FISHERY MANAGEMENT PLAN UPDATE
COBIA
AUGUST 2022

STATUS OF THE FISHERY MANAGEMENT PLAN

Fishery Management Plan History

FMP Documentation:	SAFMC FMP	February 1983
	Amendment 1	September 1985
	Amendment 2	August 1987
	Amendment 3	August 1989
	Amendment 5	August 1990
	Amendment 6	December 1992
	Amendment 8	April 1998
	Amendment 11	December 1999
	Amendment 18	January 2012
	Amendment 20b	March 2015
	Framework Amendment 4	September 2017
	Amendment 31	March 2019
	ASMFC FMP	November 2017
	Amendment 1	August 2019
	Addendum 1	October 2020
Comprehensive Review:	2027	

The Gulf of Mexico Fishery Management Council (GMFMC) and the South Atlantic Fishery Management Council (SAFMC) approved and implemented the Fishery Management Plan (FMP), Final Environmental Impact Statement, Regulatory Impact Review and Final Regulations for the Coastal Migratory Pelagic (CMP) Resources FMP in 1983 which included all cobia (*Rachycentron canadum*) in the Gulf of Mexico and South Atlantic (GMFMC/SAFMC 1983). This plan managed cobia as one unit stock across the entire jurisdictional area of the GMFMC and SAFMC. The stated management objective for cobia in the plan was to institute management measures necessary to increase yield per recruit and average size and to prevent overfishing. To achieve this, a minimum size limit was established for the Fishery Conservation Zone (FSC), which is analogous to the Exclusive Economic Zone (EEZ) of today, locally referred to as 'federal waters'. The FMP was first amended in 1985 with the adoption of Amendment 1 which established the fishing year as January 1 through December 31 and clarified that the minimum size limit for cobia (GMFMC/SAFMC 1985). This amendment also highlighted the fact that most southeastern states had not yet adopted the recommended minimum size limits for cobia and that populations of cobia in Chesapeake Bay appear to be overfished and that the federal enforcement capability in this case is very limited.

Amendment 2 to the FMP was approved in 1987 and established a permit for charter boats fishing for coastal migratory pelagics (GMFMC/SAFMC 1987a). Amendment 3 prohibited drift gill nets as a gear that could be used to harvest coastal pelagic species (GMFMC/SAFMC 1987b).

Amendment 5 addressed the issue of average annual catches from 1981-1986 exceeding the established MSY level and defined the overfishing limit for the cobia stock, as well as set the procedure for rebuilding if the stock was found to be overfished (GMFMC/SAFMC 1990). Cobia were added to the annual stock assessment procedures for the councils, and a bag and possession limit was established for both commercial and recreational sectors in an effort to control harvest. Amendment 6 (GMFMC/SAFMC 1992) removed the total length minimum size limit, specifying that the only minimum size for cobia was fork length (FL) and increased Maximum Sustainable Yield (MSY) based on results stock assessment analyses done for, and at the recommendation of, the Mackerel Stock Assessment Panel (Isely 1992; MSAP 1992).

In 1998, Amendment 8 extended the management area for cobia through the Mid-Atlantic Fishery Management Council's (MAFMC) jurisdiction which also extended the bag limit and minimum size limit (GMFMC/SAFMC 1996). Overfishing was defined as a fishing mortality rate greater than a static Spawning Potential Ratio (SPR) threshold of 30% and if exceeded, then required that fishing mortality be reduced to rates corresponding to management target levels. Optimum yield (OY) was defined as being equal to MSY. Amendment 11 (SAFMC 1998) redefined OY as the amount of harvest that can be taken by United States fishermen while maintaining the SPR at or above 40% of a static SPR. It also redefined the overfishing level as a fishing mortality rate (F) in excess of the F at 30% of a static SPR and established a threshold level for all the species in the coastal migratory pelagic unit as 10% of the static SPR.

Amendment 18 separated cobia into two stocks at the jurisdiction boundary between the GSFMC and the SAFMC (GMFMC/SAFMC 2011). The Atlantic stock range was east of the Florida Keys through New York. Annual Catch Limits (ACL) were established for both stocks as required under the federal Magnuson-Stevens Act. The ACL for the Atlantic stock was set to 1,571,399 pounds with a 92% recreational and 8% commercial sector allocation. Amendment 20B (GMFMC/SAFMC 2014) modified the stock boundary based on the results of the 2013 stock assessment (SEDAR 2013) to the Florida-Georgia state line. A new ACL was set at 690,000 pounds for the 2015 fishing season and 670,000 pounds for every year after, with sector allocations shifting appropriately. Accountability Measures (AM) required under the federal Magnuson Stevens-Act were established to ensure that ACLs are not exceeded, and that stock does not become overfished. Accountability measures require the councils to take action to limit the harvest of the species if an ACL is exceeded. For cobia, the recreational AMs did not allow for in-season closures if the ACL was met or projected to be met rather, measures were to be taken the following season to limit the harvest to keep the three-year running average of landings at or below the ACL. If the total ACL was exceeded, the AMs require that the length of the recreational season the following year be reduced to constrain harvest to the ACL for that year. The commercial AMs required an in-season closure if the commercial ACL was met or projected to be met. If the stock was overfished, and the total ACL is exceeded, then the sector-specific ACL for the following year will be reduced by the appropriate sector-specific overage.

Framework Amendment 4 (SAFMC 2016) to Amendment 20B to the CMP FMP was approved by the council in September of 2016 and the final rule went into effect in September 2017. The amendment increased the recreational minimum size limit of cobia to 36 inches FL, reduced the bag limit to one fish per person per day and implemented a vessel limit. The recreational AM were modified to allow for a reduction in vessel limit before a season reduction was implemented. The framework amendment also maintained the existing commercial minimum size limit and

established a two fish per person per day or six fish per vessel per day (whichever is more restrictive) commercial trip limit.

Amendment 31 (SAFMC 2018) to the CMP FMP was approved by the council in June of 2018 and the final rule went into effect March of 2019. The amendment removed the Atlantic migratory group cobia (Georgia through New York) from federal management under the Magnuson-Stevens Act and transfered sole management of Atlantic cobia to the Atlantic States Marine Fisheries Commission (ASMFC). The amendment also implemented comparable regulations to the CMP FMP in the federal waters under the Atlantic Coastal Act in order to ensure that Atlantic cobia continues to be managed in federal waters and that there was no lapse in the management of the stock.

The ASMFC approved the Interstate FMP for Atlantic Migratory Group Cobia in November of 2017 (ASFMC 2017). The interstate plan complements Framework Amendment 4 to the Gulf of Mexico and South Atlantic FMP for cobia and establishes Recreational Harvest Limits (RHL) for the Atlantic states based on the federal recreational and commercial ACLs. The plan provides the states flexibility in management of the species by allowing states to define their own season and vessel limits to constrain harvest to the RHL. At a minimum, states must comply with the size limits and bag limits established in Framework Amendment 4 and not exceed the vessel limits for commercial and recreational vessels (SAFMC 2016). State landings will be evaluated against the RHLs every three years to ensure that management measures are constraining coastwide harvest to the Federal ACLs.

