.
<p><b><i>Determination: All three of the states in which the Atlantic menhaden reduction fishery is conducted have effective law enforcement bodies in place and working to ensure compliance with fisheries legislation and rules. Additionally, the LEC of the ASMFC ensures that state law enforcement agencies are effective at enforcing the specific outcomes of IFMPs.</i></b></p> <p>Each of the states in which the menhaden reduction fishery is conducted has established effective fishery control and enforcement systems.</p> <p><i>Virginia</i></p> <p>The Virginia Marine Police (VMP) comprise the largest division within the Virginia Marine Resources Commission, and are responsible for enforcing state and federal commercial and recreational fishery laws and regulations. To this end, they are empowered to check fishing licences, conduct vessel and catch inspections, and have full powers of arrest. Marine Police Officers also conduct search and rescue operations, enforce boating safety laws, respond to emergency calls, investigate boating accidents and criminal activity, and provide counter-terrorism patrols to Virginia military installations, shipyards, nuclear power plants, and other high-value maritime assets.</p> <p><i>North Carolina</i></p> <p>The enforcement of marine fishery laws and rules in NC falls under the jurisdiction of the North Carolina Marine Patrol (NCMP). Currently, the Marine Patrol has 56 officers that work in three law enforcement districts along the coast. In addition to checking commercial and recreational fishermen, officers patrol waterways, piers, and beaches in coastal areas. They also inspect seafood houses, vehicles transporting seafood, and restaurants all over the state to ensure compliance with fisheries rules. Officers use a variety of different size boats, aircraft and patrol vehicles to accomplish these tasks.</p> <p><i>New Jersey</i></p> <p>The Bureau of Law Enforcement, within the DEP’s Division of Fish and Wildlife, constitutes New Jersey’s wildlife law enforcement agency. Conservation Officers enforce wildlife laws and regulations, educating and informing the public in the process regarding the rules, laws, procedures and management practices involving the recreational and commercial uses of fish and wildlife resources to ensure the protection of the environment. Each month, Conservation Officers average about 7,000 hours of duty time, conduct 3,500 inspections and initiate 315 enforcement actions. This equates to approximately 84,000 hours, 42,000 inspections and 3,780 enforcement actions per year (although these statistics are across all wildlife law enforcement activities and are not specific to commercial fisheries).</p> <p><i>ASMFC Law Enforcement Committee</i></p> <p>To aid the law enforcement organisations of member states in ensuring that the outcomes of ASMFC agreements are adhered to, the Law Enforcement Committee (LEC) meets twice a year and provides additional guidance to Commission members. Guidance includes:</p> <ul style="list-style-type: none"> <li>• Input on the efficacy and enforceability of proposed regulations in management plans.</li> </ul>	

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<ul style="list-style-type: none"> <li>• Reports on the effectiveness of existing management plans.</li> <li>• Consideration of needs and opportunities for enhancing stakeholder awareness of and compliance with Commission management plans.</li> </ul>	
R21-R24	

