Atlantic States Marine Fisheries Commission

Draft Interstate Fishery Management Plan for Atlantic Migratory Group Cobia

ASMFC Vision Statement:
Sustainably Managing Atlantic Coastal Fisheries

August 2017

DRAFT DOCUMENT FOR BOARD DISCUSSION; NOT FOR PUBLIC COMMENT

Draft Interstate Fishery Management Plan for Atlantic Migratory Group Cobia

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This Plan was prepared under the guidance of the Atlantic States Marine Fisheries Commission's South Atlantic State/Federal Fisheries Management Board, Chaired by Jim Estes of Florida and Advisory assistance was provided by the South Atlantic Species Advisory Panel Chaired by Tom Powers of Virginia.

This is a report of the Atlantic States Marine Fisheries Commission pursuant to U.S. Department of Commerce, National Oceanic and Atmospheric Administration Award No. NA15NMF4740069.

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The Atlantic States Marine Fisheries Commission seeks your input on Draft Interstate Fishery Management Plan for Atlantic Migratory Group Cobia.

The public is encouraged to submit comments regarding this document during the public comment period. Comments must be received by **5:00 PM (EST) on XXXXX.** Regardless of when they were sent, comments received after that time will not be included in the official record. The South Atlantic State/Federal Fisheries Management Board will consider public comment on this document before finalizing the Interstate FMP.

You may submit public comment by attending a public hearing held in your state or jurisdiction or mailing, faxing, or emailing written comments to the address below. Comments can also be referred to your state's members on the South Atlantic State/Federal Fisheries Management Board or South Atlantic Advisory Panel; however, only comments received at a public hearing or written comments submitted to the Commission will become part of the public comment record.

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1. INTRODUCTION

1.1. BACKGROUND INFORMATION

At the August 2016 meeting of the Interstate Fishery Management Program (ISFMP) Policy Board, Commissioners expressed an interest in developing an Interstate Fishery Management Plan (FMP) complementary to the South Atlantic Fishery Management Council (SAFMC) Coastal Migratory Pelagics (CMP) FMP for cobia (*Rachycentron canadum*). Concerns were raised because the Annual Catch Limits (ACL) established by the SAFMC were being exceeded and fishery closures were resulting in disproportionate impacts to member states. A concern with future stock status due to ACL overages and the need for state specific involvement in management precipitated the development of an interstate FMP. Based on current genetic data, the management unit for this FMP are the Atlantic Migratory Group cobia that range from Georgia through New York. After a review of the available information developed by staff, the South Atlantic State/Federal Fisheries Management Board recommended initiation of an FMP. Upon review of the report, the ISFMP Policy Board voted to initiate the FMP and assigned its development and administration to the South Atlantic State/Federal Management Board (Management Board), which administers the FMPs for Atlantic croaker, black drum, red drum, Spanish mackerel, spot, and spotted seatrout.

The Management Board initiated development of an FMP for Atlantic Migratory Group (Atlantic) cobia in August 2016 and approved the Public Information Document for public comment in November 2016. Public comment was received and hearings held in December 2016, and the Management Board tasked the Plan Development Team (PDT) with developing a Draft FMP for Atlantic cobia in February 2017. A progress report was provided to the Management Board in May 2017. The Management Board discussed future management options and approved a letter to the SAFMC and GMFMC requesting a full transfer of management authority to the ASMFC. At their June, 2017, meeting in Ponte Vedra, FL, the SAFMC voted to begin developing an amendment to the CMP FMP to consider the transfer. At the same meeting, an emergency action to restore the Atlantic cobia stock boundary to include the east coast of Florida was not approved, leaving the current stock boundary from Georgia through New York.

1.1.1. Statement of the Problem

Cobia management has historically been considered precautionary through the CMP FMP. Both sectors of the fishery have been managed with a 2 fish possession limit and 33” fork length (FL) minimum size since formal management began in Amendment 6 to the CMP FMP in 1990. The ACLs and Accountability Measures (AM) were established through Amendment 18 (GMFMC/SAFMC 2012). The 2013 stock assessment conducted through the Southeast Data Assessment and Review (SEDAR) process indicated overfishing was not occurring and that the stock was not overfished, although biomass has been trending steadily downward over the previous two decades. Additionally, the stock assessment used a new stock boundary (Georgia

through New York), which was implemented into the FMP along with the updated ACLs in Amendment 20B (GMFMC/SAFMC 2014). The current ACL is a precautionary approach to prevent the stock from reaching an overfished status. The recent overages of the ACL in 2015 and 2016 significantly exceeded the SAFMC's defined Overfishing Limit. Further quota overages could result in overfishing and lead to the stock becoming overfished.

Efforts to more closely monitor state specific harvest to ensure that the federal ACL is not exceeded and avoid overfishing is the Commission's primary focus. Further, by developing a Commission plan, the impacts of a single, federal closure may be mitigated through state-specific measures designed to maintain traditional seasons at reduced harvest rates. The proposed interstate FMP considers potential management measures to maintain a healthy resource while minimizing the socio-economic impacts of seasonal closures.

1.1.2. Benefits of Implementation

1.1.2.1. Social and Economic Benefits

Sustainable management practices and policies for a moderately-lived species such as cobia can increase economic benefits and provide social stability in the fishing community while ensuring a fishery for future generations. Greater cooperation and uniform management measures among the states ensure that the conservation efforts of one state or group will not be undermined or that one state is not disadvantaged over another.

Historically, the commercial market has been a bycatch fishery due to low possession limits of 2 fish per person. Directed harvest, even at these low limits, appears to be increasing. Cobia are primarily caught as bycatch in nearshore to offshore trolling and hook and line commercial fisheries that target snapper/grouper and king mackerel. Cobia are considered excellent table fare and command a high price for the fishermen and fish houses when they are seasonally available.

The recreational fishing season primarily occurs from May through August, but may begin as early as April and typically extends into September in the Mid-Atlantic region. Atlantic cobia support a significant for-hire fishery and lure manufacturing businesses.

The recreational fishery and landings far exceed the commercial fishery and management has deemed the recreational fishery as the primary goal in management.

1.1.2.2. Ecological Benefits

Consistent management goals across jurisdictions can provide greater protections to a migratory stock. Cobia are moderately lived and can have multiple opportunities to contribute to the population if allowed to reach older ages, which can be afforded by regulatory protections across the range of the population and age classes.

Concern that the peak fishery occurs during the spawning season has resulted in at least one state (South Carolina) implementing a closure during that time.

1.2. DESCRIPTION OF THE RESOURCE

1.2.1. Species Life History

Cobia are a member of the family Rachycentridae and has historically been managed in the SAFMC CMP FMP because of its migratory behavior. Cobia are distributed worldwide in tropical, subtropical and warm-temperate waters. In the western Atlantic it occurs from Nova Scotia, Canada, south to Argentina, including the Caribbean Sea. They are abundant in warm waters off the coast of the U.S. from the Chesapeake Bay south and throughout the Gulf of Mexico (Gulf). Cobia prefer water temperatures between 68-86°F. As a pelagic fish, cobia are found over the continental shelf as well as around offshore natural and artificial reefs. Cobia frequently reside near any structure that interrupts the open water such as pilings, buoys, platforms, anchored boats, and flotsam, and are often seen under or accompanying rays, large coastal sharks, and sea turtles. Cobia are also found inshore inhabiting bays, inlets, and mangroves.

Cobia form large aggregations, spawning during daylight hours between June and August in the Atlantic Ocean near the Chesapeake Bay and off North Carolina in May and June, and in the Gulf during April through September. Spawning frequency is once every 9-12 days, spawning 15-20 times during the season. During spawning, cobia undergo changes in body coloration from brown to a light horizontal-striped pattern, releasing eggs and sperm into offshore open water. Cobia have also been observed spawning in estuaries and shallow bays with the young heading offshore soon after hatching. Cobia eggs are spherical, averaging 1.24 mm in diameter. Larvae are released approximately 24-36 hours after fertilization.

Newly hatched larvae are 2.5 mm (1 inch) long and lack pigmentation. Five days after hatching, the mouth and eyes develop, allowing for active feeding. A pale yellow streak is visible, extending the length of the body. By day 30, juveniles take on the appearance of adult cobia with two color bands running from the head to the posterior end.

Weighing up to a record 61 kg (135 pounds whole weight [lbs ww]), cobia are more common at weights of up to 23 kg (50 lbs ww). They reach lengths of 50-120 cm (20-47 inches), with a maximum of 200 cm (79 inches). Cobia grow quickly and have a moderately long life span. Maximum ages observed for cobia in the Gulf were 9 and 11 years for males and females, respectively, while off North Carolina maximum ages were 14 and 13 years, respectively. Females reach sexual maturity at 3 years of age and males at 2 years in the Chesapeake Bay region. During autumn and winter months, cobia presumably migrate south and offshore to warmer waters. In early spring, migration occurs northward along the Atlantic coast. Significant efforts are currently underway using various tagging methods to better understand the migratory behavior of cobia.

1.2.2. Stock Assessment Summary

1.2.2.1. Stock Identification and Management Unit

Microsatellite-based analyses demonstrated that tissue samples collected from North Carolina, South Carolina, east coast Florida (near St. Lucie), Mississippi, and Texas showed disparate allele frequency distributions, and subsequent analysis of molecular variance showed population structuring occurring between the states (Darden et al. 2014). Results showed that the Gulf of Mexico stock appeared to be genetically homogeneous and that a segment of the population continued around the Florida peninsula to St. Lucie, FL, with a genetic break somewhere between St. Lucie, FL, and Port Royal Sound, SC. However, no samples were available from Cape Canaveral, FL, to Hilton Head Island, SC. Tag-recapture data using conventional dart tags also suggested two stocks of fish that overlap at Brevard County, FL, corroborating the genetic findings.

The Atlantic and Gulf stocks were separated at the Florida-Georgia line during SEDAR 28 because genetic data suggested that the split is north of the Brevard/Indian River County line and tagging data did not dispute this split. The FL-GA line was selected as the stock boundary based on recommendations from the commercial and recreational work groups and comments that this boundary would allow easier management and did not conflict with the life history information available. However, there was not enough resolution in the genetic or tagging data to suggest that a biological stock boundary exists specifically at the FL-GA line, only that a mixing zone occurs around Brevard County, FL, and potentially to the north. The Atlantic stock was determined to extend northward, as far as New York.

Several ongoing research projects are expanding sample collection throughout coastal Georgia and northern Florida, which may help provide better resolution for where the genetic break (or mixing zone) between the Gulf of Mexico population and the Atlantic population occurs. In addition, a few hundred cobia have been tagged with acoustic tags in South Carolina, Georgia, and the east coast of Florida to evaluate movement patterns along the South Atlantic (FL-NC) coast of the United States. This may also help determine where the stock boundary/mixing zone occurs.

1.2.2.2. SEDAR 28

The Gulf and Atlantic migratory groups of cobia were assessed by SEDAR 28 in 2013. The SEDAR 28 stock assessment for Atlantic migratory group cobia (Atlantic cobia) determined that the stock is not overfished or experiencing overfishing. The Gulf of Mexico Fishery Management Council (GMFMC) Scientific and Statistical Committee's (SSC) review of the SEDAR 28 stock assessment of Gulf migratory group cobia (Gulf cobia) determined that the stock was not overfished or experiencing overfishing.

1.2.3. Abundance and Present Condition

No coastwide index of abundance is available for cobia and no reliable regional indices of abundance can be generated due to lack of targeted monitoring programs and low incidental catch of cobia in most existing surveys. In particular, few surveys consistently encounter and sample adult fish due to their size and gear avoidance in primary survey methods such as trawls.

1.3. DESCRIPTION OF THE FISHERY

1.3.1. Commercial Fishery

Prior to 2015, the SAFMC's management area for Atlantic cobia extended from the east coast of Florida through New York. As implemented through Amendment 20B (GMFMC/SAFMC 2014) and effective in 2015, the harvests of cobia off the east coast of Florida have been considered part of the Gulf migratory group, thus the current management area for Atlantic cobia extends from Georgia through New York. The tables presented below include cobia landings and revenues from Georgia through New York, and thus exclude those from Florida. In this way, reported landings and revenues for 2010 through 2014 are consistent with those for 2015 under the new geographic designation of Atlantic cobia.

Three important issues should be recognized regarding the commercial landings data for Atlantic cobia presented in Tables 1 and 2. First, Table 1 shows 2015 landings in landed weight, while Table 2 shows 2010-2015 landings in whole weight. The Atlantic cobia ACL is specified and monitored in terms of landed weight ("as reported"), which is generally a combination of gutted and whole weight. This means landings in gutted weight are not converted to whole weight, or vice-versa, but landings in whole or gutted weight are simply added together to track landings against the ACL. The Atlantic Coastal Cooperative Statistics Program (ACCSP), which is a major data source for cobia (and other Atlantic species) landings, reports commercial landings in whole weight but may be converted to gutted weight using a conversion factor. However, the ACCSP is not currently able to provide landed weight. Second, the 2015 data shown in the tables is preliminary, but a more recent update has been made by the Southeast Fisheries Science Center (SEFSC). The updated 2015 Atlantic cobia commercial landings were 71,790 lbs landed weight (Table 1). This number is lower than that shown in the tables and is also in landed weight, not whole weight. Third, landings prior to 2015 cannot be directly converted to landed weight. However, the commercial ACL (quota) prior to 2015 was monitored in terms of whole weight. Also, commercial quotas were not instituted until 2011.

Table 1. Updated 2015 commercial landings (pounds landed weight [lw]) and revenues (2014 $).

States				
	GA/SC	**NC**	**VA**	**Total**
Pounds (lw)	3,219	42,338	26,233	71,790
Revenues (2014 $)	$28,755	$113,052	$75,394	$217,200

Source: D. Gloeckner (pers. comm., 2016) for 2015 data.

From 2010 through 2015, annual commercial landings of Atlantic cobia ranged from approximately 33,000 to 83,000 lbs ww (Table 2). Dockside revenues from those landings ranged from approximately $79,000 to $233,000 (2014 $) (Table 2). The average dockside price for those six years was $2.43 per lb ww (2014 $). The highest landings and revenues occurred in 2015, whereas the lowest for both landings and revenues occurred in 2011. When the Florida east coast zone was still part of the management area for Atlantic cobia, commercial harvest reached the sector's quota of 125,712 lbs ww in 2014 and closed on December 11, 2014. Under the modified management area, excluding the Florida east coast zone, the quota for Atlantic cobia was revised to 60,000 lbs landed weight (lw) in 2015 and 50,000 lbs lw in 2016 and thereafter. Although landings exceeded the 2015 quota, no quota closure was imposed. Preliminary commercial landings for 2016 are 48,690 lbs lw (SEFSC Quota Monitoring Program; July, 2017). The federal commercial fishery closed on December 6, 2016.

Commercial landings of Atlantic cobia have predominantly come from North Carolina, followed by Virginia and South Carolina/Georgia (Table 2). Georgia and South Carolina landings are combined for confidentiality purposes because of the relatively small amount of cobia landings in Georgia. Cobia landings north of Virginia are relatively rare and sporadic, thus, Virginia is considered the northernmost major contributor to the commercial Atlantic cobia fishery. One notable feature for Virginia is the surge in landings in 2014 and 2015, although they were still lower than landings in North Carolina.

Table 2. Commercial Atlantic cobia landings (lbs ww) and revenues (2014 $) by state/area, 2010-2015 (preliminary). Georgia landings are very small, so they are combined with those of South Carolina.

	GA/SC	NC	VA	Total
	Pounds (ww)			
2010	3,174	43,737	9,364	56,275
2011	4,610	19,950	9,233	33,793
2012	3,642	32,008	6,309	41,959
2013	4,041	35,496	13,095	52,632
2014	4,180	41,848	23,111	69,139
2015	3,555	52,315	27,277	83,148
Average	3,867	37,559	14,732	56,158
	Dockside Revenues (2014 $)			
2010	$11,377	$70,377	$19,976	$101,730
2011	$19,666	$37,893	$21,666	$79,224
2012	$15,554	$66,887	$14,597	$97,038
2013	$15,639	$79,397	$35,792	$130,828
2014	$13,320	$95,462	$67,972	$176,754
2015	$11,151	$147,160	$75,360	$233,672
Average	$14,451	$82,863	$39,227	$136,541

Source: SEFSC Commercial ACL Dataset (December 2015) for 2010-2014 data; D. Gloeckner (pers. comm., 2016) for 2015 data.

Commercial fishermen harvest cobia using various gear types. Table 3 shows commercial Atlantic cobia landings and revenues by gear type. In Table 3, "Hook and Line" includes handline, longline, power-assisted line, and troll line while "Others" includes traps, other net gear, dredges/gigs/spears, and unclassified gear. Handline has been the foremost gear type used in harvesting cobia for most years (Table 3), followed closely by gillnets. Within the "Others" category, the largest landings were assigned to "unclassified gear." Although not shown in the table, handline accounted for the biggest share of the hook and line landings. Longline has been a minor gear type in the commercial harvest of cobia.

Table 3. Commercial Atlantic cobia landings (lb ww) and revenues (2014$) by gear, 2010-2015 (preliminary).

	Hook and Line	**Gillnets**	**Others**	**Total**
	Pounds (ww)			
2010	26,758	23,495	6,022	56,275
2011	18,322	9,177	6,294	33,793
2012	12,962	21,091	7,906	41,959
2013	28,356	13,343	10,933	52,632
2014	37,082	23,540	8,517	69,139
2015	37,702	36,417	9,030	83,148
Average	26,864	21,177	8,117	56,158
	Dockside Revenues (2014 $)			
2010	$49,095	$38,605	$14,030	$101,730
2011	$39,265	$18,242	$21,717	$79,224
2012	$29,677	$43,875	$23,486	$97,038
2013	$69,433	$30,206	$31,189	$130,828
2014	$99,959	$55,275	$21,520	$176,754
2015	$108,165	$100,130	$25,377	$233,672
Average	$65,932	$47,722	$22,886	$136,541

Source: SEFSC Commercial ACL Dataset (December 2015) for 2010-2014 data; D. Gloeckner (pers. comm., 2016) for 2015 data.

1.3.1.1. State-specific Commercial Fishery

Georgia

There is no directed commercial fishery for cobia in Georgia. Commercial landings may occur but they are typically the result of bycatch in other targeted fisheries. Some illegal sale of recreationally-caught cobia may occur; however, the total amount and value is relatively small. The greatest recorded landings in Georgia (since annual landings became available in 1979) occurred in 1993 when 2,730 pounds of cobia were landed resulting in a market value of $4,728.

South Carolina

There is a limited commercial fishery for cobia in South Carolina. Cobia are a state-designated Gamefish, and as such, cobia landed in state waters may not be sold commercially. However, cobia landed in Federal waters can be sold commercially under current regulations. Commercial cobia landings have ranged from 2,000-4,300 lbs per year with an annual mean of 3,207 lbs per year for 2005-2016 and dollar values ranging from $4,731-$17,795 annually.

North Carolina:

Commercial landings of cobia in North Carolina are available from 1950 to the present. However, monthly landings are 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. The primary fisheries associated with cobia in North Carolina are the snapper-grouper, coastal pelagic troll, and the large mesh estuarine gill net fisheries. Cobia landings from 1950 – 2016 have ranged from a low of 600 pounds (1951; 1955) to a high of 52,684 pounds (2015) with average landings of 16,611 pounds over the 66-year time series (Table 3). Recently, landings have ranged from 19,004 pounds (2007) to 52,684 pounds (2015), averaging 34,674 pounds over the last ten years.

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, especially after North Carolina adopted the CMP FMP measures of 33-inches minimum FL and two-per person possession limit in 1991. 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 hand line fishery with modest landings from the haul seine and anchored gill net fishery. From 1994-2016, the majority of landings have occurred from the anchored gill net and pelagic troll and hand line fishery with gill nets being the top gear during most of those years.

Virginia

Similar to the situation for the recreational sector, commercial hook-and-line fishermen have come to depend more on cobia as the quality of other fisheries in Virginia has deteriorated. In fact, it has become an actively targeted species for many such commercial fishermen, even though cobia has often been considered a bycatch species in other states and for other gears.

Virginia has had variable commercial landings of cobia since the Virginia Marine Resources Commission instituted mandatory reporting in 1993, with landings being high in the mid-1990s, lower in the mid-2000s, and peaking in the past three years (2014-2016; Appendix II, Table VA1). There is a small, but directed hook-and-line fishery, with mainly bycatch landings from gillnets and pound nets, although these landings can be sizable (Appendix II, Table VA2). The “Other” category is predominantly gillnet landings, but they were combined with other gears for confidentiality purposes. Hook-and-line landings have been the largest, by gear, since 2007.

1.3.2. Recreational Fishery

The recreational sector is comprised of a private component and a for-hire component. The private component includes anglers fishing from shore (including all land-based structures) and private/rental boats. The for-hire component is composed of charter boats and headboats (also called partyboats). Although charter boats tend to be smaller, on average, than headboats, the key distinction between the two types of operations is how the fee is typically determined. On a charter boat trip, the fee charged is for the entire vessel, regardless of how many passengers are carried, whereas the fee charged for a headboat trip is paid per individual angler.

1.3.2.1. Permits

A federal charter/headboat (for-hire) vessel permit is required for harvesting CMP species, including cobia, when fishing on for-hire vessels. The South Atlantic for-hire permit is an open access system. As of May 16, 2016, there were 1,494 valid (non-expired) or renewable Atlantic charter/headboat CMP permits. A renewable permit is an expired permit that may not be actively fished, but is renewable for up to one year after expiration. Although the for-hire permit application collects information on the primary method of operation, the resultant permit itself does not identify the permitted vessel as either a headboat or a charter boat and does not restrict operation as either a headboat or charter boat, thus, vessels may operate in both capacities. However, only selected headboats are required to submit harvest and effort information to the National Marine Fisheries Service (NMFS) Southeast Region Headboat Survey (SRHS). Participation in the SRHS is based on determination by the SEFSC that the vessel primarily operates as a headboat. There were 73 South Atlantic vessels registered in the SRHS as of February 22, 2016 (K. Fitzpatrick, NMFS SEFSC, pers. comm.).

Information on South Atlantic charter boat and headboat operating characteristics, including average fees and net operating revenues, as reported in Holland et al. (2012), and financial and economic impact information on Southeast (FL-NC) for-hire vessels, as reported in Steinback and Brinson (2013), is incorporated herein by reference.

There are no specific federal permitting requirements for recreational anglers to fish for or harvest cobia. Instead, anglers are required to possess either a state recreational fishing permit that authorizes saltwater fishing in general, or be registered in the federal National Saltwater Angler Registry system, subject to appropriate exemptions. As a result, it is not possible to identify with available data how many individual anglers would be expected to be affected by this proposed FMP.

Recently, the states of North Carolina and Virginia have developed programs to survey recreational cobia fishermen. These programs may provide information in the future that would help characterize the cobia fisheries in these states.

1.3.2.2. Harvest

On average, from 2010 through 2015, the recreational sector landed approximately 793,000 lbs ww of Atlantic cobia (Table 4). North Carolina has been the dominant state in recreational landings of cobia, followed by Virginia, South Carolina, and Georgia. Cobia landings north of

Virginia are relatively rare and sporadic, thus, Virginia is considered the northernmost major contributor to the recreational Atlantic cobia fishery. Noticeable in the table is the surge in the recreational landings of cobia for all states in 2015, resulting in 2015 landings that were more than double the recreational ACL. Preliminary landings (1,289,993 lbs ww, GA-VA; Pers. com. National Marine Fisheries Service [NMFS] [July 21, 2017]) indicate that a similar circumstance occurred in 2016.

The private/rental mode has been the most dominant fishing mode for harvesting cobia (Table 5). Headboats have provided the lowest contribution to recreational landings of cobia. Information reported in Table 5 indicates that the 2015 surge in recreational landings can be attributed to substantial landings increases by the charter and private/rental fishing modes. Charter boat landings more than doubled while private/rental mode landings more than tripled in 2015. In the particular case of the South Carolina charter boat sector, increasing landings of cobia caught from offshore waters (greater than 3 miles) partly compensated for the declining landings from estuarine and nearshore waters (0-3 miles) that have occurred since about 2007 (South Carolina Cobia Management Needs PowerPoint Presentation, SC DNR, 2016).

Table 4. Annual recreational landings (lbs ww) of Atlantic cobia, by state, 2010-2015 (preliminary).

	Georgia	**South Carolina**	**North Carolina**	**Virginia**	**Total**
2010	77,064	63,678	559,476	237,528	937,746
2011	88,049	1,554	119,678	137,931	347,213
2012	102,996	222,353	66,645	103,995	495,989
2013	28,427	19,159	492,998	354,463	895,048
2014	19,768	32,010	277,846	214,426	544,050
2015	67,250	124,057	631,024	718,647	1,540,978
Average	63,926	77,135	357,945	294,498	793,504

Source: SEFSC MRIPACLspec_rec81_15wv6_17Mar16.

Table 5. Annual recreational landings (lbs ww) of Atlantic cobia, by fishing mode, 2010-2015 (preliminary).

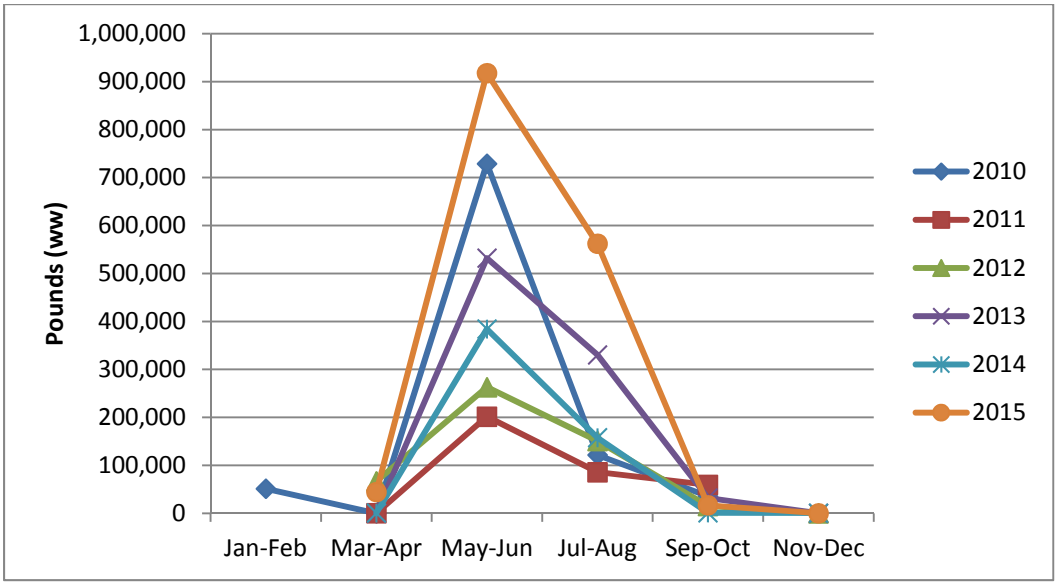
	Charter	**Headboat**	**Private/Rental**	**Shore**	**Total**
2010	133,110	2,747	789,996	11,893	937,746
2011	23,608	1,886	282,728	38,990	347,213
2012	39,729	1,671	385,777	68,811	495,989
2013	73,623	5,485	815,940	0	895,048
2014	46,528	5,701	453,871	37,950	544,050
2015	102,941	1,741	1,400,338	35,957	1,540,978
Average	69,923	3,205	688,108	32,267	793,504

Source: SEFSC MRIPACLspec_rec81_15wv6_17Mar16.

Peak recreational landings of cobia occurred in the May-June wave each year from 2010 through 2015 (Figure 1). Recreational landings steeply increased from the March-April wave to

their peak and also steeply declined after the peak wave. Landings are concentrated around the May-June and July-August waves.

Figure 1. Distribution of Atlantic cobia recreational harvest, by wave, 2010-2015 (preliminary).



Source: SEFSC MRIPACLspec_rec81_15wv6_17Mar16.

1.3.2.3. Effort

Recreational effort derived from the Marine Recreational Statistics Survey/Marine Recreational Information Program (Marine Recreational Fisheries Statistical Survey [MRFSS]/Marine Recreational Information Program [MRIP]) database can be characterized in terms of the number of trips as follows:

Target effort - The number of individual angler trips, regardless of duration, where the intercepted angler indicated that the species or a species in the species group was targeted as either the first or second primary target for the trip. The species did not have to be caught.

Catch effort - The number of individual angler trips, regardless of duration and target intent, where the individual species or a species in the species group was caught. The fish did not have to be kept.

Total recreational trips - The total estimated number of recreational trips in the Atlantic, regardless of target intent or catch success.

Other measures of effort are possible, such as the number of harvest trips (the number of individual angler trips that harvest a particular species regardless of target intent), and directed trips (the number of individual angler trips that either targeted or caught a particular species), but the three measures of effort listed above are used in this assessment.

Estimates of annual Atlantic cobia effort (in terms of individual angler trips) for 2010-2015 are provided in Table 6 for target trips and Table 7 for catch trips. Target and catch trips are shown by fishing mode (charter, private/rental, shore) for Georgia, South Carolina, North Carolina, and Virginia. These are trips for cobia in state or federal waters off of these states. Estimates of cobia target and catch trips for additional years, and other measures of directed effort, are available at http://www.st.nmfs.noaa.gov/recreational-fisheries/access-data/run-a-data-query/queries/index.

Cobia is one of the few species where target trips generally exceed catch trips. The 2010-2015 average target trips were 4,519 for the charter mode, 130,360 for the private/rental mode, and 28,293 for the shore mode (Table 6). In contrast, the average catch trips were 3,114 for the charter mode, 33,329 for the private/rental mode, and 6,840 for the shore mode (Table 7). This is suggestive of a relatively strong interest in fishing for cobia among recreational anglers across all fishing modes. For each state, the private/rental mode has been the most dominant fishing mode both in target and catch effort.

Table 6. Target trips for Atlantic cobia, by fishing mode and state, 2010-2015 (preliminary).

Year	Charter				
	Georgia	S. Carolina	N. Carolina	Virginia	Total
2010	0	3,349	3,029	358	6,736
2011	22	2,940	1,416	525	4,903
2012	0	1,025	345	156	1,526
2013	160	0	2,446	24	2,630
2014	0	1,452	1,703	295	3,450
2015	792	1,290	2,765	3,022	7,869
Average	162	1,676	1,951	730	4,519
	Private/Rental				
2010	5,453	14,228	49,358	67,730	136,769
2011	4,030	24,554	26,400	49,180	104,164
2012	2,495	57,543	23,320	37,706	121,064
2013	12,235	22,373	50,883	53,981	139,472
2014	1,322	23,365	50,112	49,075	123,874
2015	12,236	9,684	58,658	76,241	156,819

Average	6,295	25,291	43,122	55,652	130,360
	Shore				
2010	0	2,030	14,950	9,838	26,818
2011	0	0	10,090	2,366	12,456
2012	0	914	12,444	14,939	28,297
2013	0	627	15,977	5,693	22,297
2014	0	2,395	17,085	18,565	38,045
2015	0	363	21,925	19,554	41,842
Average	0	1,055	15,412	11,826	28,293

Source: http://www.st.nmfs.noaa.gov/recreational-fisheries/access-data/run-a-data-query/queries/index.

Table 7. Catch trips for Atlantic cobia, by fishing mode and state, 2010-2015 (preliminary).

Year	Charter				
	Georgia	South Car.	North Car.	Virginia	Total
2010	97	1,301	4,398	237	6,033
2011	400	0	1,655	135	2,190
2012	140	372	472	156	1,140
2013	160	48	2,798	24	3,030
2014	55	110	1,559	72	1,796
2015	0	879	2,652	963	4,494
Average	142	452	2,256	265	3,114
	Private/Rental				
2010	3,320	2,939	18,433	13,600	38,292
2011	4,145	606	8,156	9,291	22,198
2012	3,296	5,134	4,869	6,658	19,957
2013	1,157	3,699	21,047	14,256	40,159
2014	1,436	2,957	10,561	14,803	29,757
2015	2,351	4,396	18,740	24,121	49,608

Average	2,618	3,289	13,634	13,788	33,329
	Shore				
2010	0	0	6,192	0	6,192
2011	0	0	6,528	0	6,528
2012	0	0	7,983	2,055	10,038
2013	0	0	2,673	0	2,673
2014	0	3,268	6,128	0	9,396
2015	0	2,697	3,514	0	6,211
Average	0	994	5,503	343	6,840

Source: http://www.st.nmfs.noaa.gov/recreational-fisheries/access-data/run-a-data-query/queries/index.

Headboat data in the Southeast do not support the estimation of target or catch effort because target intent is not collected and the harvest data (the data reflects only harvest information and not total catch) are collected on a vessel basis and not by individual angler. **Table 8** contains estimates of the number of headboat angler days for the South Atlantic states for 2010-2015. Georgia and South Carolina data are combined for confidentiality purposes. Virginia information was not available because only South Atlantic headboats are included in the SRHS.

Table 8. South Atlantic headboat angler days, by state, 2010-2015.

Year	GA/SC	NC	TOTAL
2010	46,908	21,071	67,979
2011	46,210	18,457	64,667
2012	42,064	20,766	62,830
2013	42,853	20,547	63,400
2014	44,092	22,691	66,783
2015	41,479	22,716	64,195
Average	43,934	21,041	64,976

Source: NMFS Southeast Region Headboat Survey (SRHS).

1.3.2.4. State Specific Recreational Fisheries

Georgia

A large recreational fishery exists for cobia in Georgia. The majority of this fishery occurs in nearshore waters around natural and artificial reefs. While there are some instances of cobia being caught inshore and on beach front piers in Georgia, most landings come from outside state waters. Anglers begin targeting cobia in late April-early May with the peak of the season typically occurring in June. Late season catches often occur on nearshore reefs through October depending on water temperatures. However, these fall runs of fish are sporadic and are often missed by anglers.

South Carolina

The recreational fishery accounts for the majority of cobia landings in South Carolina. The fishery occurs in both nearshore waters and around natural and artificial reefs offshore. Historically, the majority of cobia landings have occurred in state waters in and around spawning aggregations from April through May. However, due to intense fishing pressure in the inshore zone, annual landings of cobia have fallen drastically since 2009, such that the majority of recreationally caught cobia in South Carolina now come from offshore (federal) waters. Anglers begin targeting cobia in late April-early May with the peak of the season typically occurring May into early June. Late season catches can occur on nearshore reefs through October depending on water temperatures. However, these fall catches are sporadic. South Carolina has accounted for an average of 1.3% of total landings in state jurisdictional waters along the Atlantic coast for 2010-2016.

North Carolina

Historically, recreational fisherman targeted cobia from a vessel by anchoring and fishing with dead, live, or a mixture of both bait types near inlets and deep water sloughs inshore (Manooch 1984). Fish were also harvested from shore or off of 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 harvests of cobia in North Carolina from 1981-2016 have ranged from a low of 0 pounds (1983) to a high of 631,024 pounds (2015). 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. From 2010-2015, recreational cobia landings in North Carolina ranged from 66,645 to 631,024 pounds (avg. = 357,945 pounds). 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, the majority of recreational landings of cobia in North Carolina occur form private vessels (73 %) with charter vessels (14 %) and shore based modes (13 %) accounting for the rest.

Virginia

According to the MRFSS/MRIP, Virginia's estimated recreational landings of cobia have been highly variable since 2000, with the lowest estimate being 26,537 pounds in 2012 and 898,542 pounds in 2006 (Appendix II, Table VA3). Although still preliminary, the estimate for 2016 is 919,992 pounds. It is believed the recreational fishery has grown in recent years, both in the number of participants, and the effectiveness of fishing due to the advent of sight-casting—especially when aided by "cobia towers." Traditionally, cobia had been targeted using live-bait bottom-fishing, but these new techniques are causing a shift in preference among anglers. However, the extent of this change is not clear for Virginia's recreational fishery.

In addition to a large private recreational industry, there is a small, dedicated group of for-hire participants. Many of these captains/fishing guides utilize cobia towers and prefer sight-casting, although some still chum and fish using live bait.

1.3.3. Subsistence Fishery

There is no known subsistence fishery for cobia.

1.3.4. Non-Consumptive Factors

No non-consumptive factors were identified that were of significance to the cobia resource.

1.3.5. Interactions with Other Fisheries, Species, or Users

The recreational cobia fishery tends to be a targeted fishery. Various small and large coastal sharks and various ray species are the most common bycatch. Cobia are encountered as bycatch in the troll and live bait fisheries for king and Spanish mackerel, dolphin, and other pelagic species. Additionally, cobia are taken incidental to offshore bottom fishing activities for snapper/grouper species.

The commercial cobia fishery is primarily bycatch in the same troll fisheries and taken incidental to snapper/grouper fisheries. Some directed harvest does occur; however, low limits preclude a large scale fishery.

1.4. HABITAT CONSIDERATIONS

1.4.1. Habitat Important to the Stocks

1.4.1.1. Description of the Habitat

1.4.1.1.1. Spawning Habitat

The SAFMC has management jurisdiction of the federal waters (3-200 nautical miles) offshore of North Carolina, South Carolina, Georgia, and Florida. Under the CMP FMP, the SAFMC manages Atlantic cobia through the Mid-Atlantic region (VA-NY).

Cobia spawn in nearshore waters along the South Atlantic coast from April through June. Nearby states (South Carolina) have documented the presence of inshore spawning aggregations of cobia (Lefebvre and Denson, 2012). However, there have been no such aggregations identified in Georgia. Eggs and larvae are typically found in nearshore waters and juveniles most often occur inshore or in protected nearshore waters.

Cobia enter nearshore waters along the south Atlantic Coast when water temperatures reach 20-21 °C, usually late April and aggregate to spawn through June. Histological evaluation of gonads from these nearshore collections suggest cobia are mature and spawning in inshore waters of high salinity estuaries (Callibogue, Port Royal Sound and St. Helena Sound in SC)(Lefebvre and Denson, 2012). The inshore spawning aggregations in South Carolina have been determined to be genetically distinct from the Atlantic stock of cobia (Darden et al. 2014). These findings are corroborated by conventional tag-recapture information and show estuarine fidelity for spawning fish and natal homing annually into estuaries. Eggs and larvae are typically found in nearshore waters where there is significant retention time of estuarine waters; however, juveniles (< 2yrs of age) are only occasionally caught inshore or in protected nearshore waters making it unclear what habitat the majority of this life stage utilizes until they mature and join spawning aggregations (Lefebvre and Denson, 2012).

1.4.1.1.2. Larval Habitat

Little is known about the larval stages of cobia. Larvae have been collected in pelagic waters of the Gulf of Mexico (65-134 m isobaths), within a meter of the water column (Ditty and Shaw 1992).

1.4.1.1.3. Juvenile Habitat

Juveniles, like larvae, have also been found in pelagic waters of the Gulf of Mexico, and are believed to utilize floating *Sargassum* as habitat in such areas (Ditty and Shaw 1992). Early juveniles then move to high-salinity, inshore areas along beaches, river mouths, barrier islands, and bays/inlets (Benson 1982, Hoese and Moore 1977, McClane 1974, Swingle 1971).

1.4.1.1.4. Adult Habitat

Adults enter estuaries on a seasonal basis but otherwise inhabit coastal waters and the continental shelf (Benson 1982, Collette 1978, Robins and Ray 1986). Although generally considered pelagic, adult cobia are found at various depths throughout the water column (Freeman and Walford 1976). They do not appear to be substratum-specific, but extensive tagging research is currently being conducted by various states along the U.S. Atlantic coast to better determine movement and habitat usage.

1.4.1.1.4.1. South Atlantic Region

The continental shelf off the southeastern U.S., extending from the Dry Tortugas, FL, to Cape Hatteras, NC, encompasses an area in excess of 100,000 square km (Menzel 1993). Based on

physical oceanography and geomorphology, this environment can be divided into two regions: Dry Tortugas, FL, to Cape Canaveral, FL, and Cape Canaveral, FL, to Cape Hatteras, NC. The continental shelf from the Dry Tortugas, FL, to Miami, FL, is approximately 25 km wide and narrows to approximately 5 km off Palm Beach, FL. The shelf then broadens to approximately 120 km off Georgia and South Carolina before narrowing to 30 km off Cape Hatteras, NC. The Florida Current/Gulf Stream flows along the shelf edge throughout the region. In the southern region, this boundary current dominates the physics of the entire shelf (Lee et al. 1994).

In the northern region, additional physical processes are important and the shelf environment can be subdivided into three oceanographic zones (Atkinson et al. 1985, Menzel 1993), the outer shelf, mid-shelf, and inner shelf. The outer shelf (40-75 meters (m)) is influenced primarily by the Gulf Stream and secondarily by winds and tides. On the mid-shelf (20-40 m), the water column is almost equally affected by the Gulf Stream, winds, and tides. Inner shelf waters (0-20 m) are influenced by freshwater runoff, winds, tides, and bottom friction. Water masses present from the Dry Tortugas, FL, to Cape Canaveral, FL, include Florida Current water, waters originating in Florida Bay, and shelf water.

Spatial and temporal variation in the position of the western boundary current has dramatic effects on water column habitats. Variation in the path of the Florida Current near the

Dry Tortugas induces formation of the Tortugas Gyre (Lee et al. 1992, 1994). This cyclonic eddy has horizontal dimensions of approximately 100 km and may persist near the Florida Keys for several months. The Pourtales Gyre, which has been found to the east, is formed when the Tortugas Gyres moves eastward along the shelf. Upwelling occurs in the center of these gyres, thereby adding nutrients to the near surface (<100 m) water column. Wind and input of Florida Bay water also influence the water column structure on the shelf off the Florida Keys (Smith 1994, Wang et al. 1994). Further downstream, the Gulf Stream encounters the “Charleston Bump”, a topographic rise on the upper Blake Ridge where the current is often deflected offshore resulting in the formation of a cold, quasi-permanent cyclonic gyre and associated upwelling (Brooks and Bane 1978). On the continental shelf, offshore projecting shoals at Cape Fear, Cape Lookout, and Cape Hatteras, NC, affect longshore coastal currents and interact with Gulf Stream intrusions to produce local upwelling (Blanton et al. 1981, Janowitz and Pietrafesa 1982). Shoreward of the Gulf Stream, seasonal horizontal temperature and salinity gradients define the mid-shelf and inner-shelf fronts. In coastal waters, river discharge and estuarine tidal plumes contribute to the water column structure.

The water column from Dry Tortugas, FL, to Cape Hatteras, NC, serves as habitat for many marine fish and shellfish. Most marine fish and shellfish release pelagic eggs when spawning and thus, most species utilize the water column during some portion of their early life history (Leis 1991, Yeung and McGowan 1991). Many fish inhabit the water column as adults. Pelagic fishes include numerous clupeoids, flying fish, jacks, cobia, bluefish, dolphin, barracuda, and the mackerels (Schwartz 1989). Some pelagic species are associated with particular benthic habitats, while other species are truly pelagic.

1.4.1.1.4.2. Mid-Atlantic Region

Information about the physical environment of the Mid-Atlantic region was provided by the Mid-Atlantic Fishery Management Council (MAFMC) and adapted from the 2016 Mackerel, Squid, and Butterfish Specifications Environmental Assessment, available at: http://www.greateratlantic.fisheries.noaa.gov/regs/2016/January/16msb2016specspr.html.

Climate, physiographic, and hydrographic differences separate the Atlantic Ocean from Maine to Florida into the New England-Middle Atlantic Area and the South Atlantic Area (division/mixing at Cape Hatteras, NC). The inshore New England-Middle Atlantic area is fairly uniform physically and is influenced by many large coastal rivers and estuarine areas. The continental shelf (characterized by water less than 650 ft. in depth) extends seaward approximately 120 miles off Cape Cod, narrows gradually to 70 miles off New Jersey, and is 20 miles wide at Cape Hatteras. Surface circulation is generally southwesterly on the continental shelf during all seasons of the year, although this may be interrupted by coastal indrafting and some reversal of flow at the northern and southern extremities of the area. Water temperatures range from less than 33^{o}F from the New York Bight north in the winter to over 80^{o}F off Cape Hatteras in summer.

Within the New England-Middle Atlantic Area, the Northeast U.S. Continental Shelf Large Marine Ecosystem includes the area from the Gulf of Maine to Cape Hatteras, extending from the coast seaward to the edge of the continental shelf, including the slope sea offshore to the Gulf Stream. The Northeast U.S. Continental Shelf Large Marine Ecosystem is a dynamic, highly productive, and intensively studied system providing a broad spectrum of ecosystem goods and services. This region, encompassing the continental shelf area between Cape Hatteras and the Gulf of Maine, spans approximately 250,000 km^2 and supports some of the highest revenue fisheries in the U.S. The system historically underwent profound changes due to very heavy exploitation by distant-water and domestic fishing fleets. Further, the region is experiencing changes in climate and physical forcing that have contributed to large-scale alteration in ecosystem structure and function. Projections indicate continued future climate change related to both short and medium-term cyclic trends as well as non-cyclic climate change.

A number of distinct subsystems comprise the region. The Gulf of Maine is an enclosed coastal sea, characterized by relatively cold waters and deep basins, with various sediment types. Georges Bank is a relatively shallow coastal plateau that slopes gently from north to south and has steep submarine canyons on its eastern and southeastern edge. It is characterized by highly productive, well-mixed waters and fast-moving currents. The Mid-Atlantic Bight is comprised of the sandy, relatively flat, gently sloping continental shelf from southern New England to Cape Hatteras, NC. Detailed information on the affected physical and biological environments inhabited by the managed resources is available in Stevenson et al. (2006).

1.4.2. Identification and Distribution of Habitat and Habitat Areas of Particular Concern

Habitat information for Atlantic cobia is sparse. Few, if any, fishery independent surveys consistently interact with cobia in numbers adequate to develop any trends or conclusions.

Much of the habitat data presented is generic for the coastal migratory pelagic fishes that include king and Spanish mackerel. Species-specific habitat information is a data and research need.

A description of the Habitat Areas of Particular Concern (HAPC) for CMP species is provided in Amendment 18 to the CMP FMP (GMFMC/ SAFMC 2011), and is incorporated herein by reference. Areas which meet the criteria for HAPCs include sandy shoals of Cape Lookout, Cape Fear, and Cape Hatteras from shore to the ends of the respective shoals, but shoreward of the Gulf stream; The Point, The Ten- Fathom Ledge, and Big Rock (North Carolina); The Charleston Bump and Hurl Rocks (South Carolina); The Point off Jupiter Inlet (Florida); *Phragmatopoma* (worm reefs) reefs off the central east coast of Florida; nearshore hard bottom south of Cape Canaveral; The Hump off Islamorada (Florida); The Marathon Hump off Marathon (Florida); The "Wall" off of the Florida Keys; Pelagic *Sargassum*; and Atlantic coast estuaries with high numbers of Spanish mackerel and cobia based on abundance data from the Estuarine Living Marine Resources Program. Estuaries meeting this criteria for Spanish mackerel include Bogue Sound and New River (North Carolina), for cobia, Broad River (South Carolina).

1.4.2.1. Essential Fish Habitat for Coastal Migratory Pelagics

A description of the Essential Fish Habitat (EFH) for CMP species is provided in Amendment 18 to the CMP FMP (GMFMC and SAFMC 2011), and is incorporated herein by reference. EFH for CMPs include coastal estuaries from the U.S./Mexico border to the boundary between the areas covered by the GMFMC and SAFMC from estuarine waters out to depths of 100 fathoms (GMFMC 2004). In the South Atlantic, EFH for coastal migratory pelagic species includes sandy shoals of capes and offshore bars, high profile rocky bottom and barrier island ocean-side waters, from the surf to the shelf break zone, but from the Gulf Stream shoreward, including *Sargassum*. In addition, all coastal inlets, all state-designated nursery habitats of particular importance to coastal migratory pelagics (for example, in North Carolina this would include all primary nursery areas and all secondary nursery areas).

