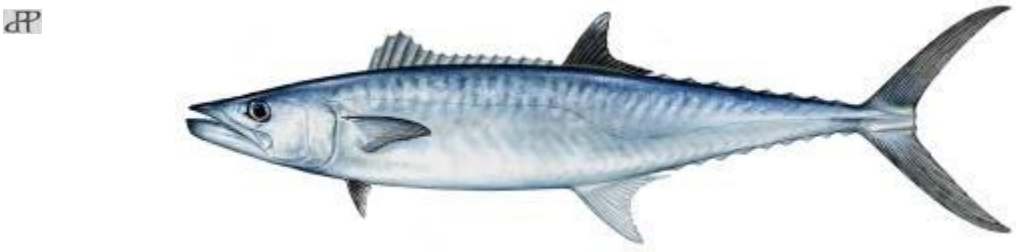
Allocation Sharing and Accountability Measures for the Gulf of Mexico Migratory Group of King Mackerel



Draft Amendment 29
to the Fishery Management Plan for Coastal Migratory Pelagic Resources in the Gulf of Mexico and Atlantic Region

October 2016

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ENVIRONMENTAL ASSESSMENT COVER SHEET

ALLOCATION SHARING AND ACCOUNTABILITY MEASURES FOR THE GULF OF MEXICO MIGRATORY GROUP OF KING MACKEREL

Draft Amendment 29 to Fishery Management Plan for Coastal Migratory Pelagic Resources in the Gulf of Mexico and Atlantic Region addressing modifications to the management of king mackerel within the coastal migratory pelagic zones.

Type of Action

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ABBREVIATIONS USED IN THIS DOCUMENT

ABC	acceptable biological catch
ACL	annual catch limit
ALS	Accumulated Landings System
AM	accountability measure
AP	Advisory Panel
APA	Administrative Procedures Act
ASMFC	Atlantic States Marine Fisheries Commission
CFDBS	Commercial Fisheries Data Base System
CLM	commercial landings monitoring system
CMP	coastal migratory pelagics
Council	Gulf of Mexico and South Atlantic Fishery Management Councils
CS	consumer surplus
CZMA	Coastal Zone Management Act
DQA	Data Quality Act
EA	environmental assessment
EEZ	exclusive economic zone
EFH	essential fish habitat
EIS	environmental impact statement
EJ	environmental justice
ESA	Endangered Species Act
F	instantaneous rate of fishing mortality
FLEC	Florida east coast
FLS	federal logbook system
FMP	Fishery Management Plan
Gulf	Gulf of Mexico
Gulf Council	Gulf of Mexico Fishery Management Council
GMFMC	Gulf of Mexico Fishery Management Council
GSMFC	Gulf States Marine Fisheries Commission
gw	gutted weight
HAPC	habitat area of particular concern
Magnuson-Stevens Act	Magnuson-Stevens Fishery Conservation and Management Act
Mid-Atlantic Council	Mid-Atlantic Fishery Management Council
MMPA	Marine Mammal Protection Act
mp	million pounds
MRFSS	Marine Recreational Fisheries Survey and Statistics
MRIP	Marine Recreational Information Program
MSY	maximum sustainable yield
NEFSC	New England Fisheries Science Center
NEPA	National Environmental Policy Act
nm	nautical mile
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NOR	net operating revenue
OFL	overfishing level

OY	optimum yield
PIMS	Permit Information Management System
PS	producer surplus
RFA	Regulatory Flexibility Act of 1980
RIR	Regulatory Impact Review
RQ	regional quotient
SAFMC	South Atlantic Fishery Management Council
SBA	Small Business Administration
Secretary	Secretary of Commerce
SEDAR	Southeast Data, Assessment, and Review
SEFSC	Southeast Fisheries Science Center
SERO	Southeast Regional Office
South Atlantic Council	South Atlantic Fishery Management Council
SSB	spawning stock biomass
SSC	Scientific and Statistical Committee
SPR	spawning potential ratio
SRHS	Southeast Regional Headboat Survey
TPWD	Texas Parks and Wildlife Department
USCG	United States Coast Guard
VOC	volatile organic compound
ww	whole weight

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CHAPTER 1. INTRODUCTION

What Actions Are Being Proposed?
The actions and alternatives in Amendment 29 to Fishery Management Plan (FMP) for Coastal Migratory Pelagic Resources (CMP) in the Gulf of Mexico and Atlantic Region (Amendment 29) address issues associated with sector allocation sharing and recreational accountability measures for the Gulf of Mexico (Gulf) migratory group of king mackerel.

Who Is Proposing the Action?
The Gulf and South Atlantic Fishery Management Councils (Councils) are proposing the actions. The Councils develop the regulations and submit them to the National Marine Fisheries Service (NMFS) who ultimately approves, disapproves, or partially approves the actions in the amendment on behalf of the Secretary of Commerce. NMFS is an agency in the National Oceanic and Atmospheric Administration.

Who's Who?

- ***Gulf of Mexico*** and ***South Atlantic Fishery Management Councils*** – Engage in a process to determine a range of actions and alternatives, and recommends action to the National Marine Fisheries Service.
- ***National Marine Fisheries Service*** and ***Council staffs*** – Develop alternatives based on guidance from the Council, and analyze the environmental impacts of those alternatives.
- ***Secretary of Commerce*** – Will approve, disapprove, or partially approve the amendment as recommended by the Councils.

Why Are The Councils Considering Action?
Historically, the recreational sector in the Gulf has not landed its sector allocation of the king mackerel stock annual catch limit (ACL), currently 68%, while the commercial sector has either met or exceeded its 32% allocation of the stock ACL. In an effort to manage Gulf migratory group king mackerel such that the maximum benefit of the resource is harvested without harming the population, the Councils have decided to evaluate sharing of allocation between the recreational and commercial sectors of Gulf migratory group king mackerel.

1.1 Background

Initially, the CMP FMP (GMFMC/SAFMC 1982) treated king mackerel as one stock. The present management regime in the FMP recognizes two migratory groups: the Gulf migratory group and the Atlantic migratory group. Each migratory group is primarily managed by the respective Council. Gulf and Atlantic migratory groups of king mackerel are also divided into zones for management purposes. This amendment considers changes to management measures for the Gulf migratory group of king mackerel. For the purposes of this amendment, the Gulf migratory group will be referred to as *Gulf king mackerel* and the Atlantic migratory group will be referred to as *Atlantic king mackerel*. Changes to sector allocations for Atlantic king mackerel are not being considered in this document because the South Atlantic Council has not indicated that such a change is necessary at this time.

The two migratory groups were historically thought to mix seasonally off the east coast of Florida and in Monroe County, Florida. The SEDAR 38 stock assessment revised this winter mixing zone to be in the exclusive economic zone south of US Highway 1 in the Florida Keys from November 1 – March 31. The Councils approved an amendment to the CMP FMP (Amendment 26) to revise the stock boundary between the Councils to the Dade/Monroe County line, with the Gulf of Mexico Fishery Management Council (Gulf Council) managing the mixing zone year-round (Amendment 26 to the CMP FMP has been transmitted to NMFS for Secretarial review). Therefore, if approved by the Secretary of Commerce, for management and assessment purposes, the boundary between the migratory groups of king mackerel will be specified at the Dade/Monroe County line (Figure 1.1.1).

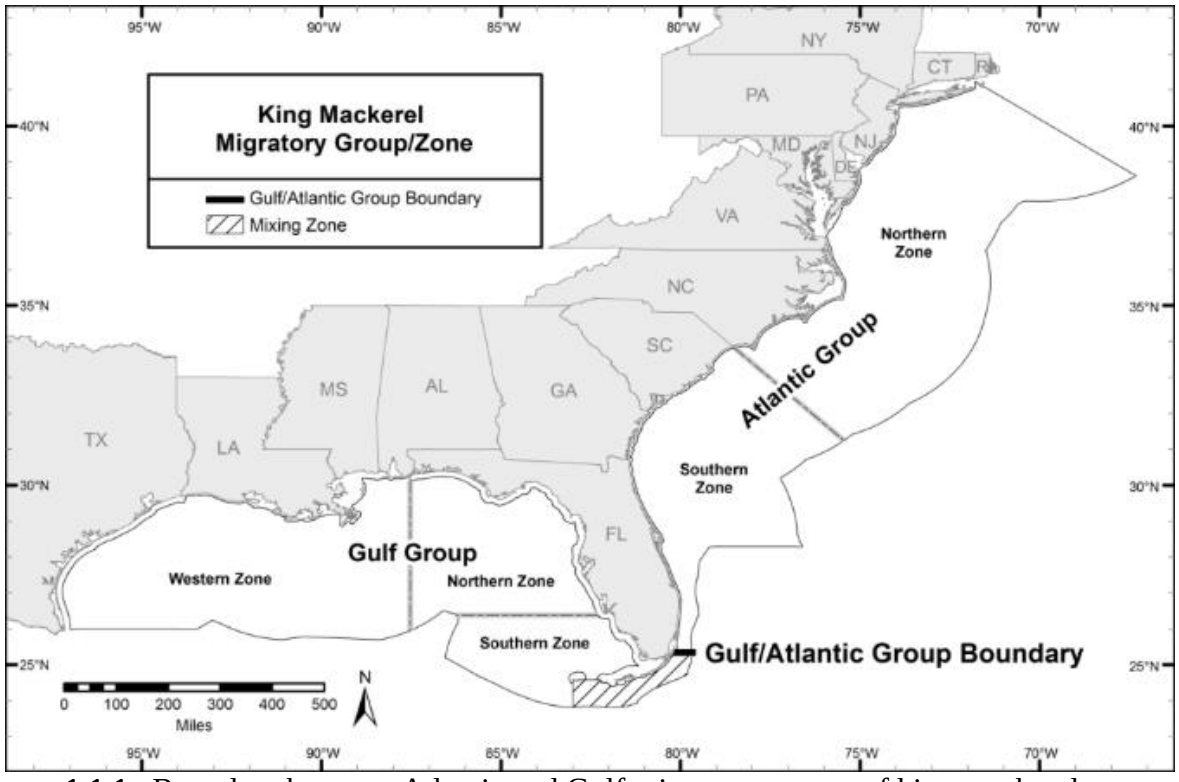

Figure 1.1.1. Boundary between Atlantic and Gulf migratory groups of king mackerel, as proposed by SEDAR 38 (2014) and Amendment 26 to the CMP FMP (GMFMC and SAFMC 2016).

Over the past decade, the commercial sector has regularly met or exceeded the commercial ACL while the recreational sector has landed low proportions of the recreational ACL. At the March and November 2015 Gulf CMP Advisory Panel (Gulf AP) meetings, members recommended that the Councils abstain from reallocating any king mackerel from the recreational sector to the commercial sector. The Gulf AP subsequently recommended an increase for the Gulf recreational bag limit as a way to potentially increase utilization of the recreational ACL (preferred by the Councils in CMP Amendment 26). The Councils did not make any changes to the sector allocations in CMP Amendment 26; however, they did direct staff to begin an amendment to examine how to utilize underages of the Gulf king mackerel ACL, along with any necessary changes to accountability measures (AMs).

1.2 Purpose and Need

Purpose for Action

The purpose of this amendment is to consider temporary modifications to the recreational and commercial allocations for Gulf migratory group king mackerel and changes to the recreational accountability measure.

Need for Action

The need for this amendment is to achieve optimum yield while ensuring overfishing does not occur in the coastal migratory pelagics fishery, thereby increasing social and economic benefits of the fishery through sustainable and valuable harvest of king mackerel.

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/SAFMC 1982). 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. The following is a list of management changes relevant to this amendment. A full 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 1, with EIS, implemented in September 1985, recognized separate Atlantic and Gulf migratory groups of king mackerel. The Gulf commercial allocation for king mackerel was divided into Eastern and Western Zones for the purpose of regional allocation, with 69% of the allocation provided to the Eastern Zone and 31% to the Western Zone.

Amendment 5, with environmental assessment (EA), implemented in August 1990, extended the management area for Atlantic migratory groups of mackerels through the Mid-Atlantic Council's area of jurisdiction; provided that the South Atlantic Council will be responsible for pre-season adjustments of total allowable catch and bag limits for the Atlantic migratory groups of mackerels while the Gulf Council will be responsible for Gulf migratory groups; and continued to manage the two recognized Gulf migratory groups of king mackerel as one until management measures appropriate to the eastern and western migratory groups could be determined.

Amendment 7, with EA, implemented in November 1994, equally divided the Gulf commercial allocation in the Eastern Zone at the Dade-Monroe County line in Florida. The sub-allocation for the area from Monroe County through Western Florida was equally divided between commercial hook-and-line and net gear users.

Amendment 8, with EA, implemented in March 1998, provided the South Atlantic Council with authority to set vessel trip limits, closed seasons or areas, and gear restrictions for Gulf king

mackerel in the North Area of the Eastern Zone (Dade/Monroe to Volusia/Flagler County lines); and modified the seasonal framework adjustment measures.

Amendment 9, with EA, implemented in April 2000, created north and south subzones on the Florida west coast and reallocated the commercial portion of the total allowable catch among the Gulf zones.

Amendment 18, with EA, implemented in January 2012, established ACLs and AMs for Gulf and Atlantic king mackerel. The ACLs for the Gulf and South Atlantic migratory groups of king mackerel were 10.8 million pounds (mp) and 10.46 mp, respectively.

Amendment 20A, with EA, implemented in July 2014, prohibited sale of recreationally caught king mackerel, with an exception for sale of fish caught on for-hire trips on dual-permitted vessels in the Gulf region, and an exception for sale of fish caught in state-permitted tournaments in both the Gulf and Atlantic regions and donated to a state or federally-permitted dealer, as long as the proceeds from the dealer sale are donated to charity.

Amendment 20B, with EA, implemented in March 2015, revised Gulf king mackerel hook–and-line trip limits in the Florida West Coast zone Northern and Southern subzones and modified the Northern subzone fishing year; created a transit provision for areas closed to king mackerel; and established Northern and Southern zones with separate commercial quotas for Atlantic king mackerel.

Amendment 23, with EA, implemented in August 2014, was part of the joint Gulf and South Atlantic Dealer Reporting Amendment, and required federally permitted CMP fishermen to sell to a federally permitted dealer.

South Atlantic CMP Framework Action 2013 with EA, implemented in December 2014, modified king mackerel trip limits in the Gulf Florida East Coast subzone.

Amendment 26, with EA, approved by the Councils in March and April of 2016, modified the stock boundary between the Gulf and Atlantic migratory groups of king mackerel to be at the Dade/Monroe County Line in southeastern Florida, with the Gulf Council managing king mackerel to that line year-round. The acceptable biological catch for Gulf king mackerel was increased. Commercial zone allocations of the commercial king mackerel ACL in the Gulf were changed as follows: Western Zone: 40%; Northern Zone: 18%; Southern Zone Handline: 21%; and Southern Zone Gillnet: 21%. Lastly, the recreational bag limit was increased from two fish per person per day to three fish per person per day. This amendment is in Secretarial review.

CHAPTER 2. MANAGEMENT ALTERNATIVES

2.1 Action 1 – Gulf of Mexico (Gulf) Migratory Group King Mackerel Quota Sharing

Alternative 1: No Action – Do not establish a quota sharing system. Maintain the current recreational and commercial allocations for Gulf migratory group king mackerel (68% recreational, 32% commercial).

Alternative 2: Conditionally transfer a certain percentage (*Options 2a-2d*) of the allocation to the commercial sector in the next fishing year, if the minimum recreational landings threshold is not met (*Options 2e-2g).* If the commercial sector does not land at least 90% of its annual catch limit (ACL), this transfer will not occur. Landings data from two years prior will be used to determine allocation transfers.

Conditional Quota Transfer (MUST CHOOSE ONE):

Option 2a: Conditionally transfer 5% from the stock allocation to the commercial allocation.

Option 2b: Conditionally transfer 10% from the stock allocation to the commercial allocation.

Option 2c: Conditionally transfer 15% from the stock allocation to the commercial allocation.

Option 2d: Conditionally transfer 20% from the stock allocation to the commercial allocation.

Recreational ACL Minimum Threshold (MUST CHOOSE ONE), if the recreational sector landings are:

Option 2e: less than 50% of the recreational ACL.

Option 2f: less than 65% of the recreational ACL.

Option 2g: less than 75% of the recreational ACL.

Alternative 3: If the stock ACL is not harvested in a fishing year, the Gulf Council's Scientific and Statistical Committee (SSC) will convene to consider increasing the acceptable biological catch (ABC) for the following fishing year only. If the SSC recommends increasing the ABC, the amount of the increase (in pounds) would be added to the ACL of the sector which landed at least 90% of its ACL in the previous fishing year. The SSC would convene to consider an adjustment in the ABC only if a minimum percentage of the stock ACL was not harvested in a given fishing season (*Options 3a-3c*). If one of Options 3a, 3b, or 3c is not chosen as preferred, and the stock ACL has not been landed, then the SSC will consider raising the ABC in any year when the stock ACL is not harvested:

Remaining Stock ACL Threshold (CHOOSE ONE):

Option 3a: At least 15% of the stock ACL remains unharvested.

Option 3b: At least 20% of the stock ACL remains unharvested.

Option 3c: At least 25% of the stock ACL remains unharvested.

Discussion:

The recreational fishing year is January – December and the commercial fishing year for most zone quotas is July – June, with the exception of the Gulf Northern Zone which is October – September. Any quota transfer will be based on recreational landings through December of the previous year, and applied to the commercial allocation for that year's fishing season. This will allow time to receive MRIP and other recreational landings before the start of the commercial season.

Over the past ten years, the commercial sector of the Gulf of Mexico (Gulf) king mackerel fishery has consistently landed the commercial ACL while the recreational sector has not landed the recreational ACL. Therefore, no alternatives directly considering transferring allocation from the commercial sector to the recreational sector will be considered any further in this analysis.

Recent landings of Gulf king mackerel are shown in Table 2.1.1 and Figure 2.1.1. The commercial fishing year for king mackerel is July 1 – June 30 for the Gulf Western and Southern Zones, October 1 – September 30 for the Gulf Northern Zone, and the day after Martin Luther King Jr. Day until June 30 for the Gulf Southern Zone gillnet component.

Table 2.1.1. Proportion of sector ACLs landed and proportion of total ACL landed for Gulf king mackerel, including those landings attributed to the former Florida East Coast Zone (FLEC). The FLEC landings are included here since there is not a recreational allocation specifically for the former FLEC Zone. Landings are reported as landed weight (gutted and whole combined).

Fishing Year	Total TAC/ACL	Comm Sector ACL	Comm Landings	Rec Sector ACL	Rec Landings	% of Sector ACL Landed		% of Total ACL Landed
						Comm[1]	Rec[2]	
2001/02	10.2 mp	3.264 mp	2.902 mp	6.936 mp	3.669 mp	88.9%	52.9%	64.7%
2002/03	10.2 mp	3.264 mp	3.186 mp	6.936 mp	2.816 mp	97.6%	40.6%	59.3%
2003/04	10.2 mp	3.264 mp	3.094 mp	6.936 mp	3.211 mp	94.8%	46.3%	62.7%
2004/05	10.2 mp	3.264 mp	3.215 mp	6.936 mp	2.532 mp	98.5%	36.5%	56.4%
2005/06	10.2 mp	3.264 mp	2.983 mp	6.936 mp	2.996 mp	91.4%	43.2%	58.9%
2006/07	10.8 mp	3.456 mp	3.231 mp	7.344 mp	3.305 mp	93.5%	45.0%	60.5%
2007/08	10.8 mp	3.456 mp	3.459 mp	7.344 mp	2.629 mp	100.1%	35.8%	56.3%
2008/09	10.8 mp	3.456 mp	3.833 mp	7.344 mp	2.350 mp	110.9%	32.0%	57.6%
2009/10	10.8 mp	3.456 mp	3.674 mp	7.344 mp	3.525 mp	106.3%	48.0%	68.0%
2010/11	10.8 mp	3.456 mp	3.522 mp	7.344 mp	2.181 mp	101.9%	29.7%	53.0%
2011/12	10.8 mp	3.456 mp	3.428 mp	7.344 mp	2.438 mp	99.2%	33.2%	54.3%
2012/13	10.8 mp	3.456 mp	3.539 mp	7.344 mp	2.710 mp	102.4%	36.9%	57.9%
2013/14	10.8 mp	3.456 mp	3.055 mp	7.344 mp	2.916 mp	88.4%	39.7%	55.3%
2014/15	10.8 mp	3.456 mp	4.004 mp[3]	7.344 mp	4.630 mp	115.8%	63.1%	79.9%

[1]Commercial allocation = 32% [2]Recreational allocation = 68%
Source: SERO

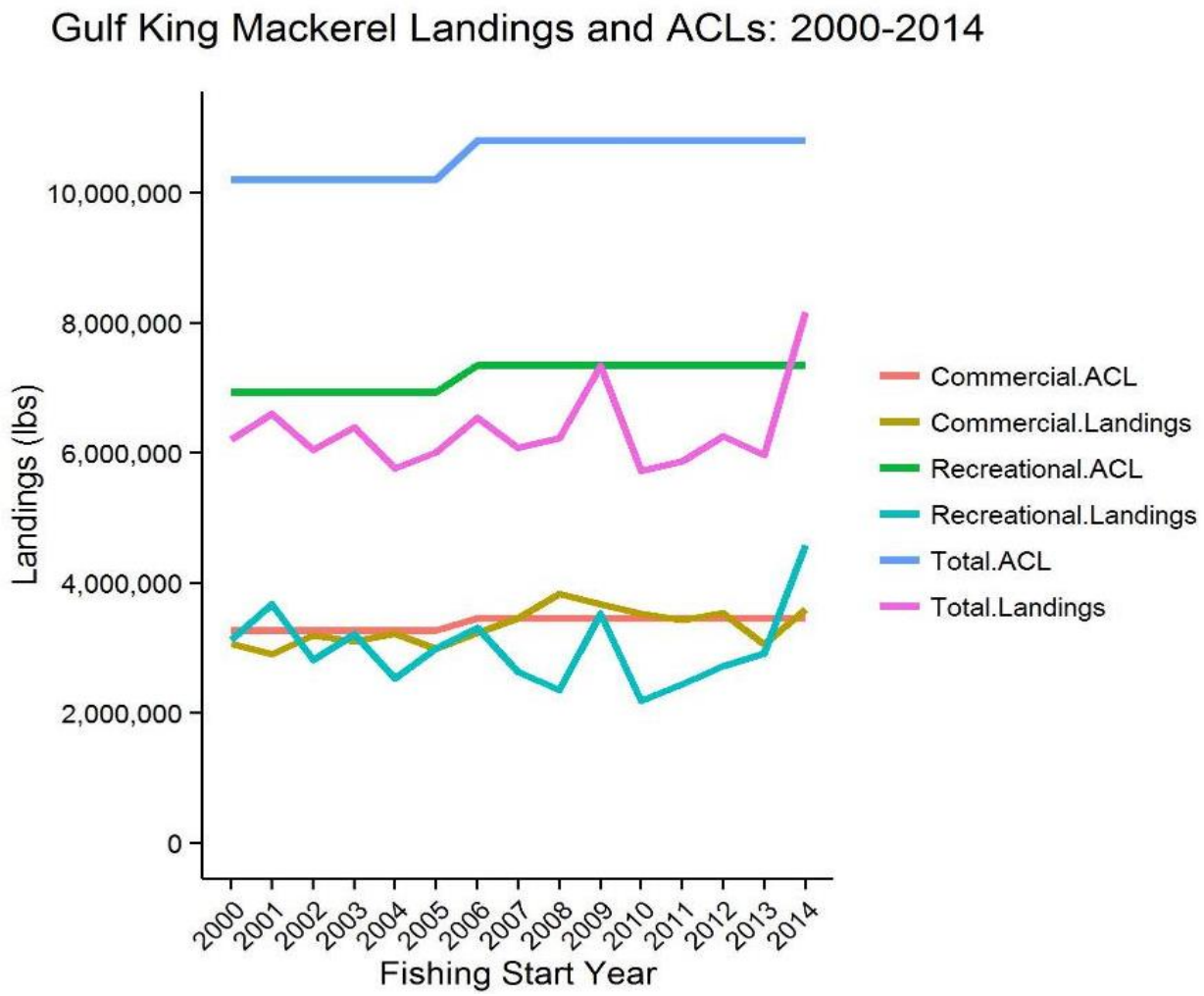

Figure 2.1.1. Trends in Gulf king mackerel landings by sector for the 2000/01 through the 2014/15 fishing seasons. Landings are in pounds.

