

**FISHERY MANAGEMENT PLAN UPDATE  
COBIA  
AUGUST 2020**

**STATUS OF THE FISHERY MANAGEMENT PLAN**

**Fishery Management Plan History**

Original FMP Adoption: February 1983 – SAFMC  
November 2017 – ASMFC

Amendments: SAFMC  
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  
Amendment 1 – August 2019

Revisions: None

Supplements: None

Information Updates: None

Schedule Changes: None

Next Benchmark Review: Completed January 2020

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 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 original plan estimated Maximum Sustainable Yield (MSY) of cobia at the time to be 1,057,000 pounds with an estimated domestic harvest of 1,000,000 pounds and set a

total allowable level of foreign fishing to zero. 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 of 33 inches fork length (FL) was established for the fishery conservation zone (FSC), which is analogous to the Exclusive Economic Zone (EEZ) of today which is 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 is 33 inches FL or 37 inches total length (TL) (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 (GMFMC/SAFMC 1987b) prohibited drift gill nets as a gear that could be used to harvest coastal pelagic species. Amendment 5 (GMFMC/SAFMC 1990) addressed the issue of average annual catches from 1981-1986 exceeding the established MSY level by 900,000 pounds and defined the overfishing limit for the cobia stock. The stock would be managed using a target level percentage of no less than 20 percent of spawning stock biomass per recruit (SSBR). If the stock was considered overfished, then the Science and Statistical Committee (SSC) will develop ranges of Allowable Biological Catch (ABC) that will rebuild the overfished stock. Cobia were added to the annual stock assessment procedures for the councils, and a bag limit of two fish per person per day with a one-day possession limit was established for both commercial and recreational sectors in an effort to control harvest. Amendment 6 (GMFMC/SAFMC 1992) removed the 37-inch total length minimum size specifying that the only minimum size for cobia is 33 inches FL and changed MSY to 2,200,000 pounds based on results from the Report of the Mackerel Stock Assessment Panel.

In 1998, Amendment 8 extended the management area for cobia through the Mid-Atlantic Fishery Management Council's (MAFMC) jurisdiction which also extended the two-fish bag limit and 33-inch FL 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 percent 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 percent of a static SPR. It also redefined the overfishing level as a fishing mortality rate ( $F$ ) in excess of the  $F$  at 30 percent of a static SPR and established a threshold level for all the species in the coastal migratory pelagic unit as 10 percent of the static SPR.

Amendment 18 (GMFMC/SAFMC 2011) separated cobia into two stocks at the jurisdiction boundary between the GSFMC and the SAFMC. 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 percent recreational and eight percent commercial sector allocation. Amendment 20b (GMFMC/SAFMC 2014) modified the stock boundary based on the results of

the 2013 stock assessment (SEDAR 28) to the Florida/Georgia line. A new ACL was set at 690,000 pounds for the 2015 fishing season and 670,000 pounds for every year after. Sector allocations were set to 630,000 pounds for the recreational sector for the 2015 season and 620,000 pounds for subsequent years. The commercial allocation was set to 60,000 pounds in 2015 and 50,000 pounds for years following. 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 is met or projected to be met rather, measures are 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 is 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 require an in-season closure if the commercial ACL is met or projected to be met. If the stock is 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 Coastal Migratory Pelagics (CMP) FMP was approved by the council in September of 2016 and the final rule went into effect in September 2017. The amendment increases the recreational minimum size limit of cobia to 36 inches FL and reduce the bag limit to one fish per person per day and implements a six fish per day vessel limit. The recreational AM were modified to allow for a reduction in vessel limit before a season reduction is implemented. The framework amendment maintains the existing commercial minimum size limit of 33 inches FL and establishes 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 removes the Atlantic migratory group cobia (Georgia through New York) from federal management under the Magnuson-Stevens Act and transfers sole management of Atlantic cobia to the Atlantic States Marine Fisheries Commission (ASMFC). The amendment also implements 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 is 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. 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).

With the acceptance of SEDAR 58 for management, the Board initiated draft Addendum 1 to the FMP to re-evaluate sector allocations as well as reconsider *de minimis* measures. Draft Addendum 1 will go to the Board for approval to go out for public comment at the August 2020 meeting.

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 2015).

### **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.

1. Provide a flexible management system to address future changes in resource abundance, scientific information, and fishing patterns among user groups or area.

2. Implement management measures that allow stable, sustainable harvest of Atlantic cobia in both state and federal waters.
3. 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.
4. 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.
5. Manage the Atlantic cobia fishery to protect both young individuals and established breeding stock.
6. 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.

## **STATUS OF THE STOCK**

### **Life History**

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 2019). 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 inhabit nearshore coastal waters from New York south through the Gulf of Mexico. They migrate in the spring and fall as water temperatures change from inshore and offshore habitats, as well as up and down the coasts. Spawning occurs in the spring months around inlets and in high salinity estuarine waters. 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**

Cobia were assessed during South East Data, Assessment, and Review (SEDAR) 58 (2020) using data through 2017; this was a benchmark assessment. Results of the assessment indicate that cobia are not overfished and overfishing is not occurring (SEDAR 2020). However, spawning stock biomass (SSB) showed a decreasing trend the last few years of the assessment

due to what appeared to be low recruitment in the last four years of the time series. If recruitment remains low, the decline in the stock will continue.

### **Stock Assessment**

SEDAR 58 began with a stock identification workshop in April 2018 to review spatial, genetic, and life history information the species and make recommendations on stock boundaries for the assessment and management. The workshop maintained the Florida/Georgia border as the stock boundary since this boarder is within a transition zone that occurs from the southern boundary of Brevard County, FL to Brunswick, GA (SEDAR 2018).