For cobia, EFH also includes high salinity bays, estuaries, and seagrass habitat. In addition, the Gulf Stream is an EFH because it provides a mechanism to disperse CMP larvae. For king and Spanish mackerel and cobia, EFH occurs in the South Atlantic and Mid-Atlantic Bights.

1.4.3. Present Condition of Habitats and Habitat Areas of Particular Concern

1.4.3.1. Coastal Spawning Habitat: Condition and Threats Coastal Spawning

It is reasonable to assume that areas where coastal development is taking place rapidly, habitat quality may be compromised. Coastal development is a continuous process in all states and all coastal areas in the nation are experiencing significant growth. The following section describes particular threats to the nearshore habitats in the South Atlantic that meet the characteristics of suitable spawning habitat for cobia.

One threat to the spawning habitat for cobia is navigation and related activities such as dredging and hazards associated with ports and marinas (ASMFC, 2013). According to the SAFMC (1998), impacts from navigation related activities on habitat include direct removal/burial of organisms from dredging and disposal of dredged material, effects due to turbidity and siltation; release of contaminants and uptake of nutrients, metals, and organics; release of oxygen-consuming substances, noise disturbance, and alteration of the hydrodynamic regime and physical characteristics of the habitat. All of these impacts have the potential to substantially decrease the quality and extent of cobia spawning habitat.

Besides creating the need for dredging operations that directly and indirectly affect spawning habitat for cobia, ports also present the potential for spills of hazardous materials. The cargo that arrives and departs from ports includes highly toxic chemicals and petroleum products. Although spills are rare, constant concern exists since huge expanses of productive estuarine and nearshore habitat are at stake. Additional concerns related to navigation and port utilization are discharge of marine debris, garbage, and organic waste into coastal waters.

Maintenance and stabilization of coastal inlets is of concern in certain areas of the southeastern U.S. Studies have implicated jetty construction to alterations in hydrodynamic regimes, thus, affecting the transport of estuarine-dependent organisms' larvae through inlets (Miller *et al*. 1984, Miller 1988).

1.4.3.2. Estuarine Nursery, Juvenile and Subadult Habitat: Condition and threats

Coastal wetlands and their adjacent estuarine waters likely constitute primary nursery, juvenile, and sub-adult habitat for cobia along the coast. Between 1986 and 1997, estuarine and marine wetlands nationwide experienced an estimated net loss of 10,400 acres. However, the rate of loss was reduced over 82% since the previous decade (Dahl 2000). Most of the wetland loss resulted from urban and rural activities and the conversion of wetlands for other uses. Along the southeast Atlantic coast, the state of Florida experienced the greatest loss of coastal wetlands due to urban or rural development (Dahl 2000). However, the loss of estuarine wetlands in the southeast has been relatively low over the past decade, although there is some evidence that invasion by exotic species, such as Brazilian pepper (*Schinus terebinthifolius*), in some areas could pose potential threats to fish and wildlife populations in the future (T. Dahl, pers. comm.).

Throughout the coast, the condition of estuarine habitat varies according to location and the level of urbanization. In general, it can be expected that estuarine habitat adjacent to highly developed areas will exhibit poorer environmental quality than more distant areas. Hence, environmental quality concerns are best summarized on a watershed level.

Threats to estuarine habitats of the southeast were described in Amendment 2 to the Red Drum FMP (ASMFC 2002). Due to the cobia's similar dependence on estuarine habitats throughout its early life history, these same threats are likely to impact cobia as well.

Nutrient enrichment of estuarine waters throughout the southeast is a major threat to the quality of estuarine habitat. Forestry practices contribute significantly to nutrient enrichment in the southeast. Areas involved are extensive and many are in proximity to estuaries. Urban and suburban developments are perhaps the most immediate threat to cobia habitat in the southeast. The almost continuous expansion of ports and marinas in the South Atlantic poses a threat to aquatic and upland habitats. Certain navigation-related activities are not as conspicuous as port terminal construction but have the potential to significantly impact the estuarine habitat upon which cobia depend. Activities related to watercraft operation and support pose numerous threats including discharge of pollutants from boats and runoff from impervious surfaces, contaminants generated in the course of boat maintenance, intensification of existing poor water quality conditions, and the alteration or destruction of wetlands, shellfish and other bottom communities for the construction of marinas and other related infrastructure.

Estuarine habitats of the southeast can be negatively impacted by hydrologic modifications. The latter include activities related to aquaculture, mosquito control, wildlife management, flood control, agriculture and silviculture. Also, ditching, diking, draining, and impounding activities associated with industrial, urban, and suburban development qualify as hydrologic modifications that may impact the estuarine habitat. Alteration of freshwater flows into estuarine areas may change temperature, salinity, and nutrient regimes as well as alter wetland coverage. Studies have demonstrated that changes in salinity and temperature can have profound effects in estuarine fishes (Serafy *et al*. 1997) and that salinity partly dictates the distribution and abundance of estuarine organisms (Holland *et al*. 1996). Cobia may be similarly susceptible to such changes in the physical regime of their environment.

1.4.3.3. Adult Habitat: Condition and Threats

Threats to the cobia's adult habitat are not as numerous as those faced by postlarvae, juveniles, and subadults in the estuary and coastal waters. Current threats to the nearshore and offshore habitats that adult cobia utilize in the South Atlantic include navigation and related activities, dumping of dredged material, mining for sand and minerals, oil and gas exploration, offshore wind facilities, and commercial and industrial activities (SAFMC 1998).

An immediate threat is the sand mining for beach nourishment projects. Associated threats include burial of bottoms near the mine site or near disposal sites, release of contaminants directly or indirectly associated with mining (i.e. mining equipment and materials), increases in turbidity to harmful levels, and hydrologic alterations that could result in diminished desirable habitat.

Offshore mining for minerals may pose a threat to cobia habitat in the future. Currently, no mineral mining activities are taking place in the South Atlantic. However, various proposals to open additional areas off the Atlantic coast to seabed mining have been introduced by the Federal Executive and Legislative branches.

Offshore wind farms may also pose a threat to cobia habitat throughout different life stages in the future (ASMFC 2012). Currently, no offshore wind farms are established in the United States. However, the Atlantic coast is a potential candidate for future wind farm sites.

1.5. IMPACTS OF THE FISHERY MANAGEMENT

1.5.1. Biological and Environmental Impacts

Significant recreational fishery overages of the ACL in 2015 and 2016 raise concerns over the future status of the stock and potential of the stock becoming overfished. Adoption of coastwide management measures can provide flexibility to states while maintaining harvest within the ACL and protecting a portion of the spawning stock. Limits on catch can provide additional protection throughout cobia's geographic range to support a sustained population and fishery.

1.5.2. Social Impacts

There is very little information on fishermen, fishing-dependent businesses, or communities that depend on the cobia fisheries. In order to understand the impact that any new rules and regulations may have on participants in any fishery, in-depth community profiles need to be developed that will aid in the description of communities involved, both present and historical. Limited social science research has been conducted in communities in the U.S. South Atlantic. Until more research is completed and in-depth community profiles are developed for sample communities, it is not possible to fully describe the possible impacts of changes in fishing regulations for any fishery.

While not an in-depth ethnographic study, a project employing rapid assessment was completed to document the location, type, and history of fishing communities in the South Atlantic region. SAFMC staff worked collaboratively with the University of Florida to describe fishing communities in a broad manner (for example, whether the community is characterized mostly by commercial fishing, for-hire, recreational or some combination of all sectors), and link on-the-ground fieldwork with the collection of as much secondary data as possible. The secondary data included U.S. Census records, landings, permits, and state information. All of this information is used to form a baseline dataset to assist in the measurement of social and economic impacts (Jepson et al. 2006).

1.5.2.1. Recreational Fishery

The recreational sector of the cobia fishery is much larger than the commercial sector, and cobia is an important species for recreational anglers and the for-hire sector. Landings estimates indicate that the private recreational sector is the dominant component of the cobia recreational fishery (Table 5), and most landings are associated with Virginia and North Carolina (Table 4).

Implementation of the cobia FMP is expected to impact the recreational sector. Specifically it is likely that social impacts would be most significant for recreational fishermen and for-hire businesses in Virginia and North Carolina. However, the FMP will also allow management to maintain stock health and recreational participation, in addition to consistency in regulations among states.

1.5.2.2. Commercial Fishery

The commercial sector has operated primarily as a bycatch fishery for decades. The current ACL for the commercial fishery is 50,000 pounds from Georgia-New York. Current measures and those proposed in this document essentially maintain status quo for the commercial fishery. In accordance with federal policy, should the coastwide ACL be met, a closure would occur. Depending on the timing of any closure, social impacts would vary.

1.5.3. Other Resource Management Efforts

1.5.3.1. Artificial Reef Development/Management

Approximately 120,000 acres (155 nm^2) of ocean and estuarine bottom along the south Atlantic coast have been permitted for the development of artificial reefs (ASMFC 2002). The Georgia Department of Natural Resources is responsible for the development and maintenance of a network of man-made reefs both in estuarine waters and in the open Atlantic Ocean. Funding for the artificial reef program is provided by Federal Aid in Sport Fish Restoration, fishing license revenues, and private contributions. To date, there are 15 reefs within the estuary proper, which are constructed of a variety of materials including concrete rubble, metal cages, and manufactured reef units. These provide habitat for juvenile cobia and other species of recreationally important fishes. In 2001, three "beach" reefs were constructed in locations within Georgia's territorial waters just off the barrier island beaches. These are experimental in nature, but should provide some habitat for juvenile and adult cobia. There are 19 man-made reefs in the U.S. Exclusive Economic Zone (EEZ) ranging from depths of 40 to 130 feet. These reefs are constructed of a variety of materials including surplus vessels, concrete rubble, barges, bridge spans, and manufactured reef units. Both juvenile and adult cobia are known to use these reefs.

The Florida Fish and Wildlife Conservation Commission's (FWC) Division of Marine Fisheries Management administers a state artificial reef program that provides financial and technical assistance to coastal local governments, nonprofit corporations and state universities to develop artificial reefs and to monitor and evaluate these reefs. To date, there are 919 artificial reefs located in the Atlantic off Florida with 38 of these reefs being located within estuarine waters. The estuarine reefs are located in two Florida counties one being Dade County which has 32 and Palm Beach County which has six. Artificial habitats off Florida range in depth from six feet to 420 feet of water and consist of a variety of materials, i.e., concrete culverts, bridge spans, barges, and decommissioned military ships such as the ex-U.S.S. Hoyt Vandenberg which has become a very popular dive destination. Oyster shells are also used to create artificial

habitat in Florida waters, but the FWC does not keep track of these reefs. These artificial habitats should provide habitat for juvenile and adult cobia off Florida's Atlantic coast.

New Jersey has also developed and invested in an artificial reef program, with the state agency involved since 1984. Similarly, Delaware has invested in an artificial reef program, with 14 reef sites within Delaware Bay. Artificial reef construction is especially important in the Mid-Atlantic region, where near shore bottom is usually featureless sand or mud.

States should continue support for habitat restoration projects, including oyster shell recycling and oyster hatchery programs as well as seagrass restoration, to provide areas of enhanced or restored bottom habitat.

1.5.3.2. Bycatch

Cobia are uncommon bycatch components in most U.S. South and Mid-Atlantic fisheries. Mortalities resulting from cobia released from varying depths in the hook and line fisheries and regulatory discards from the large mesh gill fisheries in North Carolina and Virginia are unknown.

1.6. LOCATION OF TECHNICAL DOCUMENTATION FOR FMP

1.6.1. Review of Resource Life History and Biological Relationships

The PDT has compiled available life history data on cobia, much of which is contained in this document. Readers may review the documents developed for the Coastal Migratory Pelagics FMP by the SAFMC for historical perspective (SAFMC 2016).

1.6.2. Stock Assessment Document

The most recent cobia stock assessment (SEDAR 28) was completed in 2013. The stock assessment utilized the Beaufort Assessment Model with data through 2011 (SEDAR 2013). An updated stock assessment and review of stock structure information from genetic and tagging studies is scheduled for completion in 2019.

1.6.3. Economic Assessment Document

No economic assessment has been performed.

1.6.4. Law Enforcement Assessment Document

ASMFC's Law Enforcement Committee has prepared a document titled "Guidelines for Resource Managers on the Enforceability of Fishery Management Measures' (July 2009), which can be used to evaluate the effectiveness of future measures.

2. GOALS AND OBJECTIVES

2.1. HISTORY AND PURPOSE OF THE PLAN

2.1.1. History of Prior Management Actions

No interstate fisheries management program currently exists for Atlantic cobia. At present, four states have implemented harvest regulations for cobia (Table 9).

Table 9. 2017 State Recreational Regulations for Atlantic Cobia.

State	Size Limit	Bag Limit	Vessel Limit	Season	Notes
Georgia					
South Carolina	33" FL	1	3 south of Jeremy Inlet, 2 all other areas	See notes	May closure south of Jeremy Inlet
North Carolina	36" FL	1	4	May 1 – September 1	
Virginia	40" TL	1	3	June 1 – September 15	1 fish > 50" TL, No gaffing
Maryland	none	none	none	none	
Delaware	none	none	none	none	Implement federal regulations
New Jersey	37" TL	2	none	none	
New York	37" TL	2	none	none	

Commercial regulations are consistent throughout the management unit with a 33 inch FL minimum size limit (Virginia employs a 37 inch TL size limit) and 2 fish per license holder, with up to 6 fish allowed per trip, whichever is more restrictive. The one exception is Virginia, which allows 6 fish per trip regardless of the number of license holders on board.

2.1.2. Purpose and Need for Action

Currently there is no interstate management for cobia, but four main reasons have been identified as to why/how interstate management would benefit the fishery:

1) A majority of the coastwide catch occurs in state waters;

2) Need to maintain catches within the federal ACL;

3) Lack of consistent regulations and goals;

4) An Interstate FMP establishes a framework to provide greater flexibility to states and address future concerns or changes in the fishery or population.

2.2. GOAL

The goal of the Cobia FMP shall be to provide for an efficient management structure to implement coastwide management measures in a timely manner.

2.3. OBJECTIVES

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

2) Promote cooperative collection of biological, economic, and sociological data required to effectively monitor and assess the status of the cobia resource and evaluate management efforts.

3) Manage the cobia fishery to protect both young individuals and established breeding stock.

4) Develop research priorities that will further refine the cobia management program to maximize the biological, social, and economic benefits derived from the cobia population.

2.4. SPECIFICATION OF MANAGEMENT UNIT

The proposed management unit is defined as the cobia (*Rachycentron canadum*) resource from Georgia through New York within U.S. waters of the northwest Atlantic Ocean, from the U.S. Atlantic coastal estuaries eastward to the offshore boundaries of the EEZ. The selection of this management unit is based on genetic analysis and tag-recapture data described in this document.

2.4.1. Management Areas

The proposed management area is the Atlantic coast distribution of the resource from Georgia through New York.

2.5. DEFINITION OF OVERFISHING

While the SAFMC CMP Amendment 18 defined overfishing of cobia as exceeding the Overfishing Limit, this definition was not transferred over into Amendment 22. Thus, no overfishing definition currently exists for Atlantic cobia.

2.6. STOCK REBUILDING PROGRAM

The status of the cobia population is currently not overfished; therefore, a stock rebuilding program is not required.

3. MONITORING PROGRAM SPECIFICATIONS/ELEMENTS

Upon approval of the FMP, the South Atlantic Species Advisory Panel (AP) would meet as necessary to review stock assessments for cobia (when available) and all other relevant data pertaining to stock status. Based on this information, the AP would prepare and submit a report of recommendations to the Management Board.

The Cobia Technical Committee (TC) would meet annually, or as necessary, to review state management program changes, developments in the fishery, or other changes or challenges in the fishery.

The Cobia Stock Assessment Subcommittee (SAS), in cooperation with the SAFMC SSC, would generally meet every five years to review and update or perform a benchmark stock assessment on Atlantic cobia. This schedule may be modified as needed to incorporate new information and consideration of the Atlantic cobia stock. A new cobia stock assessment through the SEDAR process is scheduled for completion in 2019.

The Cobia Plan Review Team (PRT) would annually review implementation of the management plan and any subsequent adjustments (addenda), and report to the Management Board on any compliance issues that may arise. The PRT would also prepare the annual Cobia FMP Review and coordinate the annual update and prioritization of research needs (see Section 6.2).

3.1. ASSESSMENT OF ANNUAL RECRUITMENT

No programs currently collect data necessary to assess annual recruitment of cobia.

The FMP recommends examination of possible surveys from which Atlantic cobia abundance indices could be developed. These indices would be valuable for informing future stock assessments.

3.2. ASSESSMENT OF SPAWNING STOCK BIOMASS

SEDAR 28 (2013) provides the most current information on spawning stock biomass. While the stock is not currently considered overfished, the 2013 stock assessment does indicate declines in biomass over the last few years of the assessment (terminal year: 2010). New information should be revealed by the stock assessment scheduled for completion in 2019.

3.3. ASSESSMENT OF FISHING MORTALITY TARGET AND MEASUREMENT

SEDAR 28 (2013) provides the most current information on fishing mortality. The stock is not currently considered to be undergoing overfishing. While no definition currently exists for overfishing the cobia resource, recent overages of the ACL raises concerns. New information should be revealed by the stock assessment scheduled for completion in 2019.

3.4. SUMMARY OF MONITORING PROGRAMS

The proposed FMP includes no requirements regarding fishery-dependent monitoring programs, but all state fishery management agencies are encouraged to pursue full implementation of the standards of the Atlantic Coastal Cooperative Statistics Program (ACCSP). Upon approval of the FMP, the Management Board would recommend a transitional or phased-in approach be adopted to allow for full implementation of the ACCSP standards. Until the ACCSP standards are implemented, the Management Board would encourage state fishery management agencies to initiate implementation of specific ACCSP modules and/or pursue pilot and evaluation studies to assist in development of reporting programs to meet the ACCSP standards. The ACCSP partners are the 15 Atlantic coast states from Maine through Florida, the District of Columbia, the Potomac River Fisheries Commission, NOAA Fisheries, the U.S. Fish and Wildlife Service, the three federal Fishery Management Councils, and the Atlantic States Marine Fisheries Commission. Participation by program partners in the ACCSP would not relieve states from their responsibilities in collating and submitting harvest/monitoring reports to the Commission as required under the proposed FMP.

3.4.1. Catch, Landings, and Effort Information

3.4.1.1. Commercial Catch and Effort Data

The ACCSP's standard for commercial catch and effort statistics is mandatory, trip-level reporting of all commercially harvested marine species, with fishermen and/or dealers required to report standardized data elements for each trip by the tenth of the following month. Refer to the ACCSP Program Design document for more details on standardized data elements.

3.4.1.2. Recreational Catch and Effort Data

The ACCSP has selected the MRIP as the base program for recreational fishing data collection for shore and private boat fishing. The MRIP provides statistics for finfish, but does not cover shellfish fisheries, which will require development of new surveys. The MRIP combines data from two independent surveys to produce estimates of fishing effort, catch, and participation.

3.4.1.2.1. Household Telephone Survey for Effort Data

For private/rental boats and shore, fishing effort data is collected through a random digit-dialed telephone survey of recreational marine fishing license holders. A "wave" is a two-month sampling period, such as January through February (Wave 1) or March through April (Wave 2). The random-digit dialing survey for effort data is conducted in two-week periods that begin the last week of each wave and continue through the first week of the next wave.

3.4.1.2.2. Intercept Survey for Catch Data

Catch data for private/rental boats and shore fishing is collected through an access-site intercept survey. State partners are encouraged to increase their involvement in conducting the

intercept survey. The ACCSP is addressing transition of conduct of the intercept survey for catch from a contractor to a cooperative agreement involving states at varying levels.

3.4.1.2.3. For-Hire Catch and Effort Data

The ACCSP has selected the NOAA Fisheries For-Hire Survey as the preferred methodology for collecting data from charterboats and headboats (partyboats), also called the "for-hire" sector. The For-Hire Survey is similar to the MRIP with two major improvements; it uses: 1) a telephone survey to collect fishing effort data from vessel representatives and 2) a validation process for the self-reported data. Catch data are collected in conjunction with the MRIP with the addition of on-board samplers for headboats.

The independent survey components of the For-Hire Survey include: 1) a vessel effort survey; 2) an effort validation survey; 3) an access-site intercept survey for catch data; and 4) at-sea samplers on headboats for catch data. Using the data collected through these surveys, NOAA Fisheries generates catch and effort estimates for for-hire fisheries.

3.4.1.2.4. Vessel Telephone Survey for Effort Data

The vessel effort survey is a mandatory survey for for-hire vessels that uses a coastwide directory of such vessels as the sampling frame for for-hire fishing effort. The directory is continually updated as intercept and telephone interviewers identify changes in the fleet. Optimal sampling levels will be determined following evaluation of the Atlantic coast For-Hire Survey results from the first three years. Until the optimal sampling level is determined, a minimum of 10% of for-hire vessels or three charterboats and three headboats (whichever is greater), will be randomly sampled each week in each state. A vessel representative, usually the captain, is called and asked to provide information on the fishing effort associated with that vessel during the previous week. Vessel representatives are notified in advance that they have been selected for sampling and an example form is provided. To be included in the sample frame for particular wave, a vessel record must include: 1) at least one vessel representative's telephone number; 2) the name of the vessel or a vessel registration number issued by a state or the U.S. Coast Guard; 3) the county the boat operates from during that wave, and 4) designation as either a charter or guide boat (both called "charter") or headboat.

3.4.1.2.5. Validation Survey for Effort Data

To validate the self-reported effort data collected through the vessel telephone survey, field samplers periodically check access sites used by for-hire vessels to observe vessel effort. Interviewers record the presence or absence of a for-hire vessel from its dock or slip, and if the vessel is absent, they try to ascertain the purpose of the trip. Those observations are compared to telephone data for accuracy and to make any necessary corrections.

3.4.1.2.6. Catch Data

Vessels that meet the ACCSP definition of a charterboat, "typically hired on a per trip basis," are sampled for catch data through an intercept site survey of anglers at access points, similar to the MRIP. The intercept survey has been in progress since 1981.

Some Partners collect for-hire effort data using Vessel Trip Reports (VTR), which are mandatory for some vessels and contain all minimum data elements collected by the For-Hire Survey. In areas where the survey runs concurrently with VTR programs, captains selected for the weekly telephone survey are permitted to fax their VTRs in lieu to being interviewed by phone.

3.4.1.2.7. At-Sea Sampling of Headboats

At-sea samplers collect catch data aboard headboats, defined by the ACCSP as "any vessel-for-hire engaged in recreational fishing that typically is hired on a per person basis." Samples collected at-sea are supplemented by dockside sampling.

3.4.2. Biological Information

The ACCSP has set standards for how biological data should be collected and managed for commercial, recreational, and for-hire fisheries. Trained field personnel, known as port agents or field samplers, should obtain biological samples. Information should be collected through direct observation or through interviews with fishermen. Detailed fishery statistics and/or biological samples should be collected at docks, unloading sites, and fish houses. Biological sampling includes species identification of fish and shellfish; extraction of hard parts including spines and otoliths; and tissue samples such as gonads, stomachs, and scales.

3.4.3. Social and Economic Information

3.4.3.1. Commercial Fisheries

The ACCSP is testing its sociological and economic data collection standards for commercial harvesters. Standards for these types of data for dealers and fishing communities are in development with the Committee on Economics and Social Sciences. The ACCSP should collect baseline social and economic data on commercial harvesters using the following voluntary surveys:

- An annual fixed cost survey directed at the owner/operator,
- A trip cost survey to evaluate variable costs associated with a particular vessel's most recent commercial fishing trip to be directed at the vessel captain, and
- An annual owner/captain/crew/survey to gather sociological information.

Surveys may also be conducted using permit and registration data and vessel trip reports or sampling frames.

3.4.3.2. Recreational and For-hire Fisheries

The ACCSP's sociological and economic data for recreational and for-hire fisheries should come from periodic add-ons to existing telephone and intercept surveys. The standard is voluntary surveys of finfish fisheries conducted at least every three years.

3.4.4. Observer Programs

No specific observer programs are in place to monitor the cobia fishery. Observer programs already in place, whether state or federal, may observe capture of cobia in other monitored fisheries or specific gear types. A review of these programs should take place.

3.5. STOCKING PROGRAM

The Virginia Institute of Marine Science (VIMS) began an experimental stocking program in the Chesapeake Bay in 2003 to explore stock enhancement and study juvenile movement and habitat utilization (VIMS 2017). Juvenile cobia were tagged and released into the Chesapeake Bay in 2003, 2006, 2007, and 2008, with more than 300 tagged releases occurring in those first two years. Recapture information indicated habitats ranged from 1-4 m in depth and consisting of sandy and grass-bed bottoms. It is unclear whether this program had any effect on the population of cobia in Virginia, although it is assumed to have had minimal impact due to the small number of releases.

South Carolina has an experimental stock enhancement program designed to evaluate the methodology necessary for augmenting wild populations. To date experiments have been designed to determine best size and time of year to stock cobia in coastal rivers focused on augmentation of the distinct population segment of cobia in SC. Locally-caught brood stock have been conditioned to spawn in recirculating seawater systems using temperature and photoperiod conditioning and hormone implantations to facilitate final oocyte maturation. To date multiple years of spawning and growout have occurred, and more than 50,000 (60-350 mm TL) cobia have been stocked in the Colleton and Broad Rivers of Port Royal Sound. All fish are genetically identifiable to broodstock group and can be identified in the catch and distinguished genetically from wild-spawned fish. Cobia tissue samples collected from charterboat captains and from carcasses collected at tournaments and cooperating recreational anglers show that as much as 50% of the catch from the 2007 year-class were from hatchery releases and that these animals have persisted in the catch each year since release. This research has demonstrated the application of stock enhancement as an additional management tool for cobia. In addition to research on production of animals, the SCDNR has developed predictive individual-based genetic models to determine the appropriate number of cobia that should be produced and stocked each year in order to grow the population while minimizing any negative impact on the genetic health of the wild population.

3.6. BYCATCH REDUCTION PROGRAM

Bycatch is defined as "portion of a non-targeted species catch taken in addition to the targeted species. It may include non-directed, threatened, endangered, or protected species, as well as individuals of the target species below a desired or regulatory size" (ASMFC 2009a). Bycatch can be divided into two components: incidental catch and discarded catch. Incidental catch refers to retained or marketable catch of non-targeted species, while discarded catch is the portion of the catch returned to the sea because of regulatory, economic, or personal considerations.

The ACCSP's bycatch standards include both quantitative and qualitative components. The quantitative components include at-sea sampling programs and collection of bycatch data through fisherman reporting systems. The qualitative components include sea turtle and marine mammal entanglement and stranding networks, beach bird surveys, and add-ons to existing recreational and for-hire intercept and telephone surveys. Specific fisheries priorities will be determined annually by the Bycatch Prioritization Committee.

The recreational cobia fishery is largely a directed fishery with bycatch occurring in fisheries directed towards other species. Mortality associated with regulatory discards of undersized cobia or fish taken after the bag limit is reached is largely unknown but likely varies based on depth caught and methods used to boat the catch.

The commercial cobia fishery tends to be a bycatch fishery in the hook and line and large mesh gill net fisheries. Juvenile cobia have been documented as bycatch in shrimp trawls off the Atlantic coast, although this is not a frequent occurrence. All shrimp trawlers in the South Atlantic are required to use bycatch reduction devices, as of the 1996 Amendment 2 to the Federal Shrimp Fishery Management Plan.

3.7. HABITAT PROGRAM

Particular attention should be directed toward cobia habitat utilization and habitat condition (environmental parameters). A list of existing state and federal programs generating environmental data such as sediment characterization, contaminant analysis, and habitat coverage (marsh grass, oyster beds, submerged aquatic vegetation) should also be produced and updated as new information arises. Habitats utilized by cobia range from the middle portions of estuaries and coastal rivers out to and likely beyond, the shelf break. Thus, virtually any study generating environmental data from estuarine or coastal ocean systems could be of value.

4. MANAGEMENT PROGRAM OPTIONS

The intent of the Management Program would be to complement management actions taken by the SAFMC, maintain harvest within the ACL of 670,000 pounds, and to provide the states the flexibility to adjust management to suit their specific state needs.

The current allocation of the coastwide, Atlantic coast ACL is 620,000 pounds to the recreational fishery and 50,000 pounds to the commercial fishery.

4.1. RECREATIONAL FISHERIES MANAGEMENT OPTIONS

In order to complement the current SAFMC CMP FMP and achieve the goals of the proposed ASMFC FMP, this document proposes that all states would establish regulations consistent with the federal regulations related to size and bag limits.

Several alternatives for state allocations were developed and discussed by the Management Board and the PDT. As a result of low and variable sample sizes and inconsistencies in the estimation of average weights throughout the management unit, recreational allocation percentage options are based on historical landings in numbers of fish as opposed to weights. These percentages based on numbers of fish would be multiplied by the recreational allocation of the ACL (620,000 pounds) to calculate annual state allocations in pounds. All landings would continue to be monitored against the ACL as weights in pounds. It should be noted that state-specific allocations developed in this FMP may be revisited through the ASMFC's amendment process as more data and better estimates are obtained.

4.1.1. Size Limit Options

Option 1: Status Quo: No coastwide size limit option**.**

Option 2: Coastwide size limit: All states would be required to establish a minimum size limit of 36 inches FL by April 1, 2018. A total length equivalent may be considered by the TC and Management Board.

4.1.2. Bag Limit Options

Option 1: Status Quo: No coastwide bag limit option.

Option 2: Coastwide bag limit: All states would be required to establish a 1 fish per person bag limit by April 1, 2018.

4.1.3. Vessel Limit Options

Option 1: Status Quo: No coastwide vessel limit option.

Option 2: Coastwide vessel limit: All states would be required to establish a daily vessel limit not to exceed 6 fish per vessel by April 1, 2018.

4.1.4. Season and Allocation Options

Management of the recreational ACL may be accomplished by coastwide or state-specific seasons. Options for management of the recreational ACL, including state allocation options, are shown below (Options 1-3).

Options 1 and 2 are methods for state allocation based on historical landings during one of several reference time periods between 2006 and 2015 (Tables 10 and 11; Sub-Options a-d). 2015 was chosen as the terminal year for reference period landings due to fishery closures that occurred after 2015. Landings data from states north of Virginia are excluded from calculation of coastwide harvests for state allocations due to the rare and sporadic nature of landings in these states. Using SEFSC data, historical landings in states north of Virginia are:

2005 – Delaware – 1,480 lbs.

2006 and 2012– New Jersey – 27,863 lbs., 69,655 lbs.

2010 and 2016 – Maryland – 1,287 lbs., 1,762 lbs.

Average landings in pounds and corresponding percentages by state vary based on the time series selected and the landings estimate used (SEFSC or MRIP). As a result of concerns raised over the variability in average weights throughout the management unit and the observation that total numbers of fish harvested were consistent between estimation methods, the PDT examined the landings by number of fish to eliminate any bias or concern related to average weights (Table 10).

Option 3 is an option for coastwide management under the ACL, using a combination of coastwide seasons and daily vessel limits (Sub-Options a-f) to restrict harvest to the ACL. For this option, larger changes in season dates correspond to the lower range of potential daily vessel limits because of the lack of high-catch trips in the recreational survey data. Few intercepted anglers reported catching four or more fish in a trip, thus, reductions to higher vessel limits would be projected to minimally reduce harvest. However, a daily vessel limit of one or two fish would be projected to cause a more substantial reduction in harvest.

Other allocation options may be considered in a subsequent amendment that could rely on F-based, rolling annual catch estimates, or other methods.

Option 1: State-defined seasons that adhere to a hard, state-by-state recreational quota share of the federal ACL, based on a percentage of the state's historical landings in numbers of fish during a specified reference period (Sub-Options a-d). Percentage shares of the ACL would only be divided among states that do not qualify for *de Minimus* status. States would develop harvest control measures/seasons to limit catches to their assigned quota. Proposed state measures/seasons must be reviewed and approved by the TC and Management Board for initial implementation by April 1, 2018. Overages in one year must be accounted for in the following year's harvest control plan by reducing season length or vessel limits. Under-harvest would not carry over. Allocation of the ACL may be re-evaluated by the Management Board if a *de minimis* state exceeds the *de minimis* threshold.

Historical Landings Reference Period Sub-Options:

a) 3-year average (2013-2015)

b) 5-year average (2011-2015)
c) 10-year average (2006-2015)
d) 50% of 5-year average (2011-2015) + 50% of 10-year average (2006-2015)

Option 2: State-defined seasons that adhere to a soft, state-by-state recreational quota share of the federal ACL, based on a percentage of the state's historical landings in numbers of fish during a specified reference period (Sub-Options a-d). Percentage shares of the ACL would only be divided among states that do not qualify for *de minimis* status. States would develop harvest control measures/seasons to limit catches to their assigned soft state quota. Proposed state measures/seasons must be reviewed and approved by the TC and Management Board for initial implementation by April 1, 2018. Measures approved by the Management Board would remain in place for a specified amount of time, ranging from 2-3 years (Sub-Options e-f).

After each specified time period (Sub-Options e-f), if a state's average annual landings for that time period (Sub-Options e-f) are greater than their annual allocated quota share, that state will adjust their season length or vessel limits for the following specified time period (Sub-Options e-f) to reduce average annual harvest by the average overage from the previous specified time period (Sub-Options e-f). States reporting an under-harvest over the previous specified time period (Sub-Options e-f) may present a plan to extend seasons or increase vessel limits, if desired. Changes to management measures for states with overages or states that wish to liberalize management measures must be reviewed and approved by the TC and Management Board prior to implementation. Allocation of the ACL may be re-evaluated by the Management Board if a *de minimis* state exceeds the *de minimis* threshold.

Historical Landings Reference Period Sub-Options (a-d):

a) 3-year average (2013-2015)
b) 5-year average (2011-2015)
c) 10-year average (2006-2015)
d) 50% of 5-year average (2011-2015) + 50% of 10-year average (2006-2015)

Average Landings Monitoring Timeframe Sub-Options (e-f):

e) 2 years
f) 3 years

The information used to calculate state specific harvest quotas for Options 1 and 2 are contained in Tables 10 and 11.

Table 10. Average AMG Cobia recreational landings in numbers (n) and percentages of recreational landings from Georgia through Virginia for allocating the recreational Annual Catch Limit for Options 1 and 2. Averages are calculated by state for 3-year (2013-2015; Sub-option a), 5-year (2011-2015; Sub-Option b), and 10-year (2006-2015; Sub-Option c) time periods, as well as an average of the 5-year and 10-year time periods (5-yr/10-yr Average; Sub-Option d).

State	a. 3-yr Average (2013-2015)	b. 5-yr Average (2011-2015)	c. 10-yr Average (2006-2015)	d. 5-yr/10-yr Average
Georgia	n = 1,421 4.5%	n = 2,150 9.0%	n = 2,445 10.0%	n = 2,298 9.5%
South Carolina	n = 1,984 6.3%	n = 2,558 10.8%	n = 3,312 13.6%	n = 2,935 12.2%
North Carolina	n = 15,065 48.2%	n = 10,344 43.5%	n = 8,203 33.6%	n = 9,273 38.5%
Virginia	n = 12,799 40.9%	n = 8,714 36.7%	n = 10,465 42.9%	n = 9,589 39.8%
Total	N = 31,269 100%	N = 23,766 100%	N = 24,425 100%	n = 24,095 100%

Data source: SEFSC w/ headboat.

Table 11. Recreational Annual Catch Limits of cobia by state based on percentages derived from Table 10 (ACL = 620,000 pounds).

State	a. 3-yr Average (2013-2015) (lbs.)	b. 5-yr Average (2011-2015) (lbs.)	c. 10-yr Average (2006-2015) (lbs.)	d. 5-yr/10-yr Average (lbs.)
GA	27,900	55,800	62,000	58,900
SC	39,060	66,960	84,320	75,640
NC	298,840	269,700	208,320	238,700
VA	253,580	227,540	265,980	246,760

Data source: SEFSC w/ headboat.

Option 3: Coastwide season and daily vessel limit based on SAFMC CMP Framework 4 analysis (2013-2015), with a 1 fish per person bag limit and 36 inch FL size limit. This option is essentially status quo of the current SAFMC FMP.

Under this option, annual overages in coastwide landings would be paid back through a reduction in the following year's recreational allocation of the coastwide ACL.

Coastwide season and vessel limit Sub-Options (a-f):

a) January 1-August 22 with 1 fish vessel limit
b) January 1-July 28 with 2 fish vessel limit
c) January 1-July 20 with 3 fish vessel limit
d) January 1-July 18 with 4 fish vessel limit
e) January 1-July 17 with 5 fish vessel limit
f) January 1-July 15 with 6 fish vessel limit

4.2. COMMERCIAL FISHERIES MANAGEMENT OPTIONS

This document proposes that commercial fishery management measures for cobia would complement the existing commercial regulations contained in CMP Amendment 20 (50,000 pound ACL).

4.2.1. Size Limit Options

Option 1: Status Quo: No coastwide size limit.

Option 2: Coastwide size limit: All states would be required to establish a 33 inch FL minimum size limit for commercial cobia fisheries by April 1, 2018. An equivalent total length may be considered by the TC and Management Board.

4.2.2. Possession Limit Options

Option 1: Status Quo: No coastwide possession limit.

Option 2: Coastwide possession limit: All states would be required to establish a maximum commercial possession limit of 2 cobia per license holder not to exceed 6 cobia per vessel by April 1, 2018.

4.3. HABITAT CONSERVATION AND RESTORATION

4.3.1. Threats to Cobia Habitat

Threats to Cobia habitats include the following: loss of estuarine and marine wetlands, coastal development, nutrient enrichment of estuarine waters, poor water quality, hydrologic modifications, and alteration of freshwater flows into estuarine waters.

4.3.2. Recommendations

1. Where sufficient knowledge is available, states should designate cobia habitat areas of particular concern for special protection. These locations should be accompanied by requirements that limit degradation of habitat, including minimization of non-point source and specifically storm water runoff, prevention of significant increases in contaminant loadings, and prevention of the introduction of any new categories of contaminants into the area.
2. Where habitat areas have already been identified and protected, states should ensure continued protection of these areas by notifying and working with other federal, state, and local agencies. States should advise these agencies of potential threats to cobia and recommend measures that should be employed to avoid, minimize, or eliminate any threat to current habitat quality or quantity.
3. States should minimize loss of wetlands to shoreline stabilization by using the best available information, incorporating erosion rates, and promoting incentives for use of

alternatives to vertical shoreline stabilization measures, commonly referred to as living shorelines projects.

4. All state and federal agencies responsible for reviewing impact statements and permit applications for projects or facilities proposed for cobia spawning and nursery areas should ensure that those projects will have no or only minimal impact on local stocks. Any project that would result in the elimination of essential habitat should be avoided, if possible, or at a minimum, adequately mitigated.
5. Each state should establish windows of compatibility for activities known or suspected to adversely affect cobia life stages and their habitats. Activities may include, but are not limited to, navigational dredging, bridge construction, and dredged material disposal, and notify the appropriate construction or regulatory agencies in writing.
6. Each state should develop water use and flow regime guidelines, where applicable, to ensure that appropriate water levels and salinity levels are maintained for the long-term protection and sustainability of the stocks. Projects involving water withdrawal or interruption of water flow should be evaluated to ensure that any impacts are minimized, and that any modifications to water flow or salinity regimes maintain levels within cobia tolerance limits.
7. The use of any fishing gear that is determined by management agencies to have a negative impact on cobia habitat should be prohibited within habitat areas of particular concern. Further, states should protect vulnerable habitat from other types of non-fishing disturbance as well.
8. States should conduct research to evaluate the role of submerged aquatic vegetation (SAV) and other submersed structures in the spawning success, survival, growth and abundance of cobia. This research could include regular mapping of the bottom habitat in identified areas of concern, as well as systematic mapping of this habitat where it occurs in estuarine and marine waters of the states.
9. States should continue support for habitat restoration projects, including oyster shell recycling and oyster hatchery programs as well as seagrass restoration, to provide areas of enhanced or restored bottom habitat.
10. Water quality criteria for cobia spawning and nursery areas should be established, or existing criteria should be upgraded, to ensure successful reproduction of these species. Any action taken should be consistent with Federal Clean Water Act guidelines and specifications.
11. State fishery regulatory agencies, in collaboration with state water quality agencies, should monitor water quality in known habitat for cobia, including turbidity, nutrient levels, and dissolved oxygen.
12. States should work to reduce point-source pollution from wastewater through such methods as improved inspections of wastewater treatment facilities and improved maintenance of collection infrastructure.
13. States should develop protocols and schedules for providing input on water quality regulations and on Federal permits and licenses required by the Clean Water Act, Federal Power Act, and other appropriate vehicles, to ensure that cobia habitats are protected and water quality needs are met.

4.4. ALTERNATIVE STATE MANAGEMENT REGIMES

Upon approval of the FMP, states would be required to obtain prior approval from the Management Board for any changes to their management program for which a compliance requirement is in effect. Changes to non-compliance measures would be required to be reported to the Management Board but may be implemented without prior Management Board approval. A state would be able to request permission to implement an alternative to any mandatory compliance measure only if that state could show to the Management Board's satisfaction that its alternative proposal would have the same conservation value as the measures contained in this FMP or subsequent amendments or addenda. States submitting alternative proposals would be required to demonstrate that the proposed action will not contribute to overfishing of the resource. All changes in state plans would be required to be submitted in writing to the Management Board either as part of the annual FMP Review process or in the Annual Compliance Reports.

4.4.1. General Procedures

A state would be able to submit a proposal for a change to its regulatory program or any mandatory compliance measure under the Cobia Fishery Management Plan to the Management Board, including a proposal for *de minimis* status. Such changes would be submitted to the Chair of the PRT, who would distribute the proposal to the Management Board, PRT, TC, SAS, and AP.

The PRT would be responsible for gathering the comments of the TC, SAS, and AP and presenting these comments as soon as possible to the Management Board for decision.

The Management Board would decide whether to approve the state proposal for an alternative management program if it determines that it is consistent with the "target fishing mortality rate applicable" and the goals and objectives of this FMP.

4.4.2. Management Program Equivalency

The TC, under the direction of the PRT, would review any alternative state proposals under this section and provide to the Management Board its evaluation of the adequacy of such proposals.

Following the first full year of implementation of an alternate management program, the PRT would have the responsibility of evaluating the effects of the program to determine if the measures were equivalent with the standards of the FMP and subsequent amendments or addenda. The PRT would report to the Management Board on the performance of the alternate program.

4.4.3. *De minimis* Fishery Guidelines

The ASMFC ISFMP Charter defines *de minimis* as "a situation in which, under the existing condition of the stock and scope of the fishery, conservation, and enforcement actions taken by

an individual state would be expected to contribute insignificantly to a coastwide conservation program required by a Fishery Management Plan or amendment" (ASMFC 2009b).

States may petition the Management Board at any time for *de minimis* status. Once *de minimis* status is granted, designated states must submit annual reports including commercial and recreational landings to the Management Board, justifying the continuance of *de minimis* status. States must include *de minimis* requests as part of their annual compliance reports.

Option 1: No *de minimis* program

Option 2: Include *de minimis:* To qualify for *de minimis*, a state's average total (commercial and recreational) landings for the previous 2 years must be less than 1% of the average coastwide total landings for the same time period. If a state meets the requirements, the state would be limited to 1 fish per vessel per trip. Minimum size of the 1 fish per vessel per trip may mirror the previously proposed minimum size limits of the commercial and recreational fisheries (33 inches and 36 inches FL, respectively) or be the more conservative limit (36 inches FL) for both the commercial and recreational sectors (Sub-Options a-b).

Minimum Size Limits for *De minimis*-Qualifying States Sub-Options (a-b):

a) Minimum size limits of 33 inches FL for the commercial fishery and 36 inches FL for the recreational fishery
b) Minimum size limit of 36 inches FL for both the commercial and recreational fisheries

4.5. ADAPTIVE MANAGEMENT

The Management Board would be able to vary the requirements specified in this FMP as a part of adaptive management in order to conserve the cobia resource. Specifically, the Management Board would be able to change target fishing mortality rates, harvest specifications, or other measures designed to prevent overfishing of the stock complex or any spawning component. Such changes would be instituted to be effective on the first fishing day of the following year, but may be put in place at an alternative time when deemed necessary by the Management Board.

4.5.1. General Procedures

The PRT would monitor the status of the fisheries and the resources and report on that status to the Management Board annually or when directed to do so by the Management Board. The PRT would consult with the TC, SAS, and AP in making such review and report. The report will contain recommendations concerning proposed adaptive management revisions to the management program.

The Management Board would review the report of the PRT, and may consult further with the TC, SAS, or AP. The Management Board would be able to, based on the PRT Report or on its

own discretion, direct the PRT to prepare an addendum to make any changes it deems necessary. The addendum would contain a schedule for the states to implement its provisions.

The PRT would prepare a draft addendum, as directed by the Management Board, and distribute to the board for approval for public comment. The document would be released for public comment for a minimum of 30 days. A public hearing would be held in any state that requests one. After the comment period, the PRT would summarize the comments and present them to the Board along with the recommendations of the TC, SAS,LEC and AP, when applicable. The Management Board would choose a management program and approve a final document.

Upon adoption of an addendum implementing adaptive management by the Management Board, states would prepare plans to carry out the addendum and submit them to the Management Board for approval, according to the schedule contained in the addendum.

4.5.2. Measures Subject to Change

The following measures would be subject to change under adaptive management upon approval by the Management Board:

(1) Fishing year and/or seasons;
(2) Area closures;
(3) Overfishing definition, MSY and OY;
(4) Rebuilding targets and schedules;
(5) Catch controls, including bag and size limits;
(6) Effort controls;
(7) Bycatch allowance
(8) Reporting requirements;
(9) Gear limitations;
(10) Measures to reduce or monitor bycatch;
(11) Observer requirements;
(12) Management areas;
(13) Recommendations to the Secretaries for complementary actions in federal jurisdictions;
(14) Research or monitoring requirements;
(15) Frequency of stock assessments;
(16) *De minimis* specifications;
(17) Management unit;
(18) Maintenance of stock structure;
(19) Catch allocation; and
(20) Any other management measures currently included in the FMP.

4.6. EMERGENCY PROCEDURES

Emergency procedures would be able to be used by the Management Board to require any emergency action that is not covered by or is an exception or change to any provision in the FMP. Procedures for implementation are addressed in the ASMFC ISFMP Program Charter, Section Six (c) (11) (ASMFC 2009b).

4.7. MANAGEMENT INSTITUTIONS

The management institution for cobia would be subject to the provisions of the ISFMP Charter (ASMFC 2009b). The following would not be intended to replace any or all of the provisions of the ISFMP Charter. All committee roles and responsibilities are included in detail in the ISFMP Charter and are only summarized here.