Alternative 1 would maintain the current recreational and commercial sector allocations of 68% and 32% respectively, which were established in the original Fishery Management Plan (FMP) for Coastal Migratory Pelagic Resources (CMP) in February 1983. Over the last decade, the recreational sector has not landed its sector ACL, while the commercial sector has typically met or exceeded its ACL. Closures for the commercial sector are facilitated by the National Marine Fisheries Service (NMFS), which provides notice to fishermen prior to closing each commercial zone to fishing when that zone's quota is projected to be reached. This trend would be expected to continue, at least in the short term under **Alternative 1**.

Alternative 2 would conditionally transfer a certain percentage (*Options 2a-2d*) of the allocation to the commercial sector in the next fishing year, if the minimum recreational landings threshold is not met (*Options 2e-2g)*. If the commercial sector does not land at least 90% of its ACL, this transfer will not occur. The Gulf and South Atlantic Fishery Management Councils (Councils) proposed four options for transferring quota to the commercial sector: 5% (**Option 2a**), 10% (**Option 2b**), 15% (**Option 2c**), and 20% (**Option 2d**). The resultant sector allocations for each option under **Alternative 2** are shown in Table 2.1.2. This conditional transfer is not cumulative;

whichever option (**2a** – **2d**) is chosen by the Councils determines the total amount by which the sectors' existing allocation (see **Alternative 1**) can be adjusted. The proposed minimum recreational ACL landings thresholds would nullify an allocation transfer if at least 50% (**Option 2e**), 65% (**Option 2f**), or 75% (**Option 2g**) of the recreational sector ACL is landed in either the data year or the intervening year (see example below). In order for **Alternative 2** to function as designed, the Councils must choose one option from **Options 2a** – **2d** and one option from **Options 2e** – **2g**.

Table 2.1.2. Resultant allocations based on options presented in Alternative 2 of Action 1.

Alternative 2	Commercial Allocation	Recreational Allocation
Option 2a	37%	63%
Option 2b	42%	58%
Option 2c	47%	53%
Option 2d	52%	48%

Landings data from two years prior will be used to determine allocation transfers. For example, whether any allocation sharing would occur in 2018-2019 fishing year would be determined using landings from the 2016-2017 fishing year (the data year). Using landings data from two years prior is necessary because final recreational landings are not complete until at least April of the following calendar year, final commercial landings are also not available until April of the following calendar year because final data from states are not submitted until after all fishing seasons are complete, and not all commercial zones in the Gulf use the same fishing year.

An example for **Alternative 2**:

> *Assume that for the 2018-2019 fishing year (the data year), the stock ACL equaled 10 mp (3.2 mp commercial ACL and 6.8 mp recreational ACL). The commercial sector landed its allocation of king mackerel, while the recreational sector only landed 3 mp, or 44.1% of the recreational ACL. Assume Option 2b and 2f in Alternative 2 are preferred, and recreational landings were (projected to be) less than 65% of the recreational ACL in the 2019-2020 fishing year (the intervening year). As such, in the 2020-2021 fishing year, 10% of the stock ACL would be transferred to the commercial sector for that fishing year only. This would result in the sector allocations for the 2020-2021 fishing year being 42% commercial and 58% recreational, with the sector ACLs equaling 4.2 mp and 5.8 mp, respectively. In the next year, the commercial ACL would return to the original amount unless the allocation sharing scenario was triggered again.*

Alternative 3 states that if the stock ACL is not met in a fishing year, the Gulf SSC will convene to consider increasing the ABC for the following fishing year only. If the SSC recommends increasing the ABC, the amount of the increase would be added to the ACL of the sector which harvested its ACL in the previous fishing year. The Gulf SCC would consider an ABC adjustment by only if a minimum percentage of the stock ACL was not harvested in a given fishing season: at least 15% of the stock ACL remains unharvested (**Option 3a**); at least 20% of the stock ACL remains unharvested (**Option 3b**); and at least 25% of the stock ACL remains

unharvested (**Option 3c**). If one of **Options 3a-3c** is not chosen as preferred, and any amount of the stock ACL has not been landed, then the SSC will consider raising the ABC by default. For example:

> *Assume that during the 2018-2019 fishing year, the commercial sector lands its allocation of king mackerel, while the recreational sector does not. The remaining stock ACL that went unharvested would equal 2 mp of the total stock ACL of 10 mp (3.2 mp commercial ACL and 6.8 mp recreational ACL). This would equal a 20% underage. Assuming either Option 3a or 3b is preferred, the SSC would then convene to consider increasing the ABC for the following fishing year only. If the SSC determines that the ABC for the following fishing year can be increased by 500,000 lbs, the new ABC for Gulf king mackerel for 2019-2020 would then equal 10.5 mp. This would result in the commercial ACL for the 2019-2020 fishing season equaling 3.7 mp, while the recreational ACL would remain at 6.8 mp. This increase would be valid for the 2019-2020 fishing year only.*

In the above example, the sector allocations for Gulf king mackerel would change temporarily, but the recreational sector would not lose any pounds of fish. For the 2018-2019 fishing year, the stock ABC would equal 10.5 mp, as opposed to the 10.0-mp ABC from the previous fishing year. The 500,000 lb increase for the 2018-2019 fishing year would be added to the commercial sector's ACL for that year only, while the recreational sector's ACL would go unchanged. In the next year, the commercial ACL would return to the original amount unless the allocation sharing scenario was triggered again.

The gillnet component of the Gulf commercial king mackerel fishery is currently managed using a payback provision as a post-season accountability measure (AM). If the gillnet component exceeds its quota in a given fishing year, then in the following fishing year, the gillnet component's quota will be reduced by the amount of the previous year's overage. For the purposes of the alternatives in Action 1, if additional quota is to be added to the gillnet component's quota in a given year, it will be added after any reduction resulting from the post-season AM.

Council Conclusions:

2.2 Action 2 – Adjust the Recreational Accountability Measure for Gulf Migratory Group King Mackerel

Alternative 1: No Action – Retain the in-season recreational accountability measure (AM). If recreational landings reach or are projected to reach the recreational ACL, the bag limit will be reduced to zero for the remainder of the fishing year.

Alternative 2: Replace the current in-season AM with a post-season AM. If the recreational ACL is exceeded in any fishing year, the length of the following fishing season will be reduced by the amount necessary to ensure the landings do not exceed the ACL.

Alternative 3: Replace the current in-season AM with a post-season AM. If both the recreational ACL *and* the stock ACL are exceeded in a fishing year, the length of the following recreational fishing season will be reduced by the amount necessary to ensure the landings do not exceed the recreational ACL.

Discussion:

With **Alternative 1**, if recreational landings are projected to reach the recreational ACL in a given year, it would result in a fishing closure in the same season. Given that the recreational sector has not met its sector ACL in the last 10 years, it is unlikely that this AM would be triggered. However, should some proportion of the recreational sector ACL be shifted to the commercial sector ACL through Action 1, it is possible that the adjusted recreational sector ACL could be landed. The intention of Action 1 is to ensure the recreational sector is not penalized if they begin landing more of their ACL. However, if a conditional transfer of allocation occurs in a fishing year, and then the recreational landings dramatically increase in that same fishing year, the recreational sector could exceed their adjusted ACL and be shut down for the rest of the year. For example:

> *The stock ACL is 10 mp. Assume the recreational sector only lands 75% (5.1 mp) of their ACL in 2017-2018 and 10% of the stock ACL is shifted to the commercial sector for the 2019-2020 (Action 1, Alternative 2, Options 2b and 2g). The recreational ACL would be 5.8 mp. Although unlikely, if the recreational sector landed 5.8 mp before the end of that fishing year, the bag limit would revert to zero, i.e., the recreational sector would be shut down for the remainder of that fishing year.*

Again, this scenario is unlikely because recreational landings would not be expected to increase so dramatically from one year to the next, but retaining the in-season AM (**Alternative 1**) would carry this risk. Also, this scenario could only occur if Alternative 2 is chosen in Action 1; Alternative 3 in Action 1 does not present this risk, since it relies on the SSC to adjust the ABC.

Alternative 2 would institute a post-season AM in place of the in-season AM in **Alternative 1**, whereby if the recreational ACL is exceeded, the length of the following fishing season would be reduced by the amount necessary to ensure the recreational landings do not exceed the recreational ACL. By replacing the recreational in-season AM with a post-season AM, the sector allocation sharing proposed in Action 1 would occur without the risk of shutting down the

recreational harvest of king mackerel in that year. This provides additional protection to the recreational sector in the event the allocation adjustment is large enough that the adjusted recreational sector ACL is exceeded. Further, in the next year the allocation would shift would not occur and the recreational sector would have access to the full ACL, which could potentially be enough to maintain a year-round recreational fishing season.

Alternative 3 would also institute a post-season AM in place of the in-season AM in **Alternative 1**, whereby if the recreational ACL *and* the stock ACL are exceeded in a fishing year, the length of the following recreational fishing season will be reduced by the amount necessary to ensure the landings do not exceed the recreational ACL. Like **Alternative 2**, this type of post-season AM would reduce the risk of the recreational sector shutting down before any shared allocation could be shifted back. However, since both the recreational ACL *and* the stock ACL have to be exceeded, the AM in **Alternative 3** has the lowest probability of being triggered compared to the other alternatives in Action 2.

Council Conclusions:

CHAPTER 3. AFFECTED ENVIRONMENT

3.1 Description of the Fishery and Status of the Stock

Description of the Fisheries

A detailed description of the king mackerel component of the coastal migratory pelagic (CMP) fishery was included in Amendment 26 to the Fishery Management Plan for Coastal Migratory Pelagic Resources in the Gulf of Mexico and Atlantic Region (FMP) (GMFMC and SAFMC 2016) and is incorporated here by reference, as well as further summarized below. Amendment 26 can be found at http://sero.nmfs.noaa.gov/sustainable_fisheries/gulf_sa/cmp/index.html.

King Mackerel

A federal king mackerel commercial permit is required to fish for and retain king mackerel in excess of the recreational bag limit in federal waters of the Gulf of Mexico (Gulf), South Atlantic, and Mid-Atlantic regions, to fish under a quota, and to sell king mackerel from federal waters. These permits are limited access. In addition, a limited access gillnet endorsement is required to use gillnets in the Gulf Southern Zone. As of July 6, 2016, there were 1,440 valid or renewable commercial king mackerel permits and 19 valid or renewable gillnet endorsements. The commercial king mackerel permits do not have an income requirement, which was removed through Amendment 20A (GMFMC and SAFMC 2013a).

For-hire vessels harvesting CMP species in the Gulf must have either a "Gulf Charter/Headboat permit for CMP" or a "Historical Captain Gulf Charter/Headboat permit for CMP." The Gulf CMP for-hire permit is limited access. As of July 22, 2016, there were 1,291 valid (non-expired) or renewable Gulf CMP Charter/Headboat permits and Historical Captain Gulf CMP Charter/Headboat permits.

Figure 3.1.1 shows the commercial zones for Gulf and Atlantic king mackerel. The Gulf Western Zone extends from the southern border of Texas to the Alabama/Florida state line. The fishing year for this zone is July 1 through June 30. The Gulf Northern Zone extends from the Alabama/Florida state line in the west to the Lee/Collier county line in the South, with a fishing year of October 1 through September 30. The Gulf Southern Zone extends south of the Lee/Collier county line, with a fishing year from July 1 through June 30. In the Gulf Southern Zone, the gillnet season opens on the day after the Martin Luther King, Jr. holiday. Gillnet fishing is allowed during the first weekend thereafter, but not on subsequent weekends.

The waters off Florida are divided at the Monroe/Dade county line, which corresponds to the easternmost border between the Gulf and Atlantic king mackerel migratory groups. The Florida East Coast Subzone is currently from the Flagler/Volusia county line south to the Dade/Monroe county line and only exists from November 1 through March 31 (Figure 3.1.1A). King mackerel in this subzone are considered part of the Atlantic migratory group during summer (Figure 3.1.1B).

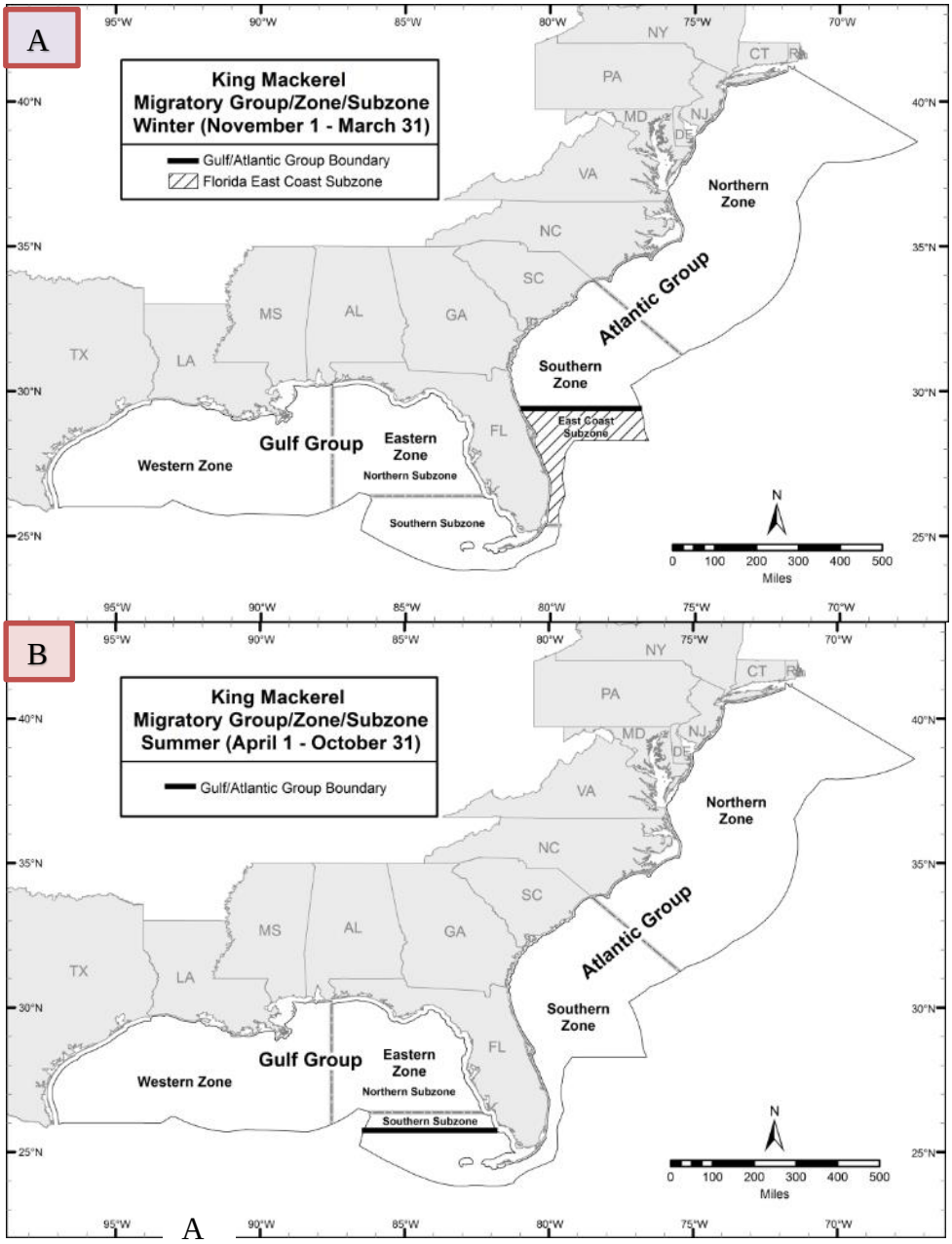

Figure 3.1.1. Gulf and Atlantic king mackerel zones for A) November 1 – March 31, and B) April 1 – October 31.

Management measures for the South Atlantic apply to king mackerel from New York to the east coast of Florida. The Atlantic migratory group king mackerel fishing year is March 1 through end of February. This migratory group is divided into Northern and Southern Zones by a line at the North Carolina/South Carolina border (Figure 3.1.1).

Amendment 26 to the CMP FMP proposes changes to the management boundaries between the Gulf of Mexico and South Atlantic Fishery Management Councils (Councils). The Councils propose establishing a single year-round boundary for separating the Gulf and Atlantic migratory

groups of king mackerel at the Miami-Dade/Monroe county line (Figure 3.1.2). The Gulf Council would be responsible for management measures in the mixing zone. Amendment 26 was sent to the National Marine Fisheries Service (NMFS) on July 7, 2016, and is currently undergoing Secretarial review.

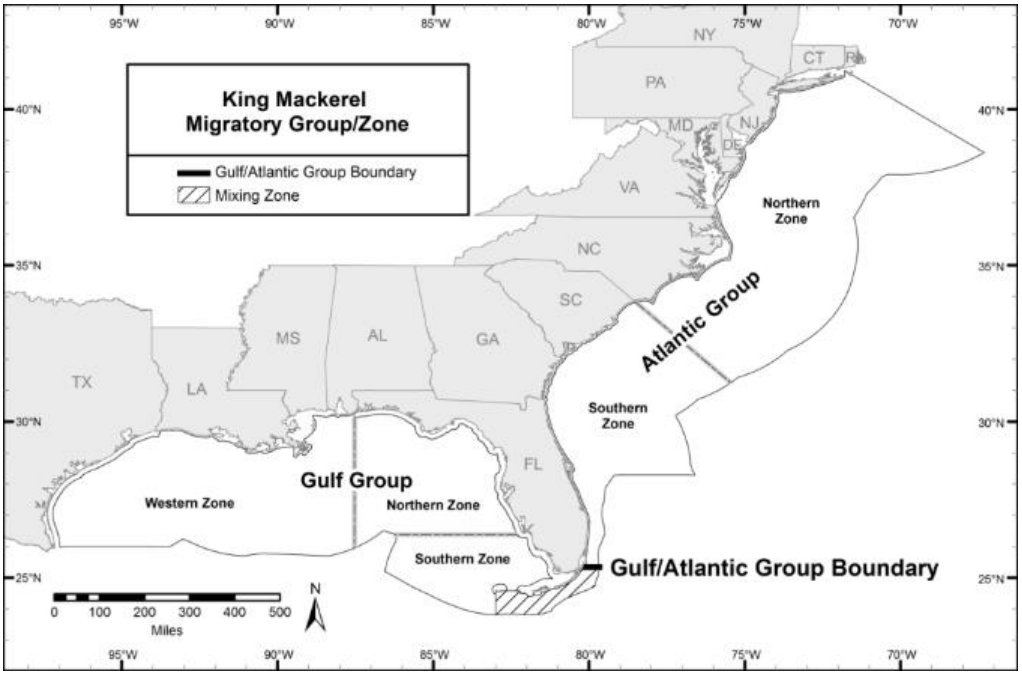

Figure 3.1.2. Preferred Alternative 3 from Action 1 in Amendment 26 to the CMP FMP, showing the proposed management boundary for Atlantic and Gulf king mackerel.