SEDAR 58 (2020) assessed the Atlantic stock of cobia using data from 1986 – 2017. This assessment included several modifications from the previous assessment (SEDAR 28 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. Additionally, MRIP recalibrated data were used, which were several times higher than the estimates used in SEDAR 28. Natural mortality estimates were higher than those used last time, leading the model to estimate a more productive stock. Finally, two of the three fishery dependent indices were excluded when re-evaluated for this assessment and only the headboat logbook was used.

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 ( $F_{2015-2017}/F_{40\%} = 0.29$ ; 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 available 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 is dubious 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. Also, the spawner-recruit relationship was 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.

In general, there was little change in age structure over time. Overall the model estimated little overall trend in biomass, 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 average.

## STATUS OF THE FISHERY

### Current Regulations

Under the Interstate Plan, North Carolina must implement seasons and/or vessel limits that constrain harvest to the 236,313 pound RHL. In August 2019, Amendment 1 to the Interstate Plan changed the RHL unit to number of fish resulting in an 8,436 fish RHL for North Carolina. State landings will be evaluated against the RHL by averaging landings over a three year period. For the 2018 – 2020 fishing years, North Carolina implemented a 36-inch minimum size FL 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 are set to two fish per vessel from May 1 to 31 and one fish per vessel from June 1 to December 31. 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 33-inch minimum size FL size limit and two fish per person per day possession limit, not to exceed six fish per vessel. Commercial landings are managed coastwide under the Federal ACL (50,000 pounds). The acceptance of SEDAR 58 for management means an increase in the amount of fish available for harvest for the specification years 2020-2022 (80,112 fish; North Carolina's RHL will be equal to 28,081 fish with a shared coastwide commercial quota of 146,232 pounds); 2020 recreational regulations will be status quo.

### Commercial Landings

Commercial landings of cobia in North Carolina are available from 1950 to the present. However, monthly landings were not available until 1974. 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. Cobia landings from 1950 - 2018 have ranged from a low of 600 pounds whole weight (1951 and 1955) to a high of 52,684 pounds (2015) with average landings of 16,799 pounds over the 69-year time series. Recently, landings have ranged from 19,924 pounds (2011) to 52,684 pounds (2015), averaging 33,683 pounds over the last 10 years (Table 1; Figure 4). In 2019, 21,553 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 mostly landed out of the haul seine fishery. Most landings that occurred during the 1980s came from the pelagic troll and handline fishery with modest landings from the haul seine and anchored gill net fishery. From 1994 - 2019, most landings have occurred from the anchored gill net, pelagic troll, and handline fisheries with gill nets being the top gear during most of those years. In 2019, gill nets accounted for 44% of the landings, while 51% of the landings were from the handline and pelagic troll fisheries combined (Table 2; Figure 5). Gill net landings have decreased since 2016 as the cobia season closed in early September since in 2017. Since 2012, landings in the pound net fishery have increased, accounting for up to 12% of the total landings dependent on the year; however, in 2019 pound net landings were the lowest for the last ten years (Table 2).

## Recreational Landings

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 Marine Recreational Information Program (MRIP) new Fishing Effort Survey-based calibrated estimates. For more information see <https://www.fisheries.noaa.gov/topic/recreational-fishing-data>.

Recreational harvest of cobia in North Carolina has ranged from a low of 592 pounds (1987) to a high of 1,925,762 pounds (2015) with average landings of 376,054 pounds over the 34-year time series. Recently, landings have ranged from 102,077 pounds (2012) to 1,925,762 pounds (2015), averaging 751,338 pounds over the last 10-year period (Table 1; Figure 4). In 2019, North Carolina landed 254,963 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. Seasonally, cobia are landed mostly in the spring and summer months corresponding with their spring spawning migration (Smith 1995). Peak landings occur during the latter part of May into June and quickly diminish thereafter. However, recreational landings of cobia can occur through the month of 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 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, are eligible for an award citation. Since 1991, just over 10,000 citations have been awarded for cobia. On average 10% of citations have been from released fish; in 2019, approximately 10% 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. Twelve cobia were measured from the commercial fishery in 2019 with an average FL of 39 inches (Table 3). Mean

FL has ranged from 36 to 43 inches since 1994. Cobia landed in the commercial fishery have ranged from 18 to 61 inches FL (Table 3; Figure 7). Thirty cobia were measured by MRIP in 2019 with an average FL of 40 inches (Table 4). Mean size has ranged from 22 to 49 inches FL over the time series. Cobia harvested in the recreational fishery have ranged from 9 to 68 inches FL (Table 4; Figure 8). The number of commercial and recreational sampled fish is low and is most likely affected by low possession limits and seasonal nature of the fishery. Size trends in commercially landed fish appear to correspond with sizes observed in the recreational fishery though at lower frequencies (Tables 3 and 4; Figure 9).

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 2019, 80 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 ½-inch increments). A total of 135 cobia have been captured in the Pamlico Sound independent gill net survey from 2001 to 2019. 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.

## **MANAGEMENT STRATEGY**

As of March 2019, cobia is managed solely under the ASMFC Interstate Plan requirements. The previous joint Gulf of Mexico and SAFMC FMP and the interstate plan, including Amendment 1 to the FMP, aim to maintain spawning stock biomass (SSB) above a threshold which allows for surplus recruitment to the stock.

## **RESEARCH NEEDS**

Current research needs for cobia can be found in the most recent SEDAR 58 (2020) report 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 (Those categorized as high priority are formatted in bold font).

- 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

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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, 1986-2019. All weights are in pounds.