4.7.1. ASMFC and the ISFMP Policy Board

The ASMFC and the ISFMP Policy Board are generally responsible for the oversight and management of the Commission's fisheries management activities. The Commission must approve all fishery management plans and amendments, and must make all final determinations concerning state compliance or non-compliance. The ISFMP Policy Board reviews any non-compliance recommendations of the various Management Boards and Sections and, if it concurs, forwards them on to the Commission for action.

4.7.2. South Atlantic State/Federal Fisheries Management Board

The South Atlantic State/Federal Fisheries Management Board (Management Board) was established under the provisions of the Commission's ISFMP Charter (Section Four; ASMFC 2009b) and would be generally responsible for carrying out all activities under this FMP.

The Management Board establishes and oversees the activities of the Cobia FMP's PDT, PRT, TC, and SAS, as well as the South Atlantic Species AP. Among other things, the Management Board makes changes to the management program under adaptive management and approves state programs implementing the amendment and alternative state programs under Sections 4.4 and 4.5. The Management Board reviews the status of state compliance with the management program, at least annually, and if it determines that a state is out of compliance, reports that determination to the ISFMP Policy Board under the terms of the ISFMP Charter.

4.7.3. Cobia Plan Development Team / Plan Review Team

The Cobia Plan Development Team (PDT) and Cobia Plan Review Team (PRT) would be composed of a small group of scientists and/or managers whose responsibility is to provide all of the technical support necessary to carry out and document the decisions of the Management Board. An ASMFC FMP Coordinator chairs the PDT and PRT. The PDT and PRT would be directly responsible to the Management Board for providing information and documentation concerning the implementation, review, monitoring and enforcement of the species management plan. The PDT and PRT would be comprised of personnel from state and federal agencies who have scientific and management ability and knowledge of the relevant species.

The Cobia PDT is responsible for preparing all documentation necessary for the development of the FMP, using the best scientific information available and the most current stock assessment information. The PDT will either disband or assume inactive status upon completion of the FMP. Alternatively, the Board may elect to retain PDT members as members of the species-specific PRT or appoint new members. The PRT would provide annual advice concerning the implementation, review, monitoring, and enforcement of the FMP once it has been adopted by the Commission.

4.7.4. Technical Committee

The Cobia Technical Committee (TC) would consist of representatives from state and/or federal agencies, Regional Fishery Management Councils, Commission, university or other specialized personnel with scientific and technical expertise and knowledge of the relevant species. The Management Board would appoint the members of a TC and may authorize additional seats as it sees fit. Its role is to act as a liaison to the individual state and federal agencies, provide information to the management process, and review and develop options concerning the management program. The TC would provide scientific and technical advice to the Management Board, PDT, and PRT in the development and monitoring of a fishery management plan or amendment.

4.7.5. Stock Assessment Subcommittee

The Cobia Stock Assessment Subcommittee (SAS) would be appointed and approved by the Management Board, with consultation from the TC, and will consist of scientists with expertise in the assessment of the relevant population. Its role is to assess the species population and provide scientific advice concerning the implications of proposed or potential management alternatives, or to respond to other scientific questions from the Management Board, TC, PDT or PRT. The SAS would report to the TC and work closely with the Southeast Fishery Science Center and SAFMC SSC in developing upcoming stock assessments.

4.7.6. Advisory Panel

The South Atlantic Species Advisory Panel (AP) was established according to the Commission's Advisory Committee Charter. Members of the AP are citizens who represent a cross-section of commercial and recreational fishing interests and others who are concerned about the conservation and management of cobia, as well as Spanish mackerel, spot, black drum, red drum, and spotted seatrout, and Atlantic croaker. The AP provides the Management Board with advice directly concerning the Commission's management program for these six species.

4.7.7. Federal Agencies

4.7.7.1. Management in the Exclusive Economic Zone (EEZ)

Management of cobia in the EEZ is within the jurisdiction of the SAFMC under the Magnuson-Stevens Fishery Conservation and Management Act, as amended (16 U.S.C. 1801 et seq.). In the

absence of a Council Fishery Management Plan for cobia, management of this species is the responsibility of the NOAA National Marine Fisheries Service (NOAA Fisheries) as mandated by the Atlantic Coastal Fisheries Cooperative Management Act (16 U.S.C. 5105 et seq.).

4.7.7.2. Federal Agency Participation in the Management Process

The Commission has accorded the United States Fish and Wildlife Service (USFWS) and NMFS NOAA Fisheries voting status on the ISFMP Policy Board and the South Atlantic State/Federal Fisheries Management Board in accordance with the Commission's ISFMP Charter. NOAA Fisheries and the USFWS may also participate on the Management Board's supporting committees described in *Sections 4.7.3-4.7.6*.

4.7.7.3. Consultation with Fishery Management Councils

In carrying out the provisions of this FMP, the states, as members of the South Atlantic State/Federal Fisheries Management Board, would closely coordinate with the SAFMC to cooperatively manage the Atlantic Migratory Group of cobia. In accordance with the Commission's ISFMP Charter, a representative of the SAFMC shall be invited to participate as a full member of the Management Board.

4.8. RECOMMENDATIONS TO THE SECRETARIES FOR COMPLEMENTARY ACTIONS IN FEDERAL JURISDICTIONS

The SAFMC manages cobia in the EEZ through bag, size limits, trip limits and seasons. It is in the interest of the Interstate FMP to achieve consistency in management efforts in state waters and the EEZ. At present, NOAA fisheries has closed the EEZ to cobia harvest in the recreational fishery to maintain harvest within the prescribed ACL. Because reliance on the EEZ for cobia harvest varies by state, closure impacts vary from south to north. The majority of the recreational harvest off Georgia occurs in the EEZ, while little harvest occurs in the EEZ off Virginia. A primary consideration for the Interstate cobia FMP may be to recommend consistent measures in state and federal waters to avoid in season closures.

4.9. COOPERATION WITH OTHER MANAGEMENT INSTITUTIONS

At this time, no other management institutions have been identified that would be involved with management of cobia on the Atlantic coast. Nothing in the FMP precludes the coordination of future management collaborations with other management institutions, should the need arise.

5. COMPLIANCE

Full implementation of the provisions of this FMP would be necessary for the management program to be equitable, efficient, and effective. States would be expected to implement these measures faithfully under state laws. Although the ASMFC does not have authority to directly compel state implementation of these measures, it would continually monitor the effectiveness of state implementation and determine whether states are in compliance with the provisions of this fishery management plan. This section sets forth the specific elements states would be required to implement in order to be in compliance with this FMP, and the procedures that will govern the evaluation of compliance. Additional details of the procedures are found in the ASMFC ISFMP Charter (ASMFC 2009b).

5.1. MANDATORY COMPLIANCE ELEMENTS FOR STATES

A state would be determined to be out of compliance with the provisions of this fishery management plan, according to the terms of Section Seven of the ISFMP Charter if:

- Its regulatory and management programs to implement *Section 4* have not been approved by the Management Board; or

- It fails to meet any schedule required by *Section 5.1.2*, or any addendum prepared under Adaptive Management (*Section 4.5*); or

- It has failed to implement a change to its program when determined necessary by the South Atlantic State-Federal Fisheries Management Board; or

- It makes a change to its regulations required under *Section 4* or any addendum prepared under Adaptive Management (*Section 4.5*), without prior approval of the Management Board.

5.1.1. Mandatory Elements of State Programs

To be considered in compliance with this FMP, all state programs would include harvest controls on cobia fisheries consistent with the requirements of *Sections 4.1, 4.2, 4.3*; except that a state may propose an alternative management program under *Section 4.5*, which, if approved by the Management Board, may be implemented as an alternative regulatory requirement for compliance.

5.1.1.1. Regulatory Requirements

Each state would be required to submit its cobia regulatory program to the Commission through the ASMFC staff for approval by the Management Board. During the period from submission until the Board makes a decision on a state's program, a state may not adopt a less protective management program than contained in this amendment or contained in current state law. The following lists the specific compliance criteria that a state/jurisdiction would be required to implement in order to be in compliance with this FMP:

1. All states would establish a maximum possession limit of 1 fish per person and a minimum size limit of 36 inches FL, or an equivalent measure in TL, for their recreational fisheries by April 1, 2018.

2. All states would establish a maximum vessel limit not to exceed 6 fish for all recreational and commercial fisheries by April 1, 2018.

3. States would establish a recreational fishing season to correspond with specific harvest goals for the individual state by April 1, 2018.

4. States would be able to apply for *de minimis* status if for the preceding three years for which data are available, their averaged combined commercial and recreational landings (by weight) constitute less than 1% of the average coastwide combined, commercial and recreational landings for the same period.

Once approved by the Management Board, states would be required to obtain prior approval from the Board for any changes to their management program for which a compliance requirement is in effect. Other measures would be required to be reported to the Board but may be implemented without prior Board approval. A state would be able to request

permission to implement an alternative to any mandatory compliance measure only if that state could show to the Board's satisfaction that its alternative proposal would have the same conservation value as the measure contained in this FMP or any subsequent amendments or addenda. States submitting alternative proposals would be required to demonstrate that the proposed action will not contribute to overfishing of the resource. All changes in state plans would need to be submitted in writing to the Board and to the Commission either as part of the annual FMP Review process or the Annual Compliance reports.

5.1.1.2. Monitoring Requirements

There are currently no requirements for additional monitoring. Monitoring may be implemented in the future through the Commission's addendum process.

5.1.1.3. Research Requirements

The PDT has prioritized the research needs for cobia (*Section 6.2*). Appropriate programs for meeting these needs may be implemented under Adaptive Management (*Section 4.5*) in the future.

5.1.1.4. Law Enforcement Requirements

All state programs would be required to include law enforcement capabilities adequate for successfully implementing that state's cobia regulations. The adequacy of a state's enforcement activity would be monitored annually by reports of the ASMFC Law Enforcement Committee to the PRT. The first reporting period would cover the period from January 1, 2018 to December 31, 2018.

5.1.1.5. Habitat Requirements

There are no mandatory habitat requirements in the FMP, although requirements may be added under Adaptive Management (*Section 4.5*). See *Section 4.3* for Habitat Recommendations.

5.1.2. Compliance Schedule

States would be required to implement the FMP according to the following schedule:

January 1, 2018:	States must submit programs to implement the FMP for approval by the South Atlantic State-Federal Fisheries Management Board. Programs must be implemented upon approval by the Management Board.
April 1, 2018:	States with approved management programs must implement FMP requirements. States may begin implementing management programs prior to this deadline, if approved by the Management Board.

Reports on compliance would be submitted to the Commission by each jurisdiction annually, no later than July 1st, beginning in 2019.

5.1.3. Compliance Reporting Content

Each state would be required to submit an annual report concerning its cobia fisheries and management program for the previous calendar year on July 1. A standard compliance report format has been prepared and adopted by the ISFMP Policy Board. States should follow this format in completing the annual compliance report.

5.2. PROCEDURES FOR DETERMING COMPLIANCE

Detailed procedures regarding compliance determinations are contained in the ISFMP Charter, Section Seven (ASMFC 2009b). Future revisions to the ISFMP Charter may take precedence over the language contained in this FMP, specifically in regards to the roles and responsibilities of the various groups contained in this section. The following summary is not meant in any way to replace the language found in the ISFMP Charter.

In brief, all states are responsible for the full and effective implementation and enforcement of fishery management plans in areas subject to their jurisdiction. Written compliance reports as specified in the FMP (or subsequent amendments and/or addenda) must be submitted annually by each state with a declared interest. Compliance with the FMP will be reviewed at least annually. The Management Board, ISFMP Policy Board or the Commission, may request that the PRT conduct a review of plan implementation and compliance at any time.

The Management Board will review the written findings of the PRT within 60 days of receipt of a state's compliance report. Should the Management Board recommend to the Policy Board that a state be determined to be out of compliance, a rationale for the recommended non-compliance finding will be included addressing specifically the required measures of the FMP that the state has not implemented or enforced, a statement of how failure to implement or enforce the required measures jeopardizes cobia conservation, and the actions a state must take in order to comply with the FMP requirements.

The ISFMP Policy Board shall, within thirty days of receiving a recommendation of non-compliance from the Management Board, review that recommendation of non-compliance. If it concurs in the recommendation, it shall recommend to the Commission that a state be found out of compliance.

The Commission shall consider any FMP non-compliance recommendation from the Policy Board within 30 days. Any state which is the subject of a recommendation for a non-compliance finding is given an opportunity to present written and/or oral testimony concerning whether it should be found out of compliance. If the Commission agrees with the recommendation of the Policy Board, it may determine that a state is not in compliance with the FMP, and specify the actions the state must take to come into compliance.

Any state that has been determined to be out of compliance may request that the Commission rescind its non-compliance findings, provided the state has revised its cobia conservation measures or shown to the Management Board and/or Commission's satisfaction that actions taken by the state provide for conservation equivalency.

5.3. RECOMMENDED (NON-MANDATORY) MANAGEMENT MEASURES

The Management Board through this FMP would request that those states outside the management unit (New York through Maine, and Pennsylvania) implement complementary regulations to protect the cobia spawning stock.

5.4. ANALYSIS OF ENFORCEABILITY OF PROPOSED MEASURES

The ASMFC Law Enforcement Committee would, during the implementation of this FMP, analyze the enforceability of new conservation and management measures as they are proposed.

6. MANAGEMENT AND RESEARCH NEEDS

Characterized as High (H), Medium (M), or Low (L) priority, these management and research needs would be reviewed annually as part of the Commission's FMP Review process. The annual Cobia FMP Review would contain an updated list for future reference.

6.1. STOCK ASSESSMENT AND POPULATION DYNAMICS

An updated stock assessment for the Atlantic Migratory Group cobia has been scheduled for completion in 2019, led by SEFSC Beaufort Lab. The assessment will provide updated status information since the terminal year of the last assessment (2012). Anticipated results will include updated stock status and reference points and contribute to recommendations for additional management needs, if any.

6.2. RESEARCH AND DATA NEEDS

6.2.1. Biological

- Conduct studies to estimate catch and release mortality estimates.
- Obtain better estimates of harvest from the cobia recreational fishery (especially in the for hire sector).
- Increase spatial and temporal coverage of age samples collected regularly in fishery dependent and independent sources. Prioritize collection of age data from fishery dependent and independent sources in all states.
- Collect genetic material to continue to assess the stock identification and any Distinct Population Segments that may exist within the management unit.
- Conduct a high reward tagging program to obtain improved return rate estimates. Continue and expand current tagging programs to obtain mortality and growth information and movement at size data.

- Continue to collect and analyze current life history data from fishery independent and dependent programs, including full size, age, maturity, histology workups and information on spawning season timing and duration. Any additional data that can be collected on any life stages of cobia would be highly beneficial.
- Conduct studies to estimate fecundity-at-age coastwide and to estimate batch fecundity.
- Obtain better estimates of bycatch and mortality of cobia in other fisheries, especially juvenile fish in South Atlantic states.
- Obtain estimates of selectivity-at-age for cobia through observer programs or tagging studies.
- Define, develop, and monitor adult abundance estimates

6.2.2. Social

- Obtain better coverage of shore and nighttime anglers.

6.2.3. Economic

- Obtain better data on the economic impacts of recreational and commercial cobia fishing on coastal communities.

6.2.4. Habitat

- If possible, expand existing fishery independent surveys in time and space to better define and cover cobia habitats.

- Conduct otolith microchemistry studies to identify regional recruitment contributions.

- Conduct new and expand existing satellite tagging programs to help identify spawning and juvenile habitat use and regional recruitment sources.

6.2.5. State-specific

<u>Georgia</u>
Little is known regarding cobia stocks off Georgia. It is unclear if Georgia has a unique sub-population of East-West migration cobia as seen in other nearby states (South Carolina). Furthermore, the range of habitat types (inshore vs. nearshore) utilized by cobia in Georgia remains unknown. It would be beneficial to better explain the range of habitat utilized by cobia in Georgia as well as identify overwintering locations for Georgia cobia. This could be easily done through a simple acoustic telemetry study. Identifying these basic life history characteristics for cobia in Georgia will aid in the management of the species both at a state and a regional level. Additionally, better socio-economic estimates of the impact of cobia fishing in Georgia would aid in understanding how regulatory changes may impact the economic benefit cobia fishing has throughout Georgia.

7. PROTECTED SPECIES

In the fall of 1995, Commission member states, the National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS) began discussing ways to improve implementation of the Marine Mammal Protection Act (MMPA) and the Endangered Species Act (ESA) in state waters. Historically, these policies have been minimally enforced in state waters (0-3 miles). In November 1995, the Commission, through its Interstate Fisheries Management Program (ISFMP) Policy Board, approved amendment of its ISFMP Charter (Section Six (b)(2)) so that interactions between ASMFC-managed fisheries and species protected under the MMPA, ESA, and other legislation, including the Migratory Bird Treaty Act be addressed in the Commission's fisheries management planning process. Specifically, the Commission's fishery management plans describe impacts of state fisheries on certain marine mammals and endangered species (collectively termed "protected species"), and recommend ways to minimize these impacts. The following section outlines: (1) the federal legislation which guides protection of marine mammals, sea turtles, and marine birds; (2) the protected species with potential fishery interactions; (3) the specific type(s) of fishery interactions; (4) population status of the affected protected species; and (5) potential impacts to Atlantic coastal state and interstate fisheries.

7.1. Marine Mammal Protection Act (MMPA) Requirements

Since its passage in 1972, one of the primary goals of the MMPA has been to reduce the incidental mortality and serious injury of marine mammals permitted in the course of commercial fishing operations to insignificant levels approaching a zero mortality and serious injury rate. Under the 1994 Amendments, the MMPA requires the NMFS to develop and implement a take reduction plan to assist in the recovery or prevent the depletion of each strategic stock that interacts with a Category I or II fishery. Specifically, a strategic stock is defined as a stock: (1) for which the level of direct human caused mortality exceeds the potential biological removal (PBR) level; (2) which is declining and is likely to be listed under the Endangered Species Act (ESA) in the foreseeable future; or (3) which is listed as a threatened or endangered species under the ESA or as a depleted species under the MMPA. Category I and II fisheries are those that have frequent or occasional incidental mortality and serious injury of marine mammals, respectively, whereas Category III fisheries have a remote likelihood of incidental mortality and serious injury of marine mammals. Each year, NMFS publishes an annual List of Fisheries which classifies commercial fisheries into one of these three categories.

Under the 1994 mandates, the MMPA also requires fishermen participating in Category I and II fisheries to register under the Marine Mammal Authorization Program (MMAP), the purpose of which is to provide an exception for commercial fishermen from the general taking prohibitions of the MMPA for non-ESA listed marine mammals. All fishermen, regardless of the category of fishery they participate in, must report all incidental injuries and mortalities caused by commercial fishing operations within 48 hours.

Section 101(a)(5)(E) of the MMPA allows for the authorization of the incidental taking of individuals from marine mammal stocks listed as threatened or endangered under the ESA in

the course of commercial fishing operations if it is determined that: (1) incidental mortality and serious injury will have a negligible impact on the affected species or stock; (2) a recovery plan has been developed or is being developed for such species or stock under the ESA; and (3) where required under Section 118 of the MMPA, a monitoring program has been established, vessels engaged in such fisheries are registered in accordance with Section 118 of the MMPA, and a take reduction plan has been developed or is being developed for such species or stock. Permits are not required for Category III fisheries; however, any mortality or serious injury of a marine mammal must be reported.

7.2. Endangered Species Act (ESA) Requirements

The taking of endangered sea turtles and marine mammals is prohibited and considered unlawful under Section 9(a)(1) of the ESA. In addition, NMFS or the USFWS may issue Section 4(d) protective regulations necessary and advisable to provide for the conservation of threatened species. There are several mechanisms established in the ESA to allow exceptions to the take prohibition in Section 9(a)(1). Section 10(a)(1)(A) of the ESA authorizes NMFS to allow the taking of listed species through the issuance of research permits for scientific purposes or to enhance the propagation or survival of the species. Section 10(a)(1)(B) authorizes NMFS to permit, under prescribed terms and conditions, any taking otherwise prohibited by Section 9(a)(1)(B) of the ESA, if the taking is incidental to, and not the purpose of, carrying out an otherwise lawful activity. Finally, Section 7(a)(2) requires federal agencies to consult with NMFS to ensure that any action that is authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of critical habitat of such species. If, following completion of consultation, an action is found to jeopardize the continued existence of any listed species or cause adverse modification to critical habitat of such species, reasonable and prudent alternatives will be identified so that jeopardy or adverse modification to the species is removed and Section 7(a)(2) is met (see Section 7(b)(3)(A)). Alternatively, if, following completion of consultation, an action is not found to jeopardize the continued existence of any listed species or cause adverse modification to critical habitat of such species, reasonable and prudent measures will be identified that minimize the take of listed species or adverse modification of critical habitat of such species (see Section 7(b)(4)). Section (7)(o) provides the actual exemption from the take prohibitions established in Section 9(a)(1), which includes Incidental Take Statements that are provided at the end of consultation via the ESA Section 7 Biological Opinions.

7.3. Migratory Bird Treaty Act (MBTA) Requirements

Under the Migratory Bird Treaty Act it is unlawful “by any means or in any manner, to pursue, hunt, take, capture, [or] kill” any migratory birds except as permitted by regulation (16 USC. 703). Section 50 CFR 21.11 prohibits the take of migratory birds except under a valid permit or as permitted in the regulations. Many migratory waterbirds occur within the boundaries of cobia fisheries. USFWS Policy on Waterbird Bycatch (October 2000) states: “It is the policy of the U.S. Fish and Wildlife Service that the Migratory Bird Treaty Act of 1918, as amended, legally mandates the protection and conservation of migratory birds. The USFWS seeks to

actively expand partnerships with regional, national, and international organizations, States, tribes, industry, and environmental groups to address seabird bycatch in fisheries, by promoting public awareness of waterbird bycatch issues, and facilitating the collection of scientific information to develop and provide guidelines for management, regulation, and compliance."

Birds of Management Concern are a subset of MBTA-protected species which pose special management challenges because of a variety of factors (e.g., too few, too many, conflicts with human interests, societal demands). These species are of concern because of: documented or apparent population declines; small or restricted populations; dependence on restricted or vulnerable habitats; or overabundant to the point of causing ecological and economic damage.

7.4. Protected Species with Potential Fishery Interactions

The management unit of the cobia Atlantic Migratory Group extends from the Georgia/Florida line through New York. There are numerous protected species that inhabit the range of the cobia management unit covered under this FMP. Listed below are ESA and MMPA protected species found in coastal and offshore waters of the Atlantic Ocean within the range of cobia fisheries. USFWS species of management concern that have the potential to interact with cobia fisheries are also listed. Species of management concern are protected under the MBTA, but lack the protections mandated by the ESA.

ESA – Endangered[1]

- Atlantic sturgeon *(Acipenser oxyrinchus oxyrinchus)*, NY Bight, Chesapeake Bay, Carolina, and South Atlantic Distinct Population Segments (DPSs)[2]
- Shorthnose sturgeon (*Acipenser brevirostrum*)
- Smalltooth sawfish (*Pristis pectinata*)
- Blue whale (Balaenoptera musculus)
- Fin whale (Balaenoptera physalus)
- Humpback whale (Megaptera novaeangliae)
- North Atlantic right whale (*Eubalaena glacialis)*
- Sei whale (Balaenoptera borealis)
- Sperm whale (Physeter microcephalus)
- Hawksbill sea turtle (Eretmochelys imbricata)
- Kemp's ridley sea turtle *(Lepidochelys kempii)*
- Leatherback sea turtle (*Dermochelys coriacea)*
- Bermuda petrel (*Pterodroma cahow*)

1 http://www.nmfs.noaa.gov/pr/species/esa/listed.htm

2 A distinct population segment (DPS) is a vertebrate population or group of populations that is discrete from other populations of the species and significant in relation to the entire species. The ESA provides for listing species, subspecies, or DPS of vertebrate species.

- Roseate tern *(Sterna dougallii dougallii*)*,* northeastern U.S. and Nova Scotia breeding population

ESA – Threatened[3]

- Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*), Gulf of Maine DPS
- Nassau grouper (Epinephelus striatus)
- Green sea turtle (*Chelonia mydas),* North Atlantic and South Atlantic DPSs
- Loggerhead sea turtle *(Caretta caretta)*, Northwest Atlantic Ocean DPS
- Roseate tern *(Sterna dougallii dougallii*)*,* Southeastern U.S. and Caribbean breeding population (FL, GA, NC, SC, Puerto Rico, Virgin Islands)
- Piping plover (Charadrius melodus)

MMPA – Protected[4]

Includes all marine mammals above in addition to:

- Atlantic spotted dolphin *(Stenella frontalis)*
- Bottlenose dolphin (Tursiops truncatus)
- Atlantic white-sided dolphin *(Lagenorhynchus acutus)*
- Clymene dolphin (Stenella clymene)
- Pantropical spotted dolphin *(Stenella attenuata)*
- Risso's dolphin (Grampus griseus)
- Rough-toothed dolphin (Steno bredanensis)
- Short-beaked common dolphin *(Delphinus delphis)*
- Spinner dolphin (Stenella longirostris)
- Striped dolphin (Stenella coeruleoalba)
- Gray seal (Halichoerus grypus)
- Harbor porpoise (Phocoena phocoena)
- Harbor seal (Phoca vitulina)
- Minke whale (Balaenoptera acutorostrata)
- Cuvier's beaked whale (Ziphius cavirostris)
- Gervais' beaked whale (Mesoplodon europaeus)
- True's beaked whale *(Mesoplodon mirus)*
- Bryde's whale (Balaenoptera edeni)
- Dwarf sperm whale *(Kogia sima)*
- False killer whale (Pseudorca crassidens)
- Killer whale (Orcinus orca)
- Long-finned pilot whale *(Globicephala melas)*
- Melon-headed whale (Peponocephala electra)

3 http://www.nmfs.noaa.gov/pr/species/esa/listed.htm
4 http://www.nmfs.noaa.gov/pr/species/mammals

- Pygmy killer whale (Feresa attenuate)
- Pygmy sperm whale (Kogia breviceps)
- Short-finned pilot whale (Globicephala macrorhynchus)

ESA – Species of Concern[5]

- Alewife (Alosa pseudoharengus)
- Blueback herring (Alosa aestivalis)
- Dusky shark (Carcharhinus obscures)
- Porbeagle shark *(Lamna nasus)*
- Rainbow smelt (Osmerus mordax)
- Sand tiger shark (Carcharias taurus)
- Speckled hind (Epinephelus drummondhayi)
- Striped croaker (Bairdiella sanctaeluciae)
- Warsaw grouper (Epinephelus nigritus)

MBTA—USFWS Species of Management Concern

- Canvasback (Aythya valisineria)
- Redhead (Aythya americana)
- Greater scaup (*Aythya marila*)
- Lesser scaup (*Aythya affinis*)
- Surf scoter (Melanitta perspicillata)
- White-winged scoter (*Melanitta fusca*)
- Black scoter (Melanitta americana)
- Long-tailed duck (*Clangula hyemalis*)
- Common goldeneye (*Bucephala clangula*)
- Red-throated loon (*Gavia stellata)*
- Black-capped petrel (Pterodroma hasitata)
- Greater shearwater (*Puffinus gravis*)
- Audubon's shearwater (*Puffinus lherminieri*)
- Band-rumped storm-petrel (*Oceanodroma castro*)
- Masked booby (*Sula dactylaria*)
- Brown booby (Sula leucogaster)
- Pied-billed grebe (*Podilymbus podiceps*)
- Horned grebe (Podiceps auritus)
- Magnificent frigatebird (*Fregata magnificens*)
- Least tern (*Sternula antillarum*), non-listed Atlantic coast subspecies
- Gull-billed tern (Gelochelidon nilotica)

5 http://www.nmfs.noaa.gov/pr/species/concern/

7.5. Protected Species Interactions with Existing Fisheries

7.5.1. Brief overview of the Cobia fishery and gears used

Recreational fisheries are prosecuted similarly along the coast. The directed cobia fishery is prosecuted in two distinct ways. Bottom fishing with live or dead baits, often while chumming, in estuarine waters or around inlets or offshore around structure, buoys, markers, natural and artificial reefs. More recently, an active method of searching for fish traveling alone or in small groups on the surface or associated with schools of Atlantic menhaden or other bait fishes has grown in popularity. This newer method has resulted in the further development of the for-hire sector for cobia, as well as the development of specific artificial baits and boat modifications (e.g., towers) to facilitate spotting and catching the fish. A third method primarily prosecuted in offshore waters is to target large rays, large sharks, sea turtles or floating debris around which cobia congregate. Additionally, the Atlantic coast of Florida is starting to see more directed spearfishing pressure on cobia. Specifically, spearfishers are chumming for bull shark and then diving/free-diving to spear cobia that associate with them. Spearfishing also occurs off North Carolina, along with a popular pier fishery.

The recreational fishery also takes cobia as bycatch in offshore bottom fisheries such as snapper/grouper, nearshore trolling for king mackerel, bluefish, and dolphin and any other fishery that employs live or dead bait fished on or near the bottom. While the directed fishery appears to focus more on the spring-summer spawning migration, bycatch, especially offshore, can yield cobia virtually year round. The average recreational cobia landings in Atlantic states north of Florida from 2010-2015 was almost 800,000lb.[6]

The commercial fishery has traditionally been a bycatch in other directed fisheries such as the snapper/grouper hook and line fishery and troll fisheries for various species (e.g., king mackerel, dolphin, wahoo, amberjack). Directed fisheries are generally precluded as a result of the low possession limits, but do occur, specifically Virginia's commercial hook and line fishery. Cobia from for-hire trips may also be sold commercially, depending on the state's permit requirements for selling fish. According to the 2015 biological opinion conducted for the Coastal Migratory Pelagic (CMP) resources in the Atlantic and Gulf of Mexico (GOM), in 2013, the predominant gear types used to capture cobia commercially were hook-and-line (78.2%), followed by diving (i.e., spearfishing; 10.4%), longline (7.5%), and gill net (2.5%); all other gears each accounted for less than 0.5% of the total catch (NMFS, 2015). The average commercial cobia landings in Atlantic states north of Florida from 2010-2015 was 56,158 lbs (ASMFC, 2016). In 2015, the predominant gear types that were used to capture cobia in the Atlantic north of Florida were hook-and-line (46%), gill net (44%), pound net (9%), and unknown gear type (1%)[7].

6 SEFSC, recreational ACL dataset

7 http://www.st.nmfs.noaa.gov/commercial-fisheries/commercial-landings/landings-by-gear/index

7.5.2. Marine Mammals

NMFS completed a biological opinion on June 18, 2015, evaluating the impacts of the CMP fishery on ESA-listed species. In the biological opinion, NMFS determined that the proposed continued authorization of the CMP Fishery, is not likely to adversely affect any listed whales (i.e., blue, sei, sperm, fin, humpback, or North Atlantic right whales). NMFS also determined that the CMP fishery will have no effect on designated critical habitat for North Atlantic right whale (NMFS, 2015).

The Gulf and South Atlantic CMP hook-and-line fishery (which includes fisheries that capture cobia) is classified in the 2017 MMPA List of Fisheries as a Category III fishery (82 FR 3655; January 12, 2017). This means the annual mortality and serious injury of a marine mammal resulting from the fishery is less than or equal to 1% of PBR, the maximum number of animals, not including natural moralities, that may be removed from a marine mammal stock while allowing that stock to reach or maintain its optimum sustainable population. In other words, there is a remote likelihood of or no known incidental mortality and serious injury of marine mammals resulting from these fisheries.

The Gulf and South Atlantic CMP gillnet fishery is classified as Category II fishery in the 2017 MMPA List of Fisheries. This classification indicates an occasional incidental mortality or serious injury of a marine mammal stock resulting from the fishery (1-50% annually of PBR). The fishery has no documented interaction with marine mammals; NMFS classifies this fishery as Category II based on analogy (i.e., similar risk to marine mammals) with other gillnet fisheries.

7.5.3. Sea Turtles

7.5.3.1. Overview

As mentioned above, the NMFS completed a biological opinion on June 18, 2015, evaluating the impacts of the CMP fishery (including King mackerel, Spanish mackerel, and cobia) on ESA-listed species (NMFS, 2015). According to the biological opinion, green, hawksbill, Kemp's ridley, leatherback, and loggerhead sea turtles are all likely to be adversely affected by the CMP fishery. Green, hawksbill, Kemp's ridley, leatherback, and loggerhead sea turtles are all highly migratory, travel widely throughout the GOM and South Atlantic, and are known to occur in area of the fishery. The biological opinion evaluated the potential for the following gears to interact with protected species: hook-and-line gear, cast net gear, and gill net gear. The biological opinion found that gill net gear is the only gear used in the CMP fisheries that may adversely affect sea turtles. Gill net gear is used to target both Spanish and king mackerel, but not cobia.

7.5.3.2. Hook-and-line fishing

The 2015 biological opinion for CMP resources concluded that sea turtles (as well as smalltooth sawfish and Atlantic sturgeon) are not likely to be adversely affected by CMP hook-and-line fishing. The 2015 biological opinion stated: "*The hook-and-line gear used by both commercial and recreational fishers to target CMP species is limited to trolled or, to a much lesser degree (e.g., historically ~2% by landings for king mackerel), jigged handline, bandit, and rod-and-reel gear. Sea turtles, Atlantic sturgeon, and smalltooth sawfish are both vulnerable to capture on hook-and-line gear, but the techniques commonly used to target CMP species makes effects on these listed species extremely unlikely and, therefore, discountable. Sea turtles are unlikely to be caught during hook-and-line trolling because of the speed (4-10 kt) at which the lure is pulled through the water. As cedar plugs and spoons are generally used when trolling, it is unlikely that a sea turtle of any size would actively pursue the gear and get hooked. Likewise, we also believe sea turtles would be unlikely to be snagged by jigged gear as it is deployed at or near the surface and constantly reeled and jigged back to the boat. It is possible that a sea turtle could be incidentally snagged if it comes in contact with a trolled or jigged hook, but the chances of this occurring are extremely low… We believe that CMP species caught on bandit gear or standard rod-and-reel gear (i.e., baited and deployed as passive, vertical gear) are largely bycatch when targeting other species closer to the bottom (e.g., snapper and grouper); use of the gear in this method (i.e., mid-water placement) is not effective at catching mackerel based on available information (e.g., landings data). In summary, we believe effects from these gear types on Atlantic sturgeon, smalltooth sawfish, and sea turtles are extremely unlikely to occur, and are therefore discountable"* (NMFS, 2015).

There is limited information about protected species interactions within recreational fisheries. In 2015, The North Carolina Division of Marine Fisheries conducted a project funded under the ACCSP to examine potential protected species interactions and finfish discards and releases in the recreational cobia hook-and-line fishery. Observations were made via an alternative observer platform, where recreational fishing activity was monitored at close proximity from individuals on state owned vessels. From April 27, 2015, through October 29, 2015, 552 recreational hook-and-line observations (observed fishing trips) were completed over 138 observed fishing days with 16.2% of fishing trips targeting cobia. Observations occurred in inshore (estuarine) and near-shore waters (≤ 3 miles) of Carteret County. No protected species interactions were observed (Boyd 2016).

7.5.3.3. Gill net

Cobia are generally considered a bycatch species within gill net fisheries. The 2015 biological opinion for CMP resources concluded that gill net gear used in the federal CMP fisheries of the Atlantic and GOM have adversely affected sea turtles, smalltooth sawfish, and Atlantic sturgeon in the past via entanglement and, in the case of sea turtles, via forced submergence (NMFS, 2015).

7.5.3.4. Targeting of large animals

One known method used to prosecute cobia in offshore waters is to target large rays, large sharks, sea turtles, or floating debris around which cobia congregate. Not much is known about this method or its impacts on protected species.

7.5.4. Sturgeon, smalltooth sawfish, Nassau grouper

The 2015 biological opinion for CMP resources concluded that gill net gear used in the federal CMP fisheries of the Atlantic and GOM have adversely affected smalltooth sawfish[8] and Atlantic sturgeon in the past via entanglement.

The biological opinion also concluded that smalltooth sawfish and Atlantic sturgeon are not likely to be adversely affected by CMP hook-and-line fishing. Fishers who capture smalltooth sawfish most commonly report that they were fishing for snook, redfish, or sharks (Simpfendorfer and Wiley 2004), not CMP species. Additionally, Atlantic sturgeon and smalltooth sawfish are largely bottom-dwelling species, whereas CMP lures and baits are typically fished near the surface of the water. This also greatly reduces the likelihood of Atlantic sturgeon and smalltooth sawfish interactions with trolling gear (NMFS, 2015).

On June 29, 2016, NMFS published a final rule listing Nassau grouper as threatened under the ESA. Reinitiation of Section 7 consultation on the CMP FMP is needed to address newly listed species. NMFS is currently prioritizing completion of the consultation along with other consultations required after recent listings.

7.5.5. Seabirds

The roseate tern, Bermuda petrel, and piping plover are the only ESA listed bird species within the mid-and south-Atlantic maritime regions. The roseate tern and Bermuda petrel are uncommon in inshore and coastal waters of the mid- and south-Atlantic and thus, have relatively low likelihoods of interacting with cobia fisheries. Nevertheless, exceptional efforts to avoid deleterious interactions with these species are warranted as they are rare and highly vulnerable to even minimal levels of mortality. The piping plover could be impacted by shore-based fishing activity if individuals were disturbed or killed by vehicles related to fishing efforts. However, during the nesting season, when plovers are highly vulnerable to beach disturbance, sensitive areas are posted and beach access is often restricted.

Bermuda petrels are occasionally seen in the waters of the Gulf Stream off the coasts of North Carolina and South Carolina during the summer. Sightings are considered rare and only occurring in low numbers (Alsop 2001). Roseate terns occur widely along the Atlantic coast during the summer but in the southeast region, they are found mainly off the Florida Keys (unpublished USFWS data). Interaction with fisheries has not been reported as a concern for

8 Although smalltooth sawfish are typically found in the peninsula of Florida, there have been recent interactions as far north as North Carolina.

either of these species. Although, the Bermuda petrel and roseate tern occur within the action area, these species are not commonly found and neither has been described as associating with vessels or having had interactions with the CMP fishery. Framework Amendment 4 to the FMP for CMP resources in the Gulf of Mexico and Atlantic Region concluded that the CMP fishery is not likely to negatively affect the Bermuda petrel and the roseate tern.

7.6. Population Status Review of Relevant Protected Species

7.6.1. Marine Mammals

The status review of marine mammal populations inhabiting the Southwest Atlantic are discussed in detail in U.S. Atlantic and Gulf of Mexico Marine Mammal Stock Assessments. The most recent assessment was published in 2016 (Waring et al. 2016). The report presents information on stock definition, geographic range, population size, productivity rates, PBR, fishery specific mortality estimates, and compares the PBR to estimated human-caused mortality and serious injury for each stock.

7.6.2. Sea Turtles

All sea turtles that occur in U.S. waters are listed as either endangered or threatened under the ESA. The Kemp's ridley (*Lepidochelys kempii*), leatherback (*Dermochelys coriacea*), and hawksbill (*Eretmochelys imbricata*) are listed as endangered. The Northwest Atlantic Ocean DPS of loggerhead turtles (*Caretta caretta*) and the North Atlantic and South Atlantic DPSs of green turtle (*Chelonia mydas*) are listed as threatened. All five of these species inhabit the waters of the U.S. Atlantic and Gulf of Mexico.

Atlantic coastal waters provide important developmental, migration, and feeding habitat for sea turtles. The distribution and abundance of sea turtles along the Atlantic coast is related to geographic location, reproductive cycles, food availability, and seasonal variations in water temperatures. Water temperatures dictate how early northward migration begins each year and are a useful factor for assessing when turtles will be found in certain areas. Sea turtles can occur in offshore as well as inshore waters, including sounds and embayments. More information about sea turtles can be found here: http://www.nmfs.noaa.gov/pr/species/turtles/index.html.

7.6.3. Sturgeon, smalltooth sawfish, and Nassau grouper

No estimate of the historical population size of shortnose sturgeon is available. While the shortnose sturgeon was rarely the target of a commercial fishery, it often was taken incidentally in the commercial fishery for Atlantic sturgeon. In the 1950s, sturgeon fisheries declined on the east coast, which resulted in a lack of records of shortnose sturgeon. Shortnose sturgeon has

been listed as endangered since 1967. A status assessement of shortnose sturgeon was last published in 2010 (SSSRT, 2010).[9]

In 2012, NOAA Fisheries listed four DPSs of Atlantic sturgeon *(Acipenser oxyrinchus oxyrinchus)* as endangered (NY Bight, Chesapeake Bay, Carolina, and South Atlantic DPSs) and one as threatened (Gulf of Maine). More information about Atlantic sturgeon can be found here: http://www.fisheries.noaa.gov/pr/species/fish/atlantic-sturgeon.html#documents.

The U.S. DPS of smalltooth sawfish was listed as endangered in 2003. No accurate estimates of abundance trends over time are available, but available data, including museum records and anecdotal observations from fishers, indicate that the population has declined dramatically by about 95%. Smallooth sawfish were once common throughout their historic range, but they have declined dramatically in U.S. waters over the last century. Still, there are few reliable data available, and no robust estimates of population size exist.[10]

In 2016, NOA Fisheries listed Nassau grouper as threatened under the ESA (81 FR 42268; June 29, 2016). While the species still occupies its historical range, overutilization through historical harvest has reduced the number of individuals which in turn has reduced the number and size of spawning aggregations. Although harvest of Nassau grouper has diminished due to management measures, the reduced number and size of spawning aggregations and the inadequacy of law enforcement continue to present extinction risk to Nassau grouper. The Nassau grouper's confirmed distribution currently includes Bermuda and Florida (U.S.A.), throughout the Bahamas and Caribbean Sea. Many earlier reports of Nassau grouper up the Atlantic coast to North Carolina have not been confirmed.

7.6.4. Seabirds

The overall population status of the Bermuda Petrel is unknown. The Bermuda Petrel is a pelagic seabird, and its range and distribution at sea make it very difficult to survey. It is known to nest only on five small islets in Bermuda. Surveys are limited to the breeding grounds. The total population of the Bermuda Petrel is estimated as 101 breeding pairs (USFWS, 2013).

The roseate tern is a federally protected and endangered seabird that is mainly found in the Northern Hemisphere on the northeastern coast of North America, extending from Nova Scotia to the southern tip of Florida, as well as several islands in the Caribbean Sea. Populations in the northeastern U.S. greatly declined in the late 19th century due to hunting for the millinery, or hat trade. In the 1930s, protected under the MBTA, the population reached a high of about 8,500, but since then, population numbers have declined and stayed in the low range of 2,500 to 3,300. The species was listed in 1987 as endangered in the northeastern U.S. Populations in

9 http://www.fisheries.noaa.gov/pr/species/fish/shortnose-sturgeon.html
10 http://www.fisheries.noaa.gov/pr/species/fish/smalltooth-sawfish.html

Florida, Georgia, North Carolina, Puerto Rico, South Carolina and the Virgin Islands are listed as threatened.[11]

The piping plover breeds on coastal beaches from Newfoundland and southeastern Quebec to North Carolina. These birds winter primarily on the Atlantic Coast from North Carolina to Florida, although some migrate to the Bahamas and West Indies. Piping plovers were common along the Atlantic Coast during much of the 19th century, but nearly disappeared due to excessive hunting for the millinery trade. The current population decline is attributed to increased development and recreational use of beaches. The most recent surveys place the Atlantic population at less than 2000 pairs.[12]

7.7. Existing and Proposed Federal Regulations/Actions Pertaining to Relevant Protected Species

7.7.1. Marine Mammals

Species of large whales protected by the ESA that occur throughout the Atlantic Ocean include the blue whale, humpback whale, fin whale, North Atlantic right whale, sei whale, and the sperm whale. Additionally, the West Indian manatee also occurs in both the Gulf of Mexico and the Atlantic Ocean. These species are also considered depleted under the Marine Mammal Protection Act (MMPA). Depleted and endangered designations afford special protections from captures, and further measures to restore populations to recovery or the optimum sustainable population are identified through required recovery (ESA species) or conservation plans (MMPA depleted species). Numerous other species of marine mammals listed under the MMPA occur throughout the Atlantic Ocean.

The MMPA mandates NOAA's NMFS to develop and implement Take Reduction Plans for preventing the depletion and assisting in the recovery of certain marine mammal stocks that are seriously injured or killed in commercial fisheries. In the Atlantic, the following Take Reduction Plans have been developed, which address in part, gears that have been used to capture cobia (gillnet):

- The Atlantic Large Whale Take Reduction Plan is designed to reduce the risk of mortality and serious injury of large whales (right, fin, humpback) incidental to U.S. commercial trap/pot and gillnet fisheries, including Southeast Atlantic gillnet.

- The Bottlenose Dolphin Take Reduction Plan is designed to reduce the incidental mortality and serious injury of the western North Atlantic coastal bottlenose dolphin stock in several coastal fisheries, including the Southeast Atlantic gillnet fishery.

11 https://www.fws.gov/northeast/pdf/Roseatetern0511.pdf
12 https://www.fws.gov/northeast/pipingplover/overview.html

7.7.2. Sea turtles

Under the ESA, and its implementing regulations, taking sea turtles – even incidentally – is prohibited, with exceptions identified in 50 CFR 223.206. The incidental take of endangered species may only legally be authorized by an incidental take statement or an incidental take permit issued pursuant to Section 7 or 10 of the ESA, respectively. According to the 2015 biological opinion on CMP fisheries, green, hawksbill, Kemp's ridley, leatherback, and loggerhead sea turtles are all likely to be adversely affected by the CMP fishery (NMFS, 2015). Green, hawksbill, Kemp's ridley, leatherback, and loggerhead sea turtles are all highly migratory, travel widely throughout the GOM and South Atlantic, and are known to occur in the area of the fishery. The 2015 biological opinion for CMP established an incidental take statement with reasonable and prudent measures and terms and conditions for incidental take coverage in the federal CMP fisheries for sea turtles takes throughout the action area.

On April 6, 2016, NMFS published a final rule (81 FR 20058) listing 11 distinct population segments (DPSs) for green sea turtles. The listing of the DPSs of green turtles triggers reinitiation of consultation under Section 7 of the ESA because the previous opinion did not consider what effects the CMP fishery is likely to have on this species, therefore NMFS must analyze the impacts of these potential interactions. NMFS is also in the process of identifying critical habitat, which will be proposed in a future rulemaking.

In 2013, the North Carolina Division of Marine Fisheries was issued a permit for the incidental take of listed sea turtles associated with the otherwise lawful large and small mesh gill net fishing in specified inshore estuarine areas. This permit requires North Carolina to close designated areas to avoid approaching the take limit.

Existing NMFS regulations specify procedures that NMFS may use to determine that unauthorized takings of sea turtles occur during fishing activities, and to impose additional restrictions to conserve sea turtles and to prevent unauthorized takings (50 CFR 223.206(d)(4)). Restrictions may be effective for a period of up to 30 days and may be renewed for additional periods of up to 30 days each. In 2007, NMFS issued a regulation (50 CFR 222.402) to establish procedures through which each year NMFS will identify, pursuant to specified criteria and after notice and opportunity for comment, those fisheries in which the agency intends to place observers (72 FR 43176, August 3, 2007). NMFS issues a notice or regulation each year maintaining or updating the fisheries listed on the annual determination. The most recent determination was in December 2016 (81 FR 90330, December 14, 2016). NMFS may place observers on U.S. fishing vessels, either recreational or commercial, operating in U.S. territorial waters, the U.S. exclusive economic zone (EEZ), or on the high seas, or on vessels that are otherwise subject to the jurisdiction of the U.S. Failure to comply with the requirements under this rule may result in civil or criminal penalties under the ESA.