Commercial landings of Gulf king mackerel increased as the total commercial quota for the Gulf increased until 1997/1998 when the quota was set at 3.39 million pounds (mp). After that, landings have been relatively steady near the annual catch limit (ACL). Commercial landings of Atlantic king mackerel have decreased in recent years (Table 3.1.1).

Table 3.1.1. Commercial landings of king mackerel by fishing year.

Fishing Year	Landings (lbs)	
	Gulf	Atlantic
2000/2001	3,056,222	1,932,162
2001/2002	2,902,632	1,686,844
2002/2003	3,184,478	1,856,717
2003/2004	3,095,673	2,774,442
2004/2005	3,215,676	2,243,000
2005/2006	2,984,694	2,991,346
2006/2007	3,231,734	2,656,832
2007/2008	3,459,064	3,105,433
2008/2009	3,834,026	3,560,880
2009/2010	3,672,628	3,402,329
2010/2011	3,521,125	2,051,938
2011/2012	3,427,891	1,346,376
2012/2013	3,538,228	1,346,459
2013/2014	3,055,018	1,116,833
2014/2015	4,003,665	1,324,957

Source: SEFSC, ALS database; NEFSC, CFDBS database.

King mackerel have long been a popular target for recreational fishermen. The recreational sector is allocated 68% of the Gulf ACL and 62.9% of the Atlantic ACL. Gulf recreational landings averaged about 2.8 mp per year over the last five years. The Atlantic king mackerel recreational landings in recent years have been lower than previous years (Table 3.1.2).

Table 3.1.2. Recreational landings of king mackerel by fishing year.

Fishing Year	Landings (lbs)	
	Gulf	Atlantic
2000/2001	3,121,584	6,184,541
2001/2002	3,668,540	5,035,061
2002/2003	2,817,537	4,574,235
2003/2004	3,211,497	4,979,506
2004/2005	2,528,457	5,321,449
2005/2006	2,995,716	4,457,679
2006/2007	3,305,567	5,127,178
2007/2008	2,626,527	7,128,545
2008/2009	2,352,510	4,228,245
2009/2010	3,523,777	4,394,015
2010/2011	2,182,980	2,692,771
2011/2012	2,436,026	1,562,905
2012/2013	2,711,213	1,719,199
2013/2014	2,914,241	1,004,441
2014/2015	4,630,482	1,305,500

Source: SEFSC, MRFSS, SRHS, and TPWD databases.

Status of the Stock

Both the Gulf and Atlantic king mackerel were assessed by the Southeast Data, Assessment, and Review (SEDAR) process in SEDAR 38 (2014). The SEDAR 38 assessments determined the Gulf and Atlantic king mackerel were not overfished and were not experiencing overfishing. Recruitment has been lower in recent years for the Atlantic king mackerel, which could be due to physical and/or biological oceanographic variables (e.g., changes in water temperature, timing of upwelling events, changes in current patterns [eddies, gyres, current proximity to shore]), anthropogenic influences, or some combination thereof. There is no evidence of a similar decline in recruitment for the Gulf migratory group.

3.2 Description of the Physical Environment

3.2.1 Gulf of Mexico

The Gulf has a total area of approximately 600,000 square miles (1.5 million km^2), 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. 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 Fechhelm 2005). Mean annual sea surface temperatures ranged from 73 through 83º F (23-28º C) including bays and bayous (Figure 3.2.1.1) between 1982 and 2009, according to satellite-derived measurements (NODC 2012: http://accession.nodc.noaa.gov/0072888). In general, mean sea surface temperature increases from north to south with large seasonal variations in shallow waters.

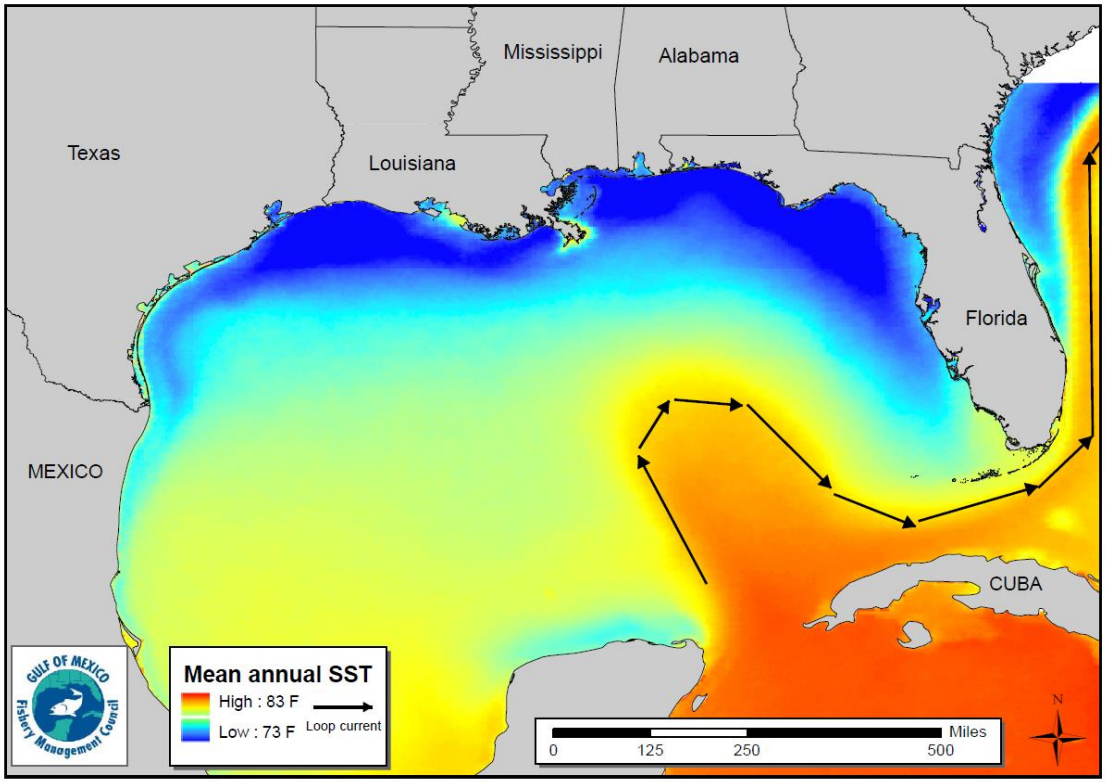

Figure 3.2.1.1. Mean annual sea surface temperature derived from the Advanced Very High Resolution Radiometer Pathfinder Version 5 sea surface temperature data set (http://pathfinder.nodc.noaa.gov).

The physical environment is detailed in the Environmental Impact Statement for the Generic Essential Fish Habitat (EFH) Amendment (GMFMC 2005) and the Generic ACLs/

Accountability Measures (AMs) Amendment[1] (GMFMC and SAFMC 2011), which are hereby incorporated by reference and updated below.

In the 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. Historical research indicates that over 2,000 ships sank on the federal outer continental shelf in the Gulf of Mexico between 1625 and 1951; thousands more sank 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

Habitat Areas of Particular Concern (HAPC)

Generic Amendment 3 (GMFMC 2005) for addressing EFH, HAPC, and adverse effects of fishing in the fishery management plans for Gulf Reef Fish, Red Drum, and CMP is hereby incorporated by reference.

Environmental Sites of Special Interest Relevant to Coastal Migratory Pelagic Species (Figure 3.2.1.2)

Tortugas North and South Marine Reserves – No-take marine reserves (185 nm^2) cooperatively implemented by Florida, the National Ocean Service, the Gulf of Mexico Fishery Management Council and the National Park Service in Generic Amendment 2: Establishing the Tortugas Marine Reserves (GMFMC 2001). Only a small portion (13 nm^2) of the Tortugas North Marine Reserve is in federal waters, while the entire Tortugas South Marine Reserve (54.5 nm^2) is in federal waters.

Reef and bank areas designated as Habitat Areas of Particular Concern (HAPCs) in the northwestern Gulf include – East and West Flower Garden Banks, Stetson Bank, and McGrail Bank - Pristine coral areas protected by preventing the use of some fishing gear that interacts with the bottom and prohibited use of anchors (totaling 80.4 nm^2). 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 2005). Sonnier Bank, MacNeil Bank, 29 Fathom, Rankin Bright Bank, Geyer Bank, Bouma Bank, Rezak Sidner Bank, Alderice Bank, and Jakkula Bank (totaling 183 nm^2) are other areas that have been designated as HAPCs but currently have no regulations associated with them. A weak link in the tickler chain of bottom trawls on all habitats throughout the Gulf exclusive economic zone (EEZ) is required. A weak link is defined as a length or section of the tickler chain that has a breaking strength less than the chain itself and is easily seen as such when visually inspected. An education program

[1] Final Generic Annual Catch Limits/Accountability Measures Amendment for the Gulf of Mexico Fishery Management Council's Red Drum, Reef Fish, Shrimp, Coral and Coral Reefs Fishery Management Plans.

for the protection of coral reefs when using various fishing gears in coral reef areas for recreational and commercial fishermen was also developed.

Pulley Ridge HAPC – A portion (101 nm^2) of the HAPC (2,300 nm^2 or 4,259 km^2) 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 2005).

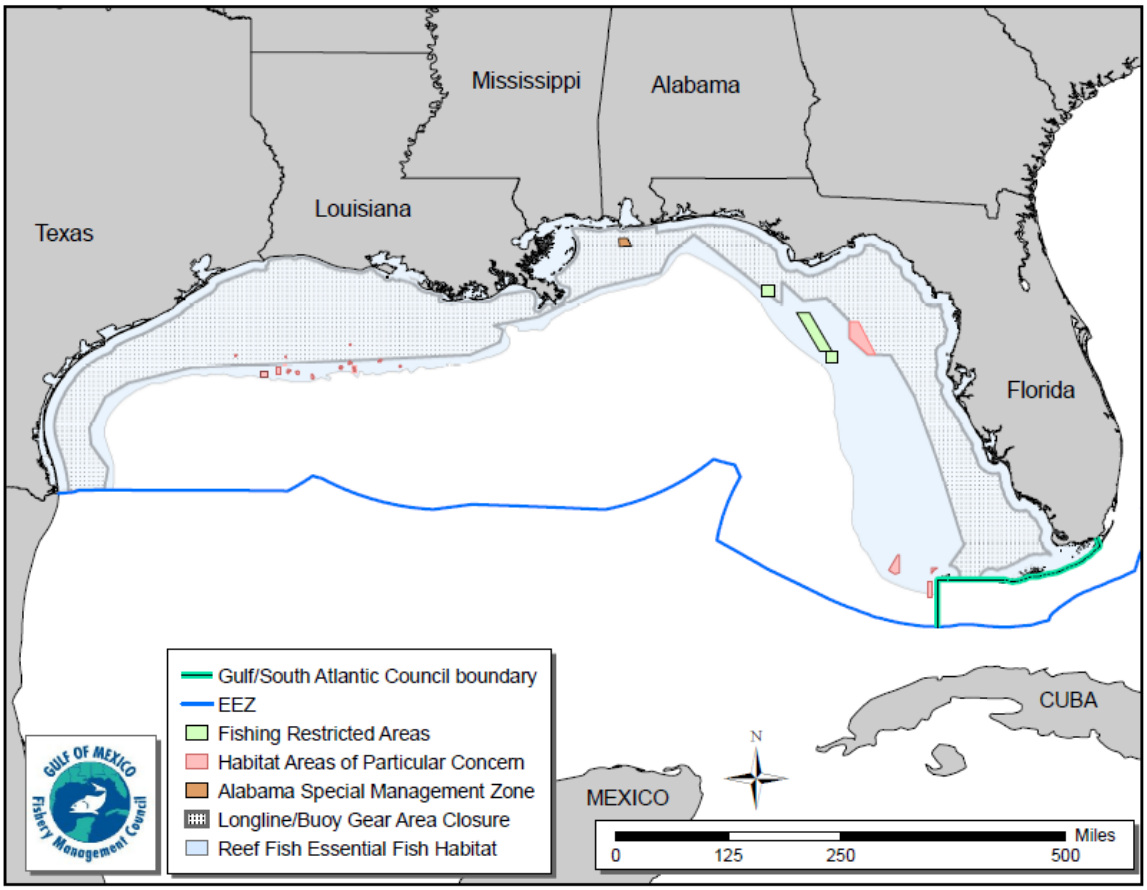

Figure 3.2.1.2. Map of most fishery management closed areas in the Gulf.

***Deepwater Horizon* MC252 Oil Spill Incident**

Overview

On April 20, 2010, an explosion occurred on the *Deepwater Horizon* semi-submersible oil rig approximately 36 nautical miles (41 statute miles) off the Louisiana coast. Two days later the rig sank. An uncontrolled oil leak from the damaged well continued for 87 days until the well was successfully capped by British Petroleum on July 15, 2010. The *Deepwater Horizon* MC252 oil spill 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.

As reported by the National Oceanic and Atmospheric Administration Office of Response and Restoration (NOAA 2010), the oil from the *Deepwater Horizon* MC252 oil spill is relatively high in alkanes which can readily be used by microorganisms as a food source. 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 polycyclic aromatic hydrocarbons. Polycyclic aromatic hydrocarbons are highly toxic chemicals that tend to persist in the environment for long periods of time, especially if the spilled oil penetrates into the substrate on beaches or shorelines. Like all crude oils, *Deepwater Horizon* 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 (http://sero.nmfs.noaa.gov/sf/deepwater_horizon/OilCharacteristics.pdf).

In addition to the crude oil, over one 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 prior to the *Deepwater Horizon* MC252 oil spill.

Oil could exacerbate the development of the hypoxic "dead" zone in the Gulf, similar in effect as higher than normal input of water laden with fertilizer runoff from the Mississippi River basin. For example, oil on the surface of the water could restrict the normal process of atmospheric oxygen mixing into and replenishing oxygen concentrations in the water column. In addition, microbes in the water that break down oil and dispersant consume oxygen; this metabolic process further depletes oxygen in the adjacent waters.

General Impacts on Fishery Resources

The presence of PAHs in marine environments can have detrimental impacts on marine finfish, especially during the more vulnerable larval stage of development (Whitehead et al. 2012). When exposed to realistic yet toxic levels of PAHs (1–15 μg/L), greater amberjack (*Seriola dumerili*) 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 (Mendelssohn 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).

An increase 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 (>400 mm TL) 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).

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.

3.2.2 Climate Change

Climate change projections show 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) http://www.ipcc.ch/]. 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) and Osgood (2008) have suggested global climate change could bring about temperature changes in coastal and marine ecosystems that, in turn, can influence organism metabolism; alter ecological processes, such as productivity and species interactions; change precipitation patterns and cause a rise in sea level that could change the water balance of coastal ecosystems; alter 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 Administration's (NOAA) Climate Change Web Portal (http://www.esrl.noaa.gov/psd/ipcc/ocn/) indicates that the average sea surface temperature in the Gulf will increase by 1.2-1.4ºC for 2006-2055 compared to the average over the years 1956-2005. Burton (2008) speculated that climate change could cause shifts in spawning seasons, changes in migration patterns, and changes to basic life history parameters such as growth rates. The OceanAdapt model (http://oceanadapt.rutgers.edu/regional_data/) shows distributional trends both in latitude and depth over the time period 1985-1013. For some reef fish species such as the smooth puffer, 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.

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 span that would include detectable climate change effects.

Greenhouse gases

The IPCC (http://www.ipcc.ch/) has indicated that greenhouse gas emissions are one of the most important drivers of recent changes in climate. Wilson et al. (2014) 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 3.2.2.1 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 (1.43% and 0.59%, respectively).

Table 3.2.2.1. Total Gulf greenhouse gas emissions estimates (tons per year) from oil platform and non-oil platform sources, commercial fishing and recreational vessels, and percent greenhouse gas emissions from commercial fishing and recreational vessels of the total emissions.*

Emission source	CO_2	Greenhouse CH_4	Gas N_2O	Total CO_{2e}**
Oil platform	11,882,029	271,355	167	17,632,106
Non-platform	22,703,695	2,029	2,698	23,582,684
Total	34,585,724	273,384	2,865	41,214,790
Commercial fishing vessels	585,204	2	17	590,516
Recreational fishing vessels	244,483	N/A	N/A	244,483
% Commercial fishing vessels	1.69	>0.01	0.59	1.43
% recreational fishing vessels	0.71	NA	NA	0.59

3.3 Description of the Biological Environment

A description of the biological 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 King Mackerel

The proposed actions in this amendment will affect the Gulf king mackerel migratory group of the CMP fishery (*Scomberomorus cavalla*). King mackerel is a marine pelagic species that is found throughout the western Atlantic from the Gulf of Maine to Brazil, including the Gulf and Caribbean Sea, and from shore to 200 m (656 ft). Adults utilize coastal waters out to the edge of the continental shelf. Within the area, the occurrence of king mackerel is governed by temperature and salinity. They are seldom found in water temperatures less than 20°C; salinity preference varies, but they generally prefer high salinity, but less than 36 parts per thousand.

Adults are migratory, and the CMP FMP recognizes two migratory groups (Gulf and Atlantic). Typically, adult king mackerel are found in the southern climates (south Florida and extreme south Texas/Mexico) in the winter and farther north in the summer; however, some king mackerel overwinter in deeper waters off the mouth of the Mississippi River, and off the coast of North Carolina. Food availability and water temperature are likely causes of these migratory patterns. King mackerel have longevities of 24 to 26 years for females and 23 years for males (GMFMC and SAFMC 1985; MSAP 1996; Brooks and Ortiz 2004).

Adults are known to spawn in areas of low turbidity, with salinity and temperatures of approximately 30 ppt and 27°C, respectively. There are major spawning areas off Louisiana and Texas in the Gulf (McEachran and Finucane 1979); and off the Carolinas, Cape Canaveral, and Miami in the western Atlantic (Wollam 1970; Schekter 1971; Mayo 1973). Spawning occurs generally from May through October with peak spawning in September (McEachran and Finucane 1979). Eggs are believed to be released and fertilized continuously during these months. Fifty percent of females are sexually mature between 450 to 499 mm (17.7 to 19.6 inches) in length and most are mature by the time they are 800 mm (35.4 inches) in length, or by about age 4. Fifty percent of males are sexually mature at age 3, at a length of 718 mm (28.3 inches). Females in U.S. waters, between the sizes of 446 – 1,489 mm (17.6 to 58.6 inches) release 69,000 – 12,200,000 eggs.

Larvae of king mackerel have been found in waters with temperatures between 26 – 31° C (79 – 88° F). This larval developmental stage has a short duration. King mackerel can grow up to 0.54 – 1.33 mm (0.02 to 0.05 inches) per day. This shortened larval stage decreases the vulnerability of the larvae, and is related to the increased metabolism of this fast-swimming species. Juveniles are generally found closer to shore than adults and occasionally in estuaries.

3.3.2 Protected Species

Species in the Gulf and South Atlantic protected under the Endangered Species Act (ESA) include: seven marine mammal species (blue, sei, fin, humpback, sperm, North Atlantic right whales and manatees); five sea turtle species (Kemp's ridley, loggerhead, green, leatherback, and

hawksbill); four fish species (Gulf sturgeon, smalltooth sawfish, shortnose sturgeon, and Atlantic sturgeon); and seven coral species (elkhorn, staghorn, lobed star, knobby star, mountainous star, pillar, and rough cactus). Aside from the aforementioned protected species, portions of designated critical habitat for *Acropora* corals and the North Atlantic Right Whale also occur within areas encompassed by the CMP fishery. In a 2015 biological opinion, NMFS determined that the proposed continued authorization of the CMP Fishery is not likely to adversely affect any listed whales (i.e., blue, sei, sperm, fin, humpback, or North Atlantic right whales), Gulf sturgeon, or elkhorn and staghorn corals. NMFS also determined that 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.

According to the 2015 Biological Opinion on CMP fisheries (NMFS 2015), the only gear type likely to adversely affect sea turtles, smalltooth sawfish, and Atlantic sturgeon is gill nets. 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. Green, hawksbill, Kemp's ridley, leatherback, and loggerhead sea turtles area 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 CMP fisheries.
On April 6, 2016, NMFS published a final rule (81 FR 20058) listing 11 distinct population segments (DPSs) of green sea turtles; the North Atlantic and South Atlantic DPSs of green sea turtles are listed as threatened, and are the only DPSs whose individuals can be expected to be encountered in the area managed under the CMP FMP. On July 29, 2016, NMFS published a final rule (81 FR 42268) listing Nassau grouper as threatened under the ESA. The listing of Nassau grouper in the Gulf may be affected by the CMP fishery off of southern Florida where the species overlaps with the fishery. The new listings trigger re-initiation of consultation under Section 7 of the ESA.

The Gulf and South Atlantic CMP hook-and-line fishery is classified in the 2016 Marine Mammal Protection Act List of Fisheries as a Category III fishery (81 FR 20550), 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 moralities, that may be removed from a marine mammal stock while allowing that stock to reach or maintain its optimum sustainable population.