Year	Recreational		Commercial Weight (lb)	Total Weight (lb)	
	Numbers				Weight (lb)
	Landed	# Released			Landed
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
Average	12,473	24,931	376,054	26,720	402,773

ASMFC AND FEDERALLY-MANAGED SPECIES WITHOUT N.C. INDICES – COBIA

Table 2. Commercial harvest (weight in pounds) by gear, 2010-2019. (Source: North Carolina Trip Ticket Program)

Year	Gill Nets	Hook & Line	Trolling	Pound Nets	Other*	Total
2010	22,087	10,021	9,166	782	1,660	43,715
2011	7,890	6,621	4,521	610	282	19,924
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

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

ASMFC AND FEDERALLY-MANAGED SPECIES WITHOUT N.C. INDICES – COBIA

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, 1986-2019.

Year	Mean Fork Length	Minimum Fork Length	Maximum Fork Length	Total Number Measured
1986	38	24	52	51
1987	37	5	50	65
1988	40	21	57	72
1989	35	3	48	53
1990	38	14	53	126
1991	36	8	46	52
1992	39	30	47	50
1993	37	32	46	27
1994	40	35	45	3
1995	39	33	48	14
1996	39	37	40	2
1997	40	37	43	3
1998				0
1999	37	25	45	7
2000	41	33	61	8
2001	37	30	42	8
2002	38	33	41	6
2003	40	30	46	13
2004	38	26	49	27
2005	43	33	54	12
2006	40	32	49	22
2007	40	31	52	24
2008	39	18	57	29
2009	39	30	44	15
2010	43	34	52	30
2011	38	34	46	13
2012	38	29	50	31
2013	38	33	46	16
2014	36	30	53	32
2015	39	32	48	34
2016	39	33	51	13
2017	42	36	46	8
2018	40	33	48	11
2019	39	34	49	12

ASMFC AND FEDERALLY-MANAGED SPECIES WITHOUT N.C. INDICES – COBIA

Table 4. Mean, minimum, and maximum lengths (fork length, inches) of cobia sampled from the recreational fisheries (MRIP) from North Carolina, 1986-2019.

Year	Mean Fork Length	Minimum Fork Length	Maximum Fork Length	Total Number Measured
1986	43	20	50	7
1987	28	9	48	13
1988	22	16	50	9
1989	36	11	55	16
1990	35	11	53	28
1991	35	11	60	20
1992	42	22	52	19
1993	42	31	51	16
1994	40	18	52	18
1995	43	31	54	25
1996	37	17	61	37
1997	43	35	51	17
1998	46	35	55	28
1999	48	41	55	5
2000	43	26	58	8
2001	45	33	59	11
2002	49	34	59	16
2003	46	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
2017	43	36	58	27
2018	41	33	57	60
2019	40	34	57	30

ASMFC AND FEDERALLY-MANAGED SPECIES WITHOUT N.C. INDICES – COBIA

Table 5. Summary of cobia age samples collected from both dependent (commercial and recreational fisheries) and independent (surveys) sources, 2008-2019.

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

\*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

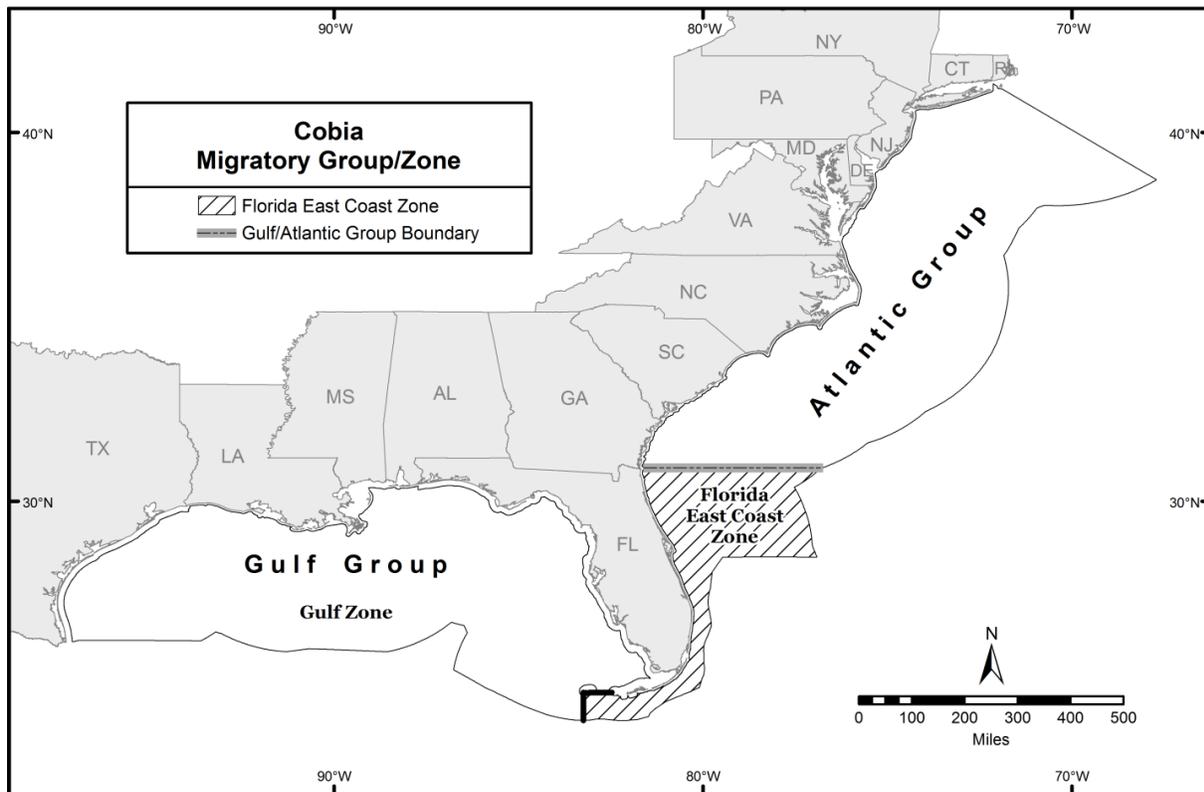


Figure 1. Zone splits for Gulf and Atlantic Migratory Group cobia established in Coastal Migratory Pelagics Fishery Management Plan Amendment 20b (Source: GMFMC/SAFMC 2014).