7.7.3. Sturgeon, smalltooth sawfish, and Nassau grouper

Shortnose sturgeon (*Acipenser brevirostrum*) and Atlantic sturgeon (*A. oxyrinchus*) were listed under the ESA in 1967 and 2012, respectively. The Commission and federal government

implemented a coastwide moratorium on sturgeon harvest in late 1997 and early 1998. Bycatch remains an important issue in the recovery of Atlantic sturgeon populations throughout their range (ASMFC 2007). The National Marine Fisheries Service established a recovery plan for shortnose sturgeon in 1998.[13]

In 2013, the Georgia Department of Natural Resources was issued a permit for the incidental take of shortnose and Atlantic sturgeon associated with the otherwise lawful commercial shad fishery in Georgia. In 2014, the North Carolina Division of Marine Fisheries was issued a permit for the incidental take of Atlantic sturgeon DPSs associated with the otherwise lawful commercial inshore gillnet fishery in North Carolina.

The 2015 biological opinion for the Federal CMP fisheries established an incidental take statement with reasonable and prudent measures and terms and conditions for incidental take of Atlantic sturgeon (as well as sea turtles and smalltooth sawfish) throughout the action area (NMFS, 2015). In June 2016, NOAA Fisheries published proposed rules to designate critical habitat for Atlantic sturgeon (81 FR 36077; 6/3/2016 and 81 FR 35701; 6/3/2016).

The U.S. DPS of smalltooth sawfish was listed as endangered in 2003. Critical habitat was designated for it in 2009 (74 FR 45353; 9/2/2009) and a recovery plan was finalized in 2009 as well.[14]

Harvest and possession of Nassau grouper is prohibited in the United States, Puerto Rico, and the U.S. Virgin Islands. NMFS is evaluating potential management actions, such as critical habitat or application of the 4(d) rule in the ESA. When NMFS listed Nassau grouper as threatened, it solicited information from the public that may be relevant to the designation of critical habitat for Nassau grouper. A 4(d) rule provides regulations necessary for the conservation of any threatened species

7.7.4. Seabirds

Under the ESA and its regulations, take of Bermuda petrels, roseate terns, and piping plovers, even incidentally, is prohibited. The incidental take of an ESA listed species may only be legally authorized by an incidental take statement or incidental take permit issued pursuant to Section 7 or 10 of the ESA. No incidental takes of ESA listed bird species is currently authorized for cobia fisheries.

Section 316(c) of the Magnuson-Stevens Fishery Conservation and Management Act authorizes the Interior and Commerce Departments to undertake projects, in cooperation with industry, to improve information and technology to reduce seabird-fisheries interactions. USFWS seeks to partner with State, regional, and Federal agencies; industry; tribes; and NGOs to facilitate outreach and improve information and technology to reduce seabird bycatch in fisheries within state and Federal waters. A Memorandum of Understanding between NMFS and the USFWS

13 http://www.nmfs.noaa.gov/pr/pdfs/recovery/sturgeon_shortnose.pdf
14 http://www.nmfs.noaa.gov/pr/pdfs/recovery/smalltoothsawfish.pdf

(July 2012) describes additional collaborative efforts recommended to better understand and reduce bird bycatch in fisheries.[15]

Most actions to understand and reduce marine bird bycatch in the U.S. have occurred in Pacific waters. However, in 2011, the USFWS issued a business plan for addressing and reducing marine bird bycatch in U.S. Atlantic fisheries. The plan identified priority goals and actions to target the following marine bird-fisheries interactions: greater shearwaters in the New England groundfish fishery, and red-throated loons in the mid-Atlantic gillnet fisheries.[16]

7.8. Potential Impacts to Atlantic Coastal State and Interstate Fisheries

Regulations under the take reduction plans for Atlantic large whales and bottlenose dolphins have the potential to impact gill net fisheries that capture cobia as bycatch.

7.9. Identification of Current Data Gaps and Research Needs

7.9.1. General Bycatch Related Research Needs

The following activities would improve our understanding of bycatch of fish and protected species in the Southeast Region. These activities were identified within NMFS' Southeast Regional Office's FY16-20 Strategic Plan[17]:

- In coordination with the Marine Recreational Information Program (MRIP), test and validate the use of on-board recording systems (e.g., electronic logbooks) for capturing information on discarded fishes and bycatch of protected species in the commercial and recreational fisheries including species, length, depth, location, and disposition; priority fisheries include shrimp (including assessing TED compliance), South Atlantic snapper-grouper, other Southeast Region recreational hook-and-line fisheries, and fisheries under take reduction teams.
- Enhance existing tools (e.g., observers, logbook requirements, electronic technologies) to collect bycatch data that inform agency bycatch priorities; priority fisheries include shrimp (including assessing TED compliance), South Atlantic snapper-grouper, other Southeast Region recreational hook-and-line fisheries, and fisheries under take reduction teams.
- Invest in new, innovative fishery monitoring techniques, such as electronic fishing logbooks and video monitoring, to provide a cost effective means of producing more information to effectively quantify bycatch; priority fisheries include shrimp (including assessing TED compliance), South Atlantic snapper-grouper, other Southeast Region recreational hook-and-line fisheries, and fisheries under take reduction teams.

15 https://www.fws.gov/migratorybirds/pdf/management/mounmfs.pdf
16 https://www.fws.gov/migratorybirds/pdf/management/focal-species/GreaterShearwater.pdf
17http://sero.nmfs.noaa.gov/news_room/press_releases/2016/pdfs/noaa_fisheries_southeast_regional_office_science_needs_12052016.pdf

- Improve the discard estimates needed for informing snapper-grouper, reef fish, dolphin wahoo, and coastal migratory pelagic SEDAR assessments in the next 3-5 years.

7.9.2. Marine Mammals

The following bycatch related research needs were identified within NMFS' Southeast Regional Office's FY16-20 Strategic Plan[18]:

- Characterize frequency, scope, and scale of bottlenose dolphin interactions with recreational rod/reel fishing gear.
- Enhance and increase observer coverage for gillnet fisheries under the bottlenose dolphin take reduction plans by focusing observer coverage in specific geographic areas and fisheries, improving observer data collection and quality, and measures of fishing effort, as well as coordinating with state observer programs.
- Experimentally investigate possible attractants/deterrents for pilot whale/Risso's dolphins to pelagic longline gear and gear modifications to decrease the likelihood of hooking and/or entanglement.

7.9.3. Sea Turtles

Observer coverage of recreational fisheries has been relatively limited (Boyd, 2016). Expansion of observer programs to recreational hook-and-line fisheries would help determine the level of protected species interactions in those fisheries.

The following bycatch related research needs were identified within NMFS' Southeast Regional Office's FY16-20 Strategic Plan[19]:

- Improved methods/models/techniques for estimating sea turtle bycatch in commercial fisheries including accounting for life stage and recovery unit (where applicable) impacts.
- Produce annual bycatch estimates for the shrimp trawl fisheries, pelagic longline, Gulf and South Atlantic reef fish, and Gulf and South Atlantic shark gillnet and bottom longline fisheries.
- Implement monitoring program to assess bycatch of sea turtles in recreational fisheries, including piers, jetties, head boats and FMP covered recreational fisheries.
- Develop tools to reduce recreational fishing bycatch including on piers/jetties.
- Develop and improve analytic methods for sea turtle bycatch estimation and sampling design to optimally allocate observer coverage and identify gaps and recommend improvements/changes to improve sea turtle bycatch information.

18http://sero.nmfs.noaa.gov/news_room/press_releases/2016/pdfs/noaa_fisheries_southeast_regional_office_science_needs_12052016.pdf

19http://sero.nmfs.noaa.gov/news_room/press_releases/2016/pdfs/noaa_fisheries_southeast_regional_office_science_needs_12052016.pdf

- Ensure sea turtle bycatch data collected across fisheries is standardized and contains all necessary elements to assess post interaction mortality and to inform conservation management.
- Conduct gear research and technology transfer to reduce sea turtle interactions and mortalities in both domestic and foreign trawl, longline, and gill net fisheries.
- Develop sea turtle observer programs for commercial fisheries not currently observed but for which data are needed.

7.9.4. Sturgeon

NOAA Fisheries Southeast Regional Office has identified the following research needs for Atlantic sturgeon[20]:

- Identification of spawning and nursery grounds and overwintering areas.
- Long-term population monitoring programs.
- Population genetics.
- Toxic contaminant and biotoxin impacts and thresholds.
- Develop fish passage devices for sturgeon.
- Impacts of dredging.
- Reducing bycatch and bycatch mortality.

Regarding bycatch, very little information is available on current levels of bycatch and bycatch mortality occurring in fisheries in the Southeast. Research is needed to identify the spatial and temporal distribution of bycatch throughout the species range, and to identify measures that can be implemented to reduce bycatch and/or bycatch mortality.

NOAA Fisheries Southeast Regional Office has identified the following research needs for shorthnose sturgeon[21]:

- Genetic assessments.
- Surveys and presence/absence studies.
- Identification of spawning and nursery grounds and overwintering areas.
- Develop fish passage devices for sturgeon.
- Contaminant research.
- Impacts of dredging.

20 http://sero.nmfs.noaa.gov/protected_resources/sturgeon/documents/ats_research_priorities.pdf
21 http://sero.nmfs.noaa.gov/protected_resources/sturgeon/documents/sns_research_priorities.pdf

7.9.5. Sawfish

The following research needs were identified within NMFS' Southeast Regional Office's FY16-20 Strategic Plan[22]:

- Develop a functional assessment model of juvenile sawfish habitat use within the critical habitat units.
- Determine the post-release mortality of sawfish from various types of fishing gear.
- Investigate movements (short-term and seasonal) of adult sawfish to identify aggregation habitats and habitat use patterns.
- Develop habitat models to identify potential sawfish nursery habitats in areas unsurveyed or outside of the currently known habitat areas.
- Continue current sawfish surveys as these will be the basis of monitoring recovery.
- Conduct juvenile sawfish surveys beyond the boundaries of current surveys (e.g., east coast or north of Charlotte Harbor) to refine a baseline abundance estimates and monitor recovery.
- Conduct adult surveys throughout the range of smalltooth sawfish to determine a relative abundance estimate, the distribution of adults, and to identify sawfish mating and pupping habitats.

7.9.6. Seabirds

- Initiate and expand observer coverage/bycatch monitoring and collection and analysis of bird bycatch data to better understand extent of bird bycatch and identify bycaught bird species within the target fisheries (state waters).
- Collaborate with fishermen to develop and test gear and identify deployment practices that reduce bird bycatch within the target fisheries (state waters).
- Conduct outreach activities to facilitate sharing of bird bycatch information in the target fisheries among agencies, industry and the public.

22http://sero.nmfs.noaa.gov/news_room/press_releases/2016/pdfs/noaa_fisheries_southeast_regional_office_science_needs_12052016.pdf

8. REFERENCES

ASMFC. 2002. Amendment 2 to the Red Drum Interstate Fishery Management Plan. Washington (DC): ASMFC. 162 p.

ASMFC. 2007. Estimation of Atlantic sturgeon bycatch in coastal Atlantic commercial fisheries of New England and the Mid-Atlantic. Special report to the ASMFC Atlantic Sturgeon Fishery Management Board. Washington (DC), ASMFC. 95 p.

ASMFC. 2009a. Guide to fisheries science and stock assessments. Washington (DC), ASMFC. 66 p.

ASMFC. 2009b. Interstate Fisheries Management Program Charter. Washington (DC): ASMFC. 27 p.

ASMFC. 2012. Offshore Wind in My Backyard? Habitat Management Series #11. Arlington (VA): 10 p.

ASMFC. 2013. Harbor Deepening: Potential Habitat and Natural Resources Issues. Habitat Management Series #12. Arlington (VA): ASMFC. 10 p.

ASMFC, 2016. Public Information Document for the Interstate Fishery Management Plan for Cobia.

Atkinson L.P., D.W. Menzel, and K.A.E. Bush. 1985. *Oceanography of the southeastern U.S. continental shelf*. American Geophysical Union: Washington, DC

Blanton, J.O., L.P. Atkinson, L.J. Pietrafesa, and T.N. Lee. 1981. The intrusion of Gulf Stream water across the continental shelf due to topographically-induced upwelling. Deep-Sea Research 28:393-405.

Brooks, D.A., and J.M. Bane. 1978. Gulf Stream deflection by a bottom feature off Charleston, South Carolina. Science 201:1225-1226.

Boyd, J. 2016. North Caroline Division of Marine Fisheries. Final Report to National Marine Fisheries Service and Atlantic Coastal cooperative Statistics Program. Grant Award #NA14NMF47400367. 36pp.

Cobia Tagging. 2017. Virginia Institute of Marine Science. http://www.vims.edu/research/departments/fisheries/programs/tagging_research/cobia/index.php

Collette, B., J. L. Russo, and L. A. Zavala-Camin. 1978. Scomberomorus brasiliensis, a new species of Spanish mackerel from the western Atlantic. Fish. Bull. 76: 273-280.

Dahl, T.E. 2000. Status and trends of wetlands in the conterminous United States I986 to 1997.U.S. Dept. of Interior, USFWS, Washington, DC. 8lp.

Darden, T.L., M.J. Walker, K.Brenkert, J.R. Yost, and M.R. Denson. 2014. Population genetics of Cobia (*Rachycentron canadum*): implications form fishery management along thr coast of the southeastern United States. Fish. Bull. 112: 24-35

Ditty, J.G., and R.F. Shaw. 1992. Larval development, distribution, and ecology of cobia *Rachycentron canadum* (Family: Rachycentridae) in the northern Gulf of Mexico. Fish. Bull. 90:668-677

GMFMC and SAFMC. 1983. Fishery Management Plan, Final Environmental Impact Statement/Regulatory Review, Final Regulations for the Coastal Migratory Pelagic Resource (Mackerels). Prepared by the Gulf of Mexico and South Atlantic Fishery

Management Councils, February, 1983. Tampa, Florida and Charleston, South Carolina. 399 pp.

GMFMC/SAFMC. 1992. Amendment 6 to the Fishery Management Plan for Coastal Migratory Pelagic Resources in the Gulf of Mexico and Atlantic Region. Gulf of Mexico Fishery Management Council, Tampa, Florida, and South Atlantic Fishery Management Council, Charleston, South Carolina.

GMFMC/SAFMC. 2011. Amendment 18 to the Fishery Management Plan for Coastal Migratory Pelagic Resources in the Gulf of Mexico and Atlantic Region. Gulf of Mexico Fishery Management Council, Tampa, Florida, and South Atlantic Fishery Management Council, North Charleston, South Carolina.

GMFMC/SAFMC. 2014. Amendment 20B to the Fishery Management Plan for Coastal Migratory Pelagic Resources in the Gulf of Mexico and Atlantic Region. Gulf of Mexico Fishery Management Council, Tampa, Florida, and South Atlantic Fishery Management Council, North Charleston, South Carolina.

SAFMC. 2016 (in preparation). Framework Amendment 4 to the Fishery Management Plan for

Holland, A.F., G.H.M. Riekerk, S.B. Lerberg, L.E. Zimmerman, D.M. Sanger, G.l. Scott and M.H. Fulton. 1996. Assessment of the impact of watershed development on the nursery functions of tidal creek habitats. ***In:*** G.S. Kleppel and M.R DeVoe (eds.) The South Atlantic Bight land use coastal ecosystems study (LU-CES), pp. 28-31. Univ. of Georgia Sea Grant and S.C. Sea Grant Program. Report of a planning workshop.

Janowitz, G.S., and L.J. Pietrafesa. 1982. The effects of alongshore variation in bottom topography on a boundary current - topographically-induced upwelling. Continental Shelf Research 1:123-141.

Lee, T.N., C. Rooth, E. Williams, M.F. McGowan, A.F. Szmant, and M.E. Clarke. 1992. Influence of Florida Current, gyres and wind-driven circulation on transport of larvae and recruitment in the Florida Keys coral reefs. Continental Shelf Research 12:971-1002.

Lee, T.N., M.E. Clarke, E. Williams, A.F. Szmant, and T. Berger. 1994. Evolution of the Tortugas Gyre. Bulletin of Marine Science 54(3):621-646.

Lefebvre, L.S., and M.R. Denson. 2012. Inshore spawning of cobia (*Rachycentron canadum*) in South Carolina. Fish. Bull. 110:397-412.

Lovell, SJ, J Hilger, S Steinback, and C Hutt. 2016. The Economic Contribution of Marine Angler Expenditures on Durable Goods in the United States, 2014. U.S. Dep. Commerce, NOAA Tech. Memo. NMFS-F/SPO-165, 72 pp.

Manooch, Charles S. 1984. Fisherman's guide to fishes of the Southeastern United States. North Carolina Museum of Natural History. Raleigh, North Carolina. 362 pp.

McClane, A.J. 1974. McClane's new standard fishing encyclopedia and international angling guide. Holt, Rinehart & Winston, NY, 1156 p.

Menzel D.W., editor. 1993. Ocean processes: U.S. southeast continental shelf. DOE/OSTI -- 11674. U.S. Department of Energy.

Miller, J.M. 1988. Physical processes and the mechanisms of coastal migrations of immature marine fishes. In: M.P. Weinstein (ed.) Larval fish and shellfish transport through inlets, pp. 68-76. American Fisheries Society, Bethesda, MD.

Musick, S, and L Gillingham. 2016. Virginia Game Fish Tagging Program Annual Report, 2015. Virginia Institute of Marine Science Marine Resources Report No. 2016-05. 102 pp.

National Marine Fisheries Service. 2015. Endangered Species Act - Section 7 Consultation Biological Opinion. 2015 Reinitiation of Endangered Species Act (ESA) Section 7 Consultation on the Continued Authorization of the Fishery Management Plan (FMP) for Coastal Migratory Pelagic (CMP) Resources in the Atlantic and Gulf of Mexico under the Magnuson-Stevens Fishery Management and Conservation Act (MSFMCA). Available at: http://sero.nmfs.noaa.gov/protected_resources/section_7/freq_biop/documents/fisheries_bo/2015_cmp_opinion.pdf.

SAFMC. 1998. Habitat plan for the South Atlantic region: essential fish habitat requirements for fishery management plans of the South Atlantic Fishery Management Council. SAFMC, Charleston, SC. 457 p. + appendices.

Schwartz, F. J. 1989. Zoogeography and ecology of fishes inhabiting North Carolina's marine waters to depths of 600 meters. Pages 335-374 *In* R. Y. George, and A. W. Hulbert, editors. North Carolina coastal oceanography symposium. U.S. Dep. Commerce, NOAA-NURP Rep. 89-2.

Scott, G. P., D. M. Burn and L. J. Hansen. 1988. The dolphin die off: Long term effects and recovery of the population. Proceedings: Oceans '88, IEEE Cat. No. 88-CH2585-8, Vol. 3: 819-823.

Serafy, J.E., K.C. Lindeman, T.E Hopkins and J.S. Ault. 1997. Effects of freshwater canal discharges on subtropical marine fish assemblages: field and laboratory observations. Mar. Ecol. Prog. Ser. 160: 161-172.

SEDAR. 2013. SEDAR 28 – South Atlantic Cobia Stock Assessment Report. SEDAR, North Charleston, SC. 420 pp., available online at: http://www.sefsc.noaa.gov/sedar.

Shaffer, R.V., and E.L Nakamura. 1989. Synopsis of biological data on the cobia Rachycentron canadum (Pisces: Rachycentridae). NMFS, NOAA Technical Report 82.

Shortnose Sturgeon Status Review Team (SSSRT). 2010. A Biological Assessment of shortnose sturgeon (Acipenser brevirostrum). Report to National Marine Fisheries Service, Northeast Regional Office. November 1, 2010. 417 pp.

Simpfendorfer, C.A., and T.R., Wiley. 2004. Determination of the distribution of Florida's remnant sawfish population, and identification of areas critical to their conservation. Mote Marine Laboratory, Technical Report July 2, 2004, 37 pp.

South Atlantic Fishery Management Council. 2016. Framework Amendment 4 to the Fishery Management Plan for Coastal Migratory Pelagics Resources in the Gulf of Mexico and Atlantic Region. NOAA award # FNA10NF4410012. Charleston SC. 148 pp.

Smith, N.P. 1994. Long-term Gulf-to-Atlantic transport through tidal channels in the Florida Keys. Bulletin of Marine Science 54:602-609.

Smith, Joseph W. 1995. Life history of cobia *Rachycentron canadum* (Osteichthyes: Rachycentridae), in North Carolina Waters. Brimleyana 23:1-23.

U.S. Fish and Wildlife Service. 2013). Cahow of Bermuda Petrel (Pterodroma cahow). 5-year review: Summary and Evaluation. https://ecos.fws.gov/docs/five_year_review/doc4326.pdf

Wang, J.D., J. van de Kreeke, N. Krishnan, and D. Smith. 1994. Wind and tide response in Florida Bay. Bulletin of Marine Science 54:579-601.

Waring, G.T., E. Josephson, K. Maze-Foley, and P.E. Rosel, editors. 2016. US Atlantic and Gulf of Mexico Marine Mammal Stock Assessments – 2015. NOAA Technical Memorandum NMFS-NE-238. http://www.nmfs.noaa.gov/pr/sars/region.htm.

Yeung, C., and M.F. McGowan. 1991. Differences in inshore-offshore and vertical distribution of phyllosoma larvae of *Panulirus, Scyllarus, and Scyllarides* in the Florida Keys in May-June, 1989. Bulletin of Marine Science 49:699-714.

9. APPENDICES

Appendix I

Atlantic States Marine Fisheries Commission
Draft Public Information Document for the Cobia FMP

Introduction

The Atlantic States Marine Fisheries Commission (Commission) is developing an Interstate Fishery Management Plan (FMP) for Cobia, under the authority of the Atlantic Coastal Fisheries Cooperative Management Act (ACFCMA). Management authority for this species is from zero to three nautical miles offshore, including internal state waters, and lies with the Commission. Regulations are promulgated by the Atlantic coastal states. Responsibility for compatible management action in the exclusive economic zone (EEZ) from 3-200 miles from shore lies with the South Atlantic Fishery Management Council (Council) and NOAA Fisheries under their Coastal Migratory Pelagics Fishery Management Plan (CMP FMP) under the authority of the Magnuson-Stevens Fisheries Conservation and Management Act.

Management Issues

Currently the Council and NOAA Fisheries manage Cobia under the CMP FMP through an Annual Catch Limit (ACL) combined with possession and minimum size limits. An overage of the recreational ACL occurred in 2015 and resulted in a shortened recreational season in 2016, consistent with the accountability measures (AMs) implemented by the Council. The closure had measureable impacts to member states. Concerned by these impacts and recognizing that a significant but variable proportion of reported recreational landings are harvested in state waters, the Council requested that the Commission consider complementary or joint management of the Cobia resource.

The Commission's Interstate Fisheries Management Program Policy Board reviewed a white paper at their August 2016 Business Meeting and agreed Commission management of Cobia was prudent. The Commission tasked the development of an FMP to the South Atlantic State/Federal Fishery Management Board, complementary with the Council plan for Cobia (*Rachycentron canadum*).

Council management, based on current genetic information, addresses the management of Atlantic Migratory Group (AMG) Cobia that occur from Georgia through New York (Figure 1). Cobia that occur off the east coast of Florida are part of the Gulf stock, but the SAFMC manages the portion of that stock on the Florida East Coast that occurs within its jurisdiction. Tag recapture data suggested two main stocks of fish that overlap at Brevard County Florida and corroborated the genetic findings. The genetic findings also determined that there were two distinct population segments (DPS) in Port Royal Sound SC and Chesapeake Bay VA. The main South Atlantic and Gulf stocks were separated for management purposes at the FL/GA line

because genetic data suggested that the split is north of the Brevard/Indian River County line and there was no tagging data to dispute this split. The FL/GA line was selected as the stock boundary based on recommendations from the commercial and recreational work groups (of the SEDAR 28 Stock Assessment) and comments that for ease of management the FL/GA line would be the preferable stock boundary and did not conflict with the life history information available.

Cobia that occur off the east coast of Florida are part of the Gulf cobia, but the Gulf of Mexico Fishery Management Council allocated a portion of the Gulf cobia ACL to the SAFMC and the SAFMC manages that portion of the Florida East Coast that occurs within its jurisdiction. This boundary and the revised ACLs based on the stock boundary changes were implemented through Amendment 20B to the CMP FMP (GMFMC/SAFMC014). Collection of genetic samples from northern Florida (east coast) and Georgia continues and analysis will be used in a Stock Identification workshop planned for 2017 that could result in better resolution of where the boundary is between the south Atlantic and Gulf stocks.

Recreational Cobia landings in 2015 were 1,565,186 pounds (SEFSC), well above the 2015 ACL of 630,000 pounds. This overage resulted in a June 20, 2016 closure of the fishery by NOAA Fisheries. Concern was expressed by individual states whose recreational seasons were reduced by the 2016 closure due to the overage of the 2015 quota. North Carolina and Virginia developed alternate management strategies for harvest in state waters to avoid the June 20, 2016 closure enacted by NOAA Fisheries for 2016. South Carolina has recently implemented more restrictive measures to protect an inshore spawning population in southern South Carolina that was independent of the actions taken by NOAA fisheries.

Commercial Cobia landings in 2015 were 71,790 pounds (landed weight) that exceeded the commercial ACL of 60,000 pounds (landed weight). Unusual fall landings occurred in 2015 that precluded a timely closure. The commercial Cobia ACL is not tracked in either whole or gutted weight, but “as landed.” Whether the fish were landed gutted or whole, the pounds were all added up together and not converted (most were landed gutted).

Purpose of the Public Information Document (PID)

The purpose of this document is to inform the public of the Commission’s intent to gather information concerning the Cobia fisheries, develop management measures to assist the Council in maintaining harvest levels within the prescribed ACL and provide management flexibility to the states to minimize the impact of potential closures. The PID provides an opportunity for the public to identify and/or comment on issues and alternatives relative to the management of Cobia. Input received at the start of the FMP development process can have a major influence on the final outcome of the FMP. This document is intended to draw out observations and suggestions from fishermen, the public, and other interested parties, as well as any supporting documentation and additional data sources.

To facilitate public input, this document provides an overview of issues identified for consideration in the FMP, as well as background information on the Cobia stock, fisheries, and management. The underlying question for public comment is: **"How would you like the Cobia fishery and population to look in the future?"** The Commission is looking for both general comments on Cobia management in state waters and any comments specific to the issues listed in this document.

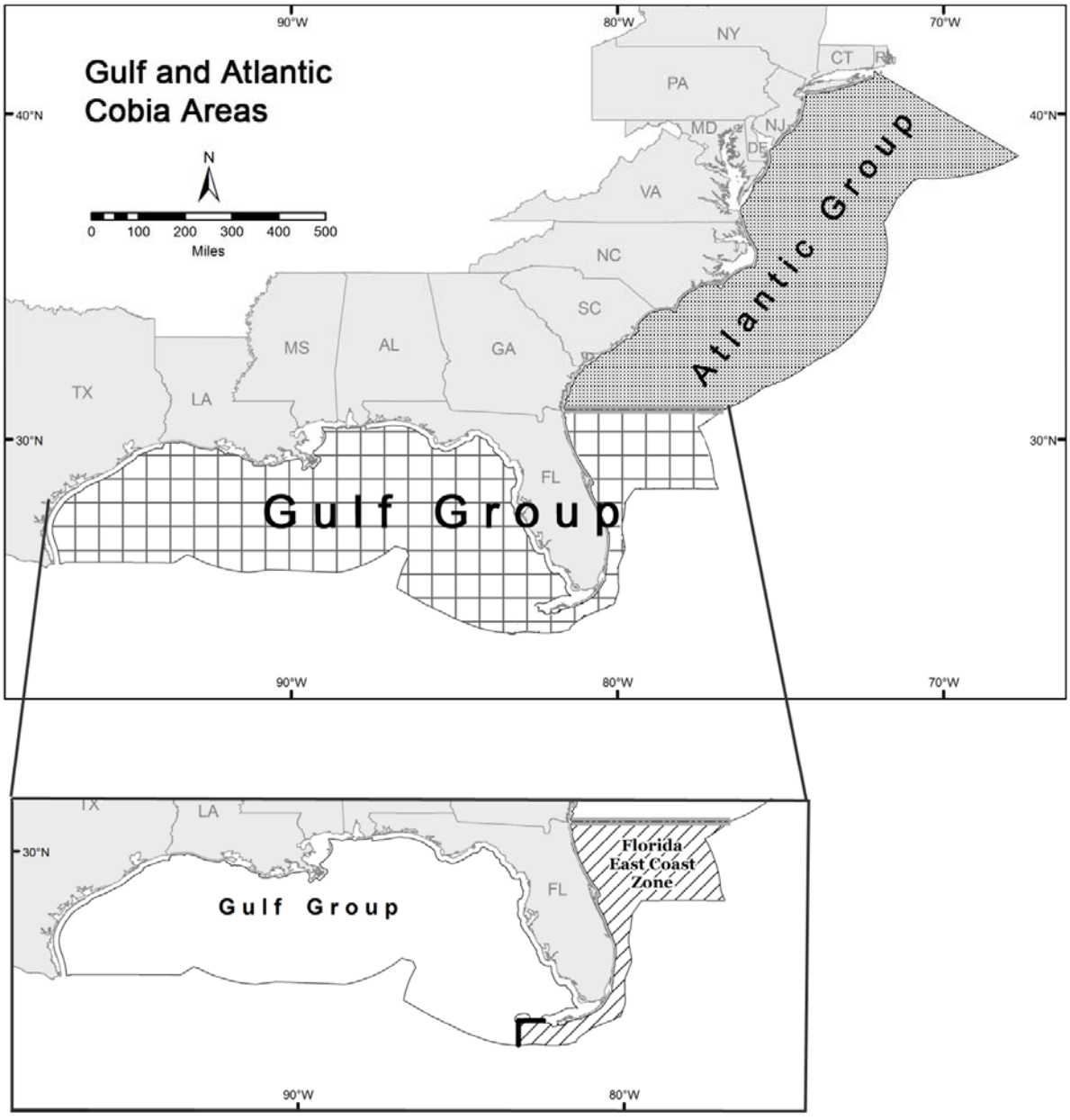


Figure 1. Current jurisdictional boundaries for Atlantic and Gulf of Mexico migratory groups of Cobia.

ASMFC's FMP Process and Timeline

The publication of this document and announcement of the Commission's intent to develop a FMP for Cobia is the formal, first step of the FMP development process. Following the initial phase of information gathering and public comment, the Commission will evaluate potential management alternatives and the impacts of those alternatives. The Commission will then develop a draft FMP, incorporating the identified management alternatives, for public review. Following the review and public comment, the Commission will specify the management measures to be included in the FMP, as well as a timeline for implementation.

This is the public's first opportunity to inform the Commission about changes observed in the fishery, management measures the public feels should not be included in the FMP, regulation, enforcement, research, development, enhancement; and any other concerns the public has about the resource or the fishery. In addition, this is the public's chance to present possible reasons for the changes and concerns for the fishery.

A tentative schedule for the completion of the FMP is included at the beginning of this document. Please note these dates are subject to change.

Statement of the Problem

Cobia management has historically been considered precautionary through the Gulf of Mexico and Atlantic Coastal Migratory Pelagics FMP. Both sectors of the fishery have been managed with a 2 fish possession limit and 33" fork length (FL) minimum size since formal management began in Amendment 6 to the Coastal Migratory Pelagics FMP in 1990. The ACLs and AMs were established through Amendment 18 (GMFMC/SAFMC 2012). The 2013 stock assessment conducted through the Southeast Data Assessment and Review (SEDAR) process indicated overfishing was not occurring and that the stock was not overfished although trending steadily downward over the previous two decades. Additionally, the stock assessment used a different stock boundary that was implemented into the FMP along with the updated ACLs in Amendment 20B (GMFMC/SAFMC 2014). The current ACL is a precautionary approach to prevent the stock from reaching an overfished status. The recent overage in 2015 exceeded the Council's defined Overfishing Limit, meaning the stock is undergoing overfishing. Further quota overages would continue this overfishing and could lead to the stock becoming overfished.

Efforts to more closely monitor state specific harvest to ensure that quotas are not exceeded and that overfishing is averted is the Commission's primary focus. Further, by developing a Commission plan, the impacts of a single, federal closure may be mitigated through state-specific measures designed to maintain traditional seasons at reduced harvest rates. The proposed interstate FMP considers potential management measures to maintain a healthy resource while minimizing the socio-economic impacts of seasonal closures.

Description of Management

Council management of Cobia is consistent for the Atlantic Migratory Group in federal waters with a 2 fish possession limit and 33" FL minimum size limit for commercial and recreational harvest. To reduce recreational harvest and attempt to extend seasons, some states have recently modified their restrictions (Table 1). Commercial management remains at 2 fish and 33" FL. **Florida Cobia are not part of the Council's Cobia management unit at this time. At present, Florida Cobia are part of the Gulf stock and the Council establishes the federal regulations for that portion within its jurisdiction.**

Table 1. Recreational measures in 2016 for Cobia in Virginia, North Carolina, South Carolina, Georgia**,** and Florida.

State	Bag limit (Fish/person/day)	Vessel limit (Fish/vessel/day)	Size Limit (inches)	Legal Gear
Virginia	1 *	2	40" TL, only 1 > 50" TL	No gaffing permitted
North Carolina	1 **	For-hire: 4/vessel or 1 person when less than 4 people on board Private: 2 fish on vessels with more than 1 person on board	37" FL	
South Carolina – north of Jeremy Inlet, Edisto Island	2	None	33" FL	
South Carolina- south of Jeremy Inlet, Edisto Island	1 (June 1- Apr 30) Catch and release only May 1-May 31	3, or 1 per person, whichever is lower	33" FL	
Georgia	2	None	33" FL	
Florida	1	1 per person or 6 per vessel, whichever is less	33" FL	spears, gigs, hook and line, seine, cast net

*VA State waters close 8/30/16.
**NC State waters close 9/30/16; private recreational can only retain Cobia on Mondays, Wednesdays, and Saturdays. Shore based anglers may retain 1 fish per day, 7 days per week.

In September 2016, the Council approved formal review for several changes to cobia management, including recreational harvest limits of 2 fish per person per day or 6 per vessel per day, and a minimum size limit of 36" FL for recreational harvest. Additionally, the Council

also proposes a commercial harvest limit of 2 fish per person per day or 6 per vessel, whichever is more restrictive, but no change to the commercial minimum size limit of 33" FL. The Council is also proposing modifications to the recreational accountability measures for Atlantic cobia. These changes are expected to be implemented in spring 2017.

In December 2016, the Council will review and consider formal approval of an amendment to change the recreational fishing year for Atlantic cobia (the fishing year is January 1 – December 31). Currently the preferred alternative would change the fishing year to May 1 – April 30.

The allocation of the Council's ACL between commercial and recreational sectors is based on historical landings (50% is based on the average 2000-2008 landings and 50% is based on the average 2006-2008). Beginning in 2016, the ACL is split 92% recreational and 8% commercial. The 2016 ACL for Cobia is 670,000 pounds. The recreational ACL is 620,000 pounds and the commercial ACL is 50,000 pounds. The ACL for 2015 was slightly higher at 690,000 pounds.

Description of the Cobia Resource

Life History and Status of the Stocks

Cobia is a fast growing, moderately lived (14 years old) species that supports a valuable recreational fishery throughout the south Atlantic and into the mid-Atlantic region. Known for their readiness to take a bait, tough fighting abilities, and excellent table fare, the fishery is popular in the recreational sector. The commercial fishery is primarily a by-catch in other directed fisheries such as the snapper/grouper hook and line fishery, and troll fisheries for various species (e.g., king mackerel, dolphin, wahoo, amberjack). However, in recent years, it has become a targeted species in Virginia's commercial hook and line fishery.

Cobia grow rapidly in their first 2 years with most mature by age 2. Females grow faster and attain larger sizes than males, but become sexually mature later. Cobia migrate South to North as well as East to West and spawning occurs when water temperatures reach 20-21 C from April through September with spawning occurring earlier in Florida and later in Virginia. Cobia form aggregations and spawn multiple batches of eggs throughout a relatively short season. Year class strength can be highly variable but it appears that a very strong year class occurs once in a decade. Both tag recapture and genetic data show that cobia exhibit natal homing and are often recaptured on the same structure or in locations where they were caught years before. This natal homing and spawning aggregation behavior make them very predictable and easily located by fishermen.

The results of the SEDAR 28 stock assessment determined that the appropriate management unit would separate out Atlantic and Gulf of Mexico stocks at the Florida/Georgia border. As previously mentioned, a workshop in early 2017 will evaluate all the current cobia genetic information. While Cobia do frequent areas north of Virginia, the harvest is uncommon and sporadic. Landings have been episodically reported from Maryland, New York, New Jersey and Rhode Island and make up from 3-15% of the total mid-Atlantic landings.

The 2013 stock assessment conducted through the SEDAR process indicated overfishing was not occurring and the stock is not overfished. The current ACL is a precautionary approach to prevent the stock reaching an overfished status. The recent overage in 2015, exceeded the Council defined Overfishing Limit, meaning overfishing is occurring. The 2013 stock assessment does indicate concerns. While the terminal year of the assessment was 2011, Spawning Stock Biomass (SSB) experienced a general decline from 2002 forward (Figure 2). Further, recreational landings have increased over the latter portion of the time series that may increase potential overfishing issues in the next assessment. In June, the Council proposed Cobia be included in a 2017 Stock ID workshop and the 2019 SEDAR schedule for a research track assessment. The operational assessment that will incorporate the outcomes and recommendations from the Stock ID workshop and 2019 research track assessment is scheduled for 2020. The operational assessment will result in management recommendations.

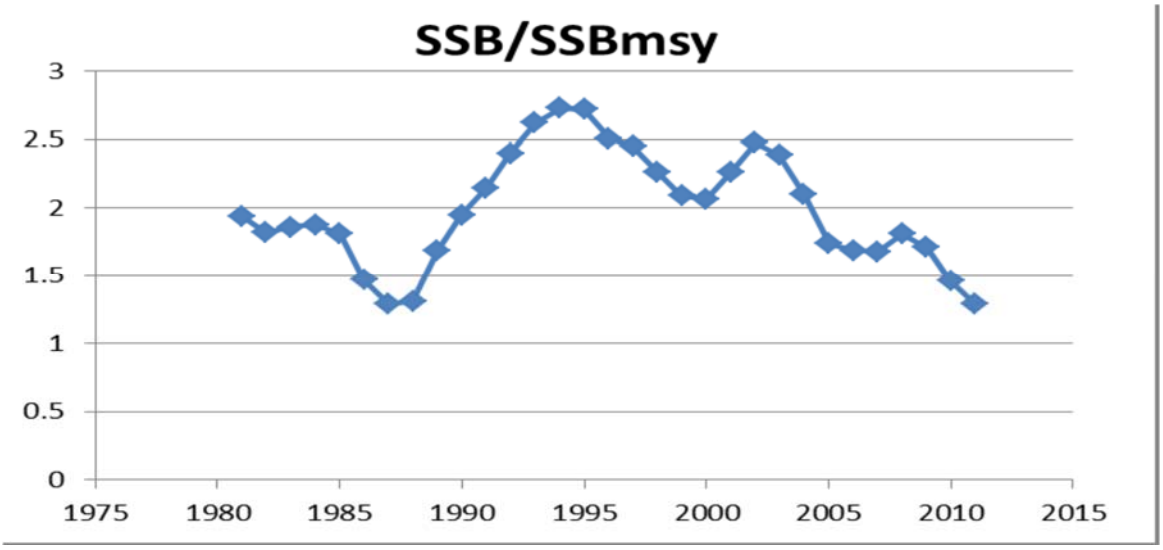


Figure 2. Cobia spawning stock biomass relative to the MSY biomass reference for 1981-2011.

Data collection programs vary by state and will be further described in the upcoming fishery management plan. However, research efforts at the state level are confounded by the observation that Cobia only occur in specific state jurisdictions in aggregations for a brief period each year and often in locations that conflict with the peak of recreational fishing. Directed sampling efforts are difficult outside of the primary recreational season that extends from April through August, because fish are migrating from spawning locations and not found in large concentrations.

Description of the Fishery

Landings data are generated for the recreational fishery through the Marine Recreational Information Program (MRIP) report landings for state and federal waters. Current information indicates a variable proportion of landings come from state waters and can range from 0 to

100% (Table 2). The 10 year average, annual percentage of cobia taken in state waters with and without east coast /Florida included are 66% and 51% respectively (Tables 3 and 4).

Recreational Cobia fisheries are prosecuted similarly along the coast. The directed Cobia fishery is prosecuted in two distinct ways. Bottom fishing with live or dead baits, often while chumming, in estuarine waters or around inlets or offshore around structure, buoys, markers, natural and artificial reefs. More recently, an active method of searching for fish traveling alone or in small groups on the surface or associated with schools of Atlantic menhaden or other bait fishes has grown in popularity. This newer method has resulted in the further development of the for-hire sector for Cobia, as well as the development of specific artificial baits and boat modifications (e.g., towers) to facilitate spotting and catching the fish. A third method primarily prosecuted in offshore waters is to target large rays, large sharks, sea turtles, or floating debris around which cobia congregate. This more active method likely confounds reported landings being in state or nearshore federal waters as vessels tend to move in and out of state and federal waters following the bait or the fish. Additionally, the Atlantic coast of Florida is starting to see more directed spearfishing pressure on cobia. Specifically, spearfishers are chumming for bull shark and then diving/free-diving to spear the cobia that associate with them. Spearfishing also occurs off North Carolina, along with a popular pier fishery.

Table 2. Percentage of cobia in the recreational fishery harvested in state's waters (zero implies all were harvested from federal waters). All data are final MRIP estimates, which may differ from SEFSC estimates.

	Florida	Georgia	South Carolina	North Carolina	Virginia
2006	22	0	98	30	100
2007	9	0	0	47	100
2008	14	0	0	50	100
2009	53	0	0	58	100
2010	59	39	41	75	94
2011	33	0	0	90	50
2012	21	80	0	49	42
2013	9	0	61	79	83
2014	17	0	52	82	100
2015	13	0	6	92	97

Table 3. 10-year average percentage of cobia harvested in state waters without east coast Florida included. All data are final MRIP estimates, which may differ from SEFSC estimates.

	State GA-NY	Federal GA-NY	Percent State
2006	1,005,706	149,537	87
2007	402393	374,051	52
2008	157,793	393,864	29
2009	541,594	134,935	80
2010	679,777	232,073	75
2011	184,514	143,357	56
2012	147,273	289,154	34
2013	590,633	172,290	77
2014	387,364	77,004	83
2015	1,496,442	232,854	85

Table 4. 10-year average percentage of cobia harvested in state waters including the east coast Florida. All data are final MRIP estimates, which may differ from SEFSC estimates.

	State FL-NY	Federal FL-NY	Percent State
2006	1,116,100	532,477	68
2007	456,395	900,681	34
2008	218,154	772,124	22
2009	733,424	304,225	71
2010	1,122,392	534,686	68
2011	436,805	652,506	40
2012	223,755	583,045	28
2013	615,462	421,737	59
2014	486,921	559,870	47
2015	1,559,160	652,092	71

The recreational fishery also takes Cobia as bycatch in offshore bottom fisheries such as snapper/grouper, nearshore trolling for king mackerel, bluefish, and dolphin, and any other fishery that employs live or dead bait fished on or near the bottom. While the directed fishery appears to focus more on the spring-summer spawning migration, bycatch, especially offshore, can yield Cobia virtually year-round.

Recreational landings for Cobia have varied with little trend since 2005; landings did hit a time series high in 2015 resulting in a significant overage of the federal ACL (Figure 3).

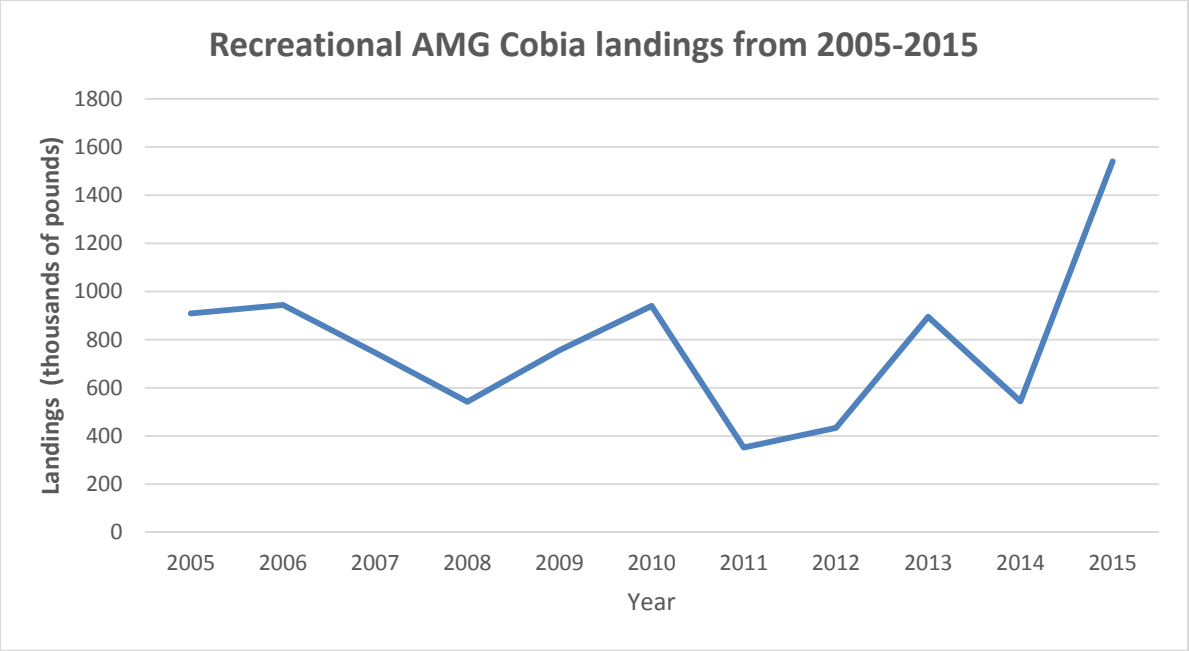


Figure 3. Recreational landings of AMG Cobia (2005-2015)

Commercial harvest of Cobia has traditionally been bycatch in the offshore snapper/grouper and trolling fisheries. Directed fisheries are generally precluded as a result of the low possession limits, but do occur, specifically Virginia's commercial hook and line fishery. Cobia from for-hire trips may also be sold commercially, depending on the state's permit requirements for selling fish. The commercial fishery has seen an increasing trend from North Carolina through the mid-Atlantic over the time series. The commercial Cobia fishery closed early in 2014 (December 11, 2014). The 2015 overages would have been deducted if the stock were overfished; however, given they are not overfished, the commercial quota for 2016 remains 50,000 pounds (Figure 4).

State-Specific Landings

Florida

Landings of Cobia in Florida are significant. Continued genetic analysis may result in some adjustments to the current stock boundaries management unit as more data become available. Recreational Cobia landing on the East coast of Florida averaged 488,788 pounds during the 2005-2015 time series (Table 5).

Commercial Cobia landings on the East coast of Florida ranged from 57,003 to 156,069 pounds (avg. = 88,278 pounds) during the 2007-2011 time series.