The gillnet component of the Gulf and South Atlantic CMP fishery is classified as Category II fishery in the 2016 Marine Mammal Protection Act List of Fisheries. This classification indicates an occasional incidental mortality or serious injury of a marine mammal stock resulting from the fishery (1-50% annually of the potential biological removal). The fishery has no documented interaction with marine mammals; NMFS classifies this fishery as Category II based on analogy (i.e., similar risk to marine mammals) with other gillnet fisheries.

3.3.3 Bycatch

A description of the affected environment as it relates to bycatch will be provided in Appendix C: Bycatch Practicability Analysis.

3.4 Description of the Economic Environment

A description of the Gulf king mackerel stock is provided in Section 3.1. An economic description of the commercial sector for CMP species, including king mackerel, is contained in Vondruska (2010) and is incorporated herein by reference. If Amendment 26 is approved and implemented, the stock boundary for Gulf king mackerel would extend into federal waters off of the Florida Keys up to the Dade/Monroe County line. A description of the commercial and recreational sectors of the South Atlantic king mackerel fishery is provided in GMFMC and SAFMC (2016) and is incorporated herein by reference. The following section contains updated information on the economic environment of the current Gulf king mackerel fishery only.

3.4.1 Commercial Sector

The major sources of data summarized in this description are the NMFS SERO Permits Information Management System (PIMS) and the Federal Logbook System (FLS), supplemented by average prices calculated from the NMFS Accumulated Landings System (ALS). Inflation adjusted revenues and prices are reported in 2015 dollars using the GDP Implicit Price Deflator. King mackerel landings are expressed in mixed weight (mw) to align with the way they are reported to NMFS. If Amendment 26 is implemented, landings that occur in East Florida, north of the Monroe County/Dade County line, will no longer count towards the Gulf king mackerel commercial ACL and, therefore, future Gulf king mackerel landings may be less than what is currently presented throughout this section.

Permits

Any fishing vessel that sells king mackerel harvested in Gulf federal waters must have a valid limited access commercial king mackerel permit. A separate and additional valid limited access commercial king mackerel gillnet endorsement is required to harvest the species using a run-around gillnet in the Gulf Southern Zone. The numbers of commercial permits associated with king mackerel on July 25, 2016 are provided in Table 3.4.1.1.

Table 3.4.1.1. Number of permits associated with the king mackerel fishery as of July 25, 2016.

	Valid*	Valid or Renewable
King Mackerel	1,310	1,445
King Mackerel Gillnet	19	20

Source: NMFS SERO PIMS, 2016.
*Non-expired; expired permits may be renewed within one year of expiration.

Landings, Value, and Effort

A breakdown of landings by gear for Gulf king mackerel is provided in Figure 3.4.1.1. King mackerel were predominantly harvested by trolling lines and vertical lines from 2011 through 2015.

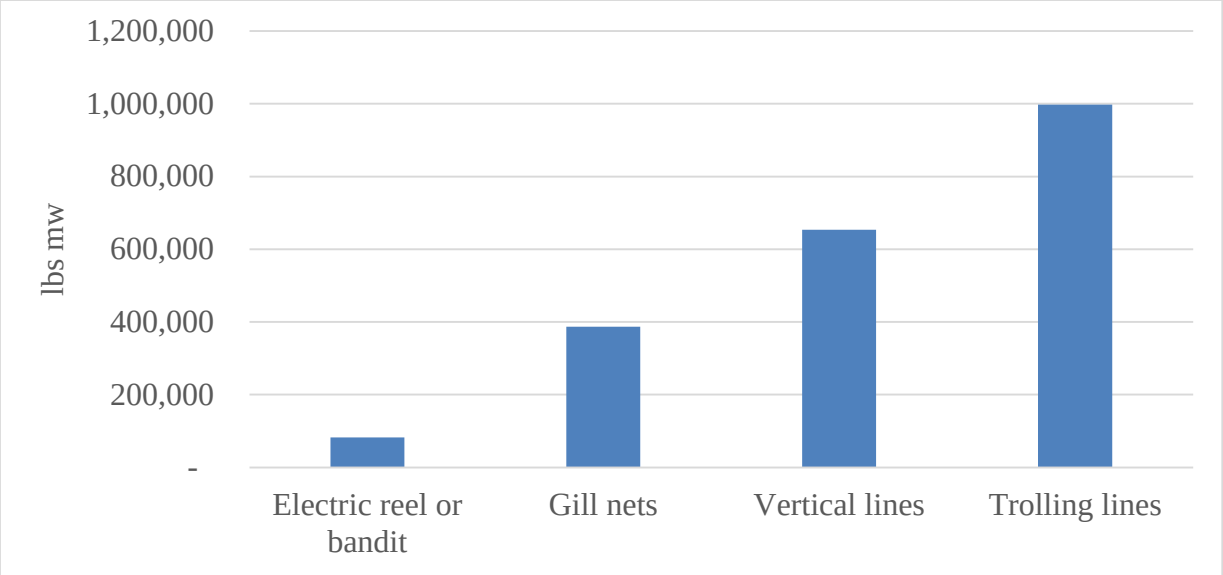

Figure 3.4.1.1. Average annual landings of king mackerel by gear (2011 through 2015)*.
Source: NMFS SEFSC Coastal Fisheries Logbook.
*Gears that accounted for less than 0.1% of landings on average are excluded from this figure.
Note 1: Calendar year estimates are provided here to align with other statistics presented later in this section; however, because the king mackerel fishing years do not align with the calendar year, these values will be somewhat different than averages based on fishing year estimates. Additionally, landings from state waters by vessels without federal permits are not included.

The number of federally permitted commercial vessels that landed Gulf king mackerel declined from 290 vessels in 2011 to 237 vessels in 2015, with an uptick in 2014 (Table 3.4.1.2). On average (2011 through 2015), these vessels landed Gulf king mackerel on approximately half of their Gulf trips and Gulf king mackerel accounted for approximately 27% of their annual all-species revenue, including revenue from South Atlantic trips (Table 3.4.1.2 and Table 3.4.1.3). Average all-species vessel-level revenue for these vessels increased by approximately 47% from 2011 through 2015. During this time period, the average annual price of Gulf king mackerel ranged from $1.92 to $2.23 (2015 dollars) (Table 3.4.1.3).

Table 3.4.1.2. Number of vessels, number of trips and landings (lbs mw) by year for Gulf king mackerel.

Year	# of vessels that caught king mackerel (> 0 lbs mw)	# of trips that caught king mackerel	King mackerel landings (lbs mw)	Other species' landings jointly caught w/ king mackerel (lbs mw)	# of Gulf trips that only caught other species	Other species' landings on Gulf trips w/o king mackerel (lbs mw)	All species landings on South Atlantic trips (lbs mw)
2011	290	2,006	2,194,213	589,794	2,248	4,827,227	1,064,795
2012	287	2,162	1,932,385	597,163	2,071	4,289,260	968,510
2013	269	2,189	1,985,415	661,266	1,731	3,886,507	799,501
2014	288	2,687	2,544,647	753,213	1,950	4,371,968	867,528
2015	237	1,869	1,952,606	607,564	1,854	4,285,931	866,547
Average	274	2,183	2,121,853	641,800	1,971	4,332,179	913,376

Source: NMFS SEFSC Coastal Fisheries Logbook.
Note: Calendar estimates are provided here for all statistics; however, because the king mackerel fishing year does not align with the calendar year, these will differ from king mackerel fishing year landings estimates. Additionally, landings from state waters by vessels without federal permits are not included.

Table 3.4.1.3. Number of vessels and ex-vessel revenues by year (2015 dollars)* for Gulf king mackerel.

Year	# of vessels that caught king mackerel (> 0 lbs mw)	Dockside revenue from king mackerel	Dockside revenue from 'other species' jointly caught w/ king mackerel	Dockside revenue from 'other species' caught on Gulf trips w/o king mackerel	Dockside revenue from 'all species' caught on South Atlantic trips	Total dockside revenue	Average total dockside revenue per vessel
2011	290	$4,219,004	$1,635,056	$5,230,617	$2,414,940	$13,499,617	$46,550
2012	287	$3,881,057	$1,786,227	$7,681,605	$2,255,753	$15,604,643	$54,372
2013	269	$4,676,362	$2,420,599	$8,766,276	$2,054,600	$17,917,836	$66,609
2014	288	$5,707,921	$2,468,701	$10,801,521	$2,405,504	$21,383,648	$74,249
2015	237	$4,349,566	$2,187,287	$7,635,680	$2,102,316	$16,274,849	$68,670
Average	274	$4,566,782	$2,099,574	$8,023,140	$2,246,623	$16,936,119	$62,090

Source: SEFSC Coastal Fisheries Logbook, augmented by the NMFS Accumulated Landings System for prices.
*Revenues converted to 2015 dollars using the annual, seasonally-adjusted GDP implicit price deflator provided by the U.S. Bureau of Economic Analysis.
Note: Calendar estimates are provided here for all statistics; however, because the king mackerel fishing year does not align with the calendar year, these will differ from king mackerel fishing year revenue estimates. Additionally, revenue from landings in state waters by vessels without federal permits is not included.

Imports

Imports of seafood products compete in, and dominate many segments of, the domestic seafood market. Imports aid in determining 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 CMP species, and king mackerel in particular,

imports affect the returns to fishermen through the ex-vessel prices they receive for their landings. As substitutes to domestic production of CMP species, including king mackerel, imports tend to cushion the adverse economic effects on consumers resulting from a reduction in domestic landings.

Ninety-nine percent of mackerel imports[2], on average (2011 through 2015), were comprised of frozen or prepared/preserved fish[3]; the remaining one percent were fresh. Imports of mackerel dropped steadily from 50 million pounds product weight (pw) in 2011 to 38.6 million pounds pw in 2013, then steadily increased to 48.3 million pounds pw in 2015. Total revenue from mackerel imports ranged from $51.2 million (2015 dollars) to $68.4 million during this time period. Imports of mackerel primarily originated in China, Norway, and Thailand, and to a lesser extent, Vietnam, South Korea and Canada. These imports primarily entered the U.S. through New York, Los Angeles, and Baltimore. Mackerel imports were highest on average (2011 through 2015) during the months of January, November and December.

Business Activity

The commercial harvest and subsequent sale 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 mackerel 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 king mackerel, and all species harvested by the vessels that harvested these king mackerel, were derived using the model[4] developed for and applied in NMFS (2016) and are provided in Table 3.4.1.4. This business activity is characterized as jobs (full- and part-time), income impacts (wages, salaries, and self-employed income), and output (sales) impacts (gross business sales). Income impacts should not be added to output (sales) impacts 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

[2] NOAA 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. Mackerel imports data do not differentiate between individual species of mackerel.

[3] Includes dried, salted and smoked mackerel.

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

example, the results provided here apply to a general reef fish category, which also includes king and Spanish mackerel, rather than just king mackerel, and a harvester job is "generated" for approximately every $31,000 (2015 dollars) in ex-vessel revenue. These results contrast with the number of harvesters (vessels) with recorded landings of king mackerel presented in Table 3.4.1.2.

Table 3.4.1.4. Average annual business activity (2011 through 2015) associated with the commercial harvest of king mackerel and the harvest of all species by vessels that landed king mackerel. All monetary estimates are in 2015 dollars*.

Species	Average Ex-vessel Value ($ thousands)	Total Jobs	Harvester Jobs	Output (Sales) Impacts ($ thousands)	Income Impacts ($ thousands)
Gulf king mackerel	$4,567	619	147	$45,288	$16,631
All species harvested by vessels that landed Gulf king mackerel	$16,936	2,296	545	$167,952	$61,678

*Converted to 2015 dollars using the annual, seasonally-adjusted GDP implicit price deflator provided by the U.S. Bureau of Economic Analysis.

3.4.2 Recreational Sector

The Gulf 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 comprised of charter boats and headboats (also called partyboats). 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 since larger concentrations of fish are required to satisfy larger groups of anglers.

Landings

Private, charter and shore fishing were the primary modes of harvest for Gulf king mackerel (Figure 3.4.2.1). The vast majority of Gulf king mackerel were harvested in West Florida through Alabama (Figure 3.4.2.2). If Amendment 26 is implemented, landings that occur in East Florida, north of the Monroe County/Dade County line, will no longer count towards the Gulf king mackerel recreational ACL and, therefore, future Gulf king mackerel landings may be less than what is currently represented in Figure 3.4.2.1 and Figure 3.4.2.2.

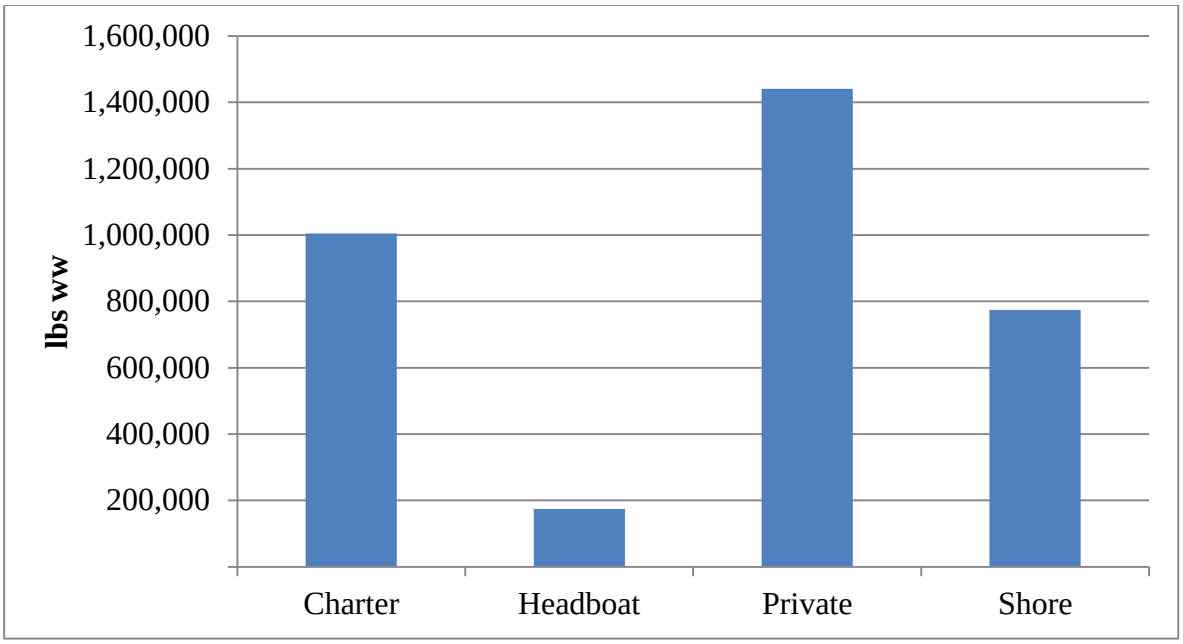

Figure 3.4.2.1. Average annual recreational landings of Gulf king mackerel by mode (2011 through 2015).

Source: SEFSC MRFSS ACL data sets (July 2016).

Note: Calendar year estimates are provided here to align with other statistics presented later in this section; however, because the king mackerel fishing year does not align with the calendar year, these values will be somewhat different than averages based on fishing year estimates.

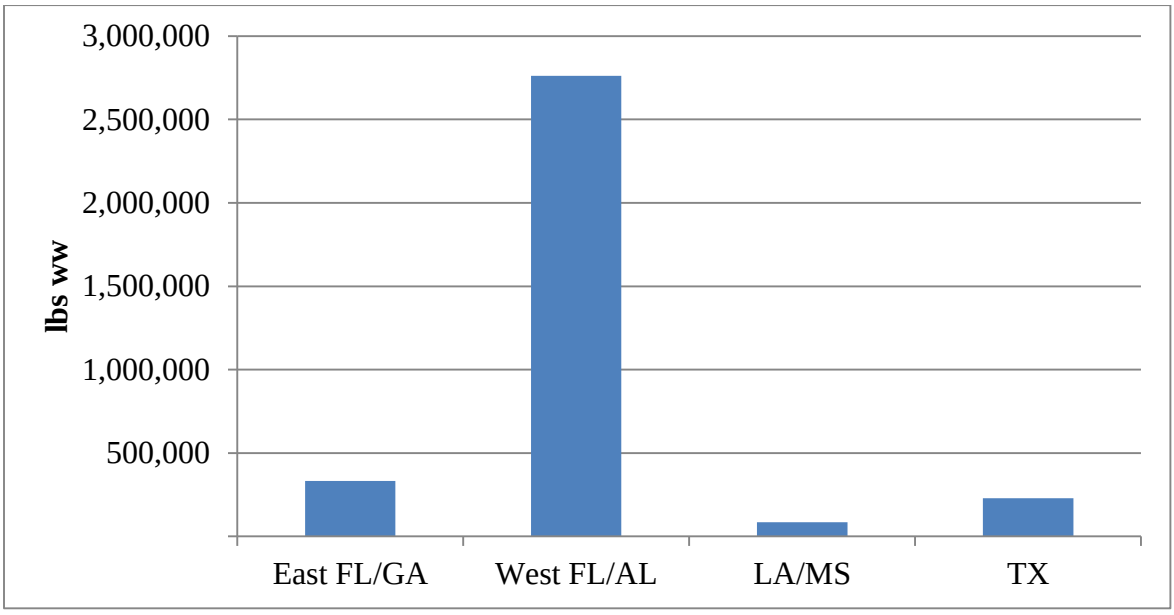

Figure 3.4.2.2. Average annual recreational landings of Gulf king mackerel by state (2011 through 2015)*.

*Some states are combined here to align with the way headboat landings were reported.

Source: SEFSC MRFSS ACL data sets (July 2016).

Note: Calendar year estimates are provided here to align with other statistics presented later in this section; however, because the king mackerel fishing year does not align with the calendar year, these values will be somewhat different than averages based on fishing year estimates.

Angler Effort

Recreational effort derived from the Marine Recreational Information Program (MRIP) database can be characterized in terms of the number of trips as follows:

- Target effort - The number of individual angler trips, regardless of duration, where the intercepted angler indicated that the species or a species in the species group was targeted as either the first or 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 king mackerel in the Gulf.

The majority of estimated target trips for king mackerel in the Gulf, on average (2011 through 2015), were shore trips (Table 3.4.2.1). There was minimal target effort for king mackerel in Louisiana and Mississippi. Gulf king mackerel target trips in Florida increased steadily from 2011 through 2014, but then declined in 2015, for an overall net increase of 29% during the time period. The number of target trips for king mackerel in Alabama fluctuated during the same time period, but overall, increased by approximately 85% (Table 3.4.2.1).

Other measures of effort are possible, such as directed trips (the number of individual angler trips that either targeted or caught a particular species). Estimates of king mackerel target effort for additional years, and other measures of directed effort, are available at http://www.st.nmfs.noaa.gov/recreational-fisheries/access-data/run-a-data-query/queries/index.

Table 3.4.2.1. Gulf king mackerel recreational target trips, by mode and state, 2011-2015*.

	Alabama	Florida	Louisiana**	Mississippi	Total
Shore Mode					
2011	46,754	135,543	0	0	182,297
2012	96,951	120,167	0	0	217,117
2013	219,921	197,781	0	0	417,702
2014	112,062	202,903	N/A	0	314,965
2015	158,651	129,920	N/A	0	288,571
Average	126,868	157,263	0	0	284,130
Charter Mode					
2011	4,078	19,854	0	0	23,932
2012	6,666	31,421	0	1,414	39,500
2013	2,488	18,042	0	53	20,583
2014	5,984	31,313	N/A	169	37,466
2015	4,908	39,533	N/A	78	44,520
Average	4,825	28,033	0	343	33,200
Private/Rental Mode					
2011	53,537	103,937	0	0	157,474
2012	42,282	157,310	574	2,601	202,767
2013	40,519	151,526	309	695	193,050
2014	24,820	143,811	N/A	110	168,741
2015	29,649	164,883	N/A	409	194,942
Average	38,161	144,293	294	763	183,395
All Modes					
2011	104,369	259,334	0	0	363,703
2012	145,898	308,897	574	4,015	459,384
2013	262,928	367,350	309	748	631,335
2014	142,866	378,027	N/A	279	521,172
2015	193,208	334,337	N/A	488	528,033
Average	169,854	329,589	294	1,106	500,725

Source: MRIP database, SERO, NMFS.
*Texas and headboat information unavailable.
**MRIP estimates for Louisiana are not available after 2013. The averages for Louisiana exclude 2014 and 2015.

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.[5] The stationary "fishing for demersal species" nature of headboat fishing, as opposed to trolling, suggests that most headboat trips and, hence, angler days, are demersal or reef fish trips by intent. According to a recent survey of the recreational for-hire industry in the Gulf, approximately 84% of headboat trips, on average, target reef fish species such as snappers or groupers (Savolainen et al. 2012). Anecdotal information suggests headboats will also sometimes drift over reef fish structures or through areas with an abundance of bait fish in order to catch pelagic species such as mackerels, wahoo, cobia and mahi.

Gulf Headboat Effort

The distribution of Gulf headboat effort (angler days) by geographic area is presented in Table 3.4.2.2. For purposes of data collection, the headboat data collection program divides the Gulf into several areas. In Table 3.4.2.2, "FLW" refers to areas in Florida from the Dry Tortugas through the Florida Middle Grounds; "FL-AL" covers Northwest Florida and Alabama; "MS-LA" refers to the combined coastlines of Mississippi and Louisiana; and "TX" includes areas in Texas from Sabine Pass-Freeport south to Port Isabel. The number of headboat angler days in West Florida increased steadily from 2011 through 2015 (Table 3.4.2.2). In Northwest Florida through Alabama, the number of angler days increased steadily from 2011 through 2014 and then dipped slightly in 2015. In Mississippi through Louisiana and Texas, the number of angler days was relatively stable from 2011 through 2015. On average (2011 through 2015), West Florida through Alabama accounted for the majority of headboat angler days reported, followed by Texas, 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 (2011 through 2015).

