



Scoping Document for

**An Amendment to Manage Atlantic Chub Mackerel
(*Scomber colias*) as a Stock in the Mackerel, Squid, and
Butterfish Fishery Management Plan**

April 2017



What is scoping?

Scoping is the process of identifying issues, potential impacts, and a reasonable range of alternatives associated with fisheries management actions being developed by the Council. **Scoping provides the first and best opportunity for the public to make suggestions and raise concerns about new Council actions.** Your comments early in the development of this action will help the Council identify effective management alternatives and issues of concern.

The regulatory actions outlined in this document are not a list of preferred alternatives, nor will they necessarily be included in this action. The Council has not yet analyzed any management measures for their effectiveness or impacts. At this early stage, the Council will consider all reasonable options.

Please comment on which management measures may or may not be useful or practical for meeting the goal of this action (including measures not described in this document) and explain your reasoning. Please also comment on any other relevant issues the Council should consider as part of this action.

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List of acronyms and abbreviations

ABC	Acceptable Biological Catch
ACL	Annual Catch Limit
Council	Mid-Atlantic Fishery Management Council
FMP	Fishery Management Plan
NEFSC	Northeast Fisheries Science Center
NMFS	National Marine Fisheries Service
OFL	Overfishing Limit
OY	Optimum Yield
SSC	Scientific and Statistical Committee
VTR	Vessel Trip Report

1) Introduction

The Mid-Atlantic Fishery Management Council (Council) seeks public input on a developing management action which may add Atlantic chub mackerel (*Scomber colias*) as a stock in the Atlantic Mackerel, Squid, and Butterfish Fishery Management Plan (FMP). The Magnuson-Stevens Fishery Conservation and Management Act requires catch limits, accountability measures, and other conservation and management measures for stocks “in the fishery.” Through this action, the Council will consider various management alternatives aimed at preventing overfishing of and achieving optimum yield¹ for Atlantic chub mackerel in U.S. waters.

2) Why is the Council pursuing this action?

Atlantic chub mackerel are considered a forage species due to their schooling behavior, relatively small size, and role as prey for a variety of predators (see section 7 for more information). The Council’s Ecosystem Approach to Fisheries Management Guidance Document states: “it shall be the policy of the Council to support the maintenance of an adequate forage base in the Mid-Atlantic to ensure ecosystem productivity, structure and function and to support sustainable fishing communities.”²

A targeted commercial chub mackerel fishery developed in the Mid-Atlantic and Southern New England in recent years, averaging 1.32 million pounds of landings per year over 2013-2016 (see section 7 for more information). In August 2016, the Council approved an annual landings limit and a possession limit for chub mackerel as part of the Unmanaged Forage Omnibus Amendment (described in more detail on page 13). Once implemented (expected in mid-2017), these will be the first regulations on chub mackerel fisheries off the U.S. east coast. These measures are temporary and will expire three years after implementation. The Chub Mackerel Amendment aims to develop alternatives for long-term management of chub mackerel fisheries to ensure their sustainability. The Council intends to develop measures through this amendment to replace the temporary measures implemented through the Unmanaged Forage Omnibus Amendment.

Amendment Objectives

- Consider adding Atlantic chub mackerel as a stock in the Atlantic mackerel, squid, and butterfish FMP
- Develop options for catch limits, accountability measures, and other management measures to ensure long-term sustainability of chub mackerel fisheries

¹ The Magnuson-Stevens Fishery Conservation and Management Act defines optimum yield as “the amount of fish which (A) will provide the greatest overall benefit to the Nation, particularly with respect to food production and recreational opportunities, and taking into account the protection of marine ecosystems; (B) is prescribed as such on the basis of the maximum sustainable yield from the fishery, as reduced by any relevant economic, social, or ecological factor; and (C) in the case of an overfished fishery, provides for rebuilding to a level consistent with producing the maximum sustainable yield in such fishery.”

² Available at: <http://www.mafmc.org/eafm/>

3) What is a “stock in the fishery”?

When the Council took final action on the Unmanaged Forage Omnibus Amendment in August 2016 (aspects relevant to chub mackerel are described in more detail on page 13), they clearly expressed their intent to develop an additional amendment to consider managing chub mackerel as a stock in the fishery.³ The National Standards Guidelines (50 CFR 600.305 et seq.) define stocks in the fishery as “stocks that require conservation and management.” Such stocks are subject to several requirements under the Magnuson-Stevens Fishery Conservation and Management Act (see section 4, below).

Any stocks that are predominately caught in Federal waters and are overfished or subject to overfishing, or likely to become overfished or subject to overfishing in the absence of management measures, require Council management under the Magnuson-Stevens Fishery Conservation and Management Act. Beyond these criteria, the Council should consider a variety of factors when deciding whether a stock requires conservation and management, including whether the stock is harvested in a directed fishery.⁴

4) Issues for consideration

The Council is soliciting public input on all aspects of this action. This section highlights several key issues for consideration. **Please provide comments on which measures may be most appropriate for the chub mackerel fishery.** These measures are described in more detail in section 8. Over the next year, the Council will develop and evaluate alternatives related to these, and potentially other, management measures.