Georgia

Recreational Cobia landings in Georgia ranged from 3,358 to 257,690 pounds (avg. = 58,111 pounds) during the 2005-2015 time series (Table 5).

Commercial landings in Georgia and South Carolina were low and values for the two states were combined from 2010-2015 to avoid confidentiality issues and averaged 3,867 pounds (Table 6).

South Carolina

Recreational Cobia landings in South Carolina averaged 76,954 pounds during the 2005-2015 time series (Table 5). Cobia were designated as gamefish in South Carolina but properly permitted for-hire vessels may sell Cobia.

North Carolina

Recreational Cobia landings in North Carolina averaged 259,883 pounds from 2005-2015 (Table 5).

Commercial landings in North Carolina ranged from 19,950 to 52,315 pounds from 2010-2015, averaging 37,559 pounds over the time series. The landings of 52,684 pounds in 2015 accounted for nearly the entire AMG Cobia commercial quota and would have exceeded the 2016 quota (Table 6).

Virginia

Recreational Cobia landings in Virginia averaged 368,059 pounds during the 2005-2015 time series (Table 5).

Commercial landings for the mid-Atlantic region (Virginia, Maryland, New Jersey, New York,) and Rhode Island are combined in Table 6 to avoid confidentiality issues in several Mid-Atlantic States. The majority of the mid-Atlantic landings come for Virginia. The average landings from 2010-2015 were 14,732 pounds.

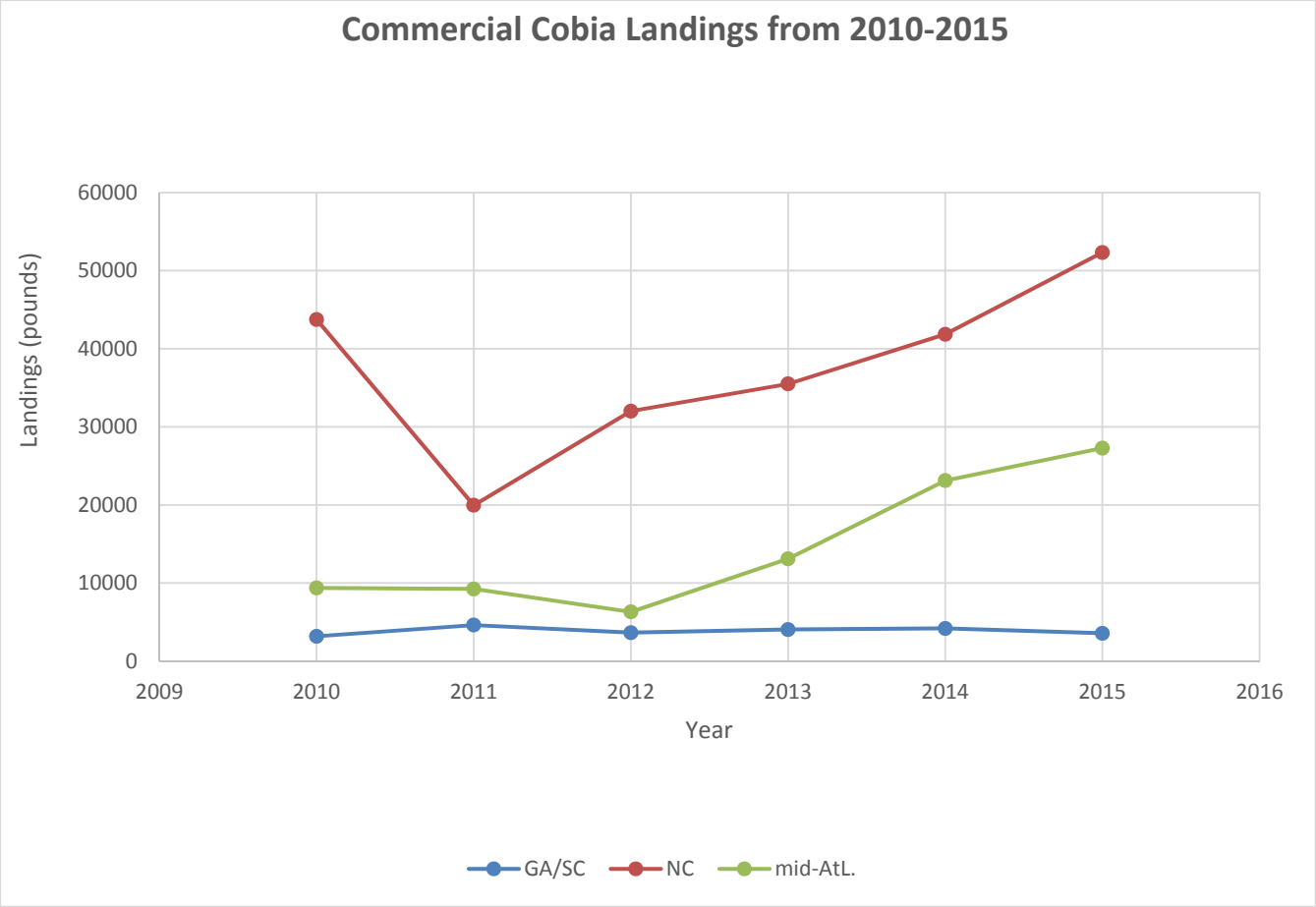


Figure 4. Commercial landings of Cobia (2010-2015)

Table 5. Recreational landings of Atlantic Cobia from 2005-2015 in pounds. Data sources: SEFSC

Year	Virginia	North Carolina	South Carolina	Georgia	Total AMG (VA-GA)	East Coast of Florida
2005	577,284	322,272	5,793	3,358	908,707	287,267
2006	733,740	104,259	101,018	4,824	943,841	493,334
2007	322,887	90,197	268,677	64,708	746,469	580,632
2008	167,949	66,258	50,108	257,690	542,006	438,621
2009	552,995	123,061	76,229	3,997	756,282	361,120
2010	232,987	561,486	65,688	79,855	940,015	745,228
2011	136,859	121,689	3,565	90,375	352,488	761,440
2012	36,409	68,657	224,365	105,193	434,623	370,373
2013	354,463	492,969	19,130	29,224	895,786	274,276
2014	214,427	277,489	31,927	20,642	544,485	582,423
2015	718,647	630,373	123,952	67,804	1,565,186	481,956

* There are no MRIP-estimated recreational landings of AMG Cobia in states north of Virginia.

Table 6. Commercial Cobia landings (pounds) and revenues (2014 dollars) by state/area, 2010-2015.

Year	GA/SC	NC	Mid-Atlantic*	Total
		Commercial Landing in Pounds		
2010	3,174	43,737	9,364	56,275
2011	4,610	19,950	9,233	33,793
2012	3,642	32,008	6,309	41,959
2013	4,041	35,496	13,095	52,632
2014	4,180	41,848	23,111	69,139
2015	3,555	52,315	27,277	71,790
Average	3,867	37,559	14,732	56,158
		Dockside Revenues (2014 dollars)		
2010	$11,377	$70,377	$19,976	$101,730
2011	$19,666	$37,893	$21,666	$79,224
2012	$15,554	$66,887	$14,597	$97,038
2013	$15,639	$79,397	$35,792	$130,828
2014	$13,320	$95,462	$67,972	$176,754
2015	$11,151	$147,160	$75,360	$233,672
Average	$14,451	$82,863	$39,227	$136,541

Georgia and South Carolina landings are combined to avoid confidentiality issues. Source: SEFSC Commercial ACL Dataset (December 2015) for 2010-2014 data; D. Gloeckner (pers. comm., 2016) for 2015 data.

- Mid-Atlantic States include Virginia, Maryland, New York, New Jersey. Landing are also reported from Rhode Island in New England.

Issues for Public Comment

Public comment is sought on several issues being considered for inclusion in the FMP. The issues are intended to focus the public comment and provide the Board with the necessary input to develop an FMP. The public is encouraged to submit comments on the issues listed below as well as other issues that may need to be addressed in the FMP.

ISSUE 1: COMPLEMENTARY MANAGEMENT WITH THE COUNCIL:

Background: The Council currently manages Cobia through the Coastal Migratory Pelagics FMP with consistent bag, trip, and size limits in federal waters. A recent ACL has been employed to protect the resource and minimize the possibility of Cobia being subjected to overfishing or becoming overfished. Complementary management of cobia is intended to increase flexibility and management reaction time, while providing states the ability to more actively and adequately manage the fishery in their respective states. The Commission would adopt the ACLs and biological reference points established by the benchmark Cobia stock assessment developed by the Council.

States have historically mirrored the Council's size and bag limit regulations in state waters. The recreational closure in 2015 resulted in the states of Virginia and North Carolina modifying their regulations in order to reduce the impacts of the June 20, 2016 federal closure. The state of South Carolina has developed various, additional regulations based on area specific genetic

work and concern over the condition of a distinct population segment that occurs in their southern waters.

Management Questions:
- Should the Commission develop a complementary Cobia FMP to the Council's CMP FMP?
- What Council management measures should be required in the Commission plan?
- What states should be included in the management unit?
- Given the upcoming workshop in 2017 that will review the most recent genetic information for cobia, should the FMP provide the flexibility to make changes to management unit and stock units to reflect changes in the science?

ISSUE 2: WHAT ARE THE APPROPRIATE MANAGEMENT OBJECTIVES FOR THE COBIA FMP?

Background: The Commission could consider the following management objectives for the Cobia FMP and is soliciting other ideas or options that could be raised.

A. Provide a management plan that achieves the long-term sustainability of the resource and strives, to the extent practicable, to implement and maintain consistent coastwide measures, while allowing the states the flexibility to implement alternative strategies to accomplish the objectives of the FMP
B. Provide for sustainable recreational and commercial fisheries.
C. Maximize cost effectiveness of current information gathering and prioritize state obligations in order to minimize costs of monitoring and management.
D. Adopt a long-term management regime which minimizes or eliminates the need to make annual changes or modifications to management measures.

Management Questions
What should be the objectives in managing the Cobia fisheries through the Commission?

ISSUE 3: CONSISTENT, STATEWIDE MANAGEMENT OF COBIA:

Background: States currently manage their Cobia fisheries independently. The Commission is considering coordinating the management of Cobia in order to avoid states being disadvantaged based on where they occur along the migratory route, while maintaining harvest at the Council's ACL level.

Management Questions:
- Are consistent, state-specific management measures, coordinated by the Commission, needed for Cobia?
- Are there regional differences in the fishery and/or in the Cobia that need to be considered when implementing management measures?

ISSUE 4: WHAT ARE THE APPROPRIATE COMMERCIAL AND RECREATIONAL MANAGEMENT MEASURES FOR COBIA?

Background: The Commission could consider different management approaches for the commercial and recreational Cobia fishery. Commercial fisheries are managed consistently throughout state and federal jurisdictions, while recreational management measures vary (Table 1).

States have been disadvantaged by geography in the past when they occur on the northern or southern end of a migratory range, often resulting in early closures or no fishery at all. While consistent, coastwide measures may be desirable, they may result in disproportionate impacts to certain states.

Consistent, coastwide measures could potentially include: minimum size restrictions, maximum size restrictions, bag/trip/boat limits, seasons, gear restrictions.

More flexibility to individual states may be available through state-by-state quota shares of the Cobia ACLs. Quota shares can allow limits and seasons to be imposed that maximize the individual state fishery needs, and reduce the impact of events occurring outside state boundaries.

Management Options:

- Should the FMP require a coastwide closure if the Council ACL is met?
- Should the FMP require a coastwide measures (e.g., size and bag limit)?
- Should the FMP develop a suite of options for the allocation of state-specific quota shares, and allow states to adopt unique size, bag, and season measures?
- Should the FMP consider gear restrictions, e.g. circle hooks for all live and dead bait fisheries for Cobia or prohibition on gaffing Cobia?
- Are there other management options that should be considered (e.g., slot limits, spawning season closures, etc.)?
- Should the FMP consider some level of *de Minimis* or threshold landings where Cobia harvest is minimal or episodic?

ISSUE 6: OTHER ISSUES?

The public is asked to comment on any other issues for consideration in the development of the Commission's Draft Fishery Management Plan for Cobia.

Literature Cited

GMFMC/SAFMC. 1992. Amendment 6 to the Fishery Management Plan for Coastal Migratory Pelagic Resources in the Gulf of Mexico and Atlantic Region. Gulf of Mexico Fishery Management Council, Tampa, Florida, and South Atlantic Fishery Management Council, Charleston, South Carolina.

GMFMC/SAFMC. 2011. Amendment 18 to the Fishery Management Plan for Coastal Migratory Pelagic Resources in the Gulf of Mexico and Atlantic Region. Gulf of Mexico Fishery Management Council, Tampa, Florida, and South Atlantic Fishery Management Council, North Charleston, South Carolina.

GMFMC/SAFMC. 2014. Amendment 20B to the Fishery Management Plan for Coastal Migratory Pelagic Resources in the Gulf of Mexico and Atlantic Region. Gulf of Mexico Fishery Management Council, Tampa, Florida, and South Atlantic Fishery Management Council, North Charleston, South Carolina.

SEDAR 28. 2012, 2013. Southeast Data, Assessment, and Review Stock Assessment of South Atlantic Spanish Mackerel and Cobia. Available at: http://www.sefsc.noaa.gov/sedar/Sedar_Workshops.jsp?WorkshopNum=28

South Atlantic Fishery Management Council. 2016. Framework Amendment 4 to the Fishery Management Plan for Coastal Migratory Pelagics Resources in the Gulf of Mexico and Atlantic Region. NOAA award # FNA10NF4410012. Charleston SC. 148 pp.

SAFMC. 2016 (in preparation). Framework Amendment 4 to the Fishery Management Plan for Coastal Migratory Pelagic Resources in the Gulf of Mexico and Atlantic Region. South Atlantic Fishery Management Council, North Charleston, South Carolina.

Appendix II
State Fishery and Regulatory Summaries

I. GEORGIA

Regulatory Summary

The Georgia Legislature, the Board of Natural Resources and the Department of Natural Resources, an executive agency, share regulatory responsibilities for wildlife in the state of Georgia with the Board and Department as subordinates. Title 27 (Game and Fish Code) Chapter 4 of the Georgia Statutes contain the laws directly related to the management of wildlife including marine fishes (O.C.G.A. 27-4-10). In 2012, the legislature amended the Game and Fish Code extensively and in doing so granted the Board and Department additional powers to promulgate regulations affecting marine fisheries. Previously the legislature maintained management authority over a select group of marine fishes while allowing the Board and Department authority over others. With the 2012 amendment, the legislature set parameters within which the Board and Department regulate marine fishes. Board of Natural Resources Rule 391-2-4-.04, Saltwater Finfishing, contains regulations for these fishes, including cobia.

Current Cobia Regulations in Georgia (March 2017)
Open year round, two fish per person per day, 33-inch fork length minimum size. (Board Rule 391-2-4-.04 (3)(h))

License Requirements
In Georgia, a license is required to fish recreationally (O.C.G.A. 27-2-1) or commercially (O.C.G.A. 27-4-110). Recreational fishing licenses are required of residents and non-residents fishing in state territorial waters as well as the EEZ. All persons under the age of 16, regardless of residency, and resident seniors who are 65 or older are not required to purchase recreational licenses. Other exemptions exist for active military and individuals with disabilities, check with the GADNR for details. Commercial fishing licenses are required to sell seafood landed in Georgia from Georgia waters or from the EEZ.

Penalties for Violations
Penalties for violations of Georgia laws and regulations are established in Georgia Statutes. Most violations of game and fish laws are misdemeanors though some may be elevated to misdemeanors of high and aggravated nature, Title 27, Chapter 4.

Gear Restrictions
There are few restrictions on recreation gear for the harvest of cobia; only gig and gillnet are prohibited. Commercially, cobia may be harvested using trawl nets, cast nets, seines, and pole-and line, though only pole-and-line are practical. (Board Rule 391-2-4-.12)

Commercial Landings and Data Reporting Requirements

Georgia requires commercial harvesters (O.C.G.A. 27-4-118) and seafood dealers (O.C.G.A. 27-4-136) to submit landings data. Information to be supplied for each trip includes trip date; vessel identification; trip number; species; quantity; units of measure; disposition; value; county or port landed; state landed; dealer identification; unloading date; market; grade; gear; quantity of gear; days at sea; number of crew; fishing time; and number of sets.

Commercial finfish harvest limits are equivalent to recreational limits unless otherwise noted. This means that commercial harvesters may land and sell no more than two cobia per person per day and minimum size and landing restrictions are the same as recreational. (Board Rule 391-2-4-.04)

Other Restrictions

Cobia, as with all marine species except sharks, must be landed with head and fins intact. Transfer between vessels at sea is prohibited. (Board Rule 391-2-4-.04 (7)(a) and (b)).

Management Chronology

1957: Gill nets prohibited in state waters.

1989: The Georgia Legislature established O.C.G.A. 27-4-130.1, Open seasons, creel limits, and minimum size limits for certain finfish species. For cobia a closed season of December 1 through March 15 was established ((a)(3)). Furthermore, the legislature authorized the Board to manage cobia seasons beyond this closed season as well as to set size limits between 20 and 40 inches and to establish a maximum daily creel not to exceed 10 fish ((b)(3)).

1989: The Board of Natural Resources adopted Rule 391-2-4-.04, Saltwater Finfishing. Specifically for cobia, it established a March 16 to November 30th open season ((3)(c)), a two cobia per person daily creel and possession limit ((4)(c)), and a 33-inch fork length minimum size ((5)(c)).

2012: The Georgia Legislature repealed O.C.G.A. 27-4-130.1 and moved those species therein to O.C.G.A. 27-4-10. Cobia ((a)(28)) parameters were set at 0 to 40 inches and five fish. Further, the board was authorized to set size limits, open seasons, creel and possession limits and possession and landing specifications on a state-wide, regional and local basis. Finally, the Commissioner of the Department was empowered to close waters to recreational and commercial fishing by species for a period of up to six months within a calendar year.

2012: The Board of Natural Resources implemented the necessary requirements of the Legislative repeal while keeping cobia management intact, with the exception of resorting species; cobia became letter (h).

2014: The Board of Natural Resources amended 391-2-4-.04, Saltwater Finfishing, for Cobia ((3)(h)) to allow fishing all year, but kept the two cobia per person creel and possession limit

and the 33-inch fork length minimum size limit as well as the landing restrictions of head and fins intact and prohibition on transfer at sea.

II. SOUTH CAROLINA

Description of the Fishery

1.3.1 Commercial Fishery:

There is a limited commercial fishery for cobia in South Carolina. Cobia are a state-designated Gamefish, and as such, cobia landed in state waters may not be sold commercially. However, cobia landed in Federal waters can be sold commercially under current regulations. Commercial cobia landings have ranged from 2000-4300 lbs a year with an annual mean of 3207 lbs a year for 2005-2016 and dollar values ranging from $4,731-$17,795 annually.

1.3.2 Recreational Fishery:
The recreational fishery for cobia in South Carolina accounts for the majority of cobia landings. The fishery occurs in both nearshore waters and around natural and artificial reefs offshore. Historically, the majority of cobia landings have occurred in state waters in and around spawning aggregations from April through May. However, due to intense fishing pressure in the inshore zone, annual landings of cobia have fallen drastically since 2009 such that the majority of recreationally caught cobia in South Carolina now come from offshore (federal) waters. Anglers begin targeting cobia in late April/early May with the peak of the season typically occurring May into early June. Late season catches can occur on nearshore reefs through October depending on water temps. However, these Fall catches of fish are sporadic. South Carolina has accounted for an average of 1.3% of total landings in state jurisdictional waters along the Atlantic coast for 2010-2016.

1.4 Specific comments for habitat – spawning, larval, juvenile, adult
Cobia enter nearshore waters along the south Atlantic Coast when water temperatures reach 20-21 C, usually late April and aggregate to spawn through June. Histological evaluation of gonads from these nearshore collections suggest cobia are mature and spawning in inshore waters of high salinity estuaries (Callibogue, Port Royal Sound and St. Helena Sound in SC)(Lefebvre and Denson, 2012). The inshore spawning aggregations in South Carolina have been determined to be genetically distinct from the Atlantic stock of cobia (Darden et al. 2014). These findings are corroborated by conventional tag-recapture information and show estuarine fidelity for spawning fish and natal homing annually into estuaries. Eggs and larvae are typically found in nearshore waters where there is significant retention time of estuarine waters; however, juveniles (< 2yrs of age) are only occasionally caught inshore or in protected nearshore waters making it unclear what habitat the majority of this life stage utilizes until they mature and join spawning aggregations (Lefebvre and Denson, 2012).

2.1.1. History of Prior Management Actions

South Carolina: see Appendix A for detailed South Carolina cobia regulatory information

3. MONITORING PROGRAM SPECIFICATIONS/ELEMENTS

ASSESSMENT OF ANNUAL RECRUITMENT: None

ASSESSMENT OF SPAWNING STOCK BIOMASS: None

ASSESSMENT OF FISHING MORTALITY TARGET AND MEASUREMENT: None

SUMMARY OF MONITORING PROGRAMS

Catch, Landings, and Effort Information – Comm & Rec (ACCSP data will be collated by ASMFC and SCDNR staff)

Biological Information:

Observer Programs: None in South Carolina

STOCKING PROGRAM: South Carolina has an experimental stock enhancement program designed to evaluate the methodology necessary for augmenting wild populations. To date experiments have been designed to determine best size and time of year to stock cobia in coastal rivers focused on augmentation of the distinct population segment of cobia in SC. Locally-caught brood stock have been conditioned to spawn in recirculating seawater systems using temperature and photoperiod conditioning and hormone implantations to facilitate final oocyte maturation. To date multiple years of spawning and growout has occurred, and more than 50,000 (60-350 mm TL) cobia have been stocked in the Colleton and Broad Rivers of Port Royal Sound. All fish are genetically identifiable to broodstock group and can be identified in the catch and distinguished genetically from wild-spawned fish. Cobia tissue samples collected from charterboat captains and from carcasses collected at tournaments and cooperating recreational anglers show that as much as 50% of the catch from the 2007 yearclass were from hatchery releases and that these animals have persisted in the catch each year since release. This research has demonstrated the application of stock enhancement as an additional management tool for cobia. In addition to research on production of animals, the SCDNR has developed predictive individual-based genetic models to determine the appropriate number of cobia that should be produced and stocked each year in order to grow the population while minimizing any negative impact on the genetic health of the wild population.

BYCATCH REDUCTION PROGRAM: None in South Carolina

6. MANAGEMENT AND RESEARCH NEEDS

Biological, Social, Economic and Habitat

While the cobia that spawn in South Carolina move offshore and mix with the Atlantic offshore cobia group, their offshore range is not well understood. It has been determined through tag-recapture research that some cobia migrate from waters off of the East coast of Florida to Georgia and South Carolina but it is unclear as to whether that is a large proportion of the population. It has been hypothesized that the majority of the cobia population make an East-West migration as water temperatures increase to 20-21 C in the spring. Current research using acoustically tagged fish should help elucidate the scale of migration of fish tagged in FL, GA, SC and NC. If the Atlantic stock of cobia is a composite of smaller regional groups that are more state specific, current management paradigms could be questioned. Research using

satellite tags with a long battery life may help answer questions of East –West migrations as current telemetry arrays are only coastal in nature. Identifying these basic life history characteristics for cobia in South Carolina would aid in the management of the species both at the state and regional level. Additionally, better socio-economic estimates of the impact of cobia fishing in South Carolina would aid in understanding how regulatory changes may impact the economic benefit cobia fishing has throughout South Carolina.

Regulatory Summary

The South Carolina Legislature and the South Carolina Department of Natural Resources, an executive agency, share regulatory and enforcement responsibilities (respectively) for wildlife in the state of South Carolina. Regulatory authority for fisheries (and cobia) in South Carolina occurs in Title 50 of the South Carolina Code of laws (http://www.scstatehouse.gov/code/title50.php). The South Carolina legislature maintains regulatory authority while the Department of Natural Resources has management authority as well as limited emergency proclamation powers (South Carolina Code of Laws: Section 50-5-20 through 25).

Current Cobia Regulations in South Carolina (July 2017)
Catch limit of two fish per person per day, 33-inch fork length minimum size. (South Carolina code of Laws: Section 50-5: Article 17). State waters south of 032^{o} 31.0 N latitude (Jeremy Inlet, Edisto Island) closed from May 1st to May 31st. Federal waters and other state waters are closed when annual catch limit (ACL) is met.

License Requirements
In South Carolina, a license is required to fish recreationally (South Carolina Code of Laws, Section 50-5) or commercially (South Carolina Code of Laws, Section 50-5). Recreational fishing licenses are required of residents and non-residents fishing in state territorial waters as well as the EEZ. All persons under the age of 16, regardless of residency, and resident seniors who are 65 or older are not required to purchase recreational licenses. Other exemptions exist for active military and individuals with disabilities, check with the SCDNR for details. Commercial fishing licenses are required to sell seafood landed in South Carolina from South Carolina waters or from the EEZ.

Penalties for Violations
Penalties for violations of South Carolina laws and regulations are established in the South Carolina Code of Laws. Most violations of game and fish laws are misdemeanors though some may be elevated to misdemeanors of high and aggravated nature (Section 50-5).

Gear Restrictions
The taking of cobia for both recreational and commercial (federal waters only) purposes can occur with either rod and reel or gig, all other gears are prohibited.

Commercial Landings and Data Reporting Requirements

South Carolina requires commercial harvesters (South Carolina Code of Laws: Section 50-5) and seafood dealers (South Carolina Code of Laws: Section 50-5) to submit landings data. Information to be supplied for each trip includes trip date; vessel identification; trip number; species; quantity; units of measure; disposition; value; county or port landed; state landed; dealer identification; unloading date; market; grade; gear; quantity of gear; days at sea; number of crew; fishing time; and number of sets.

Commercial finfish harvest limits are equivalent to recreational limits unless otherwise noted. This means that commercial harvesters may land and sell no more than two cobia per person per day and minimum size and landing restrictions are the same as recreational. (South Carolina Code of Laws: Section 50-5)

Management Chronology

Prior to 1985: No Regulation

1985: Minimum total length of 37 inches or a fork length of 33 inches. No creel limit.

1987: Minimum fork length of 33 inches, no creel limit

1989: Concurrence with Federal regulations which established a fork length of 33 inches and possession limit of 2 fish per person per day.

1990: South Carolina law (SC Code of Laws: Section 50-5) sets state creel limit set at 2 fish per person per day (matching federal regulations).

1992: South Carolina Marine Recreational Fisheries Conservation Management Act, Saltwater Recreational Fishing License established.

2000: Establishment of Marine Resources Act (Chapter 5 re-write) with Federal regulations declared to be law of the state through Section 50-5-2730 when no specific South Carolina regulations exist.

2012: Cobia designated a Gamefish, commercial capture in South Carolina state waters prohibited.

2016:

- Establishment of the Southern Cobia Management Zone for waters south of 032^{o} 31.0 N latitude (Jeremy Inlet, Edisto Island).
- Creel limit of 1 fish per person per day and no more than 3 per boat for waters south of 032^{o} 31.0 N latitude (Jeremy Inlet, Edisto Island) and no more than 2 fish per person per day in all other South Carolina and Federal waters.

- Closure: Cobia harvest prohibited (catch and release only) from May 1st to May 31st in water south of 032° 31.0 N latitude (Jeremy Island, Edisto Island). Federal and other state waters close when annual catch limit (ACL) is reached.

III. NORTH CAROLINA

Cobia have been harvested in North Carolina since at least the 1950s (CMP FMP 1982). The fishery has primarily consisted of recreationally harvested fish either from the charter boat fishery or from private vessels with modest landings from shore based anglers. Commercial landings of cobia are considered incidental in other fisheries with no targeted fishery to date.

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 of 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 of cobia in North Carolina from 1981 – 2016 have ranged from a low of 0 pounds (1983) to a high of 695,842 pounds (2015) with average landings of 165,146 over the 36-year time series (Figure NC1; Table NC1). 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. From 2005-2015, recreational cobia landings in North Carolina ranged from 66,258 to 630,373 pounds (avg. = 259,883 pounds). 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, the majority of recreational landings of cobia in North Carolina occur form private vessels (73 %) with charter vessels (14 %) and shore based modes (13 %) accounting for the rest (Table NC2).

Commercial landings of cobia in North Carolina are available from 1950 to the present. However, monthly landings are 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. The primary fisheries associated with cobia in North Carolina are the snapper-grouper, coastal pelagic troll, and the large mesh estuarine gill net fisheries. Cobia landings from 1950 – 2016 have ranged from a low of 600 pounds (1951; 1955) to a high of 52,684 pounds (2015) with average landings of 16,611 pounds over the 66-year time series (Table NC3). Recently, landings have ranged from 19,004 pounds (2007) to 52,6845 pounds (2015), averaging 34,674 pounds over the last ten years (Figure NC2).

The primary commercial gear used to harvest cobia has changed overtime. This is most likely due to changing fisheries and the fact that it is mostly considered a marketable bycatch fishery,

especially after North Carolina adopted the CMP FMP measures of 33-inches minimum fork length and two-per person possession limit in 1991. 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 handlie fishery with modest landings from the haul seine and anchored gill net fishery. From 1994 – 2016, the majority of landings have occurred from the anchored gill net and pelagic troll and handline fishery with gill nets being the top gear during most of those years.

References

GMFMC and SAFMC. 1983. Fishery Management Plan, Final Environmental Impact Statement, Regulatory Impact Review, Final Regulations for the Coastal Migratory Pelagic Resource (Mackerels). Prepared by the Gulf of Mexico and South Atlantic Fishery Management Councils, February, 1983. Tampa, Florida and Charleston, South Carolina. 399 pp.

Manooch, Charles S. 1984. Fisherman's guide to fishes of the Southeastern United States. North Carolina Museum of Natural History. Raleigh, North Carolina. 362 pp.

Smith, Joseph W. 1995. Life history of cobia *Rachycentron canadum* (Osteichthyes: Rachycentridae), in North Carolina Waters. Brimleyana 23:1-23.

Tables and Figures

Table NC1. Recreational estimates of cobia harvest from North Carolina from 1981 – 2016.

Year	Harvest (pounds)	Year	Harvest (Pounds)
1981	6,484	1999	47,477
1982	66,342	2000	118,349
1983	0	2001	74,756
1984	191,237	2002	209,043
1985	20,985	2003	84,774
1986	178,128	2004	294,042
1987	79,943	2005	239,195
1988	106,749	2006	184,299
1989	115,372	2007	106,213
1990	118,387	2008	82,566
1991	128,709	2009	166,195
1992	120,261	2010	498,581
1993	94,990	2011	145,796
1994	94,394	2012	104,105
1995	144,757	2013	506,067
1996	99,867	2014	247,386
1997	154,862	2015	695,842
1998	125,546	2016	293,544

Table NC2. Average cumulative harvest totals (pounds and percent) of cobia harvested in North Carolina from 2011 – 2015 by bi-weekly time period.

	Private Vessels		Charter Vessels		Shore based		All Modes Combined	
Day Range	Cumulative Pounds	Cumulative Percent	Cumulative Pounds	Cumulative Percent	Cumulative Pounds	Cumulative Percent	Cumulative Pounds	Cumulative Percent
Apr 16-30	3,311	1					3,311	1
May 01-15	35,385	12	4,893	9			40,278	11
May 16-31	164,469	58	30,160	56			194,629	53
Jun 01-15	248,925	87	37,722	70	14,066	47	300,713	81
Jun 16-30	264,361	93	40,936	76	14,801	49	320,098	87
Jul 01-15	272,865	96	44,423	83	19,439	65	336,727	91
Jul 16-31	279,176	98	46,772	87	21,341	71	347,289	94
Aug 01-15	281,084	98	49,840	93	21,341	71	352,265	95
Aug 16-31	282,292	99	51,734	96	28,091	94	362,116	98
Sep 01-15	284,534	100	52,098	97	28,840	96	365,472	99
Sep 16-30	284,534	100	53,737	100	29,969	100	368,239	100
Oct 01-15	285,630	100	53,790	100			369,389	100

Table NC3. Total commercial landings of cobia from North Carolina from 1950 – 2016.

Year	Landings (Pounds)	Year	Landings (Pounds)	Year	Landings (Pounds)
1950	3,700	1973	2,545	1995	35,143
1951	600	1974	1,174	1996	33,404
1952	1,500	1975	2,081	1997	42,063
1953	10,000	1976	2,019	1998	22,197
1955	600	1977	973	1999	15,491
1956	4,400	1978	1,928	2000	28,754
1957	11,400	1979	3,552	2001	24,718
1958	9,800	1980	5,128	2002	21,058
1959	13,200	1981	5,260	2003	21,313
1960	11,600	1982	10,574	2004	20,162
1961	17,900	1983	4,279	2005	17,886
1962	19,800	1984	6,701	2006	20,270
1963	17,000	1985	6,640	2007	19,005
1964	12,000	1986	18,303	2008	22,047
1965	10,100	1987	32,672	2009	31,898
1966	9,500	1988	15,690	2010	43,715
1967	10,200	1989	14,898	2011	19,924
1968	7,300	1990	21,938	2012	31,972
1969	6,300	1991	23,217	2013	35,456
1970	7,300	1992	18,534	2014	41,798
1971	10,600	1993	20,431	2015	52,684
1972	3,219	1994	30,586	2016	48,244

Figure NC1. Recreational harvest of cobia from North Carolina from 1981-2016.

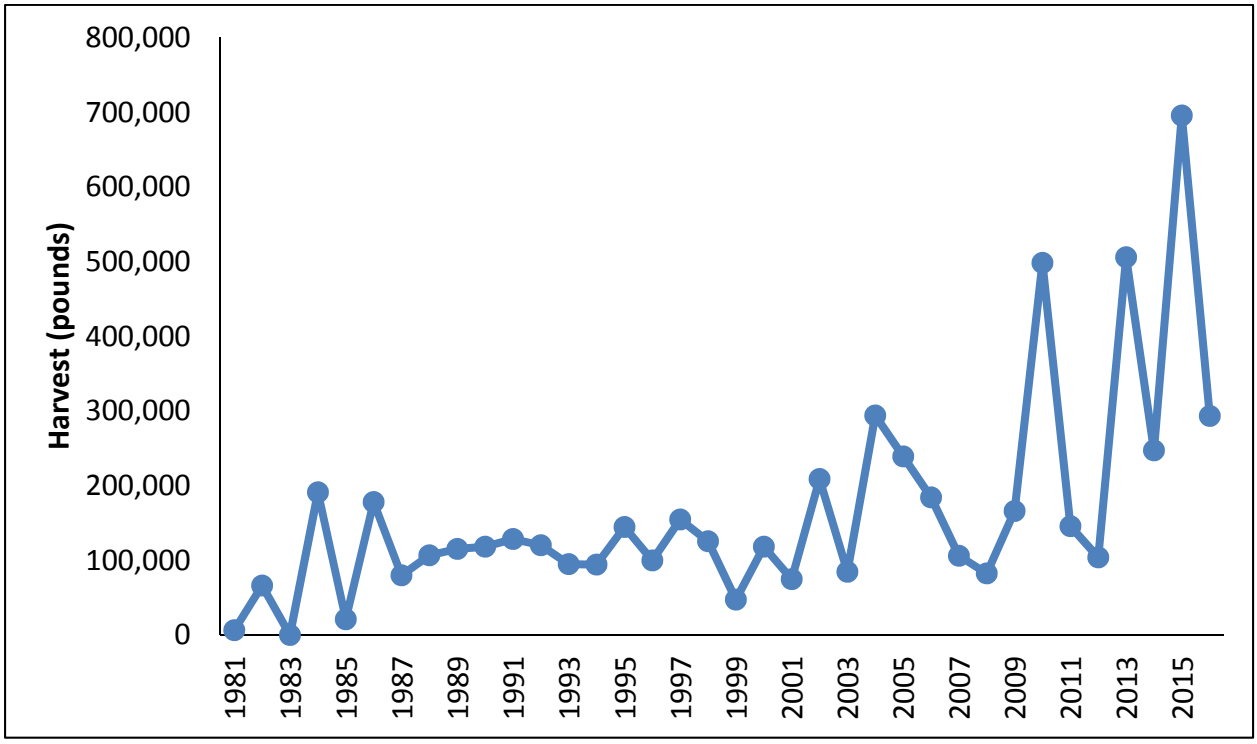
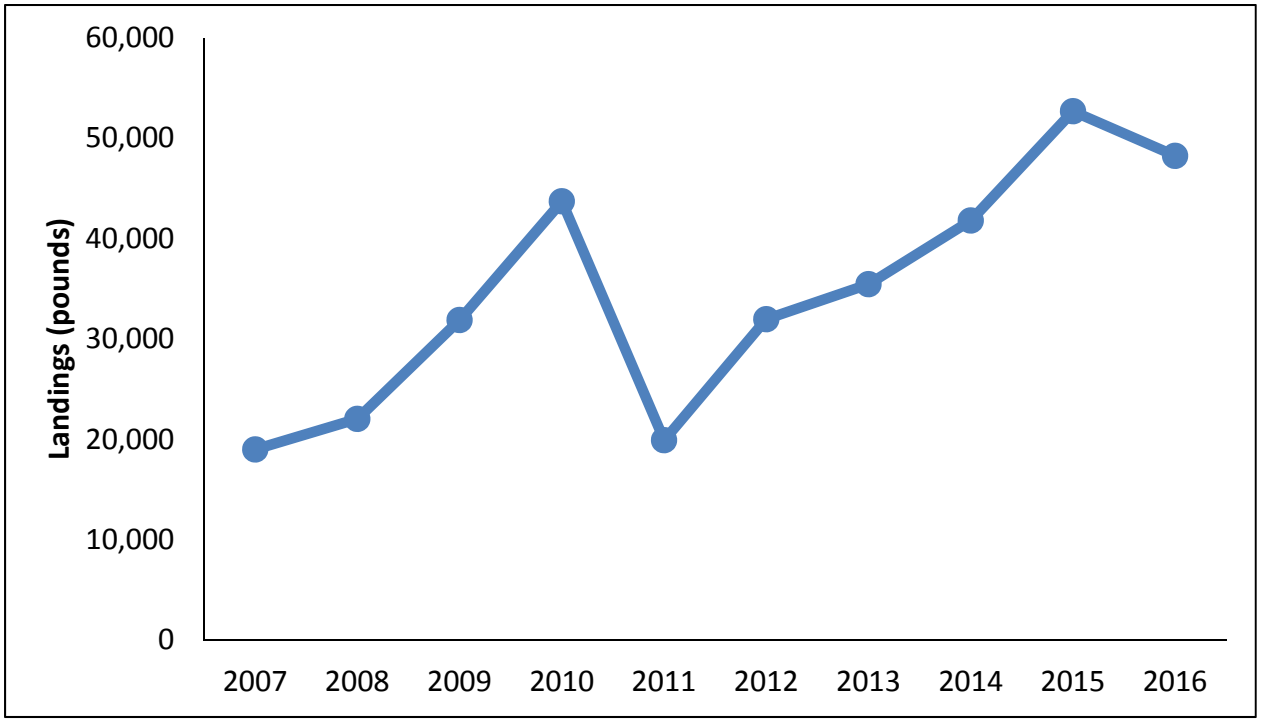


Figure NC2. Total commercial landings of cobia from North Carolina from 2007 – 2016.



IV. VIRGINIA

Description of the Fishery

1.3.1 Commercial Fishery

Virginia has had variable commercial landings of cobia since the Virginia Marine Resources Commission instituted mandatory reporting in 1993, with landings being high in the mid-1990s, lower in the mid-2000s, and peaking in the past three years (2014-2016; Table VA1). There is a small, but directed hook-and-line fishery, with mainly bycatch landings from gillnets and pound nets, although these landings can be sizable (Table VA2). The "Other" category is predominantly gillnet landings, but they were combined with other gears for confidentiality purposes. Hook-and-line landings have been the largest, by gear, since 2007.

Table VA1. Commercial cobia landings for Virginia in pounds, 1993-2016. Data before 2004 are more likely to contain duplicates and misclassifications.

Year	Landings (lbs.)
1993	5,982
1994	7,786
1995	21,942
1996	20,871
1997	11,710
1998	13,419
1999	5,808
2000	7,525
2001	10,228
2002	12,735
2003	7,698
2004	5,778
2005	5,719
2006	9,064
2007	6,052

2008	7,084
2009	6,282
2010	8,974
2011	8,755
2012	5,549
2013	10,865
2014	20,971
2015	25,516
2016	31,473

Table VA2. Percentage of commercial cobia landings for Virginia, by gear, 1993-2016

Year	Hook & Line	Pound Net	Other
1993	39	45	16
1994	32	50	18
1995	27	46	28
1996	51	38	10
1997	12	69	19
1998	38	48	13
1999	19	64	17
2000	20	21	60
2001	38	42	20
2002	45	28	27
2003	26	21	53
2004	29	10	61
2005	35	9	56
2006	31	15	54
2007	36	21	43
2008	51	13	37
2009	54	20	26
2010	66	3	31
2011	81	2	17
2012	61	3	36
2013	73	7	20
2014	85	6	9
2015	81	8	12
2016	81	7	11

1.3.2 Recreational Fishery

According to the Marine Recreational Fisheries Statistics Survey (MRFSS) and Marine Recreational Information Program (MRIP), Virginia's estimated recreational landings of cobia have been highly variable since 2000, with the lowest estimate being 26,537 pounds in 2012 and 898,542 pounds in 2006 (Table 3). Although still preliminary, the estimate for 2016 is 919,992 pounds. It is believed the recreational fishery has grown in recent years, both in the number of participants, and the effectiveness of fishing due to the advent of sight-casting—especially when aided by "cobia towers." Traditionally, cobia had been targeted using live-bait bottom-fishing, but these new techniques are causing a shift in preference among anglers. However, the extent of this change is not clear for Virginia's recreational fishery.

In addition to a large private recreational industry, there is a small, dedicated group of for-hire participants. Many of these captains/fishing guides utilize cobia towers and prefer sight-casting, although some still chum and fish using live bait.

Table VA3. MRFSS (1981-2003) and MRIP (2004-2016) estimates for recreational cobia landings in Virginia. The value for 2016 is preliminary.

Year	Harvest (pounds)	PSE
1981	4,705	.
1985	103,391	23.9
1986	77,695	39.4
1987	24,956	.
1989	105,819	50.4
1990	86,345	60.7
1991	412,996	49.5
1992	159,502	21.8
1993	93,858	47.8
1994	159,460	36.6
1995	200,794	45.6
1996	152,759	64.1
1997	358,225	59.5

1998	141,566	48.1
1999	101,308	41.8
2000	324,562	58.9
2001	367,003	40.7
2002	75,489	54
2003	37,213	.
2004	35,189	75.5
2005	516,764	53
2006	898,542	49.8
2007	352,071	41.7
2008	116,420	65.1
2009	445,993	31.3
2010	254,414	38.9
2011	107,424	57.8
2012	26,537	74.3
2013	224,442	49.9
2014	173,772	46.5
2015	882,022	48.9
2016	919,992	17.9

1.3.4 Non-Consumptive Factors

There are no known, considerable non-consumptive factors in Virginia's cobia fishery.

1.3.5 Interactions with Other Fisheries, Species, or Users

There are no known, considerable or problematic interactions between Virginia's cobia fishery and other fisheries, species, or users.

1.5 Impacts of the Fishery Management Program

1.5.1 Biological and Environmental Impacts

There are no known, considerable biological and environmental impacts from Virginia's cobia fishery.

1.5.2 Social Impacts

1.5.2.1 Recreational Fishery

Because of declines in the fisheries for other species in Virginia, the recreational cobia fishery has become one of the most important for anglers in recent years. MRIP estimates that this is a predominantly private-recreational fishery, but there is a small group of for-hire captains who fish mostly for cobia during summer months. As a result, any changes to the recreational cobia fishery can have considerable impacts on anglers and captains who have come to identify primarily as cobia anglers.

1.5.2.2 Commercial Fishery

Similar to the situation for the recreational sector, commercial hook-and-line fishermen have come to depend more on cobia as the quality of other fisheries in Virginia has deteriorated. In fact, it has become an actively targeted species for many such commercial fishermen, even though cobia has often been considered a bycatch species in other states and for other gears.

1.5.2.4 Non-consumptive Factors

There are no known, considerable non-consumptive factors in Virginia's cobia fishery.

1.5.3 Economic Impacts

1.5.3.1 Recreational Fishery

According to a National Marine Fisheries Service report, in 2014, angler expenditures generated $350 million in sales in Virginia (Lovell et al. 2016), and cobia has been among the top ten species for estimated recreational harvest since 2012. Additionally, the recreational cobia fishery is considered gear-intensive, as it can entail large, specific bucktail jigs for sight-casting or live bait, usually eels, for the more passive method of fishing. Larger nets can also be expensive for those who do not or cannot gaff cobia. The economic investments for the sight-casting fishery can be even higher, as some elect to have "cobia towers" installed on their boats and tend to travel to different spots more actively, thus using more fuel than those who chum and fish with live bait. However, those using chum and live boat often spend more money on those items, despite perhaps not using as much fuel. Altogether, the recreational cobia fishery can contribute considerable economic benefits to luremakers, marinas, bait shops, and other businesses in the Chesapeake Bay region.

1.5.3.2 Commercial Fishery

The dockside value of Virginia's commercial cobia fishery matches the variability in landings since the early 1990s, with the highest values occurring in the years 2014-2016. There have also been years of relative high value in the mid-1990s and low value in the mid-2000s. All dockside values are static and thus not adjusted for inflation.

Table VA4. Dockside values, not adjusted for inflation, of Virginia's commercial cobia fishery, 1993-2016.

Year	Landings (pounds)	Value (dollars)
1993	5,982	$9,602
1994	7,786	$4,184
1995	21,942	$35,221
1996	20,871	$26,235
1997	11,710	$12,506
1998	13,419	$13,626
1999	5,808	$10,373
2000	7,525	$11,883
2001	10,228	$18,898
2002	12,735	$23,104
2003	7,698	$14,706
2004	5,778	$10,890
2005	5,719	$7,979
2006	9,064	$11,687
2007	6,052	$10,009
2008	7,084	$13,275
2009	6,282	$12,061
2010	8,974	$17,469
2011	8,755	$17,968
2012	5,549	$11,584

2013	10,865	$28,136
2014	20,971	$55,838
2015	25,516	$70,764
2016	31,473	$84,032

1.5.3.4 Non-Consumptive Factors

There are no known, considerable non-consumptive factors for Virginia's cobia fishery that would be impacted economically.

1.5.4 Other Resource Management Efforts

1.5.4.2 Bycatch

There is no known, considerable bycatch in Virginia's cobia fishery.

3.0 MONITORING PROGRAM SPECIFICATIONS/ELEMENTS

3.4 Summary of Monitoring Programs

3.4.1 Catch and Landings Information

In 2017, the Virginia Marine Resources Commission instituted mandatory reporting for the recreational cobia fishery. Required data include date of trip, number of anglers, and number of cobia caught and released (even if zero). Permits are also used to track the number of participants in the fishery. As this program develops, it could have potential for usage in stock assessments (e.g., as an index of abundance) or in management decisions (evaluating trends in harvest).