	Angler Days				Percent Distribution			
	FLW	**FL-AL***	**MS-LA****	**TX**	**FLW**	**FL-AL**	**MS-LA**	**TX**
2011	79,722	77,303	3,657	47,284	38.33%	37.17%	1.76%	22.74%
2012	84,205	77,770	3,680	51,776	38.73%	35.77%	1.69%	23.81%
2013	94,752	80,048	3,406	55,749	40.50%	34.22%	1.46%	23.83%
2014	102,841	88,524	3,257	51,231	41.83%	36.01%	1.32%	20.84%
2015	107,910	86,473	3,587	55,135	42.63%	34.16%	1.42%	21.78%
Average	93,886	82,024	3,517	52,235	40%	35%	2%	23%

Source: NMFS Southeast Region Headboat Survey (SRHS).
*Beginning in 2013, HBS data was reported separately for NW Florida and Alabama, but has been combined here for consistency with previous years.
**Headboat data from Mississippi and Louisiana are combined for confidentiality purposes.

Headboat effort in terms of angler days for the entire Gulf was, on average, concentrated most heavily during the summer months of June through August (2011 through 2015) (Table 3.4.2.3).

[5] 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.

The monthly trend in angler days was very 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.

Table 3.4.2.3. Gulf headboat angler days and percent distribution by month (2011 – 2015).

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	Headboat Angler Days											
2011	5,242	9,174	16,378	17,626	16,148	39,775	42,089	22,513	10,766	12,609	8,514	7,132
2012	7,924	9,364	18,326	16,404	17,708	39,662	46,468	21,440	12,629	13,281	7,135	7,090
2013	8,630	9,576	16,759	16,426	17,150	47,791	38,304	27,610	12,697	21,256	8,654	9,102
2014	7,069	12,402	18,626	18,733	21,345	44,342	46,246	30,893	12,089	17,395	7,557	9,156
2015	9,444	10,594	22,827	20,684	20,973	44,731	45,192	26,637	15,114	17,246	9,757	9,906
Avg	7,662	10,222	18,583	17,975	18,665	43,260	43,660	25,819	12,659	16,357	8,323	8,477
	Percent Distribution											
2011	2.5%	4.4%	7.9%	8.5%	7.8%	19.1%	20.2%	10.8%	5.2%	6.1%	4.1%	3.4%
2012	3.6%	4.3%	8.4%	7.5%	8.1%	18.2%	21.4%	9.9%	5.8%	6.1%	3.3%	3.3%
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%
Avg	3.3%	4.4%	8.0%	7.8%	8.0%	18.7%	18.9%	11.1%	5.5%	7.0%	3.6%	3.6%

Source: NMFS Southeast Region Headboat Survey (SRHS).

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 the Gulf EEZ. On July 22, 2016, there were 1,291 valid (non-expired) or renewable[6] Gulf CMP for-hire permits listed in SERO's Permits Information Management System (PIMS). 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 NMFS Southeast Region Headboat Survey (SRHS). Participation in the SRHS is based on determination by the Southeast Fishery Science Center (SEFSC) that the vessel primarily operates as a headboat. As of February 22, 2016, 69 Gulf headboats were registered in the SRHS (K. Fitzpatrick, NMFS SEFSC, pers. comm.). The majority of these headboats were located in Florida (40), followed by Texas (16), Alabama (8), and Mississippi/Louisiana (5).

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

Information on Gulf charter boat 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 pelagic species, including king mackerel. Instead, anglers are required to possess either a state recreational fishing permit that authorizes saltwater fishing in general, or be registered in the federal National Saltwater Angler Registry system, subject to appropriate exemptions. As a result, it is not possible to identify with available data how many individual anglers would be expected to be affected by this proposed amendment.

Economic Value

Participation, effort, and harvest are indicators of the value of saltwater recreational fishing. However, a more specific indicator of value is the satisfaction that anglers experience over and above their costs of fishing. The monetary value of this satisfaction is referred to as consumer surplus (CS). The value or benefit derived from the recreational experience is dependent on several quality determinants, which include fish size, catch success rate, and the number of fish kept. These variables help determine the value of a fishing trip and influence total demand for recreational fishing trips. The estimated value of the CS for catching and keeping a second king mackerel on an angler trip is approximately $98 (2015 dollars[7]) with a 95% confidence interval (CI) of plus or minus 9% (Carter and Liese 2012). The value of harvesting additional king mackerel decreases thereafter (approximately $65 for a third king mackerel, $48 for a fourth king mackerel, and $38 for a fifth king mackerel).

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 regards 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 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 $153 (2015 dollars[8]) (Liese and Carter 2011). The estimated NOR value for an average Gulf headboat angler trip is $53 (2015 dollars) (C. Liese, NMFS SEFSC, pers. comm.). Estimates of NOR per king mackerel target trip are not available.

[7] Converted to 2015 dollars using the annual, seasonally-adjusted GDP implicit price deflator provided by the U.S. Bureau of Economic Analysis.

[8] Converted to 2015 dollars using the annual, seasonally-adjusted GDP implicit price deflator provided by the U.S. Bureau of Economic Analysis.

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 Gulf king mackerel were calculated using average trip-level impact coefficients derived from the 2014 Fisheries Economics of the U.S. report (NMFS, 2016) and underlying data provided by the National Oceanic and Atmospheric Administration (NOAA) Office of Science and Technology. Economic impact estimates in 2014 dollars were adjusted to 2015 dollars using the annual, seasonally-adjusted GDP implicit price deflator provided by the U.S. Bureau of Economic Analysis.

Recreational fishing generates business activity (economic impacts). Business activity for the recreational sector is characterized in the form of jobs (full- and part-time), income impacts (wages, salaries, and self-employed income), output (sales) impacts (gross business sales), and value-added impacts (difference between the value of goods and the cost of materials or supplies). Estimates of the average Gulf king mackerel target effort (2011-2015) and associated business activity (2015 dollars) 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 king mackerel catch trips. To calculate the multipliers from Table 3.4.2.4, simply divide the desired impact measure (output impact, value-added impact, income impact or jobs) associated with a given mode by the number of target trips for that mode.

Table 3.4.2.4. Estimated economic impacts to the U.S. from Gulf king mackerel recreational target trips (average; 2011 through 2015), using national multipliers*. All monetary estimates are in 2015 dollars (in thousands).

Mode	Total # of Trips	Value Added Impacts	Sales Impacts	Income Impacts	Employment Impacts (Jobs)
Charter	33,200	$17,466	$30,061	$11,815	234
Private/Rental	183,395	$9,221	$16,615	$5,334	111
Shore	284,130	$13,391	$24,081	$7,924	177

Source: effort data from MRIP; economic impact results calculated by NMFS SERO using NMFS (2016) and underlying data provided by the NOAA Office of Science and Technology.

*Averages exclude LA for 2014 and 2015, because MRIP effort estimates for LA are unavailable after 2013. Because of the low level of recorded target effort for king mackerel in previous years in LA, this is not expected to have a significant impact on Gulf-wide averages. Texas effort data as well as headboat target effort data are unavailable and are also excluded.

3.5 Description of the Social Environment

This amendment affects commercial and recreational management of Gulf king mackerel. This section provides the background for the proposed actions which will be evaluated in Chapter 4. Commercial and recreational landings and permits are included by state to provide information on the geographic distribution of fishing involvement. Descriptions of fishing communities including the top communities involved in king mackerel fishing in the Gulf are included here. The communities with the most Gulf charter/headboat for CMP fish permits are described. These community level data are presented in order to meet the requirements of National Standard 8 of the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act). National Standard 8 requires the consideration of the importance of fishery resources to human communities when considering changes to fishing regulations. And lastly, social vulnerability data are presented to assess the potential for environmental justice concerns.

Recent descriptions of the social environment for those engaged in mackerel fishing and associated communities are contained in Amendment 26 (GMFMC/SAFMC 2016) to the CMP FMP which is incorporated herein by reference. The Amendment 26 social description focuses on available geographic and demographic data to identify communities with strong relationships to the harvest of king mackerel (i.e., significant landings and revenue for the year 2012). The social description in Amendment 26 also includes information on the distribution of commercial and recreational king mackerel landings by state for the years 2013 and 2014 respectively and commercial king mackerel permits and charter/headboat permits for pelagic fish by state for the year 2015. Commercial and recreational landings and commercial and charter/headboat permits are updated below for Gulf king mackerel with the most recent data available, 2014 for commercial landings, 2015 for recreational landings, and 2016 for commercial and charter/headboat permits. In addition, the top Gulf king mackerel commercial communities are updated with the most recent data available, 2014 Accumulated Landings System (ALS) data.

3.5.1 Landings by State

As presented in Section 2.1, the commercial sector of the Gulf king mackerel fishery has consistently landed its ACL over the past ten years; whereas the recreational sector has not landed its ACL during the same time period (Table 2.1.1). From fishing year 2001/2002 to 2014/2015, commercial landings of Gulf king mackerel have ranged from 2.902 million pounds (mp) to 3.833 mp (Table 2.1.1). During the same time period, a range of 88.4% to 110.9% of the commercial ACL has been landed. Recreational landings of Gulf king mackerel have ranged from 2.181 mp to 4.576 mp. During the same time period, a range of 29.7% to 62.3% of the recreational ACL has been landed.

Commercial Landings

The greatest proportion of the commercial Gulf king mackerel catch is landed along the west coast of Florida (approximately 44%, Table 3.5.1.1). Louisiana (approximately 28%) and the east coast of Florida (approximately 22%) also include a sizable amount of the commercial Gulf king mackerel catch. Other Gulf states are also involved in commercial Gulf king mackerel fishing, but these states represent a much smaller percentage of the total commercial landings.

Table 3.5.1.1. Percentage of total commercial Gulf migratory group king mackerel landings by state for 2014.

State	Landings
AL	4.61%
FL (West Coast)	44.14%
FL (East Coast)	21.72%
LA	27.58%
MS	0.70%
TX	1.25%

Source: SERO (July 2016).

Recreational Landings

The majority of the recreational Gulf king mackerel catch is landed along the west coast of Florida (approximately 68%, Table 3.5.1.2). Alabama (18%) and the east coast of Florida (approximately 9%) also include a sizable amount of the recreational Gulf king mackerel catch. Other Gulf States are also involved in recreational Gulf king mackerel fishing, but these states represent a much smaller percentage of the total recreational landings.

Table 3.5.1.2. Percentage of total recreational Gulf king mackerel landings by state for 2015.

State	Landings
AL	18.29%
FL (West Coast)	67.85%
FL (East Coast)	8.71%
LA/MS	0.25%
TX	4.90%

Source: SERO (July 2016).

3.5.2 Permits by State

Commercial Permits

Commercial king mackerel permits are issued to individuals residing in the Gulf, South Atlantic, Mid-Atlantic, New England, and in other states (Table 3.5.2.1). The largest number of commercial king mackerel permits are issued to individuals residing in South Atlantic States (over 70% of king mackerel permits, Table 3.5.2.1) and individuals residing in Florida, including the west coast, east coast, and the Keys (approximately 70% of king mackerel permits). Individuals residing in Gulf states hold approximately 27% of king mackerel permits. Individuals in North Carolina also hold a sizable amount of king mackerel permits (about 16%). Residents of other states in the South Atlantic, Gulf, Mid-Atlantic, New England, and a few other states also hold commercial king mackerel permits, but these states represent a smaller percentage of the total number of issued permits. Gillnet for king mackerel permits, which is an endorsement attached to a commercial king mackerel permit, are issued to individuals residing in Florida.

Table 3.5.2.1. Number of commercial king mackerel permits and gillnet endorsements for king mackerel permits by state and region.

State	King Mackerel (KM)	Gillnet for King Mackerel (GN)
NC	229	0
SC	28	0
GA	10	0
FL (East Coast)	602	3
FL (Keys)	149	13
South Atlantic Total (including FL Keys)	1018	16
FL (West Coast)	261	4
AL	38	0
MS	10	0
LA	43	0
TX	41	0
Gulf Total (no FL Keys)	393	4
Mid-Atlantic	27	0
New England	3	0
Other States	4	0
Total	**1445**	**20**

Source: SERO permit office, July 25, 2016.

Recreational Permits

Gulf charter/headboat CMP fish permits are issued to individuals residing in the Gulf, South Atlantic, Mid-Atlantic, New England, and in other states (Table 3.5.2.2). The largest number of Gulf charter/headboat CMP permits are issued to individuals residing in Gulf states (approximately 88% of Gulf charter/headboat for CMP permits, Table 3.5.2.2) and individuals residing along the west coast of Florida (approximately 47%). Individuals in Texas (about 19%), Alabama (about 9%), and Louisiana (about 8%) also hold a sizable amount of Gulf charter/headboat for CMP permits. Residents of other states in the Gulf, South Atlantic, Mid-Atlantic, New England, and a few other states also hold Gulf charter/headboat CMP permits, but these states represent a smaller percentage of the total number of issued permits. Historical captain Gulf charter/headboat CMP permits are issued to individuals residing in Gulf states.

Table 3.5.2.2. Number of Gulf charter/headboat and historical captain charter/headboat CMP permits by state and region.

State	Gulf Charter/Headboat CMP Permits (CHG)	Historical Captain Gulf Charter/Headboat CMP Permits (HCHG)
NC	13	0
SC	1	0
GA	15	0
FL (East Coast)	24	0
FL (Keys)	80	0
South Atlantic Total (including FL Keys)	133	0
FL (West Coast)	628	18
AL	120	4
MS	34	2
LA	107	6
TX	243	4
Gulf Total (no FL Keys)	1132	34
Mid-Atlantic	7	0
New England	4	0
Other States	15	0
Total	**1291**	**34**

Source: SERO permit office, September 18, 2016.

3.5.3 Fishing Communities

The description of Gulf communities includes information about the top communities based upon a "regional quotient" (RQ) of commercial landings and value for king mackerel. 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. The Florida Keys communities are included because commercial Gulf king mackerel is landed on the west and east coasts of Florida (Table 3.5.1.1). A strong relationship with king mackerel is defined as having significant landings and revenue for the species. Thus, positive or negative impacts from regulatory change are expected to occur in places with greater landings. Identified top communities would be most likely to experience the effects of the proposed actions that could change the king mackerel component of the CMP fishery and impact the participants and associated businesses and communities within the region. However, if a community is identified as a king mackerel community based on the RQ, this does not necessarily mean that the community would experience significant impacts due to changes in the king mackerel component of the CMP fishery if a different species or number of species were also important to the local community and economy.

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.

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 king mackerel. However, it is possible to identify communities with the most Gulf charter/headboat CMP fish permits. These data show communities that are the most engaged in the charter and headboat component of the recreational CMP sector and can also reveal likely communities for landing recreational Gulf king mackerel.

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 for communities with the most Gulf charter/headboat CMP fish permits.

Commercial Communities

About 40% of all Gulf king mackerel are landed in Destin, Florida, representing about 48% of the Gulf-wide value (Figure 3.5.3.1). Three Florida Keys communities (Key West, Marathon, and Sugarloaf Key) are included in the top communities and collectively these communities represent a substantial portion of the landings and value of commercial king mackerel. Naples, Florida, also represents a substantial portion of landings. In addition, the top 15 communities include four other Florida communities, three Louisiana communities, one Mississippi community, one Alabama community, and one community in Texas.

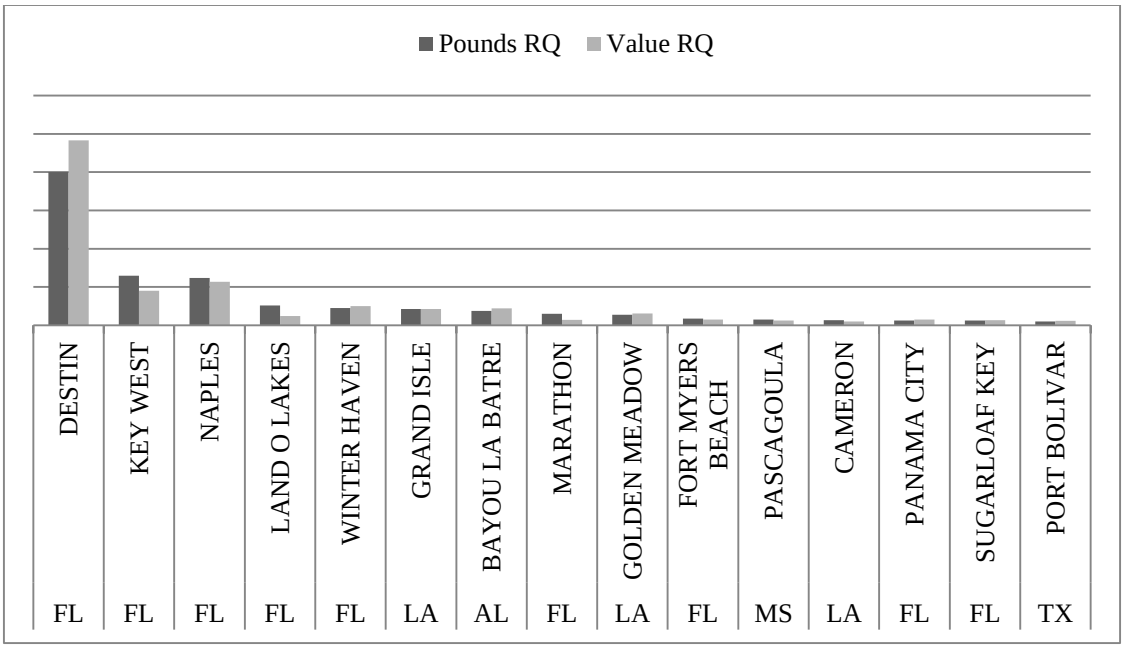

Figure 3.5.3.1. Top fifteen Gulf communities ranked by pounds and value regional quotient (RQ) of king mackerel. The actual RQ values (y-axis) are omitted from the figure to maintain confidentiality.

Source: SERO, Community ALS 2014.

Note: Landings associated with a dealer location within a community are derived from the reported address of that dealer and may not always correspond to where seafood was initially landed.

The details of how these indices are generated are explained in the beginning of Section 3.5.3. Two thresholds of one and one-half standard deviation above the mean were plotted to help determine a threshold for significance. The communities that demonstrate high levels of commercial fishing engagement include Destin, Key West, Naples, Marathon, Fort Myers Beach, and Panama City, Florida; Grand Isle, Golden Meadow, and Cameron, Louisiana; Bayou La Batre, Alabama; and Pascagoula, Mississippi (Figure 3.5.3.2). The communities that demonstrate high levels of commercial fishing reliance include Key West, Marathon, and Fort Myers Beach, Florida; Grand Isle, Golden Meadow, and Cameron, Louisiana; and Bayou La Batre, Alabama.

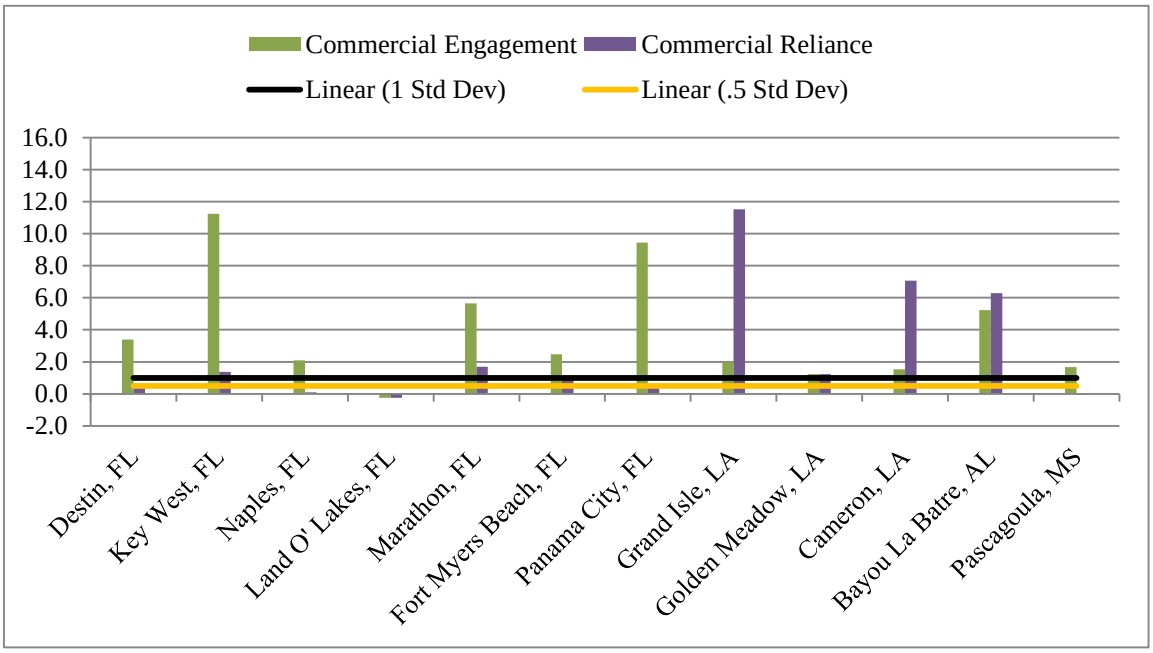

Figure 3.5.3.2. Commercial reliance and engagement for Gulf communities with the top regional quotients for king mackerel.
Source: SERO, Social Indicator Database 2012.

