



Introduction

This document presents a summary of the 2019 benchmark stock assessment for Atlantic cobia. This assessment was prepared through the Southeast Data, Assessment, and Review (SEDAR) process, and it includes new years of data and recalibrated estimates from the Marine Recreational Information Program (MRIP). This assessment is the latest and best information available on the status of the Atlantic cobia stock for use in fisheries management.

Management Overview

Atlantic cobia are managed under Amendment 1 to the Interstate Fishery Management Plan (FMP) for Atlantic Migratory Group Cobia. This amendment transitioned management of Atlantic cobia from complementary management with the South Atlantic and Gulf of Mexico Fishery Management Councils to sole management by the Atlantic States Marine Fisheries Commission. In the absence of a federal plan, the Commission has the authority to set harvest quotas and sector allocations, define stock status criteria, and recommend management measures to be implemented by NOAA Fisheries in federal waters. The current coastwide quota of 80,112 fish is allocated between the recreational (92%) and commercial (8%) fisheries. The recreational quota is further allocated into recreational harvest targets for Virginia, North Carolina, South Carolina, and Georgia. Additionally, portions of the recreational and commercial quotas are set aside to account for harvest in states with smaller fisheries.

What Data Were Used?

Due to the lack of fishery-independent data (i.e., data collected through research surveys) for Atlantic cobia, the stock assessment primarily used fishery-dependent data (or data from recreational and commercial fisheries) as well as information on cobia biology, life history, and movement to determine the current stock condition.

Life History

Genetic, tagging, and movement data were analyzed as part of a 2018 workshop to define cobia's stock structure. Based on the results, Atlantic cobia was defined as the stock north of the Georgia-Florida border, while Gulf cobia was defined as extending along the east coast of Florida and throughout the Gulf of Mexico.

Ages and lengths from over 5,000 fish collected from 1984 through 2017 were used to model growth. Cobia can live up to 16 years. Females grow to be larger than males, with larger individuals reaching over 5 feet in length and up to 120 pounds. Male Atlantic cobia can reach sexual maturity prior to age 1, while females mature later, typically by 2-3 years (around 2.5 feet in length).

Atlantic cobia move into nearshore waters when water temperatures reach 20-25°C (68-77°F). While aggregated inshore, they spawn over a period of 4-6 weeks. Spawning is localized, with at least 2 genetically distinct spawning aggregations occurring within the

Atlantic stock, one in Virginia and the other in South Carolina. The timing of spawning progresses up the coast as temperatures warm, with peak spawning in May for fish in South Carolina, June for North Carolina, and July for Virginia. Cobia are batch spawners, with females spawning every 4 to 6 days during the spawning season.

Commercial Data

Historically, Atlantic cobia have been caught commercially as bycatch in other fisheries, although more directed fisheries have recently developed in some areas. Currently, commercial landings constitute about 4% of total landings, with the greatest harvest occurring in Virginia and North Carolina.

Data collected by federal and state agencies from 1928-2017 were used to describe the commercial fishery. While handline and longline are the predominant gears to harvest

cobia, commercial landings across all gears were combined for use in the assessment. Commercial discards were calculated for the vertical line and gillnet fisheries using coastal logbook and observer data, respectively. Discard mortalities were estimated at 5% for fish discarded from vertical lines and 55% for gillnets. Atlantic cobia are subject to commercial per person possession, vessel, and minimum size limits, as well as quota-related closures, all of which may impact discards.

