Chub Mackerel Fishery Information Document

April 2022

This document provides a brief overview of the biology, stock condition, management system, and fishery performance for Atlantic chub mackerel (*Scomber colias*) with an emphasis on the most recent few years. Data sources include commercial dealer reports, vessel trip reports (VTRs), and Marine Recreational Information Program (MRIP) data. All 2021 data should be considered preliminary. For more resources, including previous Fishery Information Documents, please visit https://www.mafmc.org/msb.

Key Facts

- The Mid-Atlantic Fishery Management Council developed the first management measures for Atlantic chub mackerel in U.S. waters. These measures became effective in 2017 and were modified in 2020.
- The stock status of chub mackerel in this region is unknown as there has been no quantitative stock assessment. The Scientific and Statistical Committee assumes that biomass is currently at a sustainable level.
- After spiking at 5.25 million pounds in 2013, commercial landings returned to low levels. In 2021, commercial fishermen landed 37,371 pounds of chub mackerel from Maine through North Carolina.
- It is estimated that recreational fishermen from Maine through North Carolina harvested 194,771 pounds of chub mackerel in 2021, the highest estimate in the MRIP time series (i.e., 1981 through present).

Basic Biology

Atlantic chub mackerel are a schooling pelagic species. They migrate seasonally and can be found throughout U.S. Atlantic waters in both inshore areas and to depths of about 250-300 meters.[1] Adults prefer temperatures of 15-20°C (about 60-70°F).[1,2] Some studies suggest that juveniles tend to be found closer inshore than adults.[3,4]

Atlantic chub mackerel grow rapidly during the first year of life.[2,3,5,6] They can reach at least age 13.[7] Daley and Leaf (2019) found that most fish sampled from commercial fishery catches off the northeast U.S. were age 3.[6]

Atlantic chub mackerel spawn in several batches. Spawning areas likely occur from North Carolina through the Gulf of Mexico.[8,9] Daley (2018) suggested that chub mackerel reach maturity around age two in the Northwest Atlantic, though other studies from various locations have published a range of ages at maturity.[3,9]

Chub mackerel are opportunistic predators with a seasonally variable diet of small crustaceans (especially copepods), small fish, and squid.[1,10] Adults tend to consume larger prey and more fish prey than juveniles.[4]

Very few quantitative estimates are available of the contribution of chub mackerel to the diets of predator species in the western North Atlantic. This is likely due in part to the difficulty of visually distinguishing partially-digested chub mackerel from related species such as Atlantic mackerel (*Scomber scomber*), bullet mackerel (*Auxis rochei*), and frigate mackerel (*Auxis thazard*).[11] The family Scombridae has been documented in the diets of some fish, marine mammals, sea birds, and sharks in the western North Atlantic.[12,13] However, few studies identify chub mackerel to the species level in the diets of any predators. A thorough literature review conducted by Council and NMFS staff in 2018 identified only one study with quantitative data on the role of chub mackerel in the diets of any predators off the U.S. east coast. [14] Manooch et al. (1984) found that chub mackerel made up 0.2% (by frequency of occurrence) of the diets of dolphinfish sampled off North Carolina through Texas.[15] Chub mackerel have been documented as prey for some predators in other parts of the world. For example, they are important prey for blue marlin at certain times of year off Portugal[16] and Cabo San Lucas.[17] They have also been documented as prey for Cory's shearwaters in the eastern North Atlantic, for long-beaked common dolphins off South Africa, and short-beaked common dolphins off the Iberian Peninsula.[18] It should be emphasized that diet composition of a predator species may vary by geography and can be flexible. Therefore, the importance of chub mackerel in the diets of predators in other parts of the world does not necessarily indicate its importance off the U.S. east coast. More diet information would be required to better establish this relationship.