Recreational Communities

Communities with the most Gulf charter/headboat CMP fish permits are located in Florida, Alabama, and Texas (Table 3.5.3.1). The community with the most Gulf charter/headboat for CMP permits is Destin, Florida (about 5% of charter/headboat for CMP permits, Tables 3.5.2.2 and 3.5.3.1). Several other Florida Panhandle communities (Panama City, Pensacola, and Panama City Beach) are also included in the top communities. Communities with the most historical captain Gulf charter/headboat for CMP permits are not identified separately because these communities are included in the list of communities with Gulf charter/headboat for CMP permits.

Table 3.5.3.1. Top fifteen communities by number of Gulf charter/headboat for CMP fish permits.

State	Community	Permits
FL	Destin	64
AL	Orange Beach	47
FL	Panama City	46
FL	Key West	44
FL	Naples	43
TX	Corpus Christi	40
FL	Pensacola	30
TX	Galveston	23
FL	Panama City Beach	22
FL	St. Petersburg	19
TX	Houston	18
FL	Clearwater	17
FL	Marco Island	17
TX	Port Aransas	17
FL	Fort Meyers	16

Source: SERO permit office, September 18, 2016.
Note: Community is based on the reported address of the permit recipient.

The details of how these indices are generated are explained in Section 3.5.3. Two thresholds of one and one-half standard deviation above the mean were plotted to help determine a threshold for significance. The communities that demonstrate high levels of recreational fishing engagement include Destin, Panama City, Key West, Naples, Pensacola, Panama City Beach, St. Petersburg, Clearwater, and Marco Island, Florida; Orange Beach, Alabama; Corpus Christi, Galveston, Houston, and Port Aransas, Texas (Figure 3.5.3.3). The communities that demonstrate high levels of recreational fishing reliance include Destin and Key West, Florida; Orange Beach, Alabama; and Port Aransas, Texas.

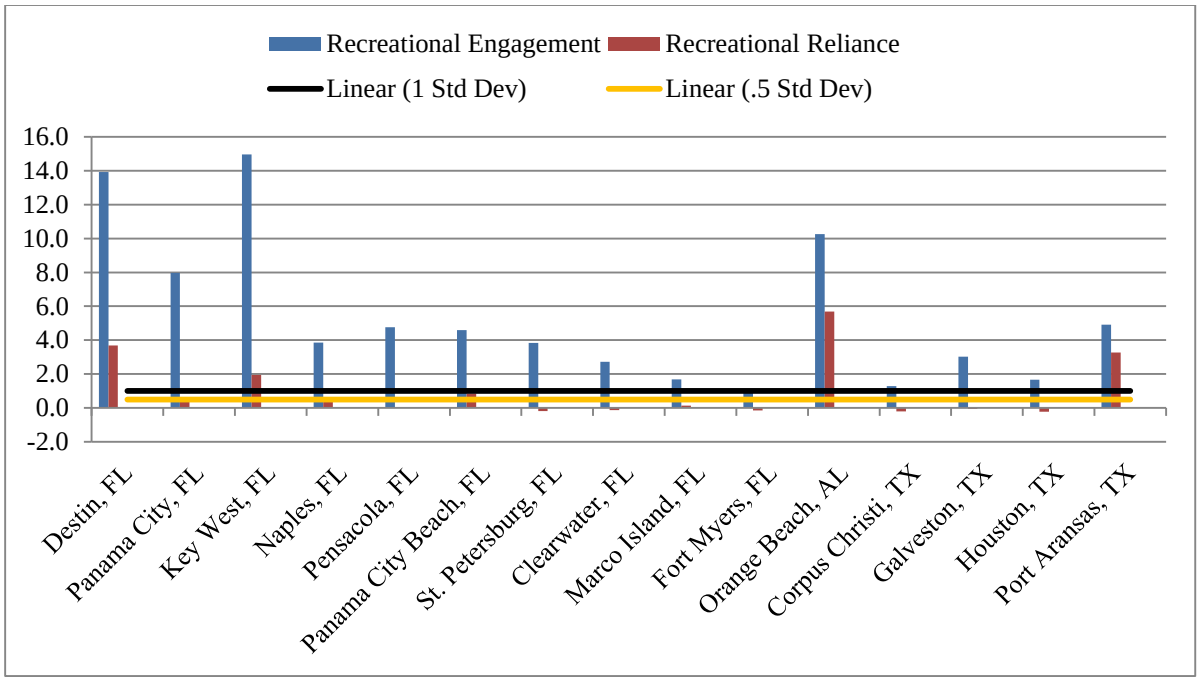

Figure 3.5.3.3. Commercial and recreational reliance and engagement for communities with top the top number of Gulf charter/headboat for coastal pelagic permits.
Source: SERO, Social Indicator Database 2012.

3.5.4 Environmental Justice Considerations

Executive Order 12898 requires federal agencies to identify and address, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations. This executive order is generally referred to as environmental justice (EJ).

To evaluate EJ considerations for the proposed actions, analysis was completed utilizing a suite of indices created to examine the social vulnerability of coastal communities and is depicted in Figures 3.5.4.1 and 3.5.4.2. 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; more households with children under the age of 5; and disruptions like higher separation rates, higher crime rates, and unemployment all are signs of populations having vulnerabilities. The data used to create these indices are from the 2005-2009 American Community Survey estimates at the U.S. Census Bureau. The thresholds of 1 and ½ standard deviation are the same for these standardized indices. Again, for those communities that exceed the threshold for all indices it would be expected that they would exhibit vulnerabilities to sudden changes or social disruption that might accrue from regulatory change. Conversely, for communities below the mean it would be expected that they would be the least vulnerable.

Similar to the reliance index discussed at the beginning of Section 3.5.3, the vulnerability indices also use normalized factor scores. Comparison of vulnerability scores is relative, but the score is

related to the percent of communities with similar attributes. The social vulnerability indices provide a way to gauge change over time with these communities but also provides a comparison of one community with another.

With regard to social vulnerabilities, the following communities exceed the threshold of ½ standard deviation for at least one of the social vulnerability indices (Figures 3.5.4.1 and 3.5.4.2): Panama City and Fort Myers, Florida; Golden Meadow and Cameron, Louisiana; Bayou La Batre, Alabama; Pascagoula, Mississippi; and Corpus Christi, Galveston, and Houston, Texas. The communities of Bayou La Batre, Alabama; Pascagoula, Mississippi; Fort Myers, Florida; and Corpus Christi, Galveston, and Houston, exceed the thresholds on all three social vulnerability indices. These communities have vulnerabilities and may be susceptible to effects from regulatory change depending upon the direction and extent of that change.

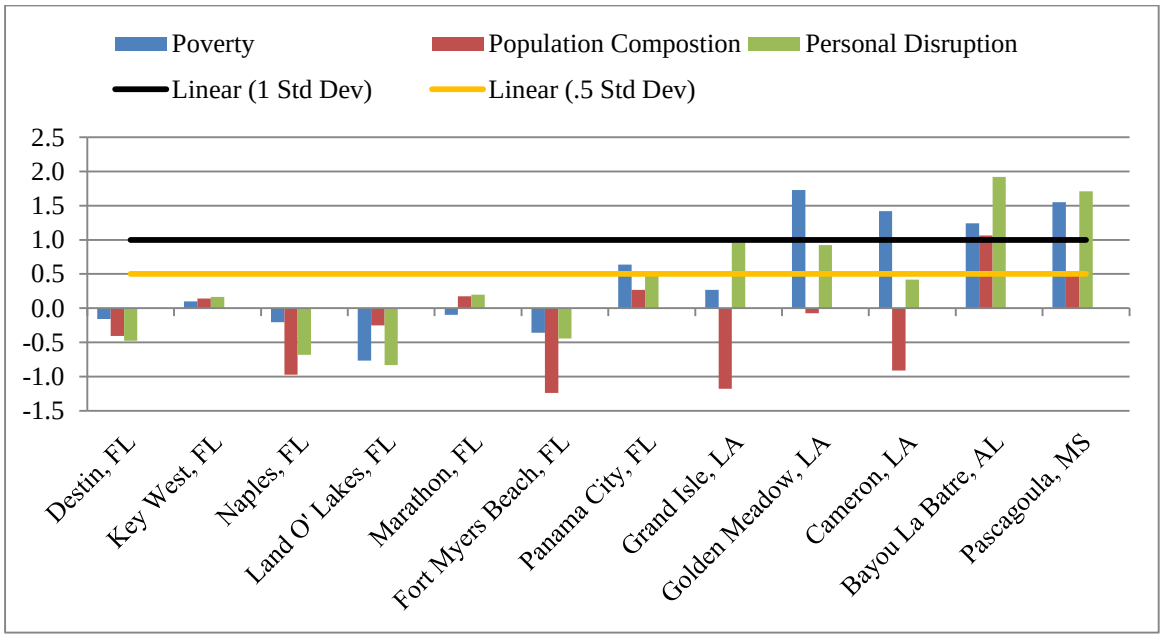

Figure 3.5.4.1. Social vulnerability indices for fifteen Gulf communities with the top regional quotients for king mackerel.
Source: SERO, Social Indicator Database 2012.

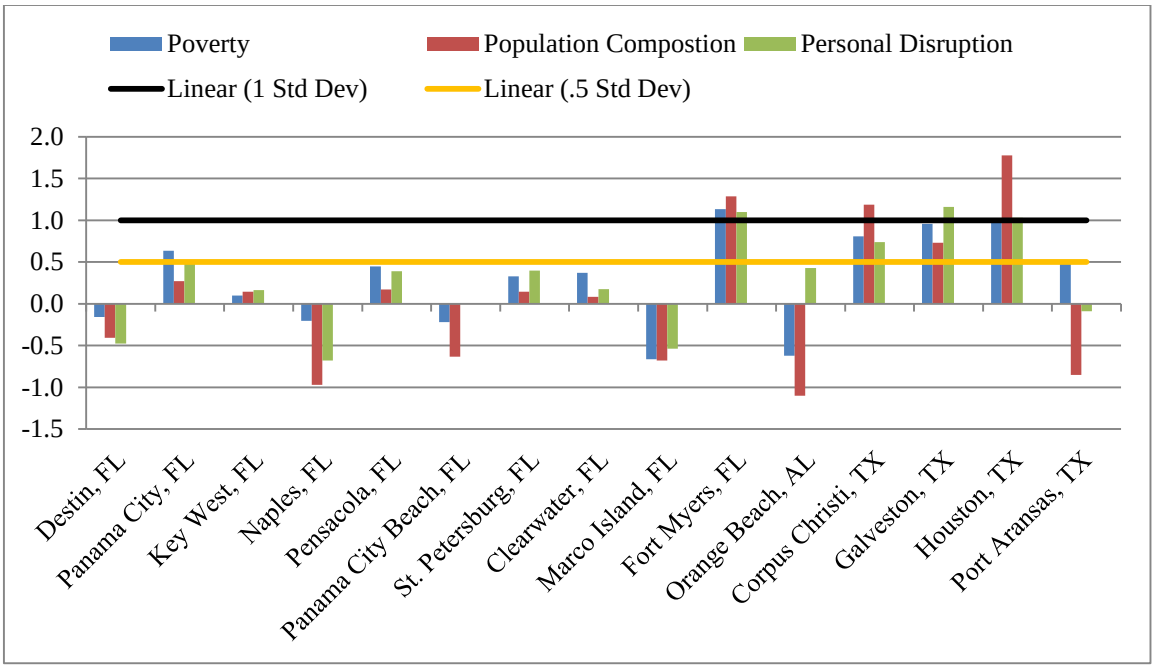

Figure 3.5.4.2. Social vulnerability indices for fifteen Gulf communities with the number of Gulf charter/headboat for coastal pelagic permits.
Source: SERO, Social Indicator Database 2012.

While some communities expected to be affected by this proposed amendment may have minority or economic profiles that exceed the EJ thresholds and, therefore, may constitute areas of concern, significant EJ issues are not expected to arise as a result of this proposed amendment. No adverse human health or environmental effects are expected to accrue from this proposed amendment, nor are these measures expected to result in an increased risk of exposure of affected individuals to adverse health hazards. The proposed management measures would apply to all participants in the affected area, regardless of minority status or income level, and information is not available to suggest that minorities or lower income persons are, on average, more dependent on the affected species than non-minority or higher income persons.

Finally, the general participatory process used in the development of fishery management measures (e.g., scoping meetings, public hearings, and open Council meetings) is expected to provide sufficient opportunity for meaningful involvement by potentially affected individuals to participate in the development process of this amendment and have their concerns factored into the decision process. Public input from individuals who participate in the fishery has been considered and incorporated into management decisions throughout development of the amendment.

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, an area extending 200 nautical miles from the seaward boundary of each of the coastal states, and 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 that management measures are consistent with the Magnuson-Stevens Act, and with other applicable laws summarized in Appendix B. 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 of Mexico. These waters extend from 9 to 200 nautical miles (nm) offshore from the seaward boundary of Florida and Texas, and 3 to 200 nm offshore from the seaward boundary of Alabama, Mississippi, and Louisiana. The Council consists of 17 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 NOAA Fisheries.

The South Atlantic Council is responsible for conservation and management of fishery resources in federal waters of the U.S. South Atlantic. These waters extend from 3 to 200 (nm) offshore from the seaward boundary of the states of North Carolina, South Carolina, Georgia, and east Florida to Key West. The Council has 13 voting members: one from NOAA Fisheries Service; one each from the state fishery agencies of North Carolina, South Carolina, Georgia, and Florida; and 8 public members appointed by the Secretary. Non-voting members include representatives of the U.S. Fish and Wildlife Service, USCG, and Atlantic States Marine Fisheries Commission (ASMFC).

The Mid-Atlantic Council has two voting seats on the South Atlantic Council's Mackerel Committee but does not vote during Council sessions. The Mid-Atlantic Council is responsible for fishery resources in federal waters off New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia, and North Carolina, but has delegated management of CMP species to the South Atlantic Council.

The Councils use Scientific and Statistical Committees to review the data and science being used in assessments and fishery management plans/amendments. Regulations contained within FMPs are enforced through actions of the NOAA's Office for Law Enforcement, the USCG, and various state authorities.

The public is involved in the fishery management process through participation at public meetings, on advisory panels and through council meetings that, with few exceptions for discussing personnel matters, are open to the public. The regulatory process is in accordance with the Administrative Procedure Act, in the form of "notice and comment" rulemaking, which provides extensive opportunity for public scrutiny and comment, and requires consideration of and response to those comments.

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 have the authority to manage their respective state fisheries including enforcement of fishing regulations. Each of the eight states exercises legislative and regulatory authority over their states' natural resources through discrete administrative units. Although each agency listed below 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.

The states are also involved through the Gulf of Mexico Marine Fisheries Commission (GSMFC) and the ASMFC in management of marine fisheries. These commissions were created to coordinate state regulations and develop management plans for interstate fisheries.

NOAA Fisheries Service' State-Federal Fisheries Division is responsible for building cooperative partnerships to strengthen marine fisheries management and conservation at the state, inter-regional, and national levels. This division implements and oversees the distribution of grants for two national (Inter-jurisdictional Fisheries Act and Anadromous Fish Conservation Act) and two regional (Atlantic Coastal Fisheries Cooperative Management Act and Atlantic Striped Bass Conservation Act) programs. Additionally, it works with the commissions to develop and implement cooperative State-Federal fisheries regulations.

More information about these agencies can be found from the following web pages:
Texas Parks & Wildlife Department – http://www.tpwd.state.tx.us
Louisiana Department of Wildlife and Fisheries http://www.wlf.state.la.us/
Mississippi Department of Marine Resources http://www.dmr.state.ms.us/
Alabama Department of Conservation and Natural Resources http://www.dcnr.state.al.us/
Florida Fish and Wildlife Conservation Commission http://www.myfwc.com
Georgia Department of Natural Resources, Coastal Resources Division http://crd.dnr.state.ga.us/
South Carolina Department of Natural Resources http://www.dnr.sc.gov/
North Carolina Department of Environmental Quality http://deq.nc.gov/

CHAPTER 4. ENVIRONMENTAL CONSEQUENCES

4.1 Action 1 – Gulf Migratory Group King Mackerel Quota Sharing

Alternative 1: No Action – Do not establish a quota sharing system. Maintain the current recreational and commercial allocations for Gulf migratory group king mackerel (68% recreational, 32% commercial).

Alternative 2: Conditionally transfer a certain percentage (*Options 2a-2d*) of the allocation to the commercial sector in the next fishing year, if the minimum recreational landings threshold is not met (*Options 2e-2g).* If the commercial sector does not land at least 90% of its annual catch limit (ACL), this transfer will not occur. Landings data from two years prior will be used to determine allocation transfers.

Conditional Quota Transfer (MUST CHOOSE ONE):

Option 2a: Conditionally transfer 5% from the stock allocation to the commercial allocation.

Option 2b: Conditionally transfer 10% from the stock allocation to the commercial allocation.

Option 2c: Conditionally transfer 15% from the stock allocation to the commercial allocation.

Option 2d: Conditionally transfer 20% from the stock allocation to the commercial allocation.

Recreational ACL Minimum Threshold (MUST CHOOSE ONE), if the recreational sector landings are:

Option 2e: less than 50% of the recreational ACL.

Option 2f: less than 65% of the recreational ACL.

Option 2g: less than 75% of the recreational ACL.

Alternative 3: If the stock ACL is not harvested in a fishing year, the Gulf Council's Scientific and Statistical Committee (SSC) will convene to consider increasing the acceptable biological catch (ABC) for the following fishing year only. If the SSC recommends increasing the ABC, the amount of the increase (in pounds) would be added to the ACL of the sector which landed at least 90% of its ACL in the previous fishing year. The SSC would convene to consider an adjustment in the ABC only if a minimum percentage of the stock ACL was not harvested in a given fishing season (*Options 3a-3c*). If one of Options 3a, 3b, or 3c is not chosen as preferred, and the stock ACL has not been landed, then the SSC will consider raising the ABC in any year when the stock ACL is not harvested:

Remaining Stock ACL Threshold (CHOOSE ONE):

Option 3a: At least 15% of the stock ACL remains unharvested.

Option 3b: At least 20% of the stock ACL remains unharvested.

Option 3c: At least 25% of the stock ACL remains unharvested.

4.1.1 Direct and Indirect Effects on the Physical and Biological Environments

King mackerel are usually caught at the ocean surface, and typical gear types used in the harvest of king mackerel do not normally come in contact with bottom habitat. Therefore, the alternatives presented in Action 1 are not expected to result in any direct effects to the physical environment. This action could indirectly affect the physical environment if changes in allocation result in an increase or decrease in the amount of fishing gear used to harvest the respective commercial and recreational quotas, which in turn could increase the probability of gear becoming lost and fouled (Barnette 2001). If an alternative other than **Alternative 1** is chosen as preferred, the likelihood of indirect negative effects from lost gear may increase, as the potential for additional commercial fishing effort would be made possible through an allocation sharing strategy; however, the degree to which these indirect effects would change from the status quo cannot be explicitly quantified. Regardless, since the method by which the harvest of king mackerel would be conducted in the Gulf of Mexico (Gulf) is not being modified and is not expected to change in the near future, this potential negative indirect effect from increased fishing effort potential in **Alternatives 2** and **3** (and all associated options) is likely negligible when compared to **Alternative 1**.

The no action alternative (**Alternative 1**) would maintain the current allocation of 68% of the Gulf king mackerel ABC reserved for the recreational sector, and the remaining 32% reserved for the commercial sector. **Alternative 1** would not result in any change in effects to the physical or biological environments.

Alternative 2 would conditionally transfer the prescribed amount of allocation (5%, 10%, 15%, or 20%; **Options 2a – 2d**), while **Alternative 3** would engage the SSC to consider adjusting the ABC so long as some portion of the stock ACL remains unharvested (15%, 20%, or 25%; **Options 3a** – **3c**). Whether a conditional transfer of allocation would occur under **Alternative 2** would be based on landings data from two years prior. For example, whether a conditional transfer of allocation would occur in the 2019-2020 fishing season would be based on the landings data from the 2017-2018 fishing season. The use of two-year-old landings data ensures that preliminary landings will not need to be used in calculating the amount of allocation to be transferred, thereby ensuring accuracy in the allocation sharing strategy. Preliminary landings would be used, in tandem with landings from two years prior, to determine whether the minimum recreational landings threshold (**Options 2e** – **2g**) had been met or is projected to be met. If the minimum recreational landings threshold is met or projected to be met in either year, the conditional allocation transfer would not occur for the following fishing year.

Alternative 3 would convene the Gulf Council's SSC to consider increasing the ABC for the following fishing year only, if the stock ACL is not harvested in the previous fishing year. If the SSC recommends increasing the ABC, the amount of the increase (in pounds) would be added to the ACL of the sector which harvested its ACL (within 10%) in the previous fishing year, so long as a minimum percentage of the stock ACL was not harvested in a given fishing year (**Options 3a** – **3c**). Such an adjustment to the ABC would be based on the best scientific information available. It is possible that the SSC would not recommend a single-year adjustment to the ABC, even if the stock ACL was not landed in the prior fishing season.