Required measures

The Magnuson-Stevens Fishery Conservation and Management Act lists several required provisions of FMPs for stocks in the fishery (defined in the previous section). Required management measures include:

- Annual catch limits specified in relation to acceptable biological catch limits recommended by the Council’s Scientific and Statistical Committee
- Accountability measures for when the annual catch limits are exceeded
- Essential fish habitat descriptions
- Definition of the management unit (i.e. the geographic extent of management measures)

³ This intent is expressed in the motions passed by the Council for chub mackerel management measures in the Unmanaged Forage Omnibus Amendment. These motions are available at: <http://www.mafmc.org/briefing/august-2016>. The Council reaffirmed this intent in December 2016 when they approved their 2017 implementation plan (available at <http://www.mafmc.org/strategic-plan/>), which includes initiation of this chub mackerel amendment. More information on the Unmanaged Forage Omnibus Amendment is available at: <http://www.mafmc.org/actions/unmanaged-forage>

⁴ For more information, see the National Standards Guidelines, which are available at: http://www.fisheries.noaa.gov/sfa/laws_policies/national_standards/

Discretionary measures

Other management measures are not explicitly required by the Magnuson-Stevens Fishery Conservation and Management Act, but may be necessary to prevent overfishing and promote long-term stability of the Atlantic chub mackerel fishery. Such measures could include, but are not limited to:

- Specification of optimum yield
- Permit requirements
- Limited access provisions
- Annual catch targets
- Landings limits (e.g. commercial quotas, recreational harvest limits)
- Possession limits
- Minimum fish size restrictions
- Gear restrictions
- Reporting requirements
- Seasonal and/or spatial closures
- Control dates

5) How to get involved

The Council is in the early stages of developing this amendment. You will have additional opportunities to provide comments; however, now is the best time to provide input and raise concerns about the general scope of the amendment.

Attend a scoping hearing

Public scoping hearings will be held at the following dates and locations. Scoping hearings provide an opportunity to learn more about the amendment, ask questions, and provide verbal and/or written comments.

Date	Time	Location	Address	Phone number
May 4, 2017	7:00 – 9:00 pm	Kingsborough Community College	Room V-219 2001 Oriental Boulevard Brooklyn, NY, 11235	718-368-5000
May 15, 2017	6:00 – 7:30 pm	Virginia Marine Resources Commission 4 th Floor Meeting Room	2600 Washington Avenue Newport News, VA, 23607	757-247-2200
May 16, 2017	6:30 – 8:00 pm	Princess Royale Oceanfront Resort & Conference Center	9100 Coastal Highway Ocean City, Maryland 21842	410-524-7777
May 23, 2017	6:30 – 8:00 pm	Congress Hall Hotel	200 Congress Place Cape May, NJ, 08204	888-944-1816
May 24, 2017	6:30 – 8:00 pm	University of Rhode Island Bay Campus Corless Auditorium	215 South Ferry Road Narragansett, RI, 02882	401-874-6222
May 25, 2017	6:00 – 7:30 pm	Webinar	http://mafmc.adobeconnect.com/chubscoping/	1-800-832-0736, room #5068871

Submit written comments

You may submit written comments at a public scoping hearing, or through one of the following methods:

1) **Online** at <http://www.mafmc.org/comments/chub-amendment-scoping>.

2) **Email** jbeaty@mafmc.org

3) **Mail or Fax** to:

Dr. Chris Moore, Executive Director
Mid-Atlantic Fishery Management Council
800 North State Street, Suite 201
Dover, DE 19901
FAX: 302-674-5399

Written comments must be received by 11:59 pm Eastern Standard Time on May 31, 2017.

Please include “chub mackerel scoping comments” in the subject line if using email or fax, or on the outside of the envelope if submitting written comments.

All comments, regardless of submission method, will be shared with the Council and made publicly available on the Council’s website.

Stay informed

For additional information and updates on development of this amendment, please visit:

<http://www.mafmc.org/actions/chub-mackerel-amendment>.

The Council will publish announcements about future opportunities for public comment in the Federal Register and at www.mafmc.org.

If you have any questions, please contact Julia Beaty at jbeaty@mafmc.org or 302-526-5250.

6) Next steps

Figure 1 illustrates the major steps in development of a fishery management plan amendment. Scoping is the initial phase of information gathering and public comment, after which the Council will evaluate potential management alternatives. There will be several additional opportunities for public input on development of these management alternatives.

Announcements of relevant public meetings will be posted to the Council’s website (www.mafmc.org).

The Council will develop a draft amendment with a range of management alternatives for public review. The Council will also prepare a draft environmental impacts analysis as required by the National Environmental Policy Act. This analysis will be subject to review and public comment as appropriate.

After development and consideration of management alternatives and environmental analysis, the Council will choose preferred management measures for submission to the National Marine Fisheries Service for review and consideration for approval. Approved management measures will be implemented through publication of proposed and final rules in the Federal Register, which will include additional public comment periods.

While there will be many additional opportunities for public comment on this amendment, the scoping period is particularly important for assisting the Council in establishing the overall focus and direction of the amendment.