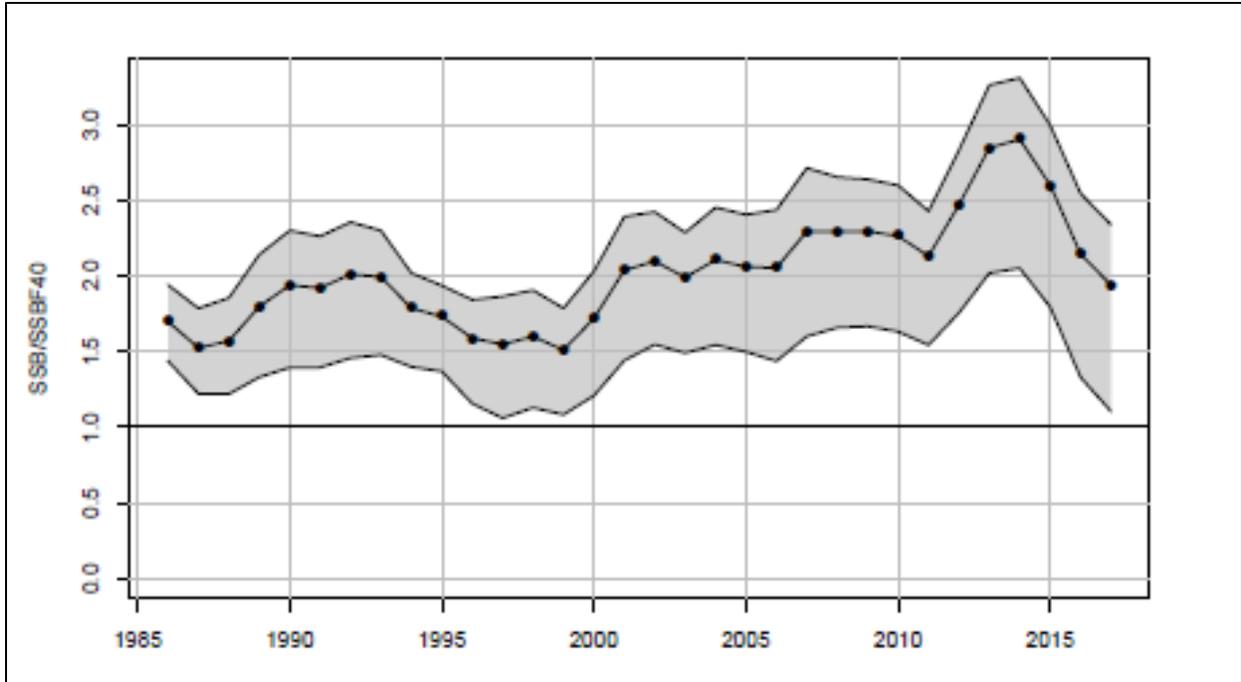


Figure 2. Spawning Stock Biomass (SSB) relative to established reference point  $SSB_{F40\%}$  for cobia from SEDAR 58 (SEDAR 2020). The shaded gray error bands indicate 5<sup>th</sup> and 95<sup>th</sup> percentiles of the Monte Carlo Bootstrap trials.