To accommodate the removal of Atlantic cobia from federal management, ASMFC approved Amendment 1 in August 2019. Amendment 1 changes several portions of the Commission's FMP that were previously dependent on the CMP FMP and institutes a long-term strategy for managing in the absence of a federal plan (ASMFC 2019). Several of these changes establish processes for the Commission to carry out management responsibilities previously performed by the South Atlantic Council, including setting of harvest quotas and sector allocations, and defining stock status criteria. Amendment 1 recommends to NOAA Fisheries that fishing in federal waters be regulated according to the state of landing. Amendment 1 changes the units used to measure and evaluate the recreational fishery from pounds to numbers of fish. Additionally, Amendment 1 transitions responsibilities of monitoring and closing commercial harvest to the Commission and establishes *de minimis* criteria for the commercial fishery (ASMFC 2019).

When SEDAR 58 was accepted for management, the ASMFC South Atlantic Board approved an increase in the annual total harvest based on the assessment results and harvest projections (SEDAR 2020). Addendum 1 to Amendment 1 was initiated after approval of the assessment. The Board approved the Addendum in October 2020. Addendum 1 modifies the sector allocations from a 92% recreational:8% commercial split to 96% recreational:4% commercial, respectively (ASMFC 2020). The change was primarily based on new recreational catch estimates that resulted from changes in survey methodology by the Marine Recreational Information Program; estimates were, on average, two times higher than previously estimated. The new commercial allocation allows the fishery to operate at the current level with some room for landings to increase as the stock range expands further north. Additionally, Addendum 1 modifies the calculation of the commercial trigger to determine when an in-season coastwide commercial closure occurs and

modified *de minimis* measures including an adjustment to the commercial allocation set aside and the recreational regulations (ASMFC 2020).

To ensure compliance with interstate requirements, North Carolina also manages this species under the North Carolina Interjurisdictional Fisheries Management Plan (IJ FMP). The goal of the IJ FMP is to adopt fishery management plans, consistent with N.C. law, approved by the MAFMC, SAFMC, or the ASMFC by reference and implement corresponding fishery regulations in North Carolina to provide compliance or compatibility with approved fishery management plans and amendments, now and in the future. The goal of these plans, established under the Magnuson-Stevens Fishery Conservation and Management Act (federal council plans) and the Atlantic Coastal Fisheries Cooperative Management Act (Atlantic States Marine Fisheries Commission plans) are like the goals of the Fisheries Reform Act of 1997 to "ensure long-term viability" of these fisheries (NCDMF 2022).

Management Unit

The management unit for Atlantic cobia is defined as all waters north of the Florida-Georgia line through New York from coastal estuarine waters eastward to the offshore boundaries of the EEZ (ASMFC 2019; Figure 1).

Goal and Objectives

The goal of Amendment 1 to the Interstate FMP (ASMFC 2019) is to provide for an efficient management structure that implements coastwide management measures, providing equitable and sustainable access to the Atlantic cobia resource throughout the management unit in a timely manner.

The following objectives are intended to support the goal of Amendment 1.

- Provide a flexible management system to address future changes in resource abundance, scientific information, and fishing patterns among user groups or area.
- Implement management measures that allow stable, sustainable harvest of Atlantic cobia in both state and federal waters.
- Establish a harvest specification procedure that will allow flexibility to respond quickly to stock assessment results or problems in the fishery, while also providing opportunities for public input on potential significant changes to management.
- Promote continued, cooperative collection of biological, economic, and social data required to effectively monitor and assess the status of the Atlantic cobia resource and evaluate management efforts.
- Manage the Atlantic cobia fishery to protect both young individuals and established breeding stock.
- Develop research priorities that will further refine the Atlantic cobia management program to maximize the biological, social, and economic benefits derived from the Atlantic cobia population.

DESCRIPTION OF THE STOCK

Biological Profile

Cobia is the sole member of the family Rachycentridae. It is a fast growing and moderately long-lived species with a maximum reported age of 16 years with a worldwide distribution in tropical, subtropical, and warm-temperature waters (SEDAR 2018). In the western Atlantic, cobia occur from Nova Scotia, Canada south to Argentina including the Caribbean Sea. Off the coast of the United States, they are most abundant in nearshore coastal waters from Virginia south through the Gulf of Mexico. They migrate in the spring and fall from inshore and offshore habitats, as well as up and down the Atlantic coast (Perkinson et al. 2019; Crear et al. 2020; Gallagher 2020). Recent tagging and genetics studies have shown there is the potential for a resident sub-stock off Virginia and northern North Carolina (Darden et al. 2014; Perkinson et al. 2019; Gallagher 2020)

Spawning along the Atlantic coast occurs from April through July, peaking during May and June around inlets and in high salinity estuarine waters (Brown-Peterson et al. 2001). In North Carolina, spawning peaks in June, coinciding with water temperatures of 20 – 25°C (Smith 1995; Lefebrve and Denson 2012; Perkinson et al. 2019). Larval fish settle in the estuaries along the southeast and mid-Atlantic coasts and utilize them as a nursery area. Cobia can grow to as large as 14 inches FL in their first year of life and move offshore as the water temperatures cool in the fall. Most cobia are mature by age-2 and at 31 inches in FL (Smith 1995). Females can spawn multiple times in a season (batch spawners) and can produce millions of eggs in a single year. Cobia can grow as large as 100 pounds but are typically encountered by fisherman in the 25-to-40-pound range (Manooch 1984). Feeding typically occurs on the bottom where they consume fish and crabs, but they have been known to consume prey as large as turtles. Cobia are structure oriented and can be found around structure such as channel markers, sea walls and jetties, or floating objects like larger marine animals such as leatherback sea turtles and rays.

Stock Status

Results of the 2020 assessment indicate that cobia are not overfished, and overfishing is not occurring (SEDAR 2020; Figures 2 and 3).

Stock Assessment

Cobia were assessed during South East Data, Assessment, and Review (SEDAR) 58 using data through 2017 (SEDAR 2020); this was a benchmark assessment. SEDAR 58 began with a stock identification workshop in April 2018. The workshop maintained the Florida-Georgia state line as the stock boundary since this border is within a transition zone that occurs from the southern boundary of Brevard County, FL to Brunswick, GA (SEDAR 2018).

SEDAR 58 assessed the Atlantic stock of cobia using data from 1986 – 2017 (SEDAR 2020). This assessment included several modifications from the previous assessment (SEDAR 2013). Though more years of data were added to the end of the assessment, overall, the time series was shorted such that the model was started in the year when the best data became available.

The data available for cobia included life history information (growth rate, age structure, and age-specific maturity), commercial and recreational landings and discards, commercial and

recreational length and age composition, and the headboat logbook index. The Beaufort Assessment Model (BAM) was selected by the Assessment Workshop (AW) as the primary assessment model. The BAM uses a statistical catch-at-age formulation which allows for forward-projecting a fish population through time. The base run of the BAM indicated that cobia were not overfished in the terminal year ($SSB_{2017}/SSB_{40\%}$ = 1.41; Figure 2) and overfishing was not occurring ($F_{2015\text{-}2017}/F_{40\%}$ = 0.29; Figure 3). Sensitivity runs of the model confirmed that these values were consistent.

Sources of uncertainty in the assessment included the lack of a fishery-independent index of abundance and the fact that the sole index used in the model was from a fishery-dependent source. Because the fishery operates in such a way that a trip consists of very few fish, the reliability of fishery-dependent indices as a true indicator of the stock should be approached with caution since they may not track actual abundance well and issues can be exacerbated by management measures. For SEDAR 58, the fishery-dependent index was not extended past 2015 due to seasonal closures. The spawner-recruit relationship was also not well defined and annual recruitment was based on a fixed value. MSY-based management quantities rely heavily on this value, so results should be considered with this uncertainty in mind.