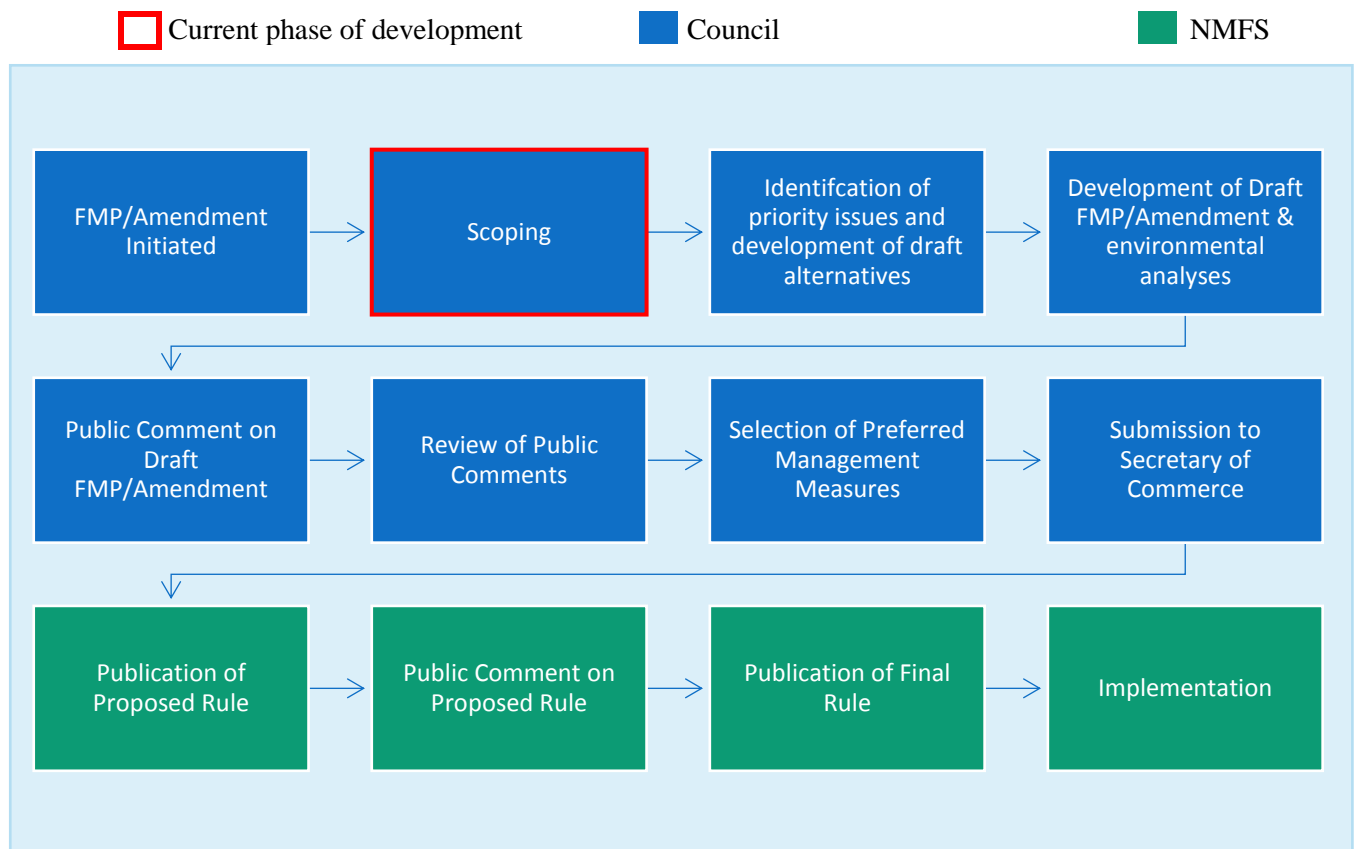


Figure 1: General process for development of a fishery management plan amendment. Items in blue are the responsibility of the Council. Items in green are the responsibility of the National Marine Fisheries Service (NMFS).

7) Background and recent fishery developments

Biology

Atlantic chub mackerel are a schooling, migratory, pelagic species. They resemble Atlantic mackerel (*Scomber scombrus*), but are smaller, generally reaching 8-14 inches in length, and have a more mottled coloration. Their distribution is more southerly than that of Atlantic mackerel, ranging from southern New England through Argentina, including the Gulf of Mexico. They are found on the continental shelf to depths of about 250-300 meters (about 137-165 fathoms) on both sides of the Atlantic, as well as in the Mediterranean (Collette and Nauen 1983).

Atlantic chub mackerel have been documented to reach age 13 (Carvalho et al. 2002); however, in most regions, ages 0-5 are most commonly observed (e.g. Krivospitchenko 1979, Martins et al. 2013). The age structure off the U.S. east coast is not well documented. Chub mackerel grow rapidly during the first year of life (Hernández and Ortega 2000). They typically spawn in water

temperatures of 15-20°C (about 60-70°F). Berrien (1978) found evidence of chub mackerel spawning from North Carolina to Florida during January - July. Richardson et al. (2010) documented Atlantic chub mackerel larvae in the straits of Florida in nearshore waters during January – May. Atlantic chub mackerel spawn in several batches (Collette and Nauen 1983). The closely related Pacific chub mackerel is believed to spawn several times throughout the year whenever oceanographic conditions are favorable and sufficient food is available (Crone and Hill 2015).

Large fluctuations in Atlantic chub mackerel abundances have been recorded around the world, including in the Mid-Atlantic and New England (Goode 1884, Hernández and Ortega 2000). These fluctuations may be partly the result of environmental influences such as temperature and upwelling strength on recruitment (Hernández and Ortega 2000). Given that chub mackerel are a fully pelagic species, ocean processes likely influence their availability in any given area, in addition to their recruitment.

Chub mackerel are opportunistic predators of copepods, other crustaceans, fish, and squid (Collette and Nauen 1983). Their diet varies seasonally (Sever et al. 2006). In the Mid-Atlantic, chub mackerel are frequent prey for tunas and billfishes (personal communication, Dr. John Graves, Virginia Institute of Marine Science, July 2016). They are also likely prey for spiny dogfish, monkfish, summer flounder,⁵ and a variety of marine mammals⁶ (Smith et al. 2015) and sharks⁷ (personal communication, Nancy Kohler, Apex Predators Program, NEFSC, Narragansett Laboratory, December 2015).

