



Chub Mackerel Fishery Information Document

April 2023

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 and 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. They have not been revised since 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 have been below 150,000 pounds since 2017. In 2022, commercial fishermen landed 18,015 pounds of chub mackerel from Maine through North Carolina.
- Recreational catch and harvest has generally been increasing since 2016. It is estimated that recreational fishermen from Maine through North Carolina harvested 67,683 pounds of chub mackerel in 2022 (preliminary estimate).

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 predators in the western North Atlantic. 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 eight chub mackerel were identified in two white marlin stomachs.¹¹

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 has assumed that biomass is currently at or above biomass at maximum sustainable yield.¹²

Large fluctuations in abundance have been reported around the world, including in the mid-Atlantic and New England.^{3, 13} 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. 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 2020.¹⁴ All chub mackerel management measures have remained unchanged since that time.

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 - 2025 (unless otherwise modified) include 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 2020-2022.

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.

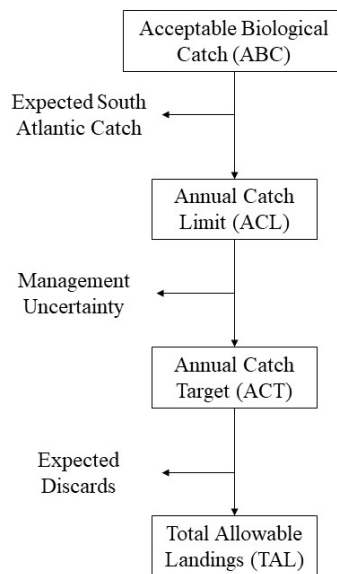


Figure 1. Flowchart summarizing chub mackerel catch and landings limits.

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).¹⁵ 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 (2003-2022). 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.¹⁵

Dealers in six states purchased at least 100 pounds of chub mackerel over the past 20 years combined (2003-2022): Rhode Island, Connecticut, New York, New Jersey, Virginia, and North Carolina. During this time period, an average of 8 vessels, with a maximum of 20 vessels, landed at least 100 pounds of chub mackerel per year from Maine through North Carolina.¹⁵

The annual average ex-vessel price per pound varied during 2003-2022, averaging \$0.51 per pound (adjusted to 2022 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).¹⁵

According to VTR data, about 90% of the chub mackerel landed by commercial fishermen from Maine through North Carolina from 2003 through 2022 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.¹⁶

Most commercial chub mackerel landings (about 92%) from Maine through North Carolina over the past 20 years occurred during June-October. The highest proportion of landings occurred in September (35%). June, July, August, and October contributed about equally to commercial landings (12-16%).¹⁵

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).¹⁶

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, 2003-2022. Value and price are adjusted to 2022 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.¹⁵

Year	Landings (pounds)	Ex-vessel value (2022 dollars)	Avg. price/pound (2022 dollars)
2003	493,368	\$37,592	\$0.08
2004-2005	138	\$97	\$0.78
2006	0	\$0	\$0.00
2007-2009	21,040	\$8,381	\$0.39
2010-2011	197,020	\$43,487	\$0.22
2012	644,153	\$79,957	\$0.48
2013	5,250,139	\$1,246,707	\$0.24
2014	1,231,646	\$409,988	\$0.33
2015	2,110,707	\$589,778	\$0.28
2016	611,199	\$122,177	\$0.20
2017	4,309	\$3,132	\$1.42
2018	35,308	\$13,125	\$0.59
2019	87,942	\$45,040	\$0.75
2020	141,728	\$33,089	\$0.58
2021	39,245	\$26,241	\$0.70
2022	18,015	\$8,016	\$0.51
2003-2022 avg	544,298	\$133,340	\$0.51

