

Modifications to Gulf of Mexico Migratory Group Cobia Size and Possession Limits



COBIA

Rachycentron canadum

Draft Framework Amendment 7 to the Fishery Management Plan for Coastal Migratory Pelagic Resources in the Gulf of Mexico and Atlantic Region

October 2018



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ENVIRONMENTAL ASSESSMENT COVER SHEET

Draft Framework Amendment 7 to Modify Gulf of Mexico Migratory Group Cobia Size and Possession Limits

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ABBREVIATIONS USED IN THIS DOCUMENT

ABC	acceptable biological catch
ACL	annual catch limit
ACT	annual catch target
ALS	accumulated landings system
AM	accountability measure
ASFMC	Atlantic States Marine Fisheries Commission
BiOP	biological opinion
CMP	coastal migratory pelagics
CHTS	Coastal Household Telephone Survey
CS	consumer surplus
Councils	Gulf of Mexico and South Atlantic Fishery Management Councils
DPS	distinct population segment
EA	environmental assessment
EEZ	exclusive economic zone
EFH	essential fish habitat
EIS	Environmental Impact Statement
EJ	environmental justice
ESA	Endangered Species Act
FES	(mail-based) fishing effort survey
FL	fork length
FMP	fishery management plan
GDP	gross domestic product
GMFMC	Gulf of Mexico Fishery Management Council
Gulf	Gulf of Mexico
Gulf Council	Gulf of Mexico Fishery Management Council
HAPC	habitat area of particular concern
IPCC	Intergovernmental Panel on Climate Change
LHWG	Life History Working Group
MMPA	Marine Mammal Protection Act
MRIP	Marine Recreational Information Program
MSY	maximum sustainable yield
NARW	North Atlantic right whales
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Agency
NOR	net operating revenue
OFL	overfishing limit
OY	optimum yield
PAH	polycyclic aromatic hydrocarbons
PS	producer surplus
RQ	regional quotient
SAFMC	South Atlantic Fishery Management Council
SEDAR	Southeast Data, Assessment, and Review
SEFSC	Southeast Fisheries Science Center

SEFSC-SSRG	Southeast Fisheries Science Center Social Science Research Group
SERO	NMFS Southeast Regional Office
South Atlantic Council	South Atlantic Fishery Management Council
SSC	Scientific and Statistical Committee
VOC	volatile organic compounds
ww	whole weight
lw	landed weight

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CHAPTER 1. INTRODUCTION

1.1 Background

Cobia are managed jointly between the South Atlantic Fishery Management Council (South Atlantic Council or SAFMC) and the Gulf of Mexico (Gulf) Fishery Management Council (Gulf Council) (together: “Councils”) under the Fishery Management Plan (FMP) for Coastal Migratory Pelagic Resources in the Gulf of Mexico and Atlantic Region (CMP FMP).¹ Two migratory groups of cobia exist in the southeastern US: the Atlantic and the Gulf migratory group. A recent stock identification workshop (April 2018) reviewed genetic, spatial distribution, movement, and life history data on cobia from both migratory groups, and found that a transition zone between these migratory groups may exist between Savannah, Georgia, and Cape Canaveral, Florida (SEDAR 2018a). These findings were later validated by an independent review panel (SEDAR 2018b). The current stock and management boundaries are shown in Figure 1.1.1. The Councils recently recommended removing the Atlantic migratory group of cobia (Atlantic cobia) from the CMP FMP, since the preponderance of Atlantic cobia are landed in state waters (CMP Amendment 31; SAFMC and GMFMC 2018). The Atlantic States Marine Fisheries Commission (ASMFC) will recommend management measures for federal waters from Georgia to New York under the Atlantic Coastal Fisheries Cooperative Management Act, which will be mirrored by the National Marine Fisheries Service in those federal waters. In the future if the Councils determine that Atlantic cobia require federal management in federal waters, they can add Atlantic cobia back into the CMP FMP and implement all necessary management measures, and management through the ASMFC will end.

- ***Gulf of Mexico and South Atlantic Fishery Management Councils*** – Develop the range of actions and alternatives and select preferred alternatives that are submitted to the National Marine Fisheries Service.
- ***National Marine Fisheries Service and Council staff*** – Assist in the development of alternatives based on guidance from the Council, and analyze the environmental impacts of those alternatives.
- ***Secretary of Commerce*** – Approves, disapproves, or partially approves the amendment as recommended by the Council.

¹ The Mid-Atlantic Fishery Management Council has granted authority to the South Atlantic Council for management of cobia in its jurisdictional area.

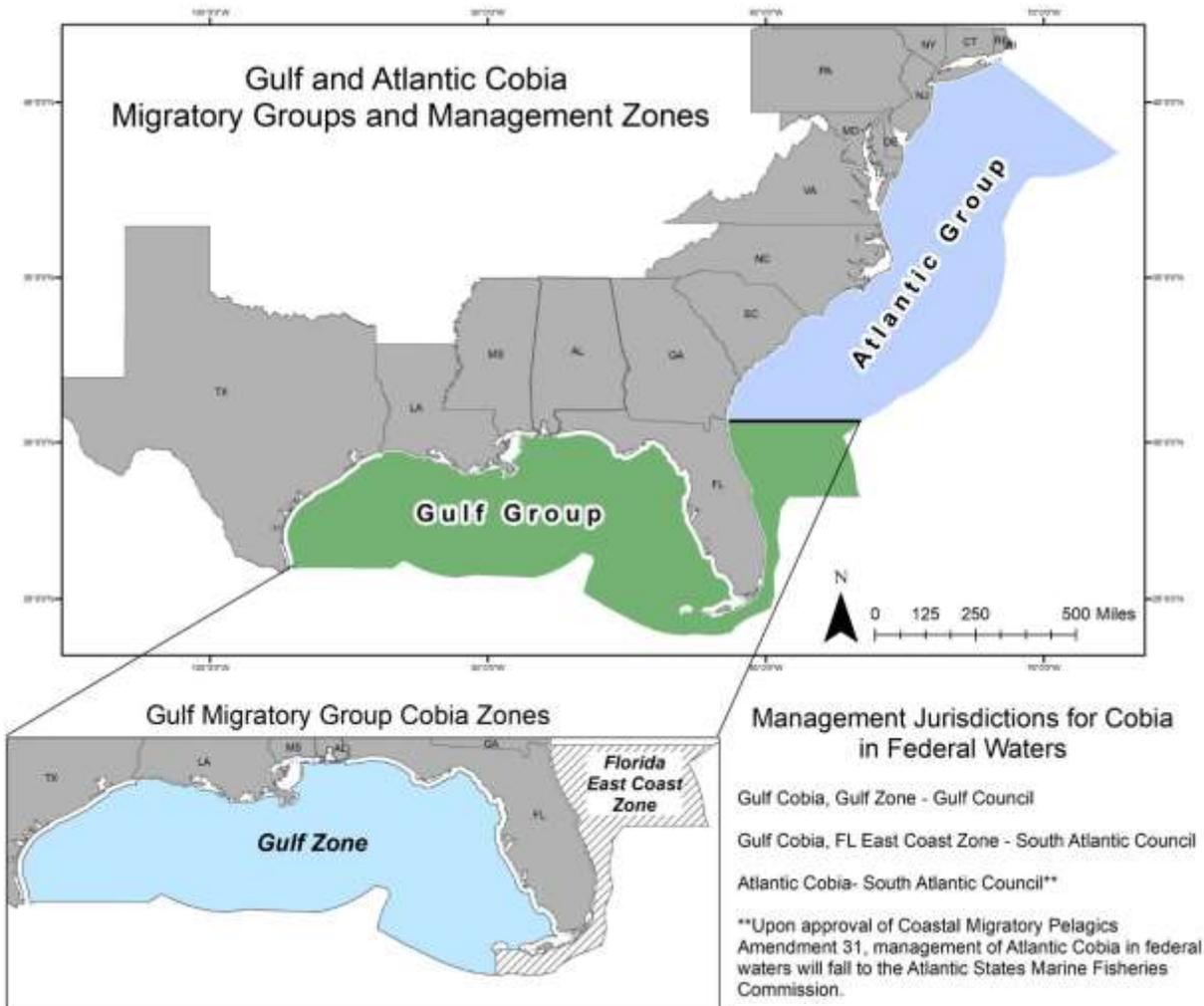


Figure 1.1.1. Current cobia stock boundaries used for management purposes by the Councils, as established through CMP Amendment 20B (GMFMC and SAFMC 2014).

The Gulf migratory group of cobia (Gulf cobia) occurs from Texas east and north to the Florida-Georgia state line (Figure 1.1.1). Each Council manages Gulf cobia within their respective jurisdictions, with the Gulf Council apportioning the Gulf cobia occurring east and north of the Gulf Council jurisdictional boundary around the Florida Keys to the South Atlantic Council for management (Florida East Coast Zone is the shaded section in the Figure 1.1.1 inset). The Gulf Council manages cobia from Texas to Key West. The South Atlantic Council is not presently considering management changes to its apportionment of Gulf cobia. Within the Gulf Council’s jurisdiction (Gulf Zone), Gulf cobia is managed using a single stock annual catch limit (ACL), meaning that there are no sector-specific allocations for the recreational and commercial sectors. Landings of cobia remained relatively consistent from 2012 – 2016; however, a decrease in landings was observed in the 2017 landings data. Anglers from throughout the Gulf attending Gulf Council meetings have provided public testimony and have been reporting a decrease in the presence of cobia and asked the Gulf Council to address this as a potential problem with the status of the Gulf cobia stock. These public comments are primarily from for-hire and private angling stakeholders, and recreational landings account for the vast majority (> 90%) of all Gulf

cobia landings. Commercial landings are shown in Table 1.1.1. Recreational landings are shown in Table 1.1.2.

Table 1.1.1. Commercial landings history for Gulf cobia from 2001 – 2017 in pounds whole weight (ww). 2017 data are preliminary and incomplete.

Year	AL/West FL	LA/MS	Texas	Gulf Zone	East Florida Zone	Grand Total
2001	54,864	30,219	7,025	92,108	85,605	177,713
2002	64,691	31,621	8,940	105,252	78,441	183,693
2003	80,743	24,059	6,634	111,436	83,488	194,924
2004	74,486	20,188	6,507	101,181	78,219	179,400
2005	60,360	15,935	11,370	87,665	49,415	137,080
2006	52,745	12,429	16,691	81,865	69,639	151,504
2007	58,668	9,467	5,073	73,208	74,278	147,486
2008	53,337	11,253	4,133	68,723	71,525	140,248
2009	42,817	15,198	4,224	62,239	75,604	137,843
2010	75,792	4,733	1,836	82,361	112,942	195,303
2011	58,913	8,870	1,385	69,168	171,472	240,640
2012	35,969	13,343	2,599	51,911	87,825	139,736
2013	64,149	15,370	2,989	82,508	69,623	152,131
2014	55,420	18,759	4,302	78,481	86,497	164,978
2015	48,771	18,544	2,999	70,314	62,488	132,802
2016	43,896	24,893	5,819	74,608	48,258	122,866
2017	-	-	-	68,514	-	-

Source: SERO ALS data, July 2018.

Note: Commercial landings for Louisiana and Mississippi, and Alabama and West Florida, were pooled for data confidentiality reasons. The “Gulf Zone” column represents those landings from the Gulf Council’s jurisdictional area identified in Figure 1.1.1. The “East Florida Zone” column represents landings of Gulf migratory group cobia from the Florida East Coast Zone. The “Grand Total” column combines landings from the Gulf Zone with landings from the Florida East Coast Zone, to represent commercial landings for the entire Gulf migratory group of cobia.

Table 1.1.2. Recreational landings history for Gulf cobia from 2001 – 2017 in lbs ww.

Year	Alabama	West FL	Louisiana	Mississippi	Texas	Gulf Zone Total	East Florida Zone	Grand Total
2001	126,431	890,024	102,852	73,194	35,521	1,228,022	312,511	1,540,533
2002	71,061	545,269	114,871	69,753	25,897	826,851	361,632	1,188,483
2003	81,673	853,207	262,921	38,800	34,362	1,270,963	741,188	2,012,151
2004	120,193	1,000,850	290,994	107,939	44,461	1,564,437	353,087	1,917,524
2005	39,063	531,113	528,425	27,720	33,086	1,159,407	349,606	1,509,013
2006	33,796	432,214	525,706	22,647	50,697	1,065,060	543,598	1,608,658
2007	206,434	600,559	341,321	32,465	39,587	1,220,366	615,866	1,836,232
2008	41,543	495,016	253,640	27,988	55,679	873,866	459,572	1,333,438
2009	93,960	337,155	132,370	26,302	65,122	654,909	351,283	1,006,192
2010	15,607	482,804	427	0	39,563	538,401	775,306	1,313,707
2011	70,425	310,579	504,074	93,342	26,525	1,004,944	802,217	1,807,161
2012	199,679	405,324	150,690	1,939	36,625	794,256	451,097	1,245,353
2013	97,941	379,141	364,038	280,681	24,229	1,146,030	314,129	1,460,159
2014	102,423	511,110	157,820	62,572	29,489	863,413	649,816	1,513,229
2015	128,011	365,489	258,683	25,843	29,433	807,459	425,267	1,232,726
2016	136,935	385,484	325,141	14,799	27,600	889,959	447,026	1,336,985
2017	216,680	252,944	125,358	55,668	27,815	678,464	298,583	977,047

Source: MRIP ACL data and TPWD Creel data, July 2018.

Note: The “Gulf Total” column represents those landings from the Gulf Council’s jurisdictional area. The “Grand Total” column combines the “Gulf Total” column with landings from the Florida to represent recreational landings for the entire Gulf migratory group of cobia.

Annual catch targets (ACTs) and ACLs were not used for Gulf cobia until 2012 (GMFMC and SAFMC 2011). The ACTs and ACLs for Gulf cobia apply only to the Gulf Council’s jurisdictional area; the South Atlantic Council is responsible for setting ACTs and ACLs for the portion of the Gulf cobia stock which occurs off the east coast of Florida. Table 1.1.3 shows the percentages of the ACTs and ACLs landed in the Gulf Council’s jurisdictional area since 2012.

Table 1.1.3. Landings and catch limit history for Gulf Zone cobia from 2012 – 2017 in lbs ww.

Year	Recreational Landings	Commercial Landings	Total Landings	ACT	ACL	% ACT	% ACL
2012	794,256	51,911	846,167	1,310,000	1,460,000	64.59%	57.96%
2013	1,146,030	82,508	1,228,538	1,310,000	1,460,000	93.78%	84.15%
2014	863,413	78,481	941,894	1,310,000	1,460,000	71.90%	64.51%
2015	807,459	70,314	877,773	1,450,000	1,610,000	60.54%	54.52%
2016	889,959	74,608	964,567	1,500,000	1,660,000	64.30%	58.11%
2017	678,464	68,514	746,978	1,500,000	1,660,000	49.80%	45.00%

Source: [SERO ACL Monitoring webpage \(July 11, 2018\)](#).

The most recent stock assessment of Gulf cobia (SEDAR 28 2013) determined that Gulf cobia is not overfished and is not undergoing overfishing. The Gulf Council’s Scientific and Statistical Committee (SSC) accepted the stock assessment for management advice. Because a portion of the Gulf cobia stock occurs in the South Atlantic Council’s jurisdiction, that portion of the stock is apportioned to the South Atlantic Council to manage (Florida East Coast Zone) and the rest of the stock remains under the Gulf Council jurisdiction (Gulf Zone). The SSC recommended the overfishing limit (OFL) and acceptable biological catch (ABC) levels for the entire Gulf cobia stock, including the Florida East Coast Zone. Subsequently, the Gulf Council recommended ACL and annual catch target (ACT) levels for the Gulf Zone (Table 1.1.4) for 2014 – 2016 and subsequent years.

Table 1.1.4. Harvest limits for Gulf cobia for 2014 – 2016 and subsequent fishing years. Values are in pounds whole weight.

Year	Gulf Cobia (Total)		Gulf Zone	
	OFL*	ABC*	ACL**	ACT**
2014	2,560,000	2,460,000	1,460,000	1,310,000
2015	2,590,000	2,520,000	1,610,000	1,450,000
2016+	2,660,000	2,600,000	1,660,000	1,500,000

* OFL and ABC values are for the entire Gulf cobia stock, including the portion which occurs in the South Atlantic Council’s jurisdiction.

** ACL and ACT values are only for the portion of the Gulf cobia stock which occurs in the Gulf Council’s jurisdiction.

The minimum size limit for Gulf cobia in both the Gulf and South Atlantic has been set at 33 inches fork length (FL) since the implementation of the original CMP FMP in 1983 (GMFMC and SAFMC 1983). This minimum size limit applies to the recreational and commercial sectors, and corresponds with the length at which life history information indicates that 50% of cobia are sexually mature (sexes combined) and capable of reproduction (SEDAR 28 2013). The current daily federal possession limit of two fish per person in both the Gulf and South Atlantic has been in effect since Amendment 5 to the CMP FMP was implemented in 1990, and applies to both sectors (GMFMC and SAFMC 1990).

Stakeholders fishing within the Gulf Zone have expressed concern to the Gulf Council regarding the condition of the Gulf cobia stock since 2016, with increasing frequency in public comment on the issue in 2017 and 2018 (see recordings of public testimony from Gulf Council meetings for more information²). At its meeting in April 2018, the Gulf Council decided to explore options for reducing fishing mortality of Gulf cobia in the Gulf Zone, including modifications to minimum size and possession limits, ahead of the next stock assessment, which is currently scheduled to be conducted in 2019 and made available for management advice in 2020. Though the 2013 stock assessment (SEDAR 28 2013) did not indicate that Gulf cobia are overfished or undergoing overfishing, the actions presented in this framework amendment are designed to take a precautionary approach by reducing fishing mortality, in case the decrease in landings observed in 2017 indicates some presently unknown issue with the stock. Further, the management measures considered in this document do not reflect those adopted for Atlantic cobia by the ASMFC because Atlantic and Gulf cobia are two separate stocks with different growth,

² <http://gulfcouncil.org/meetings/council/archive/>

recruitment, and migratory patterns. Atlantic cobia are a separate and genetically distinct stock (SEDAR 2018) from Gulf cobia. Atlantic cobia can reach similar sizes as Gulf cobia, but do so over a longer lifespan (~15 years compared to ~11 years for Gulf cobia), and range from the Georgia-Florida state line north to New York. Therefore, the management measures appropriate for Atlantic cobia may not be appropriate for Gulf cobia.

1.2 Purpose and Need

The purpose of this action is to modify the minimum size limit and possession limit for Gulf cobia in order to reduce harvest. The need is to respond to concerns of potential overfishing of Gulf cobia until more information on the stock status becomes available.

1.3 History of Management

The **CMP FMP**, with environmental impact statement (EIS), was approved in 1982 and implemented by regulations effective in February 1983 (GMFMC and SAFMC 1983). The management unit includes king mackerel, Spanish mackerel, and cobia. The FMP treated king and Spanish mackerel as unit stocks in the Atlantic and Gulf and set the minimum size limit for cobia. The following is a list of management changes relevant to this framework amendment. A history of CMP management can be found in **Amendment 18** to the CMP FMP (GMFMC and SAFMC 2011), and is incorporated here by reference.

Amendment 2, with environmental assessment (EA), implemented in June 1987, established annual permits for for-hire vessels fishing for CMP species. Qualifying for-hire vessels (charter and headboats) could obtain commercial permits to fish under the commercial quotas but must adhere to bag limits when under charter or when more than three persons are aboard.

Amendment 5, with EA, implemented in August 1990, set the current federal possession limit for cobia of two fish per person.

Amendment 6, with EA, implemented in November 1992, changed all size limit measures to fork length only, and set the commercial cobia fishing year to the calendar year.

Amendment 14, with EA, implemented in July 2002, established a 3-year moratorium on the issuance of federal charter vessel/headboat permits unless sooner replaced by a comprehensive effort limitation system.

Amendment 16, with EA, implemented in May 2003, defined maximum sustainable yield (MSY), optimum yield (OY), the overfishing threshold, and the overfished condition for Gulf cobia.

Amendment 17, with supplemental EIS, implemented in May 2006, established a limited access system on for-hire reef fish and CMP permits.

Amendment 18, with EA, implemented in January 2012, separated cobia into Atlantic and Gulf migratory groups and established ACLs and accountability measures for Gulf cobia.

Amendment 20B, with EA, implemented in March 2015, created a Florida east coast subzone for Gulf cobia with a separate ACL, which would be managed by SAFMC.

Amendment 31, with EA, removed the Atlantic migratory group of cobia from the CMP FMP. The amendment was transmitted to the Department of Commerce in July of 2018.

CHAPTER 2. MANAGEMENT ALTERNATIVES

2.1 Action 1: Modify the Minimum Size Limit for the Gulf of Mexico Migratory Group Cobia

Alternative 1: No Action – Do not change the current recreational and commercial 33-inch fork length (FL) minimum size limit for the Gulf of Mexico (Gulf) migratory group of cobia (Gulf cobia) in the Gulf of Mexico Fishery Management Council’s (Gulf Council) jurisdictional area.

Preferred Alternative 2: Increase the recreational and commercial minimum size limit for Gulf cobia to 36 inches FL in the Gulf Council’s jurisdictional area.

Alternative 3: Increase the recreational and commercial minimum size limit for Gulf cobia to 39 inches FL in the Gulf Council’s jurisdictional area.

Alternative 4: Increase the recreational and commercial minimum size limit for Gulf cobia to 42 inches FL in the Gulf Council’s jurisdictional area.

Discussion:

Gulf cobia have been managed with a 33-inch FL minimum size limit since the implementation of the original Fishery Management Plan (FMP) for Coastal Migratory Pelagic Resources (CMP) in the Gulf of Mexico and Atlantic Regions (CMP FMP) in 1983 (GMFMC and SAFMC 1983). This minimum size limit is commensurate with those in other parts of the world with both recreational and commercial fishing pressure, including the Atlantic migratory group of cobia (Atlantic cobia; GMFMC and SAFMC 1985) and Australia (750 mm total length [29.5 inches]; Fry and Griffiths 2010). Unfortunately, detailed data on size or age at maturity for cobia in the Gulf are sparse, resulting in insufficient data to provide reliable estimates (SEDAR 28 2013; references therein).

The purpose of this amendment is to reduce fishing mortality on Gulf cobia in response to concerns that harvest rates are decreasing in waters under the Gulf Council’s jurisdiction (Gulf Zone). Decreasing the minimum size limit would be expected to result in increased landings by allowing the retention of cobia which are currently being released, thereby increasing fishing mortality compared with **Alternative 1**. Therefore, decreasing the minimum size limit is not being considered in this action. Increasing the minimum size limit would reduce fishing mortality in two ways: by increasing the minimum size, anglers would release cobia that they would otherwise retain under the current regulations (**Alternative 1**); and raising the minimum size limit would increase the probability of a fish reproducing, perhaps more than once, before being selected by the fishery. Changes to average weight from 2010-2017 show the average weight in the commercial sector going up in 2013 and then down in 2017; there has also been a slight decline (13% decline from 2011 to 2017) in average weight for the recreational sector in recent years (Figure 2.1.1).

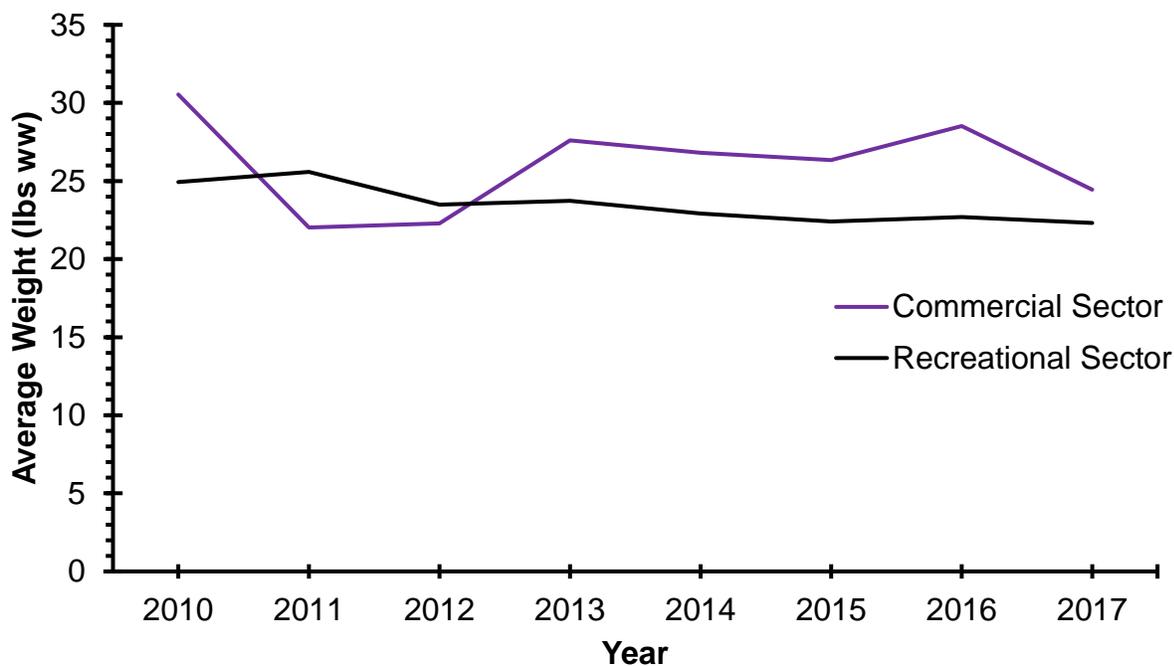


Figure 2.1.1. Annual average weight of cobia in the Gulf of Mexico (Texas through west Florida) for commercial and recreational sectors.

The number of discards could have an impact on Gulf cobia in the Gulf Zone. Annual Gulf cobia discards from the Gulf recreational sector are plotted in Figure 2.1.2. No discard estimates are available for the Gulf Zone commercial sector, which typically accounts for less than 10% of total Gulf cobia landings.

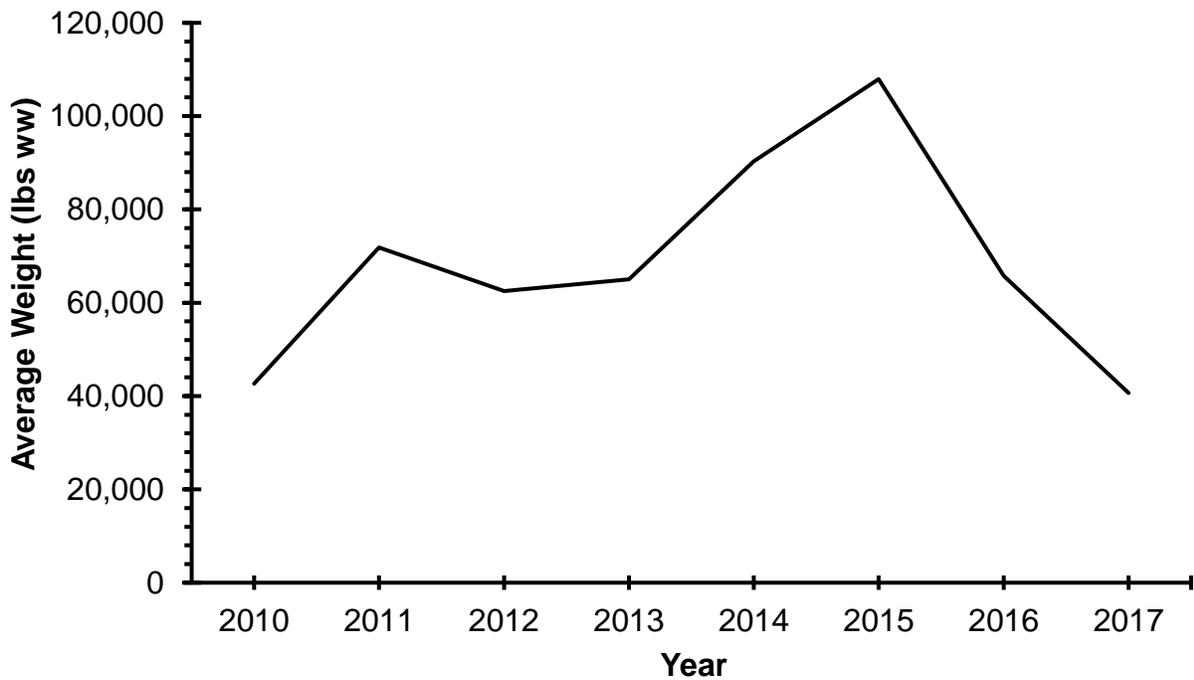


Figure 2.1.2. Total discards of cobia in the Gulf of Mexico (Texas through west Florida) by year for the recreational sector. Discard estimates are only available from MRIP.