Fisheries

Commercial chub mackerel fisheries

Atlantic chub mackerel support important commercial fisheries in several countries (e.g. Collette and Nauen 1983, Carvalho et al. 2002, Velasco et al. 2011, Vasconcelos et al. 2012, Martins et al. 2013). By comparison, the recent commercial fishery in the Mid-Atlantic and New England is fairly small, averaging 444,245 pounds per year between 1994 and 2016⁸ with a peak of 5.25 million pounds in 2013. Commercial fish dealers paid an average of \$0.19 per pound of chub mackerel (adjusted to 2016 dollars) over 1994-2016 (Table 1).

Between 1996 and 2016, nearly all commercial chub mackerel landings (>95%) occurred during the months of June-October, according to data from northeast commercial fish dealers, vessel trip reports (VTRs), the Northeast Fisheries Observer Program, and the Northeast Fisheries

⁵ Based on records of scombrids (likely including chub mackerel) in stomach samples from spiny dogfish, monkfish, and summer flounder caught in the Northeast Fisheries Science Center's spring and fall bottom trawl surveys in Mid-Atlantic and southern New England offshore strata from 1973 through 2015.

⁶ Based on observations of scombrids in stomach contents, likely including chub mackerel. See Smith et al. (2015) for more information.

⁷ Based on observations of scombrids in stomach contents, likely including chub mackerel.

⁸ 2016 data are preliminary.

Science Center's study fleet. The highest proportion of landings occurred in September, followed by August.

All life stages of Atlantic chub mackerel are pelagic; however, in recent years, most landings in the Mid-Atlantic and New England were from bottom trawls. This is likely due to the spatial and temporal overlap of chub mackerel availability and the bottom trawl *Illex* squid fishery. Over the past 10 years in the Mid-Atlantic and New England, chub mackerel were mostly landed on bottom trawl trips which also landed *Illex* squid, longfin squid, and/or butterfish. Lesser amounts of chub mackerel were caught (though not always landed) in other bottom trawl fisheries and in gill net fisheries.⁹

During 1996-2016, as many as 29 federally-permitted vessels per year landed chub mackerel in the Mid-Atlantic and New England. The number of vessels without federal permits which landed chub mackerel is unknown. As many as 8 federally-permitted dealers per year in 5 states purchased these landings. A small number of vessels and dealers were responsible for most of these landings. A few relatively large vessels (by Mid-Atlantic standards; i.e. greater than 140 feet in length) which also participate in the *Illex* squid fishery targeted chub mackerel in recent years. According to some of the dominant captains and dealers in the recent chub mackerel fishery, only a few large, fast vessels in the region are capable of harvesting chub mackerel in large quantities (e.g. tens of thousands of pounds at a time). Over the past several years, a few vessels and dealers worked to build a market for chub mackerel. One captain reported that chub mackerel has become an important part of his business, especially in years when *Illex* squid are not available. Commercial dealer data show an inverse correlation between chub mackerel and *Illex* squid landings in recent years (Figure 2).

Over the past 20 years, most chub mackerel landings reported through VTRs, the study fleet, and the northeast observer program, were from statistical area 622 or 626 (depending on the dataset; e.g. Figure 3). Most landings (about 80%) resulted from catch at about 50-100 fathoms depth. Over 90% of these landings were from catch south of Hudson Canyon in statistical areas which included areas in or near the shelf break (e.g. Figure 3).

⁹ According to Northeast Fisheries Observer Program data from 1996 through March 2016.

*Table 1: Northeast dealer-reported landings and average price per pound of chub mackerel and *Illex* squid, 1994-2016. Data from some years are combined to protect confidential information representing fewer than three vessels and/or dealers. Prices are adjusted to 2016 dollars using the gross domestic product deflator index. 2016 landings are preliminary.*

Year	Chub mackerel landings (lb)	Average chub mackerel price per pound	<i>Illex</i> squid landings (lb)	Average <i>Illex</i> squid price per pound
1994-1996	44,706	\$0.13	108,676,400	\$0.18
1997	5,013	\$0.12	29,444,276	\$0.14
1998	40,219	\$0.13	51,958,751	\$0.13
1999	6,443	\$0.26	16,289,021	\$0.17
2000	16,246	\$0.24	19,866,592	\$0.14
2001	4,384	\$0.74	8,837,567	\$0.16
2002	471	\$0.33	6,061,729	\$0.18
2003	488,316	\$0.04	14,090,521	\$0.22
2004	126	\$0.41	57,534,687	\$0.23
2005	0	--	26,526,087	\$0.26
2006	0	--	30,740,382	\$0.22
2007-2009	55,562	\$0.23	95,549,924	\$0.20
2010-2011	192,301	\$0.16	76,326,551	\$0.37
2012	164,846	\$0.36	25,813,134	\$0.39
2013	5,249,567	\$0.19	8,359,998	\$0.27
2014	1,230,311	\$0.26	19,327,085	\$0.30
2015	2,108,337	\$0.23	5,339,292	\$0.29
2016*	610,783	\$0.17	14,736,843	\$0.49
1994-2016 Average	444,245	\$0.19	26,759,950	\$0.19