Removal of fish from the population through fishing can reduce the overall population size if harvest is not maintained at sustainable levels. Direct effects of these alternatives on the biological environment would depend on the resulting changes in the amount of fishing effort as a result of each alternative. Indirect impacts of these alternatives on the biological environment would depend on the resulting change in biomass of king mackerel as a result of any change in fishing effort in the Gulf, whereby indirect biological effects could be increasingly negative as removals increase (**Alternatives 2** and **3**). However, so long as the stock ACL is not exceeded, no long-term direct or indirect negative biological effects are anticipated. This is because both **Alternatives 2** and **3** restrain harvest to the ACL, which is set equal to the ABC. Under **Alternative 2**, the ABC would be based on the yield projections from the most recent stock assessment. Under **Alternative 3**, the ABC would be based on the annual advice of the SSC. The likelihood of the stock ACL being landed under **Alternative 2** would be highest under **Options 2d** and **2g**, and would decrease as both the amount of allocation to be conditionally transferred and the minimum recreational landings threshold decreased. The likelihood of the stock ACL being landed under **Alternative 3** would depend on the catch per unit effort from the commercial and recreational sectors; since the SSC would be considering an increase to the ABC, with that increase above the existing ABC going to the sector which is landing its ACL, the onus would remain on the individual sectors to land their respective ACLs for the stock ACL to be met. Since the recreational sector *is not* currently landing its allocation, and the commercial sector *is* landing its allocation (Table 2.1.1), any transfer of unharvested fish under **Alternative 3** would currently be directed to the commercial sector, which would likely result in additional removals from the Gulf king mackerel stock. It is also because of this trend in landings that the Councils are not currently explicitly considering reallocating some portion of the stock ACL to the recreational sector.

In a 2015 biological opinion, NMFS determined that the hook-and-line component of the CMP commercial fishery does not regularly interact with protected species; however, the gillnet component of the CMP commercial fishery may occasionally interact with protected sharks, turtles, and marine mammals. See Section 3.3.2 for more information. If an alternative other than **Alternative 1** is chosen as preferred, the likelihood of gillnet gear coming in contact with a protected species could increase; however, due to the variability in the amount of king mackerel landed from each individual gillnet deployment, the degree to which protected species would be exposed to additional risk of interaction with gillnet gear is unknown. The 2015 biological opinion did not assume a specific amount of gillnet effort; however, the propensity for adverse effects to protected species classified mackerel gillnets as a Category II gear, indicating that gillnets occasionally interact with protected species.

Neither alternative would be permanently discontinued if recreational landings increased to the extent that the safeguards present in either alternative prevent allocation sharing; rather, the alternative would not result in any additional quota being shared with the commercial sector for the applicable year. Ultimately, the amount of additional king mackerel, which would be removed from the stock under either **Alternative 2** or **3**, is completely dependent upon changes in future recreational fishing effort. However, so long as the sector ACLs are not exceeded, neither **Alternative 2** nor **3** are expected to impact the long-term sustainability of Gulf king mackerel because catch would be held to the ABC. The effect of the increased bag limit is

unknown, but is expect to result in a minimal increase in landings because the average king mackerel landed per trip is less than one fish.

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 CMP species in the marine environment are poorly known. King mackerel 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 king mackerel fishing effort. However the king mackerel portion of the CMP fishery is associated with a low level of bycatch. Action 1 would not modify the gear types or fishing techniques in the CMP fishery. Therefore, ecological effects due to changes in bycatch in the CMP fishery are likely to be negligible if implemented.

Under Section 118 of the Marine Mammal Protection Act (MMPA), NMFS must publish, at least annually, a List of Fisheries that place all U.S. commercial fisheries into one of three categories based on the level of incidental serious injury and mortality of marine mammals that occurs in each fishery. The 2016 List of Fisheries classifies the Gulf and South Atlantic CMP hook-and-line fishery as a Category III fishery (81 FR 20550, April 8, 2016). Category III designates fisheries with a remote likelihood or no known serious injuries or mortalities. The gillnet component of the Gulf and South Atlantic CMP fishery is classified as Category II fishery. This classification indicates an occasional incidental mortality or serious injury of a marine mammal stock resulting from the fishery (1-50 % annually of the potential biological removal). The gillnet component of the CMP fishery has no documented interaction with marine mammals. The List of Fisheries can be found at http://www.nmfs.noaa.gov/pr/interactions/fisheries/lof.html. Action 1 is not expected to significantly increase or decrease the magnitude of effects to marine mammals in the CMP fishery.

4.1.2 Direct and Indirect Effects on the Economic Environment

Alternative 1 would maintain the current recreational and commercial allocations for Gulf king mackerel. As a result, **Alternative 1** would not be expected to affect harvests or other customary uses of Gulf king mackerel. Therefore, **Alternative 1** would not be expected to result in any direct economic effects. However, relative to **Alternatives 2** and **3**, **Alternative 1** fails to provide potential additional fishing opportunities to commercial fishermen because it does not

reallocate a portion of the unharvest recreational quota. Therefore, **Alternative 1** would be expected to result in indirect adverse economic effects due to the forgone additional commercial harvests.

Alternative 2 would conditionally reallocate a portion of the recreational quota to the commercial sector. **Options 2a**, **2b**, **2c**, and **2d** would reallocate 5%, 10%, 15%, and 20% of the stock ACL to the commercial sector, respectively. Such a conditional allocation transfer is contingent on the commercial sector landing at least 90% of its ACL, as well as the recreational sector landing less than 50%, 65%, and 75% of its ACL, as determined through **Options 2e**, **2f**, and **2g**, respectively. Excluding considerations relative to non-use values, e.g. option value, **Alternative 2** would not be expected to result in economic effects to the recreational sector. Because the recreational sector routinely harvests below its assigned ACL, none of the four options in **Alternative 2** are expected to result in economic losses to the sector. Due to the time lag in utilizing landings data from two years prior for determining the conditional quota transfer, the potential exists that the recreational sector exceeded the ACL minimum threshold in **Options 2e-2g** in the previous year. Although unlikely, the recreational sector could potentially experience an economic loss through the transfer of a percentage of its quota to the commercial sector if the recreational accountability measures are not adjusted (Action 2). However, since the conditional transfer is evaluated annually, this potential economic loss would be further mitigated by the annual evaluation of the conditional allocation transfer between the sectors. In contrast, the commercial sector has typically harvested all of its ACL, and the sector would therefore be expected to potentially benefit from additional landings due to the conditional allocation transfer. The potential economic benefits to the commercial sector are not quantifiable at this time. The magnitude of the potential economic benefits from conditionally transferring allocation would be determined by the amount of quota transferred, as determined in **Options 2a-2d**, and the extent to which commercial fishermen utilized the additional quota through landings. If the commercial fishermen harvest the totality of the portion of the recreational king mackerel ACL conditionally reallocated to the commercial sector, economic benefits to the sector, as measured by increases in commercial ex-vessel values would be proportional to the amount reallocated. Percentages of the recreational ACL that could potentially be reallocated to the commercial sector range from 5% (**Option 2a**) to 20% (**Option 2d**). Based on a recreational king mackerel ACL of 7.344 mp and on a 2011-2015 average king mackerel ex-vessel price of $2.15 per pound (Tables 3.4.1-2), maximum economic benefits expected to result from **Alternative 2** are estimated to be between $0.79 million (**Option 2a**) and $3.16 million (**Option 2d**) (2015 dollars). If the commercial sector does not harvest the entirety of the amount conditionally reallocated, these estimates would be revised downward to account for the amounts left unharvested.

Alternative 3 would call for the Gulf Council's SSC to convene to consider an increase in the ABC for the following fishing year only. **Options 3a**, **3b**, and **3c** call for this consideration of an ABC increase to occur when, respectively, at least 15%, 20%, and 25% of the stock ACL remains unharvested in a given fishing season. Although the recreational sector has typically harvested less than its assigned ACL while the commercial sector typically harvests all of its ACL, **Alternative 3** provides for an increase in the ACL of either sector, in that the ABC increase is added to the ACL of the sector which harvested its ACL (within 10%) in the previous fishing year. Since the amount of the ABC increase would be determined by the SSC in

Alternative 3 and is not known at this time, potential economic benefits that would be expected to result from **Alternative 3** cannot be quantified. Therefore, a quantitative comparison of the economic effects expected to result from **Alternatives 2** and **3** is not provided. However, relative to **Alternative 2**, **Alternative 3** provides added economic benefits because the amount to be conditionally reallocated would be determined by the SSC and because it offers the flexibility to increase harvests and associated economic benefits for either sector.

4.1.3 Direct and Indirect Effects on the Social Environment

Over the last decade, the commercial sector has regularly landed near the commercial ACL, while the recreational sector has landed decreasingly lower proportions of the recreational ACL (Table 2.1.1). For example, over the last 10 years, the recreational sector has harvested an average 38% of the recreational ACL, and in each of those years, the recreational sector landed less than half of its ACL. However, as noted in Amendment 26 (GMFMC and SAFMC 2016), increased landings would not be expected to negatively affect the health of the stock so long as the ABC is not exceeded. King mackerel is not overfished or undergoing overfishing (SEDAR 38 2014), and the total amount of allowable harvest is expected to increase upon implementation of Amendment 26 (GMFMC and SAFMC 2016).

Alternative 1 (No Action) would retain the current sector allocations for the Gulf king mackerel ACL. Although additional effects would not be expected under **Alternative 1** as fishing practices and customary uses of Gulf king mackerel would not change, optimum yield is not being achieved. Thus, indirect negative effects would be expected to continue under **Alternative 1** as fishing opportunities continue to go unused.

It is possible that some of these foregone fishing opportunities could be used by the recreational sector through an increase in the bag limit, which will increase to 3 fish per person per day upon implementation of Amendment 26. However, increasing the bag limit is not expected to increase landings substantially (Sections 2.9 and 4.9, GMFMC 2016), and it is likely that the recreational sector would continue to harvest well below its sector ACL even under the larger bag limit. Further, the recreational sector does not have a closed season for the harvest of king mackerel; the fishing season is open year-round. Thus, it is not possible to extend the recreational season for the harvest of king mackerel. However, these unused fishing opportunities could provide benefits to the commercial sector, which typically harvests its sector ACL. The commercial fishing zones are regularly closed when the ACL for a zone is estimated to be reached; in some zones, the quota is caught quickly resulting in a very short season. It is highly likely that allocating some of the unused recreational fishing opportunities to the commercial sector would result in those fish being caught. In turn, benefits would result for the commercial sector.

Compared with **Alternative 1**, social benefits would be expected for the commercial sector under **Alternative 2** or **3**, while no effects would be expected for the recreational sector. Because **Alternatives 2** and **3** would make more quota available to the commercial sector but not increase the quota for the recreational sector, the types of effects on the social environment would be similar for both alternatives. The effects would vary in scope and strength relative to the amount of quota that is transferred or increased to the commercial sector. Most generally, the quality of social impacts differs between the sectors, in that a gain of commercial access to king

mackerel could benefit the livelihoods of commercial fishermen, especially small-scale owner-operators, hired captains and crew, and the well-being of commercial communities. Direct effects would not be expected for the recreational sector, which is not catching its portion of the quota. Should fishing behavior change or effort increase substantially in the future such that the recreational sector meets its quota, a reallocation of quota could result in constraints on recreational fishing opportunities, which would entail some negative effects for the recreational sector. However, neither alternative proposes a permanent reallocation. Rather, **Alternative 2** proposes a conditional transfer of allocation, which would revert to that under **Alternative 1** if a selected threshold of recreational landings is met. **Alternative 3** would allow for an increase to the commercial ACL on a yearly basis, only so long as a predetermined proportion of the stock ACL remains unharvested. Given current fishing practices and behavior, it seems unlikely for recreational effort towards king mackerel to increase substantially in the near future. Finally, there are no additional biological benefits to allowing a portion of the allowable harvest to remain in the water, unfished, since the stock is not overfished or undergoing overfishing. Thus, no long-term benefits would be expected for the recreational sector by not harvesting part of its quota.

Alternative 2 would conditionally transfer a portion of the recreational sector ACL to the commercial sector (**Options 2a – 2d**), provided that the recreational sector's landings are below a preset threshold (**Options 2e – 2g**). Greater benefits would be expected for the commercial sector the greater the amount of fish is transferred. Among the **Alternative 2** options, the greatest benefits would be expected from **Option 2d**, followed in descending order by **Option 2c**, **Option 2b**, and the fewest benefits would be expected from **Option 2a**. No effects would be expected for the recreational sector as recreational landings have remained well below 80% of the sector's ACL, and in the event recreational landings increase substantially, the thresholds provided under **Options 2e – 2g** would end the conditional quota sharing.

If the minimum threshold is reached (**Options 2e – 2g**), the conditional ACL transfer would revert to that under **Alternative 1**: 68% recreational and 32% commercial of the stock ACL. Based on the recreational king mackerel landings (Table 2.1.1), the recreational sector has met 50% of its ACL, the lowest proposed threshold (**Option 2e**), twice (2001/02 and 2014/15). Since 2001/02, recreational landings have come close to reaching 65% of the recreational ACL (**Option 2f**), only once; in 2014/15, recreational landings were 63.1% of the recreational ACL. Since 2001, recreational landings have never reached 75% of the recreational ACL (**Option 2g**). Among the threshold options, it is most likely that recreational landings would meet the lowest threshold of 50% (**Option 2e**), less likely to meet 65% of the recreational ACL, and not likely to meet the highest threshold of 75% of the recreational ACL (**Option 2g**) in the foreseeable future. Thus, the greatest benefits to the commercial sector would be realized under **Option 2g**, followed by **Option 2f**. **Option 2e** would result in the fewest benefits for the commercial sector, as the conditional transfer of quota could end if the recreational sector lands as little as 51% of its sector ACL. Selecting **Option 2e** would be most similar to **Alternative 1**, as the greatest amount of quota could potentially remain unharvested the year following one in which the recreational sector landings reach this threshold.

Alternative 3 would require the SSC to make a determination about increasing the stock ABC should a selected proportion of the stock ACL remain unharvested in the previous year. Since

the amount of the ABC increase would be determined by the SSC and is not known at this time, potential benefits that would be expected to result from **Alternative 3** cannot be compared quantitatively with **Alternative 2**. However, relative to **Alternative 2**, **Alternative 3** provides some added benefits because the amount of the ABC to be conditionally reallocated would be determined by the SSC and because it offers the flexibility to increase harvests and associated benefits for either sector. Because the SSC would only consider an increase to the ABC should a selected threshold of the stock ACL remain unharvested, any potential benefits to the commercial sector through an increase in the ABC would be most likely under the smallest threshold of unharvested ACL. Thus, it would be most likely that the SSC reviews the ABC under **Option 3a**, however this option would be expected to result in the smallest increase to the ABC, as it most closely matches the stock ACL. **Option 3b** would be intermediary, and under **Option 3c**, it would be least likely for the SSC to review the ABC, but the greatest increase to the ABC could potentially result if at least 25% of the stock ACL remains unharvested.

4.1.4 Direct and Indirect Effects on the Administrative Environment

The alternatives provide options which ultimately change the division of quota among the commercial and recreational sectors. The change in the division of the ACL under **Alternative 2** would increase the administrative burden compared to **Alternative 1**, since it would necessitate the annual recalculation of ACLs for the commercial and recreational sectors. Alternative 2 would also require the noticing of the resultant changes in allocation and commercial season lengths in the Federal Register. **Alternative 3** would result in increased administrative burdens in the form of involving the Gulf Council's SSC, and like **Alternative 2**, the noticing of the resultant changes in allocation and commercial season lengths in the Federal Register. The negative effects on the administrative environment would be greater for **Alternative 3** compared to **Alternative 2**.

Other administrative burdens that may result from all of the action alternatives considered would take the form of development and dissemination of outreach and education materials for fishery participants.

4.2 Action 2 – Adjust the Recreational Accountability Measure for Gulf Migratory Group King Mackerel

Alternative 1: No Action – Retain the in-season recreational accountability measure (AM). If recreational landings reach or are projected to reach the recreational ACL, the bag limit will be reduced to zero for the remainder of the fishing year.

Alternative 2: Replace the current in-season AM with a post-season AM. If the recreational ACL is exceeded in any fishing year, the length of the following fishing season will be reduced by the amount necessary to ensure the landings do not exceed the ACL.

Alternative 3: Replace the current in-season AM with a post-season AM. If both the recreational ACL *and* the stock ACL are exceeded in a fishing year, the length of the following recreational fishing season will be reduced by the amount necessary to ensure the landings do not exceed the recreational ACL.

4.2.1 Direct and Indirect Effects on the Physical and Biological Environments

Accountability measures (AMs) are used to prevent the ACT from being exceeded and to mitigate the effects of exceeding the ACL. For Gulf king mackerel, the current recreational AM is an in-season AM that requires NMFS to reduce the bag limit to zero if the recreational landings reach or are projected to reach the recreational ACL (**Alternative 1**). As **Alternative 1** represents the status quo, it does not result in any changes to direct or indirect effects on the physical and biological environments.

Alternatives 2 and **3** would both replace the current in-season AM with a post-season AM. If the recreational ACL is exceeded in any fishing year, **Alternative 2** would reduce the length of the following fishing season by the amount necessary to ensure the landings do not exceed the ACL. **Alternative 3** differs from **Alternative 2** in that both the recreational ACL *and* the stock ACL would have to be exceeded in a fishing year for the length of the following recreational fishing season to be reduced by the amount necessary to ensure the landings do not exceed the recreational ACL. **Alternatives 2** and **3** could result in direct negative effects to the biological environment if the amount of the recreational overage results in the stock ACL, and by default the stock acceptable biological catch (ABC), being exceeded; however, the current effort in the recreational sector makes the likelihood of this negative effect being experienced minimal (see Table 2.1.1). Further, any negative effects to the biological environment would be expected to be minimal because they would be mitigated in the following year through a reduction in the length of the recreational fishing season. No measurable changes to the physical environment are anticipated with respect to **Alternatives 2** and **3**, since the methods by which king mackerel are harvested are not being modified.

It is important to consider the effect of Alternative 2 in Action 1 on a potential post-season AM under **Alternatives 2** or **3** in Action 2. If recreational landings exceed the minimum threshold in Action 1, Alternative 2, then the allocation sharing strategy would not be implemented in a given year, and the recreational ACL for that year will be higher than it would have been had the allocation sharing occurred. This higher ACL would be the catch level NMFS uses to determine

whether any reduction in the recreational fishing season is necessary under either **Alternative 2** or **Alternative 3**. The likelihood that a reduction in the recreational fishing season would be necessary in these circumstances would be low given the recent trend in recreational landings.

4.2.2 Direct and Indirect Effects on the Economic Environment

Alternative 1 would maintain the current in-season recreational AM for Gulf king mackerel. As a result, **Alternative 1** would not be expected to affect harvests or other customary uses of Gulf king mackerel. Therefore, direct economic effects would not be expected to result from **Alternative 1**. However, indirect economic effects could result from **Alternative 1** because an in-year closure of the recreational Gulf king mackerel season is possible if the recreational ACL (post-allocation sharing) is met or projected to be met. Although the likelihood of such an occurrence is negligible given the magnitude of recreational harvests recorded in recent years, a shortening of the season would result in reduced recreational harvests and would be expected to result in adverse economic effects.

Alternative 2 would replace in the in-season AM with a post-season AM when the recreational ACL is exceeded in any fishing year. Because the conditional allocation transfer of a portion of the recreational quota to the commercial sector would be reconsidered on an annual basis, **Alternative 2** would shield the recreational sector from the adverse economic effects that would result from an in-season recreational closure if the recreational quota, as reduced by the conditional allocation transfer to the commercial sector, is met or projected to be met.

Alternative 3, identical to **Alternative 2**, also utilizes a post-season AM instead of the current in-season AM. In addition, **Alternative 3** includes a secondary requirement that the stock ACL must also be exceeded, in order for the recreational fishing season in the next year to be reduced. Therefore, as with **Alternative 2**, **Alternative 3** affords the recreational sector the protection from an in-season closure and further mitigates the risk of a closure in the subsequent fishing season by requiring that the stock ACL be exceeded. Because the conditional allocation transfer to the commercial sector is evaluated on an annual basis, it could be cancelled for the following year if it is expected to result in the shortening of the recreational season, thereby avoiding the adverse economic effects that would be expected to result from a reduction of recreational fishing opportunities.

4.2.3 Direct and Indirect Effects on the Social Environment

No additional effects would be expected from retaining **Alternative 1** (No Action), which would maintain the existing in-season AM for the recreational sector. Because the recreational sector has not come close to landing its sector ACL in more than 10 years, it is unlikely that this AM would be triggered. If, however, the AM were to be triggered, direct negative effects would result for the recreational sector through an in-season closure to the retention of king mackerel for the duration of the year. Such an in-season AM is generally associated with greater negative direct effects due to the immediate disruption of fishing activity, as compared with a post-season AM, which would involve some negative effects in the following fishing season unless some other action is taken. Because **Alternatives 2** and **3** would remove the in-season AM and

replace it with a post-season AM, the likelihood of negative direct effects would be greater under **Alternative 1** (No Action) than under either of **Alternatives 2** and **3**.

The post-season AM under **Alternative 2** would reduce the length of the fishing season in the year following an overage of the recreational sector ACL. Because recreational landings have not exceeded 63% of the sector ACL since 2001 (Table 2.1.1), it is unlikely that this post-season AM would be triggered, thus negative effects are not expected. In contrast, the post-season AM under **Alternative 3** would reduce the length of the following fishing season only if both the recreational sector ACL and the total stock ACL are exceeded. Depending on the alternative selected in Action 1, more fish may be expected to become available to the commercial sector which could decrease the likelihood of the commercial sector exceeding its sector ACL. Although it is highly unlikely that the recreational sector ACL would be exceeded, the additional fish provided to the commercial sector could be expected to reduce the likelihood of exceeding the commercial sector ACL, which combined with the recreational ACL is equivalent to the stock ACL. Thus, the likelihood of exceeding both the recreational sector ACL and the stock ACL would be less likely under **Alternative 3** than **Alternative 2**.