The size distribution of cobia harvested in the Gulf Zone for the commercial and recreational sectors is summarized for the recent years of 2015 through 2017 in Figure 2.1.3. An analysis of the data showed that, overall, the commercial and charter modes harvested larger cobia than the headboat and private angling modes.

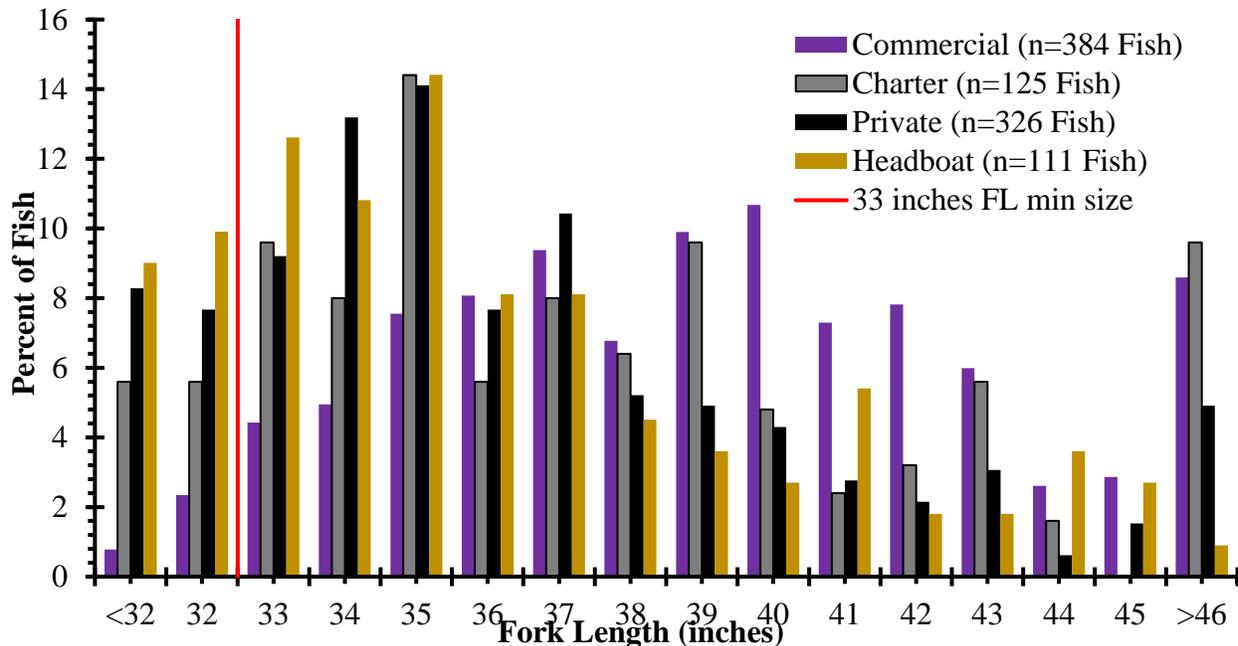


Figure 2.1.3. Size distribution of cobia landed in the Gulf of Mexico (Texas through west Florida) by mode. Right of the red line is the current minimum size limit (33 inches FL). Data are from 2015 through 2017. Source: SERO-TIP, MRIP, SRHS, LA Creel, and TPWD.

The different recreational modes (charter, headboat, private angling) have different catch rates and different length distributions of cobia. Therefore, to determine the impact on the recreational sector from the different alternatives, the estimated changes to landings were performed by mode and then weighted by the percent each mode contributed to the total landings. Table 2.1.1 provides the total and percentage of Gulf cobia landings by mode in the recent years of 2015 – 2017.

Table 2.1.1. Gulf of Mexico (Texas through west Florida) cobia recreational landings from 2015 through 2017 by mode and the percentage of total recreational landings.

Charter		Headboat		Private Angling	
Landings	Percent	Landings	Percent	Landings	Percent
469,068	19.7	48,102	2.0	1,858,712	78.2

Reductions in harvest weight were calculated for minimum size limits (MSL) at 1-inch intervals between 33 and 42 inches FL as follows:

Percent reduction = $((C - G) - B)/C$, where:

C = catch in pounds *ww*

G = weight of fish that are greater than or equal to the MSL

B = weight of fish smaller than the 33-inch FL MSL (non-compliance or measurement error)

Percent reductions associated with minimum size limits were normalized to a 0% reduction at the status quo of 33 inches FL (**Alternative 1**). Due to concerns about low sample sizes, the output was pooled for 2015 – 2017 data. Table 2.1.2 provides the estimated reduction in landings for both the commercial and recreational sectors for the alternatives in Action 1.

Table 2.1.2. Estimated percent reduction in landings for the proposed alternatives of Action 1.

Alternative	Size Limit (Inches FL)	% Reduction	
		Commercial	Recreational
Alternative 1 (No Action)	33	0.0	0.0
Preferred Alternative 2	36	10.3	26.1
Alternative 3	39	29.0	47.0
Alternative 4	42	55.9	61.7

Alternative 1 would leave the current recreational and commercial 33-inch FL minimum size limit for Gulf cobia in the Gulf Zone unchanged, and would not be expected to result in any change in the current level of fishing mortality. **Preferred Alternative 2, Alternative 3, and Alternative 4** would increase the recreational and commercial minimum size limit in the Gulf Zone, which would reduce the landings for the recreational and commercial sectors as shown in Table 2.1.2. As the minimum size limit is increased, so increases the predicted reduction in landings for each sector. Comparatively, increases in the minimum size limit result in larger predicted reductions in landings for the recreational sector, since the commercial sector typically lands larger cobia, on average (Figure 2.1.3). The majority of Gulf cobia in the Gulf zone are landed by the recreational sector (Table 1.1.3).

Preferred Alternative 2, Alternative 3, and Alternative 4 would be expected to increase regulatory discards of undersized cobia; however, discarded cobia only have an estimated 5% discard mortality rate (SEDAR 28 2013). Concurrently, those fish which survive being released by anglers may have the opportunity to reproduce multiple times prior to being harvested, depending on which alternative is selected as preferred. The probability of a cobia being able to reproduce more than once before being harvested increases with the size limit, if for no other reason than the time it takes for a cobia to grow to a larger size (SEDAR 28 2013; Figures 2.1.4 and 2.1.5). Further, the larger a cobia is compared to the size at which 50% of cobia (sexes combined) are thought to be mature (presently 33 inches FL), the greater the probability of that particular cobia being sexually mature. Since females have been observed to be larger than males of the same age, an increase in the minimum size limit may also increase the probability of female fish reproducing more so than male fish. The SEDAR 28 (2013) stock assessment estimated a 1:1 ratio of males to females in the Gulf cobia stock.

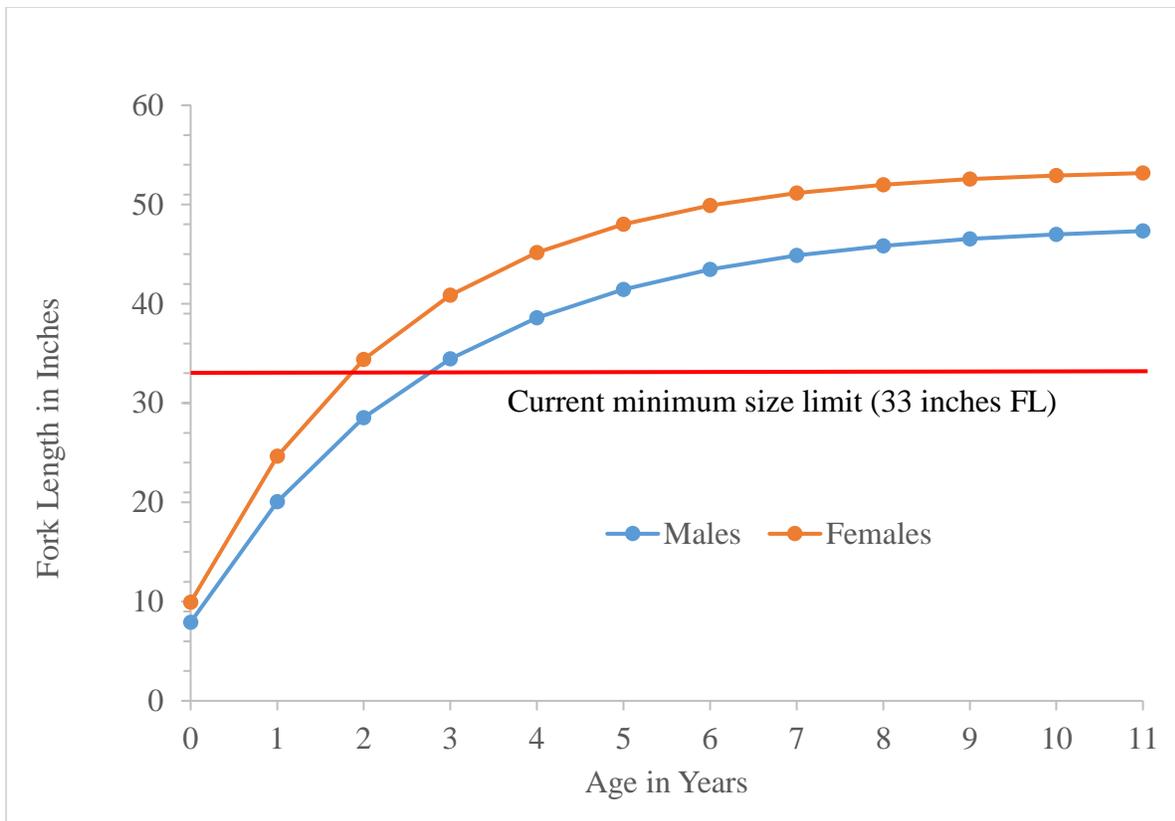


Figure 2.1.4. Gulf cobia sex-specific length-at-age data using von Bertalanffy growth parameters from SEDAR 28 (2013), using the Diaz et al. (2004) correction and inverse weighting by sample size.

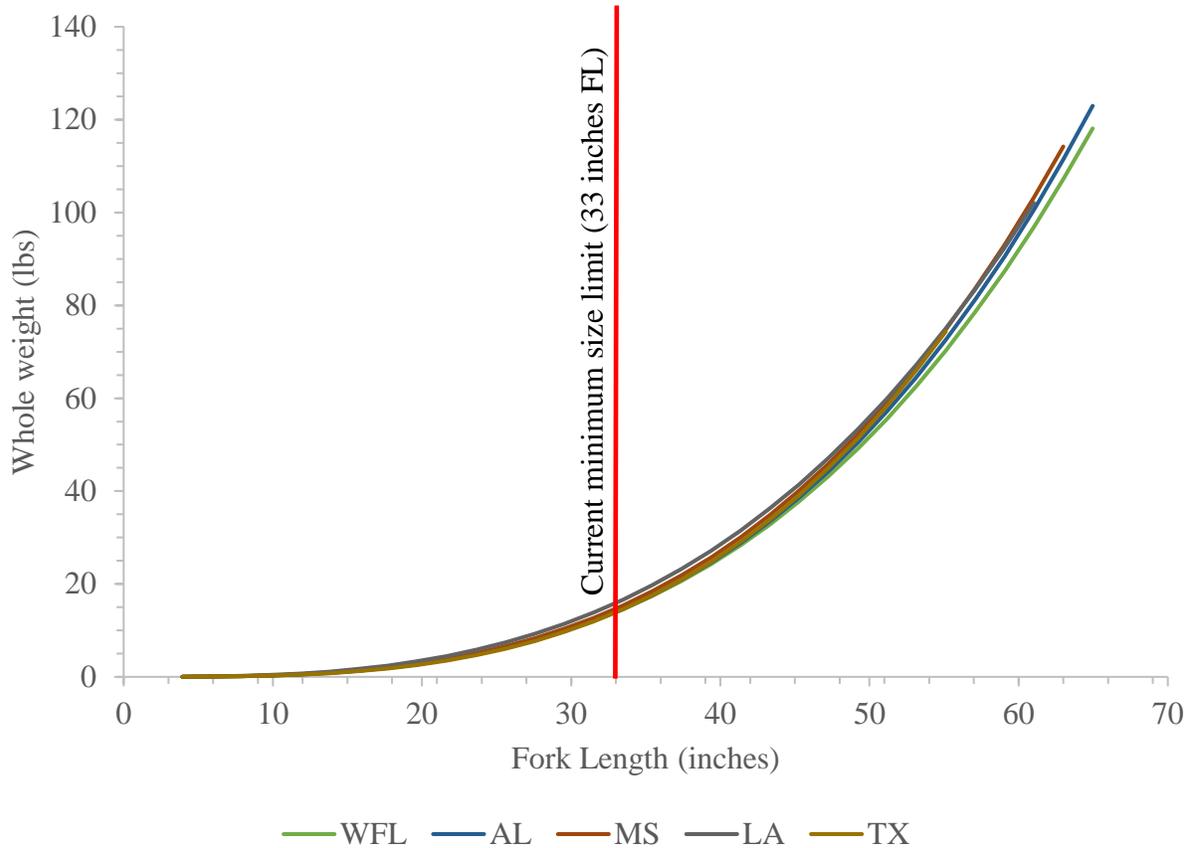


Figure 2.1.5. Gulf cobia length-at-weight data by Gulf state from the SEDAR 58 Stock ID Workshop (2013).

Action 1 would only apply to Gulf cobia within the Gulf Zone, which is shown in Figure 1.1.1. The Gulf Council manages Gulf cobia from Texas east to the Council jurisdictional boundary at the Dry Tortugas to the west of Key West. The South Atlantic Fishery Management Council (South Atlantic Council) manages Gulf cobia east of the Council jurisdictional boundary and north to the Florida – Georgia state line. Atlantic cobia were recommended for removal from the CMP FMP by the Gulf and South Atlantic Councils in CMP Amendment 31 (GMFMC and SAFMC 2018).

2.2 Action 2: Modify the Possession Limit for the Gulf Cobia

Alternative 1: No Action – Do not change the current two fish per person daily recreational and commercial possession limit for Gulf cobia, regardless of the number or duration of trips.

Preferred Alternative 2: Decrease the per person recreational and commercial possession limit for Gulf cobia to one fish per day.

Preferred Alternative 3: Create a recreational and commercial daily vessel limit for Gulf cobia. Anglers may not exceed the per person possession limit.

Preferred Option 3a: The recreational and commercial daily vessel limit for cobia is two fish.

Option 3b: The recreational and commercial daily vessel limit for cobia is four fish.

Option 3c: The recreational and commercial daily vessel limit for cobia is six fish.

Note: The Gulf Council may select more than one alternative as preferred. Doing so would require anglers to abide by the more restrictive of the resultant regulations.

Discussion:

The daily possession limit for Gulf cobia is currently two fish per person for both sectors, and has been in effect since 1990 (GMFMC and SAFMC 1990). The fishing year for cobia is year-round, with no closed seasons. The Gulf Council is considering pre-emptive options to reduce the fishing mortality on Gulf cobia in the Gulf Zone. Reducing the number of legal-size cobia caught on a fishing trip which may be retained would be expected to reduce overall fishing mortality on Gulf cobia. Fish that are released after capture are assumed to be subject to a 5% discard mortality rate (SEDAR 28 2013). **Alternative 1** would not change the current two fish per person recreational and commercial daily possession limit for Gulf cobia, and would therefore not be expected to result in any change in fishing mortality from the status quo.

To determine the effects of changing the per person possession limits, or the addition of vessel limits, the cobia harvest per person and per vessel on each trip for the Gulf Zone was summarized for 2015 – 2017. This was done for the commercial, charter, private angling, and headboat harvest data. The majority of both commercial and recreational trips harvested less than one cobia per person (Figure 2.2.1). This is possible because the number of anglers exceeds the number of cobia. For example, a trip with four anglers that harvested two cobia would result in less than one cobia per angler (0.5 cobia per angler is this example). Examination of the cobia per vessel data revealed that the majority of the commercial and recreational trips harvested only one cobia per vessel per trip (Figure 2.2.2).

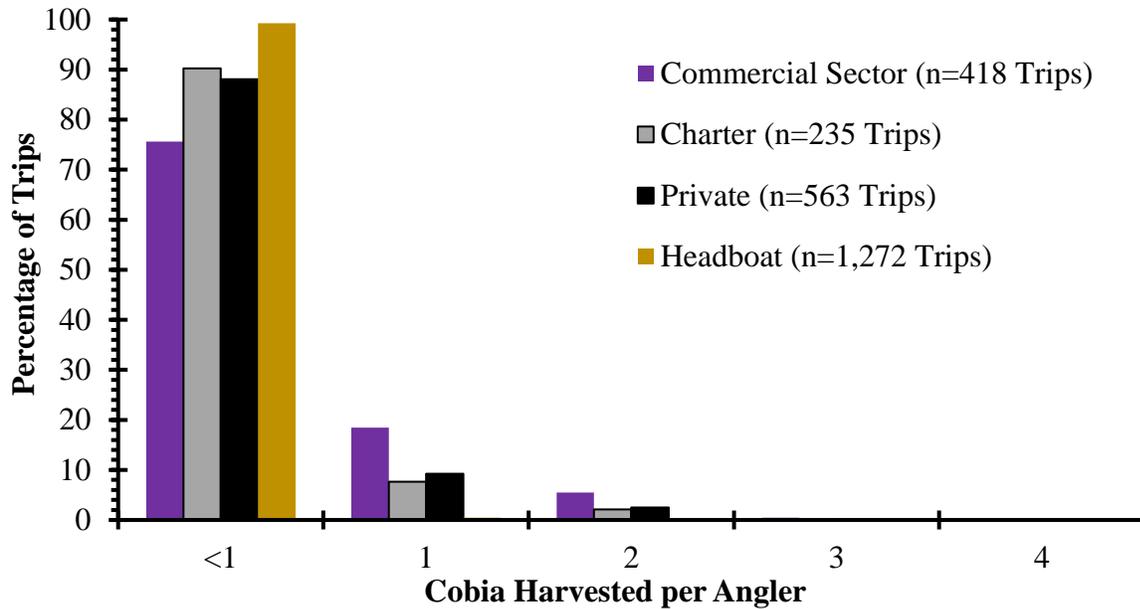


Figure 2.2.1. Number of cobia per angler per trip (expressed as a percentage) landed in the Gulf of Mexico (Texas through west Florida) by mode. Data are from 2015 through 2017. Source: SERO-TIP, MRIP, SRHS, LA Creel, and TPWD.

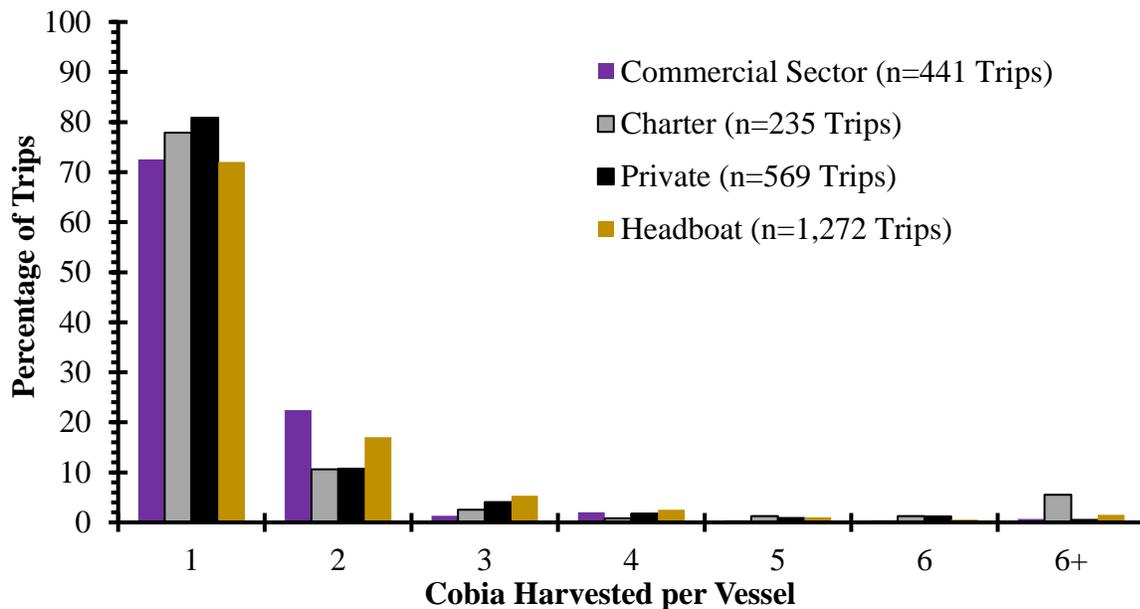


Figure 2.2.2. Number of cobia per vessel per trip (expressed as a percentage) landed in the Gulf of Mexico (Texas through west Florida) by mode. Data are from 2015 through 2017. Source: SERO-TIP, MRIP, SRHS, LA Creel, and TPWD.

The different recreational modes (charter, headboat, private) have different catch rates. Following the method used for the size limit analysis in Section 2.1, the impact on the recreational sector from the alternatives in Action 2 was performed by mode and then weighted by the percent each mode contributed to the total landings. Estimated reductions in landings

were calculated by assuming any trips that exceeded the vessel limit would now meet the vessel limit. For example, imposing a vessel limit of two cobia assumes all trips with more than two cobia per vessel would now only harvest two cobia. Table 2.2.1 provides the estimated reduction in landings for both the commercial and recreational sectors.

Table 2.2.1. Estimated percent reduction in landings for the proposed alternatives of Action 2.

Alternative	% Reduction	
	Commercial	Recreational
Alternative 1 No Action	0.0	0.0
Preferred Alternative 2 , 1 Cobia per Person	6.0	4.0
Preferred Alternative 3a , 2 Cobia per Vessel	5.0	9.1
Alternative 3b, 4 Cobia per Vessel	1.6	3.7
Alternative 3c, 6 Cobia per Vessel	0.7	1.5

Preferred Alternative 2 would decrease the per person daily recreational and commercial possession limit for Gulf cobia in the Gulf Zone to one fish. Since Gulf cobia are managed under a stock ACL with equivalent harvest restrictions for both recreational and commercial anglers, separate possession limits are not currently being considered herein. **Preferred Alternative 2** would halve the maximum possible harvest per person. However, less than one cobia per angler is retained, on average, on trips in the Gulf Zone (Figure 2.2.1), reducing the per person possession limit to one fish per day would likely result in only minimal reductions in fishing mortality (commercial: 6%; recreational: 4%; Table 2.2.1).

Preferred Alternative 3 would create a recreational and commercial daily vessel limit for Gulf cobia of either two fish (**Preferred Option 3a**), four fish (**Option 3b**), or six fish (**Option 3c**) per vessel. Anglers would not be permitted to exceed the per person possession limit. For example, if there are three anglers on a vessel, and the daily possession limit is two fish per person (**Alternative 1**) with a two fish daily vessel limit (**Preferred Alternative 3, Preferred Option 3a**), then the maximum number of cobia that could be retained on that trip for all anglers combined would be two fish, as opposed to six fish in the absence of a daily vessel limit. However, since the preponderance of trips catching cobia average only one fish retained per vessel (Figure 2.2.2), the predicted reductions in harvest from the options in **Preferred Alternative 3** are low.

Combined Effects: Size Limits Combined with Possession and Vessel Limits

More than one alternative and accompanying option may be selected as preferred in Action 2. For example, a daily possession limit of one fish per person (**Preferred Alternative 2**) could be paired with a four fish daily vessel limit (**Alternative 3, Option 3b**). Further, a possession and/or vessel limit could be combined with an increase in the minimum size limit (Section 2.1). More restrictive harvest controls would likely result in larger reductions in fishing mortality. These scenarios were analyzed by combining the effects of the size limit (Section 2.1) with the possession/vessel limit. Tables 2.2.2 through 2.2.4 provide the estimated reductions in landings from combining both size limits with the possession limits.

Table 2.2.2. Estimated percent reduction in landings for a 36-inch FL minimum size limit (Action 1 Alternative 2) combined with the proposed alternatives of Action 2.

Alternative	% Reduction	
	Commercial	Recreational
Alternative 1 No Action	10.3	26.1
Preferred Alternative 2, 1 Cobia per Person	16.3	30.1
Preferred Alternative 3a, 2 Cobia per Vessel	15.3	35.2
Alternative 3b, 4 Cobia per Vessel	11.9	29.8
Alternative 3c, 6 Cobia per Vessel	11.0	27.6

Table 2.2.3. Estimated percent reduction in landings for a 39-inch fork length minimum size limit (Action 1 Alternative 3) combined with the proposed alternatives of Action 2.

Alternative	% Reduction	
	Commercial	Recreational
Alternative 1 No Action	29.0	47.0
Preferred Alternative 2, 1 Cobia per Person	35.0	51.0
Preferred Alternative 3a, 2 Cobia per Vessel	34.0	56.1
Alternative 3b, 4 Cobia per Vessel	30.6	50.7
Alternative 3c, 6 Cobia per Vessel	29.7	48.5

Table 2.2.4. Estimated percent reduction in landings for a 42-inch fork length minimum size limit (Action 1 Alternative 4) combined with the proposed alternatives of Action 2.

Alternative	% Reduction	
	Commercial	Recreational
Alternative 1 No Action	55.9	61.7
Preferred Alternative 2, 1 Cobia per Person	61.9	65.7
Preferred Alternative 3a, 2 Cobia per Vessel	60.9	70.8
Alternative 3b, 4 Cobia per Vessel	57.5	65.4
Alternative 3c, 6 Cobia per Vessel	56.6	63.2

As with most projections, the reliability of the results depends upon the accuracy of the underlying data and input assumptions. Uncertainty exists in this possession/vessel limit analysis, as economic conditions, weather events, changes in catch-per-unit effort, angler response to management regulations, and a variety of other factors may influence the impact from changes to the size limit and possession limit.

CHAPTER 3. AFFECTED ENVIRONMENT

3.1 Description of the Fishery and Status of the Stock

3.1.1 Description of the Fishery

The commercial and recreational fishing year for cobia in the exclusive economic zone (EEZ) in the Gulf of Mexico (Gulf) begins January 1 and ends December 31 (GMFMC and SAFMC 1992). The fishery is managed as a single stock (Gulf cobia) in the Gulf of Mexico Fishery Management Council's (Gulf Council) jurisdiction, meaning there is one annual catch limit (ACL) and one annual catch target (ACT) for both sectors. Neither sector has a seasonal closure. Recreational and commercial cobia management measures include a 33-inch fork length (FL) minimum size limit (GMFMC and SAFMC 1983), a daily possession limit of two fish per person (GMFMC and SAFMC 1990), a prohibition of retaining more than the per person daily possession limit on a multi-day trip and an in-season accountability measure (AM). The AM states that if recreational and commercial landings combined reach or are projected to reach the ACT, both sectors will close for the remainder of the fishing year. The stock ACT has not been reached since it was implemented in 2012 and the harvest of cobia has never been closed.

Permits

While the National Marine Fisheries Service (NMFS) does not require a recreational permit for private angling of cobia in federal waters of the Gulf, each state requires its own recreational fishing license for anglers fishing in their respective state waters. A federal charter/headboat (for-hire) vessel permit for pelagic fish has been required for coastal migratory pelagic (CMP) species since 1987 and the sector currently operates under a limited access system (GMFMC and SAFMC 1987). As of July 3, 2018, there were 1,285 vessels in the Gulf with a federal for-hire pelagic fish permit (1,185 valid and 100 renewable). A permit in "renewable" status is an expired limited access permit that may not be actively fished, but is renewable for up to one year after expiration. Valid and renewable permits are transferable. Approximately 96% of the federal for-hire permits for pelagic fish list a mailing recipient in a Gulf state, with the majority of permits being listed in Florida (Table 3.1.1.1). There is no federal permit required for the commercial harvest of Gulf cobia. However, vessels with a valid federal commercial vessel permit that harvest Gulf cobia in the EEZ or in state waters may only sell or transfer those fish to dealers with a federal dealer permit. Similarly, a federal dealer may only purchase or receive cobia that was harvested in the EEZ from a vessel that has a valid federal commercial vessel permit. As of July 3, 2018, there were 1,428 vessels with a federal commercial king mackerel permit (1,294 valid and 134 renewable). As of July 3, 2018, there were 1,892 vessels with a valid federal commercial Spanish mackerel permit. Approximately 80% of the commercial king mackerel and commercial Spanish mackerel permits are located in a Gulf state, with more than half of the for-hire permits, and the majority of all commercial permits being located in Florida (Table 3.1.1.1).