*2016 landings are preliminary

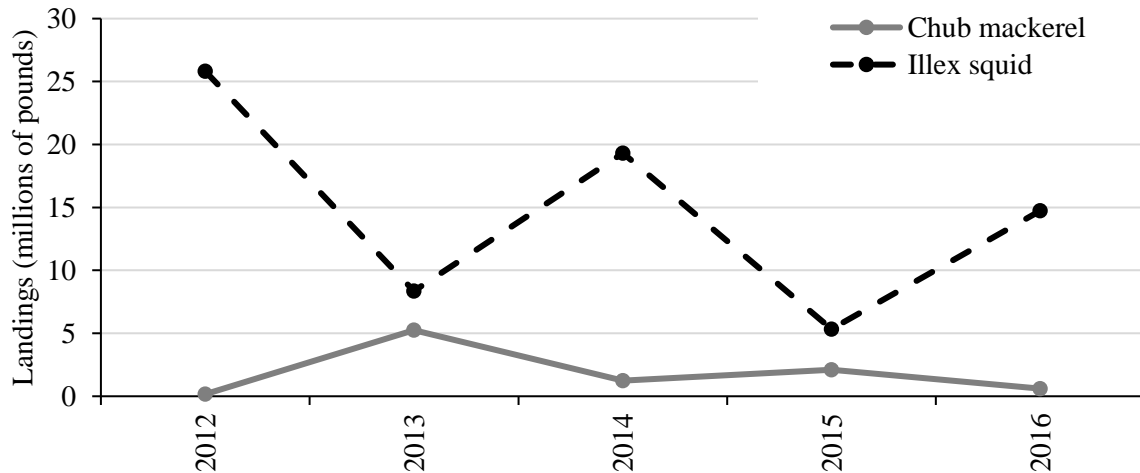


Figure 2: Landings of chub mackerel and Illex squid from 2012 through 2016, as shown in northeast commercial dealer data. 2016 values are preliminary.

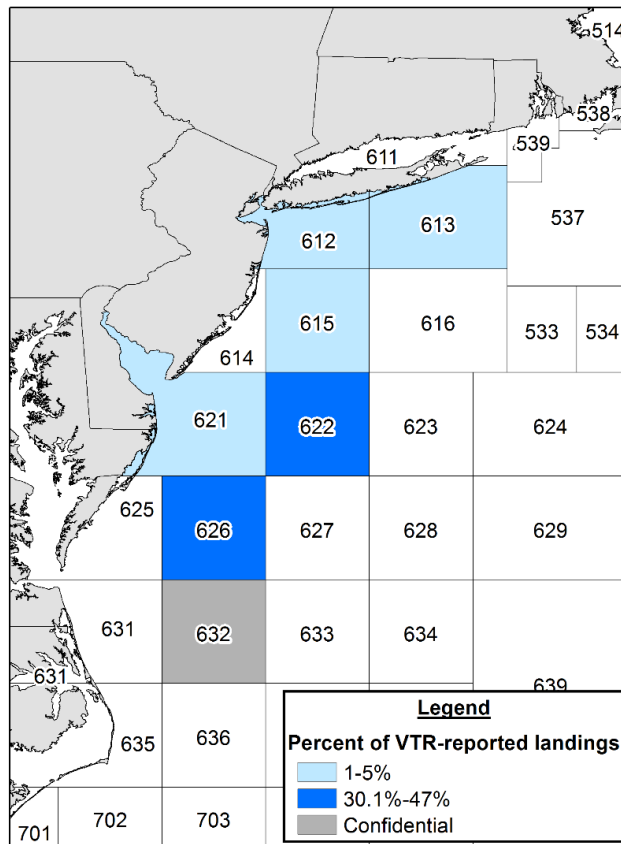


Figure 3: Percent of commercial chub mackerel landings (by weight) by statistical area, 1996-2016 as shown on Vessel Trip Reports. Data for statistical areas accounting for less than 1% of landings are not shown. Landings from statistical area 632 are confidential because they are associated with fewer than three vessels and/or dealers; however, they accounted for less than 30% of overall landings.

Recreational chub mackerel fisheries

Over the past 20 years, recreational chub mackerel landings were sporadically reported in the Mid-Atlantic, New England, the South Atlantic, and the Gulf of Mexico through the Marine Recreational Information Program and the Southeast Region Headboat Survey. Chub mackerel are likely rarely targeted by recreational anglers; however, the Council has heard reports of recreational chub mackerel catch and landings, some of which is used as live bait. Recreational catches may not have been accurately reported due to the potential for misidentification of chub mackerel as Atlantic mackerel.

Recreational fisheries for chub mackerel predators

Some large tuna, billfish, and shark species are predators of chub mackerel (page 8). These predators support important recreational fisheries. For example, 3.71 million pounds of tunas and swordfish were landed by recreational fishermen using rod and reel gear in 2014. Catch and release fishing dominates the recreational fishing effort for many of these species. Tournaments are important and unique aspects of some of these fisheries. In 2014, at least 274 tuna, billfish, or shark tournaments throughout the east coast, Gulf of Mexico, and Caribbean were registered with the National Marine Fisheries Service. Sailfish, blue marlin, yellowfin tuna, and white marlin were the predominant species in the tournaments (NMFS 2015).

In 2011, anglers spent an estimated \$23 million on private boat trips targeting tunas, billfish, and sharks in New England and the Mid-Atlantic. An economic model estimated that these expenditures generated \$266 million in total economic outputs and \$96 million in labor income and generated 1,824 full or part time jobs from Maine to North Carolina (Hutt et al. 2014).