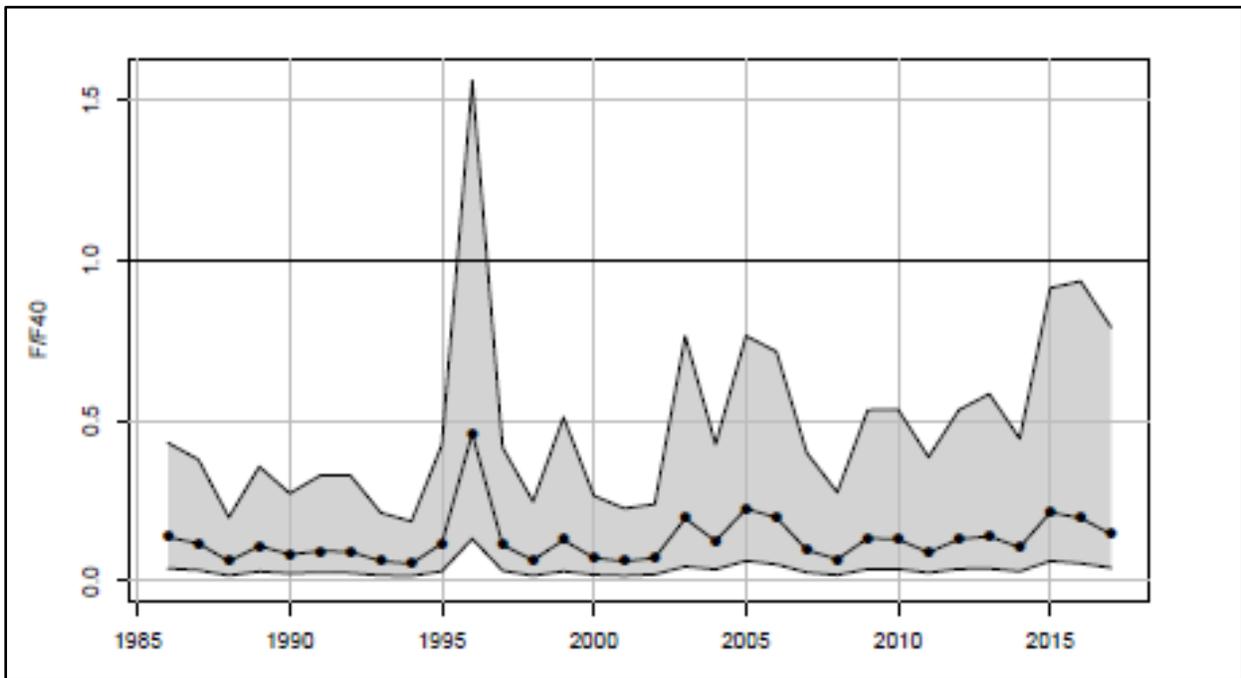


Figure 3. Fishing mortality ( $F$ ) relative to established reference point  $F_{40\%}$  for cobia from SEDAR 58 (SEDAR 2020). The shaded gray error bands indicate 5<sup>th</sup> and 95<sup>th</sup> percentiles of the Monte Carlo Bootstrap trials.

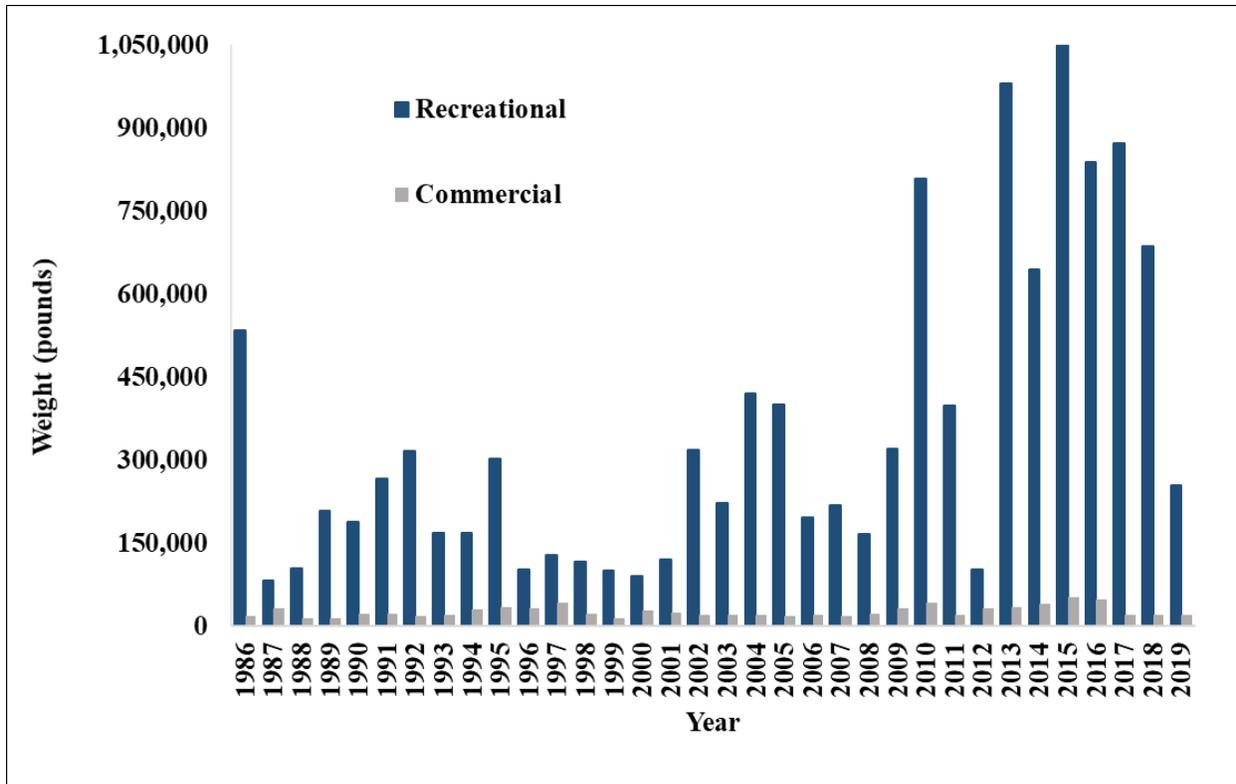


Figure 4. Annual commercial (Atlantic Coastal Cooperative Statistics Program and N.C. Trip Ticket Program) and recreational (MRIP) landings in pounds for cobia in North Carolina from 1986 to 2019.