Table 3.1.1.1. Number and percentage of vessels with a federal charter/headboat (for-hire) pelagic fish permit, a federal commercial king mackerel permit, or a federal commercial Spanish mackerel permit by state in the Gulf.

State	For-hire Pelagic Fish Permits		Commercial King Mackerel Permits		Commercial Spanish Mackerel Permits	
	Number	Percent	Number	Percent	Number	Percent
Alabama	122	9.5%	38	2.7%	27	1.4%
Florida	743	57.8%	1013	70.9%	1397	73.8%
Louisiana	105	8.2%	46	3.2%	48	2.5%
Mississippi	36	2.8%	10	0.7%	9	0.5%
Texas	226	17.6%	35	2.6%	12	0.6%
Subtotal	1232	95.9%	1142	80.0%	1493	79.0%
Other	53	4.1%	286	20.0%	399	21.0%
Total	1285	100.0%	1428	100.0%	1892	100.0%

Source: NMFS SERO Permits website (July 3, 2018).

Landings

Gulf cobia is managed under a stock ACL that is specified and monitored in terms of landed weight (lw)³, which is 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.

In the commercial sector, cobia are predominantly harvested by hook-and-line. Landings peaked in 1993 at approximately 245,000 lbs, but have been well below this level in subsequent years (Figure 3.1.1.1). Landings steadily declined since 1993, with a slight increase in 2002 and 2003, followed by further declines in 2010 and 2013. The stock ACL has increased since 2014 despite declining landings. On average, 55-88% of the stock ACL has been landed since 2012. However, only 45% of the stock ACL was landed in 2017.

³ Landed weight is equivalent to “as reported.”

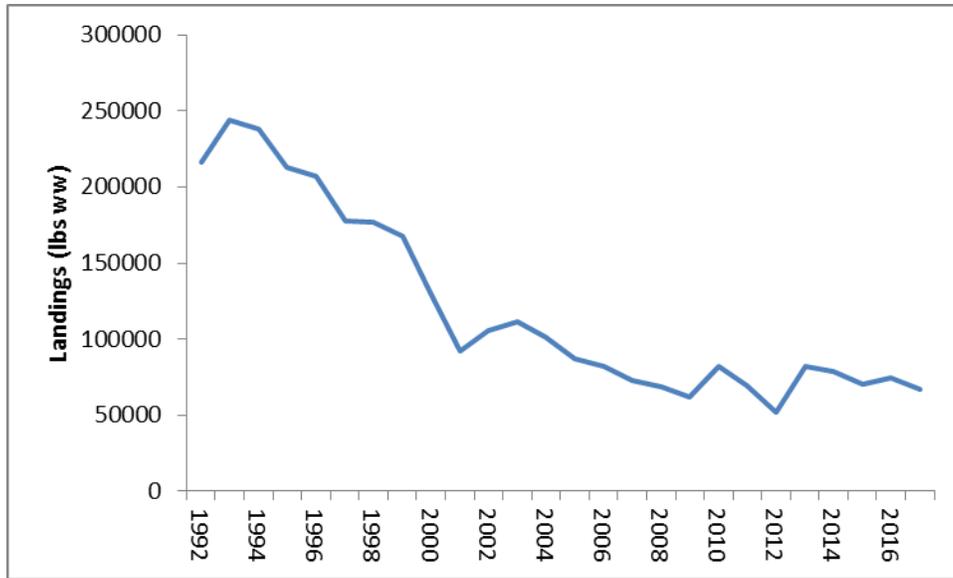


Figure 3.1.1.1. Commercial landings (lbs ww) of Gulf cobia from 1992 through 2017. Source: SEFSC commercial (6/27/2018) ACL datasets.

In the recreational sector, cobia are predominantly harvested by hook-and-line, with some occasionally targeted by spear. The majority of landings of cobia in the Gulf Zone are from the recreational sector. Landings peaked in 1997 at 2.9 million pounds, but have been well below this level in subsequent years (Figure 3.1.1.2). As with the commercial sector, declines in landings have been occurring since 2013.

The SEDAR 28 stock assessment concluded that Gulf cobia was not overfished or undergoing overfishing, but anglers have expressed concern to the Gulf Council about decreased landings and infrequent sightings of cobia in times and places where they have seemed abundant. Anglers have asked the Gulf Council to reduce fishing mortality until the next stock assessment can be completed.

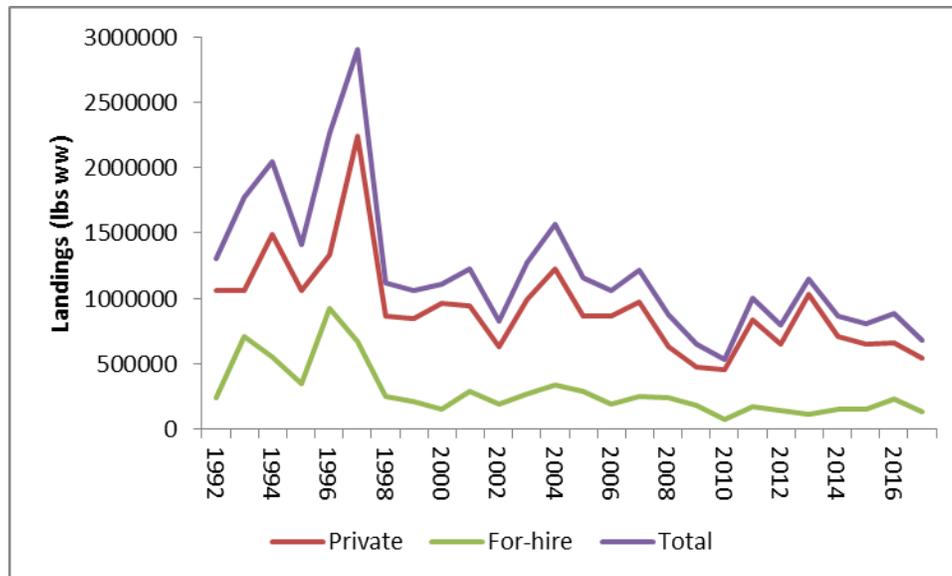


Figure 3.1.1.2. Recreational private angling and for-hire landings (lbs ww) of Gulf cobia from 1992 through 2017.

Source: SEFSC recreational (6/11/2018) ACL datasets (MRIP, TPWD, LA Creel, SRHS).

3.1.2 Status of the Stocks

Gulf cobia has been assessed three times (1996, 2001, and 2013). Historically, cobia has been overseen by the Mackerel Stock Assessment Panel under the purview of the Fishery Management Plan for Coastal Migratory Pelagic Resources in the Gulf of Mexico and Atlantic Region (CMP FMP). Gulf cobia was previously assessed in both 1996 (Thompson 1996) and 2001 (Williams 2001). The results of the 2001 assessment concluded that the population status of Gulf cobia was virtually unknown, given the degree of uncertainty in the estimates from the assessment model. The only statement that could be made with any degree of certainty about Gulf cobia was that the population had increased since the 1980s. In the most recent assessment, both the Gulf and Atlantic migratory groups of cobia were assessed by the Southeast Data, Assessment, and Review (SEDAR) process in SEDAR 28 (2013). The SEDAR 28 assessment determined that Gulf and Atlantic cobia were not overfished and were not experiencing overfishing. Gulf cobia will undergo an update assessment in 2019.

3.2 Description of the Physical Environment

A description of the physical environment for CMP species is provided in Amendment 18 (GMFMC and SAFMC 2011), is incorporated herein by reference, and is summarized below.

The Gulf has a total area of approximately 600,000 square miles (1.5 million km²), including state waters (Gore 1992). It is a semi-enclosed, oceanic basin connected to the Atlantic Ocean by the Straits of Florida and to the Caribbean Sea by the Yucatan Channel (Figure 3.2.1). Oceanographic conditions are affected by the Loop Current, discharge of freshwater into the northern Gulf, and a semi-permanent, anti-cyclonic gyre in the western Gulf. The Gulf includes both temperate and tropical waters (McEachran and Fechtelm 2005). Mean annual sea surface

temperatures ranged from 73 through 83° F (23-28° C) including bays and bayous (Figure 3.2.1) between 1982 and 2009, according to satellite-derived measurements.⁴ In general, mean sea surface temperature increases from north to south with large seasonal variations in shallow waters.

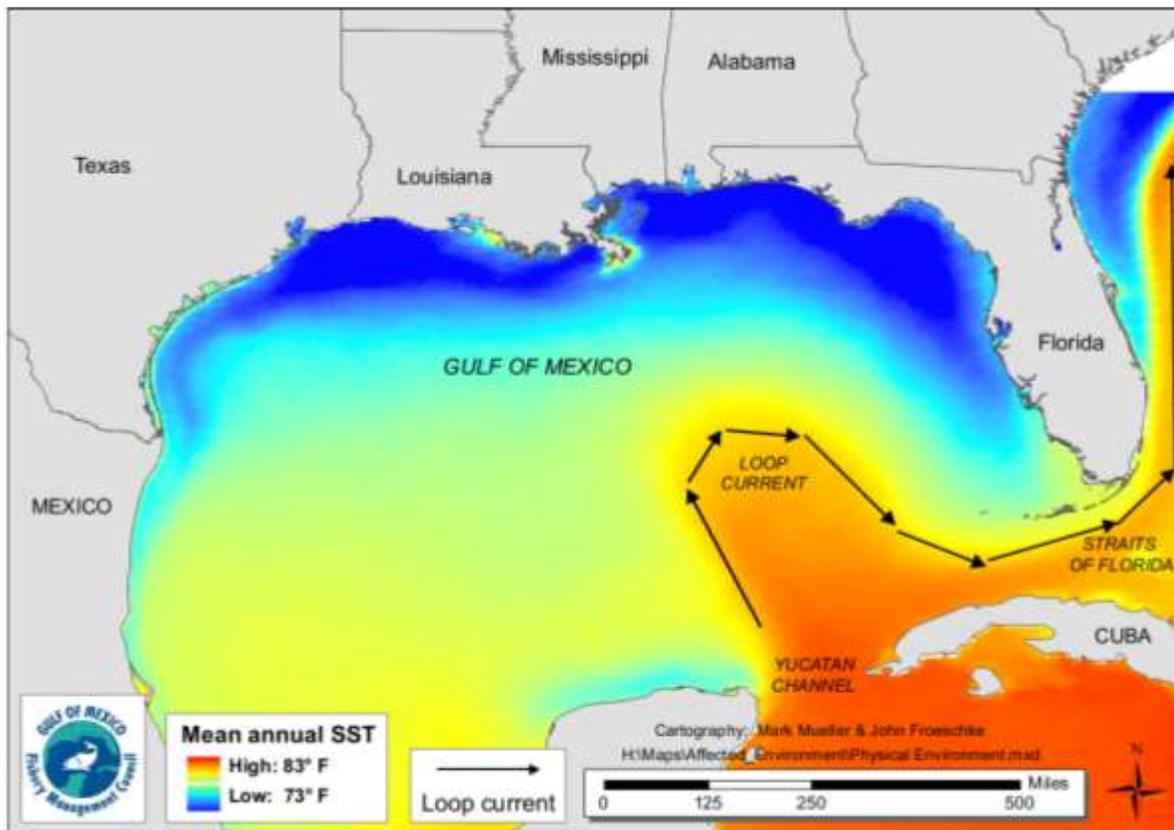


Figure 3.2.1. Mean annual sea surface temperature derived from the Advanced Very High Resolution Radiometer Pathfinder Version 5 sea surface temperature data set (<http://pathfinder.nodc.noaa.gov>).

Habitat Areas of Particular Concern

Generic Amendment 3 (GMFMC 2005c) for addressing EFH, Habitat Areas of Particular Concern (HAPC), and adverse effects of fishing in the following FMPs, including the Gulf Reef Fish Resources, Red Drum, and Coastal Migratory Pelagics is hereby incorporated by reference.

Environmental Sites of Special Interest Relevant to Reef Fish, Coastal Migratory Pelagics, and Red Drum. (Figure 3.2.2)

Longline/Buoy Gear Area Closure – Permanent closure to use of this gear for reef fish harvest inshore of 118 feet (36.6 meters) off the Florida shelf and inshore of 293 feet (91.4 meters) for the remainder of the Gulf, and encompasses 72,300 square nautical miles (nm²) or 133,344 km²

⁴ <http://accession.nodc.noaa.gov/0072888>

(GMFMC 1989). Bottom longline gear is prohibited inshore of 35 fathoms (54.3 meters) during the months of June through August in the eastern Gulf (GMFMC 2010), but is not depicted in Figure 3.2.2.

Madison-Swanson and Steamboat Lumps Marine Reserves – No-take marine reserves (total area is 219 nm² or 405 km²) sited based on gag spawning aggregation areas where all fishing is prohibited except surface trolling from May through October (GMFMC 1999; GMFMC 2003).

The Edges Marine Reserve – All fishing is prohibited in this area (390 nm² or 1,338 km²) from January through April and possession of any fish species is prohibited, except for such possession aboard a vessel in transit with fishing gear stowed as specified. These provisions do not apply to highly migratory species (GMFMC 2008c).

Tortugas North and South Marine Reserves – No-take marine reserves (185 nm²) cooperatively implemented by the state of Florida, National Ocean Service, the Gulf of Mexico Fishery Management Council (Council), and the National Park Service in Generic Amendment 2 Establishing the Tortugas Marine Reserves (GMFMC 2001).

Reef and bank areas designated as HAPCs in the northwestern Gulf include – East and West Flower Garden Banks, Stetson Bank, Sonnier Bank, MacNeil Bank, 29 Fathom, Rankin Bright Bank, Geyer Bank, McGrail Bank, Bouma Bank, Rezak Sidner Bank, Alderice Bank, and Jakkula Bank – pristine coral areas protected by preventing the use of some fishing gear that interacts with the bottom and prohibited use of anchors (totaling 263.2 nm² or 487.4 km²). Subsequently, three of these areas were established as marine sanctuaries (i.e., East and West Flower Garden Banks and Stetson Bank). Bottom anchoring and the use of trawling gear, bottom longlines, buoy gear, and all traps/pots on coral reefs are prohibited in the East and West Flower Garden Banks, McGrail Bank, and on significant coral resources on Stetson Bank (GMFMC 2005c).

Florida Middle Grounds HAPC – Pristine soft coral area (348 nm² or 644.5 km²) that is protected by prohibiting the following gear types: bottom longlines, trawls, dredges, pots and traps (GMFMC and SAFMC 1982).

Pulley Ridge HAPC – A portion of the HAPC (2,300 nm² or 4,259 km²) where deepwater hermatypic coral reefs are found is closed to anchoring and the use of trawling gear, bottom longlines, buoy gear, and all traps/pots (GMFMC 2005c).

Alabama Special Management Zone – For vessels operating as a charter vessel or headboat, a vessel that does not have a commercial permit for Gulf reef fish, or a vessel with such a permit fishing for Gulf reef fish, fishing is limited to hook-and-line gear with no more than three hooks. Nonconforming gear is restricted to recreational bag limits, or for reef fish without a bag limit, to 5% by weight of all fish aboard.

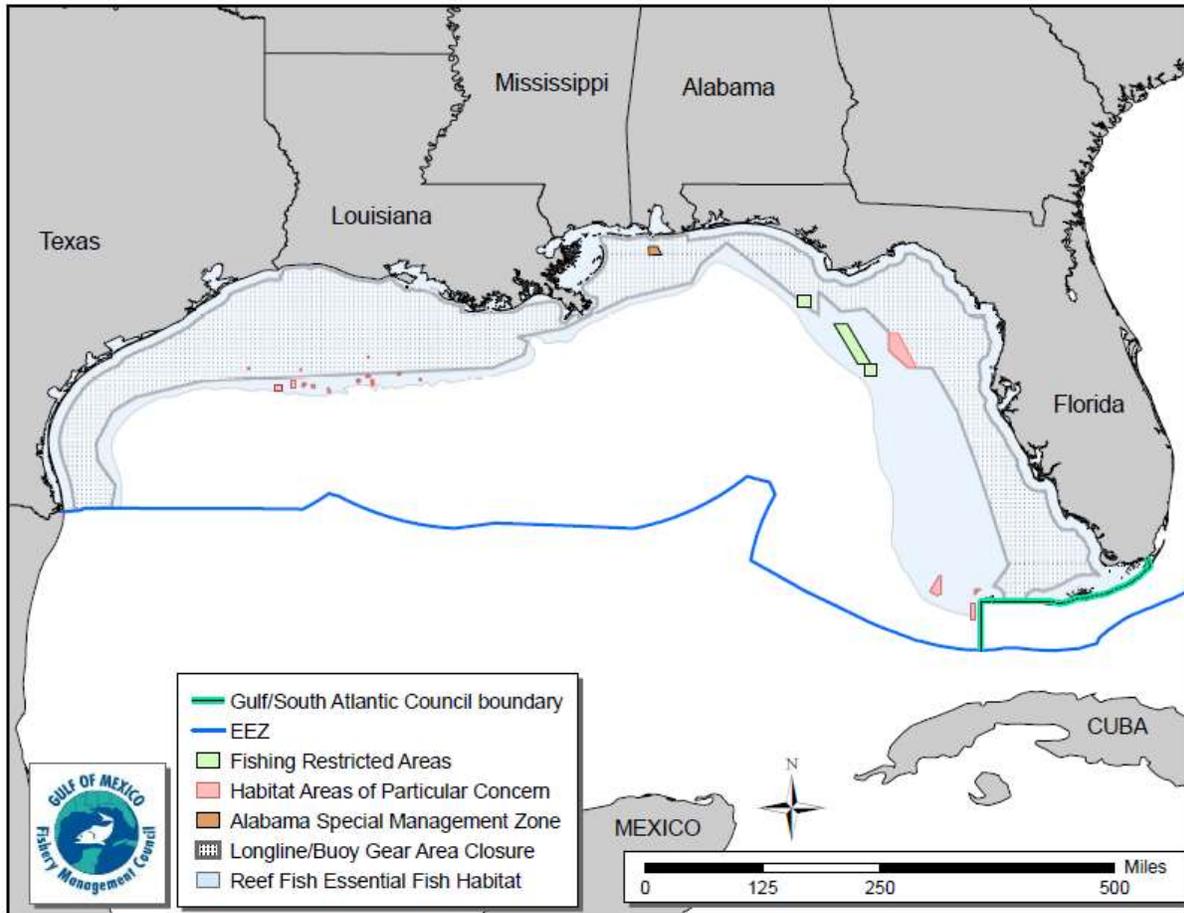


Figure 3.2.2. Map of most fishery management closed areas in the Gulf.

Note: An interactive map of these areas is available at <http://portal.gulfcouncil.org/FisheryManagementAreas.html>.

Deepwater Horizon MC252

The *Deepwater Horizon* MC252 oil spill in 2010 affected at least one-third of the Gulf area from western Louisiana east to the Florida Panhandle and south to the Campeche Bank in Mexico. The impacts of the *Deepwater Horizon* MC252 oil spill on the physical environment are expected to be significant and may be long-term. Oil was dispersed on the surface, and because of the heavy use of dispersants (both at the surface and at the wellhead), oil was also documented as being suspended within the water column, some even deeper than the location of the broken well head. Floating and suspended oil washed onto shore in several areas of the Gulf, as did non-floating tar balls. Whereas suspended and floating oil degrades over time, tar balls are persistent in the environment and can be transported hundreds of miles.

Surface or submerged oil during the *Deepwater Horizon* MC252 event could have restricted the normal processes of atmospheric oxygen mixing into and replenishing oxygen concentrations in the water column, thus affecting the long-standing hypoxic zone located west of the Mississippi River on the Louisiana continental shelf. In addition, microbes in the water that break down oil and dispersant also consume oxygen, which could lead to further oxygen depletion. Zooplankton

that feed on algae could also be negatively impacted, thus allowing more of the hypoxia-fueling algae to grow. Additional information regarding the impacts on fishery resources from the *Deepwater Horizon* MC252 event are provided below.

3.3 Description of the Biological/Ecological Environment

A description of the biological and ecological environment for CMP species is provided in Amendment 18 (GMFMC and SAFMC 2011), is incorporated herein by reference, and is summarized below.

3.3.1 Cobia Life History and Biology

Distribution and Meristics:

Cobia are a member of the family Rachycentridae, and are managed in the CMP FMP because of their migratory behavior. Cobia are distributed worldwide in tropical, subtropical and warm-temperate waters. Cobia are found in the western Atlantic Ocean from Nova Scotia, Canada, south to Argentina, including the Caribbean Sea, and are abundant in warm waters off the coast of the U.S. from the Chesapeake Bay south and throughout the Gulf of Mexico. Cobia prefer water temperatures between 68°F-86°F. As a pelagic fish, cobia are found over the continental shelf and around offshore rocky outcrops, coral reefs, and artificial reefs. Cobia prefer to reside near any structure that interrupts open water, including pilings, buoys, platforms, anchored boats, and flotsam. Cobia are also found inshore inhabiting bays, inlets, and mangroves (SEDAR 2018a).

Cobia are opportunistic predators that feed on crustaceans, cephalopods, shrimp, and small fish (Arendt et al. 2001; Franks et al. 1996). Gulf cobia can weigh up to a record 61 kilograms (kg) (135 lbs ww), but are more common at weights of up to 23 kg (50 lbs ww). They reach lengths of 50-120 centimeters (cm; 20-47 inches), up to a maximum of 200 cm (79 inches). Gulf 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. Females reach sexual maturity at approximately three years of age and males at approximately two years (SEDAR 28 2013). During fall and winter months, cobia migrate south and offshore to warmer waters.

Stock Description

Two migratory groups, Gulf and Atlantic, are recognized for cobia. Cobia from federal waters off the east coast of Florida south and west through Texas are part of the Gulf migratory group. Cobia from the Florida/Georgia border north to New York are considered the Atlantic migratory group. Genetics research has demonstrated a distinct population segment for the Gulf extending around the Florida peninsula into southeast Florida (Darden 2012). Spawning aggregations are known to utilize inshore estuarine habitats. Tag-recapture data from several long-term studies suggest that a high number of tagged fish demonstrate little movement or exchange between stocks in the Atlantic and Gulf (Perkinson and Denson 2012).

Seasonal aspects of reproduction

Cobia form large aggregations, spawning during daylight hours in the Gulf from April through September (Brown-Peterson et al. 2001). Gonad values for both sexes of cobia from the eastern Gulf began to increase in March, peaked in July, and declined and leveled off thereafter. Gonad values for females from the north central Gulf increased in March, peaked in May, and then declined through September. In contrast, gonad values of males from the north central Gulf steadily increased through July, then fell in August (Brown-Peterson et al. 2001). Spawning frequency is once every 4-5 days in the north central Gulf and once every 9-12 days in the western Gulf (west of the Mississippi River; Brown-Peterson et al. 2001). Spawning occurs 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. Cobia eggs are spherical, averaging 1.24 millimeters (mm) in diameter (Lotz et al. 1996). 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, and a pale yellow streak is visible, extending the length of the body (Ditty and Shaw 1992). By day 30, the juvenile cobia takes on the appearance of the adult, with two color bands running from the head to the posterior end.

Size at Maturity

Cobia grow quickly in the first few years of life and exhibit sexually-dimorphic growth, with females attaining larger sizes than males. The following excerpt is from the SEDAR 28 stock assessment (2013) on cobia, detailing the recommendations of the Life History Working Group (LHWG):

“Maturity in cobia appears to more strongly correlate with size than age. Due to the paucity of samples at the youngest ages for both stocks, and the influence of the minimum size limit on size at age of those young fish, the [Life History Working Group] recommends using age-2 for age at [which] 50% [of cobia are sexually mature] for Gulf and Atlantic stocks [sexes combined]. All fish aged 3+ in the samples were mature. Again, due to the influence of the minimum size limit on the young fish, there is a chance that not all age-3 fish are mature. When back-calculating the length of the fish to age using the von Bertalanffy growth curve, not all age-3 fish would be mature...

Because of the lack of samples below the minimum size limit of 838 mm FL and the fact that female cobia above 800 mm FL are likely to be mature [...], one can only guess at the size at [which] 50% [of cobia are sexually mature]. If the [assessment workshop] desires to use size rather than age at maturity, as a *first* estimate the LHWG suggests using 700 mm and examine model sensitivity by trying 650 and 750 mm as well.”

3.3.2 Bycatch

See Bycatch Practicability Analysis in Appendix D.

3.3.3 Protected Species

NMFS manages marine protected species in the Southeast region under the Endangered Species Act (ESA) and the Marine Mammal Protection Act (MMPA). A summary of these two laws and more information is available on NMFS Office of Protected Resources website.⁵ ESA-listed species or Distinct Population Segments (DPS) of marine mammals, sea turtles, fish, and corals occur in the EEZ of the Gulf. There are numerous stocks of marine mammals managed within the Gulf of Mexico in the Southeast region. All marine mammals in U.S. waters are protected under the MMPA.

Four of the marine mammals (sperm, sei, fin, blue) protected under the MMPA are also listed as endangered under the ESA and may occur in the Gulf. Bryde's whales are the only resident baleen whales in the Gulf and are currently being evaluated to determine if listing under the ESA is warranted (81 FR 88639; December 8, 2016). Manatees, listed as threatened under the ESA, also occur in the Gulf and are the only marine mammal species in this area managed by the U.S. Fish and Wildlife Service.

Sea turtles, fish, and corals that are listed as threatened or endangered under the ESA and occur in the Gulf include the following: six species/DPS of sea turtles (Kemp's ridley, Northwest Atlantic DPS of loggerhead, North Atlantic DPS of green, South Atlantic DPS of green, leatherback, and hawksbill); five species/DPS of fish (Gulf sturgeon, U.S. DPS of smalltooth sawfish, Nassau grouper, oceanic whitetip shark and giant manta ray); and seven species of coral (elkhorn, staghorn, lobed star, mountainous star, boulder star, pillar, and rough cactus).

Critical habitat designated under the ESA for smalltooth sawfish, Gulf sturgeon, and the Northwest Atlantic Ocean DPS of loggerhead sea turtles occur in the Gulf, though only loggerhead critical habitat occurs in federal waters.

A biological opinion (BiOp) on the CMP FMP was completed on June 18, 2015 (NMFS 2015). The BiOp determined that the continued authorization of the CMP fishery is not likely to adversely affect any listed whales, or elkhorn and staghorn corals. The BiOp determined that CMP fisheries would have no effect on the Gulf sturgeon. The BiOp also determined that the CMP fishery is not likely to adversely affect designated critical habitats for elkhorn and staghorn corals or loggerhead sea turtles. NMFS determined in a memorandum dated October 7, 2014, and later it confirmed the determination in the 2015 BiOp, that any adverse effects from the CMP fishery's impacts to the five corals listed in 2014 (rough cactus coral, pillar coral, lobed star, mountainous star, and boulder star corals) are extremely unlikely to occur and therefore are discountable.

According to the 2015 BiOp, the green, hawksbill, Kemp's ridley, leatherback, and loggerhead sea turtles and the smalltooth sawfish are all likely to be adversely affected by the CMP fishery. Green, hawksbill, Kemp's ridley, leatherback, and loggerhead sea turtles area all highly migratory, travel widely throughout the Gulf, and are known to occur in areas subject to CMP fishing. The distribution of smalltooth sawfish within the action area is more limited, but this

⁵ <http://www.nmfs.noaa.gov/pr/laws/>

species has the potential to be incidentally captured in the CMP fishery. The 2015 BiOp concluded that the fishery is not likely to jeopardize the continued existence of loggerhead (the Northwest Atlantic DPS) or green (both the Florida breeding population and non-Florida breeding population, as well as the proposed North Atlantic DPS) sea turtles. The BiOp also stated that the proposed action is not likely to jeopardize the continued existence of Kemp's ridley, hawksbill, or leatherback sea turtles, or smalltooth sawfish (U.S. DPS).

On April 6, 2016, NMFS and the U.S. Fish and Wildlife Service published a final rule (81 FR 20057) removing the range-wide and breeding population ESA-listings of the green sea turtle and listing eight DPSs as threatened and three DPSs as endangered, effective May 6, 2016. Two of the green sea turtle DPSs, the North Atlantic DPS and the South Atlantic DPS, overlap with the CMP fishery. In addition, on June 29, 2016, NMFS published a final rule (81 FR 42268) listing Nassau grouper as threatened under the ESA.

In a memorandum dated November 18, 2017, NMFS amended the 2015 BiOp to address these new listings. The amendment determined that the proposed action is not likely to jeopardize the continued existence of loggerhead (the NWA DPS) or the green (North Atlantic DPS or South Atlantic DPS), Kemp's ridley, hawksbill, or leatherback sea turtles, or smalltooth sawfish (U.S. DPS). Furthermore, it was determined that Nassau grouper were not likely to be adversely affected by the CMP fishery.