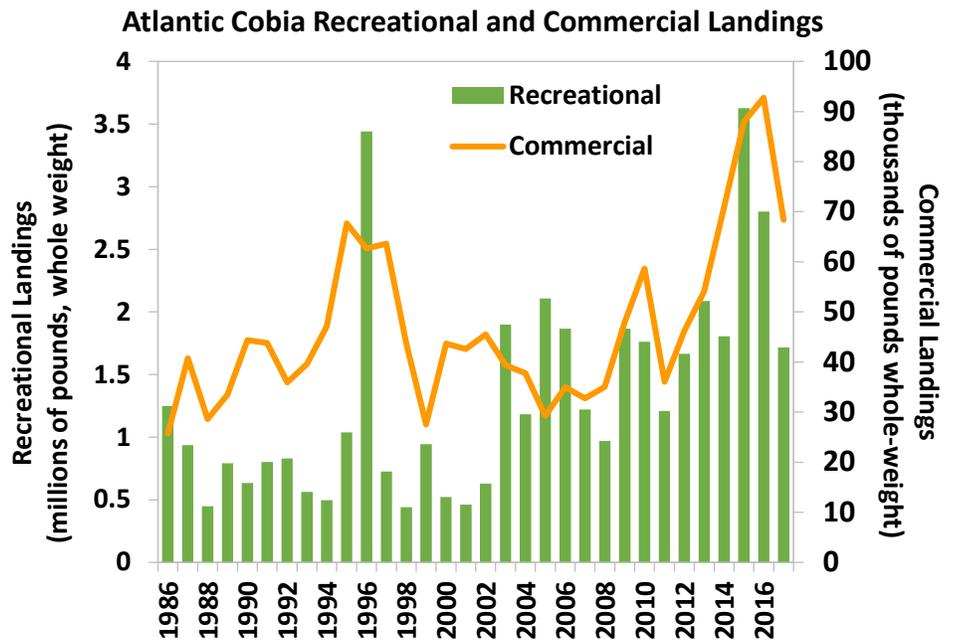
Recreational Data

Recreational landings comprise the vast majority (~96%) of total landings, with landings showing an increasing trend since the early 2000s. Landings peaked at 3.6 million pounds in 2015 and have since declined to 1.7 million pounds in 2017.

Recreational data used in this assessment for the years 1986-2017 came from several sources. MRIP data provided re-calibrated estimates of recreational catch, effort, landings, and releases/discards, as well as biological information on fish length and weight. Additional data were provided by the Southeast Region Headboat Survey (SRHS), which was used to estimate landings and effort for headboats in North Carolina through Georgia.

Discard mortality for the recreational fishery was estimated at 5%, the same as the commercial handline fishery. Atlantic cobia are subject to recreational per person bag, vessel, and minimum size limits, as well as seasonal closures in some areas, all of which may impact discards.

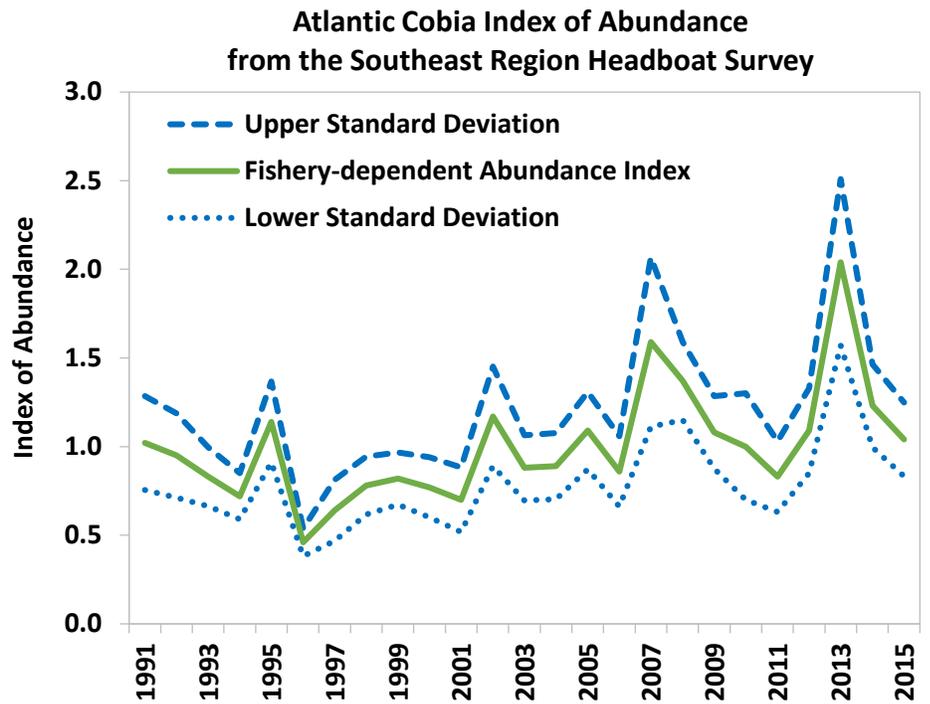
The SRHS was used to develop a fishery-dependent index of abundance (see figure on next page). Due to federal water closures that occurred in 2016 and 2017, which likely impacted effort within the SRHS sampling frame, data from this time series only went through 2015.