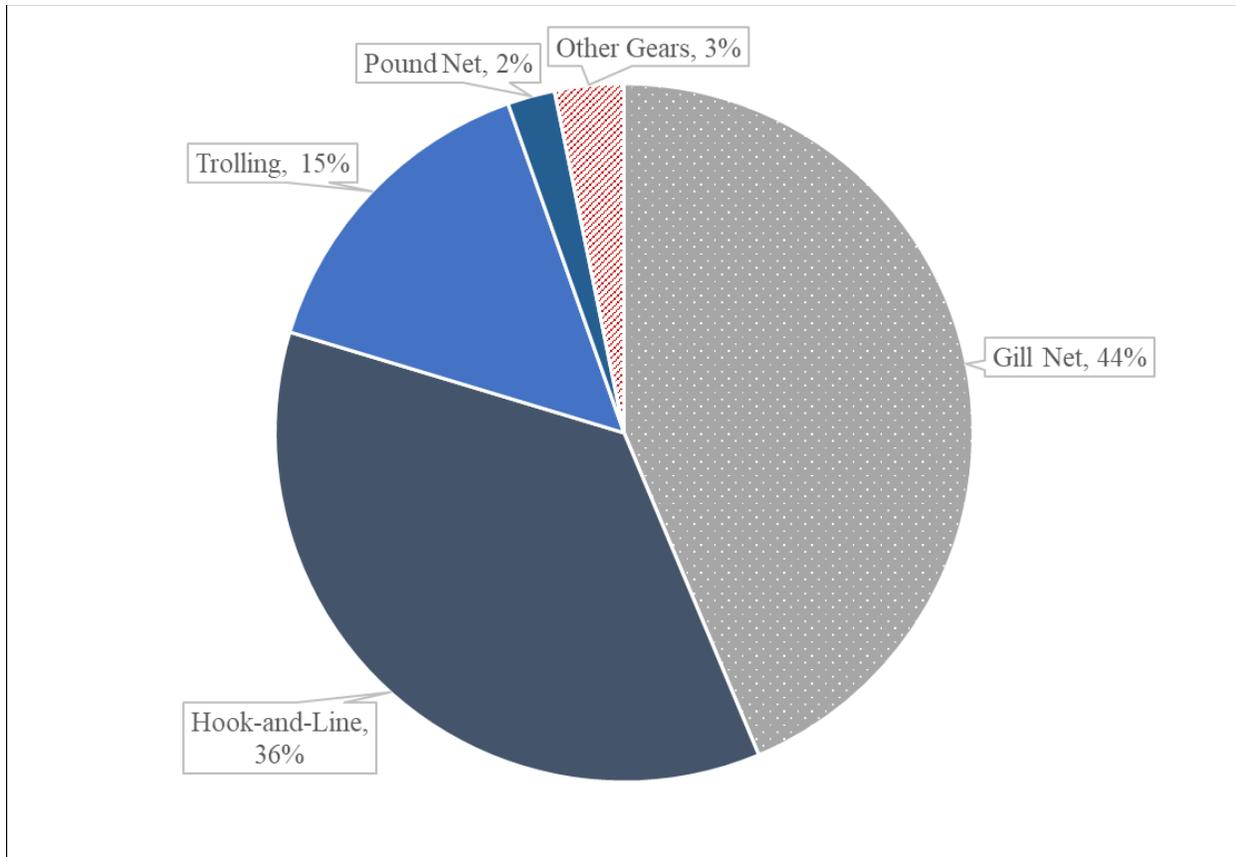


Figure 5. Commercial harvest in 2019 by gear type. Other gears can include beach seines, trawls, crab and fish pots, flynets, fyke nets, spears, longlines, and haul seines.

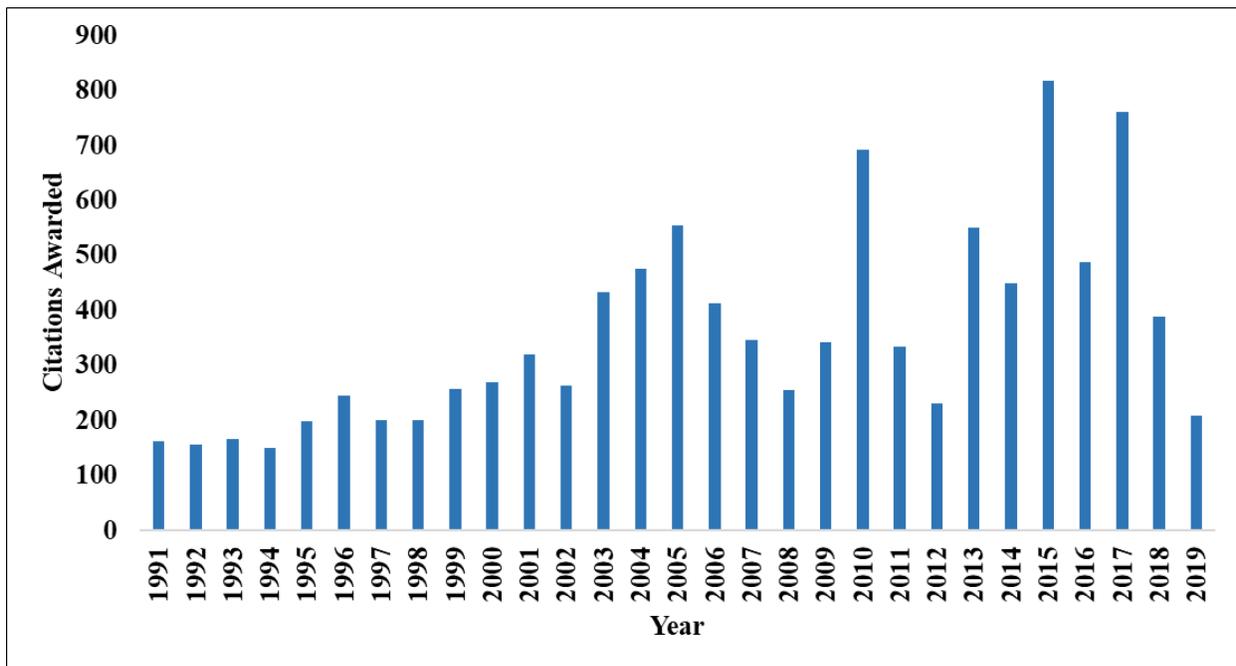


Figure 6. North Carolina Saltwater Fishing Tournament citations awarded for cobia from 1991 to 2019.