On January 22, 2018, NMFS published a final rule (83 FR 2916) listing the giant manta ray as threatened under the ESA. On January 30, 2018, NMFS published a final rule (83 FR 4153) listing the oceanic whitetip shark as threatened under the ESA. In a memorandum dated June 11, 2018, NMFS reinitiated consultation on the CMP FMP to address the listings of the giant manta ray and oceanic whitetip shark. The consultation memo determined that allowing fishing under the CMP FMP to continue during the re-initiation period is not likely to adversely affect oceanic whitetip sharks and will not appreciably reduce the likelihood of the giant manta ray's survival or recovery within its range.

There is no information to indicate marine mammals and birds rely on cobia for food, and they are not generally caught by fishers harvesting cobia. The primary gear in the Gulf and South Atlantic CMP fishery used to harvest cobia are hook-and-line. This gear is classified in the 2018 Marine Mammal Protection Act List of Fisheries as a Category III fishery (82 FR 47424), meaning the annual mortality and serious injury of a marine mammal resulting from the fishery is less than or equal to 1% of the maximum number of animals, not including natural mortalities, that may be removed from a marine mammal stock while allowing that stock to reach or maintain its optimum sustainable population. Additionally, there is no evidence that the cobia fishery is adversely affecting seabirds.

3.3.4 General Information

Northern Gulf of Mexico Hypoxic Zone

Every summer in the northern Gulf, a large hypoxic zone forms. It is the result of allochthonous materials and runoff from agricultural lands by rivers to the Gulf, increasing nutrient inputs from

the Mississippi River, and a seasonal layering of waters in the Gulf. The layering of the water is temperature and salinity dependent and prevents the mixing of higher oxygen content surface water with oxygen-poor bottom water. For 2014, the extent of the hypoxic area was estimated to be 5,052 square miles and is similar the running average for over the past five years of 5,543 square miles Gulf⁶. The hypoxic conditions in the northern Gulf directly impact less mobile benthic macroinvertebrates (e.g., polychaetes) by influencing density, species richness, and community composition (Baustian and Rabalais 2009). However, more mobile macroinvertebrates and demersal fishes (e.g., red snapper) are able to detect lower dissolved oxygen levels and move away from hypoxic conditions. Therefore, although not directly affected, these organisms are indirectly affected by limited prey availability and constrained available habitat (Baustian and Rabalais 2009; Craig 2012).

Climate Change

Climate change projections predict increases in sea-surface temperature and sea level; decreases in sea-ice cover; and changes in salinity, wave climate, and ocean circulation (Intergovernmental Panel on Climate Change [IPCC]).⁷ These changes are likely to affect plankton biomass and fish larvae abundance that could adversely impact fish, marine mammals, seabirds, and ocean biodiversity. Kennedy et al. (2002), Link (2015) and Osgood (2008) have suggested global climate change could affect temperature changes in coastal and marine ecosystems that can influence organism metabolism and alter ecological processes such as productivity and species interactions; change precipitation patterns and cause a rise in sea level which could change the water balance of coastal ecosystems; altering patterns of wind and water circulation in the ocean environment; and influence the productivity of critical coastal ecosystems such as wetlands, estuaries, and coral reefs. The National Oceanic and Atmospheric Association (NOAA) Climate Change Web Portal⁸ predicts the average sea surface temperature in the Gulf will increase by 1-3°C for 2010-2070 compared to the average over the years 1950-2010. For reef fishes, Burton (2008) speculated climate change could cause shifts in spawning seasons, changes in migration patterns, and changes to basic life history parameters such as growth rates. It is unclear if CMP distribution in the Gulf and South Atlantic has been affected. The smooth puffer and common snook are examples of species for which there has been a distributional trend to the north in the Gulf. For other species such as red snapper and the dwarf sand perch, there has been a distributional trend towards deeper waters. For other fish species, such as the dwarf goatfish, there has been a distributional trend both to the north and to deeper waters. These changes in distributions have been hypothesized as a response to environmental factors such as increases in temperature.

The distribution of native and exotic species may change with increased water temperature, as may the prevalence of disease in keystone animals such as corals and the occurrence and intensity of toxic algae blooms. Hollowed et al. (2013) provided a review of projected effects of climate change on the marine fisheries and dependent communities. Integrating the potential effects of climate change into the fisheries assessment is currently difficult due to the time scale differences (Hollowed et al. 2013). The fisheries stock assessments rarely project through a time

⁶ <http://www.gulfhypoxia.net/>

⁷ <http://www.ipcc.ch/>

⁸ <https://www.esrl.noaa.gov/psd/ipcc/>

span that would include detectable climate change effects.

Greenhouse Gases

The IPCC has indicated greenhouse gas emissions are one of the most important drivers of recent changes in climate. Wilson et al. (2017) inventoried the sources of greenhouse gases in the Gulf from sources associated with oil platforms and those associated with other activities such as fishing. A summary of the results of the inventory are shown in Table 3.3.4.1 with respect to total emissions and from fishing. Commercial fishing and recreational vessels make up a small percentage of the total estimated greenhouse gas emissions from the Gulf (2.04% and 1.67%, respectively).

Table 3.3.4.1. Total Gulf greenhouse gas 2014 emissions estimates (tons per year [tpy]) from oil platform and non-oil platform sources, commercial fishing, and percent greenhouse gas emissions from commercial fishing vessels of the total emissions*.

Emission source	CO₂	Greenhouse CH₄	Gas N₂O	Total CO_{2e}**
Oil platform	5,940,330	225,667	98	11,611,272
Non-platform	14,017,962	1,999	2,646	14,856,307
Total	19,958,292	227,665	2,743	26,467,578
Commercial fishing	531,190	3	25	538,842
Recreational fishing	435,327	3	21	441,559
Percent commercial fishing	2.66%	>0.01%	0.91%	2.04%
Percent recreational fishing	2.18%	>0.01%	0.77%	1.67%

*Compiled from Tables 6-11, 6-12, and 6-13 in Wilson et al. (2017). **The CO₂ equivalent (CO_{2e}) emission estimates represent the number of tons of CO₂ emissions with the same global warming potential as one ton of another greenhouse gas (e.g., CH₄ and N₂O). Conversion factors to CO_{2e} are 21 for CH₄ and 310 for N₂O.

Deepwater Horizon MC252 Oil Spill

General Impacts on Fishery Resources

The presence of polycyclic aromatic hydrocarbons (PAH), which are highly toxic chemicals that tend to persist in the environment for long periods of time, in marine environments can have detrimental impacts on marine finfish, especially during the more vulnerable larval stage of development (Whitehead et al. 2011). When exposed to realistic, yet toxic levels of PAHs (1–15 µg/L), greater amberjack larvae develop cardiac abnormalities and physiological defects (Incardona et al. 2014). The future reproductive success of long-lived species, including red drum (*Sciaenops ocellatus*) and many reef fish species, may be negatively affected by episodic events resulting in high-mortality years or low recruitment. These episodic events could leave gaps in the age structure of the population, thereby affecting future reproductive output (Mendelsohn et al. 2012). Other studies have described the vulnerabilities of various marine finfish species, with morphological and/or life history characteristics similar to species found in

the Gulf, to oil spills and dispersants (Hose et al. 1996; Carls et al. 1999; Heintz et al. 1999; Short 2003).

Increases in histopathological lesions were found in red snapper (*Lutjanus campechanus*) in the area affected by the oil, but Murawski et al. (2014) found that the incidence of lesions had declined between 2011 and 2012. The occurrence of such lesions in marine fish is not uncommon (Sindermann 1979; Haensly et al. 1982; Solangi and Overstreet 1982; Khan and Kiceniuk 1984, 1988; Kiceniuk and Khan 1987; Khan 1990). Red snapper diet was also affected after the spill. A decrease in zooplankton consumed, especially by adults (greater than 400 mm total length) over natural and artificial substrates may have contributed to an increase in the consumption of fish and invertebrate prey – more so at artificial reefs than natural reefs (Tarnecki and Patterson 2015).

In addition to the crude oil, over a million gallons of the dispersant, Corexit 9500A[®], was applied to the ocean surface and an additional hundreds of thousands of gallons of dispersant was pumped to the mile-deep well head (National Commission 2010). No large-scale applications of dispersants in deep water had been conducted until the *Deepwater Horizon* MC252 oil spill. Thus, no data exist on the environmental fate of dispersants in deep water. The effect of oil, dispersants, and the combination of oil and dispersants on fishes of the Gulf remains an area of concern. Marine fish species typically concentrate PAHs in the digestive tract, making stomach bile an appropriate testing medium. A study by Synder et al. (2015) assessed bile samples from golden tilefish (*Lopholatilus chamaeleonticeps*), king snake eel (*Ophichthus rex*), and red snapper for PAH accumulation over time, and reported concentrations were highest in golden tilefish during the same time period when compared to king snake eel and red snapper. These results suggest that the more highly associated an organism is with the sediment in an oil spill area, the higher the likelihood of toxic PAH accumulation. Twenty-first century dispersant applications are thought to be less harmful than their predecessors. However, the combination of oil and dispersants has proven to be more toxic to marine fishes than either dispersants or crude oil alone. Marine fish which are more active (e.g., a pelagic species versus a demersal species) appear to be more susceptible to negative effects from interactions with weathered oil/dispersant emulsions. These effects can include mobility impairment and inhibited respiration (Swedmark et al. 1973). Another study found that while Corexit 9500A[®] and oil are similar in their toxicity, when Corexit 9500A[®] and oil were mixed in lab tests, toxicity to microscopic rotifers increased up to 52-fold (Rico-Martínez et al. 2013). These studies suggest that the toxicity of the oil and dispersant combined may be greater than anticipated.

As reported by NOAA's Office of Response and Restoration (NOAA 2010), the oil from the *Deepwater Horizon* MC252 spill is relatively high in alkanes, which can readily be used by microorganisms as a food source (Figure 3.3.4.1). As a result, the oil from this spill is likely to biodegrade more readily than crude oil in general. The *Deepwater Horizon* MC252 oil is also relatively much lower in PAH, especially if the spilled oil penetrates into the substrate on beaches or shorelines. Like all crude oils, MC252 oil contains volatile organic compounds (VOCs) such as benzene, toluene, and xylene. Some VOCs are acutely toxic but because they evaporate readily, they are generally a concern only when oil is fresh.⁹

⁹ http://sero.nmfs.noaa.gov/deepwater_horizon/documents/pdfs/fact_sheets/oil_characteristics.pdf

Outstanding Effects

As a result of the *Deepwater Horizon* MC252 oil spill, a consultation pursuant to ESA Section 7(a)(2) was reinitiated. As discussed above, on September 30, 2011, the Protected Resources Division released an opinion, which after analyzing best available data, the current status of the species, environmental baseline (including the impacts of the recent *Deepwater Horizon* MC252 oil spill in the northern Gulf), effects of the proposed action, and cumulative effects, concluded that the continued operation of the CMP fishery is not likely to jeopardize the continued existence of green, hawksbill, Kemp's ridley, leatherback, or loggerhead sea turtles, nor the continued existence of smalltooth sawfish (NMFS 2011). More information on the *Deepwater Horizon* MC252 oil spill and associated closures is available on the Southeast Regional Office website¹⁰.

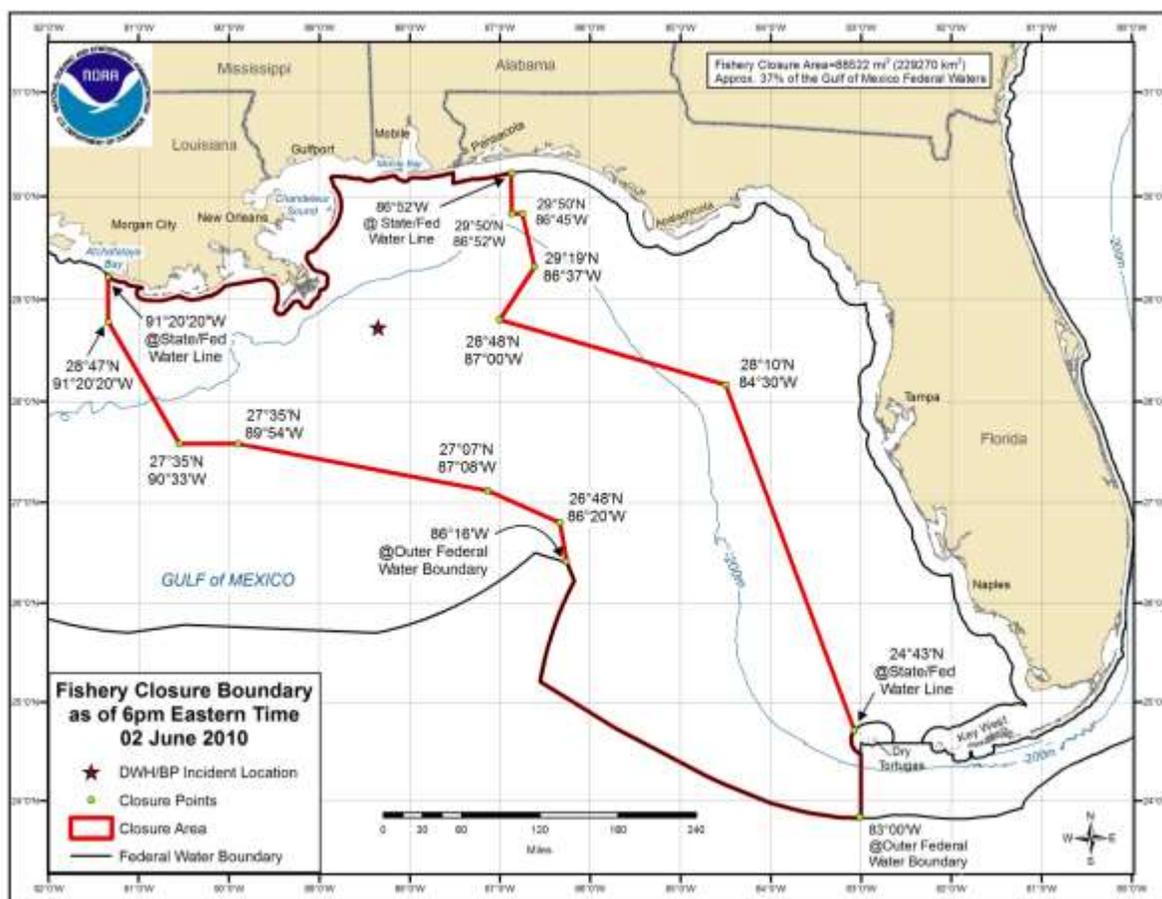


Figure 3.3.4.1. Fishery closure at the height of the *Deepwater Horizon* MC252 oil spill.

3.4 Description of the Economic Environment

Economic information pertaining to cobia can be found in Vondruska (2010), as well as Amendment 18 (GMFMC/SAFMC 2011) and Amendment 20B (GMFMC/SAFMC 2014), and is incorporated herein by reference. The following section contains updated information on the

¹⁰ http://sero.nmfs.noaa.gov/deepwater_horizon_oil_spill.htm

economic environment of the Gulf cobia portion of the CMP fishery, with a focus on the Gulf Zone.

3.4.1 Commercial Sector

There is no federal permit required for the commercial harvest of Gulf cobia. However, vessels with a valid federal commercial vessel permit or a charter vessel/headboat permit that harvest Gulf cobia in the EEZ or in state waters may only sell or transfer those fish to dealers with a federal dealer permit. Similarly, a federal dealer may only purchase or receive cobia that was harvested in the EEZ from a vessel that has a valid federal commercial vessel or charter vessel/headboat permit. As of July 13, 2018, there were 401 entities with a federal Gulf and South Atlantic Dealers permit.

Cobia harvested in the Gulf by vessels that do not have a valid federal commercial or charter vessel/headboat permit may be sold or transferred to state authorized seafood dealers. Such sales are subject to the regulations of the state where the cobia is sold.

Total Landings and Dockside Revenue

Gulf Zone cobia is managed under a stock ACL that is specified and monitored in terms of landed weight (lw)¹¹, which is 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. Florida, which accounted for the majority of cobia landings and revenue in the Gulf, experienced a substantial increase in landings in 2013, but then a steady decrease through 2016 (Table 3.4.1.1). In Alabama, Louisiana, and Texas, cobia landings trended upwards during this period and there were no cobia landings reported in Mississippi. The average annual ex-vessel price for cobia from 2013 through 2017 was approximately \$3.38 per pound lw (2017 dollars). There was a significant spike in commercial cobia landings in April of each year from 2012 through 2016, and April landings accounted for approximately 40% of the annual harvest, on average (Figure 3.4.1.1).

¹¹ Landed weight is equivalent to “as reported.”

Table 3.4.1.1. Commercial Gulf Zone cobia landings (lbs lw) and revenue (2017 \$) by state.*

-	AL	FL	LA	TX	Total
	Landings (lbs lw)				
2012	2,815	33,154	13,343	2,599	51,911
2013	1,115	63,034	15,370	2,989	82,508
2014	3,276	52,144	18,759	4,302	78,481
2015	2,582	46,189	18,544	2,999	70,314
2016	3,694	40,202	24,893	5,819	74,608
Average	2,696	46,945	18,182	3,742	71,564
	Dockside Revenue (2017 \$)				
2012	\$ 4,661	\$ 108,234	\$ 32,950	\$ 6,943	\$ 152,789
2013	\$ 2,110	\$ 247,282	\$ 40,582	\$ 9,215	\$ 299,188
2014	\$ 6,400	\$ 188,621	\$ 59,712	\$ 11,934	\$ 266,666
2015	\$ 5,070	\$ 156,785	\$ 64,235	\$ 11,428	\$ 237,519
2016	\$ 11,776	\$ 155,178	\$ 76,860	\$ 20,989	\$ 264,803
Average	\$ 6,004	\$ 171,220	\$ 54,868	\$ 12,102	\$ 244,193

Source: SEFSC Commercial ACL Dataset (October 2017)

* No commercial cobia landings were reported in Mississippi.

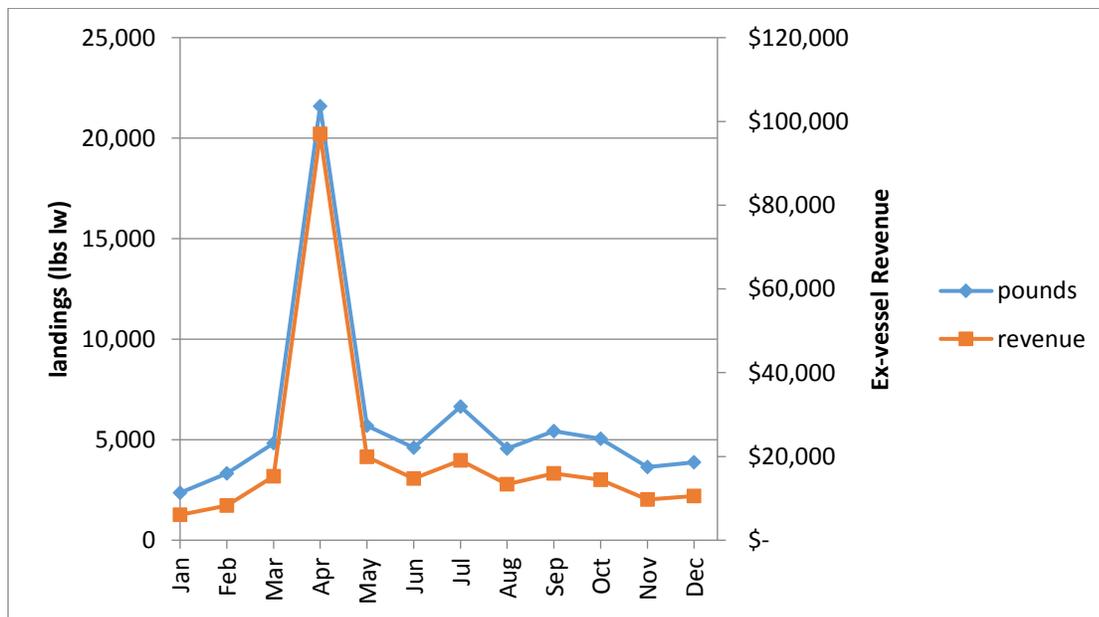


Figure 3.4.1.1. Average (2012-2016) monthly Gulf Zone cobia landings (lbs lw) and ex-vessel revenue (2017 \$).

Source: SEFSC Commercial ACL Dataset (October 2017)

Vessels, Trips, Landings, and Dockside Revenue

The following summaries of landings, revenue, and effort (Tables 3.4.1.2 and 3.4.1.3) are based on logbook information and the NMFS Accumulated Landings System (ALS) for prices and so would not match exactly with the landings and revenue values presented above. In addition, the landings are presented in gutted weight rather than in total or landed weight. Landings for all species in the Southeast Fisheries Science Center Social Science Research Group's (SEFSC-SSRG) Socioeconomic Panel data are expressed in gutted weight to provide one unit for all species. This is because data summarizations, as presented in Table 3.4.1.2 and Table 3.4.1.3 below, generally involve a multitude of species. It is also important to note that federally-permitted vessels that are required to submit logbooks generally report their harvest of most species regardless of whether the fish were caught in state or federal waters. Because there is no federal permit required for the commercial harvest of Gulf cobia, the estimates presented in Table 3.4.1.2 and Table 3.4.1.3 only describe cobia fishing activity by commercial vessels that held federal permits for other commercial species. Finally, the year range presented in Table 3.4.1.2 and Table 3.4.1.3 includes 2017; whereas, the other tables presented in this section only cover 2012 through 2016. This is due to differences in data availability between the SEFSC-SSRG Socioeconomic Panel and the SEFSC ACL data set.

The number of federally permitted vessels that harvested Gulf Zone cobia increased substantially in 2014, decreased slightly in 2015 and 2016, and then dropped significantly in 2017 (Table 3.4.1.2). On average (2013 through 2017), these vessels landed cobia on approximately 16% of their Gulf trips, but cobia comprised less than 1% of their annual revenue from all species (Table 3.4.1.2 and Table 3.4.1.3).

Table 3.4.1.2. Number of vessels, trips, and landings (lbs gw) by year for Gulf Zone cobia.

Year	# of vessels that caught cobia (> 0 lbs gw)	# of trips that caught cobia	cobia landings (lbs gw)	Other species' landings jointly caught w/ cobia (lbs gw)	# of Gulf trips that only caught other species	Other species' landings on Gulf trips w/o cobia (lbs gw)	All species landings on South Atlantic trips (lbs gw)
2012	267	669	30,415	2,488,552	4,137	9,525,597	562,700
2013	266	750	35,202	3,028,226	3,774	9,096,489	530,426
2014	287	856	37,265	3,429,346	4,402	9,903,967	463,222
2015	286	814	35,593	3,452,743	4,565	10,346,026	563,162
2016	283	928	39,666	3,607,633	4,380	10,089,531	646,728
2017	261	782	33,372	2,689,097	4,066	8,769,459	559,934
5-year Avg*	277	826	36,220	3,241,409	4,237	9,641,094	552,694

Source: SEFSC-SSRG Socioeconomic Panel v.7 May 2018

*Average based on most recent 5 years of available data only (2013-2017). 2012 is included for consistency with other tables presented in this section.

Note: Gulf trips refer to trips taken in Gulf Council jurisdictional waters and South Atlantic trips refer to trips taken in South Atlantic Council jurisdictional waters.

Table 3.4.1.3. Number of vessels and ex-vessel revenue by year (2017 dollars) for Gulf Zone cobia.

Year	# of vessels that caught cobia (> 0 lbs gw)	Dockside revenue from cobia	Dockside revenue from 'other species' jointly caught w/ cobia	Dockside revenue from 'other species' caught on Gulf trips w/o cobia	Dockside revenue from 'all species' caught on South Atlantic trips	Total dockside revenue	Average total dockside revenue per vessel
2012	267	\$85,523	\$8,450,232	\$31,414,872	\$1,368,747	\$41,319,374	\$154,754
2013	266	\$115,735	\$11,678,984	\$34,166,701	\$1,486,335	\$47,447,755	\$178,375
2014	287	\$114,400	\$13,418,937	\$36,354,431	\$1,165,913	\$51,053,681	\$177,887
2015	286	\$116,264	\$14,118,061	\$39,389,127	\$1,533,851	\$55,157,303	\$192,858
2016	283	\$139,009	\$14,586,202	\$38,774,330	\$1,255,694	\$54,755,235	\$193,481
2017	261	\$121,762	\$10,821,858	\$33,358,086	\$1,352,365	\$45,654,071	\$174,920
5-year Avg*	277	\$121,434	\$12,924,808	\$36,408,535	\$1,358,832	\$50,813,609	\$183,504

Source: SEFSC-SSRG Socioeconomic Panel v.7 May 2018

*Average based on most recent 5 years of available data only (2013-2017). 2012 is included for consistency with other tables presented in this section.

Note: Gulf trips refer to trips taken in Gulf Council jurisdictional waters and South Atlantic trips refer to trips taken in South Atlantic Council jurisdictional waters.

Imports

Imports of seafood products compete in the domestic seafood market and have in fact dominated many segments of the seafood market. Imports affect the price for domestic seafood products and tend to set the price in the market segments in which they dominate. Seafood imports have downstream effects on the local fish market. At the harvest level for cobia, imports affect the returns to fishermen through the ex-vessel prices they receive for their landings. As substitutes to domestic production of cobia, imports tend to cushion the adverse economic effects on consumers resulting from a reduction in domestic landings. The following describes the imports of fish products that directly compete with domestic harvest of cobia.

Imports¹² of fresh cobia ranged from 1.4 million lbs product weight (pw) to 1.7 million lbs pw during 2013 through 2017, with a peak in 2014. Annual revenue from these imports ranged from \$4.7 million to \$7.9 million (2017 dollars¹³). Imports of fresh cobia primarily originated in Panama, and entered the U.S. through the port of Miami.

¹²NOAA Fisheries Service purchases fisheries trade data from the Foreign Trade Division of the U.S. Census Bureau. Data are available for download at <http://www.st.nmfs.noaa.gov/st1/trade/index.html>.

¹³Converted to 2017 dollars using the annual, not seasonally adjusted GDP implicit price deflator provided by the U.S. Bureau of Economic Analysis.

Imports of frozen cobia were sparse, with average annual imports of approximately 110,000 lbs pw from 2013 through 2017, worth approximately \$344,000 (2017 dollars). Imports of frozen cobia primarily originated in Panama and Ecuador and entered the U.S. through the ports of Savannah, Los Angeles, and Miami.

Business Activity

The commercial harvest and subsequent sales and consumption of fish generates business activity as fishermen expend funds to harvest the fish and consumers spend money on goods and services, such as cobia purchased at a local fish market and served during restaurant visits. These expenditures spur additional business activity in the region(s) where the harvest and purchases are made, such as jobs in local fish markets, grocers, restaurants, and fishing supply establishments. In the absence of the availability of a given species for purchase, consumers would spend their money on substitute goods, such as other finfish or seafood products, and services, such as visits to different food service establishments. As a result, the analysis presented below represents a distributional analysis only; that is, it only shows how economic effects may be distributed through regional markets and should not be interpreted to represent the impacts if these species are not available for harvest or purchase.

Estimates of the U.S. average annual business activity associated with the commercial harvest of cobia in the Gulf were derived using the model developed for and applied in NMFS (2017) and are provided in Table 3.4.1.4.¹⁴ This business activity is characterized as jobs (full- and part-time), income impacts (wages, salaries, and self-employed income), output impacts (gross business sales), and value-added impacts, which represent the contribution made to the U.S. Gross Domestic Product (GDP). These impacts should not be added together because this would result in double counting. It should be noted that the results provided should be interpreted with caution and demonstrate the limitations of these types of assessments. These results are based on average relationships developed through the analysis of many fishing operations that harvest many different species. Separate models to address individual species are not available. For example, the results provided here apply to an “all other finfish” category rather than just cobia, and a harvester job is “generated” for approximately every \$34,000 (2017 dollars) in ex-vessel revenue. These results contrast with the number of harvesters (vessels) with recorded landings of cobia presented in Table 3.4.1.2.

¹⁴A detailed description of the input/output model is provided in NMFS (2011).