Overall, the model estimated little trend in SSB, though the terminal year was the lowest of the time series (Figure 2). The last strong year class in the model was predicted to have occurred around 2010. Predicted recruitment in the last four years (2014-2017) was below the time series average. If recruitment remains low, the decline in the stock as seen in the last several years of the assessment, will continue.

DESCRIPTION OF THE FISHERY

Current Regulations

Under the Interstate Plan, North Carolina must implement seasons and/or vessel limits that constrain harvest to the RHL. State landings will be evaluated against the RHL by averaging landings over a three-year period. The acceptance of SEDAR 58 in 2020 for management meant an increase in the amount of fish available for harvest, and the shift of harvest allocation to the recreational sector through Addendum 1. North Carolina's RHL increased to 29,302 fish with a shared coastwide commercial quota of 73,116 pounds.

For the 2020 – 2022 fishing years, North Carolina implemented a 36-inch FL minimum size limit and a one fish per person per day possession limit with a season from May 1 to December 31. Vessel limits for private vessels were set to two fish per vessel from May 1 to 31 and one fish per vessel from June 1 to December 31. Due to the increase in the RHL through Addendum 1, North Carolina re-submitted the cobia implementation plan to ASMFC, and was approved to extend the two fish vessel limit for private vessels through June 30 each year starting in 2021. Charter and for-hire vessels may harvest up to four fish per vessel from May 1 to December 31. The commercial fishery is managed under a 36-inch FL minimum size limit and two fish per person per day possession limit, not to exceed six fish per vessel.

North Carolina was not the only state to implement new management measures in 2021. Based on a recommendation from the Technical Committee to the Coastal Pelagics Board at the spring 2022

meeting, the Board changed the fishing years to 2021 – 2023 to better align with management. New specifications for the 2024 – 2026 fishing years will be decided in 2023.

Commercial Fishery

Commercial landings of cobia in North Carolina are available from 1950 to the present. However, monthly landings were not available until 1972. North Carolina instituted mandatory reporting of commercial landings through their Trip Ticket Program, starting in 1994. Landings information collected since 1994 are considered the most reliable. Since 1986, landings have ranged from 14,898 pounds (1989) to 52,684 pounds (2015), averaging 34,083 pounds over the last 10 years (Table 1; Figure 4A). In 2021, 29,301 pounds were landed commercially in North Carolina.

The primary fisheries associated with cobia in North Carolina are the snapper-grouper, coastal pelagic troll, and the gill net fisheries. The primary commercial gear used to harvest cobia has changed over time. This is most likely due to changing fisheries and the fact that it is mostly considered a marketable bycatch fishery. From 1950 to the late 1970s, cobia were primarily landed out of the haul seine fishery. Most landings that occurred during the 1980s came from the pelagic troll and hook-and-line fisheries with modest landings from the haul seine and anchored gill net fisheries. From 1994 – 2020, most landings have occurred from the anchored gill net, pelagic troll, and hook-and-line fisheries with gill nets being the top gear during most of those years. In 2021, gill nets accounted for 73% of the landings, while 21% of the landings were from the hook-and-line and pelagic troll fisheries combined (Table 2; Figure 5). From 2017-2019 gill-net landings decreased as the cobia season closed in early September. As the result of an increase in quota in 2020 due to SEDAR 58, gill-net landings have increased the last couple of years as fishermen have been able to land cobia incidentally caught during the fall king mackerel fishery. From 2012- 2017, landings in the pound net fishery increased, accounting for up to 12% of the total landings dependent on the year; however, since 2017, pound nets landings have contributed less than 5% to the overall landings (Table 2).

Recreational Fishery

Historically, recreational fisherman targeted cobia from a vessel by anchoring and fishing either dead or live bait, or both near inlets and deep-water sloughs inshore (Manooch 1984). Fish were also harvested from shore or off piers using dead or live bait, most commonly menhaden. In the early 2000s, fisherman began outfitting their vessels with towers to gain a higher vantage point to spot and target free swimming cobia along tidelines and around bait aggregations. This method of fishing actively targets cobia in the nearshore coastal zone and has become the primary mode of fishing in most parts of the state.

Recreational harvest estimates are available from 1981 to the present. Recreational estimates across all years have been updated and are now based on the MRIP new Fishing Effort Survey-based calibrated estimates. For more information see: https://www.fisheries.noaa.gov/topic/recreational-fishing-data.

Cobia is enthusiastically pursued by recreational anglers in North Carolina, and recreational harvest can be up to 98% of the total harvest. Over the last 10 years, recreational harvest has averaged 93% of the total harvest. Recreational harvest of cobia in North Carolina has ranged from

a low of 81,833 pounds (1987) to a high of 1,925,762 pounds (2015) with average landings of 376,390 pounds over the 36-year time series. Recently, landings have ranged from 102,077 pounds (2012) to 1,925,762 pounds (2015), averaging 707,018 pounds over the last 10-year period (Table 1; Figure 4B). In 2021, North Carolina landed 356,340 pounds of cobia in the recreational fishery. Landings during the 1980s and 1990s remained relatively constant from year to year. Landings began to increase and become more variable beginning in the mid-2000s. Cobia are landed mostly in the spring and summer months corresponding with their spring spawning migration (Smith 1995; Brown-Peterson et al. 2001). Peak landings occur during the latter part of May into June and quickly diminish thereafter. However, recreational landings of cobia can occur through October. By fishing mode, most recreational landings of cobia in North Carolina occur from private vessels (75%) with charter vessels (8%) and shore-based modes (17%) accounting for the rest.

The North Carolina Division of Marine Fisheries (NCDMF) offers award citations for exceptional catches of cobia. Harvested cobia that weigh greater than 40 pounds, and cobia captured and released that measure greater than 33 inches FL (prior to May 1, 2021) or 36 inches FL (currently), are eligible for an award citation. Since 1991, just over 10,500 citations have been awarded for cobia. On average, 10% of citations have been from released fish; in 2021, approximately 7% were from releases. From 1991 through 2005 the number of award citations for cobia steadily increased, but since 2005 the number of citations has fluctuated most likely dependent on the availability of the fish (Figure 6).

MONITORING PROGRAM DATA

Fishery-Dependent Monitoring

Fishery dependent length-frequency information for the commercial cobia fishery in North Carolina is collected by fish house samplers, the majority of which come NCDMF Program 438 (Offshore Live Bottom Fishery), as well as Program 431 (Sciaenid Pound Nets) and Program 434 (Ocean Gill Net Fishery). Length-frequency information for the recreational cobia fishery is collected through the NCDMF Carcass Collection Program and MRIP. Ten cobia were measured from the commercial fishery in 2021 with an average FL of 39 inches (Table 3). Mean FL has ranged from 37 to 43 inches since 1986. Cobia landed in the commercial fishery have ranged from 15 to 61 inches FL (Table 3; Figure 7).