To address this data gap, the Council funded a study with the goal of better delineating the role of chub mackerel in the diets of tunas and marlins, which were identified by stakeholders as predators of key interest. For this study, 758 non-empty stomachs from yellowfin and bigeye tunas were obtained from commercial and recreational fisheries, including recreational fishing tournaments, throughout the Mid-Atlantic and Southern New England, primarily in 2018 and 2019. Thirty-six white marlin and 17 blue marlin stomachs were also obtained. The marlin sample sizes were limited by regulations on landings. Chub mackerel were determined to be an exceptionally small component of the diets of tunas and marlins. Specifically, only two chub mackerel were identified in yellowfin tuna stomachs and seven chub mackerel were identified in two white marlin stomachs (Dr. Walt Golet, personal communication).

Status of the Stock

The stock status of chub mackerel in the western Atlantic Ocean is unknown as there have been no quantitative assessments of this species in this region. The SSC assumes that biomass is currently at or above biomass at maximum sustainable yield.[19]

Large fluctuations in abundance have been reported around the world, including in the mid-Atlantic and New England.[3, 20] These fluctuations may be partly the result of environmental influences such as temperature and upwelling strength on recruitment.[3] Given that chub mackerel are a fully pelagic species, ocean processes likely influence their availability in any given area, as well as their recruitment.

Management System and Fishery Performance

Management

The Mid-Atlantic Fishery Management Council manages Atlantic chub mackerel fisheries in federal waters from Maine through North Carolina. An increase in commercial landings during 2013-2015, as well as concerns about the potential role of chub mackerel as prey for tunas and

marlins, prompted the Council to adopt an annual commercial landings limit and a commercial possession limit for chub mackerel as part of the Unmanaged Forage Omnibus Amendment.[13] These measures were implemented in September 2017 and were the first regulations for chub mackerel fisheries off the U.S. east coast. They were intended to be temporary measures and were replaced by longer-term measures developed through Amendment 21 to the Mackerel, Squid, and Butterfish Fishery Management Plan, which became effective in September 2020.[21]

The Council's SSC recommends annual acceptable biological catch (ABC) limits for chub mackerel. The Council must either approve the ABC recommended by the SSC or approve a lower ABC. Total catch (i.e., commercial and recreational landings and dead discards) from Maine through the east coast of Florida count against the ABC. Expected South Carolina through Florida catch is subtracted from the ABC to derive the annual catch limit (ACL). An annual catch target (ACT) is set less than or equal to the ACL to account for management uncertainty. Expected dead discards are subtracted from the ACT to derive a total allowable landings limit (TAL). The commercial and recreational fisheries do not have separate annual catch or landings limits (Figure 1).

The catch and landings limits for 2020-2022 included an ABC of 5.07 million pounds, an ACL of 4.99 million pounds, an ACT of 4.79 million pounds, and a TAL of 4.50 million pounds. Catch and landings remained well below these limits in 2020-2021.

Although total catch from Maine through the east coast of Florida counts against the ABC, the ACL, ACT, and TAL apply to Maine through North Carolina. Based on past landings trends, the Council agreed that catch from South Carolina through Florida is immaterial to proper management. Therefore, commercial and recreational fisheries in South Carolina through Florida are not subject to the permit and possession limit requirements described below.

A commercial mackerel, squid, or butterfish fishing permit is required of vessels which retain chub mackerel for sale in federal waters from Maine through North Carolina. Ten permit types meet this requirement. The owner of any party or charter vessel that fishes for, possesses, or retains chub mackerel while carrying passengers for hire must have the federal mackerel/squid/butterfish for-hire permit. There is no federal permit type specific to Atlantic chub mackerel in either the commercial or recreational fisheries.

There is no commercial possession limit for chub mackerel until 90% of the TAL is projected to be landed. At that point, a 40,000 pound possession limit is in effect. Once 100% of the TAL is projected to be landed, commercially-permitted vessels are limited to a 10,000 pound possession limit. There are no federal waters recreational possession limits for chub mackerel.

There are no commercial or recreational gear restrictions, fish size requirements, or closed seasons for Atlantic chub mackerel in federal waters.