Table 3.4.1.4. Average annual business activity (2012 through 2016) associated with the commercial harvest of cobia in the Gulf. All monetary estimates are in 2017 dollars.*

Species	Average Ex-vessel Value (\$ thousands)	Total Jobs	Harvester Jobs	Output (Sales) Impacts (\$ thousands)	Income Impacts (\$ thousands)	Value Added (\$ thousands)
Cobia	\$244	32	7	\$2,429	\$880	\$1,250

Source: Calculated by NMFS SERO using the model developed for and applied in NMFS (2017).

*Converted to 2017 dollars using the annual, not seasonally adjusted GDP implicit price deflator provided by the U.S. Bureau of Economic Analysis.

3.4.2 Recreational Sector

The recreational sector is comprised of the private and for-hire modes. The private mode includes anglers fishing from shore (all land-based structures) and private/rental boats. The for-hire mode is composed of charter boats and headboats. Charter boats generally carry fewer passengers and charge a fee on an entire vessel basis, whereas headboats carry more passengers and payment is per person. The type of service, from a vessel- or passenger-size perspective, affects the flexibility to search different fishing locations during the course of a trip and target different species because larger concentrations of fish are required to satisfy larger groups of anglers.

Landings

Gulf Zone cobia is managed under a stock ACL that is specified and monitored in terms of landed weight (lw)¹⁵, which is 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 annual catch limit. This section contains landings data from the Southeast Fisheries Science Center (SEFSC) Marine Recreational Information Program (MRIP) ACL monitoring data set. Recreational landings of cobia decreased approximately 41% from 2013 through 2017 and the majority of landings were from private/rental vessel trips (Figure 3.4.2.1). Only a small amount of landings were attributed to headboats and shore modes during this time period. The greatest percentage of recreational cobia landings on average came from Florida (43%), followed by Louisiana and Mississippi combined (38%), Alabama (16%), and Texas (3%) (Figure 3.4.2.2). Seasonal landings fluctuated each year and across years from 2013 through 2017, but on average peak landings occurred in MRIP wave 3 (May/June) (Figure 3.4.2.3).

¹⁵ Landed weight is equivalent to “as reported.”

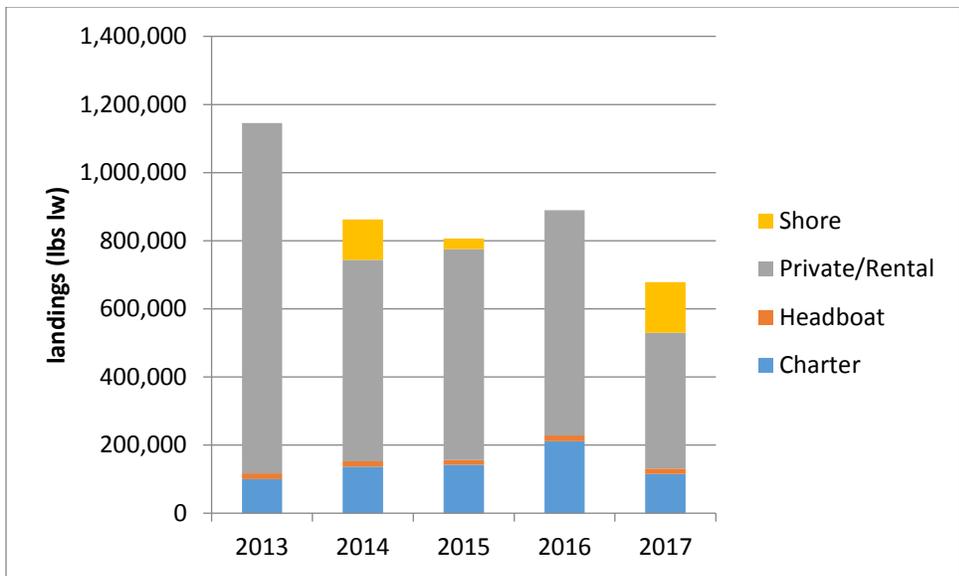


Figure 3.4.2.1. Recreational landings of Gulf Zone cobia by mode.
Source: SEFSC MRIP ACL data set (June 2018).

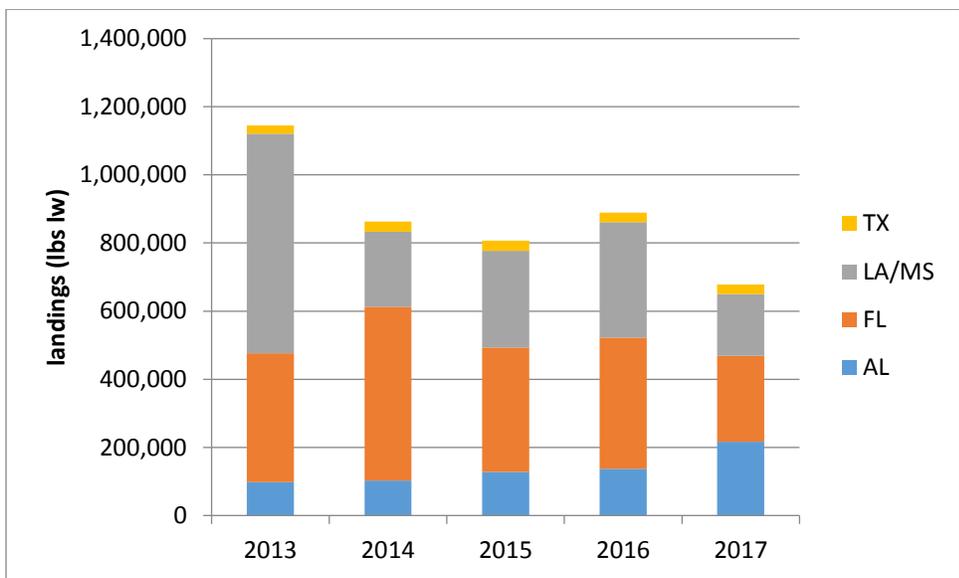


Figure 3.4.2.2. Recreational landings of Gulf Zone cobia by state.*
Source: SEFSC MRIP ACL data set (June 2018).

*Louisiana and Mississippi are combined here to align with the way headboat landings were reported.

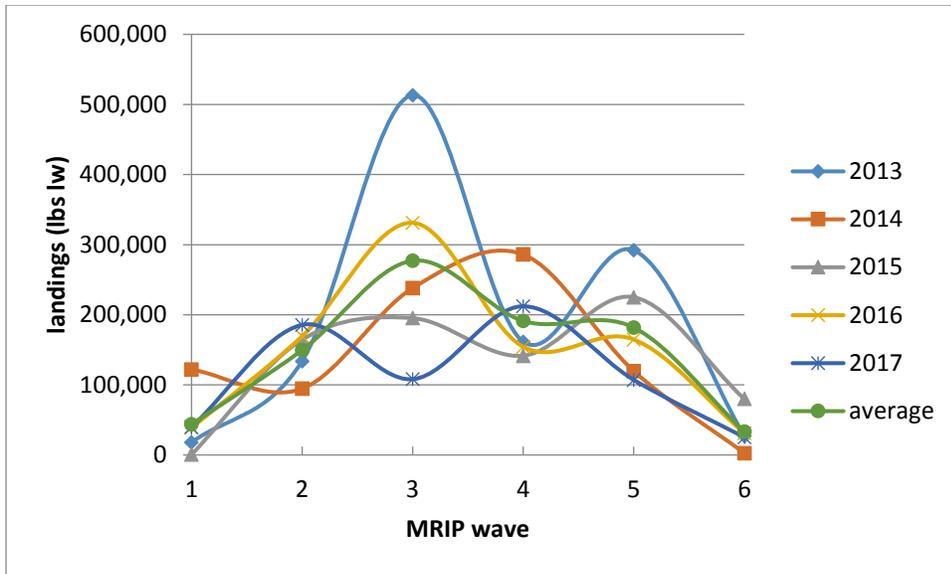


Figure 3.4.2.3. Recreational landings of Gulf Zone cobia by MRIP wave. Source: SEFSC MRIP ACL data set (June 2018).

Permits

For-hire vessels in the Gulf are required to have a limited access Gulf Charter/Headboat for Coastal Migratory Pelagics permit (Gulf CMP for-hire permit) to fish for or possess CMP species in or from the Gulf EEZ (a similar, but separate, permit is required for coastal reef fish species). On July 3, 2018, there were 1,285 valid (non-expired) or renewable¹⁶ Gulf CMP for-hire permits and 33 valid or renewable Gulf CMP historical captain for-hire permits. Although the for-hire permit application collects information on the primary method of operation, the permit itself does not identify the permitted vessel as either a headboat or a charter vessel and vessels may operate in both capacities. However, only federally permitted 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. As of June 11, 2018, 70 Gulf headboats were registered in the SRHS (K. Fitzpatrick, NMFS SEFSC, pers. comm.). The majority of these headboats were located in Florida (41), followed by Texas (16), Alabama (8), and Mississippi/Louisiana (5).

Information on Gulf charter vessel and headboat operating characteristics is included in Savolainen et al. (2012) and is incorporated herein by reference.

There are no specific federal permitting requirements for recreational anglers to fish for or harvest CMP species, including 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

¹⁶ A renewable permit is an expired permit that may not be actively fished, but is renewable for up to one year after expiration.

result, it is not possible to identify with available data how many individual anglers would be expected to be affected by this proposed amendment.

Angler Effort

Recreational effort derived from the 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 the 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 Gulf, regardless of target intent or catch success.

A target trip may be considered an angler's revealed preference for a certain species, and thus may carry more relevant information when assessing the economic effects of regulations on the subject species than the other two measures of recreational effort. Given the subject nature of this action, the following discussion focuses on target trips for cobia in the Gulf.

The majority of estimated target trips for cobia in the Gulf, on average (2013 through 2017), were taken in Florida and the dominant mode of fishing was the private/rental mode (Table 3.4.2.1). Target trips for cobia increased substantially in 2014, but then declined steadily to a 5-year low in 2017. It is important to note that in 2018, MRIP transitioned from the existing Coastal Household Telephone Survey (CHTS) to a new mail-based fishing effort survey (FES). The estimates presented in Table 3.4.2.1 are based on the CHTS and have not been calibrated to the FES; however, it is expected that such calibration would result in greater estimates.

Table 3.4.2.1. Gulf Zone cobia recreational target trips, by mode and state, 2013-2017.*

-	Alabama	Florida	Louisiana**	Mississippi	Total
Shore Mode					
2013	7,341	13,144	0	0	20,485
2014	2,735	60,041	N/A	0	62,776
2015	3,118	54,940	N/A	0	58,059
2016	11,697	39,093	N/A	0	50,791
2017	6,405	56,182	N/A	0	62,587
Average	6,259	44,680	0	0	50,940
Charter Mode					
2013	0	2,273	0	237	2,510
2014	635	2,974	N/A	100	3,710
2015	285	2,690	N/A	0	2,975
2016	483	1,191	N/A	0	1,674
2017	235	6,726	N/A	0	6,960
Average	328	3,171	0	67	3,566
Private/Rental Mode					
2013	15,042	84,542	11,609	21,959	133,152
2014	10,472	110,356	N/A	15,057	135,885
2015	14,762	74,203	N/A	41,839	130,804
2016	13,526	108,095	N/A	6,030	127,651
2017	11,060	40,633	N/A	9,695	61,388
Average	12,972	83,566	11,609	18,916	117,776
All Modes					
2013	22,382	99,959	11,609	22,196	156,147
2014	13,843	173,372	N/A	15,157	202,372
2015	18,166	131,833	N/A	41,839	191,838
2016	25,706	148,379	N/A	6,030	180,115
2017	17,699	103,541	N/A	9,695	130,935
Average	19,559	131,417	11,609	18,983	172,281

Source: MRIP database, SERO, NMFS.

* These estimates are based on the MRIP CHTS. Directed effort estimates that are calibrated to the new MRIP mail-based FES are currently unavailable, but may be greater than what are presented here.

** MRIP estimates for Louisiana are not available after 2013. The Louisiana Department of Wildlife and Fisheries did collect target effort data beginning in 2016; however, that data are not currently calibrated with the MRIP data and therefore are not useful for direct comparison.

Note: Texas and headboat information is unavailable.

Similar analysis of recreational effort is not possible for the headboat mode because headboat data are not collected at the angler level. Estimates of effort by the headboat mode are provided in terms of angler days, or the total number of standardized full-day angler trips.¹⁷ Florida experienced a 12% increase overall in the number of headboat angler days from 2013 through 2017 and Alabama experienced a 23% increase (Table 3.4.2.2). The other Gulf states experienced minor decreases during this time period. On average (2013 through 2017), Florida accounted for the majority of headboat angler days reported, followed by Texas and Alabama, whereas Mississippi through Louisiana accounted for only a small percentage (Table 3.4.2.2).

Table 3.4.2.2. Gulf headboat angler days and percent distribution by state (2013 through 2017).

	Angler Days				Percent Distribution			
	FL	AL	MS-LA**	TX	FL	AL	MS-LA	TX
2013	160,346	14,454	3406	55,749	68.54%	6.18%	1.46%	23.83%
2014	174,599	16,766	3257	51,231	71.02%	6.82%	1.32%	20.84%
2015	176,375	18,008	3587	55,135	69.68%	7.11%	1.42%	21.78%
2016	183,147	16,831	2955	54,083	71.26%	6.55%	1.15%	21.04%
2017	178,816	17,841	3189	51,575	71.12%	7.10%	1.27%	20.51%
Average	174,657	16,780	3,279	53,555	70%	7%	1%	22%

Source: NMFS SRHS.

**Headboat data from Mississippi and Louisiana are combined for confidentiality purposes.

Headboat effort in terms of angler days for the entire Gulf was concentrated most heavily during the summer months of June through August on average (2013 through 2017) (Table 3.4.2.3). The monthly trend in angler days was mostly similar across years, building gradually from January through May, rising sharply to a peak in June and July, dropping rapidly through September, increasing slightly in October, then tapering through December.

¹⁷ Headboat trip categories include half-, three-quarter-, full-, and 2-day trips. A full-day trip equals one angler day, a half-day trip equals .5 angler days, etc. Angler days are not standardized to an hourly measure of effort and actual trip durations may vary within each category.

Table 3.4.2.3. Gulf headboat angler days (in thousands) and percent distribution by month (2013 – 2017).

-	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
-	Headboat Angler Days (in thousands)											
2013	8.6	9.6	16.8	16.4	17.2	47.8	38.3	27.6	12.7	21.3	8.7	9.1
2014	7.1	12.4	18.6	18.7	21.3	44.3	46.2	30.9	12.1	17.4	7.6	9.2
2015	9.4	10.6	22.8	20.7	21.0	44.7	45.2	26.6	15.1	17.2	9.8	9.9
2016	8.0	13.2	21.8	18.7	21.7	50.3	49.9	21.8	13.6	15.8	11.8	10.4
2017	9.0	14.0	21.0	19.4	19.2	47.7	54.0	23.0	10.3	11.1	11.3	11.5
Avg	8.4	12.0	20.2	18.8	20.1	47.0	46.7	26.0	12.8	16.6	9.8	10.0
-	Percent Distribution											
2013	3.7%	4.1%	7.2%	7.0%	7.3%	20.4%	16.4%	11.8%	5.4%	9.1%	3.7%	3.9%
2014	2.9%	5.0%	7.6%	7.6%	8.7%	18.0%	18.8%	12.6%	4.9%	7.1%	3.1%	3.7%
2015	3.7%	4.2%	9.0%	8.2%	8.3%	17.7%	17.9%	10.5%	6.0%	6.8%	3.9%	3.9%
2016	3.1%	5.1%	8.5%	7.3%	8.4%	19.6%	19.4%	8.5%	5.3%	6.2%	4.6%	4.0%
2017	3.6%	5.6%	8.4%	7.7%	7.6%	19.0%	21.5%	9.1%	4.1%	4.4%	4.5%	4.6%
Avg	3.4%	4.8%	8.1%	7.6%	8.1%	18.9%	18.8%	10.5%	5.1%	6.7%	3.9%	4.0%

Source: NMFS SRHS.

Economic Value

Economic value can be measured in the form of consumer surplus (CS) per additional cobia kept on a trip for anglers (the amount of money that an angler would be willing to pay for a fish in excess of the cost to harvest the fish). There is no available estimate of CS for cobia, but dolphin or king mackerel CS estimates may be close proxies. The estimated values of the CS per fish for a second, third, fourth, and fifth king mackerel kept on a trip are approximately \$101, \$68, \$50, and \$39, respectively. For dolphin, the values for the second, third, fourth, and fifth kept fish are approximately \$15, \$10, \$8, and \$6, respectively (Carter and Liese 2012; values updated to 2017 dollars).¹⁸

The foregoing estimates of economic value should not be confused with economic impacts associated with recreational fishing expenditures. Although expenditures for a specific good or service may represent a proxy or lower bound of value (a person would not logically pay more for something than it was worth to them), they do not represent the net value (benefits minus cost), nor the change in value associated with a change in the fishing experience.

With regard to for-hire businesses, economic value can be measured by producer surplus (PS) per passenger trip (the amount of money that a vessel owner earns in excess of the cost of providing the trip). Estimates of the PS per for-hire passenger trip are not available. Instead, net

¹⁸Converted to 2017 dollars using the annual, not seasonally adjusted GDP implicit price deflator provided by the U.S. Bureau of Economic Analysis.

operating revenue (NOR), which is the return used to pay all labor wages, returns to capital, and owner profits, is used as a proxy for PS. The estimated NOR value for an average Gulf charter angler trip is \$158 (2017 dollars) and the estimated NOR value for an average Gulf headboat angler trip is \$52 (C. Liese, NMFS SEFSC, pers. comm.). Estimates of NOR per cobia target trip are not available.

Business Activity

The desire for recreational fishing generates economic activity as consumers spend their income on various goods and services needed for recreational fishing. This spurs economic activity in the region where recreational fishing occurs. It should be clearly noted that, in the absence of the opportunity to fish, the income would presumably be spent on other goods and services and these expenditures would similarly generate economic activity in the region where the expenditure occurs. As such, the analysis below represents a distributional analysis only.

Estimates of the business activity (economic impacts) associated with recreational angling for cobia in the Gulf were calculated using average trip-level impact coefficients derived from the 2015 Fisheries Economics of the U.S. report (NMFS 2017) and underlying data provided by the National Oceanic and Atmospheric Administration (NOAA) Office of Science and Technology. Economic impact estimates in 2015 dollars were adjusted to 2017 dollars using the annual, not seasonally adjusted GDP implicit price deflator provided by the U.S. Bureau of Economic Analysis.

Business activity (economic impacts) for the recreational sector is characterized in the form of jobs (full- and part-time), income impacts (wages, salaries, and self-employed income), output impacts (gross business sales), and value-added impacts (contribution to the GDP in a state or region). Estimates of the average annual economic impacts (2013-2017) resulting from Gulf Zone cobia target trips are provided in Table 3.4.2.4. The average impact coefficients, or multipliers, used in the model are invariant to the “type” of effort and can therefore be directly used to measure the impact of other effort measures such as cobia catch trips. To calculate the multipliers from Table 3.4.2.4, simply divide the desired impact measure (sales impact, value-added impact, income impact or employment) associated with a given state and mode by the number of target trips for that state and mode.

The estimates provided in Table 3.4.2.4 only apply at the state-level. Addition of the state-level estimates to produce a regional (or national) total may underestimate the actual amount of total business activity, because state-level impact multipliers do not account for interstate and interregional trading. It is also important to note that these economic impacts estimates are based on trip expenditures only and do not account for durable expenditures. Durable expenditures cannot be reasonably apportioned to individual species. As such, the estimates provided in Table 3.4.2.4 may be considered a lower bound on the economic activity associated with those trips that targeted cobia.

Estimates of the business activity associated with headboat effort are not available. Headboat vessels are not covered in MRIP in the Southeast, so, in addition to the absence of estimates of

target effort, estimation of the appropriate business activity coefficients for headboat effort has not been conducted.

Table 3.4.2.4. Estimated annual average economic impacts (2013-2017) from recreational trips that targeted Gulf Zone cobia, by state and mode, using state-level multipliers. All monetary estimates are in 2017 dollars in thousands.*

-	FL	AL	MS	LA**
-	Charter Mode			
Target Trips	3,171	328	67	0
Value Added Impacts	\$1,160	\$106	\$15	\$0
Sales Impacts	\$2,102	\$202	\$31	\$0
Income Impacts	\$757	\$72	\$11	\$0
Employment (Jobs)	17	2	0	0
-	Private/Rental Mode			
Target Trips	83,566	12,972	18,916	11,609
Value Added Impacts	\$1,875	\$366	\$271	\$417
Sales Impacts	\$3,165	\$708	\$625	\$859
Income Impacts	\$1,087	\$213	\$162	\$225
Employment (Jobs)	28	7	5	6
-	Shore			
Target Trips	44,680	6,259	0	0
Value Added Impacts	\$753	\$230	\$0	\$0
Sales Impacts	\$1,239	\$414	\$0	\$0
Income Impacts	\$431	\$136	\$0	\$0
Employment (Jobs)	12	5	0	0
-	All Modes			
Target Trips	131,417	19,559	18,983	11,609
Value Added Impacts	\$3,788	\$702	\$287	\$417
Sales Impacts	\$6,506	\$1,324	\$656	\$859
Income Impacts	\$2,275	\$421	\$173	\$225
Employment (Jobs)	57	13	5	6

Source: Effort data from MRIP; economic impact results calculated by NMFS SERO using NMFS (2017) and underlying data provided by the NOAA Office of Science and Technology.

* Headboat target information is unavailable as are target effort estimates from Texas.

** Louisiana estimates are based on 2013 target trips only.

3.5 Description of the Social Environment

This amendment affects commercial and recreational management of cobia in the Gulf. Commercial and recreational cobia landings and federal for-hire permits by state are included to provide information on the geographic distribution of fishing involvement. Descriptions of the top communities involved in commercial fishing for cobia in the Gulf are included, along with the top recreational fishing communities based on recreational engagement and the top ranking communities by the number of federal for-hire permits. Community level data are presented in order to meet the requirements of National Standard 8 of the Magnuson-Stevens Act, which requires the consideration of the importance of fishery resources to human communities when changes to fishing regulations are considered. Lastly, social vulnerability data are presented to assess the potential for environmental justice concerns.

3.5.1 Fishing Communities

The descriptions of communities include information about the top communities based on a “regional quotient” (RQ) of commercial landings and value for cobia. The RQ is the proportion of landings and value out of the total landings and value of that species for that region, and is a relative measure. These communities would be most likely to experience the effects of the proposed actions that could change cobia fishing and impact participants, associated businesses, and communities within the region. If a community is identified as a cobia community based on the RQ, this does not necessarily mean that the community would experience significant impacts due to changes in fishing if a different species or a number of species were also important to the local community and economy. Additional detailed information about communities with the highest RQs can be found on the Southeast Regional Office (SERO)’s Community Snapshots website.¹⁹

In addition to examining the RQs to understand how Gulf communities are engaged and reliant on fishing, indices were created using secondary data from permit and landings information for the commercial sector (Jepson and Colburn 2013, Jacob et al. 2013). Fishing engagement is primarily the absolute numbers of permits, landings, and value. For commercial fishing, the analysis used the number of vessels designated commercial by homeport and owner address, value of landings, and total number of commercial permits for each community. Fishing reliance includes the same variables as fishing engagement divided by population to give an indication of the per capita influence of this activity.

Using a principal component and single solution factor analysis, each community receives a factor score for each index to compare to other communities. Taking the communities with the highest RQs, factor scores of both engagement and reliance for commercial fishing were plotted. Two thresholds of one and ½ standard deviation above the mean are plotted onto the graphs to help determine a threshold for significance. The factor scores are standardized; therefore, a score above 1 is also above one standard deviation. A score above ½ standard deviation is considered engaged or reliant, with anything above one standard deviation to be very engaged or reliant.

¹⁹ http://sero.nmfs.noaa.gov/sustainable_fisheries/social/community_snapshot/

Because limited data are available concerning how recreational fishing communities are engaged and reliant on specific species, indices were created using secondary data from permit and infrastructure information for the southeast recreational fishing sector at the community level (Jepson and Colburn 2013, Jacob et al. 2013). Recreational fishing engagement is represented by the number of recreational permits and vessels designated as “recreational” by homeport and owners address. Fishing reliance includes the same variables as fishing engagement, divided by population. Factor scores of both engagement and reliance were plotted.

Landings for the recreational sector are not available by species at the community level; therefore, it is not possible with available information to identify communities as dependent on recreational fishing for Gulf cobia. However, it is possible to identify communities with the most federal for-hire permits.

Commercial Fishing Communities

The majority of Gulf Zone commercial cobia landings are from waters adjacent to Alabama and Florida (approximately 59% in 2016), followed by Louisiana and Mississippi (33%), and Texas (8%; Table 1.1.1). The bulk of landings from the combined category of Alabama and Florida are attributable to Florida.

The top cobia communities are located in Florida, Louisiana, and Texas (Figure 3.5.1.1). About 23% of cobia is landed in the top community of Destin, Florida; representing about 30% of the Gulf-wide ex-vessel value for the species. The top Louisiana communities (New Orleans and Gretna) collectively represent about 19% of landings and 16% of value. Two Pinellas County, Florida communities (Madeira Beach and St. Petersburg) are included in the top communities and collectively represent about 10% of landings and 6% of value. The Gulf Council’s jurisdictional boundary is located through the Florida Keys and Keys communities are included, although it is not possible in the community-level analysis to determine the harvest area (Gulf or South Atlantic) of the reported catch. It is important to note that location of the dealer in the Accumulated Landings System (ALS) dataset may not always correspond to where seafood was initially landed. The landings associated with a dealer location within a community are derived from the reported address of that dealer. In some cases a dealer may have several locations, but landings are reported to one primary address.

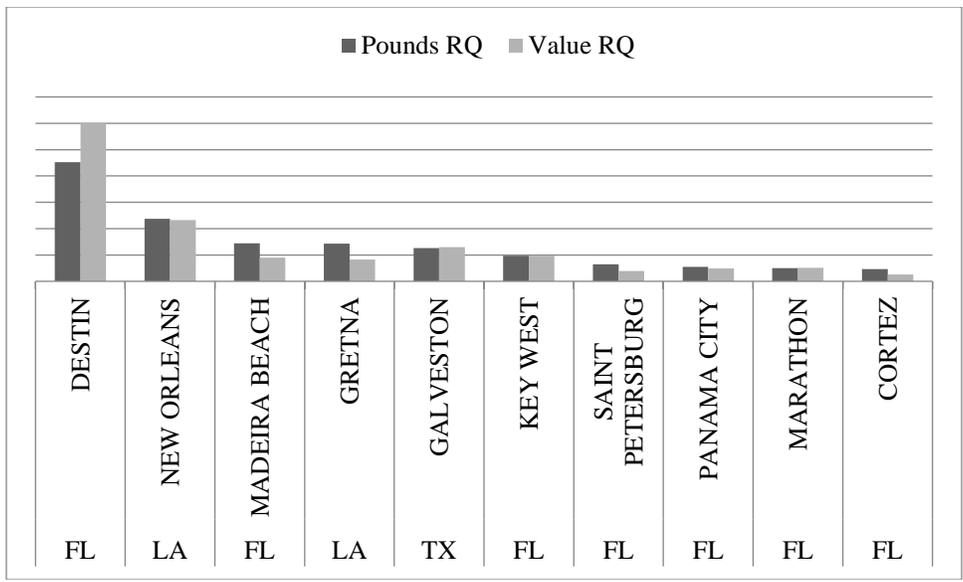


Figure 3.5.1.1. Top ten Gulf communities ranked by pounds and value RQ of cobia. The actual RQ values (y-axis) are omitted from the figure to maintain confidentiality.
 Source: SERO, Community ALS 2016.

The details of how these indices are generated are explained at the beginning of Section 3.5.1. All communities demonstrate high levels of commercial fishing engagement (Figure 3.5.1.2). The communities that demonstrate high levels of commercial fishing reliance include Key West and Marathon, Florida.