What Models Were Used?

This assessment used the Beaufort Assessment Model (BAM). BAM is a statistical catch-at-age model that estimates population size-at-age and recruitment, and then projects the population forward in time. The model estimates trends in the population, including abundance-at-age, recruitment, spawning stock biomass, and fishing mortality rates. It has been used for many reef fish species including blueline tilefish, red porgy, and red snapper.

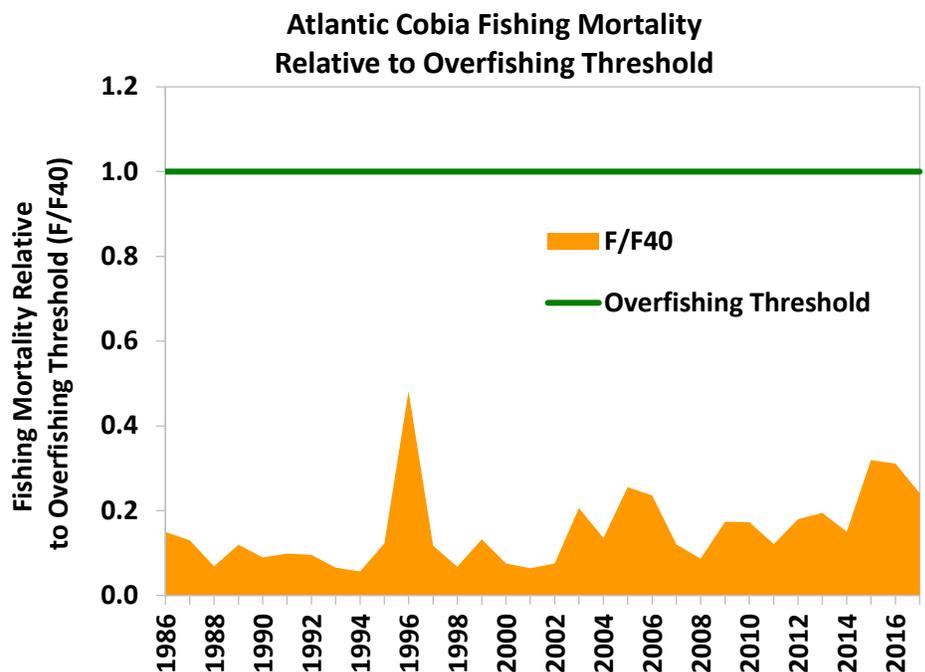
For Atlantic cobia, the SRHS, with data from 1991-2015, was the only index of abundance used in the BAM. While the use of a single, fishery-dependent index is not ideal, it was necessary due to rare or inconsistent occurrences of cobia in current fishery-independent surveys.



Due to changes in management that occurred while SEDAR 58 was being conducted, biological reference points to determine stock status were not provided to the Assessment Panel. Instead, the Assessment Panel was requested to recommend reference points. The Assessment Panel recommended the use of $F_{40\%}$ and spawning stock biomass (SSB) at $F_{40\%}$ reference points, which were calculated to be the fishing rate and SSB level that allows the population to achieve 40% of the maximum spawning potential it would have obtained in the absence of fishing. Such reference points are commonly used proxies for maximum sustainable yield-derived reference points in the absence of a reliable stock-recruit relationship. The Assessment and Peer Review Panels both recommended evaluation of stock status relative to $SSB_{F_{40\%}}$ and $F_{40\%}$.