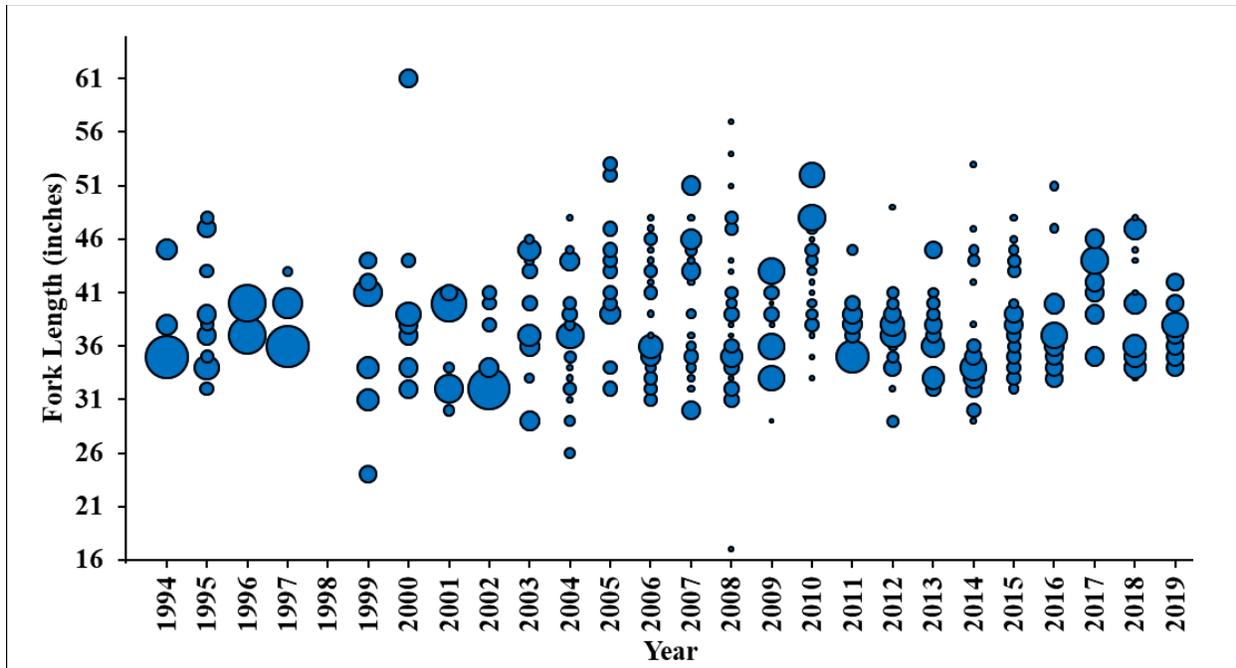


Figure 7. Commercial length frequency (fork length, inches) of cobia harvested from 1994 to 2019. Bubbles represent fish harvested at length and the size of the bubble is equal to the proportion of fish at that length.

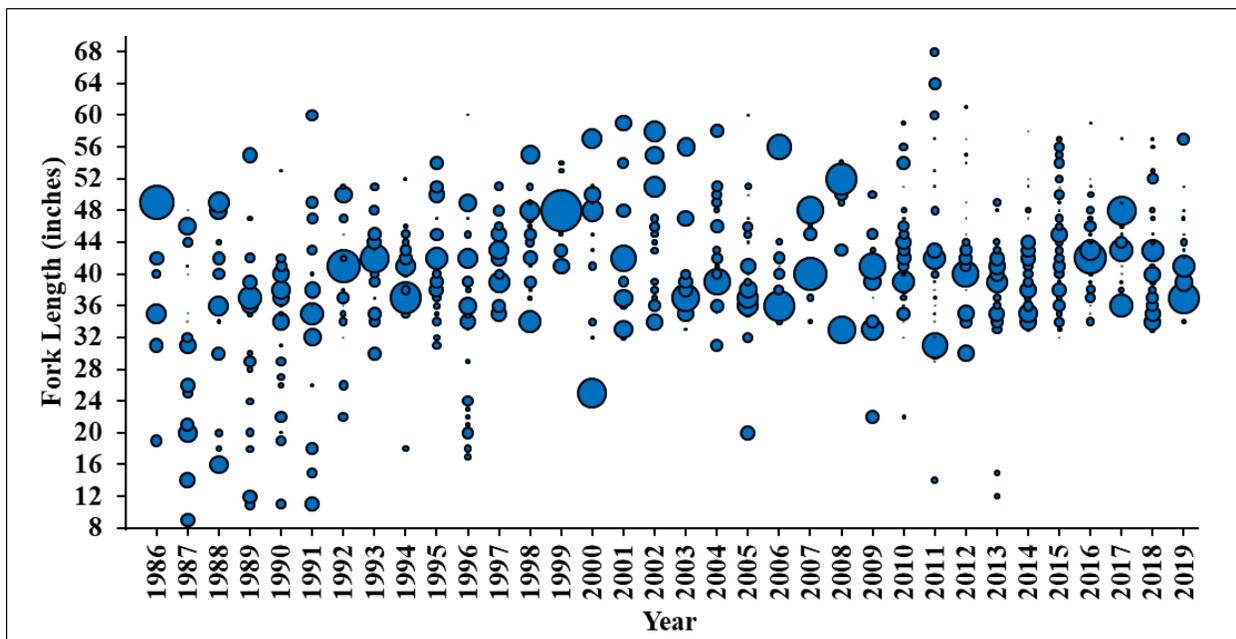


Figure 8. Recreational length frequency (fork length, inches) of cobia harvested from 1986 to 2019. Bubbles represent fish harvested at length and the size of the bubble is equal to the proportion of fish at that length.