Nine cobia were measured by MRIP in 2021 with an average FL of 43 inches (Table 4). Mean size has ranged from 27 to 48 inches FL over the time series. Cobia harvested in the recreational fishery have ranged from 9 to 68 inches FL (Table 4; Figure 8). Additionally, a total of 28 cobia were measured through the carcass collection program in 2021, with a average FL of 41 inches. Donated carcass lengths tend to be similar to what is measured by MRIP (Table 4). The number of commercial and recreational fish sampled is low and is most likely affected by low possession limits and seasonal nature of the fishery. Size trends in commercially landed fish for most years appear to correspond with sizes observed in the recreational fishery though at lower frequencies (Tables 3 and 4). However, the length distribution of the recreational fishery was larger than that of the commercial fishery in 2021 (Figure 9). This is possibly due to the timing of the fisheries, and differences in gear selectivity between the sectors; these differences may be hyper-inflated by the lower than normal sample sizes for both sectors in 2021.

In order to describe the age structure of harvest and indices, cobia age structures are collected from various fishery-independent (scientific surveys) and dependent (fisheries) sources throughout the year. Through 2018, aging structures are provided to the NOAA Beaufort Age Lab for analysis. In 2017, 50 cobia were collected ranging in age from 0 to 13 years (Table 5). In 2021, 47 cobia were collected for aging, but have not yet been aged. The modal age of cobia collected each year is hard to determine due to low sample size. The age-length relationship is less predictable beyond age-3, as there is overlap in age for a given length (Figure 10).

Fishery-Independent Monitoring

Currently, the NCDMF does not have many fishery-independent sampling programs that target or catch cobia in great numbers.

In 2001, the NCDMF initiated a fisheries-independent gill net survey in Pamlico Sound (Program 915). The objective of this project is to provide annual, independent, relative-abundance indices for key estuarine species in the nearshore Pamlico Sound. The survey employs a stratified random sampling design and utilizes multiple mesh gill nets (3.0-inch to 6.5-inch stretched mesh, by half-inch increments). A total of 146 cobia have been captured in the Pamlico Sound Independent Gill Net Survey from 2001 – 2021. Cobia ranged from 6 to 38 inches FL and had a mean size of 19 inches FL. Due to the low number of positive trips (ranging from <1% to 5% of all sets), this survey cannot be used to create an index.

Additionally, cobia have been caught by the independent gill net survey sampling south of Pamlico Sound. The 'Rivers' portion of the survey (Neuse, Pamlico, Tar, and Pungo rivers) was initiated in 2003, the 'Southern' portion (Cape Fear and New rivers) in 2008, and the 'Central' portion (White Oak River through Back Sound) in 2018. Seventy-two cobia have been caught in this sampling, ranging in size from 8 to 22 inches FL, with a mean size of 15 inches FL.

While this data cannot be used to create an index of abundance, this sampling program is one of the few programs on the Atlantic coast that catches smaller cobia, providing important life history information that may not otherwise be obtained.

For the 2020, data are not available for cobia from the Fishery-Independent Gill-Net Survey (Program 915) due to the COVID pandemic. Sampling in this program was suspended in February 2020 due to COVID-19 restrictions and protected species interactions but resumed July 2021.

RESEARCH NEEDS

Current research needs for cobia can be found in the most recent SEDAR 58 stock assessment report (SEDAR 2020) and the Amendment 1 to the Interstate FMP (ASMFC 2019). Below is a list of state prioritized research needs based off the recommendations from SEDAR 58, Amendment 1 to the Interstate Plan, and input from NCDMF lead staff.

- Institute fisheries independent sampling programs to obtain estimates of cobia abundance

- Better characterize the life history of cobia including age sampling of the recreational sector, update age- and length-at-maturity, batch fecundity, spawning seasonality, and spawning frequency information
- Obtain more precise and timely estimates of harvest from the Atlantic cobia recreational fishery.
- Investigate release mortality and fishing mortality within the commercial and recreational fisheries
- Increase reporting of recreational harvest and better characterize the recreational and for-hire fisheries

MANAGEMENT STRATEGY

As of March 2019, cobia is managed solely under the ASMFC Interstate Plan requirements. The interstate plan, including Amendment 1 and Addendum 1 to the FMP, aim to maintain SSB above a threshold which allows for surplus recruitment to the stock.

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TABLES

Table 1. Recreational harvest (number of fish released and weight) and releases (number of fish; MRIP) and commercial harvest (weight in pounds; Atlantic Coastal Cooperative Statistic Program and N.C. Trip Ticket Program) of cobia from North Carolina, 1986 – 2021. All weights are in pounds.

	Recreational			Commercial	
Year	Number Landed	Number Released	Weight Landed (lb)	Weight Landed (lb)	Total Weight (lb)
1986	17,956	9,112	533,982	18,303	552,285
1987	6,959	592	81,833	32,672	114,505
1988	5,716	3,257	103,975	15,690	119,665
1989	9,872	2,262	208,259	14,898	223,157
1990	10,054	6,089	188,539	21,938	210,477
1991	11,524	22,522	266,633	23,217	289,850
1992	10,711	9,777	317,628	18,534	336,162
1993	6,346	2,778	168,142	20,431	188,573
1994	6,908	4,543	169,168	30,586	199,754
1995	9,530	4,817	302,745	35,134	337,879
1996	4,744	2,000	102,899	33,404	136,303
1997	4,115	13,723	129,299	42,063	171,362
1998	3,132	9,859	117,754	22,197	139,951
1999	2,399	18,498	101,465	15,463	116,928
2000	2,473	4,734	91,143	28,754	119,897
2001	3,548	18,500	121,751	24,718	146,469
2002	7,196	14,036	319,178	21,058	340,236
2003	6,948	21,722	223,508	21,313	244,821
2004	12,522	11,079	420,684	20,162	440,846
2005	18,491	19,083	401,557	17,886	419,443
2006	5,154	11,425	196,330	20,270	216,600
2007	6,262	12,695	218,447	19,005	237,452
2008	3,972	24,028	167,463	22,047	189,510
2009	12,823	55,374	320,075	31,898	351,973
2010	24,030	48,590	808,227	43,715	851,942
2011	10,711	47,151	399,192	19,924	419,116
2012	3,805	66,567	102,077	31,972	134,049
2013	37,617	35,398	980,541	35,456	1,015,997
2014	24,601	32,184	645,427	41,798	687,225
2015	47,110	44,254	1,925,762	52,684	1,978,446
2016	26,421	39,237	838,363	48,252	886,615
2017	25,025	125,251	872,861	20,842	893,703
2018	25,331	68,219	685,962	20,629	706,591
2019	10,090	38,285	254,963	21,553	276,516
2020*	15,067	51,158	407,883	38,344	446,227
2021	10,970	40,136	356,340	29,301	385,641
Mean	12,504	26,082	376,390	27,114	403,505

*2020 recreational data contains imputed data as a result of impacts from COVID on sampling during this year.

Table 2. Commercial harvest (weight in pounds) by gear, 2012 – 2021. (Source: North Carolina Trip Ticket Program)

	Gear					
Year	Gill Nets	Hook & Line	Trolling	Pound Nets	Other*	Total
2012	19,482	6,011	1,421	3,681	1,378	31,972
2013	11,744	15,530	4,453	2,506	1,223	35,456
2014	21,288	9,670	6,163	3,538	1,140	41,798
2015	32,904	10,624	3,560	4,541	1,055	52,684
2016	32,809	9,041	2,314	3,434	656	48,252
2017	11,768	4,765	1,056	2,541	712	20,842
2018	8,965	7,040	2,552	1,636	436	20,629
2019	9,417	7,752	3,221	473	690	21,553
2020	29,202	3,175	3,780	1,294	894	38,344
2021	21,451	4,146	2,078	1,060	567	29,301

*Other can include beach seines, trawls, crab and fish pots, flynets, fyke nets, spears, longlines, and haul seines.