3.4.2 Biological Information

In June 2007, the VMRC began the Marine Sportfish Collection Project (MSCP). This project places freezers at various high traffic weigh stations, where recreational anglers can voluntarily leave legal size whole fish or carcasses. These fish are used to collect biological information such as length, age, and sex. Cobia is one such species accepted for processing and thus has a relatively large dataset for biological information. From 2007 through 2015, the VMRC received a total of 1,265 cobia donations. Before 2007, staff collected cobia carcasses sporadically from various fishing tournaments, totaling 376 samples from 1999 through 2006. In total, there are 1,687 samples of age data, with an average age of 5.3 years.

The Virginia Game Fish Tagging Program (VGFTP) began in 1995 and is jointly operated by the VMRC and the Virginia Institute of Marine Science (VIMS). It utilizes trained volunteers who

target and tag several primary species depending on data needs for the current year. From 1995 through 2015, there were 2,865 tags reported for cobia, with the most tags reported in 2012 (n=457, Musick and Gillingham 2016). During that same time period, 298 recaptures were reported, with 66 of them coming in 2015.

3.4.3 Social Information

There are no social impact programs monitoring Virginia's cobia fishery.

3.4.4 Economic Information

There are no economic programs monitoring Virginia's cobia fishery.

3.4.5 Observer Programs

There are no observer programs monitoring Virginia's cobia fishery.

3.5 Stocking Program *(if appropriate)*

The Virginia Institute of Marine Science (VIMS) began an experimental stocking program in the Chesapeake Bay in 2003 to explore stock enhancement and study juvenile movement and habitat utilization (VIMS 2017). Juvenile cobia were tagged and released into the Chesapeake Bay in 2003, 2006, 2007, and 2008, with more than 300 coming in those first two years. Recapture information indicated habitats ranging 1-4 m in depth and consisting of sandy and grass-bed bottoms. It is unclear whether this program had any effect on the population of cobia in Virginia, although it is assumed it did not due to the small number of releases.

3.6 Bycatch Reduction Program

There is no bycatch reduction program in place for Virginia's cobia fishery.

3.7 Habitat Program

There is no habitat program for cobia in Virginia.

References

Cobia Tagging. 2017. Virginia Institute of Marine Science. http://www.vims.edu/research/departments/fisheries/programs/tagging_research/cobia/index.php

Lovell, SJ, J Hilger, S Steinback, and C Hutt. 2016. The Economic Contribution of Marine Angler Expenditures on Durable Goods in the United States, 2014. U.S. Dep. Commerce, NOAA Tech. Memo. NMFS-F/SPO-165, 72 pp.

Musick, S, and L Gillingham. 2016. Virginia Game Fish Tagging Program Annual Report, 2015. Virginia Institute of Marine Science Marine Resources Report No. 2016-05. 102 pp.

Appendix III

Cobia Management Options from the Working Group

for South Atlantic Board Review

The Atlantic States Marine Fisheries Commission's (ASMFC) Cobia Plan Development Team and Working Group have met on several occasions by conference call since the February 2017 South Atlantic Board (Board) meeting. The draft FMP should be completed soon and be ready for consideration of approval at the August meeting for public meetings in the early fall.

The purpose of this review is to provide the information discussed by the Working Group and to solicit Board recommendations for the various management options to be considered in the FMP for public review.

Background:

Based on data through 2011, the SEDAR 28 (2013) stock assessment concluded that Atlantic cobia and Gulf cobia were not overfished (SSB>MSST) and overfishing was not occurring (F>MFMT). SEDAR 28 also incorporated genetic and tagging data, and the stock boundary was set at the Georgia/Florida line. The Councils modified the stock boundary and updated the annual catch limits for Atlantic Migratory Group (GA-NY) cobia and Florida east coast cobia through CMP Amendment 20B. The changes were implemented in March 2015.

In 2015 and 2016, Atlantic cobia landings exceeded the ACL and the overfishing level (OFL) recommended by the SSC after SEDAR 28. As defined by the Council, landings > OFL indicate that overfishing occurred in 2015 and 2016. NMFS reduced the recreational season length of Atlantic cobia in 2016 and 2017.

As a result of the overages of the recreational ACL, the Atlantic States Marine Fisheries Commission was asked to consider complementary management of the AMG cobia stock. The ASMFC directed the South Atlantic Board to develop a complementary plan with the basic objectives to maintain catches within the Council prescribed catch limits and to provide states with the flexibility to provide maximum opportunities for their respective stakeholders involved in the fishery.

Summary of the Fishery:

Recreational landings and commercial landings and value are presented in Tables 1 and 2. Landings north of Virginia are sporadic and will be included in the FMP. For purposes of this discussion, we focused on the 4 primary states that land cobia.

Table 1. Recreational landings of Atlantic Cobia from 2005-2015 in pounds. Data sources: SEFSC

Year	VA	NC	SC	GA	Total
2005	577,284	322,272	5,793	3,358	908,707
2006	733,740	104,259	101,018	4,824	943,841
2007	322,887	90,197	268,677	64,708	746,469
2008	167,949	66,258	50,108	257,690	542,006
2009	552,995	123,061	76,229	3,997	756,282
2010	232,987	561,486	65,688	79,855	940,015
2011	136,859	121,689	3,565	90,375	352,488
2012	36,409	68,657	224,365	105,193	434,623
2013	354,463	492,969	19,130	29,224	895,786
2014	214,427	277,489	31,927	20,642	544,485
2015	718,647	630,373	123,952	67,804	1,565,186

* There are no MRIP-estimated recreational landings of AMG Cobia in states north of Virginia.

Table 2. Commercial Cobia landings (pounds) and revenues (2014 dollars) by state/area, 2010-2015.

Year	GA/SC	NC	Mid-Atlantic*	Total
		Commercial Landing in Pounds		
2010	3,174	43,737	9,364	56,275
2011	4,610	19,950	9,233	33,793
2012	3,642	32,008	6,309	41,959
2013	4,041	35,496	13,095	52,632
2014	4,180	41,848	23,111	69,139
2015	3,555	52,315	27,277	71,790
Average	3,867	37,559	14,732	56,158
		Dockside Revenues (2014 dollars)		
2010	$11,377	$70,377	$19,976	$101,730
2011	$19,666	$37,893	$21,666	$79,224
2012	$15,554	$66,887	$14,597	$97,038
2013	$15,639	$79,397	$35,792	$130,828
2014	$13,320	$95,462	$67,972	$176,754
2015	$11,151	$147,160	$75,360	$233,672
Average	$14,451	$82,863	$39,227	$136,541

Georgia and South Carolina landings are combined to avoid confidentiality issues. Source: SEFSC Commercial ACL Dataset (December 2015) for 2010-2014 data; D. Gloeckner (pers. comm., 2016) for 2015 data. Mid-Atlantic States include Virginia, Maryland, New York, New Jersey. Landing are also reported from Rhode Island in New England.

BOARD DISCUSSION ISSUES:

Size and Bag Limits:

The current Council plan proposes a 1 fish bag limit and a 36" FL minimum size limit for federal waters. States appear prepared to complement these measures in state waters if they haven't already. The Working Group suggests that the ASMFC FMP complement these actions and not provide opportunities to adjust at this time.

State by State Allocations:

Arguably, one method to provide states with the greatest flexibility in managing their recreational cobia fishery is to provide a specific allocation or percentage of the current Annual Catch Limit (ACL) to each state. The Working Group has spent significant time reviewing the AMG cobia landings data, recognizing that cobia are a pulse fishery that are considered a rare event species in the MRIP program.

The SAFMC used the SEFSC data for the SEDAR 28 Cobia stock assessment and those data have been certified as best available data by the Council's Science and Statistics Committee (SSC). The Board directed staff to use the SEFSC data in developing this plan, however, understanding and recognizing the differences in the two methods is important moving forward.

Concerns have been raised regarding the differences between the recreational landings data estimated from MRIP data from the Office of Science and Technology (OST MRIP) and landings generated by the Southeast Fishery Science Center (SEFSC). The primary difference in the methodologies center around average weights of the fish used to expand numbers harvested to pounds landed by state. The OST MRIP estimates are based on actual fish observed and may be estimated based on one fish, while SEFSC estimates require a sample of at least 30 fish to generate an average (Table 3).

States without a sample size of 30 for a specific year may use an average over several years (e.g., Virginia) or lumped with another state to meet the required sample size of 30 fish (e.g., SC and GA).

Table 3. Comparison of OST and SEFSC average weights for Virginia, North Carolina, South Carolina, and Georgia (2010-2015) (source: SEFSC; MRIP website).

State-Year	Cobia #	OST Landings	OST Weight (lbs.)	SEFSC Landings	SEFSC Weight (lbs.)
Va-2010	7,056	254,414	36.1	239,153	33.9
Va-2011	4,119	107,424	26.1	139,622	33.9
Va-2012	1,051	26,537	25.2	35,614	33.9
Va-2013	10,735	224,442	20.9	363,865	33.9
Va-2014	6,490	173,772	26.8	219,993	33.9
Va-2015	21,173	882,022	41.7	717,676	33.9
NC-2010	15,125	498,581	33.0	558,984	37.0
NC-2011	4,478	145,796	32.6	119,347	26.7
NC-2012	2,050	104,106	50.8	66,302	32.3
NC-2013	19,224	506,067	26.3	491,527	25.6
NC-2014	9,804	247,386	25.2	275,777	28.1
NC-2015	16,166	695,842	43.0	642,213	39.7
SC-2010	2,102	67,946	32.3	61,424	29.2
SC-2011	0	0	0	0	0

SC-2012	6,835	201,223	29.4	221,024	32.3
SC-2013	634	9,873	15.6	15,146	23.9
SC-2014	1,137	26,439	23.3	28,377	25.0
SC-2015	4,182	124,933	29.9	124,316	29.7
GA-2010	2,637	89,840	34.1	77,064	29.2
GA-2011	3,304	74,651	22.6	88,049	26.6
GA-2012	3,185	97,766	30.7	102,996	32.3
GA-2013	1,189	25,183	21.2	28,427	23.9
GA-2014	792	19,079	24.1	19,768	25.0
GA-2015	2,282	26,499	11.6	67,851	29.7

Staff and the Working Group expressed concerns regarding the average weights as being high. In some years, the average size exceeds the weight required to receive a citation for an outstanding catch.

Staff provided the Working Group with multiple views of the landings from both the OST MRIP and SEFSC that included head boat landings, various time series (3, 5, and 10 years), and an option that considered 50% of the 10 year time series to account for historical landings and 50% of the 5 year average to account for the more recent time series (Tables 4-7).

Table 4. Average AMG Cobia landings and percentage by state for the 3 yr., 5 yr., 10 yr., and 50% 10 yr. + 5 yr. averages (**2005-2014**) (Data source: SEFSC w/ headboat).

State	3yr/%	5yr/%	10yr/%	5yr/10yr%
Georgia	51,051 lbs. 8.1%	63,873 lbs. 10.1%	64,391 lbs. 9.0%	64,132 lbs. 9.5%
South Carolina	91,174 lbs. 14.5%	67,751 lbs. 10.7%	83,054 lbs. 11.7%	75,402 lbs. 11.2%
North Carolina	279,163 lbs. 44.5%	303,329 lbs. 47.8%	221,266 lbs. 31.1%	262,297 lbs. 39.0%
Virginia	206,491 lbs. 32.9%	199,649 lbs. 31.5%	342,608 lbs. 48.1%	271,128 lbs. 40.3%
Total	627,879 lbs. 100%	634,602 lbs. 100%	711,319 lbs. 100%	672,959 lbs. 100%

Table 5. Average AMG Cobia landings and percentage by state for the 3 yr., 5 yr., 10 yr., and 50% 10 yr. + 5 yr. averages (**2006-2015**). (Data source: SEFSC w/ headboat).

State	3yr/%	5yr/%	10yr/%	5yr/10yr%
Georgia	39,474 lbs. 4.0%	61,993lbs. 8.2%	71,100 lbs. 9.2%	66,546 lbs. 8.7%
South Carolina	58,845 lbs. 5.9%	80,088 lbs. 10.6%	95,212 lbs. 12.3%	87,650 lbs. 11.4%
North Carolina	471,250 lbs. 47.0%	320,015 lbs. 42.2%	253,529 lbs. 32.7.0%	286,772 lbs. 37.4%
Virginia	433,845 lbs. 43.2%	295,354 lbs. 39.0%	354,811 lbs. 45.8%	325,082 lbs. 42.4%
Total	1,003,414 lbs. 100%	757,450 lbs. 100%	774,652 lbs. 100%.	766,050 lbs. 100%

Table 6. Average AMG Cobia landings and percentage by state for the 3 yr., 5 yr., 10 yr., and 50% 10 yr. + 5 yr. averages (**2005-2014**) with headboat landings (Data source: OST MRIP website).

State	3yr/%	5yr/%	10yr/%	5yr/10yr%
Georgia	47,997 lbs. 8.6%	61,916 lbs. 10.6%	68,249 lbs. 10.0%	65,082 lbs. 10.3%
South Carolina	82,170 lbs. 14.7%	63,653 lbs. 10.9%	76,263 lbs. 11.1%	69,958 lbs. 11.0%
North Carolina	286,507 lbs. 51.3%	300,944 lbs. 51.5%	228,728 lbs. 33.4%	264,836 lbs. 41.7%
Virginia	141,584 lbs. 25.4%	157,318 lbs. 27.0%	311,639 lbs. 45.5%	234,478 lbs. 37.0%
Total	558,258 lbs. 100%	583,831lbs. 100%	684,879 lbs. 100%.	634,354 lbs. 100%

Table 7. Average AMG Cobia landings and percentage by state for the 3 yr., 5 yr., 10 yr., and 50% 10 yr. + 5 yr. averages (**2006-2015**) with headboat landings (Data source: OST MRIP website).

State	3yr/%	5yr/%	10yr/%	5yr/10yr%
Georgia	24,379 lbs. 2.5%	49,211 lbs. 6.6%	70,868 lbs. 9.1%	60,039 lbs. 7.8%
South Carolina	56,647 lbs. 5.7%	74,809 lbs. 10.0%	88,334 lbs. 11.3%	81,571lbs. 10.7%
North Carolina	483,890 lbs. 48.8%	340,418 lbs. 45.5%	274,266 lbs. 35.1%	307,342 lbs. 40.2%
Virginia	426,745 lbs. 43.0%	282,839 lbs. 37.8%	348,164 lbs. 44.5%	315,501 lbs. 41.3%
Total	991,661 lbs. 100%	747,277 lbs. 100%	781,632 lbs. 100%.	764,453 lbs. 100%

Excluded from all these analyses are landings data from north of Virginia. Using SEFSC data, those landings are:

2005 – Delaware – 1,480 lbs.

2006 and 2012– New Jersey – 27,863 lbs., 69,655 lbs.

2010 and 2016 – Maryland – 1,287 lbs., 1,762 lbs.

Average landings and percentages by state vary based on the time series selected and the landings estimate used. As a result of concerns raised over the variability in average weights throughout the management unit and the observation that total numbers of fish harvested were consistent between methods, we examined the landings by number of fish to eliminate any bias or concern relative to average weights. While any time series of landings may be selected, the time series of 2005-2014 using 50% of the 10 year average and 50% of the 5 year average appears to smooth out the variability in the results from other time series, and was used in this simple comparison (Table 8).

Table 8. Average AMG Cobia landings and percentage by state 50% 10 yr. + 5 yr. averages compared to numbers of fish harvested (**2005-2014**) with share of ACL (620,000 pounds) for both methods (Data source: SEFSC w/ headboat).

State	5yr/10yr-lbs.	ACL	5yr/10yr-#	ACL
Georgia	64,132 lbs. 9.5%	58,900 lbs.	n = 2,221 10.2%	63,240 lbs.
South Carolina	75,402 lbs. 11.2%	69,444 lbs.	n = 2,521 11.6%	71,920 lbs.
North Carolina	262,297 lbs. 39.0%	241,800 lbs.	n = 8,932 41.2%	255,440 lbs.
Virginia	271,128 lbs. 40.3%	249,860 lbs.	n = 7,999 36.9%	228,780 lbs.
Total	672,959 lbs. 100%		n = 21,673 100%	

Based on the review of the Working Group, there was clear interest in considering numbers of fish to examine allocations among states if that is a direction of the Board.

Board Decisions:

Time series options (years used and number of years)

Use average weights (SEFSC or MRIP) or numbers of fish

Seasonal Options:

Data are sparse for analysis of seasonal options outside of wave data and are variable based on the years chosen for review (Figure 1). Peak landings occur during wave 3 from Georgia through North Carolina (May-June) with limited landings after wave 3. Landing vary for Virginia with peaks occurring during waves 3 and 4 (July-August) and landings occurring as late as wave 5.

Figure 2 provides coastwide landings for the most recent years (2013-2015) and indicates an extension of availability later into the fall (wave 5).

The SAFMC examined the potential for changing the start date to the fishing year to May 1 using the most recent landings information (2013-2015). This option was removed from the framework document because fishing year changes can only be done through an amendment. Based on their analysis, and recognizing that landings of AMG cobia are minimal prior to May 1, Table 5 indicates that season lengths could be extended by 3-4 days by delaying the coastwide opening until May 1.

Based on review, coastwide, seasonal options are limited. A January 1 start date for the fishing year and vessel limits that range from 1 to 6 fish, result in seasonal closures that range from July 15 – August 22. Changing the fishing year to begin May 1, provides coastwide seasons that close from July 19 – August 25.

State specific impacts of a coastwide seasonal closure vary. Based on the most recent years (2013-2015), the majority of the catch is taken during waves 2 and 3 in Georgia (80%), South Carolina (82%), and North Carolina (90%), whereas 70% of the catch is taken during waves 4 and 5 in Virginia.

While Virginia had no wave 2 landings reported from 2006-2015, wave 2 accounted for nearly 100% of the landings in Georgia, and 16-26% of the landings in North Carolina and South Carolina respectively, in some years.

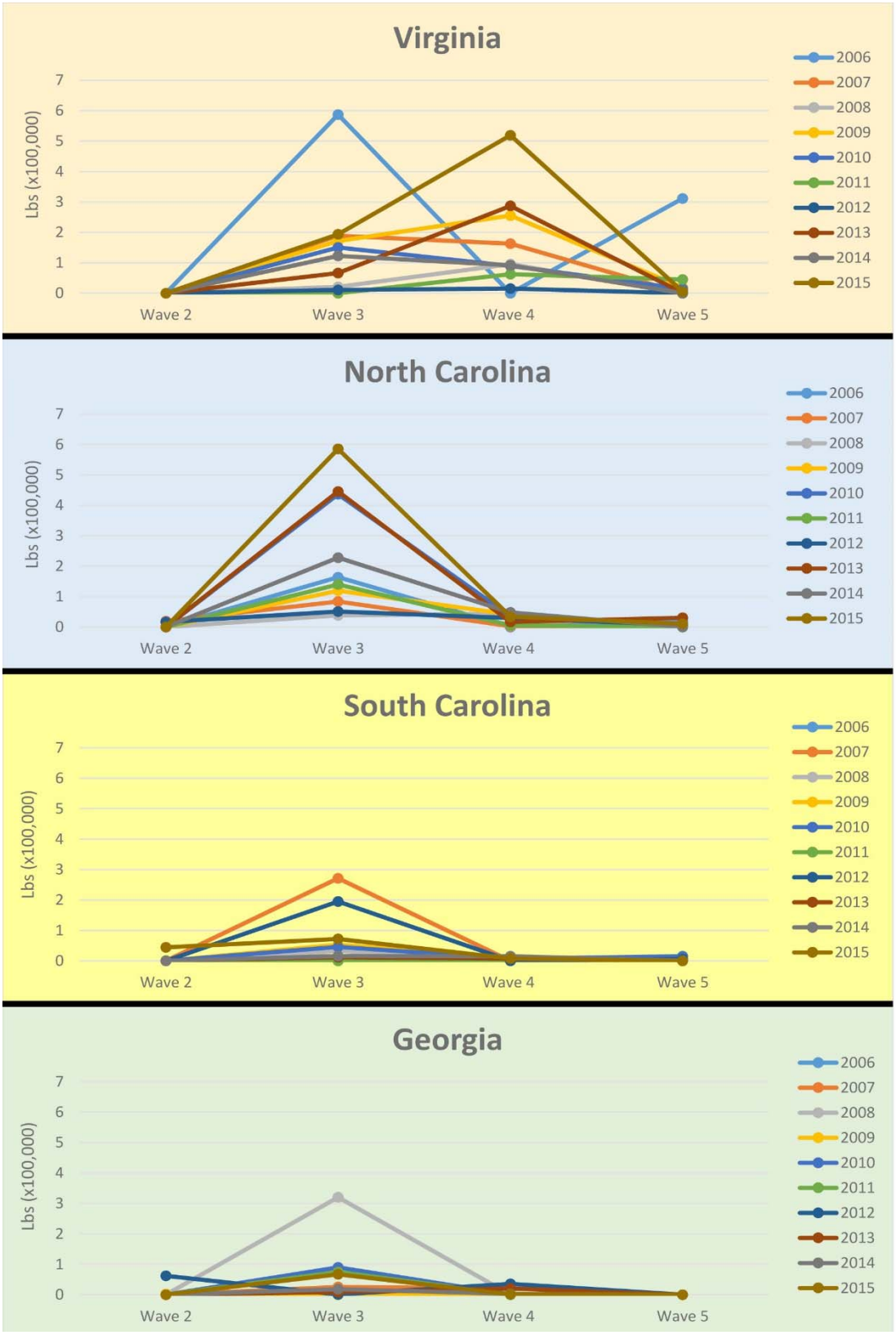


Figure 1. Recreational catch of Atlantic cobia by wave from 2006-2015 for Waves 2-5. Data sources: SERO and MRIP database—Framework 4.

Table 9. Framework 4 proposed but omitted Table 2.2.1. Estimated dates when Atlantic cobia recreational landings would meet the recreational ACL under the range of minimum size limits, bag limits, and vessel limits, if the fishing year is changed to May 1-April 30. Highlighted cells are the current Preferred Sub-alternatives in Action 1.

	Minimum Size Limit (inches fork length)								
	33	34	35	36	37	38	39	45	50
Bag Limit									
1 per Person	5-Jul	8-Jul	13-Jul	19-Jul	26-Jul	3-Aug	8-Aug	None	None
2 per Person	2-Jul	6-Jul	10-Jul	16-Jul	23-Jul	31-Jul	4-Aug	None	None
Vessel Limit									
1 per Vessel	2-Aug	7-Aug	14-Aug	25-Aug	20-Mar	None	None	None	None
2 per Vessel	14-Jul	18-Jul	23-Jul	31-Jul	8-Aug	18-Aug	24-Aug	None	None
3 per Vessel	8-Jul	12-Jul	16-Jul	23-Jul	30-Jul	8-Aug	13-Aug	None	None
4 per Vessel	6-Jul	9-Jul	14-Jul	21-Jul	27-Jul	5-Aug	10-Aug	None	None
5 per Vessel	5-Jul	8-Jul	13-Jul	20-Jul	26-Jul	4-Aug	9-Aug	None	None
6 per Vessel	3-Jul	7-Jul	11-Jul	18-Jul	24-Jul	1-Aug	6-Aug	None	None

Note: As with **Table 2.1.1** this analysis assumed consistent regulations in state and federal waters, and estimated the dates based on recreational landings from 2013-2015.

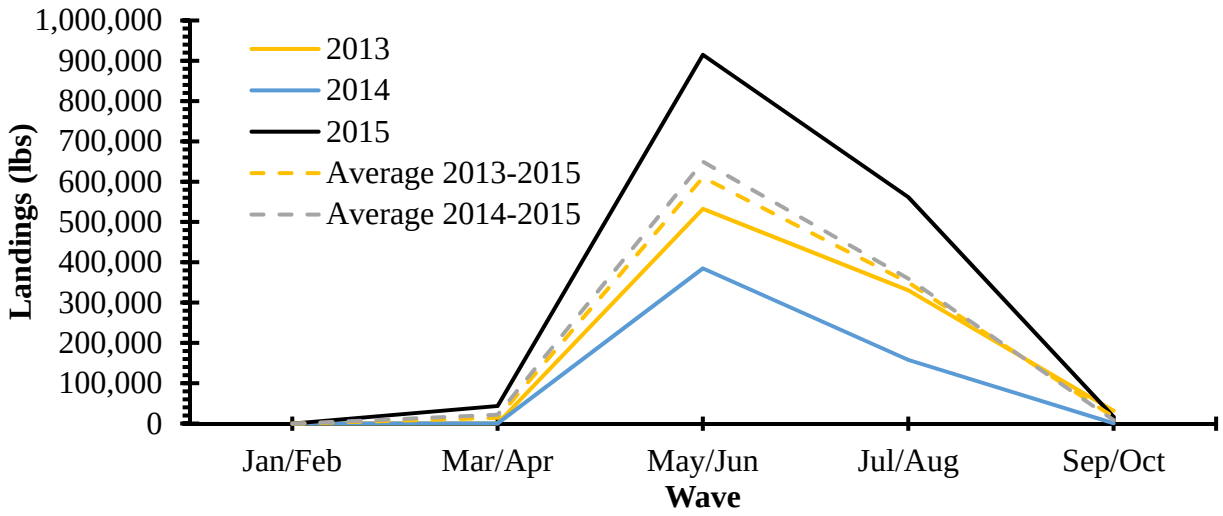


Figure 2. Framework Figure 2.2.1. Atlantic recreational landings for January-October of 2013, 2014, 2015, average 2013-2015 landings, and average 2014-2015 landings by two-month wave. The landings for 2015 are preliminary. Source: SEFSC Recreational ACL Dataset

A detailed analysis of state specific landings information was conducted by C. Wilson with NC DMF. The analysis was provided to members of the Working Group and the PDT. Summary findings illustrate the variability in the impacts of seasons, size limits, bag and vessel limits on the individual states. These data tend to indicate that mandated seasonal options remove flexibility from the states and that the data are available, though confidence varies, for states to modify seasonal opening based on the interests of their unique situation.

A summary table provides some of the general information from the state specific analysis (Table 10). The analysis also provides state specific information at the month level as opposed to wave. The analyst does not recommend reducing time periods less than 1 month due to data limitations.

Table 10. Cobia Harvest reductions by state from a 36" FL size limit (36"), a 36" FL size limit with a 1 fish bag limit and season open May 1 (May 1), a 36" FL size limit with a 1 fish bag limit and season open June 1 (June 1)

State	36"	May 1	June 1
Georgia	28%	37%	60%
SC	11%	58%	66%
NC	5%	49%	73%
VA	11%	44%	48%
Total	**11%**	**47%**	**61%**

In summary, variability in catch rates over the past decade indicate that landings are increasing and have recently exceeded the ACL by a wide margin. A consistent size limit of 36" FL in state and federal waters along with a 1 fish bag limit is unlikely to constrain catches if recent years harvest are an indication of future success. Consequently, vessel limits, season start dates, and season lengths are the primary mechanisms we examined to further constrain landings to achieve the FMP objective of maintaining catches within the ACL.

Board Decisions/Discussion:

Are specific seasons options wanted for the FMP or are they best left to the states to develop and have approved by the TC and Board?

If specific seasons are needed in the FMP, should, they be based on a state specific allocation? What would be another viable option to ensure equity and accountability?

Regardless of the allocation scheme used, if at all, concern has been raised over tracking the ACL on a state or coastwide basis in real time using MRIP. While all states may have port agents to observe catches, effort data are unavailable until after waves are complete and could result in impacts despite best efforts to control.

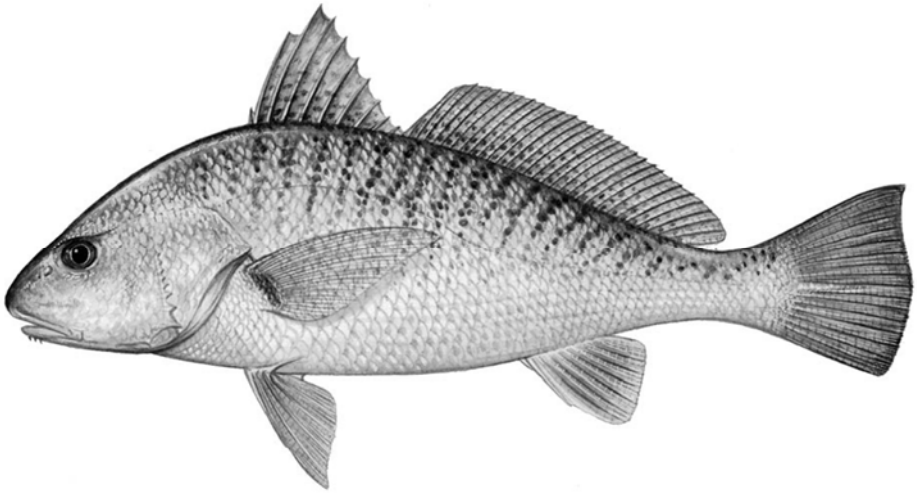
Should the plan attempt to develop alternative quota monitoring methods that use a multiple of years to provide states to adjust after year 1 or an overage if landings are too high or too low based on initial measures? These efforts would have to be developed with NMFS and the Council.

The PDT expressed some interest in spawning season closures, suggesting that an early season closure that extended through May would provide an increase in population egg production. The state of South Carolina has implemented a May closure in their southern management unit to reduce harvest and facilitate spawning.

Based on current state actions that implement 3-4 fish vessel limits, we are unclear as to how those limits may constrain catches to the level required for NMFS to re-open the EEZ to harvest. Providing access to the cobia resource in federal waters is a critical need for most states. Prior to final approval of the draft for public hearings, we need to discuss how we might complement federal actions in state waters or vice versa. Based on recent performance in the fishery, vessel limits greater than 2 may impact the fishery in the EEZ. However, later start dates or in season closures at the state level may provide NMFS with the assurance they need to minimize the chances of exceeding the ACL.

Traffic Light Analysis of Atlantic Croaker (*Micropogonias undulatus)* for the Atlantic States Marine Fisheries Commission Fishery Management Plan Review.

Update for 2015-2016 Fishing Years



Atlantic Croaker Plan Review Team

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Introduction

Atlantic croaker are managed under Amendment 1 to the Interstate Fishery Management Plan for Atlantic Croaker (2005) and Addendum I (2011). The Amendment does not require any specific measures restricting harvest but encourages states with conservative measures to maintain them. It also implemented a set of management triggers, based on an annual review of certain metrics, to respond to changes in the fishery or resource and initiate a formal stock assessment on an accelerated timeline if necessary. The Addendum revises the management program's biological reference points to assess stock condition on a coastwide basis as recommended by the 2010 stock assessment.

In August 2014, the South Atlantic State/Federal Fisheries Management Board approved Addendum II to Amendment I to the Atlantic Croaker Fishery Management Plan (FMP). The Addendum establishes a new management framework (i.e., Traffic Light Approach or TLA) to evaluate fisheries trends and develop state-specified management actions (i.e., bag limits, size restrictions, time & area closures, and gear restrictions) when harvest and abundance thresholds are exceeded. The TLA is a statistically-robust way to incorporate multiple data sources (both fishery-independent and -dependent) into a single, easily understood metric for management advice. It is often used for data-poor species, or species which are not assessed on a frequent basis, such as blue crabs in North Carolina and snow crabs in the Gulf of St. Lawrence. As such, its serves as an excellent management tool for Atlantic croaker, until the currently underway stock assessment is completed.

The name comes from assigning a color (red, yellow, or green) to categorize relative levels of indicators on the condition of the fish population (abundance metric) or fishery (harvest metric). For example, as harvest or abundance increase relative to their long-term mean, the proportion of green in a given year will increase and as harvest or abundance decrease, the amount of red in that year becomes more predominant. Under the Addendum II, state-specific management action would be initiated when the proportion of red exceeds specified thresholds (30% or 60%), for both harvest and abundance, over three consecutive years.

The current management triggers for Atlantic croaker compare annual changes in various indices (e.g. recent landings and survey information) to review trends in the fisheries. The Atlantic Croaker Technical Committee expressed concern that previous review methodology did not illustrate long-term trends in the stock nor did it include specific management measures to implement in response to declines in the stock or fishery. This resulted in the change to the TLA for annual review of Atlantic croaker. A new stock assessment for Atlantic croaker was begun in 2015 and the current management triggers from the TLA will be re-evaluated and adjusted as needed once the stock assessment has been completed.

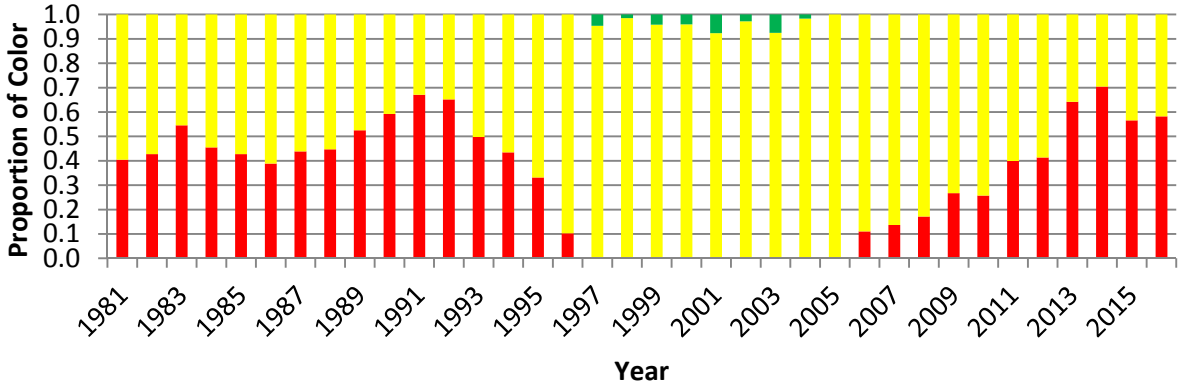
The indices used for the TLA include both commercial and recreational harvest (fishery dependent) and four fishery independent monitoring surveys that occur in different areas of the Atlantic coast of the United States. The fishery independent surveys include the Northeast Fisheries Science Center (NMFS) fall ground fish trawl survey, the Virginia Institute of Marine Science (VIMS) trawl survey, the North Carolina Dept. of Marine Fisheries trawl program 195, and the Southeast Area Monitoring Assessment Program (SEAMAP) trawl survey.

Traffic Light Analysis (Fishery Dependent)

Commercial Landings

- Commercial landings were up 156% in 2015 (3,120 metric tons) from 2014 (1,220 metric tons) and declined slightly (7.3%) in 2016 to 2,894 metric tons.
- The TLA for commercial landings has been above the 30% every year since 2011 (Fig. 1) and was the fifth year in a row where landings were above the 30%.
- More concerning is that the red proportion has been above the 60% red threshold for the last four years (2013-2016).
- The three year red proportion average was greater than 60% in 2015, and 2016 which indicates possible elevated management concern due to the decline in commercial landings.

Figure 1. Annual TLA color proportions for Atlantic croaker commercial landings for the Atlantic coast of the US.

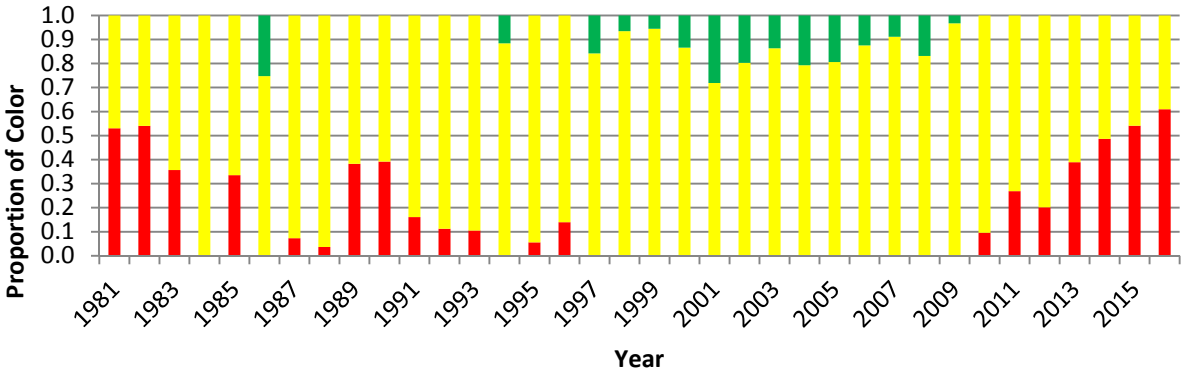


Recreational Harvest

- The recreational harvest index also continued to decline, down 16.4% in 2015 and 24.6% in 2016 from harvest levels seen in 2014.
- The recreational harvest level in 2015 (2,584,350 lbs) was among the lowest annual harvests in the entire time series (1981-2014) and 2016 (1,949,944 lbs) was the lowest year in the entire data series.
- Annual percent standard error (PSE) levels were elevated (> 20%) but not quite at the level where considered completely unreliable (> 50%).
- The 3 year average proportion of red in the TLA was 47.2% in 2015 and 54.6% in 2016 (Fig. 2), indicating the recreational index would has triggered the last three years at the 30% level.

- The decline in harvest levels for Atlantic croaker in the recreational fishery may be cause for concern.

Figure 2. Annual TLA color proportions for Atlantic croaker from Atlantic coast (NJ-FL) recreational harvest of the U.S. based on a 1996-2008 reference period.

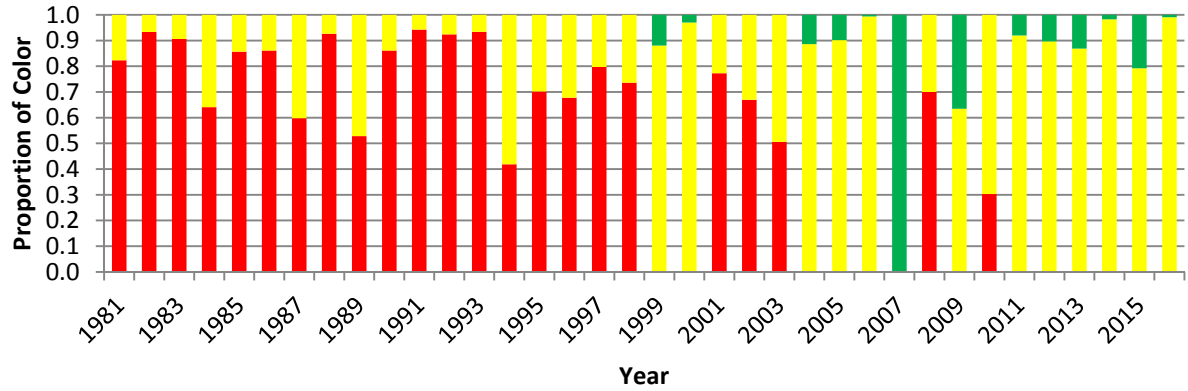


Traffic Light Analysis (Fishery Independent Surveys)

NEFSC/NMFS Fall Groundfish Survey

- The NMFS index increased 49.7% in 2015 and declined 34.6% in 2016 with no red in the TLA since 2010 (Fig. 3).
- The index has stayed above the long term mean since 2011.
- The TLA trigger would not have tripped on the NMFS index in either 2015 or 2016 given catch levels at or above the long term mean in the previous three years.

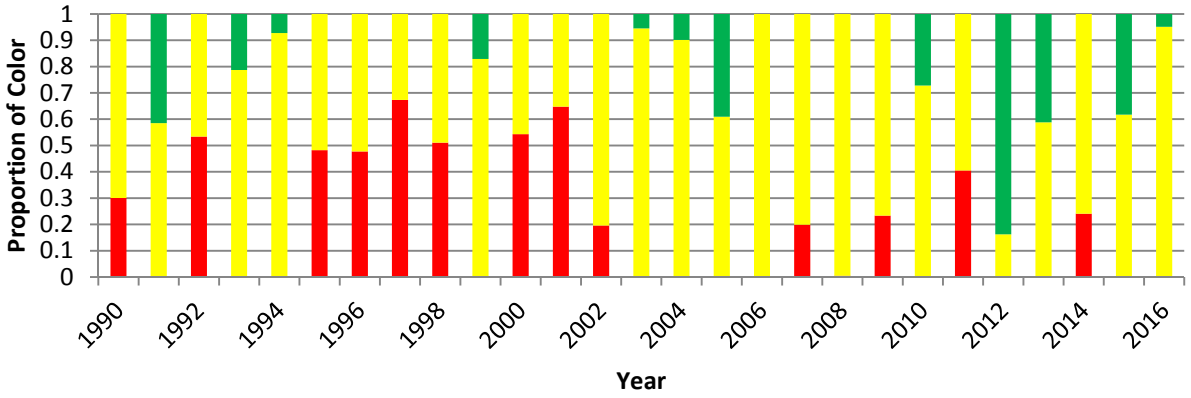
Figure 5. Annual TLA color proportions for Atlantic croaker from NMFS ground-fish trawl survey based on 1996-2008 reference period.



SEAMAP Survey

- The SEAMAP index increased 174% in 2015 and then declined 40.8% in 2016.
- Index values remained above the long term mean for both years, so there was no red in the TLA (Fig. 4).
- The TLA trigger for the SEAMAP survey did not trip in either 2015 or 2016.

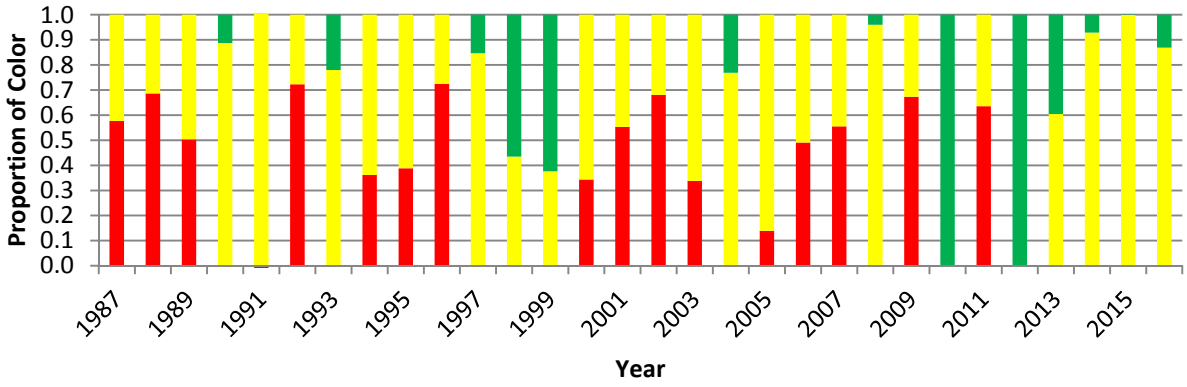
Figure 4. Traffic Light Model for SEAMAP catch data by weight using a 1996-2008 reference period.



North Carolina Program 195

- The North Carolina index declined in 2015 (down 16.5% from 2014) and increased in 2016 (36.7%) from 2015, but did not drop below the long term mean for the data series in either year.
- While the TLA indicates declining index values since the peak in 2012 (decreasing green proportions, Figure 5), general catch levels in the index remained above the long term mean for the series and did not trigger in 2015 or 2016.

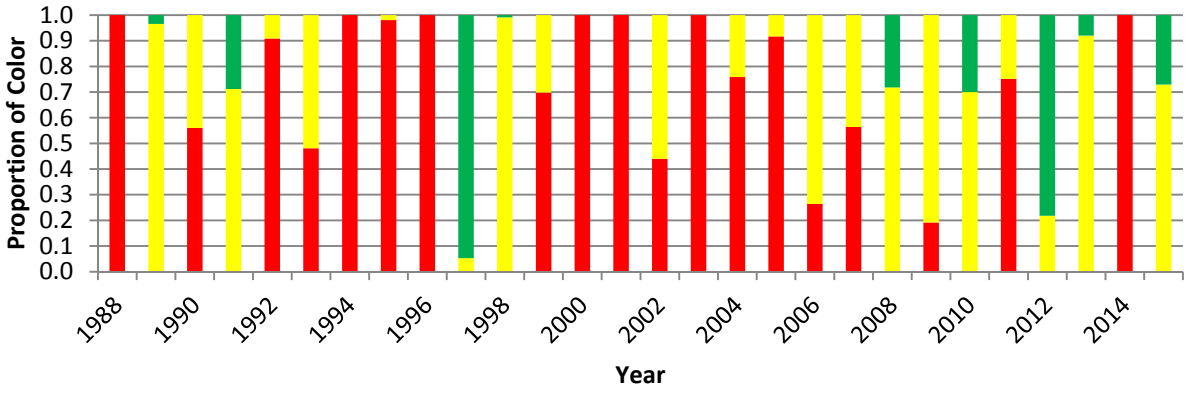
Figure 5. NCDMF Program 195 TLA color proportions for Atlantic croaker using 1996-2008 reference period.



VIMS Survey

- The VIMS index increased significantly (1668%) in 2015 from 2014 going from 1.55 fish per tow in 2014 to 27.4 fish per tow in 2015. The alternating high variability in annual index values was evident in the alternating proportions of red and green in the TLA (Fig. 6).
- The index value was above the long term mean in 2015 and the three year average red proportion was below 30% so the index would not have tripped the TLA trigger.

Figure 6. Annual TLA color proportions for Atlantic croaker from VIMS spring trawl survey.

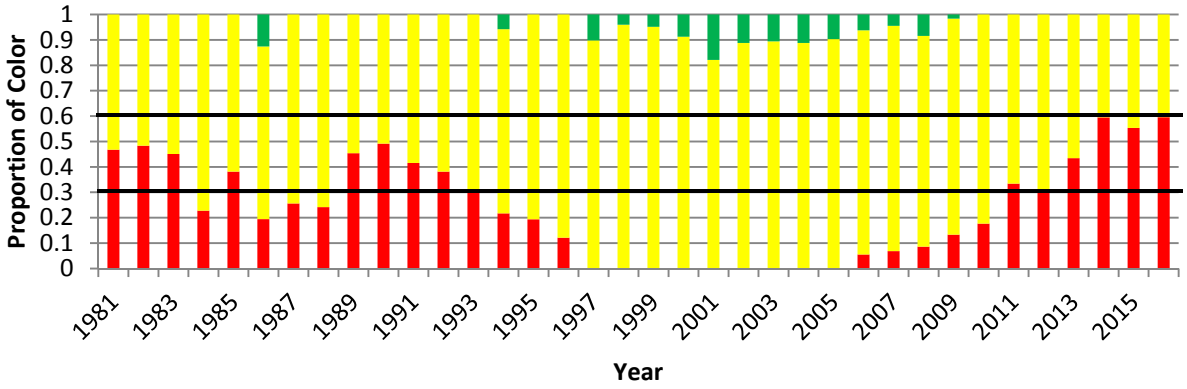


Traffic Light Analysis (Composite Indexes)

Harvest Composite Index

- The harvest composite TLA index indicates that the management response trigger would have been tripped for the fourth year in a row.
- The mean red proportion for the most recent three year time period (2014-2016) was 58.1% which was well above the 30% moderate concern threshold.
- The important trend to point out is the continuing decline in recreational and commercial landings for Atlantic croaker.

Figure 7. Annual color proportions for harvest composite TLA of Atlantic Croaker recreational and commercial landings



Abundance Composite Characteristic Indexes

The abundance composite TLA index was broken into two components based age composition. The adult composite index was generated from the NMFS and SEAMAP surveys since the majority of Atlantic croaker captured in those surveys were ages 1+. The juvenile composite index was generated from the NC program 195 and VIMS surveys because these two captured primarily young-of-the-year Atlantic croaker.