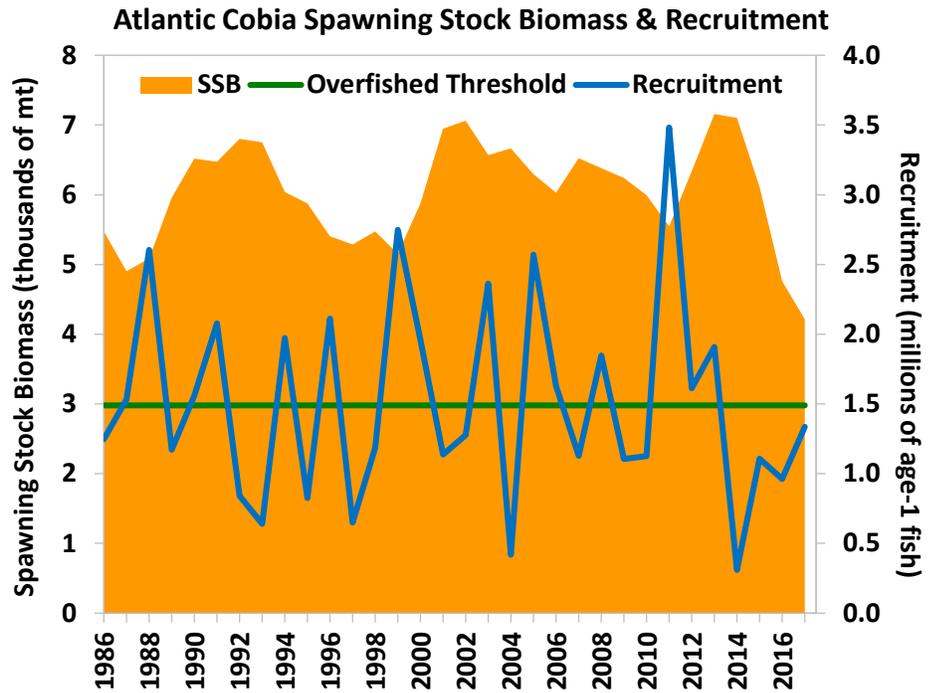
What is the Status of the Stock?

Based on the recommended $F_{40\%}$ -based reference points, the results of the benchmark assessment show that cobia are not overfished and not subject to overfishing. The last strong year class occurred in 2010 (recruited to the fishery at age 1 in 2011), with the four most recent years at low levels of recruitment. While SSB



remains above the overfished threshold ($SSB_{F_{40\%}}$), below-average recruitment has led to a decreasing trend in SSB since 2014. The fishing mortality rate has increased since the late 2000s, but has not exceeded the overfishing threshold ($F_{40\%}$).

While this assessment indicated notably larger estimates of landings, biomass, and SSB when compared to the 2013 assessment, both assessments had similar trends in biomass, recruits, and SSB. SEDAR 58 also saw similar trends and scales for F and SSB relative to reference point values used in each of the last two assessments, supporting use of the recommended $F_{40\%}$ -based reference points. Finally, SEDAR 58 also made improvements in fitting length and age composition data. The age composition data was noted by the Review Panel as a strength in SEDAR 58, allowing several cohorts to be tracked through the data over time.



Data and Research Needs

The most pressing research need is the development of a fishery-independent sampling program to better understand overall abundance and clarify any uncertainties in the fishery-dependent abundance indices. This need has previously been recognized, but has been difficult to address through current multispecies surveys due to the seasonal and sporadic nature of cobia catches. The Panels also recommend coordination and expansion of tagging efforts, as well as age and reproductive sampling.

Whom Do I Contact For More Information?

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Glossary

Batch Spawners: fish which spawn multiple times throughout a spawning season.

Discards: fish returned to the sea dead or alive.

Fishery-Dependent Data: information collected from recreational and commercial fishermen and dealers on catch, landings, and effort.

Fishery-Independent Data: information collected by scientists via a long-term research survey or other monitoring program.

Fishing mortality rate (F): the instantaneous rate at which fish in a stock die because of fishing.

$F_{40\%}$ and $SSB_{40\%}$ Reference Points: the fishing mortality rate and SSB level that allows the population to achieve 40% of the maximum spawning potential it would have obtained in the absence of fishing.

Overfished: harvesting from a stock that exists at a biomass below the value sufficient to produce enough young fish during the next spawning period.

Overfishing: harvesting from a stock at a rate greater than the stocks reproductive capacity to replace fish removed through harvest.

Recruitment: the number of fish entering the fishery.

Spawning stock biomass (SSB): the total weight of fishing in a stock that are old enough to spawn.

References

SEDAR. 2020. SEDAR 58 – Atlantic Cobia Stock Assessment Report. SEDAR, North Charleston, SC. 500 p.
http://www.asmfc.org/uploads/file/5e3d99a3SEDAR58_AtlCobiaAssessment_PeerReviewReport.pdf

ASMFC. 2009. Guide to Fisheries Science and Stock Assessments. Arlington, VA.
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