Table 3. Mean, minimum, and maximum lengths (fork length, inches) of cobia sampled from the commercial fisheries (NCDMF fish house sampling programs) from North Carolina, 1986 – 2021.

Year	Mean Fork Length	Minimum Fork Length	Maximum Fork Length	Total Number Measured
1986	38	24	52	21
1987	39	28	50	42
1988	40	21	57	52
1989	38	24	48	28
1990	38	15	53	108
1991	39	31	46	19
1992	39	32	47	19
1993	37	32	46	10
1994	38	31	45	4
1995	40	33	48	14
1996	35	17	42	5
1997	38	33	43	4
1998				0
1999	37	25	45	8
2000	41	33	61	7
2001	37	30	42	8
2002	38	33	41	5
2003	40	30	46	13
2004	38	26	49	24
2005	40	31	54	18
2006	39	32	49	23
2007	40	31	52	24
2008	39	18	57	29
2009	39	30	44	15
2010	43	35	52	19
2011	38	34	46	13
2012	38	29	50	34
2013	38	33	46	16
2014	36	30	53	32
2015	39	32	48	34
2016	39	33	51	13
2017	42	36	46	9
2018	40	33	48	11
2019	39	34	49	12
2020	39	33	47	14
2021	39	34	47	10

Table 4. Mean, minimum, and maximum lengths (fork length, inches) of cobia sampled from the recreational fisheries (MRIP) and the NCDMF Carcass Collection Program from North Carolina, 1986 – 2021. It should be noted that the NCDMF Carcass Collection Program started in 2016.

Year	MRIP				NCDMF Carcass Collection			
	Mean Length	Minimum Length	Maximum Length	Total Number Measured	Mean Length	Minimum Length	Maximum Length	Total Number Measured
1986	43	20	50	7				
1987	27	9	48	13				
1988	37	16	50	9				
1989	34	11	55	16				
1990	34	11	53	28				
1991	35	11	60	20				
1992	41	22	52	19				
1993	41	31	51	16				
1994	39	18	52	18				
1995	43	31	54	25				
1996	36	17	61	37				
1997	42	35	51	17				
1998	45	35	55	28				
1999	47	41	55	5				
2000	41	26	58	8				
2001	43	33	59	11				
2002	48	34	59	16				
2003	42	33	56	19				
2004	43	32	58	26				
2005	37	20	61	30				
2006	43	34	57	12				
2007	44	34	49	8				
2008	45	33	55	5				
2009	38	23	51	8				
2010	43	23	59	58				
2011	42	14	68	21				
2012	39	30	62	11				
2013	39	12	50	34				
2014	39	33	58	41				
2015	44	32	58	65				
2016	43	35	59	54	44	36	63	12
2017	43	36	58	27	41	33	48	38
2018	41	33	57	60	37	23	47	39
2019	40	34	57	30	45	35	57	42
2020	41	33	57	67	41	34	49	9
2021	43	31	50	9	41	35	49	28

Table 5 Summary of cobia age samples collected from both dependent (commercial and recreational fisheries) and independent (surveys) sources, 2008 – 2021.

Year	Minimum Age	Maximum Age	Total Number Aged
2008	0	1	7
2009	1	1	4
2010	0	12	13
2011	0	1	6
2012	1	4	5
2013	1	1	1
2014*			0
2015	1	1	1
2016	0	11	20
2017	0	13	50
2018**			94
2019**			80
2020**			34
2021**			47

**Cobia was not added to the priority species list for sampling until 2016; as a result, no species were collected this year.*

***Age samples not yet read.*

FIGURES

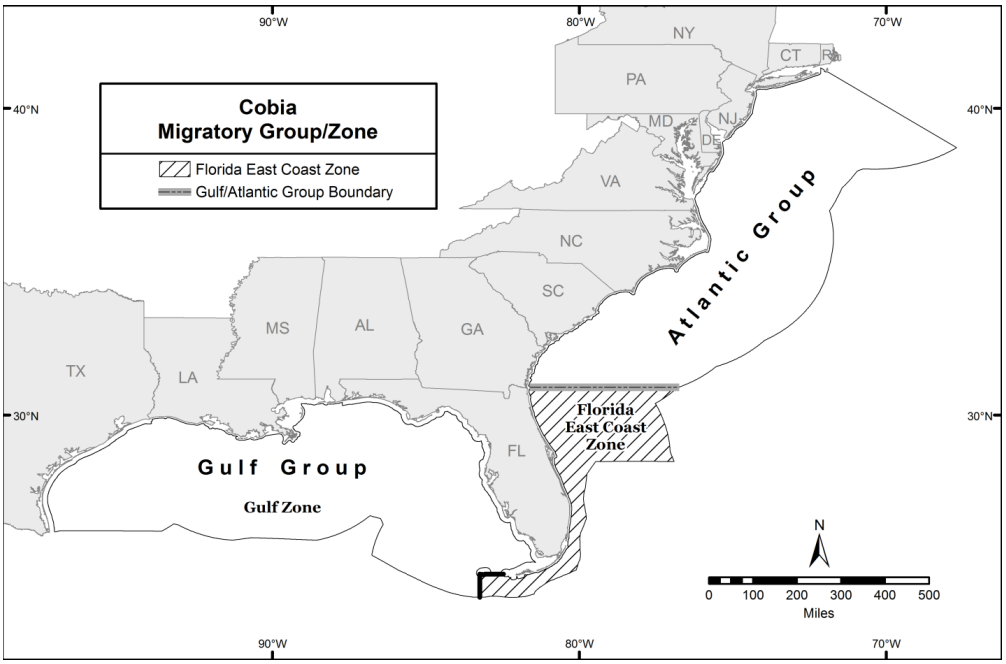

Figure 1. Zone splits for Gulf and Atlantic Migratory Group cobia established in Coastal Migratory Pelagics Fishery Management Plan Amendment 20b (Source: GMFMC/SAFMC 2014).