- All four abundance indexes showed increases in both 2015 and 2016 with no red proportion occurring in either year.
- The adult composite TLA characteristic (Fig. 8) showed a higher proportion of green in 2015 (29.5%) than in 2016 (2.9%).
- The juvenile composite TLA characteristic (Fig. 9) had no red in the index for either 2015 or 2016 indicating and increase in abundance over 2014. The NC 195 index had a lower proportion of green compared to the VIMS index.
- The juvenile composite characteristic index did not trip in either 2015 or 2016.

- The higher annual variability for the different color proportions in the juvenile composite characteristic (compared to the adult composite characteristic) is likely a reflection annual recruitment variability rather than population trends.
- It is also worthwhile to point out that the trends in the two abundance composite characteristics reflect each other closely for the last three years with similar trends in color proportions.

Figure 8. Adult croaker TLA composite characteristic index (NMFS and SEAMAP surveys).

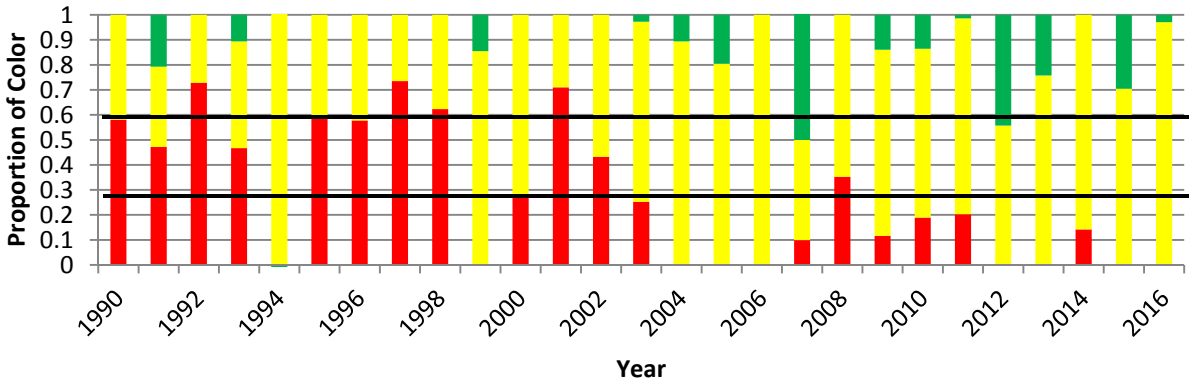
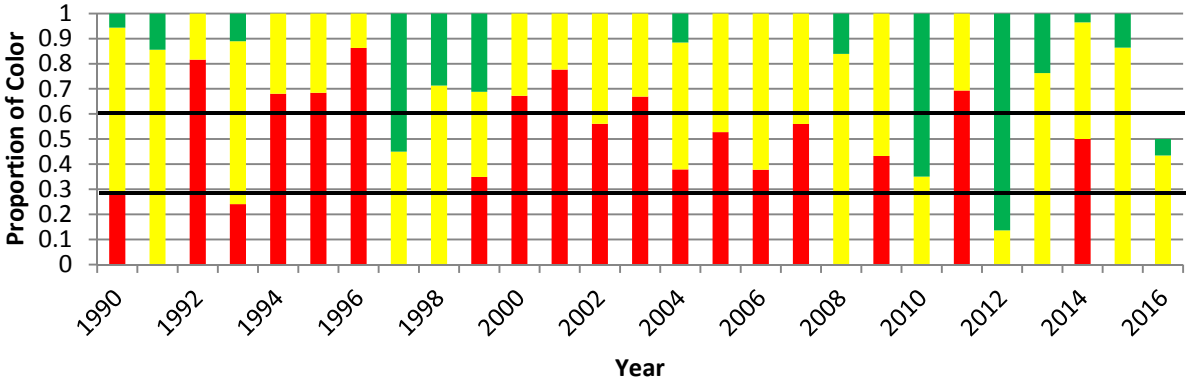


Figure 9. Juvenile croaker TLA composite characteristic index (NC 195 and VIMS surveys).



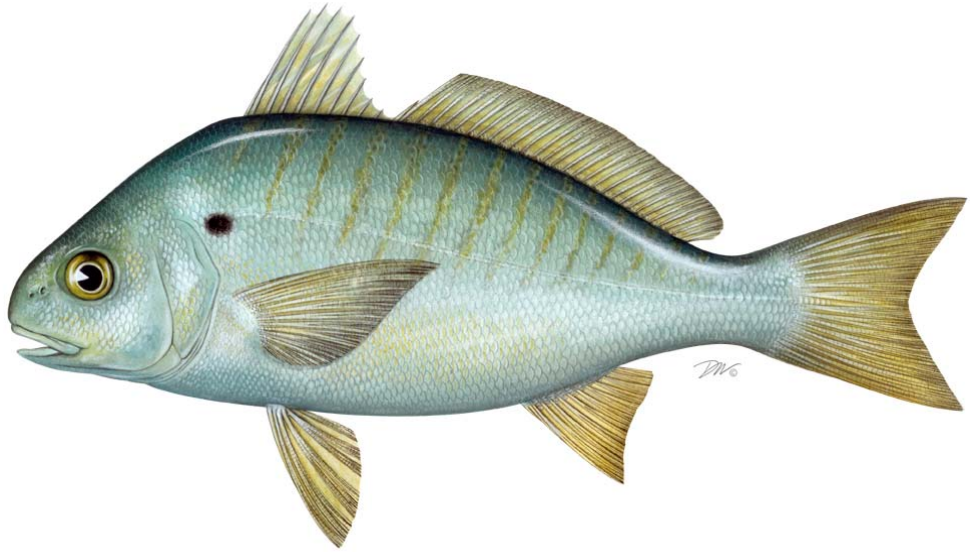
Summary

The harvest composite TLA did trip in both 2015 and 2016 while the abundance TLA composite showed the opposite trend with increasing abundance and not having the management concern threshold tripped. The continued declining trend in the commercial and recreational harvests for the Atlantic coast is of concern. The recently completed Atlantic croaker stock assessment (ASMFC, 2017) showed that overfishing was not occurring and that Atlantic croaker were not overfished with biomass levels (SSB) at relatively high levels and fishing mortality (F) being relatively low. This contrasts the decline seen in the harvest TLA for both recreational and

commercial landings, while the increasing trends seen in the abundance indices more closely resemble the results of the stock assessment. The explanation for this discrepancy may lie in differing size and age structures of the different fishery independent surveys and commercial and recreational landings, with older/larger fish being the more likely target of the fishery. An age partitioning approach of the different indices may allow better refinement of the TLA providing more synchrony between the harvest and landings metrics for adults as well as juveniles. This approach should be examined by the TC for future consideration.

2017 Traffic Light Analysis of Spot (*Leiostomus xanthurus)* for the Atlantic States Marine Fisheries Commission Fishery Management Plan Review

2016 Fishing Year



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Introduction

Spot is managed under the Omnibus Amendment for Spot, Spotted Seatrout, and Spanish Mackerel (2011) and Addendum I (2014). The Omnibus Amendment updates all three species plans with requirements of the Commission's ISFMP Charter. No coastwide assessment has been performed for spot; however, spot are a target or component of several state surveys using trawls, gillnets, or seine nets. Abundance indices have been highly variable throughout the survey time series. The Commission has begun preparations for the development of the first coastwide benchmark stock assessment in 2015 for final presentation to the South Atlantic Management Board in 2017.

In the absence of a coastwide stock assessment, the South Atlantic Board approved Addendum I to the Spot FMP in 2014. The Addendum establishes use of a Traffic Light Analysis (TLA), similar to that used for Atlantic croaker, to evaluate fisheries trends and develop state-specified management actions (e.g., bag limits, size restrictions, time and area closures, and gear restrictions) when harvest and abundance thresholds are exceeded for two consecutive years. The TLA is a statistically-robust way to incorporate multiple data sources (both fishery-independent and -dependent) into a single, easily understood metric for management advice. It is often used for data-poor species, or species which are not assessed on a frequent basis. The name comes from assigning a color (red, yellow, or green) to categorize relative levels of indicators on the condition of the fish population (abundance metric) or fishery (harvest metric). For example, as harvest or abundance increase relative to their long-term mean, the proportion of green in a given year will increase and as harvest or abundance decrease, the amount of red in that year becomes more predominant. The TLA improves the management approach as it illustrates long-term trends in the stock and includes specific management recommendations in response to declines in the stock or fishery. Under the Addendum, state-specific management action would be initiated when the proportion of red exceeds specified thresholds (30% or 60%), for both harvest and abundance, over two consecutive years.

The current management triggers for spot compare annual changes in various indices (e.g. recent landings and survey information) to review trends in the fisheries. The spot Plan Review Team expressed concern that previous review methodology did not illustrate long-term trends in the stock nor did it include specific management measures to implement in response to declines in the stock or fishery. This resulted in the change to the TLA for annual review of spot. A new stock assessment for spot was begun in 2015 and the current management triggers from the TLA will be re-evaluated and adjusted as needed once the stock assessment has been completed.

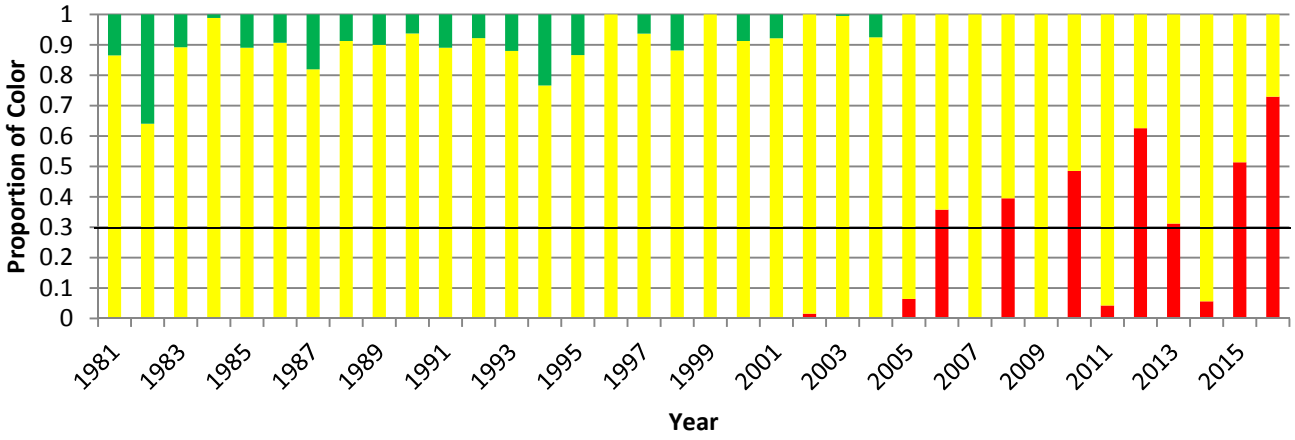
The indices used for the TLA include both commercial and recreational harvest (fishery dependent) and three fishery independent monitoring surveys that occur in different areas of the Atlantic coast of the United States. The fishery independent surveys include the Northeast Fisheries Science Center (NMFS) fall ground fish trawl survey, the Maryland Dept. of Natural Resources juvenile striped bass seine survey, and the Southeast Area Monitoring Assessment Program (SEAMAP) trawl survey.

Traffic Light Analysis (Fishery Dependent)

Commercial

- Commercial landings for spot on the Atlantic coast declined 70% in 2016 from 2015, continuing a declining trend in commercial landings that has been occurring since 2003. Total annual landings have declined 90.7% from 2004 to 2016.
- The TLA for commercial landings had relatively stable proportions of green and yellow throughout the 1980s and 1990s but began declining in the early 2000s as evidenced by increasing proportions of red (Fig. 1). The long term mean for the reference time series (1989-2012) was 5,744,635 lbs per year but the average landings since 2010 have dropped to 2,886,785lbs with a value of 627,220 lbs in 2016.
- The landings in 2016 represent the lowest annual landings for spot in the entire commercial data time series (1950-2016) and are only 10.9% of the long term mean landings.
- The TLA commercial index did trip at the 30% level in 2016 and has done so in 5 of the last 7 years, with the 2 year average proportion exceeding 30%.

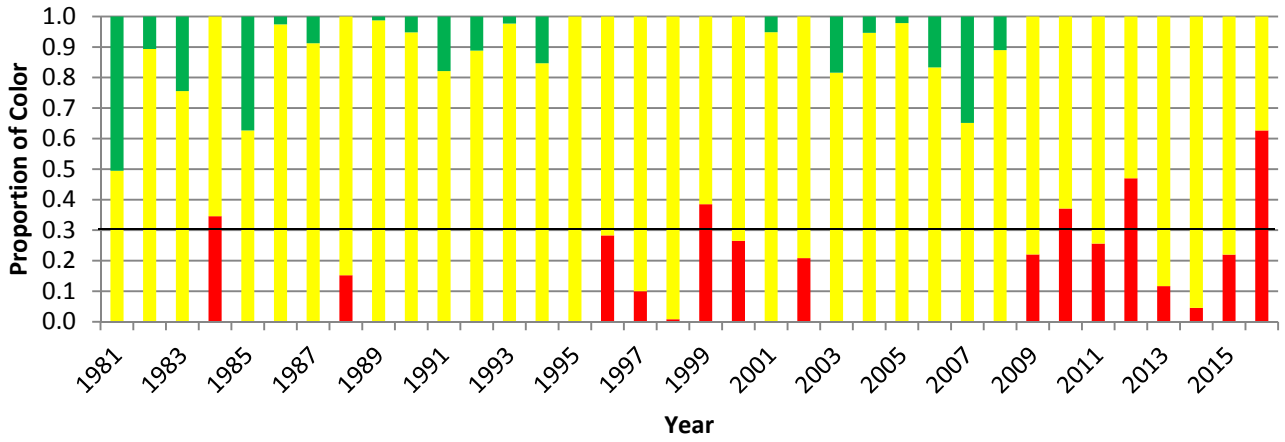
Figure 1. Annual FTLA color proportions using 1981-2012 reference time period for Spot from NMFS commercial landings for the Atlantic coast of the U.S.



Recreational

- The recreational harvest (in lbs) for spot on the Atlantic coast declined 66.9% in 2016 from 2015, down to 751,332 lbs in 2016 from 2,270,859 lbs in 2015.
- Annual harvest in the recreational fishery has been below the long term mean (LTM) since 2009 and was still below that threshold in 2016.
- The red proportion of the TLA increased in 2016 to 62.6%, well above the 30% trigger level. The recreational TLA did not trip in 2016 as it did not exceed the 2 year (2015-2016) average proportion of 30% or greater.

Figure 2. Annual TLA color proportions using 1989-2012 reference period for spot from recreational harvest in LBS on the Atlantic coast of the U.S.

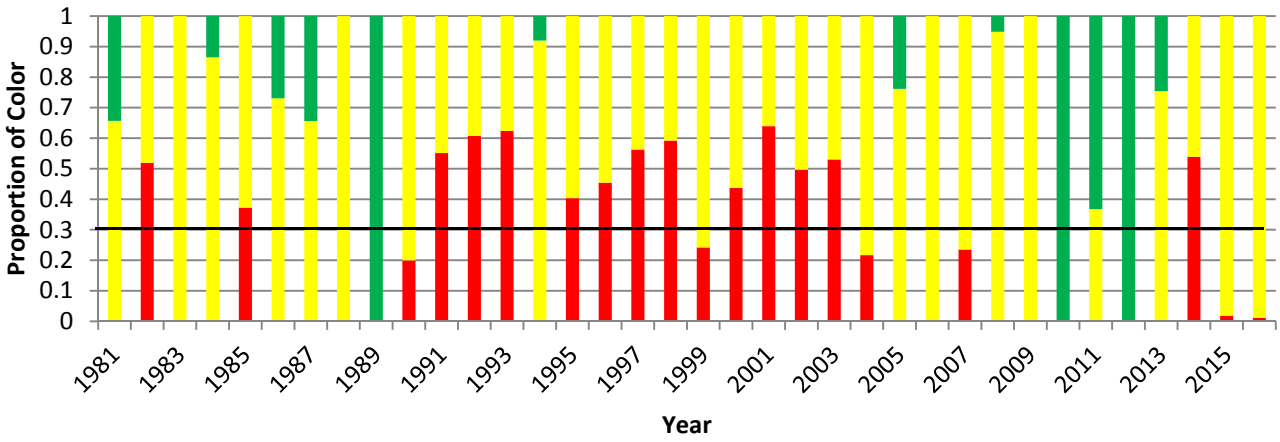


Traffic Light Analysis (Fishery Independent)

NEFSC/NMFS Fall Groundfish Trawl Survey

- The NMFS index had only a slight increase (1.3%) in 2016 from 2015, however it was still below the long term mean (green/yellow boundary for the TLA).
- The longest time period with high red proportions in the TLA occurred from 1990-2003 (Fig. 3), after which catch steadily increased until the peak in 2012. Higher proportions of green in the index did not occur until 2010-2012 when the catch was well above the LTM.
- The TLA did not trigger in 2016 with the 2 year average red proportion below the 30% threshold.

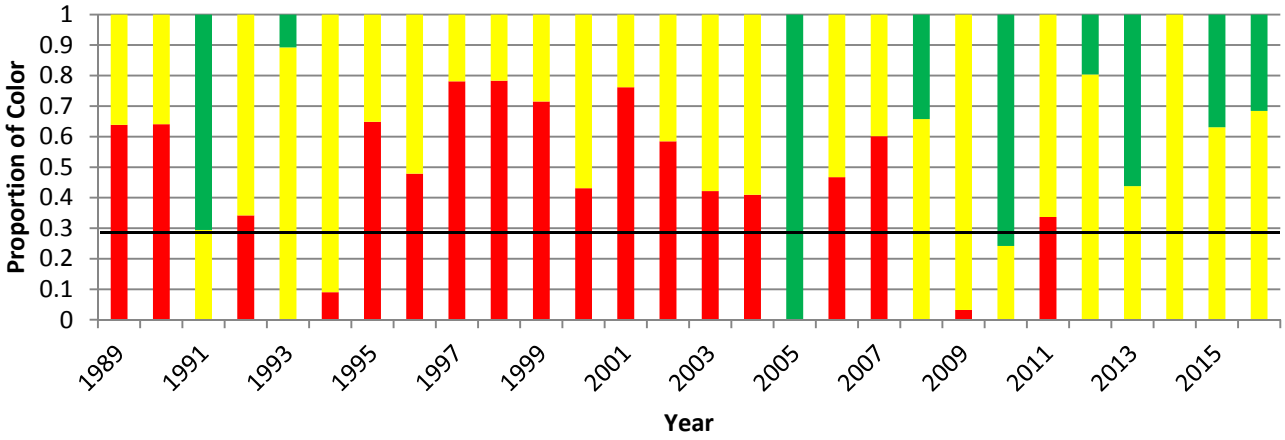
Figure 3. Annual TLA color proportions for Fuzzy Traffic Light model using 1989-2012 reference time period for Spot from NMFS fall groundfish trawl survey.



SEAMAP Trawl Survey

- The annual CPUE declined 6.9% in 2016 from 2015 and remained above the long term mean (11.3 kg fish per tow).
- The TLA index did not trigger 2016, and under the current TLA trigger scheme hasn't triggered since 2007.

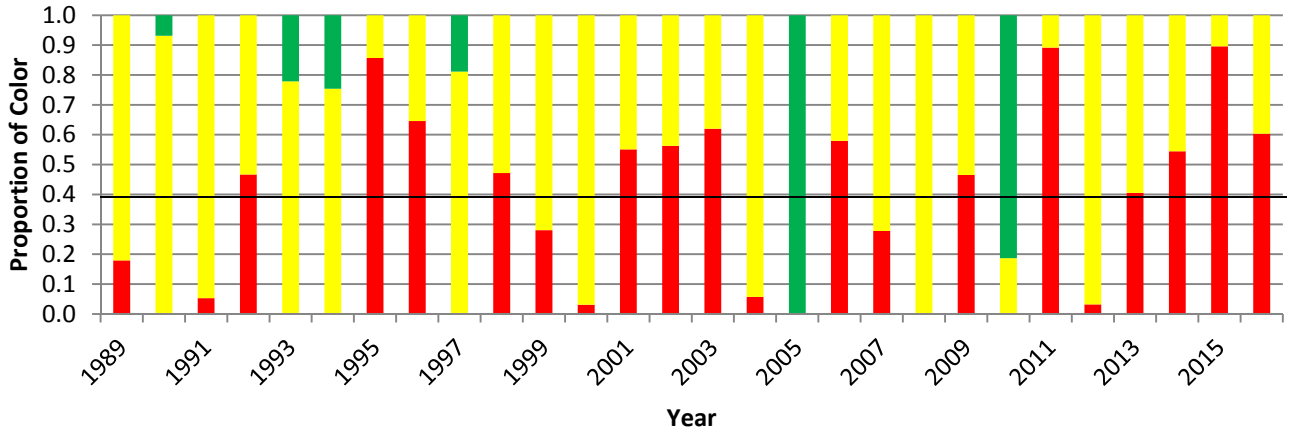
Figure 4. Annual TLA color proportions for spot from SEAMAP survey using 1989-2012 reference time period.



Maryland Juvenile Striped Bass Survey

- Since the Maryland survey was the only juvenile index used in the trigger exercise it was used by itself to compare to the other two composite characteristic indexes (harvest and abundance).
- The Maryland CPUE increased 422% in 2016 from 2015, however the 2015 index value was the lowest in the entire time series (Fig. 5).
- Mean annual CPUE was only above the LTM twice since 1998 with peak years occurring in 2005 and 2010. The large fluctuations in CPUE (and alternating red and green proportions in the TLA) were likely due to changes in annual recruitment and year-class strength rather than population changes as this is a juvenile fish index.
- The TLA trigger did trip in 2016 at the 60% threshold. In previous years of the index, the trigger would have also tripped at the 30% threshold in almost all of the years from 1995-2013 except in the two peak years of 2005 and 2010.
- The index tripping at the 30% level 2012-2014 and at the 60% level in 2015 and 2016 may be cause for some concern as the general decline in this index indicates a decline in spot recruitment in Maryland waters has been occurring for the past 20 years.

Figure 5. Annual TLA color proportions for the Maryland seine survey juvenile index using 1990-2012 reference period.

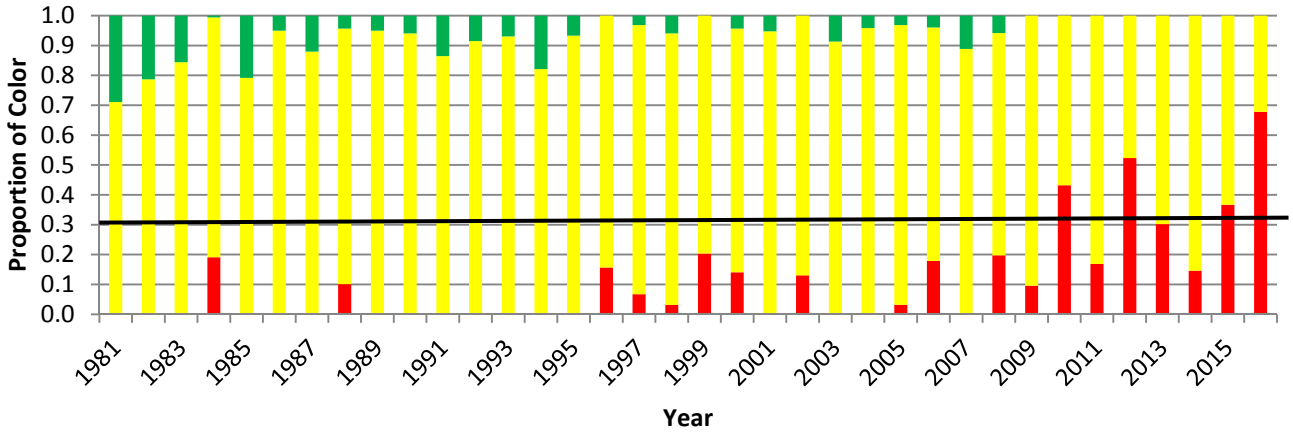


Traffic Light Analysis (Composite Indexes)

Harvest Composite Characteristic Index

- The harvest composite characteristic TLA shows the general decline in landings since 2008, with increasing proportions of red annually (Fig. 6).
- The composite characteristic did trip in 2016 with a 2 year red proportion greater than 30%. The proportion of red has shown an increasing trend recently and has triggered in 4 of the last 7 years.
- The increase in red proportion was likely driven more by the decline in commercial landings rather than the recreational harvest, particularly given the series low value in 2016.
- The continued declining trend in spot fishery landings was driven primarily by declining landings in the mid-Atlantic region where the majority of coastwide landings occur.

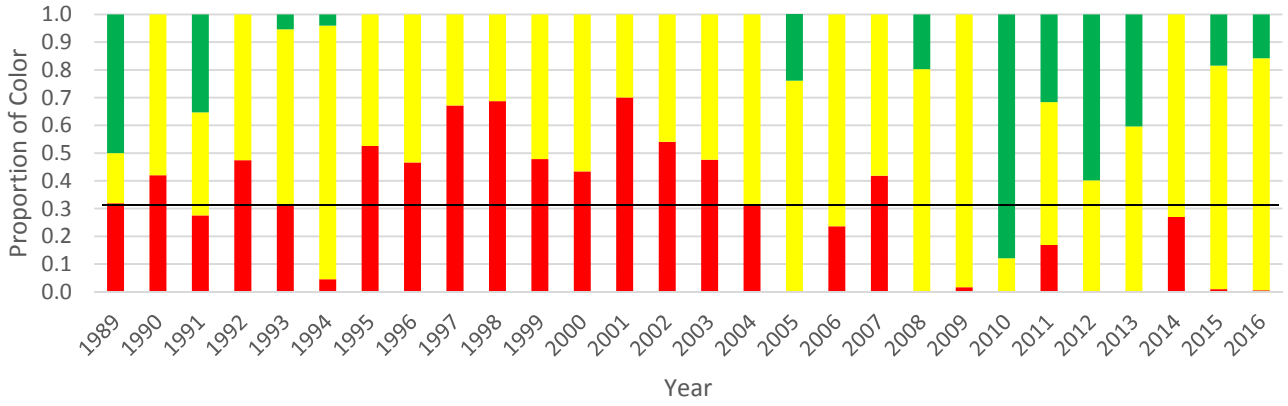
Figure 6. Annual TLA color proportions for harvest composite (commercial and recreational landings) for spot on the Atlantic coast of the US.



Abundance Composite Characteristic Index

- The TLA composite characteristic for adult spot (NMFS and SEAMAP surveys) showed very little change from 2015 with only a slight decline in the green proportion (Fig. 7).
- The slight increase in catch levels in the NMFS index and the slight decrease in the SEAMAP index resulted in only a slight change in the TLA for 2016.
- The composite characteristic TLA for the abundance indexes did not trigger in 2016.

Figure 7. Annual TLA color proportions for spot for composite characteristic of adult fishery independent surveys (NMFS and SEAMAP) using a 1989-2012 reference period.



Summary

The TLA composite characteristic indexes tripped for juvenile spot index (60% threshold) but not for the adult composite characteristic index. The harvest composite characteristic also triggered at the 30% threshold in 2016, mostly due to declines in commercial harvest. Although the recreational index did not trigger at the 30% threshold it came very close (29.7%). With the benchmark stock assessment now complete, further refinement of the TLA for spot by the TC should be considered through either adding additional TLA metrics (bycatch, F, or SPR) or additional abundance indices (ChesMMAP, NEAMAP).

The recently completed Spot Stock Assessment (ASMFC, 2017) utilized age partitioning in the Catch Survey Analysis model (CSA) separating indices into age 0 and age 1+ (pre-recruits and recruits). The TC may want to consider a similar partitioning for the TLA if it can provide better information on annual changes as well as synchrony between the different indices.

2017 REVIEW OF THE
ATLANTIC STATES MARINE FISHERIES COMMISSION
FISHERY MANAGEMENT PLAN FOR

ATLANTIC CROAKER
(Micropogonias undulatus)

2016 FISHING YEAR

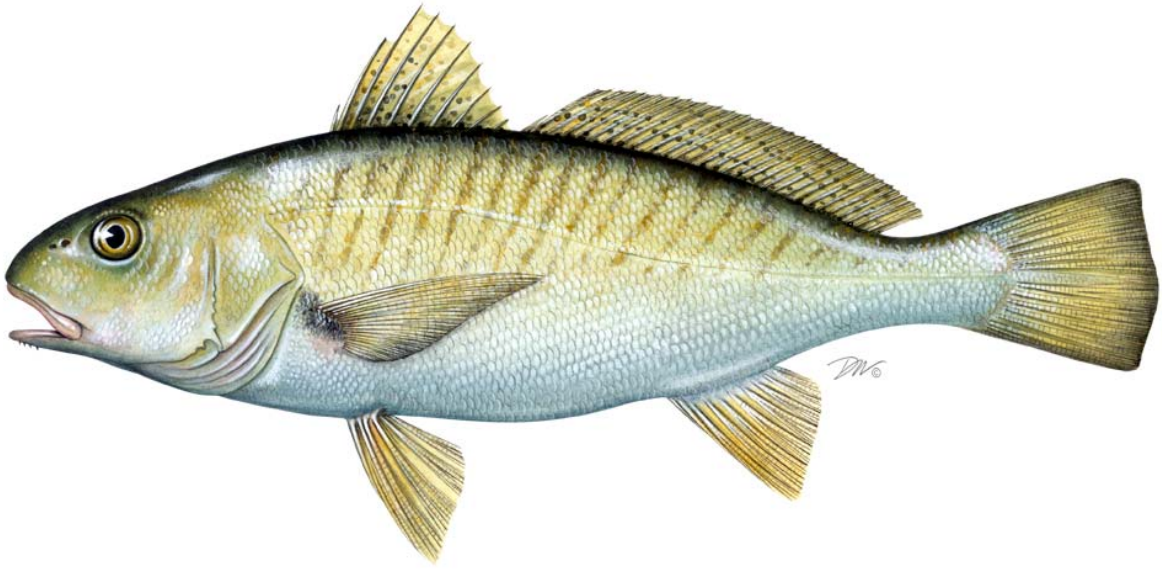


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Table of Contents

I. Status of the Fishery Management Plan

Date of FMP Approval: Original FMP – October 1987

Amendments: Amendment 1 – November 2005 (implemented January 2006)
Addendum I – March 2011
Addendum II – August 2014

Management Areas: The Atlantic coast distribution of the resource from New Jersey through Florida

Active Boards/Committees: South Atlantic State/Federal Fisheries Management Board; Atlantic Croaker Technical Committee, Stock Assessment Subcommittee, and Plan Review Team; South Atlantic Species Advisory Panel

The Fishery Management Plan (FMP) for Atlantic Croaker was adopted in 1987 and included the states from Maryland through Florida (ASMFC 1987). In 2004, the South Atlantic State/Federal Fisheries Management Board (Board) found the recommendations in the FMP to be vague, and recommended that an amendment be prepared to define management measures necessary to achieve the goals of the FMP. The Interstate Fisheries Management Program Policy Board also adopted the finding that the original FMP did not contain any management measures that states were required to implement.

In 2002, the Board directed the Atlantic Croaker Technical Committee to conduct the first coastwide stock assessment of the species to prepare for developing an amendment. The Atlantic Croaker Stock Assessment Subcommittee developed a stock assessment in 2003, which was approved by a Southeast Data Assessment Review (SEDAR) panel for use in management in June 2004 (ASMFC 2005a). The Board quickly initiated development of an amendment and, in November 2005, approved Amendment 1 to the Atlantic Croaker FMP (ASMFC 2005b). The amendment was fully implemented by January 1, 2006.

The goal of Amendment 1 is to utilize interstate management to perpetuate the self-sustainable Atlantic croaker resource throughout its range and generate the greatest economic and social benefits from its commercial and recreational harvest and utilization over time. Amendment 1 contains four objectives:

1) Manage the fishing mortality rate for Atlantic croaker to provide adequate spawning potential to sustain long-term abundance of the Atlantic croaker population.
2) Manage the Atlantic croaker stock to maintain the spawning stock biomass above the target biomass levels and restrict fishing mortality to rates below the threshold.
3) Develop a management program for restoring and maintaining essential Atlantic croaker habitat.
4) Develop research priorities that will further refine the Atlantic croaker management program to maximize the biological, social, and economic benefits derived from the Atlantic croaker population.

Amendment 1 expanded the management area to include the states from New Jersey through Florida. Consistent with the stock assessment completed in 2004, the amendment defined two Atlantic coast management regions: the south-Atlantic region, from Florida through South Carolina; and the mid-Atlantic region, from North Carolina through New Jersey.

Amendment 1 established biological reference points (BRPs) to define an overfished and overfishing stock status for the mid-Atlantic region only. Reliable stock estimates and BRPs for the South Atlantic region could not be developed during the 2004 stock assessment due to a lack of data. The BRPs were based on maximum sustainable yield (MSY), and included threshold and target levels of fishing mortality (F) and spawning stock biomass (SSB): F threshold = F_{MSY} (estimated to be 0.39); F target = 0.75 X F_{MSY} (estimated to be 0.29); SSB threshold = 0.7 X SSB_{MSY} (estimated to be 44.65 million pounds); and SSB target = SSB_{MSY} (estimated to be 63.78 million pounds). An SSB estimate below the SSB threshold resulted is an overfished status determination, and an F estimate above the F threshold resulted is an overfishing status determination. The Amendment established that the Board would take action, including a stock rebuilding schedule if necessary, should the BRPs indicate the stock is overfished or overfishing is occurring.

Amendment 1 did not require any specific measures restricting recreational or commercial harvest of Atlantic croaker. States with more conservative measures were encouraged to maintain those regulations (Table 1). The Board was able to revise Amendment 1 through adaptive management, including any regulatory and/or monitoring requirements in subsequent addenda, along with procedures for implementing alternative management programs via conservation equivalency.

The Board initiated Addendum I to Amendment I at its August 2010 meeting, following the updated stock assessment, in order to address the proposed reference points and management unit. The stock assessment evaluated the stock as a coastwide unit, rather than the two management units established within Amendment I. In approving Addendum I, the Board endorsed consolidating the stock into one management unit, as proposed by the stock assessment. In addition, Addendum I established a procedure, similar to other species, by which the Board may approve peer-reviewed BRPs without a full administrative process, such as an amendment or addendum.

In August 2014, the Board approved Addendum II to the Atlantic Croaker FMP. The Addendum established the Traffic Light Approach (TLA) as the new precautionary management framework to evaluate fishery trends and develop management actions. The TLA was originally developed as a management tool for data poor fisheries. The name comes from assigning a color (red, yellow, or green) to categorize relative levels of population indicators. When a population characteristic improves, the proportion of green in the given year increases. Harvest and abundance thresholds of 30% and 60% were established in Addendum II, representing moderate and significant concern for the fishery. If thresholds for both population characteristics achieve or exceed a threshold for a three year period, then management action is enacted.

The TLA framework replaces the management triggers stipulated in Addendum I, which dictated that action should be taken if recreational and commercial landings dropped below 70% of the previous two year average. Those triggers were limited in their ability to illustrate long-term declines or increases in stock abundance. In contrast, the TLA approach better illustrates trends in the fishery through changes in the proportion of green, yellow, and red coloring.

Addenda I and II did not add or change any management measures or requirements. The only existing requirement is for states to submit an annual compliance report by July 1st of each year that contains commercial and recreational landings as well as results from any monitoring programs that intercept Atlantic croaker.

II. Status of the Stock

The most recent stock assessment, conducted in 2017, upon peer review was not recommended for management use. Therefore, stock status is based on data and results of the 2010 stock assessment (ASMFC 2010), which is the most recent assessment that was recommended by peer review for management use. Results include revised biological reference points (below), which are ratio-based and apply to the entire coastwide resource (unlike those in Amendment 1). Overfishing is occurring if F/F_{MSY} is greater than 1 and the stock is considered overfished if $SSB/(SSB_{MSY}(1-M))$ is less than 1.

	Overfishing Definition	Overfished Definition
Target	$F/(F_{MSY}*0.75) = 1$	$SSB/SSB_{MSY} = 1$
Threshold	$F/F_{MSY} = 1$	$SSB/(SSB_{MSY}(1-M)) = 1$

Atlantic croaker is not experiencing overfishing. According to the 2010 stock assessment, biomass has been increasing and fishing mortality decreasing since the late 1980s. Biomass conclusions are based on information from the data compiled for the assessment, namely increasing indices of relative abundance and expanding age structure in the catch and indices. Model estimated values of fishing mortality (F), spawning stock biomass (SSB), and biological reference points are too uncertain to be used to determine stock status. However, the ratio of F to F_{MSY} (the F needed to produce maximum sustainable yield) is reliable and can be used to determine that overfishing is not occurring. The 2010 assessment was unable to confidently determine stock status, particularly with regards to biomass, due to an inability to adequately estimate removals from discards of the South Atlantic shrimp trawl fishery. Improvements on estimation of these discards were made in the 2017 assessment, allowing the potential for shrimp trawl discards to be included in the annual TLA. Annual monitoring of shrimp trawl fishery discards is important because these discards represent a considerable proportion of Atlantic croaker removals, ranging from 7% to 78% annually during 1988-2008, according to the 2010 assessment (ASMFC 2010).

Absolute estimates of total F are unavailable because of model uncertainty; however, the general trend in total F from the model is considered reliable due to support from the data. The trend in total F decreases substantially during the first five years of the time series (1988-1992) and shows an overall decline over the remainder of the time series, except for occasional, brief spikes (Figure 1). Retrospective analysis of the model showed that estimates of F decreased as more years of data were used. A series of sensitivity runs conducted over a range of plausible values of shrimp-trawl fishing mortality found that the ratio of directed fishing mortality to F_{MSY} was less than one in all cases, indicating overfishing was not occurring.

Again, absolute estimates of SSB are unavailable because of model uncertainty; however, the general trend in SSB from the model is considered reliable due to support from the data. Spawning stock biomass shows a nearly consistent increasing trend since 1998 (Figure 2). Sensitivity runs of the model, including rough estimates of shrimp trawl discards, do not change the overall trend in SSB. Retrospective analysis of the model showed that estimates of SSB increased as more years of data were used.

Recruitment, estimated in the model as age-1 abundance, has been variable but generally increasing over the time series. Figure 2 shows the trend in recruitment; absolute values are omitted because of uncertainty in abundance estimates. The model estimated the production of strong year classes in 1997, 2001, and 2007.

III. Status of the Fishery

Total Atlantic croaker harvest from New Jersey through the east coast of Florida in 2016 is estimated at 8.31 million pounds (Tables 2 and 3, Figure 3). This represents an 80% decline in total harvest since the peak of 41.2 million pounds in 2001 (79% commercial decline, 82% recreational decline). The commercial and recreational fisheries harvested 76.5% and 23.5% of the total, respectively. The vast majority of landings are from the Mid-Atlantic region (94% in 2016), and the recent decline in total landings is a result of both commercial and recreational landings declines in that region (Figure 4). Commercial and recreational landings in the South Atlantic region have been generally stable over the last decade; however, 2010 showed large decreases in the South Atlantic states' recreational harvests, followed by a slow general increase in recreational harvest in this region. Recreational and commercial harvests in the South Atlantic region rose to 5.8% of coastwide harvest in 2016 from 0.6% in 2010.

Atlantic coast commercial landings of Atlantic croaker exhibit a cyclical pattern, with low domains in the 1960s to early 1970s and the 1980s to early 1990s, and high domains in the mid-to-late 1970s and the mid-1990s to early 2000s (Figure 3). Commercial landings increased from a low of 3.7 million pounds in 1991 to 30.1 million pounds in 2001 (Table 2); however, landings have declined consistently since 2003 to 6.4 million pounds in 2016, which registers below the 1950-2016 average of 11.9 million pounds. Within the management unit, the majority of 2016 commercial landings came from Virginia (61%) and North Carolina (33%). The Potomac River Fisheries Commission (PRFC) had the next highest level, with 2.7% of coastwide landings.

From 1981-2016, recreational landings of Atlantic croaker from New Jersey through Florida have varied between 2.8 million fish (1.3 million pounds) and 13.2 million fish (11.1 million pounds; Tables 3 and 4, Figure 5). Landings generally increased until 2001, held stable from 2001-2006 before exhibiting a declining trend from 2007 through 2016. The 2016 landings are estimated at 4.5 million fish and 2.0 million pounds. Virginia was responsible for 67% of the 2016 recreational landings, in numbers of fish, followed by Florida, Maryland, and North Carolina (12.5%, 9.5%, and 8.1%, respectively).

The number of recreational releases increased over the time series until 2008, when numbers released began to generally decline (Figure 5). However, percentage of released recreational catch has remained stable, ranging from 52 to 61% from 2008-2016. In 2016, anglers released approximately 6.9 million fish, a decline from the 13.8 million fish released in 2013. Anglers released an estimated 61% of the croaker catch in 2016 (Figure 5).

IV. Status of Assessment Advice

A statistical catch-at-age (SCA) model was used in the 2010 Atlantic croaker stock assessment (ASMFC 2010). This model combines catch-at-age data from the commercial and recreational fisheries with information from fishery-independent surveys and biological information such as growth rates and natural mortality rates to estimate the size of each age class and the exploitation rate of the population. The assessment was peer reviewed by a panel of experts in conjunction with the Southeast Data, Assessment, and Review (SEDAR) process.

The Review Panel was unable to support some of the 2010 assessment results due to uncertainty regarding the estimation of Atlantic croaker discards in the shrimp trawl fishery, and the application of estimates in modeling. Specifically, model-estimated values of stock size, fishing mortality, and biological reference points are too uncertain for use; however, the trends in model-estimated parameters and ratio-based fishing F reference points are considered reliable. Despite the uncertainty in assessment results caused by shrimp trawl bycatch, the Review Panel concluded that it is unlikely that the stock is in trouble. The stock is not experiencing overfishing, biomass has been trending up, commercial catches are stable, and discards from the shrimp trawl fishery have been reduced.

A benchmark stock assessment was conducted in 2017, but was not recommended for management use due to uncertainty in biomass estimates due to conflicting signals among abundance indices and catch time series as well as sensitivity of model results to assumptions and model inputs. One noted improvement in this assessment was in the estimation of Atlantic croaker discards by the shrimp trawl fishery. The Review Panel recommended incorporation of shrimp trawl discard estimates into the annual monitoring of Atlantic croaker through the TLA. The Plan Review Team supports this recommendation.

V. Status of Research and Monitoring

There are no research or monitoring programs required of the states except for the submission of an annual compliance report. The following fishery-dependent (other than catch and effort

data) and fishery-independent monitoring programs were reported in the 2016 compliance reports.

Fishery-Dependent Monitoring

- New Jersey: initiated biological monitoring of commercially harvested Atlantic croaker in 2006 in conjunction with ACCSP (2016 n=166)
- Delaware: collects trip-based information on pounds landed, area fished, effort, and gear type data through mandatory monthly state logbook reports submitted by fishermen.
- Maryland: commercial pound net fishery biological sampling (2,239 length measurements, 175 samples aged in 2016, one fish older than age seven).
- PRFC: has a mandatory commercial harvest daily reporting system, with reports due weekly.
- Virginia: commercial fishery biological sampling (9,453 length measurements, 9,434 weight measurements, 346 otolith ages, and 895 sex determinations in 2016)
- North Carolina: commercial fishery biological sampling since 1982 for length (2016 n=6,492), weight, otolith, sex determination, and reproductive condition.
- South Carolina: recreational fishery biological sampling via SCDNR State Finfish Survey, MRIP, and a SCDNR-managed mandatory trip reporting system for licensed charter boat operators. In 2013, SCDNR took over its portion of MRIP data collection.
- Georgia: collects biological information, including length, sex, and maturity stage, through the Marine Sportfish Carcass Recovery Project (3 fish in 2016)
- Florida: commercial fishery biological sampling

Fishery-Independent Monitoring

- New Jersey: 3 nearshore ocean (within 12 nm) juvenile trawl surveys (New Jersey Ocean Trawl Survey, 1988-present: 2016 CPUE was well below time-series average; nearshore Delaware Bay juvenile trawl survey, 1991-present: 2016 survey index was well below time series average but above 2015 value; Delaware River juvenile seine survey, 1980-present: 2016 survey index was below time series average but above 2015 value)
- Delaware: offshore Delaware Bay adult finfish trawl survey (1990-present; 2016 #/tow = 2.22; 27% decrease in relative abundance from 2015 index, below mean and median for time series); nearshore Delaware Bay juvenile finfish trawl survey (1980-present; 2016 index decreased from 8.48 in 2015 to 1.17; Inland Bays index decreased from 1.19 in 2015 to 0.43 in 2016).
- Maryland: summer gill net survey was initiated in 2013 on lower Choptank (steady decline in catch; 476 fish in 2013, 269 in 2014, 21 in 2015; 32 fish were captured in 2016); Atlantic coast bays juvenile otter trawl survey (standardized from 1989-present; 2016 GM of 1.10 fish/hectare above time series median but below time series mean); Chesapeake Bay juvenile trawl index (standardized from 1989-present; CPUE increased from 0.21 in 2015 to 0.81 in 2016).
- PRFC: Maryland DNR conducts an annual juvenile beach haul seine survey in the Potomac River (1954-present; YOY GM increased from 0 in 2014 and 2015 to 0.27 in 2016).
- Virginia: Independent monitoring results are not yet available for the 2015 fishing year. VIMS Juvenile Finfish and Blue Crab Trawl Survey (1988-present; 2015 index representing the 2014 year class was 0.73, which is down from the 2014 value of 1.55).

- North Carolina: Pamlico Sound juvenile trawl survey (1987-present; 2016 juvenile abundance index (mean number of individuals/tow) was 369.8, above the time series average)
- South Carolina: estuarine electroshock survey for juveniles (2001-present; 2016 CPUE increased slightly since 2015, third consecutive year below the long-term mean); SEAMAP shallow water (15-30 ft) trawl survey from Cape Hatteras to Cape Canaveral (1989-present; 2016 CPUE decreased by 41% from 2015; inshore estuarine trammel net survey for adults (May-September, 1991-present; 2016 CPUE decreased 59.5% from 2015); SCECAP estuarine trawl survey (1999-present, primarily targets juveniles, 2016 CPUE increased from 2015, well below long-term mean and continuing a declining trend).
- Georgia: Marine Sportfish Population Health Survey (trammel and gill net surveys in the Altamaha River Delta and Wassaw estuary, 2002-present; 2016 n=180); Ecological Monitoring Survey (trawl, 2003-present; 2016 n=39,664; CPUE (#/tow) increased from 55.53 in 2015 to 95.35 in 2016).
- Florida: juvenile seine survey (2002-present; 2016 index continued variable trend with an increase from 2015); juvenile trawl survey (2002-present; 2016 index continued variable trend with an increase from 2015); adult haul seine survey (2001-present; 2016 index value decreased from 2015)

The Northeast Fishery Science Center performs a randomly stratified groundfish survey along the U.S. east coast. Atlantic croaker are one of the main species caught throughout much of the survey area and, since the surveys started in 1972, it provides a long term data set. Regionally, mean CPUE (catch-per-unit-effort) of Atlantic croaker has increased from north to south. Since 1994, there has been an increase in annual catch variability. Catch levels in 2016 decreased 34.6% from 2015 and were above the long term mean.