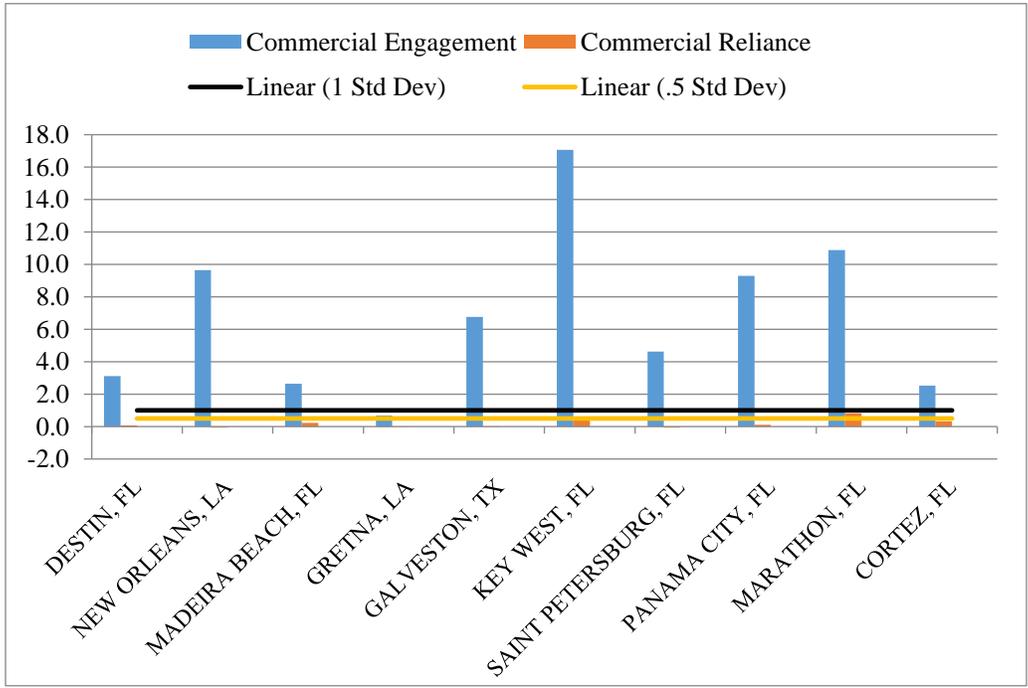


Figure 3.5.1.2. Top Gulf cobia communities' commercial engagement and reliance.
 Source: SERO, Community Social Vulnerability Indicators Database 2014 (ACS 2010-2014).

Recreational Fishing Communities

The greatest proportion of Gulf Zone recreational cobia landings are from waters adjacent to Florida (approximately 37% in 2017), followed by Alabama (32%), Louisiana (18%), Mississippi (8%), and Texas (4%, Table 1.1.2)

The details of how these indices are generated are explained in Section 3.5.1. Figure 3.5.1.3 identifies the top Gulf communities that are engaged and reliant upon recreational fishing in general and is not specific to CMP species. Two thresholds of one and one-half standard deviation above the mean were plotted to help determine a threshold for significance. Communities are presented in ranked order by fishing engagement and all 20 included communities demonstrate high levels of recreational engagement, although this is not specific to fishing for cobia. Because the analysis used discrete geo-political boundaries, Panama City and Panama City Beach had separate values for the associated variables. Calculated independently, each still ranked high enough to appear in the top 20 list suggesting a greater importance for recreational fishing in that area.

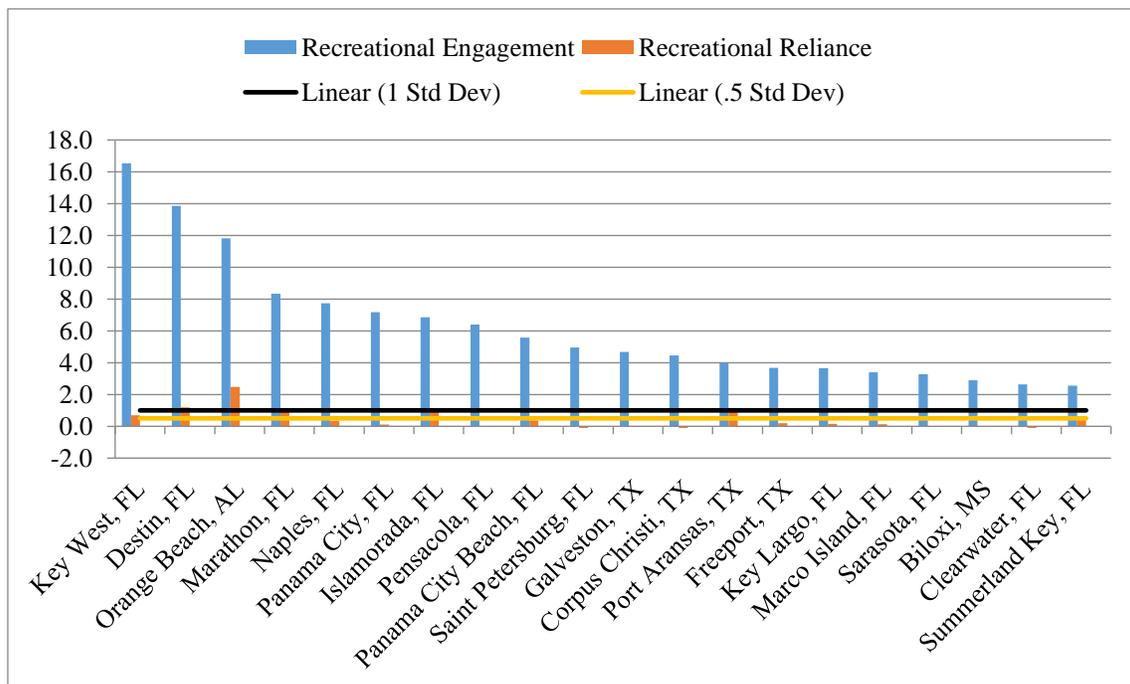


Figure 3.5.1.3. Top 20 recreational fishing communities’ engagement and reliance.
Source: SERO, Community Social Vulnerability Indicators Database 2016 (ACS 2010-2014).

The majority of federal for-hire permits for pelagic fish are held by operators in Florida (57.8%), followed by Texas (17.6%), Alabama (9.5%), Louisiana (8.2%), Mississippi (2.8%), and other states (4.1%; Table 3.1.1.1). Federal for-hire permits are held by those with mailing addresses in a total of 375 communities, located in 23 states (SERO permit office, July 30, 2018). The communities with the most for-hire permits for pelagic fish are provided in Table 3.5.1.1.

Table 3.5.1.1. Top ranking communities based on the number of federal for-hire permits for Gulf pelagic fish, including historical captain permits, in descending order.

State	Community	Permits
FL	Destin	66
FL	Panama City	53
AL	Orange Beach	51
FL	Naples	47
FL	Key West	42
FL	Pensacola	26
TX	Galveston	23
FL	St. Petersburg	21
FL	Sarasota	19
TX	Houston	18
FL	Cape Coral	17
FL	Clearwater	17
FL	Fort Myers	17
TX	Port Aransas	17
LA	Metairie	16
FL	Marco Island	15
FL	Panama City Beach	15
MS	Biloxi	15
TX	Freeport	14
FL	Fort Walton Beach	13

Source: NMFS SERO permit office, July 30, 2018.

3.5.2 Environmental Justice Considerations

Executive Order 12898 requires federal agencies conduct their programs, policies, and activities in a manner to ensure individuals or populations are not excluded from participation in, or denied the benefits of, or subjected to discrimination because of their race, color, or national origin. In addition, and specifically with respect to subsistence consumption of fish and wildlife, federal agencies are required to collect, maintain, and analyze information on the consumption patterns of populations who principally rely on fish and/or wildlife for subsistence. The main focus of Executive Order 12898 is to consider “the disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations in the United States and its territories...” This executive order is generally referred to as environmental justice (EJ).

Commercial and recreational fishermen and associated industries could be impacted by the proposed actions. However, information on the race and income status for groups at the different participation levels is not available. Although information is available concerning communities

overall status with regard to minorities and poverty (e.g., census data), such information is not available specific to fishermen and those involved in the industries and activities, themselves. To help assess whether any EJ concerns arise from the actions in this amendment, a suite of indices were created to examine the social vulnerability of coastal communities. The three indices are poverty, population composition, and personal disruptions. The variables included in each of these indices have been identified through the literature as being important components that contribute to a community's vulnerability. Indicators such as increased poverty rates for different groups, more single female-headed households and households with children under the age of five, disruptions such as higher separation rates, higher crime rates, and unemployment all are signs of populations experiencing vulnerabilities. Again, for those communities that exceed the threshold it would be expected that they would exhibit vulnerabilities to sudden changes or social disruption that might accrue from regulatory change.

Figures 3.5.2.1 and 3.5.2.2 provide the social vulnerability of the top commercial and recreational communities. Freeport, Texas exceeds the threshold of one standard deviation above the mean for all three indices. Several communities exceed the threshold of one-half standard deviation above the mean for more than one index (Fort Myers, Florida; Freeport, Texas; Galveston, Texas; Gretna, Texas; Houston, Texas; New Orleans, Louisiana; and Panama City, Florida). These communities would be the most likely to exhibit vulnerabilities to social or economic disruption due to regulatory change.

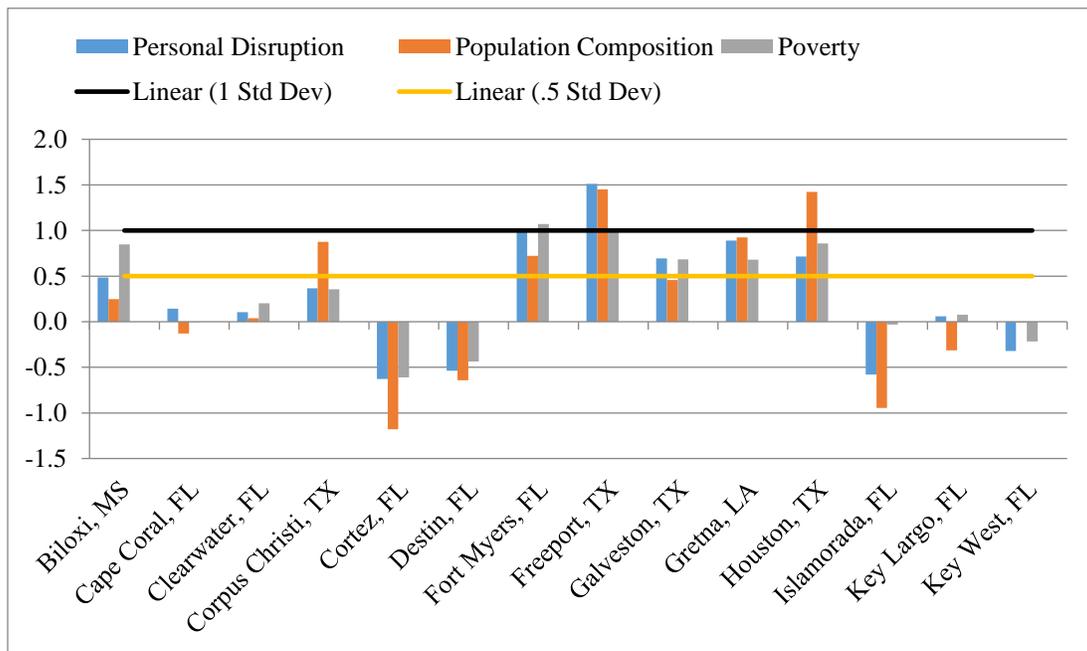


Figure 3.5.2.1. Social vulnerability indices for top commercial and recreational fishing communities.

Source: SERO, Community Social Vulnerability Indicators Database 2014 (American Community Survey 2010-2014).

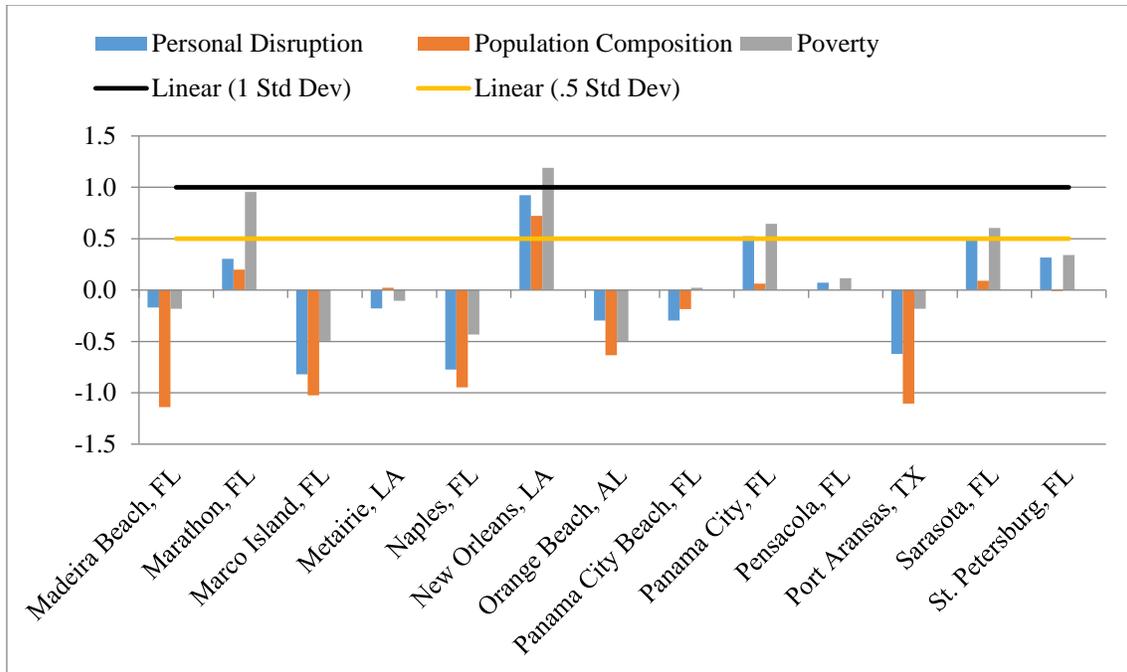


Figure 3.5.2.2. Social vulnerability indices for top commercial and recreational fishing communities continued.

Source: SERO, Community Social Vulnerability Indicators Database 2014 (American Community Survey 2010-2014).

People in these communities may be affected by fishing regulations in two ways: participation and employment. Although these communities may have the greatest potential for EJ concerns, no data are available on the race and income status for those involved in the local fishing industry (employment), or for their dependence on cobia specifically (participation). However, the implementation of the proposed actions of this amendment would not discriminate against any group based on their race, ethnicity, or income status because the proposed actions would be applied to all participants in the fishery. Thus, the actions of this amendment are not expected to result in adverse or disproportionate environmental or public health impacts to EJ populations. Further, cobia is primarily caught opportunistically (i.e., not targeted) offshore by recreational fishermen (>90%), and there are no known claims for subsistence use or consumption of Gulf cobia. Nevertheless, although no EJ issues have been identified, the absence of potential EJ concerns cannot be assumed.

3.6 Description of the Administrative Environment

3.6.1 Federal Fishery Management

Federal fishery management is conducted under the authority of the Magnuson-Stevens Act (16 U.S.C. 1801 *et seq.*), originally enacted in 1976 as the Fishery Conservation and Management Act. The Magnuson-Stevens Act claims sovereign rights and exclusive fishery management authority over most fishery resources within the EEZ. The EEZ is defined as an area extending 200 nautical miles from the seaward boundary of each of the coastal states. The Magnuson-

Stevens Act also claims authority over U.S. anadromous species and continental shelf resources that occur beyond the EEZ.

Responsibility for federal fishery management decision-making is divided between the Secretary of Commerce (Secretary) and eight regional fishery management councils that represent the expertise and interests of constituent states. Regional councils are responsible for preparing, monitoring, and revising management plans for fisheries needing management within their jurisdiction. The Secretary is responsible for promulgating regulations to implement proposed plans and amendments after ensuring management measures are consistent with the Magnuson-Stevens Act and with other applicable laws summarized in Section 10. In most cases, the Secretary has delegated this authority to NMFS.

The Gulf Council is responsible for fishery resources in federal waters of the Gulf. These waters extend 9 to 200 nautical miles offshore from the seaward boundaries of Alabama, Florida, Louisiana, Mississippi, and Texas, as those boundaries have been defined by law. The length of the Gulf coastline is approximately 1,631 miles. Florida has the longest coastline extending 770 miles along its Gulf coast, followed by Louisiana (397 miles), Texas (361 miles), Alabama (53 miles), and Mississippi (44 miles).

The Gulf Council consists of seventeen voting members: 11 public members appointed by the Secretary; one each from the fishery agencies of Texas, Louisiana, Mississippi, Alabama, and Florida; and one from NMFS. The public is also involved in the fishery management process.

3.6.2 State Fishery Management

The purpose of state representation at the Council level is to ensure state participation in federal fishery management decision-making and to promote the development of compatible regulations in state and federal waters. The state governments of Texas, Louisiana, Mississippi, Alabama, and Florida have the authority to manage their respective state fisheries. Each of the five Gulf states exercises legislative and regulatory authority over their states' natural resources through discrete administrative units. Although each agency is the primary administrative body with respect to the states' natural resources, all states cooperate with numerous state and federal regulatory agencies when managing marine resources. A more detailed description of each state's primary regulatory agency for marine resources is provided on their respective web pages (Table 3.6.2.1).

Table 3.6.2.1. Gulf state marine resource agencies and web pages.

State Marine Resource Agency	Web Page
Alabama Marine Resources Division	http://www.outdooralabama.com/
Florida Fish and Wildlife Conservation Commission	http://myfwc.com/
Louisiana Department of Wildlife and Fisheries	http://www.wlf.louisiana.gov/
Mississippi Department of Marine Resources	http://www.dmr.ms.gov/
Texas Parks and Wildlife Department	http://tpwd.texas.gov/

CHAPTER 4. ENVIRONMENTAL CONSEQUENCES

4.1 Action 1: Modify the Minimum Size Limit for the Gulf of Mexico Migratory Group Cobia

Alternative 1: No Action – Do not change the current recreational and commercial 33-inch fork length (FL) minimum size limit for the Gulf of Mexico (Gulf) migratory group of cobia (Gulf cobia) in the Gulf of Mexico Fishery Management Council’s (Gulf Council) jurisdictional area.

Preferred Alternative 2: Increase the recreational and commercial minimum size limit for Gulf cobia to 36 inches FL in the Gulf Council’s jurisdictional area.

Alternative 3: Increase the recreational and commercial minimum size limit for Gulf cobia to 39 inches FL in the Gulf Council’s jurisdictional area.

Alternative 4: Increase the recreational and commercial minimum size limit for Gulf cobia to 42 inches FL in the Gulf Council’s jurisdictional area.

4.1.1 Direct and Indirect Effects on the Physical Environment

Gulf cobia are typically caught at the ocean surface and, therefore, hook-and-line and spearfishing gear typically do not come in contact with bottom habitat. However, these gear types have the potential to snag and entangle bottom structures and cause tear-offs or abrasions (Barnette 2001). If gear is lost or improperly disposed of, it can entangle marine life. Entangled gear often becomes fouled with algal growth. If fouled gear becomes entangled on corals, the algae may eventually overgrow and kill the coral. **Alternatives 2 – 4** address increasing the minimum size limit from the status quo (**Alternative 1**), which is not expected to significantly alter the current level of fishing effort and would not be expected to alter the effects of fishing gear on habitat.

4.1.2 Direct and Indirect Effects on the Biological and Ecological Environments

Management actions that affect the biological environment mostly relate to the impacts of fishing on a species’ population size, life history, and the role of the species within its habitat. Removal of fish from the population through fishing can reduce the overall population size if harvest is not maintained at sustainable levels. The same would be true of non-targeted species incidentally caught during cobia fishing. Because this action is not expected to significantly alter the current level of fishing effort in the Gulf Council’s jurisdictional area for cobia, it is not expected to significantly increase or decrease the magnitude of bycatch or bycatch mortality. Cobia fishing has a relatively low baseline level of bycatch, which is not expected to change as a result of the implementation of this framework amendment. See Appendix D for more information.

Action 1 may increase regulatory discards of Gulf cobia. Increasing the minimum size limit from the status quo (**Alternative 1**; 33 inches FL) will result in Gulf cobia less than the new minimum size limit being discarded; whereas, presently, those cobia could have been retained, provided the possession limit had not been met. This increase in regulatory discards will be greatest for **Alternative 4**, followed by **Alternative 3** and then **Preferred Alternative 2**. Most cobia are harvested using hook-and-line gear. For Gulf cobia, SEDAR 28 (2013) used a discard mortality rate of 5% for the hook-and-line gear (for both commercial and recreational sectors). Discards in the commercial sector are relatively low for cobia, and while discards of cobia in the private recreational sector are high, the discard mortality rate is very low for this species using hook-and-line gear (SEDAR 28 2013). Therefore, although increased regulatory discards are expected as a result of **Preferred Alternative 2**, **Alternative 3**, and **Alternative 4**, the low discard mortality rate of Gulf cobia is expected to result in negligible negative biological effects to the Gulf cobia stock. See Figure 2.1.3 for a size distribution of Gulf cobia landed in Texas through west Florida by mode, for 2015 – 2017.

Increasing the minimum size limit from 33 inches FL (**Alternative 1**) to some larger minimum size limit may increase the probability of a cobia reproducing during the April to September spawning season (see Section 3.3.1 for more information on Gulf cobia life history). Gulf cobia exhibit rapid growth in the first few years of life, with the majority of individuals being sexually mature by age three (~35 inches FL for males; ~42 inches FL for females; Figure 2.1.4). Therefore, a larger minimum size limit for Gulf cobia may allow for a greater proportion of the stock to become sexually mature prior to being harvested, with this positive biological effect being most pronounced under **Alternative 4** (42 inches FL), followed by **Alternative 3** (39 inches FL) and then **Preferred Alternative 2** (36 inches FL). However, a larger size limit may shift harvest of Gulf cobia disproportionately to females, which achieve a larger size at age than males (Figure 2.1.4; SEDAR 28 2013). If the decrease in landings and the stakeholder-reported concerns regarding the Gulf cobia stock are indicative of an issue with the spawning stock biomass, a shift in fishing effort which could remove more females from the population may result in deleterious effects on stock recruitment. This negative biological effect could be most pronounced under **Alternative 4** (42 inches FL), followed by **Alternative 3** (39 inches FL) and then **Preferred Alternative 2** (36 inches FL).

The ecological effects of bycatch mortality are the same as fishing mortality from directed fishing efforts. If not properly managed and accounted for, either form of mortality could potentially reduce stock biomass to an unsustainable level. The Councils and NMFS are developing actions that would improve bycatch monitoring in all fisheries, including the CMP fishery. Better bycatch and discard data would provide a better understanding of the composition and magnitude of catch and bycatch, enhance the quality of data provided for stock assessments, increase the quality of assessment output, provide better estimates of interactions with protected species, and lead to better decisions regarding additional measures to reduce bycatch. Management measures that affect gear and effort for a target species can influence fishing mortality in other species. Therefore, enhanced catch and bycatch monitoring would provide better data that could be used in multi-species assessments.

Ecosystem interactions among cobia and other species in the marine environment are poorly known. Cobia are migratory, interacting in various combinations of species groups at different

levels on a seasonal basis. With the current state of knowledge, it is difficult to evaluate the potential ecosystem-wide impacts of these species interactions, or the ecosystem impacts from the limited mortality estimated to occur from cobia fishing effort. However, there is very little bycatch in the cobia portion of the CMP fishery. Action 1 would not modify the gear types or fishing techniques for cobia. Therefore, ecological effects due to changes in bycatch for cobia are likely to be negligible.

This action would not modify the way in which the Gulf cobia portion of the CMP fishery is prosecuted in terms of gear types used or effort. Therefore, there are no additional impacts on Endangered Species Act (ESA)-listed species or designated critical habitats anticipated as a result of this action (see Section 3.2.5 for a detailed description of ESA-listed species and critical habitat in the action area).

4.1.3 Direct and Indirect Effects on the Economic Environment

Alternative 1 (No Action) would not change the current recreational and commercial 33-inch fork length (FL) minimum size limit for Gulf cobia. Because **Alternative 1** is not expected to alter recreational or commercial fishing practices and harvests, **Alternative 1** is not expected to result in direct economic effects. However, **Alternative 1** could result in indirect adverse economic effects if it unduly fails to implement needed Gulf cobia harvest reduction measures, thereby jeopardizing the health of Gulf cobia in the future.

Preferred Alternative 2 would increase the recreational and commercial size limit for Gulf cobia to 36 inches FL. **Alternatives 3** and **4** would further increase the minimum size limit to 39 and 42 inches FL, respectively. Increasing the minimum size limit would be expected to reduce commercial and recreational harvests and potentially benefit Gulf cobia.

Table 4.1.3.1 provides commercial reductions in landings and associated economic effects expected to result from proposed minimum size limit increases. Average commercial landings between 2012 and 2017, which are derived from commercial landings provided in Table 1.1.3, are used as baseline landings (i.e., landings under **Alternative 1**). Economic effects expected to result in the commercial sector can be measured by changes in ex-vessel value. Changes in ex-vessel value are obtained by multiplying estimated commercial reductions in Gulf cobia landings by the ex-vessel price per pound. An average ex-vessel price of \$3.40 per pound of commercially harvested Gulf cobia is derived from the 2012-2016 average Gulf cobia commercial landings and revenues provided in Table 3.4.1.1.

Table 4.1.3.1. Commercial reductions in landings (in percent and in pounds) and decreases in ex-vessel values (in \$2017) by size limit alternative (relative to Alternative 1).

	Size Limit (inches FL)	Reductions in Landings		Decreases in Ex-vessel Value
		Percent	Pounds	
Alternative 1	33	-	-	-
Preferred Alternative 2	36	10.3	7,318.8	\$24,884
Alternative 3	39	29	20,606.2	\$70,061
Alternative 4	42	55.9	39,720.3	\$135,049

Preferred Alternative 2, which would result in a 10.3 percent reduction in Gulf cobia commercial landings relative to **Alternative 1** is expected to result in decreases in ex-vessel value estimated at \$24,884. Decreases in ex-vessel values that would result from **Alternatives 3** and **4** are commensurate with the corresponding reductions in landings. For example, **Alternative 4**, which would result in a 55 percent reduction in landings is expected to result in a \$135,049 loss in ex-vessel value.

Table 4.1.3.2 provides Gulf cobia reductions in recreational landings (in percent and in pounds) and associated economic effects that would result from the alternative minimum size limit increases proposed in this action. Average recreational landings between 2012 and 2017, which are derived from recreational landings provided in Table 1.1.3, are used as baseline recreational landings (i.e., landings under **Alternative 1**). Reductions in recreational landings are also expressed in number of fish based on an average weight of 22.9 pounds per Gulf cobia (M. Larkin, SERO NMFS, pers. comm.).

For recreational anglers, changes in economic value expected to result from this action can be evaluated based on consumer surplus (CS) changes. CS per additional fish kept during a trip is defined as the amount of money an angler would be willing to pay for a fish in excess of the cost to harvest the fish. Because estimates of CS for cobia are not available, this analysis used the CS for king mackerel, which can be considered as a substitute for cobia. The CS per fish for a second kept king mackerel is estimated at \$101 (Carter and Liese 2012; values updated to 2017 dollars)²⁰. The use of a lower CS per fish, e.g., \$10 per fish for another substitute to cobia such as dolphin, would not change the ordinal ranking of the alternatives but would lower estimated changes in economic value across the board. Economic value for for-hire vessels can be measured by producer surplus (PS) per passenger trip (the amount of money that a vessel owner earns in excess of the cost of providing the trip). Estimates of the PS per for-hire passenger trip are not available. Instead, net operating revenue (NOR), which is the return used to pay all labor

²⁰Converted to 2017 dollars using the annual, not seasonally adjusted GDP implicit price deflator provided by the U.S. Bureau of Economic Analysis.

wages, returns to capital, and owner profits, is used as a proxy for PS. For vessels in the Gulf, the estimated NOR value is \$158 (2017 dollars) per charter angler trip (Liese and Carter 2011). The estimated NOR value per headboat angler trip is \$52 (C. Liese, NMFS SEFSC, pers. comm.). Estimates of NOR per cobia target trip are not available. In the absence of estimates for changes in charter and headboat angler trips expected to result from proposed minimum size limit increases, the alternatives are evaluated based on CS changes.

Table 4.1.3.2. Recreational reductions in landings (in percent, pounds, and in number of fish) and decreases in economic value (in \$2017) by minimum size limit alternative (relative to Alternative 1).

Alternative	Size Limit (Inches FL)	Reductions in Landings			Decreases in Economic Value
		Percent	Pounds	Fish	
Alternative 1	33	-	-	-	-
Preferred Alternative 2	36	26.1	243,857.4	10,649	\$1,075,528
Alternative 3	39	47	439,130.2	19,176	\$1,936,775
Alternative 4	42	61.7	576,475.1	25,174	\$2,542,532

Preferred Alternative 2 is expected to reduce the number of Gulf cobia harvested by recreational anglers by 10,649 fish relative to **Alternative 1** and would decrease economic value to anglers by about \$1.08 million. Greater minimum size limit increases would correspond to greater reductions in recreational landings and decreases in economic value. For example, **Alternative 4**, which would reduce recreational landings by 61.7 percent, is expected to result in a \$2.5 million loss in economic value.