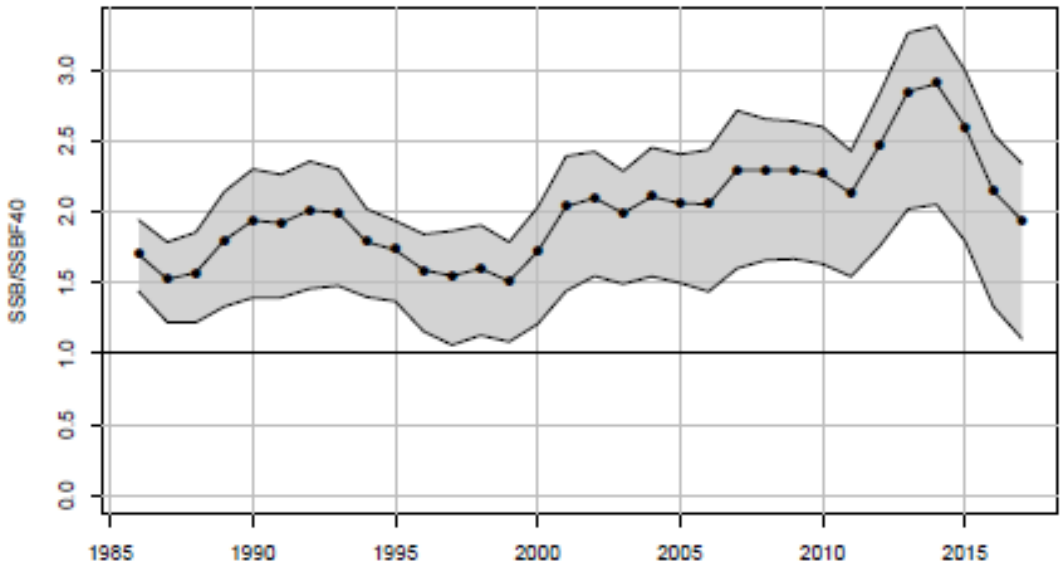

Figure 2. Spawning Stock Biomass (SSB) relative to established reference point SSBF40% for cobia from SEDAR 58 (SEDAR 2020). The shaded gray error bands indicate 5th and 95th percentiles of the Monte Carlo Bootstrap trials.

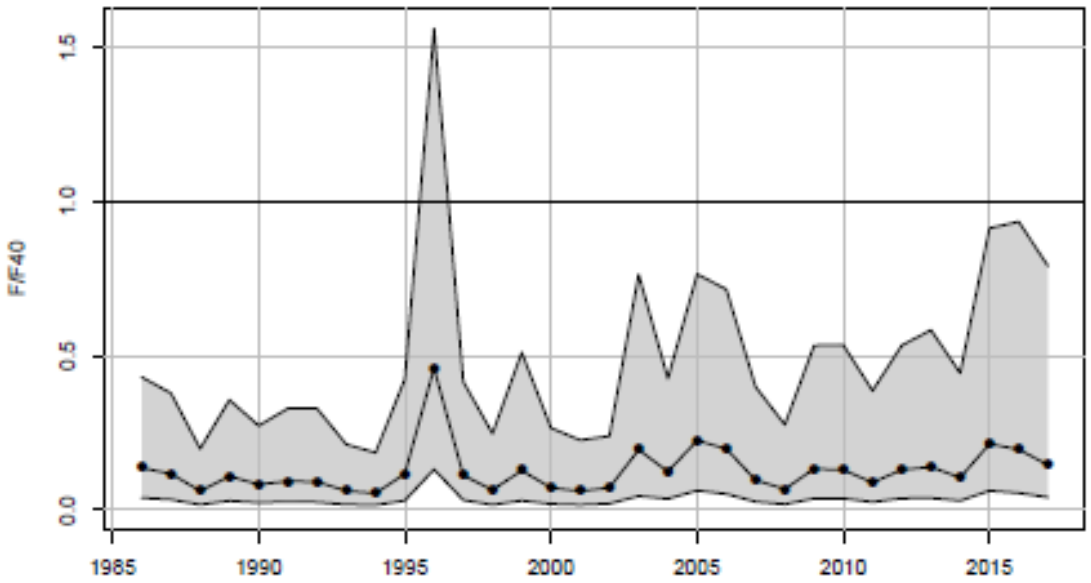

Figure 3. Fishing mortality (F) relative to established reference point $F_{40\%}$ for cobia from SEDAR 58 (SEDAR 2020). The shaded gray error bands indicate 5th and 95th percentiles of the Monte Carlo Bootstrap trials.

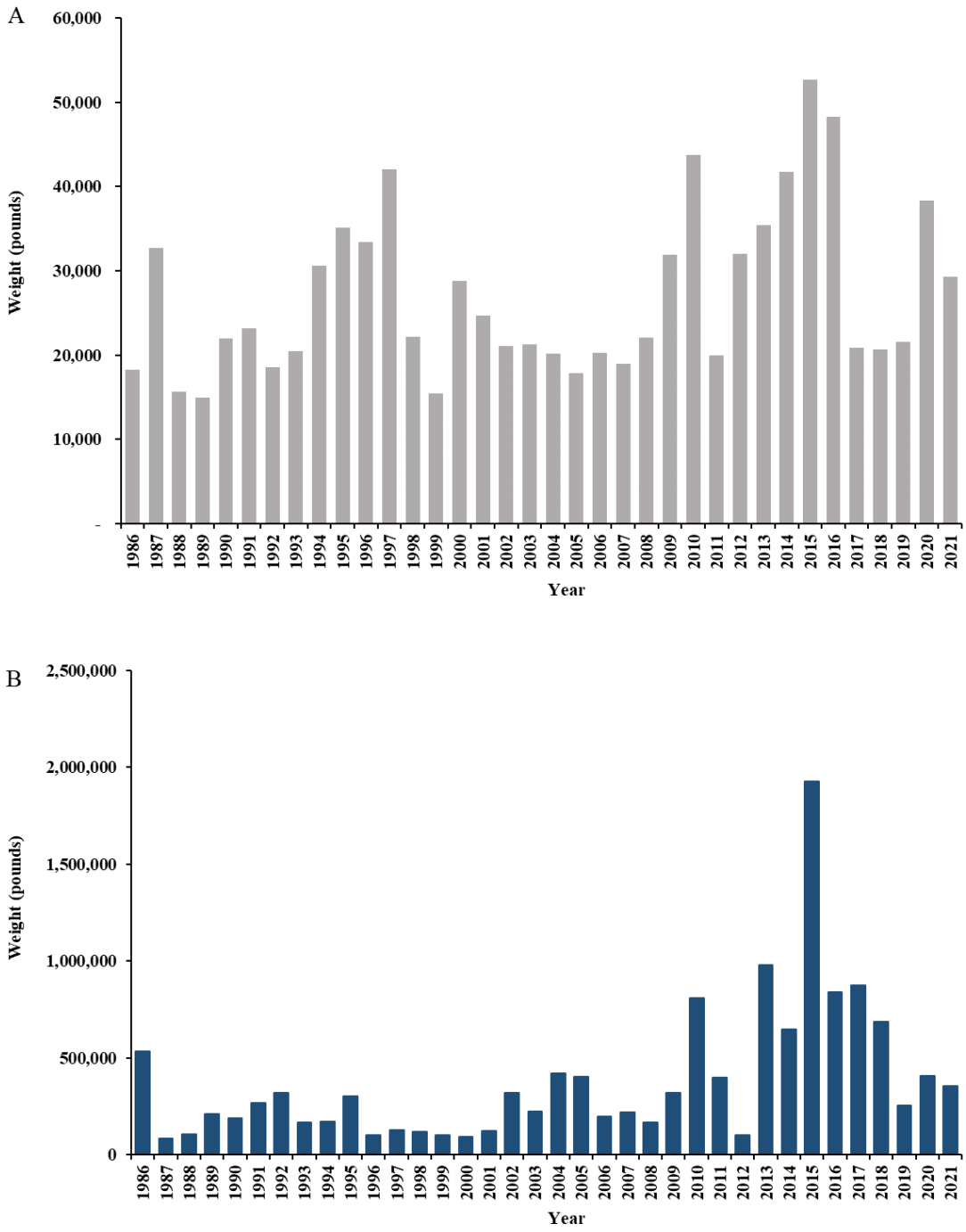

Figure 4. Annual (A) commercial (Atlantic Coastal Cooperative Statistics Program and N.C. Trip Ticket Program) and (B) recreational (MRIP) landings in pounds for cobia in North Carolina from 1986 – 2021.