The Southeast Area Monitoring and Assessment Program - South Atlantic (SEAMAP-SA) Coastal Survey (previously known as the Shallow Water Trawl Survey) began in 1986 and is conducted by the SCDNR Marine Resources Division (MRD). This survey has provided long-term, fisheries-independent data characterizing the seasonal abundance and biomass of finfish and other organisms that are accessible by high-rise trawls from the coastal zone of the South Atlantic Bight (SAB) between Cape Hatteras, North Carolina, and Cape Canaveral, Florida. Croaker abundance index values have generally trended upward since the early 2000s. The 2016 index decreased 40.8% from the time series high in 2015 and was above the long-term mean.

VI. Status of Management Measures and Issues

Fishery Management Plan

Amendment 1 was fully implemented by January 1, 2006, and provided the management plan for the 2009 fishing year. There are no interstate regulatory requirements for Atlantic croaker. Should regulatory requirements be implemented in the future, all state programs must include law enforcement capabilities adequate for successfully implementing the regulations. Addendum I to Amendment 1 was initiated in August 2010 and approved in March 2011, in order to 1) revise the biological reference points to be ratio-based, and 2) remove the distinction of two regions within the management unit, based on the results of the 2010 stock

assessment. Addendum II was approved August 2014 and established the TLA management framework for Atlantic croaker in order to better illustrate long-term trends in the fishery.

Traffic Light Approach
Addendum II established the TLA as the new management framework for Atlantic croaker. Under this management program, if thresholds for both population characteristics (harvest and adult abundance) achieve or exceed the proportion of threshold for the specified three year period, management action will be taken.

Analysis of the harvest composite index for 2016 shows that this population characteristic tripped for a fourth consecutive year (Figure 6). The mean proportion of red color from 2014-2016 was 58.1%, well above the 30% threshold. The harvest composite index was comprised of commercial and recreational landings. Both commercial and recreational indices would have individually tripped in 2014 at the 30% level. The TLA for commercial landings was just below the 60% threshold in 2016, and has exceeded 50% in three consecutive years.

The abundance composite TLA index was broken into two components based on age composition. The adult composite index was generated from the NMFS and SEAMAP surveys, since the majority of Atlantic croaker captured in those surveys were ages 1+. The juvenile composite index was generated from the NC program 195 and VIMS surveys because these two captured primarily young-of-the-year Atlantic croaker.

All four TLA composite abundance indices showed increases in both 2015 and 2016 with no red proportion occurring in either year. The adult composite TLA characteristic (Figure 7) did not trigger in 2016 with no red proportion and no red in the two previous years. The juvenile composite characteristic index (Figure 8) also had no red proportion for 2015 or 2016, indicating an increase in abundance since 2014. The higher annual variability for the different color proportions in the juvenile composite characteristic, in comparison to the adult composite characteristic, is likely a reflection annual recruitment variability rather than population trends.

Overall, management triggers were not tripped in 2016 since both population characteristics (harvest and abundance) were not above the 30% threshold for the 2014-2016 time period. This continues a trend of disconnect between the harvest and abundance indices since the mid-2000s, with the harvest index generally decreasing and abundance index generally increasing.

De Minimis Requests
States are permitted to request *de minimis* status if, for the preceding three years for which data are available, their average commercial landings or recreational landings (by weight) constitute less than 1% of the coastwide commercial or recreational landings for the same three year period. A state may qualify for *de minimis* in either its recreational or commercial sector, or both, but will only qualify for exemptions in the sector(s) that it qualifies for as *de minimis*. Amendment 1 does not include any compliance requirements other than annual state reporting, which is still required of *de minimis* states, thus *de minimis* status does not exempt states from any measures.

In the annual compliance reports, the following states requested *de minimis* status: Delaware (commercial fishery), South Carolina (commercial fishery), Georgia (commercial fishery), and Florida (commercial fishery). The commercial and recreational *de minimis* criteria for 2016 are based on 1% of the average coastwide 2014-2016 landings in each fishery: 67,705 pounds for the commercial fishery and 25,419 pounds for the recreational fishery. The Delaware commercial fishery qualifies for *de minimis* status with a three-year average of 4,806 pounds. The South Carolina commercial fishery qualifies for *de minimis* status with a three-year average of 206 pounds. The Georgia commercial fishery qualifies for *de minimis* status with a three-year average of zero pounds. The Florida commercial fishery qualifies for *de minimis* status with a three-year average of 46,612 pounds.

Changes to State Regulations

In 2016, North Carolina enacted several gill net restrictions for coastal waters pertaining to area closures/openings, gear modifications, and attendance rules to avoid interactions with endangered species. These restrictions may indirectly affect the harvest and bycatch of Atlantic croaker and are defined by North Carolina Proclamations: M-32-2016, M-30-2016, M-27-2016, M-25-2016, M-24-2016, M-23-2016, M-20-2016, M-19-2016, M16-2016, M-13-2016, M-12-2016, M-9-2016, M-8-2016, and M-5-2016.

Atlantic Croaker Habitat

In Winter of 2017, the ASMFC Habitat Committee released *Atlantic Sciaenid Habitats: A Review of Utilization, Threats, and Recommendations for Conservation, Management, and Research*, which outlines the habitat needs of Atlantic croaker at different life stages (egg, larval, juvenile, adult). This report also highlights threats and uncertainties facing these ecological areas and identifies Habitat Areas of Particular Concern. It can be found online at: http://www.asmfc.org/files/Habitat/HMS14_AtlanticSciaenidHabitats_Winter2017.pdf.

Bycatch Reduction

Atlantic croaker is subject to both direct and indirect fishing mortality. Historically, croaker ranked as one of the most abundant bycatch species of the south Atlantic shrimp trawl fishery, resulting in the original FMP's recommendation that bycatch reduction devices (BRDs) be developed and required in the shrimp trawl fishery. Since then, the states of North Carolina through Florida have all enacted requirements for the use of BRDs in shrimp trawl nets in state waters, reducing croaker bycatch from this fishery (ASMFC 2010). However, bycatch and discard monitoring from the shrimp trawl fishery have historically been inadequate, resulting in a major source of uncertainty for assessing this stock, as well as other important Mid- and South Atlantic species. Most of the discarded croaker are age-0 and thus likely have not yet reached maturity (ASMFC 2010). The North Carolina Division of Marine Fisheries conducted a two-year study, published in 2015, to collect bycatch data from state shrimp trawlers. It found that Atlantic croaker represent between 34-49% of the total observed finfish bycatch by weight in estuarine waters and between 20-42% in ocean waters. The at-net mortality for Atlantic croaker was found to be 23% (Brown 2015). These data will be valuable for incorporating estimates of removals in future stock assessments.

Atlantic croaker are also discarded from other commercial fishing gears, primarily due to market pressures and few restrictions on croaker harvest at the state level. The NMFS Pelagic Observer Program provides data to estimate these discards for use in assessments; however, the time series is limited and only discards from gill nets and otter trawls could be estimated for the 2010 assessment based on the available data. Since 1988, estimated discards have fluctuated between 94 and 15,176 mt without trend, averaging 2,503 mt (ASMFC 2010).

Atlantic croaker is also a major component of the scrap/bait fishery. Landings from this fishery are not reported at the species level, except in North Carolina, which has a continuous program in place to sample these landings and enable estimation of croaker scrap landings for use in the stock assessment. As part of the 2010 stock assessment, North Carolina estimated the scrap/bait landings, which have declined in recent years, from a high of 1,569 mt in 1989 to a low of 84 mt in 2008, primarily due to restrictions placed on fisheries producing the highest scrap/bait landings (ASMFC 2010). Regulations instituted by North Carolina include a ban on flynet fishing south of Cape Hatteras, incidental finfish limits for shrimp and crab trawls in inside waters, minimum mesh size restrictions in trawls, and culling panels in long haul seines.

South Carolina has also begun a state monitoring program to account for scrap landings. The state initiated a bait harvester trip ticket program for all commercial bait harvesters licensed in South Carolina. The impetus for this program is to track bait usage of small sciaenid species (croaker, spot, and whiting) as well as other important bait species.

Several states have implemented other commercial gear requirements that further reduce bycatch and bycatch mortality, while others continue to encourage the use of the BRD devices. NOAA Fisheries published a notice on June 24, 2011 for public scoping in the Federal Register to expand the methods for reducing bycatch interactions with sea turtles, which may have additional effects on the bycatch of finfish like Atlantic croaker in trawls (76 FR 37050). Continuing to reduce the quantity of sub-adult croaker harvested should increase spawning stock biomass and yield per recruit.

Atlantic croaker are also subject to recreational discarding. The percentage of Atlantic croaker released alive by recreational anglers has generally increased over time. Discard mortality was estimated to be 10% for the 2010 stock assessment (ASMFC 2010). The use of circle hooks and appropriate handling techniques can help reduce mortality of released fish.

VII. Implementation of FMP Compliance Requirements for 2015

The PRT finds that all states have fulfilled the requirements of Amendment 1.

VIII. Recommendations

Management and Regulatory Recommendations

- Encourage the use of circle hooks to minimize recreational discard mortality.

- Consider approval of the *de minimis* requests from Delaware, South Carolina, Georgia, and Florida.
- Consider the basic research and monitoring information needed for informed management in light of the budgetary constraints limiting all state governments.

Research and Monitoring Recommendations

High Priority

- Increase observer coverage for commercial discards, particularly the shrimp trawl fishery. Develop a standardized, representative sampling protocol for observers to use to increase the collection of individual lengths and ages of discarded finfish.
- Describe the coast-wide distribution, behavior, and movement of croaker by age, length, and season, with emphasis on collecting larger, older fish.
- Continue state and multi-state fisheries-independent surveys throughout the species range and subsample for individual lengths and ages. Ensure NEFSC trawl survey continues to take lengths and ages. Examine potential factors affecting catchability in long-term fishery independent surveys.
- Quantify effects of BRDs and TEDs implementation in the shrimp trawl fishery by examining their relative catch reduction rates on Atlantic croaker.
- Continue to develop estimates of length-at-maturity and year-round reproductive dynamics throughout the species range. Assess whether temporal or density-dependent shifts in reproductive dynamics have occurred.
- Re-examine historical ichthyoplankton studies for an indication of the magnitude of estuarine and coastal spawning, as well as for potential inclusion as indices of spawning stock biomass in future assessments. Pursue specific estuarine data sets from the states (NJ, VA, NC, SC, DE, MD) and coastal data sets (MARMAP, EcoMon).

Medium Priority

- Conduct studies of discard mortality for recreational and commercial fisheries by each gear type in regions where removals are highest.
- In the recreational fishery, develop sampling protocol for collecting lengths of discarded finfish and collect otolith age samples from retained fish.
- Encourage fishery-dependent biological sampling, with proportional landings representative of the distribution of the fisheries. Develop and communicate clear protocols on truly representative sampling.
- Investigate environmental covariates in stock assessment models including climate cycles (e.g., Atlantic Multi-decadal Oscillation, AMO, and El Niño Southern Oscillation, El Niño) and recruitment and/or year class strength, spawning stock biomass, stock distribution, maturity schedules, and habitat degradation.
- Utilize NMFS Ecosystem Indicators bi-annual reports to consider folding indicators into the assessment; identify mechanisms for how environmental indicators affect the stock.
- Encourage efforts to recover historical landings data, determine whether they are available at a finer scale for the earliest years than are currently reported.
- Collect data to develop gear-specific fishing effort estimates and investigate methods to develop historical estimates of effort.

- Develop gear selectivity studies for commercial fisheries with emphasis on age 1+ fish.
- Conduct studies to measure female reproductive output at size and age (fecundity, egg and larval quality) and impact on assessment models and biomass reference points.
- Develop and implement sampling programs for state-specific commercial scrap and bait fisheries in order to monito the relative importance of Atlantic croaker. Incorporate biological data collection into the program.
- Investigate the relationship between estuarine nursery areas and their proportional contribution to adult biomass, i.e., are select nursery areas along Atlantic coast ultimately contributing more to SSB than others, reflecting better quality juvenile habitat?

IX. References

Atlantic States Marine Fisheries Commission (ASMFC). 1987. Fishery Management Plan for Atlantic Croaker. Washington (DC): ASMFC. Fishery Management Report No. 10. 90 p.

ASMFC. 2005a. Atlantic Croaker Stock Assessment & Peer Review Reports. Washington (DC): ASMFC. 370 p.

ASMFC. 2005b. Amendment 1 to the Interstate Fishery Management Plan for Atlantic Croaker. Washington (DC): ASMFC. Fishery Management Report No. 44. 92 p.

ASMFC. 2010. Atlantic Croaker 2010 Benchmark Stock Assessment. Washington (DC): ASMFC. 366 p.

Kevin Brown. 2015. Characterization of the commercial shrimp otter trawl fishery in the estuarine and ocean (0-3 miles) waters of North Carolina. Morehead City (NC): NCDEQ, Division of Marine Fisheries. Abstract.

X. Figures

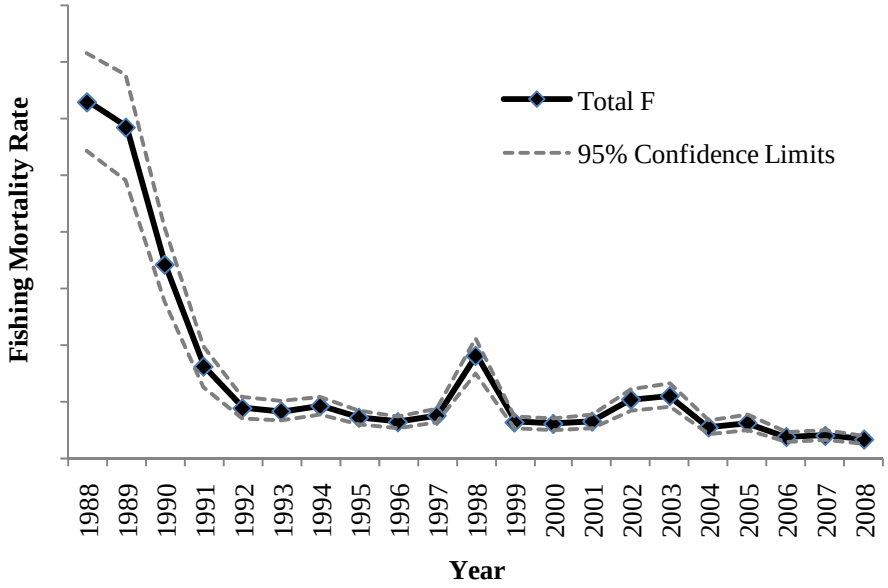

Figure 1. Trend in estimated total fishing mortality rate (F) of Atlantic croaker
(Absolute estimates of F are unreliable due to uncertainty regarding the estimation of Atlantic croaker discards in the shrimp trawl fishery, and the application of estimates in modeling. Source: ASMFC 2010.)

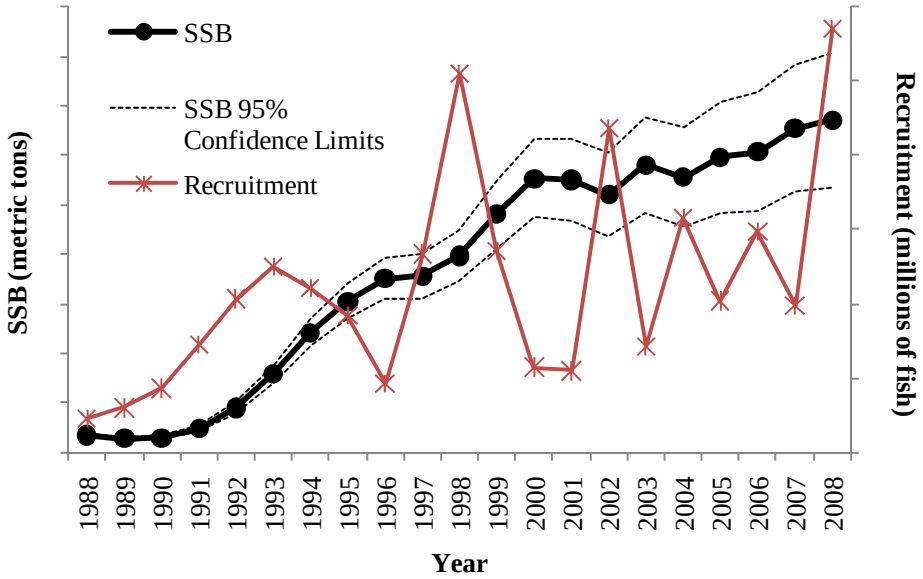

Figure 2. Trends in estimated spawning stock biomass (SSB, metric tons) and age-1 recruitment (numbers of fish) of Atlantic croaker
(Absolute estimates of stock size are unreliable due to uncertainty regarding the estimation of Atlantic croaker discards in the shrimp trawl fishery, and the application of estimates in modeling. Source: ASMFC 2010.)

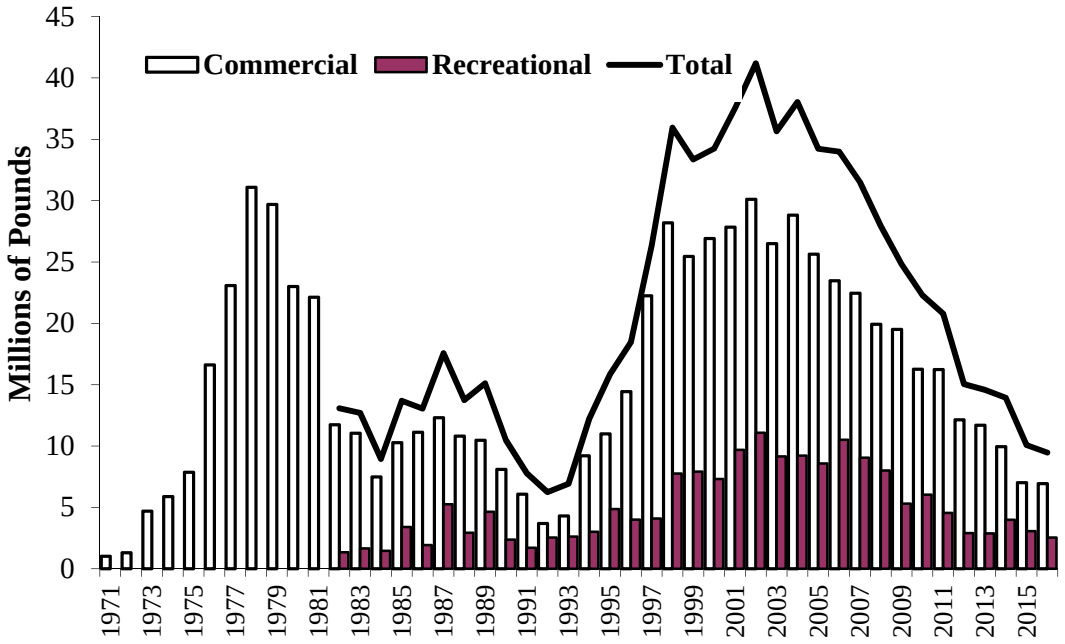

Figure 3. Atlantic croaker commercial, recreational, and total landings (pounds)
(See Tables 2 and 3 for values and source information. Commercial landings estimate for 2015 is preliminary. Reliable recreational landings estimates are not available before 1981.)

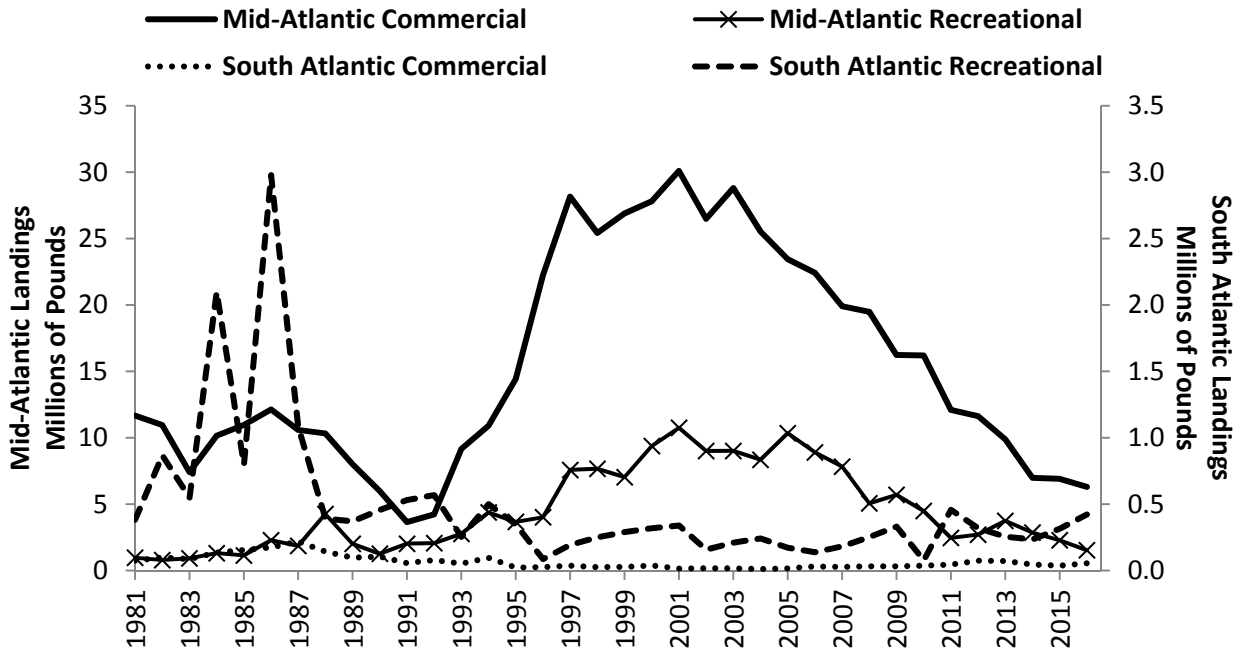

Figure 4. Mid-Atlantic (NJ-NC) and South Atlantic (SC-FL) landings (pounds)
(See Tables 2 and 3 for values and source information.)

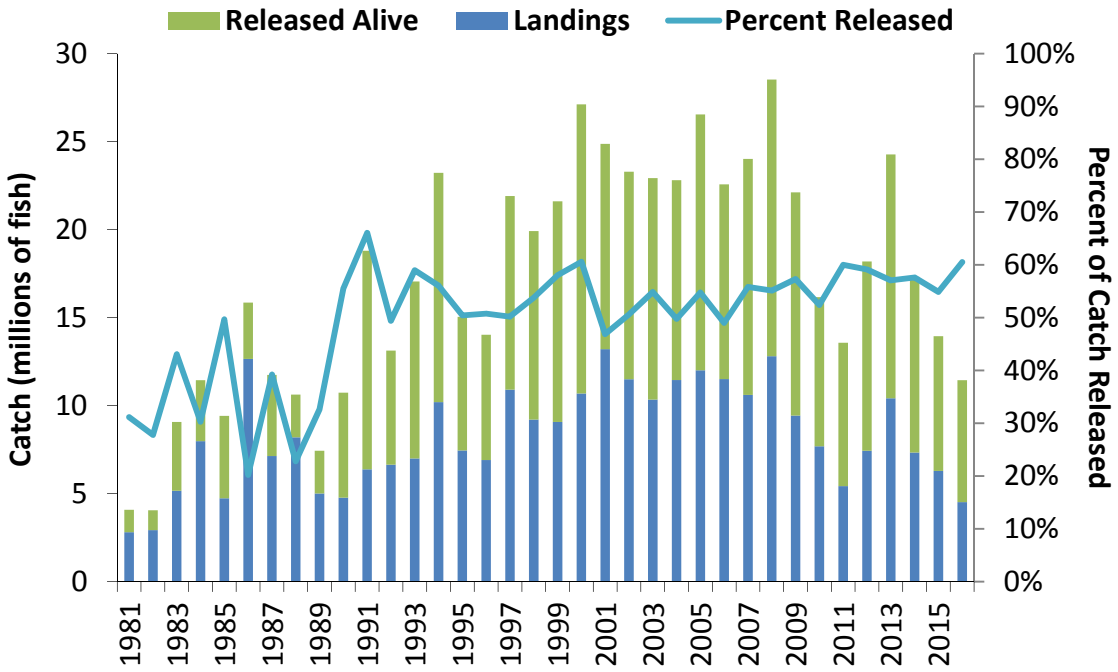

Figure 5. Recreational catch (landings and alive releases, in numbers) and the percent of catch that is released, 1981-2015
(See Tables 4 and 5 for values and source information.)

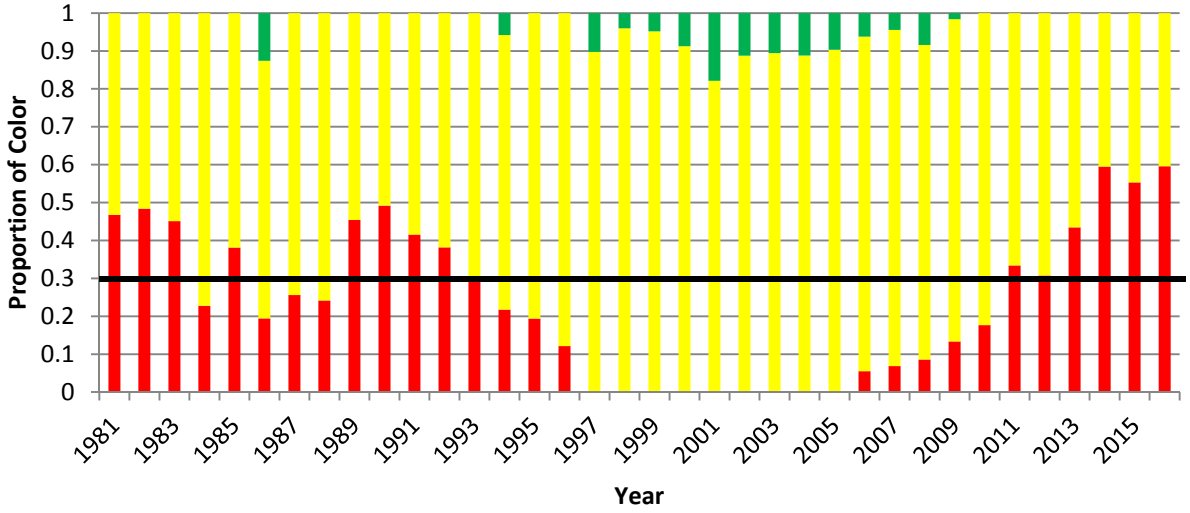

Figure 6. Annual color proportions for the harvest composite TLA of Atlantic croaker recreational and commercial landings.

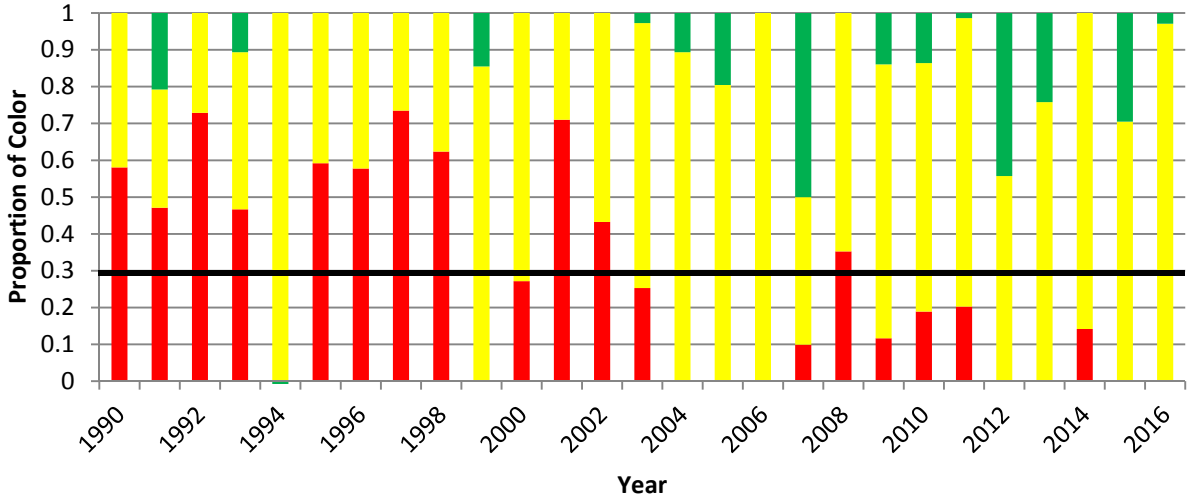

Figure 7. Adult croaker TLA composite characteristic index (NMFS and SEAMAP surveys).

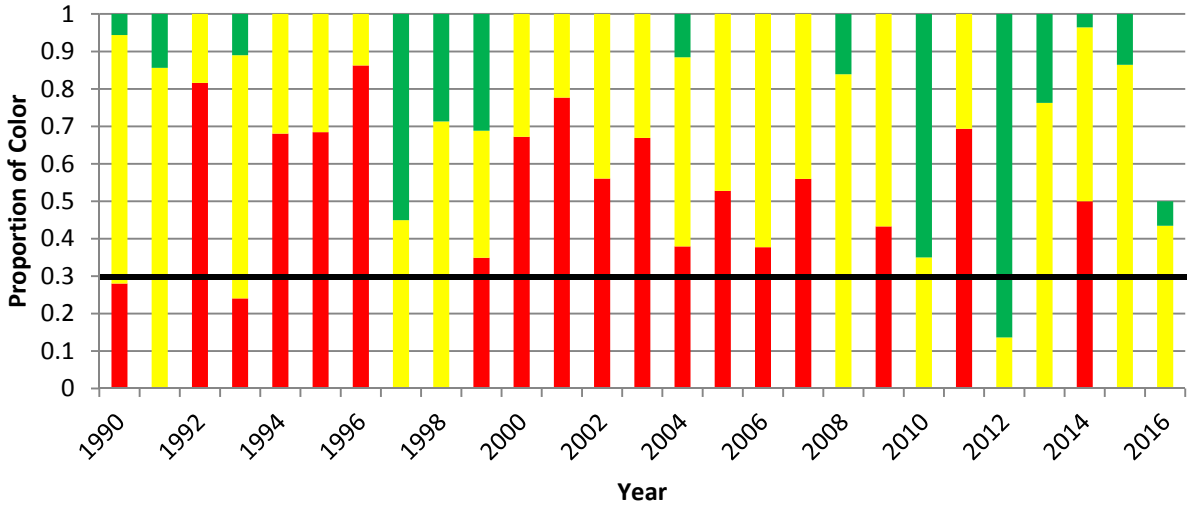

Figure 8. Juvenile croaker TLA composite characteristic index (NC 195 and VIMS surveys).
(2016 VIMS survey is not yet available.)

XI. Tables

Table 1. Summary of state regulations for Atlantic croaker in 2016*

State	Recreational	Commercial
NJ	none	otter/beam trawl mesh restriction for directed croaker harvest (>100 lbs in possession)
DE	8" minimum; recreational gill nets (up to 200 ft.) with license	8" minimum
MD	9" min, 25 fish/day, charter boat logbooks	9" minimum; open 3/16 to 12/31
PRFC	25 fish/day	pound net season: 2/15 to 12/15
VA	none	none
NC	recreational use of commercial gears with license and gear restrictions	
SC	mandatory for-hire logbooks, small Sciaenidae species aggregate bag limit of 50 fish/day	
GA	25 fish/day	25 fish/day limit except for trawlers harvesting shrimp for human consumption (no limit)
FL	none	none

* A commercial fishing license is required to sell croaker in all states with fisheries. For all states, general gear restrictions affect commercial croaker harvest.

Table 2. Commercial harvest (pounds) of Atlantic croaker by state, 1981-2015

(Estimates for 2016 are preliminary. Sources: 2017 state compliance reports for 2016 fishing year and for years prior to 2016, personal communication with ACCSP, Arlington, VA [07/18/2017], except DE [state compliance reports 1985-2016 and ACCSP for years prior to 1985], MD [state compliance reports only], and Virginia [state compliance reports only].)

Year	NJ	DE	MD	PRFC	VA	NC	SC	GA	FL	Total
1981	23,500		2,104	648	429,800	11,205,342	*	1,038	72,112	11,734,544
1982	100		7,091	188	119,300	10,824,953	386	2,177	95,357	11,049,552
1983	200		417	1,549	150,400	7,249,680	*	1,097	81,737	7,485,080
1984	57,700		27,072	73,701	817,700	9,170,775	3,793	*	131,375	10,282,116
1985	48,800	66	9,510	19,854	2,171,821	8,714,432	*		115,641	11,080,124
1986	106,000	466	135,922	99,373	2,367,000	9,424,828	924		173,531	12,308,044
1987	357,600	770	119,409	102,691	2,719,500	7,289,191	698	553	217,995	10,808,407
1988	30,100	162	98,855	12,796	1,749,200	8,434,415	2,614	304	140,051	10,468,497
1989	137,100		89,173	5,579	949,649	6,824,088	*	*	95,021	8,100,610
1990	644	42	2,473	5,115	201,353	5,769,512	1,190	*	104,402	6,084,731
1991	31,292	1,111	6,183	996	164,126	3,436,960	*	*	56,739	3,697,407
1992	51,600	687	17,050	17,692	1,339,353	2,796,612		*	79,040	4,302,034
1993	183,414	2,435	114,159	262,482	5,326,293	3,267,652	*		52,031	9,208,466
1994	117,256	3,044	158,918	240,271	5,718,085	4,615,754	*	*	96,018	10,949,346
1995	334,654	12,106	489,506	606,184	6,949,639	6,021,284	*	*	22,879	14,436,252
1996	621,889	9,681	792,326	1,427,285	9,320,283	9,961,834		*	26,045	22,159,343
1997	1,994,446	10,509	1,088,969	1,518,196	12,829,212	10,711,667	*	*	36,577	28,189,576
1998	1,029,332	10,384	1,006,529	610,885	11,285,458	10,865,897		*	26,418	24,834,903
1999	2,071,046	15,068	948,191	1,190,138	12,476,074	10,185,507		*	26,824	26,912,848
2000	2,130,465	11,118	902,379	1,812,130	12,822,400	10,122,676		*	31,566	27,832,734
2001	1,389,837	21,759	1,488,815	1,963,294	13,214,731	12,017,424		*	16,511	30,112,370
2002	1,828,484	10,515	894,879	1,421,094	12,104,334	10,189,153	*	*	18,216	26,466,675
2003	1,575,738	16,612	713,205	1,128,003	10,935,574	14,429,197	140	*	18,868	28,817,337
2004	2,096,305	30,369	1,354,982	1,631,596	8,535,638	11,993,488	*	*	11,407	25,653,785
2005	1,847,753	36,624	972,801	481,912	8,211,802	11,903,292	41	*	16,809	23,471,033
2006	1,617,227	19,307	466,833	670,276	9,252,110	10,396,554	160	*	30,520	22,452,986
2007	1,357,999	13,522	477,887	188,567	10,557,370	7,271,162	*	*	26,726	19,893,233
2008	946,339	10,465	592,211	337,062	11,796,771	5,791,766	116	*	30,407	19,505,137
2009	585,552	16,341	448,550	234,101	8,808,677	6,135,437	75		32,151	16,260,884
2010	342,116	6,182	490,067	162,571	7,879,847	7,312,159	*		37,229	16,230,171
2011	458,397	12,252	704,019	243,196	5,611,885	5,054,186	*		47,649	12,131,583
2012	363,381	2,811	908,619	273,849	6,963,815	3,106,616	*		74,527	11,693,617
2013	332,813	6,700	850,336	130,285	6,626,517	1,927,938	*		76,463	9,951,052
2014	265,166	9,647	479,079	177,777	3,406,958	2,629,908	247		45,587	7,014,369
2015	81,311	3,975	288,331	118,996	4,585,623	1,819,067	69		39,096	6,936,468

2016	55,210	795	101,141	168,889	3,882,869	2,092,135	302		55,154	6,356,495

* confidential data

Table 3. Recreational harvest (pounds) of Atlantic croaker by state, 1981-2015
(Source: personal communication with NMFS Fisheries Statistics Division. [07/18/2017])

Year	NJ	DE	MD	VA	NC	SC	GA	FL	Total
1981	582	2,317		535,297	426,240	67,284	9,665	305,547	1,346,932
1982			70,276	455,250	264,607	67,015	45,161	754,956	1,657,265
1983			32,053	486,006	395,402	14,158	25,412	510,599	1,463,630
1984			86,462	634,870	584,660	161,661	80,684	1,856,599	3,404,936
1985			17,169	843,414	278,214	72,780	40,421	684,449	1,936,447
1986		2,595	116,542	2,034,337	126,888	173,028	21,504	2,783,651	5,258,545
1987			191,628	1,306,814	352,346	64,696	14,947	1,005,053	2,935,484
1988		826	926,399	2,390,573	935,460	54,313	20,313	316,900	4,644,784
1989		283	19,189	1,329,680	658,567	80,580	21,138	268,335	2,377,772
1990		112	37,873	875,427	347,183	123,795	205,352	127,525	1,717,267
1991	4,264	10,972	117,210	1,728,021	157,660	16,173	54,116	460,453	2,548,869
1992		3,292	53,556	1,768,962	233,533	28,512	132,596	407,672	2,628,123
1993	844	9,640	476,866	1,993,915	282,910	18,005	55,604	180,517	3,018,301
1994	818	2,892	991,166	3,024,118	351,230	128,306	34,048	337,474	4,870,052
1995	9,515	82,863	567,149	2,675,381	326,135	25,386	20,862	301,918	4,009,209
1996	39,099	205,527	702,037	2,716,759	346,501	14,480	21,797	50,038	4,096,238
1997	278,758	340,198	1,117,999	5,522,195	309,457	53,863	26,272	113,096	7,761,838
1998	135,733	293,561	1,150,459	5,920,436	161,117	76,821	30,966	141,756	7,910,849
1999	301,957	522,201	1,024,398	4,969,283	212,991	26,356	32,375	231,694	7,321,255
2000	1,125,730	483,963	2,672,996	4,888,910	201,306	13,457	62,390	242,914	9,691,666
2001	1,132,214	304,126	1,278,699	7,674,759	355,009	10,750	7,844	320,487	11,083,888
2002	268,423	250,900	1,162,278	7,075,130	242,184	29,343	10,622	117,880	9,156,760
2003	682,698	262,113	2,069,176	5,674,111	317,606	59,399	71,881	79,397	9,216,381
2004	859,373	307,312	1,078,951	5,792,487	306,029	69,510	15,597	156,395	8,585,654
2005	1,193,848	750,857	987,379	7,240,971	168,797	34,922	14,995	121,320	10,513,089
2006	632,085	717,803	865,433	6,460,336	222,286	16,240	9,210	112,512	9,035,905
2007	453,854	321,200	806,826	6,111,612	131,185	11,109	12,756	159,077	8,007,619
2008	527,179	322,166	465,064	3,612,065	132,731	16,212	12,948	223,121	5,311,486
2009	114,015	240,468	1,504,806	3,708,788	131,742	71,517	36,771	222,239	6,030,346
2010	36,063	41,533	976,143	3,185,485	241,993	11,970	10,067	56,023	4,559,277
2011	21,460	52,889	444,595	1,837,183	99,298	240,665	21,548	194,848	2,912,486
2012	96,366	63,037	535,325	1,905,100	105,530	12,433	13,503	292,365	3,023,659
2013	539,125	103,444	737,291	2,217,664	141,880	32,138	17,209	205,970	3,994,721
2014	205,388	207,903	607,046	1,602,504	227,949	35,785	32,833	165,353	3,084,761
2015	99,768	73,579	432,325	1,479,567	190,808	76,531	37,363	200,948	2,590,889
2016	2,318	3,636	110,398	1,269,504	141,571	16,695	17,637	388,304	1,950,063

Table 4. Recreational harvest (numbers) of Atlantic croaker by state, 1981-2015
(Source: personal communication with NMFS Fisheries Statistics Division. [07/18/2017])

Year	NJ	DE	MD	VA	NC	SC	GA	FL	Total
1981	1,054	3,003	0	964,013	1,043,240	165,742	35,591	598,896	2,811,539
1982			10,452	273,039	596,493	193,554	169,749	1,682,619	2,925,906
1983			108,355	2,154,133	1,620,909	60,811	75,173	1,148,227	5,167,608
1984			211,035	2,047,720	2,147,871	588,114	202,364	2,781,742	7,978,846
1985			21,276	2,284,334	723,933	260,265	144,341	1,306,955	4,741,104
1986		392	123,578	6,384,966	356,742	599,442	69,887	5,118,552	12,653,559
1987	0	0	208,488	3,234,224	904,030	166,978	44,783	2,580,727	7,139,230
1988		604	1,005,452	4,048,690	2,256,128	144,057	64,093	685,778	8,204,802
1989		478	22,871	2,203,504	2,131,763	217,023	72,598	359,417	5,007,654
1990		281	100,673	2,374,679	1,063,452	346,631	585,380	304,064	4,775,160
1991	16,235	28,837	288,471	4,298,542	434,067	100,816	184,435	1,030,115	6,381,518
1992	0	9,281	117,427	4,524,040	723,823	74,051	440,185	754,595	6,643,402
1993	2,552	19,352	805,560	4,990,098	755,998	32,700	89,734	304,067	7,000,061
1994	1,567	4,970	1,633,581	6,494,691	1,179,735	188,520	102,974	599,032	10,205,070
1995	15,184	122,720	827,183	5,029,708	850,606	75,422	100,826	438,076	7,459,725
1996	35,037	221,423	775,115	4,997,021	662,240	37,464	61,957	116,575	6,906,832
1997	342,089	373,621	1,053,232	8,066,926	661,116	118,428	64,050	235,430	10,914,892
1998	143,404	352,468	1,126,058	6,730,181	387,427	170,528	64,953	234,360	9,209,379
1999	357,261	618,676	1,209,572	5,881,671	442,185	54,761	104,438	403,982	9,072,546
2000	1,023,442	497,491	2,674,880	5,486,159	391,056	32,332	128,922	455,870	10,690,152
2001	1,177,813	278,907	1,319,928	9,335,313	635,552	19,802	21,503	426,264	13,215,082
2002	253,472	207,344	1,223,385	9,129,060	408,944	66,409	36,497	177,751	11,502,862
2003	692,391	238,617	1,619,766	6,695,192	490,399	198,339	248,853	165,459	10,349,016
2004	855,927	306,801	896,855	8,259,608	511,418	171,544	38,599	415,570	11,456,322
2005	1,227,349	391,456	1,921,122	7,657,147	326,777	143,387	39,561	302,784	12,009,583
2006	511,220	419,010	2,538,525	7,221,148	556,024	58,500	34,081	172,586	11,511,094
2007	406,238	272,092	2,130,970	6,944,886	461,162	38,147	45,068	310,130	10,608,693
2008	600,975	198,531	2,747,160	8,388,497	317,940	65,853	38,246	449,054	12,806,256
2009	193,464	319,734	2,473,018	5,327,388	368,990	238,900	82,269	438,209	9,441,972
2010	63,027	46,152	2,147,825	4,743,697	478,156	46,464	35,635	132,664	7,693,620
2011	40,855	45,523	919,922	3,305,707	246,676	349,463	44,044	476,292	5,428,482
2012	266,832	72,284	2,710,294	3,445,232	288,813	27,873	38,402	589,642	7,439,372
2013	889,754	197401	4,076,910	4273744	411,882	106,938	54915	411,858	10,423,402
2014	263,734	366,608	2,226,095	3,429,768	541,657	149,890	64,138	298,322	7,340,212
2015	116,109	139,031	1,441,241	3,342,008	471,869	216,168	111,344	456,802	6,294,572
2016	4,277	5,057	432,683	3,044,851	368,203	48,537	54,211	563,174	4,520,993

Table 5. Recreational releases (number) of Atlantic croaker by state, 1981-2015

(Source: personal communication with NMFS Fisheries Statistics Division. [07/18/2017])

Year	NJ	DE	MD	VA	NC	SC	GA	FL	Total
1981			16,233	324,238	704,259	128,192	13,481	85,740	1,272,143
1982				77,756	641,327	107,340	111,630	188,277	1,126,330
1983			1,507,184	1,410,151	424,562	119,036	70,499	379,021	3,910,453
1984			70,192	673,080	1,701,418	746,905	37,573	236,432	3,465,600
1985			13,132	1,616,052	1,596,901	238,678	66,649	1,146,582	4,677,994
1986		1,757	43,399	2,578,268	137,841	84,335	40,623	318,511	3,204,734
1987	1,374	861	32,074	2,056,580	560,853	108,366	76,908	1,770,697	4,607,713
1988		582	273,231	832,284	984,219	112,271	20,021	200,630	2,423,238
1989		1,307	41,822	1,342,169	891,926	58,642	17,632	72,822	2,426,320
1990		1,268	88,688	3,922,564	1,351,152	111,085	317,497	168,144	5,960,398
1991	91,633	75,319	3,352,190	7,418,045	669,385	25,168	140,402	647,824	12,419,966
1992	4,103	43,583	856,292	4,167,137	954,494	26,729	178,267	251,343	6,481,948
1993	5,799	13,194	2,504,362	5,795,479	1,499,217	16,949	83,203	138,875	10,057,078
1994	17,253	14,069	1,628,824	7,676,780	3,110,528	141,513	99,026	331,736	13,019,729
1995	31,019	51,574	496,046	5,494,289	1,172,716	108,345	89,609	141,732	7,585,330
1996	17,585	76,851	403,776	5,151,206	1,218,799	64,494	60,282	126,300	7,119,293
1997	111,468	384,233	1,497,670	7,275,160	1,443,568	138,107	25,630	116,276	10,992,112
1998	221,324	839,932	3,021,780	4,990,541	1,060,928	266,068	159,928	152,744	10,713,245
1999	860,325	1,017,499	2,483,800	5,668,925	1,368,478	116,826	57,567	967,894	12,541,314
2000	688,746	694,813	4,967,856	7,811,048	1,569,385	96,402	169,903	428,131	16,426,284
2001	853,621	285,123	1,585,806	7,086,706	1,256,807	115,284	192,362	282,461	11,658,170
2002	369,003	361,355	2,523,276	7,107,656	925,806	92,498	194,474	217,054	11,791,122
2003	833,508	654,697	1,393,224	6,543,524	1,552,315	440,446	965,496	192,356	12,575,566
2004	1,237,163	599,207	854,132	6,276,767	1,656,049	320,788	154,259	253,951	11,352,316
2005	1,692,401	674,684	1,136,846	8,738,109	1,401,413	321,861	280,889	293,692	14,539,895
2006	503,491	937,193	1,783,557	4,193,675	2,578,819	595,075	283,851	187,562	11,063,223
2007	590,078	672,771	1,258,131	8,504,212	1,608,120	224,454	228,564	321,559	13,407,889
2008	2,373,945	601,994	2,427,219	7,806,627	1,419,019	205,373	293,926	596,450	15,724,553
2009	108,371	537,587	1,137,578	7,621,484	1,912,670	514,839	434,608	406,822	12,673,959
2010	167,191	228,936	1,011,236	4,824,151	1,598,139	187,184	263,987	188,637	8,469,461
2011	62,391	88,524	365,716	4,872,928	1,798,230	240,605	262,493	452,669	8,143,556
2012	1,151,045	446,879	1,731,079	5,091,063	1,255,216	271,321	167,488	641,570	10,755,661
2013	773,763	770,454	2,936,927	5,968,340	1,984,701	799,982	298,409	318,139	13,850,715
2014	205,601	664,648	1,146,192	3,606,078	2,713,787	780,171	470,751	393,360	9,980,588
2015	78,135	118,565	626,529	2,760,541	2,477,625	959,887	210,454	422,164	7,653,900
2016	41,595	169,076	245,155	2,543,800	2,147,160	976,768	152,037	652,440	6,928,031