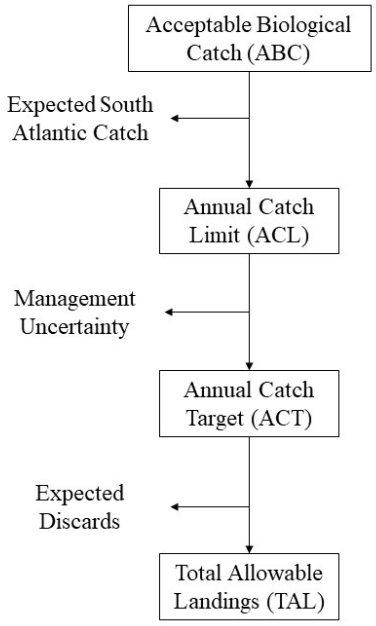

Figure 1. Flowchart summarizing chub mackerel catch and landings limits.

Commercial Fishery Trends

After remaining below 0.5 million pounds per year for several years, commercial chub mackerel landings spiked to 5.25 million pounds in 2013, but decreased to pre-2013 levels by 2016 (Table 1). [22] This temporary increase was the result of a small number of trawl vessels targeting chub mackerel. These vessels also participate in the *Illex* squid fishery. Some fishermen have described chub mackerel as a "bailout" species which they sometimes target when they are not able to harvest *Illex* squid. Chub mackerel tend to be harvested in the same areas and times of year when *Illex* squid are harvested; however, fishermen have said they typically will not harvest both species at the same time because the quality of both species suffers when they are stored together.

According to public comments, a small number of vessels on the east coast are capable of harvesting chub mackerel in profitable quantities because vessels need to be large, fast, and have refrigerated sea water or freezing capabilities in order to harvest this fast-swimming, low-value, warm water species. Landings data seem to support these statements.

Fewer than 5 vessels accounted for more than 95% of chub mackerel landings over the last 20 years (2002-2021). The chub mackerel landings from these vessels were sold to fewer than three dealers; therefore, much of the data associated with these vessels and dealers are confidential.[22]

At least 19 dealers across 6 states (MA, RI, CT, NY, NJ, VA) purchased at least 100 pounds of chub mackerel over the past 20 years combined (2002-2021), with only four dealers purchasing more than 10,000 pounds of chub mackerel. During this time period, an average of 10 vessels, with a maximum of 20 vessels, landed at least 100 pounds of chub mackerel per year from Maine through North Carolina.[22]

The annual average ex-vessel price per pound varied during 2002-2021, averaging $0.53 per pound (adjusted to 2021 dollars). There appears to be a relationship between price and volume

landed; however, this relationship is neither linear nor consistent across time. In general, years with higher landings had lower average annual prices per pound, and vice versa (Table 1).[22]

According to VTR data, about 91% of the chub mackerel landed by commercial fishermen from Maine through North Carolina from 2002 through 2021 were caught with bottom otter trawls. About 9% of landings were caught with midwater trawls. All other gear types collectively accounted for less than 1% of total landings.[23]

Nearly all commercial chub mackerel landings (about 97%) from Maine through North Carolina over the past 20 years occurred during June-October. The highest proportion of landings occurred in September (38%). June, July, August, and October contributed about equally to commercial landings (13-16%).[22]

According to VTR data, nearly all commercial chub mackerel landings from 2002-2021 originated from statistical areas south of New York. Much of these landings came from statistical areas which overlap with the shelf break (Figure 2).[23]

Public comments received during development of Amendment 21 suggest that most chub mackerel landed on the east coast are processed for use as human food, much of which is sent overseas, and lesser amounts are used as bait in other fisheries.