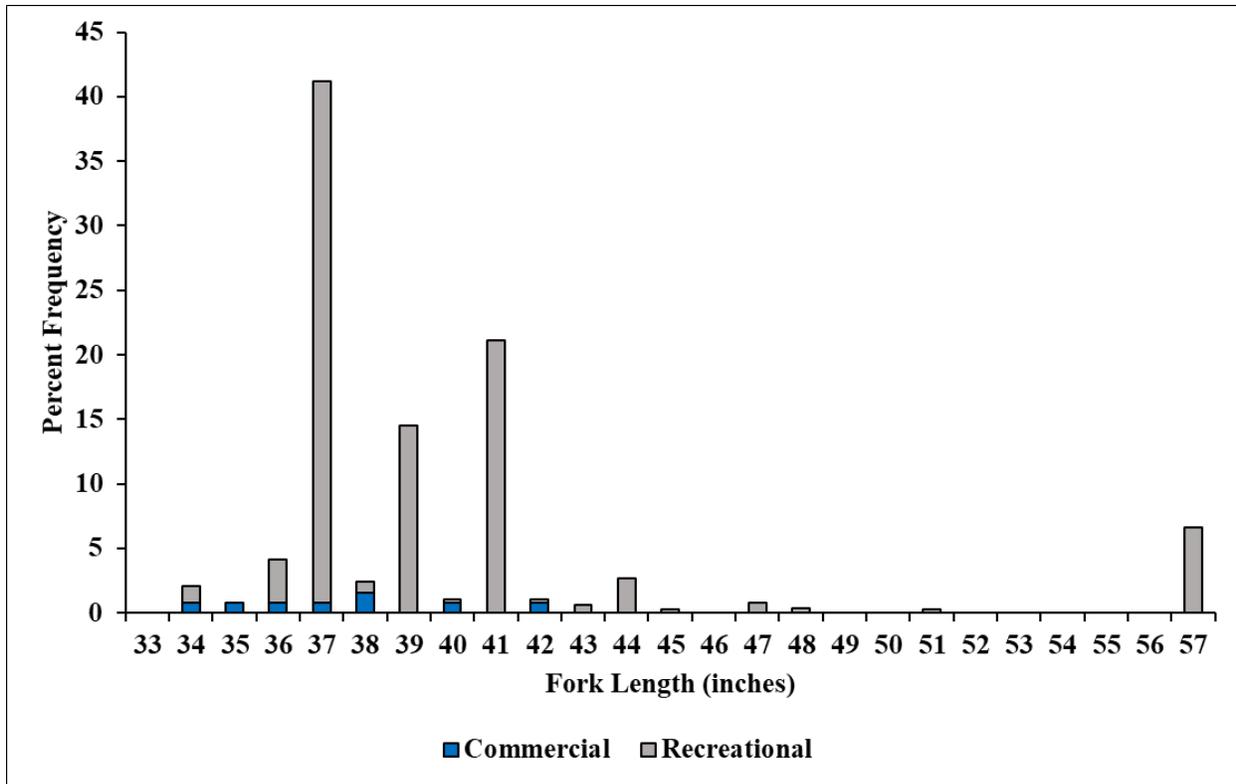


Figure 9. Commercial and recreational length frequency distribution from cobia harvested in 2019.

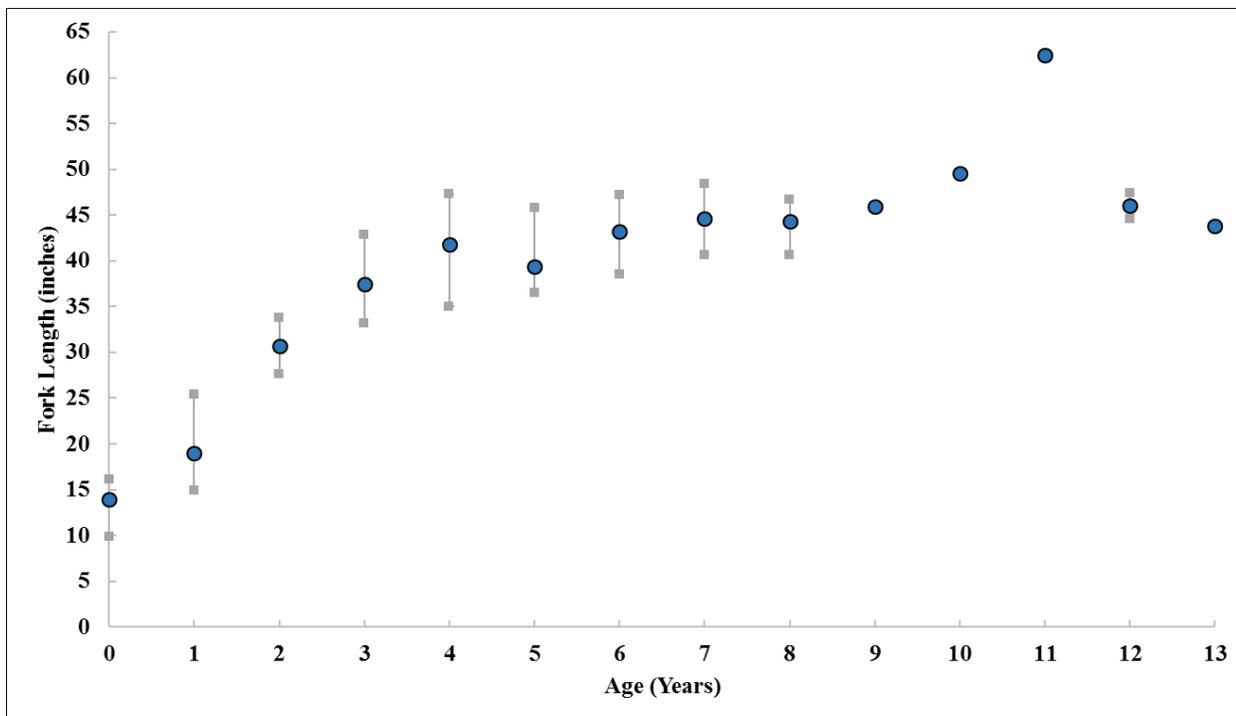


Figure 10. Cobia length at age based on all age samples collected from 2008 to 2017. Blue circles represent the mean size at a given age while the grey squares represent the minimum and maximum observed size for each age.