4.1.4 Direct and Indirect Effects on the Social Environment

Additional effects would not be expected from retaining the 33-inch FL minimum size limit for cobia (**Alternative 1**). An increase in the minimum size limit of a fish would be expected to result in some negative effects as fishermen are unable to retain a fish that previously would have been retainable. These effects would increase as the minimum size limit increases compared with the existing minimum size limit. Under this scenario, the greatest negative social effects would be expected under **Alternative 4**, which would result in a 56% reduction in landings for the commercial sector and a 62% reduction in landings for the recreational sector (Table 2.1.2) compared to **Alternative 1**. Intermediary effects would be expected under **Alternative 3** (29% reduction in landings for the commercial sector and a 47% reduction in landings for the recreational sector) and **Preferred Alternative 2** (10% reduction in landings for the commercial sector and a 26% reduction in landings for the recreational sector) compared with **Alternative 1**.

The minimum size limit in Texas is 37 inches total length, which is approximately equal to 33 inches FL (SEDAR 28 2013). In public testimony, however, some fishermen in Texas stated that Texas has a larger minimum size limit than the federal regulations, and thus, would not be affected by an increase to 36 inches FL (**Preferred Alternative 2**). If Texas modifies its minimum size limit to be consistent with **Preferred Alternative 2**, the Texas minimum size limit would change to 40 inches total length.

Usually, an increase in the minimum size limit is proposed to slow harvest due to a biological consideration, such as required reductions to achieve the goals of a rebuilding plan. However, this action is being considered based on fishermen's reports that cobia are in need of more restrictive management. The fact that fishermen are requesting more restrictive regulations suggests support for the measures, which would be expected to mitigate some of the negative effects from fishermen not being able to retain a cobia of a size that would previously have been legal. The effects of this action are related to the effects of the next action, which would modify the possession limit. Among the fishermen who have expressed their concerns during public testimony at Council meetings regarding the health of the cobia stock, there is greater support for the adoption of a vessel limit (Action 2) than an increase to the minimum size limit. Thus, while public support for more restrictive regulations should mitigate some of the negative effects of an increased minimum size limit, greater negative effects would be expected from increasing the minimum size limit than from decreasing the possession limits (Action 2).

4.1.5 Direct and Indirect Effects on the Administrative Environment

Gulf cobia are presently managed with a minimum size limit (**Alternative 1**), and changing that regulation to a larger size limit (**Preferred Alternative 2**, **Alternative 3**, and **Alternative 4**) would result in a negligible administrative burden in the form of noticing the change in the rule. No additional burden on law enforcement activities is expected from any of the alternatives in Action 1.

4.2 Action 2: Modify the Possession Limit for the Gulf Cobia

Alternative 1: No Action – Do not change the current two fish per person daily recreational and commercial possession limit for Gulf cobia.

Preferred Alternative 2: Decrease the per person recreational and commercial possession limit for Gulf cobia to one fish per day.

Preferred Alternative 3: Create a recreational and commercial daily vessel limit for Gulf cobia. Anglers may not exceed the per person possession limit.

Preferred Option 3a: The recreational and commercial daily vessel limit for cobia is two fish.

Option 3b: The recreational and commercial daily vessel limit for cobia is four fish.

Option 3c: The recreational and commercial daily vessel limit for cobia is six fish.

Note: The Gulf Council may select more than one alternative as preferred. Doing so would require anglers to abide by the more restrictive of the resultant regulations.

4.2.1 Direct and Indirect Effects on the Physical Environment

Gulf cobia are typically caught at the ocean surface and therefore neither hook-and-line nor spearfishing gear typically come in contact with bottom habitat. However, these gear types have the potential to snag and entangle bottom structures and cause tear-offs or abrasions (Barnette 2001). If gear is lost or improperly disposed of, it can harm marine life. Entangled gear often becomes fouled with algal growth. If fouled gear becomes entangled on corals, the algae may eventually overgrow and kill the coral.

Effects on the physical environment from fishing effort on Gulf cobia are not expected to change as a result of the alternatives presented in Action 2. Gulf cobia are encountered infrequently by fishermen in the Gulf, with fewer than one Gulf cobia typically landed per person (Figure 2.2.1), and two or fewer Gulf cobia typically landed per vessel (Figure 2.2.2). To that end, decreasing the daily per-person possession limit from two fish to one fish (**Preferred Alternative 2**) is expected to decrease fishing mortality by 4% for the recreational sector and 6% for the commercial sector (Table 2.2.1). Creating vessel limits for Gulf cobia (**Alternative 3** and options) would result in similar reductions in fishing mortality, with the greatest reduction coming from **Preferred Alternative 3, Preferred Option 3a** (9.1% for the recreational sector, and 5% for the commercial sector), followed by **Options 3b** and **3c**. These reductions in fishing mortality are not expected to change the amount of fishing effort, including fishing effort directed at Gulf cobia, compared to **Alternative 1** (no action).

4.2.2 Direct and Indirect Effects on the Biological and Ecological Environments

Management actions that affect the biological environment mostly relate to the impacts of fishing on a species' population size, life history, and the role of the species within its habitat.

Removal of fish from the population through fishing can reduce the overall population size if harvest is not maintained at sustainable levels. Impacts of these alternatives on the biological environment would depend on the resulting reduction or increases in the level of fishing as a result of each alternative.

Decreasing the per-person daily possession limit from two fish (**Alternative 1**; no action) to one fish (**Preferred Alternative 2**) is expected to reduce fishing mortality on Gulf cobia by 4% for the recreational sector and 6% for the commercial sector (Table 2.2.1). This reduction in fishing mortality, coupled with a 5% discard mortality rate for Gulf cobia (SEDAR 28 2013), is expected to result in a positive biological effect on the stock by reducing the removal of potentially reproductively mature individuals from the population. Fifty percent of Gulf cobia are thought to be sexually mature by approximately 33 inches FL, which is the current minimum size limit (SEDAR 28 2013; see sections [2.1](#) and [4.1](#) on potential modifications to the minimum size limit). If more Gulf cobia that are greater than or equal to 33 inches FL are discarded and survive, then the probability that those cobia will live long enough to reproduce increases. Without a more in-depth analysis through a stock assessment, however, it is not possible to determine exactly how the reproductive capacity of the Gulf cobia stock would be impacted by this reduction in fishing mortality.

Establishing a vessel limit for Gulf cobia (**Alternative 3** and options) would also reduce fishing mortality on potentially reproductively mature individuals from the population. The predicted reductions in fishing mortality are greatest for **Preferred Alternative 3, Preferred Option 3a** (9.1% for the recreational sector, and 5% for the commercial sector), followed by **Options 3b** and **3c** (Table 2.2.1). As with the proposed reduction in the daily possession limit in **Preferred Alternative 2**, the options proposed in **Alternative 3** would be expected to result in an increase in discards of potentially reproductively mature individuals. Since Gulf cobia have a 5% discard mortality rate, the net biological effects of **Alternative 3** on Gulf cobia are expected to be positive. However, the degree to which these positive biological effects could benefit the Gulf cobia stock cannot be determined without a more in-depth analysis through a stock assessment.

The ecological effects of bycatch mortality are the same as fishing mortality from directed fishing efforts. If not properly managed and accounted for, either form of mortality could potentially reduce stock biomass to an unsustainable level. The Councils and NMFS are developing actions that would improve bycatch monitoring in all fisheries, including the CMP fishery. Better bycatch and discard data would provide a better understanding of the composition and magnitude of catch and bycatch, enhance the quality of data provided for stock assessments, increase the quality of assessment output, provide better estimates of interactions with protected species, and lead to better decisions regarding additional measures to reduce bycatch. Management measures that affect gear and effort for a target species can influence fishing mortality in other species. Therefore, enhanced catch and bycatch monitoring would provide better data that could be used in multi-species assessments.

Ecosystem interactions among cobia and other species in the marine environment are poorly known. Cobia are migratory, interacting in various combinations of species groups at different levels on a seasonal basis. With the current state of knowledge, it is difficult to evaluate the potential ecosystem-wide impacts of these species interactions, or the ecosystem impacts from

the limited mortality estimated to occur from cobia fishing effort. However, there is very little bycatch in the cobia portion of the CMP fishery. Action 2 would not modify the gear types or fishing techniques for cobia. Therefore, ecological effects due to changes in bycatch for cobia are likely to be negligible.

This action would not modify the way in which the Gulf cobia portion of the CMP fishery is prosecuted in terms of gear types used or effort. Therefore, there are no additional impacts on Endangered Species Act (ESA)-listed species or designated critical habitats anticipated as a result of this action (see Section 3.2.5 for a detailed description of ESA-listed species and critical habitat in the action area).

4.2.3 Direct and Indirect Effects on the Economic Environment

Alternative 1 (No Action) would not change the current recreational and commercial person or vessel daily possession limit for Gulf cobia. Because **Alternative 1** is not expected to affect recreational or commercial fishing practices and harvests, **Alternative 1** is not expected to result in direct economic effects. However, **Alternative 1** could result in indirect adverse economic effects if it unduly fails to implement needed Gulf cobia harvest reduction measures, thereby jeopardizing the health of Gulf cobia in the future.

Preferred Alternative 2 would decrease the per person recreational and commercial daily possession limit for Gulf cobia to one fish. **Preferred Alternative 3** would establish a recreational and commercial daily vessel limit for Gulf cobia. **Preferred Option 3a** would set a daily vessel limit of 2 Gulf cobia. **Options 3b** and **3c** would set the daily vessel limit at 4 and 6 Gulf cobia, respectively.

Reductions in commercial ex-vessel value expected to result from modifications to the person and vessel daily possession limits are estimated following the procedures described in Action 1. Table 4.2.3.1 provides commercial reductions in landings and corresponding reductions in ex-vessel value expected to result from proposed changes in daily possession limits.

Table 4.2.3.1. Commercial reductions in landings (in percent and in pounds) and decreases in ex-vessel values (in \$2017) by daily possession limit alternative (relative to Alternative 1).

Alternative	Daily Possession Limit	Reductions in Landings		Decreases in Ex vessel Value
		Percent	Pounds	
Alternative 1	2 fish/person	-	-	-
Preferred Alternative 2	1 fish/person	6.0	4,263	\$14,495
Preferred Alternative 3	Vessel Limit	-	-	-
Preferred Option 3a	2 fish/vessel	5.0	3,553	\$12,080
Option 3b	4 fish/vessel	1.6	1,137	\$3,865
Option 3c	6 fish/vessel	0.7	497	\$1,691

Preferred Alternative 2, which would result in a 6 percent reduction in Gulf cobia commercial landings relative to **Alternative 1** is expected to result in decreases in ex-vessel value estimated at \$14,495. Decreases in ex-vessel values that would result from options considered under **Alternative 3** are commensurate with the corresponding reductions in landings. For example, **Preferred Option 3a**, which would result in a 5 percent reduction in landings is expected to result in a \$12,080 loss in ex-vessel value.

Decreases in economic value to recreational anglers expected to result from modifications to the person and vessel daily possession limits are estimated following the procedures described in Action 1. Table 4.2.3.2 provides Gulf cobia reductions in recreational in landings (in percent, pounds, and in number of fish) and associated economic effects that would result from the daily per person and per vessel possession limits considered in this action.

Table 4.2.3.2. Recreational reductions in landings (in percent, pounds, and in number of fish) and decreases in economic value (in \$2017) by possession limit alternative (relative to **Alternative 1**).

Alternative	Daily Possession Limit	Reductions in Landings			Decreases in Economic Value
		Percent	Pounds	Fish	
Alternative 1	2 fish/person	-	-	-	-
Preferred Alternative 2	1 fish/person	4	34,531	1,508	\$152,296
Preferred Alternative 3	Vessel Limit	-	-	-	-
Preferred Option 3a	2 fish/vessel	9.1	78,557	3,430	\$346,474
Option 3b	4 fish/vessel	3.7	31,941	1,395	\$140,874
Option 3c	6 fish/vessel	1.5	12,949	565	\$57,111

Relative to **Alternative 1**, **Preferred Alternative 2** is expected to reduce the number of Gulf cobia harvested by recreational anglers by 1,508 fish and would decrease economic value to anglers by about \$152,296. **Preferred Alternative 3 - Preferred Option 3a**, which would set a 2 fish per vessel possession limit, is expected to reduce the number of Gulf cobia harvested by recreational anglers by 3,480 fish and would decrease economic value to anglers by \$346,474. More generous possession limit would correspond to smaller reductions in recreational landings and decreases in economic value. For example, **Preferred Option 3c**, which would set a 6 fish per vessel possession limit, is expected to reduce the number of recreationally-harvested Gulf cobia by 565 fish and would decrease economic value to anglers by \$57,111.

Combined Effects Actions 1 and 2

This regulatory framework is expected to establish new recreational and commercial size limits per person and per vessel daily possession limits Gulf cobia. Taken separately, each of these management measures would be expected to decrease landings and result in reductions in recreational economic value and decreases in commercial ex-vessel values. Consequently, it can be concluded that Actions 1 and 2, when combined, would be expected to result in lower commercial and recreational landings and reduced ex-vessel values for the commercial sector and economic values to recreational anglers. Although the direction of the economic effects expected to result from Actions 1 and 2 is known, the magnitude of these effects will be determined by the combination of management measures selected. In general, greater size limits combined with more restrictive daily possession limits would be expected to result in larger reductions in landings and consequently, greater decreases in economic value to recreational anglers and in ex-vessel values to commercial fishermen. **Action 1-Preferred Alternative 2** and **Action 2 –Preferred Alternative 3-Preferred Option 3a** would be expected to reduce commercial and recreational landings by 15.3 percent and 35.2 percent respectively; thereby reducing ex-vessel value to the commercial sector and economic value to recreational anglers by

\$36,963 and \$1.34 million, respectively.

4.2.4 Direct and Indirect Effects on the Social Environment

Additional effects would not be expected from **Alternative 1** and the current two fish per person per day possession limit would remain in effect. A reduction in the possession limit of a fish would be expected to result in negative effects as fishermen are unable to retain one or more additional fish that previously would have been retainable. These effects would increase in magnitude as the possession limit is reduced compared with the existing possession limit. Under this scenario, negative social effects would be expected under **Preferred Alternative 2** compared with **Alternative 1**, as the per person possession limit is reduced from two fish per person to one fish per person.

Alternative 3 proposes a per vessel possession limit for which the effects would vary depending on the number of fishermen onboard the vessel. For the same vessel limit, fewer fishermen on a vessel would be associated with less negative effects than when more fishermen are on a vessel. For a vessel with a single fisherman, the effects of **Preferred Option 3a** would be the same as **Alternative 1**, as one fisherman would still be able to retain two fish. With six fishermen on a vessel, **Preferred Option 3a** would be the most restrictive and entail the greatest negative effects compared with **Alternative 1**, as the maximum possession limit is reduced from a possible 12 fish to 2 fish. Intermediary effects would be expected for **Option 3b**, which would reduce the maximum number of fish possible from 12 to 4 fish, and the least negative effects would be expected for **Option 3c**, which would allow the 6 fishermen to retain a maximum of 6 fish. When **Preferred Alternative 3** is combined with **Preferred Alternative 2**, the maximum number of fish possible is halved, increasing the negative effects compared with **Alternative 1**. However, it is not common for fishing trips to return with more than two cobia (Figure 2.2.2), suggesting that the expected negative effects from a trip carrying multiple fishermen would be minimal. **Preferred Option 3a**, with the most restrictive vessel limit among the options, would result in an estimated reduction in cobia landings of 5% for commercial trips and 9.1% for recreational trips.

If both **Preferred Alternative 2** and **Preferred Option 3a** are adopted, federal regulations would be consistent with Florida's state water regulations. In 2018, Florida decreased the bag limit to one fish per person and adopted a two fish vessel limit. For federally permitted for-hire vessels in Florida that are required to follow the stricter regulations if different in state and federal waters, no additional effects would be expected under **Preferred Alternative 2** and **Preferred Option 3a**, as these vessels are currently required to abide by the Florida regulations.

Usually, a decrease in possession limits is proposed to slow harvest due to a biological consideration, such as required reductions to achieve the goals of a rebuilding plan. However, this action is being considered based on fishermen's reports that cobia are in need of more restrictive management. The fact that fishermen are requesting more restrictive regulations suggests support for the measures, which would be expected to mitigate some of the negative effects from fishermen not being able to retain as many cobia as would previously have been allowed. The effects of this action are related to the effects of the previous action, which would increase the minimum size limit. Among the fishermen who have expressed their concerns

during public testimony at Council meetings regarding the health of the cobia stock, there is greater support for the adoption of a vessel limit and reduction to the bag limit than an increase to the minimum size limit (Action 1). Thus, the minimal negative effects from reducing the possession limit (**Preferred Alternative 2** and **Preferred Option 3a**) should mitigate the negative effects compared to **Alternative 1**, and be less than the effects from increasing the minimum size limit (Action 1).

4.2.5 Direct and Indirect Effects on the Administrative Environment

Gulf cobia are currently managed with a daily per-person possession limit (**Alternative 1**), and changing that possession limit (**Preferred Alternative 2**) is expected to result in negligible administrative effects in the form of rulemaking and noticing the change in regulations. Creating a vessel limit (**Alternative 3** and options) for Gulf cobia will incur additional administrative burdens in the form of rulemaking and noticing the change in regulations, and also for law enforcement through the necessity to inspect vessels for compliance with any newly implemented vessel limit in Gulf jurisdictional waters.

4.3 Cumulative Effects

As directed by the National Environmental Policy Act, federal agencies are mandated to assess not only the indirect and direct impacts, but cumulative impacts of actions as well. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time. The cumulative impacts of Fishery Management Plan (FMP) and non-FMP actions are analyzed in detail in Amendment 40 (GMFMC 2014b) and are incorporated here by reference. The affected area of this proposed action encompasses the state and federal waters of the Gulf and Gulf communities which are dependent on reef fish fishing. The following are some specific past, present, and future actions that could impact the environment in the area where mutton snapper and gag are harvested.

Past Actions

Participation in and the economic performance of the reef fish fishery addressed in this document have been affected by a combination of regulatory, biological, social, and external economic factors. Regulatory measures have obviously affected the quantity and composition of harvests of species addressed in this document, through the various size limits, seasonal restrictions, trip or bag limits, and quotas. Chapter 1.3 discusses the history of management actions that have affected mutton snapper and gag in further detail.

Biological forces that either motivate certain regulations or simply influence the natural variability in fish stocks have likely played a role in determining the changing composition of the fisheries addressed by this document. Additional factors, such as changing career or lifestyle preferences, stagnant to declining prices due to imports, increased operating costs (gas, ice, insurance, dockage fees, etc.), and increased waterfront/coastal value leading to development pressure for other than fishery uses have impacted both the commercial and recreational fishing sectors. In general, the regulatory environment for all fisheries has become progressively more

complex and burdensome, increasing the pressure on economic losses, business failure, occupational changes, and associated adverse pressures on associated families, communities, and businesses. Some reverse of this trend is possible and expected through management. However, certain pressures would remain, such as total effort and total harvest considerations, increasing input costs, import induced price pressure, and competition for coastal access.

The cumulative effects from the *Deepwater Horizon* MC252 (DWH) oil spill and response may not be known for years. The impacts of the oil spill on the physical environment are expected to be significant and may be long-term. Oil was dispersed on the surface, and because of the heavy use of dispersants, oil was also documented as being suspended within the water column. Floating and suspended oil washed onto shore in several areas of the Gulf as well as non-floating tar balls. Whereas suspended and floating oil degrades over time, tar balls are more persistent in the environment and can be transported hundreds of miles.

The effects of the DWH oil spill may not begin to manifest themselves measurably until recruits from the 2010 year class begin to enter the adult spawning population and be caught by anglers. Oil exposure could also create sub-lethal effects on the eggs, larvae, and early life stages. In a 2014 study (Incardona et al), embryos of bluefin tuna, yellowfin tuna, and amberjack exposed to environmentally realistic levels of hydrocarbons showed defects in heart function. The oil itself could adversely affect other reef fish species. Weisberg et al. (2014) suggested the hydrocarbons associated with the DWH oil spill may be associated with the occurrences of reef fish with lesions and other deformities. However, Murawski et al. (2014) reported that the incidence of lesions on bottom-dwelling fish had declined between 2011 and 2012 in the northern Gulf. Other studies of the effects of hydrocarbon are ongoing. The stressors could potentially be additive, and each stressor may increase susceptibility to the harmful effects of the other.

Indirect and inter-related effects on the ecological environment of the reef fish fishery in concert with the DWH oil spill are not well understood. Changes in the population size structure could result from shifting fishing effort to specific geographic segments of populations, combined with any anthropogenically induced natural mortality that may occur from the impacts of the oil spill. The impacts on the food web from phytoplankton, to zooplankton, to mollusks, to top predators may be significant in the future. Impacts to cobia from the oil spill may similarly impact other species that may be preyed upon by cobia, or that might benefit from a reduced cobia stock. However, since the majority of the spawning biomass for cobia occurs outside the main areas affected by the DWH oil spill plume, it is less likely that a direct effect on either species will be detected.

Present Actions

The following are actions important to cobia, and the CMP fishery in general²¹:

- The Gulf Council submitted the Framework Amendment to modify charter vessel and headboat reporting requirements in May 2017
- The Gulf Council will submit Amendment 44 to the Reef Fish FMP, which will modify the minimum stock size threshold for reef fish stocks with existing status determination criteria

²¹ Information on these developing actions can be found on the Council's website at www.gulfcouncil.org.

Reasonably Foreseeable Future Actions

The following are actions important to cobia²²:

- The Gulf Council will submit a Framework Amendment to modify charter vessel and headboat reporting requirements in March 2017
- The Gulf Council Carryover Provisions and Framework Modifications Amendment would modify the process of how unharvested quota will be added to the OFL, ACL, and ACTs.
- The Gulf Council ABC Control Rule Modifications Amendment will revise or replace the current ABC control rule, and to consider incorporating provisions to allow carry-over of uncaught ACLs, phase-in of changes to ABCs, and to consider developing a process to evaluate economic, social, or ecological trade-offs when determining the risk policy for an ABC control rule.
- The South Atlantic Council Amendment 31 to the Fishery Management Plan for Coastal Migratory Pelagic Resources in the Gulf of Mexico and Atlantic Region to remove the Atlantic migratory group of cobia ('Atlantic cobia,' Georgia through New York) from the fishery management plan.

Global climate change can affect marine ecosystems through ocean warming by increased thermal stratification, reduced upwelling, sea level rise, through increases in wave height and frequency, loss of sea ice, and increased risk of diseases in marine biota. Decreases in surface ocean pH due to absorption of anthropogenic carbon dioxide emissions may impact a wide range of organisms and ecosystems (Solomon et al. 2007). These influences could affect biological factors such as migration, range, larval and juvenile survival, prey availability, and susceptibility to predators. At this time, the level of impacts cannot be quantified, nor is the time frame known in which these impacts would occur. The Environmental Protection Agency's climate change webpage (<http://www.epa.gov/climatechange/>) provides basic background information on these and other measured or anticipated effects. A compilation of scientific information on climate change can be found in the United Nations Intergovernmental Panel on Climate Change's Fourth Assessment Report (Solomon et al. 2007) and is incorporated here by reference. Global climate change could have significant effects on Gulf fisheries; however, the extent of these effects is not known at this time. Possible impacts are outlined in Amendment 31 (GMFMC 2009), the Generic ACL amendment (GMFMC 2011a), and Amendment 32 (GMFMC 2011b).

Monitoring

The effects of the proposed action are, and will continue to be, monitored through collection of landings data by NMFS, stock assessments and stock assessment updates, life history studies, economic and social analyses, and other scientific observations. Landings data for the recreational sector in the Gulf Zone are collected through Marine Recreational Fishing Statistics Survey (MRFSS)/Marine Recreational Information Program (MRIP), Southeast Region Headboat Survey, Texas Parks and Wildlife's Marine Recreational Fishing Survey, and Louisiana's Creel Survey. Commercial data are collected through trip ticket programs, port samplers, and logbook programs. In response to the *Deepwater Horizon* MC252 incident, increased frequency of surveys of the recreational sector's catch and effort, along with additional fishery independent information regarding the status of the stock are being conducted. This will allow future determinations regarding the impacts of the *Deepwater Horizon* MC252 incident on

²² Information on these developing actions can be found on the Council's website at www.gulfcouncil.org.

various fishery stocks, including mutton snapper and gag, but currently it is not possible to make such determinations.

The proposed actions relate to the harvest of an indigenous species in the Gulf and Atlantic, and the activities being altered do not introduce non-indigenous species, and are not reasonably expected to facilitate the spread of such species through depressing the populations of native species. Additionally, the aforementioned actions do not propose any activity, such as increased ballast water discharge from foreign vessels, which is associated with the introduction or spread on non-indigenous species.

Conclusion

This action, in combination with any past, present, or reasonably foreseeable future actions is not expected to have significant beneficial or adverse cumulative effects on the physical and biological/ecological environments. The cumulative social and economic effects of past, present, and future amendments may be described as limiting fishing opportunities in the short-term, with some exceptions of actions that alleviate some negative social and economic impacts. The intent of these amendments is to improve prospects for sustained participation in the respective fisheries over time and the proposed actions in this amendment are expected to result in some important long-term benefits to the commercial and for-hire fishing fleets, fishing communities and associated businesses, and private recreational anglers. The proposed changes in management for cobia will contribute to changes in the fishery within the context of the current economic and regulatory environment at the local and regional level.

This analysis found positive effects on the biophysical environment because it would maintain the cobia stock at a level that allows the maximum benefits in yield. However, short-term negative impacts on the socioeconomic environment associated with cobia fishing are likely to continue due to the need to limit directed harvest. These negative impacts can be minimized by selecting measures that would provide the least disruption to the cobia component of the CMP fishery.

CHAPTER 5. REGULATORY IMPACT REVIEW

CHAPTER 6. REGULATORY FLEXIBILITY ANALYSIS

CHAPTER 7. LIST OF AGENCIES, ORGANIZATIONS AND PERSONS CONSULTED

LIST OF AGENCIES CONSULTED

National Marine Fisheries Service

- Southeast Fisheries Science Center
- Southeast Regional Office
 - Protected Resources
 - Habitat Conservation
 - Sustainable Fisheries

NOAA General Counsel

U.S. Coast Guard

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APPENDIX A. OTHER APPLICABLE LAWS

The Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) (16 U.S.C. 1801 et seq.) provides the authority for management of stocks included in fishery management plans (FMP) in federal waters of the exclusive economic zone. However, management decision-making is also affected by a number of other federal statutes designed to protect the biological and human components of U.S. fisheries, as well as the ecosystems that support those fisheries. Major laws affecting federal fishery management decision-making include the Endangered Species Act (Section 3.3.3), E.O. 12866 (Regulatory Planning and Review, Chapter 5) and E.O. 12898 (Environmental Justice, Section 3.5). Other applicable laws are summarized below.

Administrative Procedure Act

All federal rulemaking is governed under the provisions of the Administrative Procedure Act (5 U.S.C. Subchapter II), which establishes a “notice and comment” procedure to enable public participation in the rulemaking process. Under the Act, the National Marine Fisheries Service (NMFS) is required to publish notification of proposed rules in the *Federal Register* and to solicit, consider, and respond to public comment on those rules before they are finalized. The Act also establishes a 30-day waiting period from the time a final rule is published until it takes effect. Proposed and final rules will be published before implementing the actions in this amendment.

Coastal Zone Management Act

Section 307(c)(1) of the federal Coastal Zone Management Act of 1972 (CZMA), as amended, requires federal activities that affect any land or water use or natural resource of a state’s coastal zone be conducted in a manner consistent, to the maximum extent practicable, with approved state coastal management programs. The requirements for such a consistency determination are set forth in NOAA regulations at 15 CFR part 930, subpart C. According to these regulations and CZMA Section 307(c)(1), when taking an action that affects any land or water use or natural resource of a state’s coastal zone, NMFS is required to provide a consistency determination to the relevant state agency at least 90 days before taking final action.

Upon submission to the Secretary of Commerce, NMFS will determine if this plan amendment is consistent with the Coastal Zone Management programs of the states of Alabama, Florida, Louisiana, Mississippi, and Texas to the maximum extent possible. Their determination will then be submitted to the responsible state agencies under Section 307 of the CZMA administering approved Coastal Zone Management programs for these states.