Table 1. Commercial chub mackerel landings, ex-vessel value, and average price per pound, Maine through North Carolina, 2002-2021. Value and price are adjusted to 2021 dollars using the Gross Domestic Product Price Deflator. Landings in some years are combined to protect confidential data representing fewer than 3 vessels and/or dealers.[22]

Year	Landings (pounds)	Ex-vessel value (2021 dollars)	Avg. price/pound (2021 dollars)
2002	471	$299	$0.64
2003	488,316	$34,988	$0.07
2004	126	$91	$0.72
2005	0	$0	--
2006	0	$0	--
2007-2009	21,039	$7,797	$0.37
2010-2011	192,301	$40,458	$0.21
2012	164,867	$74,391	$0.45
2013	5,249,686	$1,159,920	$0.22
2014	1,230,411	$381,446	$0.31
2015	2,108,337	$548,723	$0.26
2016	610,783	$113,672	$0.19
2017	2,202	$2,914	$1.32
2018	22,357	$12,214	$0.55
2019	60,522	$41,917	$0.69
2020	56,950	$30,829	$0.54
2021	37,371	$23,837	$0.64
2002-2021 avg.	512,287	$123,675	$0.53

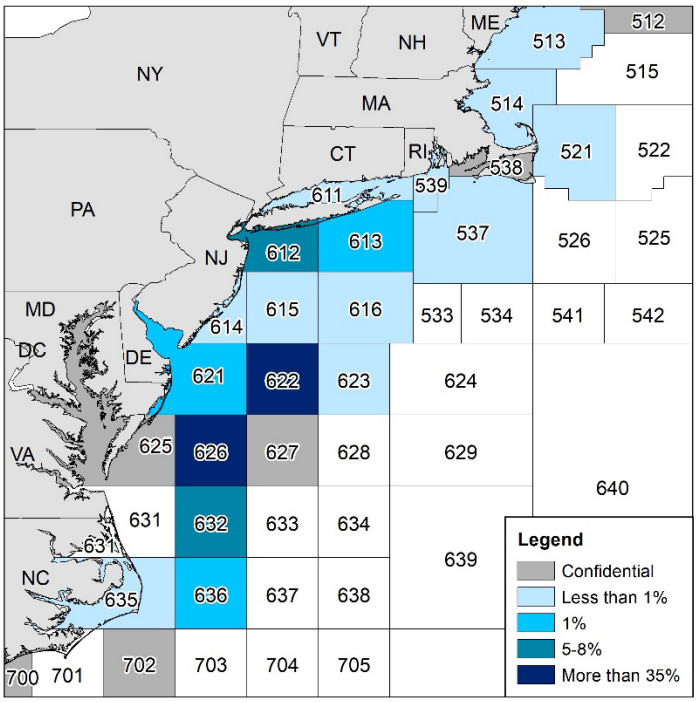

Figure 2. Percent of commercial chub mackerel landings by statistical area, 2002-2021 as shown in federal VTR data. Data associated with fewer than three vessels and/or dealers are confidential. Confidential landings collectively account for about 1% of the total.[23]

Recreational Fishery Trends

MRIP data from Maine through North Carolina show increasing recreational catch and harvest of chub mackerel nearly year from 2015 through 2021 (Table 2). In 2021, an estimated 215,631 chub mackerel were caught and 137,468 chub mackerel were harvested, corresponding to 194,771 pounds of harvested chub mackerel.[24]

The increasing recreational catch and harvest estimates in recent years could be due, at least in part, to improved reporting and improved differentiation between chub mackerel and other species which are similar in appearance, such as Atlantic mackerel. For example, in 2017 chub mackerel were added to the core list of species for trainings of MRIP field samplers from Maine through Virginia. In addition, the Council and partners at NMFS developed a small scombrid species identification guide and distributed over 3,700 copies to commercial and recreational permit holders and other interested stakeholders in 2019.[25]

MRIP data collection in 2020 was impacted by the COVID-19 pandemic. Specifically, the Access Point Angler Intercept Survey (APAIS), which serves as the basis for catch estimates in the shore based and private angler fishing modes, was suspended in all New England and Mid-Atlantic states in late March or April 2020 and resumed between May and August 2020, depending on the state. MRIP headboat sampling was also suspended in 2020 and resumed in 2021. NMFS used imputation methods to fill gaps in 2020 catch data with data collected in 2018 and 2019. These proxy data match the time, place, and fishing mode combinations that would have been sampled had the APAIS continued uninterrupted. Proxy data were combined with observed data to produce catch estimates using the standard estimation methodology.