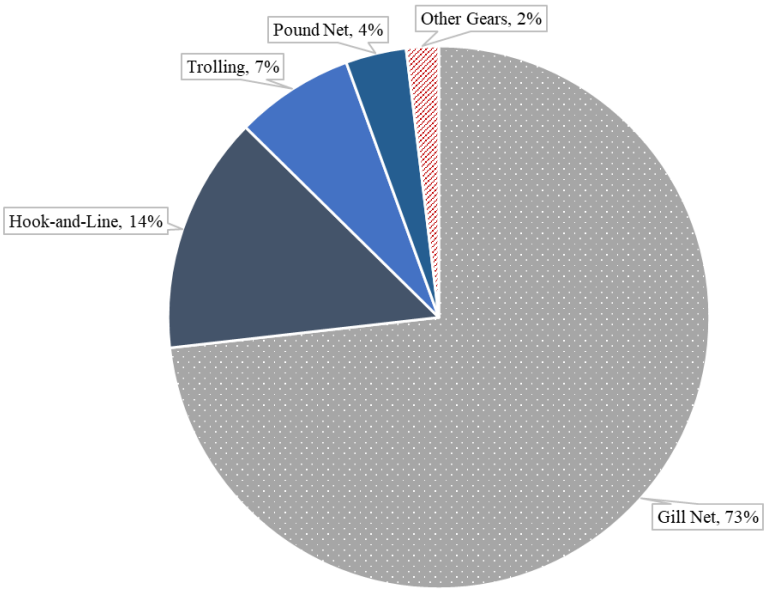

Figure 5. Commercial harvest in 2021 by gear type. Other gears can include beach seines, trawls, crab and fish pots, flynets, fyke nets, spears, longlines, and haul seines.

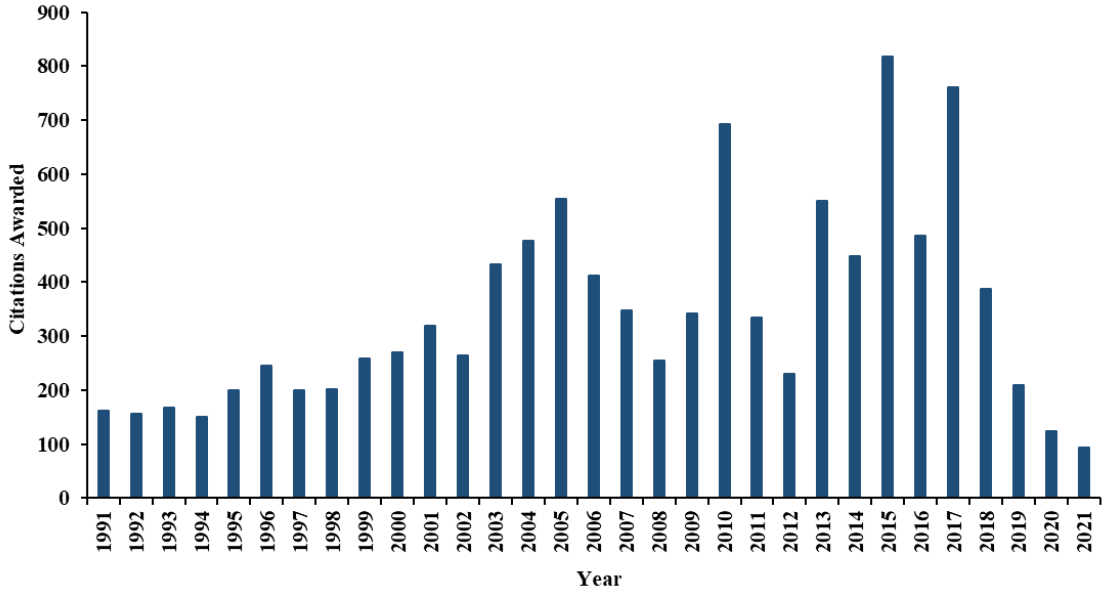

Figure 6. North Carolina Saltwater Fishing Tournament citations awarded for cobia from 1991 – 2021.

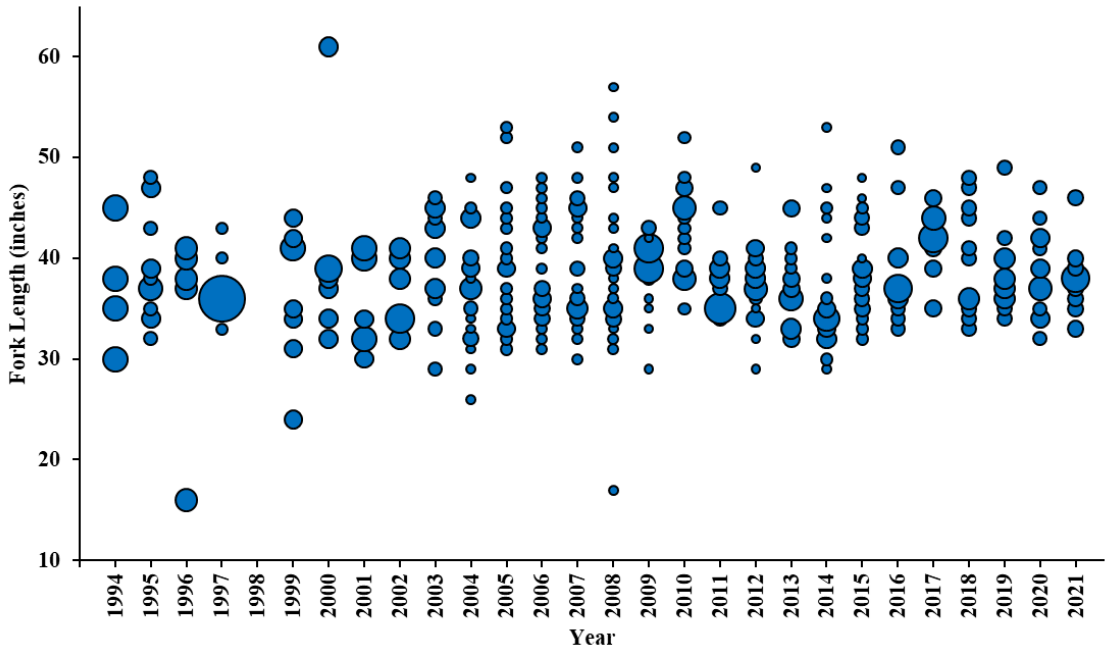

Figure 7. Commercial length frequency (fork length, inches) of cobia harvested from 1994 – 2021. Bubbles represent fish harvested at length and the size of the bubble is equal to the proportion of fish at that length.