Some Council members and members of the public have expressed concerns about spatial and temporal overlap of the commercial chub mackerel fishery and recreational fisheries targeting large tunas and billfish in offshore canyons in the summer. The concerns stem from potential negative impacts of the commercial fishery on these predators and the potential for resulting negative economic impacts to recreational fisheries, including several fishing tournaments. To date, these impacts have been difficult to analyze due to limited data on the relative importance of chub mackerel in the diet of these predators¹⁰ and limited data on the locations of recreational fishing activities. The Council will continue to explore this concern.

How should the Council evaluate potential conflicts between the commercial chub mackerel fishery and recreational fisheries for large tunas and billfish? What, if any, action should the Council take to address these potential conflicts?

¹⁰ Specifically, to date, the Council has found limited quantitative data on the importance of chub mackerel in the diet of these predators, relative to other prey items. Stomach contents are not always recorded to the species level, especially in cases of morphologically similar species such as chub mackerel and Atlantic mackerel.

Existing management measures

The Council developed a set of management measures for chub mackerel through the Unmanaged Forage Omnibus Amendment.¹¹ Once implemented (expected mid-2017), these will be the first management measures for Atlantic chub mackerel in the U.S. These measures include an annual landings limit of 2.86 million pounds, which will apply to all commercial landings of chub mackerel by federally-permitted vessels throughout the Mid-Atlantic and New England. Once this limit is reached, commercial fishing vessels will be restricted to a 40,000 pound possession limit in Mid-Atlantic federal waters. This possession limit will only come into effect once the annual landings limit is met and will only apply to vessels fishing in Mid-Atlantic federal waters. The landings and possession limits are not expected to result in a reduction in landings compared to recent levels (table 1). These measures are temporary and will expire three years after they are implemented. The Council plans to complete development of this amendment within three years so new measures can be implemented prior to expiration of the temporary measures.

8) Types of management measures which may be considered

The following section describes the types of required and discretionary management measures which the Council may consider through this amendment. Please comment on which measures may be most appropriate for managing chub mackerel fisheries.

Required measures

The Magnuson-Stevens Fishery Conservation and Management Act requires the following management measures for stocks that are managed as stocks in the fishery.

Annual catch limits

Annual catch limits account for both landings and discards and are implemented to ensure that overfishing does not occur. They are derived from the acceptable biological catch (ABC) recommendations of the Council's Scientific and Statistical Committee (SSC). The Council's Ecosystem Approach to Fisheries Management Document¹² and the National Standards Guidelines¹³ include several suggestions for developing more conservative ABCs and/or annual catch limits for forage species than are otherwise required for non-forage species.

ABCs serve as the upper bounds for annual catch limits; Councils cannot set annual catch limits that exceed the ABCs recommended by the SSC. The SSC typically derives ABCs from stock assessment model outputs and the Council's risk policy. The risk policy defines the acceptable probability of overfishing based on stock size such that the lower the stock size, the lower the acceptable risk of overfishing. The Council's Ecosystem Approach to Fisheries Management Guidance Document suggests that the Council could modify this risk policy such that the acceptable probability of overfishing is lower for forage species than for non-forage species.¹⁴

¹¹ More information is available at: <http://www.mafmc.org/actions/unmanaged-forage>

¹² More information available at: <http://www.mafmc.org/eafm/>

¹³ More information available at: http://www.fisheries.noaa.gov/sfa/laws_policies/national_standards/

¹⁴ More information available at: <http://www.mafmc.org/eafm/>

ABCs typically represent the overfishing limit (OFL) reduced to account for scientific uncertainty and modified by the Council’s risk policy (Figure 4). OFLs are typically derived from analytical stock assessments. In some cases, an OFL cannot be derived from a stock assessment and the SSC uses alternative methods to recommend an ABC.

The Magnuson-Stevens Fishery Conservation and Management Act states that the OFL should be based on the concept of maximum sustainable yield. The Council’s Ecosystem Approach to Fisheries Management Guidance Document suggests that the Council could consider using a more conservative standard than maximum sustainable yield when setting OFLs for forage species.

The Council may choose to set annual catch limits equal to the respective ABCs, or they may set them at lower levels to account for biological, ecological, social, or economic factors. For example, to account for the role of forage species in the ecosystem, the Council could consider using more restrictive catch limits for forage species than is otherwise required. The Council could do so by setting annual catch limits based on optimum yield rather than ABCs. According to the Magnuson-Stevens Fishery Conservation and Management Act, optimum yield represents the ABC “as reduced by any relevant economic, social, or ecological factor.” For example, the Council could choose to set optimum yield at a lower level than the ABC to account for the needs of predators.

The Ecosystem Approach to Fisheries Management Guidance Document emphasizes that the Council should consider tradeoffs when considering more conservative management measures when setting ABCs or discussing optimum yield for forage species. The document states:

“Optimal management of forage fish ultimately depends on the tradeoff between their indirect *in situ* value versus their direct harvest market value. Thus, managing these trade-offs requires knowledge of not only the species ecology, but also the uses of and substitutes for these species within the economy. Further, these choices are based not just on ecological preferences and commercial uses, but cultural and social preferences as well.”

For some Council-managed species, the annual catch limit is divided among different sectors of a fishery (e.g. commercial and recreational sectors); however, this is not required.

Should the Council incorporate ecosystem considerations into annual catch limits for chub mackerel? If so, how could this best be achieved?

What ecological and socioeconomic tradeoffs should the Council consider when developing management measures for chub mackerel?