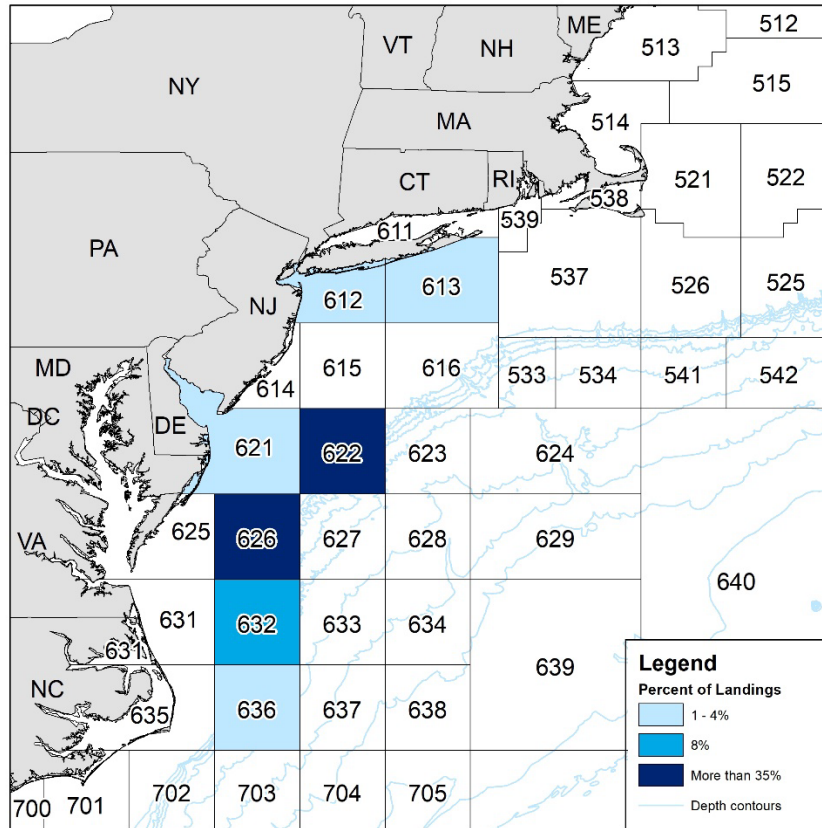


Figure 2. Percent of commercial chub mackerel landings by statistical area, 2003-2022, as shown in federal VTR data. Only areas accounting for at least 1% of the total are shown. Confidential data associated with fewer than three vessels and/or dealers collectively account for less than 1% of landings and are not shown.¹⁶

Recreational Fishery Trends

MRIP data from Maine through North Carolina show increasing recreational catch of chub mackerel nearly year from 2015 through 2022 (Table 2). Estimates for 2022 were preliminary at the time of writing this document and showed an estimated 260,517 chub mackerel caught in recreational fisheries from Maine through North Carolina, with 46,669 chub mackerel harvested, corresponding to an estimated 67,683 pounds of harvest.¹⁷

During 2018-2022, about 52% of the recreational chub mackerel harvest from Maine through North Carolina (in numbers of fish) was caught in state waters, with the remaining 48% caught in federal waters. During this same time period, the proportion of harvest by mode averaged 56% from private and rental boats, 39% from party and charter boats, and 5% from shore (Table 3). MRIP data are no longer available by wave (i.e., two-month sampling increment) except by request. Most recreational catch and harvest occurred in New York, Rhode Island, New Jersey, and Connecticut (Table 4).¹⁷ Previously available MRIP data for 2017-2021 suggested that over 90% of chub mackerel catch and harvest occurred during waves 4 (July-August) and 5 (September-October).¹⁸

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.¹⁹

Table 2. MRIP-estimated recreational catch and harvest of chub mackerel from Maine through North Carolina, 2003-2022.¹⁷

Year	Recreational catch (# of fish)	Recreational harvest (# of fish)	Recreational harvest (pounds)	% retained
2003-2010	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	2,092	81%
2017	26,062	13,310	14,831	51%
2018	157,471	104,830	128,949	67%
2019	139,282	49,894	74,462	36%
2020*	199,921	125,758	149,578	63%
2021	215,633	137,469	194,771	64%
2022 - <i>preliminary</i>	260,517	46,669	67,683	18%
2018-2022 Avg.	194,565	92,924	123,089	50%

* 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 (APAIS) and subsequent data gaps. The methods filled 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.

Table 3. Chub mackerel harvest by recreational fishing mode in numbers of fish, 2003-2022, Maine through North Carolina.¹⁷

Year	Party/charter	Private/rental boat	Shore
2003-2010	0	0	0
2011	0	0	1,613
2012-2013	0	0	0
2014	49,813	0	49,813
2015	0	0	0
2016	1,889	198	2,087
2017	2,422	10,888	13,310
2018	43,424	58,817	104,830
2019	17,150	32,744	49,894
2020	35,901	70,677	125,758
2021	65,414	72,055	137,469
2022- preliminary	21,159	25,101	46,669
2018-2022 Avg.	36,610 (39%)	51,879 (56%)	4,436 (5%)

Table 4. Proportion of total chub mackerel catch and harvest in numbers of fish by state, 2018-2022 (2022 data are preliminary).¹⁷