It is not likely that the increase in recreational chub mackerel catch and harvest in 2020 is due to the use of imputed data as the imputed data match the 2018 and 2019 data. Any change from 2018 and 2019 would be due to changes in effort data (which are collected through mail and telephone surveys that were largely unimpacted by the pandemic) or due to changes during the locations and times of year that did not require use of imputed data.

During 2017-2021, about 56% of the recreational chub mackerel harvest from Maine through North Carolina (in numbers of fish) was caught in state waters, with the remaining 44% caught in federal waters. The proportion of harvest by mode averaged 57% from private and rental boats, 38% from party and charter boats, and 5% from shore (Table 3). Most recreational catch and harvest occurred in New York, Rhode Island, New Jersey, and Connecticut (Table 4). Most catch and harvest occurred during July and August (Table 5).[24]

Through development of Amendment 21, the Council heard anecdotal descriptions of recreational chub mackerel harvest, including reports of catch on for-hire vessels out of New York and New Jersey. There have also been reports of chub mackerel harvest for use as live bait on recreational trips out of Maryland and Virginia targeting white marlin, blue marlin, sailfish, spearfish, yellowfin tuna, bigeye tuna, and/or wahoo. According to public comments, this live bait fishery occurs on the edges of certain offshore canyons, especially Norfolk Canyon, where chub mackerel and their predators are concentrated in the late summer and early fall.[26]

Table 2. MRIP-estimated recreational catch and harvest of chub mackerel from Maine through North Carolina, 2002-2021.[24]

Year	Recreational catch (# of fish)	Recreational harvest (# of fish)	Recreational harvest (pounds)	% retained
2002-2010	0	0	0	--
2011	1,613	1,613	355	100%
2012	15,569	0	0	0%
2013	0	0	0	--
2014	60,191	49,813	48,087	83%
2015	0	0	0	--
2016	2,575	2,087	2,093	81%
2017	26,061	13,310	14,831	51%
2018	157,471	104,830	128,949	67%
2019	139,282	49,892	74,462	36%
2020*	199,919	125,757	149,578	63%
2021	215,631	137,468	194,771	64%
2017-2021 Avg.	**147,673**	**86,251**	**112,518**	**56%**

* Contribution of imputed data to total values for 2020: 19% for catch, 28% for harvest in numbers of fish, and 25% for harvest in pounds. This imputation method was only needed in 2020 due to COVID-related disruptions to the Access Point Angler Intercept Survey and subsequent data gaps.

Table 3. Chub mackerel harvest by recreational fishing mode in numbers of fish, 2002-2021, Maine through North Carolina.[24]

Year	Party/charter	Private/rental boat	Shore
2002-2010	0	0	0
2011	0	0	1,613
2012-2013	0	0	0
2014	49,813	0	0
2015	0	0	0
2016	1,889	198	0
2017	2,422	10,888	0
2018	43,424	58,817	2,589
2019	17,149	32,743	0
2020	35,901	70,676	19,180
2021	65,413	72,055	0
2017-2021 Avg.	**32,862 (38%)**	**49,036 (57%)**	**4,354 (5%)**

Table 4. Proportion of total chub mackerel catch and harvest in numbers of fish by state, 2017-2021. [24]

State	Recreational catch	Recreational harvest
ME	0%	0%
NH	3%	4%
MA	1%	0%
RI	30%	28%
CT	10%	8%
NY	40%	42%
NJ	17%	18%
DE	0%	0%
MD	Less than 1%	Less than 1%
VA	0%	0%
NC	0%	0%
Total	100%	100%

Table 5. Proportion of total chub mackerel catch and harvest in numbers of fish by wave, Maine through North Carolina, 2017-2021. Note that only North Carolina conducts MRIP sampling during wave 1.[24]

Wave	Catch	Harvest
1 (Jan-Feb)	0%	0%
2 (Mar-Apr)	0%	0%
3 (May-Jun)	3%	3%
4 (Jul-Aug)	55%	57%
5 (Sep-Oct)	42%	40%
6 (Nov-Dec)	0%	0%
Total	100%	100%

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