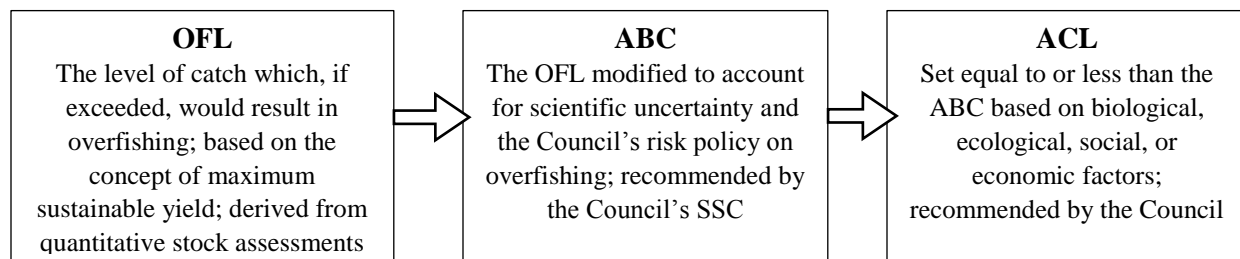


Figure 4: Schematic of the process for developing annual catch limits.

Accountability measures

Accountability measures are measures that are automatically implemented when annual catch limits are exceeded. They are intended to mitigate the negative biological impacts of annual catch limit overages and can help prevent overages from reoccurring in subsequent years.

Accountability measures can include fishery closures, gear restrictions, deductions of overages from a subsequent year's catch or landings limit, and/or adjustments to possession limits, fishing seasons, or minimum fish size limits in subsequent years. Accountability measures may be proactive or reactive.

What types of accountability measures may be most appropriate for the chub mackerel fishery?

Essential fish habitat descriptions

The Magnuson-Stevens Fishery Conservation and Management Act defines essential fish habitat (EFH) as those waters and substrates necessary to fish for spawning, breeding, feeding, or growth to maturity. Councils must describe and identify EFH for each managed species and must also describe and identify adverse impacts on EFH from fishing and other activities. The National Marine Fisheries Service uses EFH designations when consulting with federal agencies on ways to avoid or minimize adverse effects of various activities on fish habitat. EFH designations are also used in review of Council actions and are sometimes used to review state actions.

Definition of the management unit

“Management unit” refers to a fishery or a portion of a fishery that is subject to a set of regulations in a fishery management plan. The management unit defines the geographic area over which a set of regulations applies. The management unit should, to the extent practical, cover the geographic range of the species or stock.

Given the wide distribution of chub mackerel (p. 7), should measures developed through this amendment apply to areas beyond the Mid-Atlantic?

Discretionary measures

Other management measures are not explicitly required by the Magnuson-Stevens Fishery Conservation and Management Act, but may be necessary to prevent overfishing and promote long-term stability of the fishery. Some of these measures are described below.

Permit requirements

Federal commercial fishing permits are typically required to fish for, possess, or land any Council-managed species. Federal permits also typically require that vessels sell their landings to a federally-permitted dealer. Federal recreational permits are required for certain party or charter vessels.

Reporting requirements

Owners/operators of vessel issued federal fishing permits are typically required to maintain logs of estimates of catch and landings for each trip, regardless of target or retained species.

Limited access provisions

Limited access provisions limit participation in a fishery to those satisfying certain eligibility criteria. For example, fishermen may need to demonstrate a certain volume of past landings of a species to qualify for a permit to continue fishing for that species. Limited access provisions are used to regulate effort and capacity in a fishery. They can also be used to ensure that individuals with a vested interest in the fishery maintain some rights to continue fishing when restrictions on fishing effort are deemed necessary. Most, but not all, of the commercial fisheries managed by the Council are limited access fisheries.

Annual catch targets specific to the commercial and/or recreational sectors

Annual catch limits (see page 13) are required for Council-managed species. Councils may develop annual catch targets at their discretion. All the Council's fishery management plans include provisions for annual catch targets. Annual catch targets are set equal to annual catch limits, or are reduced from the annual catch limits to account for management uncertainty.

Annual catch targets can help prevent a fishery from exceeding the annual catch limit and can reduce the likelihood of accountability measures being triggered.

Landings limits (e.g. commercial quotas, recreational harvest limits)

Annual catch limits and annual catch targets include both landings and discards. Landings limits, usually in the form of commercial quotas and/or recreational harvest limits, account only for landings. They are typically derived from annual catch limits or targets by subtracting expected levels of discards. When landings limits are reached, the fishery typically closes for the remainder of the fishing year.

Possession limits

Possession limits restrict the amount of a species that an individual or vessel may legally possess at a time. Possession limits can help regulate the pace of landings and can help ensure that annual landings limits are not exceeded.

Minimum fish size restrictions

Minimum fish size restrictions prohibit retention of fish smaller than a certain size. These restrictions are intended to minimize catch of fish which have not yet had a chance to spawn.

Should participation in the commercial chub mackerel fishery be limited to certain individuals? If so, who should be allowed to participate?

Should the Council develop catch and/or landings limits specific to the commercial and recreational sectors?

What is an appropriate chub mackerel possession limit? Should the limit be different for directed and incidental fisheries? Should there be a recreational possession limit?

Should the Council use gear restrictions, seasonal closures, control dates, or other measures to manage the chub mackerel fishery?

Should the Council consider any other management measures not listed in this document?