<b>7. KEY STAKEHOLDERS</b>

**8. REFERENCES**

- R1 – Fishbase – Atlantic menhaden page: <http://www.fishbase.org/summary/1592>
- R2 – ASMFC, “About us”: <http://www.asmfc.org/about-us/program-overview>
- R3 – ASMFC Interstate fisheries management programme charter, 2013: [http://www.asmfc.org/files/pub/ISFMPCharter\\_May2013.pdf](http://www.asmfc.org/files/pub/ISFMPCharter_May2013.pdf)
- R4 – NOAA Chesapeake Bay office Atlantic menhaden fact page: <http://chesapeakebay.noaa.gov/fish-facts/menhaden>
- R5 – ASMFC – Amendment 2 to the IFMP for Atlantic menhaden: [http://www.asmfc.org/uploads/file/atlanticMenhadenAmendment2\\_Dec2012.pdf](http://www.asmfc.org/uploads/file/atlanticMenhadenAmendment2_Dec2012.pdf)
- R6 – VMRC – Fisheries Management Division overview: <http://mrc.virginia.gov/fmac/fmoverview.shtm>
- R7 – VMRC – History of the VMRC: <http://mrc.virginia.gov/vmrhist.shtm>
- R8 – NCDMF sections: <http://portal.ncdenr.org/web/mf/dmf-sections>
- R9 – NJ Bureau of Marine Fisheries, “About”: <http://www.nj.gov/dep/fgw/marhome.htm>
- R10 – NJ Fishing, Hunting and Trapping regulations: <http://www.state.nj.us/dep/fgw/njregs.htm>
- R11 – Stock assessment report no. 10-02 of the ASMFC – Atlantic menhaden stock assessment and review panel reports, May 2010 (revised March 2011): <http://www.asmfc.org/uploads/file/2010AtlanticMenhadenStockAssessmentAndReviewPanelReport.pdf>
- R12 – Amendment 2 to the Interstate Fishery Management Plan for Atlantic Menhaden: [http://www.asmfc.org/uploads/file/atlanticMenhadenAmendment2\\_Dec2012.pdf](http://www.asmfc.org/uploads/file/atlanticMenhadenAmendment2_Dec2012.pdf)
- R13 – 2013 review of the FMP and state compliance for the 2012 Atlantic menhaden fishery: <http://www.asmfc.org/uploads/file/2013MenhadenFMPreview.pdf>

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- R14 – ASMFC 2012 Atlantic menhaden stock assessment update:  
[http://www.asmfc.org/uploads/file/2012MenhadenStockAssmtUpdate\\_July2012.pdf](http://www.asmfc.org/uploads/file/2012MenhadenStockAssmtUpdate_July2012.pdf)
- R15 – US national plan of action for the management of fishing capacity:  
<http://www.nmfs.noaa.gov/op/pds/documents/01/113/01-113-01.pdf>
- R16 – Code of Virginia Title 28.2, Fisheries and Habitat of the Tidal Waters: <https://leg1.state.va.us/cgi-bin/legp504.exe?000+cod+TOC2802000000300000000000>
- R17 – North Carolina General Statutes § 113-187: <http://law.onecle.com/north-carolina/113-conservation-and-development/113-187.html>
- R18 – North Carolina misdemeanor sentencing explained:  
<http://www.criminaldefenselawyer.com/resources/north-carolina-misdemeanor-crimes-class-and-sentences>
- R19 – North Carolina General Statutes § 113-137:  
[http://www.ncleg.net/EnactedLegislation/Statutes/PDF/BySection/Chapter\\_113/GS\\_113-137.pdf](http://www.ncleg.net/EnactedLegislation/Statutes/PDF/BySection/Chapter_113/GS_113-137.pdf)
- R20 – New Jersey Statutes Title 23, Fish and Game, Wild Birds and Animals: <http://law.onecle.com/new-jersey/23-fish-and-game-wild-birds-and-animals/index.html>
- R21 – Virginia Marine Police overview: <http://mrc.virginia.gov/MP/leoverview.shtm>
- R22 – North Carolina Marine Patrol overview: <http://portal.ncdenr.org/web/mf/n.c.-marine-patrol>
- R23 – New Jersey DFW Bureau of Law Enforcement overview: <http://www.nj.gov/dep/fgw/lawhome.htm>
- R24 – ASMFC Law Enforcement Committee: <http://www.asmfc.org/law-enforcement/the-law-enforcement-committee>
- R25 – ASMFC Atlantic menhaden species page: <http://www.asmfc.org/species/atlantic-menhaden>
- R26 – Forecast for the 2014 Gulf and Atlantic Menhaden Purse-Seine Fisheries and Review of the 2013 Fishing Season: [http://www.st.nmfs.noaa.gov/Assets/commercial/market-news/Forecast2014\\_Final.pdf](http://www.st.nmfs.noaa.gov/Assets/commercial/market-news/Forecast2014_Final.pdf)

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