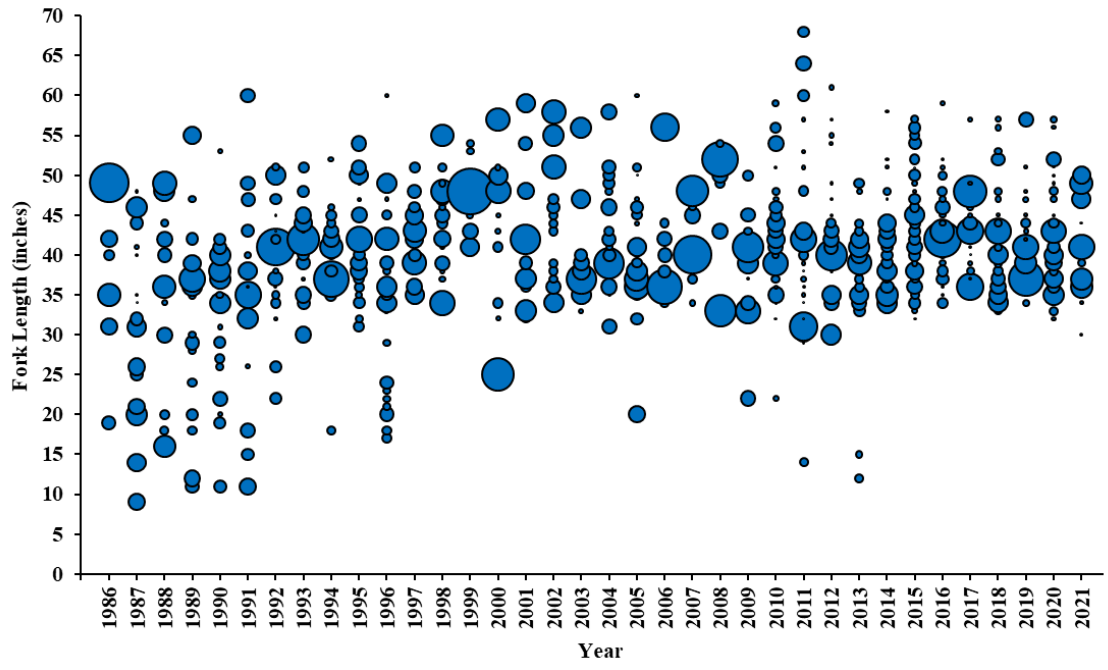

Figure 8. Recreational length frequency (fork length, inches) of cobia harvested from 1986 – 2021. Bubbles represent fish harvested at length and the size of the bubble is equal to the proportion of fish at that length.

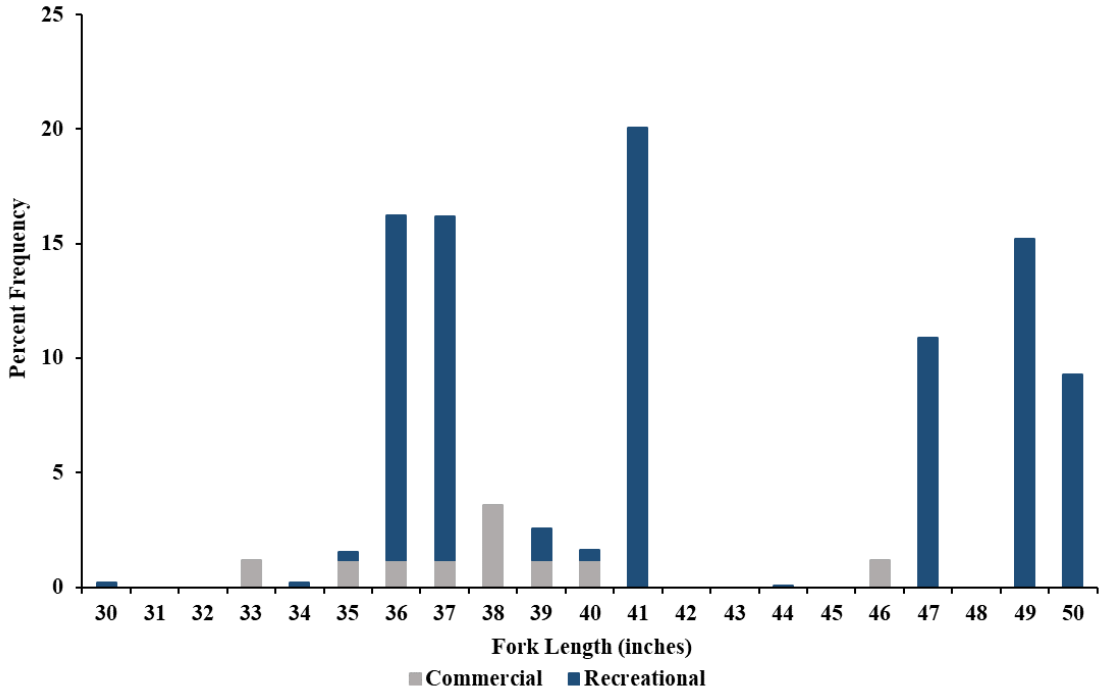

Figure 9 Commercial and recreational length frequency distribution from cobia harvested in 2021.

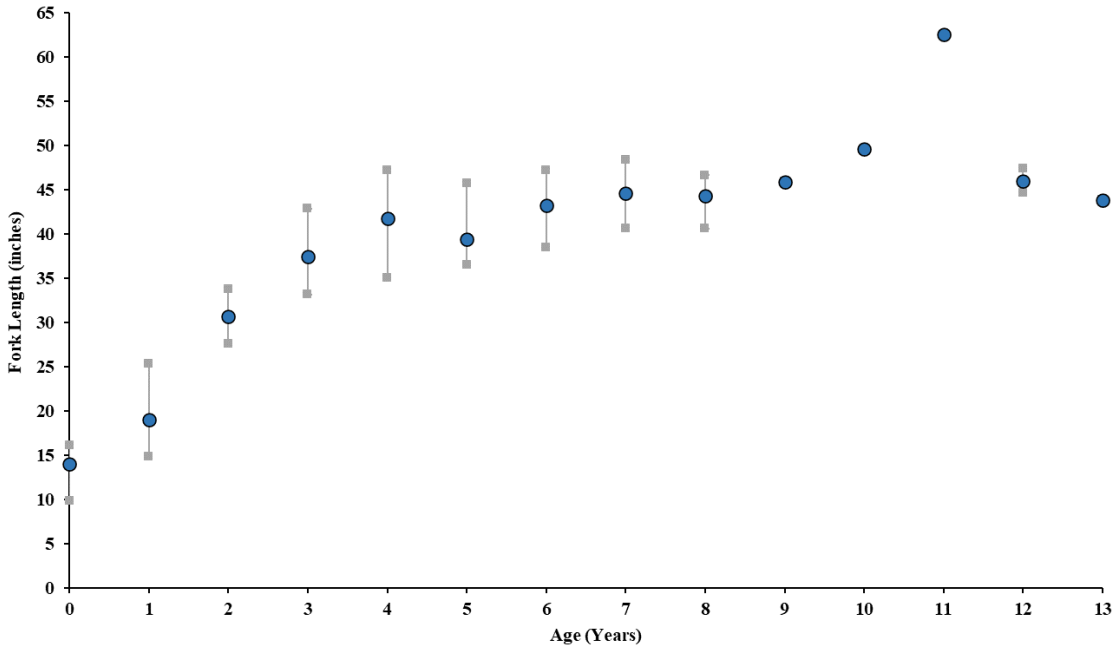

Figure 10. Cobia length at age based on all age samples collected from 2008 – 2017. Blue circles represent the mean size at a given age while the grey squares represent the minimum and maximum observed size for each age. Otoliths from 2018-2021 are not included in this figure as they have not yet been aged.