Gear restrictions

Gear restrictions can include restrictions on the type of gear that can be legally used in a fishery and requirements for certain gear configurations (e.g. minimum mesh sizes, hook sizes, turtle excluder devices, escape panels, etc.). Councils can develop gear restrictions for an entire fishery, for certain sectors of a fishery, or for certain areas and/or seasons. Gear restrictions are typically aimed at minimizing catch of undersized (typically juvenile) individuals and/or non-target species. They can also help to minimize interactions between fishing gear and protected species and to minimize damage to sensitive physical habitats caused by fishing gear.

Seasonal and/or spatial closures

Seasonal closures are regularly occurring fishery closures during certain times of year. Spatial closures are year-round or seasonal closures that apply to a certain area. Such closures can be used to protect spawning fish, minimize catch of non-target species, or minimize interactions between fishing gear and protected species. During development of the Unmanaged Forage Omnibus Amendment, the Council discussed, but decided not to develop, spatial and seasonal closures to prevent potential conflicts between the commercial chub mackerel fishery and recreational billfish fisheries, including fishing tournaments.

Control dates

Control dates are used to define the potential participants in a management program based on fishing activities prior to that date. For example, the Council could specify that individuals must demonstrate a certain level of landings prior to the control date to qualify for participation in a limited access program.

9) References

- Berrien, P. L. 1978. Eggs and larvae of *Scomber scombrus* and *Scomber japonicus* in continental shelf waters between Massachusetts and Florida. *Fishery Bulletin*. 76(1):95-115.
- Carvalho, N., R. G. Perrotta, and E. Isidro. 2002. Age, growth and maturity in the chub mackerel (*Scomber japonicus* Houttuyn, 1782) from the Azores. *Arquipélago Life and Marine Sciences*. 19A: 93-99.
- Collette, B. B. and C. E. Nauen. 1983. FAO species catalogue. Vol. 2 Scombrids of the world: An annotated and illustrated catalogue of tunas, mackerels, bonitos, and related species known to date. Available at: <http://www.fao.org/docrep/009/ac478e/ac478e00.htm>
- Crone, P. R. and K. T. Hill. 2015. Pacific mackerel (*Scomber japonicus*) stock assessment for USA management in the 2015-16 fishing year. Report to Pacific Fishery Management Council. NOAA Fisheries Southwest Fisheries Science Center. La Jolla, CA. 135 pp.
- Goode, G. B. 1884. The food fishes of the U.S. part 3: natural history of useful aquatic animals. In: *The Fisheries and Fishery Industries of the United States*. U.S. Government Printing Office. Washington, D.C. Available at: <http://celebrating200years.noaa.gov/rarebooks/fisheries/welcome.html>
- Hernández, J. J. C. and A. T. S. Ortega. 2000. Synopsis of biological data on the chub mackerel (*Scomber japonicus* Houttuyn, 1782). FAO Fisheries Synopsis No. 157.
- Hutt, C. P., S. J. Lovell, and G. Silva. 2014. The economic contribution of Atlantic highly migratory species angling permit holders in New England and the Mid-Atlantic, 2011. NOAA Technical Memorandum NMFS-F/SPO-147. Available at: <http://spo.nmfs.noaa.gov/content/economic-contribution-atlantic-highly-migratory-species-angling-permit-holders-new-england>

- Krivospitchenko, S.G. 1979. Mackerel *Scomber japonicus* of the Saharan littoral region. Meeting of the Ad Hoc Working Group on West African Coastal Pelagic Fish from Mauritania to Liberia. Dakar, Senegal. June 19, 1978. FAO Fisheries Department, Rome. Available at: <http://www.fao.org/docrep/003/N0952E/n0952e0t.htm>
- Martins, M. M., D. Skagen, V. Marques, J. Zwolinski, and A. Silva. 2013. Changes in the abundance and spatial distribution of the Atlantic chub mackerel (*Scomber colias*) in the pelagic ecosystem and fisheries off Portugal. *Scientia Marina*. 77(4): 551-563.
- NMFS (National Marine Fisheries Service). 2015. 2015 Stock assessment and fishery evaluation (SAFE) report for Atlantic highly migratory species. Available at: nmfs.noaa.gov/sfa/hms/documents/safe_reports/index.html
- Richardson, D. E., J. K. Llopiz, C. M. Guignard, and R. K. Cowen. 2010. Larval assemblages of large and medium-sized pelagic species in the Straits of Florida. *Progress in Oceanography*. 86(2010):8-20.
- Vasconcelos, J., M. Afonso-Dias, and G. Faria. 2012. Atlantic chub mackerel (*Scomber colias*) spawning season, size and age at first maturity in Madeira waters. *Arquipélago Life and Marine Sciences*. 29:43-51.
- Sever, T. M., B. Bayhan, M. Bilecenoglu, and S. Mavili. 2006. Diet composition of the juvenile chub mackerel (*Scomber japonicus*) in the Aegean Sea (Izmir Bay, Turkey). *Journal of Applied Ichthyology*. 22(2006):145-148.
- Smith, L. A., J. S. Link, S. X. Cadrin, and D. L. Palka. 2015. Consumption by marine mammals on the Northeast U.S. continental shelf. *Ecological Applications*. 25(5):373-389.
- Velasco, E. M., J. D. Arbol, J. Baro, and I. Sobrino. 2011. Age and growth of the Spanish chub mackerel *Scomber colias* off southern Spain: a comparison between samples from the NE Atlantic and the SW Mediterranean. *Revista de Biología Marina y Oceanografía*. 46(1):27-34.