Data Quality Act

The Data Quality Act (Public Law 106-443) effective October 1, 2002, requires the government to set standards for the quality of scientific information and statistics used and disseminated by federal agencies. Information includes any communication or representation of knowledge such as facts or data, in any medium or form, including textual, numerical, cartographic, narrative, or

audiovisual forms (includes web dissemination, but not hyperlinks to information that others disseminate; does not include clearly stated opinions).

Specifically, the Act directs the Office of Management and Budget to issue government wide guidelines that “provide policy and procedural guidance to federal agencies for ensuring and maximizing the quality, objectivity, utility, and integrity of information disseminated by federal agencies.” Such guidelines have been issued, directing all federal agencies to create and disseminate agency-specific standards to: (1 ensure information quality and develop a pre-dissemination review process; (2 establish administrative mechanisms allowing affected persons to seek and obtain correction of information; and (3 report periodically to Office of Management and Budget on the number and nature of complaints received.

Scientific information and data are key components of FMPs and amendments and the use of best available information is the second national standard under the Magnuson-Stevens Act. To be consistent with the Magnuson-Stevens Act, FMPs and amendments must be based on the best information available. They should also properly reference all supporting materials and data, and be reviewed by technically competent individuals. With respect to original data generated for FMPs and amendments, it is important to ensure that the data are collected according to documented procedures or in a manner that reflects standard practices accepted by the relevant scientific and technical communities. Data will also undergo quality control prior to being used by the agency and a pre-dissemination review.

National Historic Preservation Act

The National Historic Preservation Act (NHPA) of 1966, (Public Law 89-665; 16 U.S.C. 470 *et seq.*) is intended to preserve historical and archaeological sites in the United States of America. Section 106 of the NHPA requires federal agencies to evaluate the impact of all federally funded or permitted projects for sites on listed on, or eligible for listing on, the National Register of Historic Places and aims to minimize damage to such places.

Historical research indicates that over 2,000 ships have sunk on the Federal Outer Continental Shelf between 1625 and 1951; thousands more have sunk closer to shore in state waters during the same period. Only a handful of these have been scientifically excavated by archaeologists for the benefit of generations to come. Further information can be found at:

<http://www.boem.gov/Environmental-Stewardship/Archaeology/Shipwrecks.aspx>

The proposed action does not adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places nor is it expected to cause loss or destruction of significant scientific, cultural, or historical resources. In the Gulf of Mexico (Gulf), the *U.S.S. Hatteras*, located in federal waters off Texas, is listed in the National Register of Historic Places. Fishing activity already occurs in the vicinity of this site, but the proposed action would have no additional adverse impacts on listed historic resources, nor would they alter any regulations intended to protect them.

Executive Orders (E.O.)

E.O. 12630: Takings

The E.O. on Government Actions and Interference with Constitutionally Protected Property Rights that became effective March 18, 1988, requires each federal agency prepare a Takings Implication Assessment for any of its administrative, regulatory, and legislative policies and actions that affect, or may affect, the use of any real or personal property. Clearance of a regulatory action must include a takings statement and, if appropriate, a Takings Implication Assessment. The NOAA Office of General Counsel will determine whether a Taking Implication Assessment is necessary for this amendment.

E.O. 13089: Coral Reef Protection

The E.O. on Coral Reef Protection requires federal agencies whose actions may affect U.S. coral reef ecosystems to identify those actions, utilize their programs and authorities to protect and enhance the conditions of such ecosystems, and, to the extent permitted by law, ensure actions that they authorize, fund, or carry out do not degrade the condition of that ecosystem. By definition, a U.S. coral reef ecosystem means those species, habitats, and other national resources associated with coral reefs in all maritime areas and zones subject to the jurisdiction or control of the United States (e.g., federal, state, territorial, or commonwealth waters).

Regulations are already in place to limit or reduce habitat impacts within the Flower Garden Banks National Marine Sanctuary. Additionally, NMFS approved and implemented Generic Amendment 3 for Essential Fish Habitat (GMFMC 2005), which established additional habitat areas of particular concern (HAPCs) and gear restrictions to protect corals throughout the Gulf. There are no implications to coral reefs by the actions proposed in this amendment.

E.O. 13132: Federalism

The E.O. on Federalism requires agencies in formulating and implementing policies, to be guided by the fundamental Federalism principles. The E.O. serves to guarantee the division of governmental responsibilities between the national government and the states that was intended by the framers of the Constitution. Federalism is rooted in the belief that issues not national in scope or significance are most appropriately addressed by the level of government closest to the people. This E.O. is relevant to FMPs and amendments given the overlapping authorities of NMFS, the states, and local authorities in managing coastal resources, including fisheries, and the need for a clear definition of responsibilities. It is important to recognize those components of the ecosystem over which fishery managers have no direct control and to develop strategies to address them in conjunction with appropriate state, tribes and local entities (international too).

No Federalism issues were identified relative to the action to modify the management of the recreational harvest of greater amberjack. Therefore, consultation with state officials under Executive Order 12612 was not necessary. Consequently, consultation with state officials under Executive Order 12612 remains unnecessary.

E.O. 13158: Marine Protected Areas

This E.O. requires federal agencies to consider whether their proposed action(s) will affect any area of the marine environment that has been reserved by federal, state, territorial, tribal, or local laws or regulations to provide lasting protection for part or all of the natural or cultural resource within the protected area. There are several marine protected areas, HAPCs, and gear-restricted areas in the eastern and northwestern Gulf. The existing areas are entirely within federal waters of the Gulf. They do not affect any areas reserved by federal, state, territorial, tribal or local jurisdictions.

APPENDIX B. CONSIDERED BUT REJECTED ACTIONS AND ALTERNATIVES

APPENDIX C. PUBLIC COMMENTS RECEIVED

APPENDIX D. BYCATCH PRACTICABILITY ANALYSIS

Background/Overview

The Gulf of Mexico Fishery Management Council (Council) is required by the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) §303(a)(11) to establish a standardized bycatch reporting methodology for federal fisheries and to identify and implement conservation and management measures that, to the extent practicable and in the following order: 1) Minimize bycatch, and 2) minimize the mortality of bycatch that cannot be avoided. The Magnuson-Stevens Act defines bycatch as “fish which are harvested in a fishery, but which are not sold or kept for personal use, and includes economic discards and regulatory discards. Such term does not include fish released alive under a recreational catch-and-release fishery management program” (Magnuson-Stevens Act §3(2)). Economic discards are fish that are discarded because they are undesirable to the harvester. This category of discards generally includes certain species, sizes, and/or sexes with low or no market value.

Regulatory discards are fish that are required by regulation to be discarded, but also include fish that may be retained but not sold. National Marine Fisheries Service (NMFS) outlines at 50 CFR 600.350(d)(3)(i) ten factors that should be considered in determining whether a management measure minimizes bycatch or bycatch mortality to the extent practicable.

Guidance provided at 50 CFR 600.350(d)(3)(i) identifies ten factors to consider in determining whether a management measure minimizes bycatch or bycatch mortality to the extent practicable. These are:

1. Population effects for the bycatch species.
2. Ecological effects due to changes in the bycatch of that species (effects on other species in the ecosystem).
3. Changes in the bycatch of other species of fish and the resulting population and ecosystem effects.
4. Effects on marine mammals and birds.
5. Changes in fishing, processing, disposal, and marketing costs.
6. Changes in fishing practices and behavior of fishermen.
7. Changes in research, administration, and enforcement costs and management effectiveness.
8. Changes in the economic, social, or cultural value of fishing activities and non-consumptive uses of fishery resources.
9. Changes in the distribution of benefits and costs.
10. Social effects.

The Councils are encouraged to adhere to the precautionary approach outlined in Article 6.5 of the Food and Agriculture Organization of the United Nations Code of Conduct for Responsible Fisheries when uncertain about these factors.

The harvest of cobia is currently regulated with a minimum size limit, possession limit, quotas, and an in-season accountability measure. These measures are generally effective in limiting fishing mortality, the size of fish landed, the number of targeted fishing trips, and/or the time fishermen spend pursuing a species. However, these management tools may have the

unavoidable adverse effect of creating regulatory discards, which reduces landings. Consequently, the Council is considering this analysis to further minimize cobia bycatch.

Cobia Discard Rates

Commercial Discard Rates

Cobia discard rates were calculated for the Gulf of Mexico (Gulf) hook-and-line line and gillnet gear types by using both self-reported data (discard coastal logbook) and observer data for vessels operating in the Gulf and South Atlantic. The Southeast Data Assessment and Review (SEDAR) data workshop panel recommended a discard mortality rate of 5% for the commercial hook-and-line sector (with a range of 2% to 8%) and 51% for the gillnet sector (with a range of 36% to 77%). The gillnet range was developed from the gillnet sector with 10 or greater cobia observed released. However, of the 586 reported gill net trips that occurred in the Gulf between 2002 and 2010 none reported cobia discards. Furthermore, it was stated that the discard mortality rate developed for the gillnet sector may not reflect the discard mortality rate for the remaining gears in the “other gears” category. Overall, the SEDAR data workshop panel felt that cobia were hardy and not likely to have the barotraumas issues common to many of the snapper and grouper species in the South Atlantic and Gulf. Calculation of commercial discards followed SEDAR 22. The methods are summarized and presented below.

Cobia discard rates were calculated for SEDAR 28 and were the mean nominal discard rate among all trips (by gear) that reported to the discard logbook program during the period 2002–2010. Rates were separately calculated for vertical line, trolling, and gill net gears. Yearly gear specific discards were calculated as the product of the gear specific discard rate and gear specific yearly total effort (vertical line and trolling effort = total hook-hours fished; gill net effort = square yard hours fished) reported to the coastal logbook program. Discards were then calculated for the years 1993–2011. Prior to the establishment of the minimum size limit, it was assumed that some discarding occurred by the commercial sector, however, no information was available on commercial discards prior to 1993. Federal permits were not required to land cobia caught in federal waters; therefore, total cobia fishing effort may not have been reported to the coastal logbook program by all commercial vessels, and thus any estimates of total discards would be erroneously low.

Approximately 6.2% of all cobia discard reports for the period 2002–2010 were from trips reporting fishing gears other than vertical lines, trolling, and gill nets. Data reported for those other gears were not included in the discard calculations.

The yearly calculated cobia discards from the commercial sector (of vessels with federal permits reporting to the coastal logbook program) were relatively low. During the 18 years included in the analysis, fewer than 14,000 cobia per year were discarded in the Gulf. The number of trips upon which the calculations were based, however, was very small. An additional concern was the possible under-reporting of commercial discards. The percentage of fishers returning discard logbooks with reports of “no discards” has been much greater than the percentage of observer reports of “no discards” on a commercial fishing trip suggesting that under-reporting of discards

may be occurring. These results should, therefore, be used with caution. Discards calculated here may represent the minimum number of discards from the commercial sector.

A high percentage of cobia discards were reported as “all alive” or “majority alive” in the Gulf hand line and trolling sectors. Those using vertical line and trolling gear in the Gulf report many fish that may have otherwise been discards as “kept”. Many of those “kept” fish may have been used as bait. It was decided to include discards reported as “kept, not sold” with regular landings and not be notated as discards.

Shrimp fishery discards of cobia also followed SEDAR 22, but due to concerns about the accuracy and precision of the annual estimates of cobia bycatch from the shrimp fishery the advisory panel agreed to not use annual point estimates of bycatch in SEDAR 28. However, the advisory panel recommended that shrimp fishery effort be used as a proxy for cobia bycatch trends since shrimp fishery effort is known with more certainty. The median estimate of shrimp bycatch from 1972-2011 was used to represent the magnitude of cobia removals from the shrimp fleet.

Recreational Discard Rates

The sources for the SEDAR 28 recreational landings and discard estimates (1981-2011) were obtained from the Marine Recreational Fisheries Statistics Survey (MRFSS) and the Southeast Region Headboat Survey (SRHS). Calculation of recreational discards followed SEDAR 22. The methods are summarized and presented below.

In order to get headboat estimates for 1981-2003, a mean ratio of SRHS discard landings (2004-2011) to the mean ratio of MRFSS charter vessel discard landings (2004-2011) was calculated. This was then applied to the yearly MRFSS charter vessel discard landings ratio (1981-2003) in order to estimate the yearly SRHS discard landings ratio for 1981-2003.

SEDAR 28 determined that the recreational sector has been the largest contributor to cobia fishing mortality. However, the SEDAR data workshop panel only recommended a discard mortality rate of 5% for all recreational vessels with a range of 2% to 8%.

Coastal Migratory Pelagic Discards

Background

In the Gulf of Mexico (Gulf) and Atlantic (Florida through New York) regions, most king mackerel and cobia are harvested with hook-and-line gear; however, gillnets and castnets are the predominant gear type used to harvest Spanish mackerel.

Commercial Sector

Currently, discard data are collected using a supplemental form that is sent to a 20% stratified random sample of the active permit holders in the coastal migratory pelagics (CMP) fishery.

However, in the absence of any observer data, there are concerns about the accuracy of logbook data in collecting bycatch information. Biases associated with logbooks primarily result from inaccuracy in reporting of species that are caught in large numbers or are of little economic interest (particularly of bycatch species), and from low compliance rates. During 2012 – 2016, the commercial sector fishing for CMP species in both the Gulf and Atlantic landed 9.5 million pounds and discarded 10,887 fish (Table D.1) per year. The commercial sector predominantly harvested king and Spanish mackerel, with relatively few cobia (Table D.1). The commercial harvest of both king mackerel and Spanish mackerel have very low discards.

Recreational Sector

For the recreational sector, during 2012 – 2016, estimates of the number of recreational discards were available from SRHS and Marine Recreational Information Program (MRIP). SRHS gets discards from the captains reporting discards in their logbook reports for each trip. The MRIP system classifies recreational catch into three categories:

- Type A - Fishes that were caught, landed whole, and available for identification and enumeration by the interviewers.
- Type B - Fishes that were caught but were either not kept or not available for identification:
 - Type B1 - Fishes that were caught and filleted, released dead, given away, or disposed of in some way other than Types A or B2.
 - Type B2 - Fishes that were caught and released alive.

During 2012 – 2016, the private angling landings and discards for all three CMP species were higher than for either the headboat or charter vessel category (Table D.1). Spanish and king mackerel had the highest private angling landings and cobia had the highest discards (53%) relative to the private angling landings. For headboats, cobia had 2% discards relative to a total catch of 1,512. King and Spanish mackerel had considerably higher headboat and charter landings but a lower discard percentage compared to those of cobia.

During 2012 – 2016, information for charter trips came from two sources. Charter vessels for the CMP fishery were selected by the Science and Research Director (SRD) to maintain a fishing record for each trip, or a portion of such trips as specified by the SRD, and on forms provided by the SRD. Harvest and bycatch information was monitored by MRIP. Since 2000, a 10% sample of charter vessel captains have been called weekly to obtain trip level information, such as date, fishing location, target species, etc. In addition, standard dockside intercept data were collected from charter vessels, and charter vessel clients were sampled through the standard random digital dialing of coastal households. Precision of charter vessel effort estimates has improved by more than 50% due to these changes (Van Voorhees et al. 2000).

Harvest from headboats were monitored by NMFS at the Southeast Fisheries Science Center's (SEFSC) Beaufort Laboratory through the SRHS. Collection of discard data began in 2004. Daily catch records (trip records) were filled out by the headboat operators, or in some cases by NMFS-approved headboat samplers based on personal communication with the captain or crew. Headboat trips were subsampled for data on species lengths and weights. Biological samples (scales, otoliths, spines, reproductive tissues, and stomachs) were obtained as time allowed.

Lengths of discarded fish were occasionally obtained but these data were not part of the headboat database.

Recent improvements have been made to the recreational survey of MRIP, formerly called MRFSS. Beginning in 2013, samples were drawn from a known universe of fishermen rather than randomly dialing coastal households. Other improvements have been and will be made that should result in better estimating recreational catches and the variances around those catch estimates.

Table D.1. Annual mean headboat, charter, private angling, and commercial estimates of landings and discards in the Gulf and Atlantic (Florida to New York) during 2012 – 2016. Recreational landings are in numbers of fish (N); commercial landings are in pounds. Discards represent numbers of fish that were caught and released alive (B2).

	HEADBOAT				CHARTER				PRIVATE ANGLING				COMMERCIAL		
	Catch (N)	Landings (N)	Discards (N)	Percent Discards	Catch (N)	Landings (N)	Discards (N)	Percent Discards	Catch (N)	Landings (N)	Discards (N)	Percent Discards	Landings (lbs ww)	Discards (N)	Percent Discards
Cobia	2,279	2,245	34	1%	20,561	11,586	8,975	44%	196,312	75,076	121,237	62%	209,495	1,240	<1%
King Mackerel	21,442	21,442	0	0%	203,941	173,509	30,432	15%	453,522	308,177	145,345	32%	4,974,380	8,415	<1%
Spanish Mackerel	10,167	10,155	12	0%	399,268	309,095	90,173	23%	5,226,627	2,715,591	2,511,036	48%	4,364,320	1,232	<1%
Total	33,888	33,842	46	-	623,770	494,190	129,580	-	5,876,461	3,098,844	2,777,618		9,548,195	10,887	-

Sources: Charter vessel and private angling data from MRIP (SEFSC Recreational ACL Dataset; January 2018); headboat data from SEFSC Headboat Logbook CRNF files (expanded; January 2018); commercial landings data from SEFSC Commercial ACL Dataset (October 2017) with discard estimates from expanded SEFSC Commercial Discard Logbook (April 2017);

Notes: Commercial discard estimates are for vertical line gear only. Commercial king mackerel includes "king and cero mackerel" category; estimates of commercial discards are highly uncertain.

Practicability of Management Measures in Directed Fisheries Relative to their Impact on Bycatch and Bycatch Mortality

According to the bycatch information for mackerel gillnets, menhaden, smooth dogfish sharks, and spiny dogfish sharks were the three most frequently discarded species (SAFMC 2004). There were no interactions of sea turtles or marine mammals reported (Poffenberger 2004). The Southeast Region Current Bycatch Priorities and Implementation Plan FY04 and FY05 reported that 26 species of fish are caught as bycatch in the Gulf king mackerel gillnet sector. Of these, 34% are reported to be released dead, 59% released alive, and 6% undetermined. Bycatch was not reported for the Gulf Spanish mackerel sector. The Atlantic Spanish mackerel portion of the CMP fishery has 51 species reported as bycatch with approximately 81% reported as released alive. For the South Atlantic king mackerel portion of the CMP fishery 92.7% are reported as released alive with 6% undetermined. Bycatch was not reported separately for gillnets and hook-and-line gear. Additionally, the supplementary discard program to the logbook reporting requirement shows no interactions of gillnet gear with marine mammals or birds.

Table D.2 lists the species most often caught with cobia in the Gulf and South Atlantic from SEFSC commercial logbook data. The harvest of cobia is incidental to harvest of king mackerel, gag grouper, and gray snapper.

Table D.2. Top three species caught on trips where at least one pound of cobia was caught with all gear types in the Gulf of Mexico and South Atlantic from 2012-2016.

Species	% of Trips (All Gear Types)
King mackerel & Cero	37.0%
Gag grouper	26.7%
Gray Snapper	24.0%

Source: Southeast Fisheries Science Center Commercial Logbook (November 2017)

Other Bycatch

No species are incidentally encountered by the directed cobia fishery. The primary gears used to harvest Gulf cobia (handline) are classified in the List of Fisheries for 2018 (82 FR 47424) as Category III gear and are unchanged from the 2017 list. This classification indicates the annual mortality and serious injury of a marine mammal stock resulting from any fishery is less than or equal to one percent of the maximum number of animals, not including natural mortalities, that may be removed from a marine mammal stock, while allowing that stock to reach or maintain its optimum sustainable population.

NMFS has conducted specific analyses (“Section 7 consultations”) to evaluate potential effects from the Gulf and South Atlantic CMP fishery on species and critical habitats protected under the Endangered Species Act (ESA). Bryde’s whales are the only resident baleen whales in the Gulf and are currently being evaluated to determine if listing under the ESA is warranted (81 FR 88639; December 8, 2016). On June 18, 2015, the Protected Resources Division released a biological opinion (BiOp), which concluded that the continued authorization of the CMP fishery is not likely to adversely affect any listed whales, Gulf sturgeon, or elkhorn and staghorn corals.

The BiOp also determined that the CMP fishery is not likely to adversely affect designated critical habitats for elkhorn and staghorn corals or loggerhead sea turtles, and will have no effect on designated critical habitat for North Atlantic right whale (NMFS 2015). An incidental take statement was issued specifying the amount and extent of anticipated take, along with reasonable and prudent measures and associated terms and conditions deemed necessary and appropriate to minimize the impact of these takes. Twenty new species of coral were listed under the ESA on September 10, 2014 (79 FR 53852), five of which occur in the Gulf and South Atlantic (rough cactus coral, pillar coral, lobed star, mountainous star, and boulder star corals). NMFS determined in a memorandum dated October 7, 2014, that any adverse effects from the CMP fishery's impacts to these corals are extremely unlikely to occur and therefore are discountable, therefore, they aren't mentioned in the BiOp.

According to the 2015 BiOp, the only gear type likely to adversely affect sea turtles, smalltooth sawfish, and Atlantic sturgeon is gillnets. Green, hawksbill, Kemp's ridley, leatherback, and loggerhead sea turtles, Atlantic sturgeon, and the smalltooth sawfish are all likely to be adversely affected by the CMP fishery with this gear. Green, hawksbill, Kemp's ridley, leatherback, and loggerhead sea turtles are all highly migratory, travel widely throughout the Gulf and South Atlantic, and are known to occur in areas subject to shrimp trawling. The distribution of Atlantic sturgeon and smalltooth sawfish within the action area is more limited, but all of these species do overlap in certain regions of the action area and these species have the potential to be been incidentally captured in the CMP fishery.

Subsequent to the completion of the BiOp, NMFS and the U.S. Fish and Wildlife Service published a final rule removing the range-wide and breeding population ESA-listings of the green sea turtle and listing eight DPSs as threatened and three DPSs as endangered, effective May 6, 2016 listing (81 FR 20057). Two of the green sea turtle DPSs, the North Atlantic DPS and the South Atlantic DPS, occur in the Gulf and are listed as threatened. In addition, on June 29, 2016, NMFS published a final rule (81 FR 42268) listing Nassau grouper as threatened under the ESA.

In a memorandum dated November 18, 2017, NMFS amended the 2015 BiOp to address these new listings. The amendment determined that the proposed action is not likely to jeopardize the continued existence of loggerhead (the NWA DPS) or the green (North Atlantic DPS or South Atlantic DPS), Kemp's ridley, hawksbill, or leatherback sea turtles, Atlantic sturgeon (GM, NYB, CB, Carolina, or SA DPSs), or smalltooth sawfish (U.S. DPS). Furthermore, it was determined that Nassau grouper were not likely to be adversely affected by the CMP fishery.

On January 22, 2018, NMFS published a final rule (83 FR 2916) listing the giant manta ray as threatened under the ESA. On January 30, 2018, NMFS published a final rule (83 FR 4153) listing the oceanic whitetip shark as threatened under the ESA. In a memorandum dated June 11, 2018, NMFS reinitiated consultation on the CMP FMP to address the listings of the giant manta and oceanic whitetip. The consultation determined that allowing fishing under the CMP FMP to continue during the reinitiation period is not likely to adversely affect oceanic whitetip sharks and will not appreciably reduce the likelihood of the giant manta ray's survival or recovery within its range.

Three primary orders of seabirds are represented in the Gulf, Procellariiformes (petrels, albatrosses, and shearwaters), Pelecaniformes (pelicans, gannets and boobies, cormorants, tropic birds, and frigate birds), and Charadriiformes (phalaropes, gulls, terns, noddies, and skimmers) (Clapp et al., 1982; Harrison, 1983) and several species, including: piping plover, least tern, and roseate tern are listed by the U.S. Fish and Wildlife Service as either endangered or threatened. Note the brown pelican and bald eagle had been listed as endangered or threatened, but have subsequently been delisted. Human disturbance of nesting colonies and mortalities from birds being caught on fishhooks and subsequently entangled in monofilament line are primary factors affecting sea birds. Oil or chemical spills, erosion, plant succession, hurricanes, storms, heavy tick infestations, and unpredictable food availability are other threats. There is no information to indicate seabirds rely on cobia for food, and they are not generally caught by fishers harvesting cobia. Additionally, there is no evidence that the cobia fishery is adversely affecting seabirds.

Studies have documented low bycatch and bycatch mortality of finfish due to the ability for anglers to specifically target cobia. No other finfish species are known to be incidentally caught. Minimum size limits are estimated to be the greatest source of regulatory discards for the majority of fish species. Due to the ability for anglers to be selective of cobia, very little bycatch of target or non-target fish species is expected in the harvest of cobia.

Practicability Analysis

Criterion 1: Population effects for the bycatch species

Bycatch of cobia due to management measures such as possession limits, vessel limits, and minimum size limits could result in loss of yield. Increasing the minimum size limit is expected to protect cobia until they reach a size at which almost 100% have been able to spawn at least once, thus improving the status of the stock. Decreasing the per person possession limit and implementing a vessel limit may increase discards. However, with anglers being able to specifically target cobia by spear or vertical line, increases in discards by these gear types is expected to be minimal. Gillnet discards may increase more than spear or vertical line.

Criterion 2: Ecological effects due to changes in the bycatch of cobia (on other species in the ecosystem)

Relationships among species in marine ecosystems are complex and poorly understood, making the nature and magnitude of ecological effects difficult to predict. Increasing the minimum size limit will allow the cobia stock to increase in abundance, resulting in increased competition for prey with other predators. Consequently, it is possible that forage species and competitor species could decrease in abundance in response to an increase in cobia abundance.

Criterion 3: Changes in the bycatch of other species of fish and invertebrates and the resulting population and ecosystem effects

Population and ecosystem effects resulting from changes in the bycatch of other species of fish and invertebrates are difficult to predict. Fishermen can specifically target cobia when using certain gears and no other species are commonly caught as bycatch in association with cobia.

Therefore, measures evaluated in this framework are not expected to affect other species of fish and invertebrates.

Criterion 4: Effects on marine mammals and birds

The effects of current management measures on marine mammals and birds are described above. Measures evaluated in this framework are not expected to significantly affect marine mammals and birds. There is no information to indicate marine mammals and birds rely on cobia for food, and they are not generally caught by fishers harvesting cobia.

Criterion 5: Changes in fishing, processing, disposal, and marketing costs

Reducing the possession limit and implementing a vessel limit will affect costs associated with fishing operations. To the extent that reducing these management measures for cobia would reduce harvest, reductions in commercial revenue and recreational consumer surplus would occur. Commercial fishermen will incur losses in revenue due to limiting the amount of harvest per fishing year. This reduction in revenue is thought to be minimal since fishing for cobia is usually opportunistic with fishing effort usually being directed at another species.

Criterion 6: Changes in fishing practices and behavior of fishermen

Shifts or changes in fishing locations and/or target species due to a decreased possession limit and a new vessel limit will have an effect on fishing behavior and practices that may potentially affect the bycatch of other fish species. Although, as mentioned above, these changes are expected to be minimal since fishing for cobia is usually opportunistic.

Criterion 7: Changes in research, administration, and enforcement costs and management effectiveness

The proposed management measures are not expected to significantly impact administrative costs. Minimum size limits and possession limits are currently used to regulate the commercial and recreational sectors harvesting cobia. An increase in the minimum size limit, decreasing the possession limit, and implementing a new vessel limit will require additional research to determine the magnitude and extent of impacts to bycatch and bycatch mortality. However, this kind of research is currently ongoing. Administrative activities such as quota monitoring and enforcement should not be affected by the proposed management measures.

Criterion 8: Changes in the economic, social, or cultural value of fishing activities and non-consumptive uses of fishery resources

If the minimum size limit for commercial and recreational harvest of cobia is increased and the possession limit is decreased, it is expected to positively impact the stock by allowing more fish to reach sexually maturity or have the opportunity to spawn multiple times. Implementing a vessel limit will also contribute positively to the cobia stock for these same reasons. These management measures will in turn have long-term positive economic and social benefits as more

and larger fish become available. Negative social implications are not anticipated because cobia can be avoided and another species targeted while anglers are out on a trip.

Criterion 9: Changes in the distribution of benefits and costs

Bycatch minimization measures that provide an overall net benefit to the stock and increase the stock's biomass will benefit both sectors in the long run. Bycatch minimization measures are intended to provide an overall net benefit to the stock, by reducing mortality associated with bycatch and increasing the rate of stock growth.

Criterion 10: Social effects

Bycatch is considered wasteful and it reduces overall yield obtained from the fishery. Minimizing bycatch to the extent practicable will increase efficiency, reduce waste, and benefit stock growth, thereby resulting in net social benefits.