State	Recreational catch	Recreational harvest
ME	0%	0%
NH	2%	4%
MA	1%	0%
RI	26%	28%
CT	8%	5%
NY	33%	41%
NJ	30%	21%
DE	0%	0%
MD	Less than 1%	Less than 1%
VA	Less than 1%	Less than 1%
NC	0%	0%
Total	100%	100%

References

- ¹ Collette, B. B. and C. E. Nauen. 1983. FAO species catalogue. Vol. 2 Scombrids of the word: 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>
- ² Perrotta, R. G., M. D. Viñas, D. R. Hernandez, and L. Tringali. 2001. Temperature conditions in the Argentine chub mackerel (*Scomber japonicus*) fishing ground: implications for fishery management. *Fisheries Oceanography*. 10(3):275-283.
- ³ 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.

- ⁴ Castro, J. J. 1993. Feeding ecology of chub mackerel *Scomber japonicus* in the Canary Islands area. *South African Journal of Marine Science*. 13(1): 323-328.
- ⁵ 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.
- ⁶ Daley, T. T. and R. T. Leaf. 2019. Age and growth of Atlantic chub mackerel (*Scomber colias*) in the Northwest Atlantic. *Journal of Northwest Atlantic Fisheries Science*. 50: 1-12.
- ⁷ Carvalho, N., R. G. Perrotta, and E. Isidro. 2002. Age, growth and maturity in the chub mackerel (*Scomber japonicus* Houuttuyn, 1782) from the Azores. *Arquipélago Life and Marine Sciences*. 19A: 93-99.
- ⁸ Houde, E. D., S. A. Berkeley, J. J. Klinovsky, and C.E. Dowd. 1976. Ichthyoplankton survey data report: summary of egg and larvae data used to determine abundance of clupeid fishes in the eastern Gulf of Mexico. University of Miami Sea Grant Technical Bulletin Number 32. Available at: <https://repository.library.noaa.gov/view/noaa/10888>
- Houde, E. D., J. C. Leak, C. E. Dowd, S. A. Berkeley, and W. J. Richards. 1979. Ichthyoplankton abundance and diversity in the eastern Gulf of Mexico - a report to the Bureau of Land Management prepared under contract number AA550-CT7-28. Available at: <https://www.boem.gov/ESPIS/3/4042.pdf>
- 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.
- 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.
- Southeast Area Monitoring and Assessment Program (SEAMAP) larval survey catches from 1983-2014.
- ⁹ Daley, T. 2018. Growth and reproduction of Atlantic chub mackerel (*Scomber colias*) in the Northwest Atlantic. Master's thesis. University of Southern Mississippi.
- ¹⁰ Castro, J. J. and A. S. Del Pino. 1995. Feeding preferences of *Scomber japonicus* in the Canary Islands area. *Scientia Marina*. 59(3-4):352-333.
- 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.
- ¹¹ Golet, W., J. Logan, L. Kerr, J. Quattro. 2021. Evaluating the importance of Atlantic chub mackerel (*Scomber colias*) in the diet of highly migratory species in the northwest Atlantic. Report to the Mid-Atlantic Fishery Management Council. Available at <https://www.mafmc.org/actions/chub-mackerel-amendment>.
- ¹² Report of the July 2018 SSC meeting. Available at: <http://www.mafmc.org/ssc>
- ¹³ 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>
- ¹⁴ More information on the Chub Mackerel Amendment (Amendment 21 to the Mackerel, Squid, and Butterfish Fishery Management Plan) is available at: <https://www.mafmc.org/actions/chub-mackerel-amendment>.
- ¹⁵ Commercial fish dealer data provided by the NOAA Fisheries Greater Atlantic Regional Fisheries Office (includes state and federal dealers).
- ¹⁶ Commercial vessel trip report data provided by the NOAA Fisheries Greater Atlantic Regional Fisheries Office.
- ¹⁷ Personal communication from the National Marine Fisheries Service, Fisheries Statistics Division. Accessed April 20, 2023. Available at: <https://www.st.nmfs.noaa.gov/recreational-fisheries/data-and-documentation/queries/index>
- ¹⁸ See the 2022 chub mackerel Fishery Information Document available at <https://www.mafmc.org/msb>.
- ¹⁹ Summary of November 9, 2017 webinar on chub mackerel in HMS diets. Available at: <http://www.mafmc.org/actions/chub-mackerel-amendment>