4.2.4 Direct and Indirect Effects on the Administrative Environment

Since **Alternative 1** represents the status quo, it would not be expected to result in changes to current direct or indirect effects on the administrative environment. NMFS would monitor recreational landings in-season, and implement a closure if the recreational ACL is met or projected to be met. **Alternatives 2** and **3** would not require any additional quota monitoring activity on behalf of the National Marine Fisheries Service, but they would require a determination of the length of the next fishing season. Additional outreach and education to stakeholders about changes to the AMs would be a minor, negative administrative effect resulting from **Alternative 2** or **3**.

4.3 Cumulative Effects

As directed by the National Environmental Policy Act (NEPA), federal agencies are mandated to assess not only the indirect and direct effects of their actions, but cumulative effects of those actions and other actions as well. Under regulations implementing NEPA, cumulative impact is defined as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions" (40 CFR 1508.7).

Cumulative effects "can result from individually minor but collectively significant actions taking place over a period of time" (40 CFR 1508.7). Cumulative effects can either be additive or synergistic. A synergistic effect occurs when the combined effects are greater than the sum of the individual effects. The following are some past, present, and future actions that could impact the environment in the area where the CMP fishery is prosecuted, where the impacts of this amendment might be felt.

Past Actions

Environmental Influences

The *Deepwater Horizon* MC252 (DWH) oil spill in 2010 affected at least one-third of the Gulf from western Louisiana east to the Florida Panhandle and south to the Campeche Bank of Mexico. Millions of barrels of oil flowed from the ruptured wellhead (www.restorethegulf.gov). The impacts of the DWH oil spill on the physical environment may be significant and 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 suspended within the water column (Camilli et al. 2010; Kujawinski et al. 2011). Floating and suspended oil washed onto coastlines in several areas of the Gulf along with non-floating tar balls. Suspended and floating oil degrades over time, but tar balls persist in the environment and can be transported hundreds of miles (Goodman 2003).

Surface or submerged oil during the DWH oil spill event could have restricted the normal processes of atmospheric oxygen mixing into and replenishing oxygen concentrations in the water column affecting the long-standing hypoxic zone located west of the Mississippi River on the Louisiana continental shelf (NOAA 2010). Microbial biodegradation of hydrocarbons in the water column may have occurred without substantial oxygen drawdown (Hazen et al. 2010). Residence time of hydrocarbons in sediments is also a concern. The indices developed for past oil spills (Harper 2003) and oil spill scenarios (Stjernholm et al. 2011) such as the "oil residence index" do not appear to have been used during the assessment of the DWH oil spill.

The full effects from the DWH oil spill and response may not be known for several years. The highest concern is that the oil spill may have impacted the spawning success of species that spawn in the summer months, either by reducing spawning activity or by reducing survival of the eggs and larvae. The oil spill occurred during spawning months for every species in the CMP FMP; however, most species have a protracted spawning period that extends beyond the months of the oil spill. The presence of hydrocarbons in marine environments have been shown to have detrimental impacts on marine finfish, especially during the more vulnerable larval stage of

development (Whitehead et al. 2011). Embryos of bluefin tuna, yellowfin tuna, and amberjack exposed to environmentally realistic levels of hydrocarbons showed defects in heart function (Incardona et al 2014). Other studies of the effects of hydrocarbon are ongoing.

If eggs and larvae were affected, impacts on harvestable-size king mackerel should begin to be seen when the 2010 year class becomes large enough to enter the fishery and be retained. The impacts would be realized as reduced fishing success and reduced spawning potential. King mackerel mature at age 3-4; therefore, a year class failure in 2010 could have been observed as early as 2013 or 2014. No data were available which demonstrated any such potential for year-class failure during Southeast Data Assessment and Review (SEDAR) 38. Any new data generated since the completion of SEDAR 38 would need to be taken into consideration in the next SEDAR assessment of king mackerel. Therefore, due to a paucity of data, the impact of the DWH oil spill on Gulf king mackerel cannot be determined at this time.

Regulatory Influences

Participation in and the economic performance of the CMP fishery addressed in this document have been affected by a combination of regulatory, biological, social, and external economic factors. Regulatory measures have affected the quantity and composition of harvests of king mackerel, through the various size limits, seasonal restrictions, trip or bag limits, and quotas. In addition to a complex boundary and quota system, the CMP fishery also exists under regulations on bag limits, size limits, trip limits, and gear restrictions.

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 king mackerel component of the CMP fishery. 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 commercial king mackerel permit, king mackerel gillnet endorsement, and the Gulf Charter/Headboat CMP permit are all under a limited entry permit systems (see Section 1.3 for a regulatory history of these measures). New participation in the king mackerel commercial CMP sector and the for-hire CMP component in the Gulf requires access to additional capital and an available permit to purchase, which may limit opportunities for new entrants. Gillnet endorsements can only be transferred to an immediate family member. Additionally, almost all fishermen or businesses with one of the limited entry permits also hold at least one (and usually multiple) additional commercial or for-hire permits to maintain the opportunity to participate in other fisheries. Commercial fishermen, for-hire vessel owners and crew, and private recreational anglers commonly participate in multiple fisheries throughout the year. Even within the CMP fishery, effort can shift from one species to another due to environmental, economic, or

regulatory changes. Overall, changes in management of one species in the CMP fishery can impact effort and harvest of another species (in the CMP fishery or in another fishery) because of multi-fishery participation that is characteristic in the Gulf and South Atlantic regions. Due to the inherent degree of variability associated with fishing for multiple species, it is not possible to succinctly quantify the effects (physical, biological, social, economic, and/or administrative) of changes to the regulatory environment of any one species on all others. This fact necessitates flexibility from participating stakeholders, who will shift their fishing effort from species to species as harvest opportunities are available. Likewise, resource managers strive to ensure fishing opportunities for participating stakeholders, while simultaneously ensuring that overfishing does not occur.

Actions in CMP Framework Amendment 3, implemented January 2016, increased the gillnet trip limit, imposed a payback provision if the gillnet component's ACL is exceeded, changed reporting requirements for dealers buying gillnet-caught king mackerel, and removed inactive gillnet endorsements. These actions were requested by the gillnet fishermen and are expected to generally improve social and economic conditions for participants in this component of the fishery. The higher trip limit is expected to shorten the fishing season and increase the risk of exceeding the ACL; however, the payback provision will account for any ACL overages, thereby acting as a safeguard against any potential negative biological effects. The potential for increased quota for a year through Amendment 29 could allow for a longer gillnet fishing season.

Present Actions

Environmental Influences

Hurricane season is from June 1 to November 30, and accounts for 97% of all tropical activity affecting the Atlantic Basin. These storms, although unpredictable in their annual occurrence, can devastate areas when they occur. However, while these effects may be temporary, those fishing-related activities which rely on access to the resource may be jeopardized if a hurricane strikes. It is reasonable to expect that access to fishery resources will be spatially and temporally reduced in hurricane-affected areas, which would result in negative short- to long-term social and economic effects. The spatially and temporally reduced harvest of fishery resources when a hurricane is present may result in negligibly positive biological effects, depending on the duration of the weather associated decrease in harvest. The action proposed in this document is not expected to alter the manner in which participating stakeholders respond to weather or other related safety-at-sea concerns, nor is it expected to result in any cumulative effect to the physical or biological environments.

Regulatory Influences

Amendment 26 to the CMP FMP (GMFMC and SAFMC 2016) has been submitted for Secretarial review by the Councils. This amendment responds to the most recent stock assessment of king mackerel (SEDAR 38 2014) and proposes actions to adjust the management boundary of the Gulf and Atlantic king mackerel; revise reference points, ACLs, commercial quotas and recreational annual catch targets for Atlantic king mackerel; allow incidental catch of Atlantic king mackerel in the shark gillnet fishery; establish a commercial split season for

Atlantic king mackerel in the Atlantic southern zone; establish a trip limit for Atlantic king mackerel in the Atlantic southern zone; modify ACLs for Gulf king mackerel; revise commercial zone quotas for Gulf king mackerel; and modify the recreational bag limit for Gulf king mackerel. If approved, Amendment 26 will increase the ACLs for king mackerel, which will increase access to king mackerel for both fishing sectors and resulting in positive social and economic effects. The increase in the recreational bag limit is expected to further increase recreational fishing opportunities and may influence the likelihood of triggering the conditional transfer of allocation proposed in Action 1 of Amendment 29. If more fish are harvested by the recreational sector, that sector is more likely to reach a higher percentage of the recreational ACL; if that percentage is higher than the trigger chosen, no transfer of allocation would happen. However, the increased bag limit is expect to result in a minimal increase in landings because the average king mackerel landed per trip is less than one fish.

Framework Amendment 5 to the CMP FMP is being developed by the Councils and would eliminate a regulation that prohibits a person aboard a vessel with a federal commercial permit for king or Spanish mackerel from fishing for or retaining king or Spanish mackerel in the EEZ under a bag or possession limit, if commercial harvest for the species is closed. In addition to removing restrictions on recreational fishing, this action is also expected to reduce the potential for regulatory discards of king and Spanish mackerel. In relation to Amendment 29, the increased recreational fishing opportunities could also increase the recreational harvest and decrease the likelihood of an allocation transfer to the commercial sector.

Reasonably Foreseeable Future Actions

Environmental Influences

Global climate change can affect marine ecosystems through ocean warming by increased thermal stratification, reduced upwelling, sea level rise, and 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 affect a wide range of organisms and ecosystems. These influences could negatively affect biological factors such as productivity, species distributions and range, recruitment, larval and juvenile survival, migration, community structure, timing of biological events, prey availability, and susceptibility to predators (Osgood 2008).

In the southeast, general impacts of climate change have been predicted through modeling, with few studies on specific effects to species. Warming sea temperature trends in the southeast have been documented, and animals must migrate to cooler waters, if possible, if water temperatures exceed survivable ranges (Needham et al. 2012). Higher water temperatures may also allow invasive species to establish communities in areas they may not have been able to survive previously. An area of low oxygen, known as the dead zone, forms in the northern Gulf each summer, and has been increasing in recent years. Climate change may contribute to this increase by increasing rainfall that in turn increases nutrient input from rivers. This increased nutrient load causes algal blooms that, when decomposing, reduce oxygen in the water (Kennedy et al. 2002, Needham et al. 2012). Other potential impacts of climate change to the southeast include increases in hurricanes, decreases in salinity, altered circulation patterns, coral bleaching and sea level rise (Osgood 2008). The combination of warmer water and expansion of salt marshes

inland with sea-level rise may increase productivity of estuarine-dependent species in the short term. However, in the long term, this increased productivity may be temporary because of loss of fishery habitats due to wetland loss (Kennedy et al. 2002). Actions from this amendment are not expected to significantly contribute to climate change through the increase or decrease in the carbon footprint from fishing.

Regulatory Influences

Amendments establishing electronic reporting for for-hire vessels operating in Gulf and South Atlantic federal waters are in development and may be implemented within the next few years and may affect the CMP fishery. These amendments would improve landings data resolution and accountability for that portion of the CMP fishery. The action proposed in this document is not expected to diminish or augment the positive effects anticipated of the electronic reporting amendments.

Expected Impacts from Past, Present, and Future Actions

The proposed management actions are summarized in Chapter 2 of this document. Detailed discussions of the magnitude and significance of the impacts of the preferred alternatives on the human environment appear in Chapter 4 of this document. None of the impacts of the action in this amendment, in combination with past, present, and future actions have been determined to be significant. The additive effects, beneficial and adverse, on the species and the fishery are not expected to result in a significant level of cumulative impacts.

The proposed actions would not adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places as these are not in the South Atlantic EEZ. This action is not likely to result in direct, indirect, or cumulative effects to unique areas, such as significant scientific, cultural, or historical resources, park land, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas as the proposed action is not expected to substantially increase fishing effort or the spatial and/or temporal distribution of current fishing effort within the Gulf. The proposed actions are not likely to cause loss or destruction of these national marine sanctuaries because the actions are not expected to result in appreciable changes to current fishing practices.

The proposed action relates to the harvest of an indigenous species in the Gulf and Atlantic, and the activity being altered does not itself introduce non-indigenous species, and is not reasonably expected to facilitate the spread of such species through depressing the populations of native species. Additionally, it does 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.

Monitoring and Mitigation

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. Commercial data are collected through trip ticket programs, port samplers, and logbook programs. Recreational data are

collected through dockside, online, and telephone-based surveys. The action proposed in this document is not expected to result in changes to how NMFS monitors landings data.

The proposed action would not have significant biological, social, or economic effects because even though the action could extend fishing opportunities, AMs are also considered, and are in place to ensure overfishing does not occur. Therefore, the cumulative effects of the proposed action is not expected to affect the magnitude of bycatch, diversity and ecosystem structure of fish communities, or safety at sea of fishermen targeting CMP species, and other species managed by Gulf Council. Based on the cumulative effects analysis presented herein, the proposed action would not have any significant adverse cumulative impacts compared to, or combined with, other past, present, and foreseeable future actions.

CHAPTER 5. REGULATORY IMPACT REVIEW

5.1 Introduction

The National Marine Fisheries Service (NMFS) requires a Regulatory Impact Review (RIR) for all regulatory actions that are of public interest. The RIR does three things: 1) It provides a comprehensive review of the level and incidence of impacts associated with a regulatory action; 2) it provides a review of the problems and policy objectives prompting the regulatory proposals and an evaluation of the major alternatives which could be used to solve the problem; and 3) it ensures that the regulatory agency systematically and comprehensively considers all available alternatives so that the public welfare can be enhanced in the most efficient and cost effective way. The RIR also serves as the basis for determining whether any proposed regulations are a "significant regulatory action" under certain criteria provided in Executive Order 12866 (E.O. 12866) and whether the approved regulations will have a "significant economic impact on a substantial number of small business entities" in compliance with the Regulatory Flexibility Act of 1980.

5.2 Problems and Objectives

The purpose and need, issues, problems, and objectives of these actions are presented in Chapter 1 of this amendment and are incorporated herein by reference.

5.3 Description of the Fishery

A description of the Gulf of Mexico and South Atlantic coastal migratory pelagic king mackerel fisheries is contained in Chapter 3 of this amendment and is incorporated herein by reference.

5.4 Effects on Management Measures

5.4.1 Gulf Migratory Group King Mackerel Quota Sharing

A detailed analysis of the economic effects expected to result from this action is provided in Section 4.1.2. The following discussion summarizes the key points of this analysis.

5.4.2 Adjust the Recreational Accountability Measure for Gulf Migratory Group King Mackerel

A detailed analysis of the economic effects expected to result from this action is provided in Section 4.2.2. The following discussion summarizes the key points of this analysis.

5.5 Public and Private Costs of Regulations

5.6 Determination of Significant Regulatory Action

Pursuant to E.O. 12866, a regulation is considered a "significant regulatory action" if it is expected to result in: 1) An annual effect of $100 million or more or adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or state, local, or tribal governments or communities; 2) create a serious inconsistency or otherwise interfere with an action taken or planned by another agency; 3) materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights or obligations of recipients thereof; or 4) raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in this executive order.

CHAPTER 6. REGULATORY FLEXIBILITY ANALYSIS

Introduction

The purpose of the Regulatory Flexibility Act (RFA) is to establish a principle of regulatory issuance that agencies shall endeavor, consistent with the objectives of the rule and of applicable statutes, to fit regulatory and informational requirements to the scale of businesses, organizations, and governmental jurisdictions subject to regulation. To achieve this principle, agencies are required to solicit and consider flexible regulatory proposals and to explain the rationale for their rules to assure that such proposals are given serious consideration. The RFA does not contain any decision criteria; instead, the purpose of the RFA is to inform the agency, as well as the public, of the expected economic impacts of various alternatives contained in the FMP or amendment (including framework management measures and other regulatory rules). The RFA is also intended to ensure that the agency considers alternatives that minimize the expected impacts while meeting the goals and objectives of the FMP and applicable statutes.

With certain exceptions, the RFA requires agencies to conduct a regulatory flexibility analysis for each proposed rule. The regulatory flexibility analysis is designed to assess the impacts various regulatory alternatives would have on small entities, including small businesses, and to determine ways to minimize those impacts. In addition to analyses conducted for the RIR, the regulatory flexibility analysis provides: 1) A statement of the reasons why rule by the agency is being considered; 2) a succinct statement of the objectives of, and legal basis for the proposed rule; 3) a description and, where feasible, an estimate of the number of small entities to which the proposed rule will apply; 4) a description of the projected reporting, record-keeping, and other compliance requirements of the proposed rule, including an estimate of the classes of small entities which will be subject to the requirements of the report or record; 5) an identification, to the extent practical, of all relevant Federal rules which may duplicate, overlap, or conflict with the proposed rule; and 6) a description of any significant alternatives to the proposed rule which accomplish the stated objectives of applicable statutes and which minimize any significant economic impact of the proposed rule on small entities.

Additional information on the description of affected entities may be found in Chapter 3, and additional information on the expected economic effects of the proposed action may be found in Chapter 4.

Statement of Need for, Objectives of, and Legal Basis for the Action

Identification of All Relevant Federal Rules Which May Duplicate, Overlap or Conflict with the Proposed Action

Description and Estimate of the Number of Small Entities to Which the Proposed Action will Apply

Description of the Projected Reporting, Record-keeping and other Compliance Requirements of the Proposed Action

Substantial Number of Small Entities Criterion

Significant Economic Impact Criterion

Description of Significant Alternatives

CHAPTER 7. LIST OF AGENCIES, ORGANIZATIONS, AND PERSONS CONSULTED

Preparers:

Name	Expertise	Responsibility
Ryan Rindone, GMFMC	Fishery Biologist	Co-Team Lead – amendment development, introduction, biological and administrative impacts
Kari MacLauchlin, SAFMC	Fishery Social Scientist	Co-Team Lead – amendment development
Rich Malinowski, NMFS	Fishery Biologist	Co-Team Lead – amendment development, introduction, biological, administrative impacts
Karla Gore, NMFS/SF	Fishery Biologist	Co-Team Lead – amendment development
Susan Gerhart	Fishery Biologist	Co-Team Lead – cumulative effects
Assane Diagne, GMFMC	Economist	Economic impacts, regulatory impact review
Matt Freeman, GMFMC	Economist	Economic impacts,
Ava Lasseter, GMFMC	Anthropologist	Social impacts
David Records, NMFS/SF	Economist	Economic environment and impacts, Regulatory Flexibility Act analysis
Christina Package-Ward, NMFS/SF	Anthropologist	Social environment and Environmental Justice
Mike Larkin, NMFS/SF	Data Analyst	Data analysis

Reviewers:

Name	Discipline/Expertise	Role in EA Preparation
Mara Levy, NOAA GC	Attorney	Legal review
Monica Smit-Brunello, NOAA GC	Attorney	Legal review
Susan Gerhart	Fishery Biologist	Biological review
Noah Silverman, NMFS	Environmental Protection Specialist	NEPA review
David Dale, NMFS/HC	EFH Specialist	Habitat review
Jennifer Lee, NMFS/PR	Protected Resources Specialist	Protected resources review
Christopher Liese	Economist	Social/economic review
Michael Schirripa	Research Fishery Biologist	Biological review

GMFMC = Gulf of Mexico Fishery Management Council, SAFMC = South Atlantic Fishery Management Council, NMFS = National Marine Fisheries Service, SF = Sustainable Fisheries Division, PR = Protected Resources Division, HC = Habitat Conservation Division, GC = General Counsel

The following have or will be consulted:

National Marine Fisheries Service

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

NOAA General Counsel
Environmental Protection Agency
United States Coast Guard
Texas Parks and Wildlife Department
Alabama Department of Conservation and Natural Resources/Marine Resources Division
Louisiana Department of Wildlife and Fisheries
Mississippi Department of Marine Resources
Florida Fish and Wildlife Conservation Commission
Georgia Department of Natural Resources
South Carolina Department of Natural Resources
North Carolina Division of Marine Fisheries
Mid-Atlantic Fishery Management Council

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APPENDIX A. SUMMARIES OF PUBLIC COMMENTS RECEIVED

Gulf of Mexico Scoping Workshop Comments

These comments were received with respect to Amendment 26 to the CMP FMP, and have been limited to those comments received with pertain to the proposed management alternatives in Action 1.

SCOPING WORKSHOPS
Coastal Migratory Pelagics
Amendment 26
King Mackerel Allocations & Mixing Zone Delineation

Biloxi, Mississippi
March 31, 2015

Meeting Attendees:
Rufus Young

Gulf King Mackerel Sector Allocation

Should the Gulf Council adjust the commercial and recreational allocations for king mackerel?

- There should be a hard shift of 10% of the allocation from the recreational to commercial sector. Anything to give the commercial side more and keep the season open longer.

Saint Petersburg, Florida
April 13, 2015

Meeting Attendees:
Richard Sergent
Stewart Hehenberger

Gulf King Mackerel Sector Allocation

Should the Gulf Council adjust the commercial and recreational allocations for king mackerel?

- The fish that are under harvested by the recreational sector should be given to the commercial sector.

Key West, Florida
April 19, 2015

Meeting Attendees:
George Niles
Daniel Padron
Bill Kelly

Gulf King Mackerel Sector Allocation

Should the Gulf Council adjust the commercial and recreational allocations for king mackerel?

- There has to be some way to use the fish that aren't being harvested.
- Recreational fish already go against commercial quota because they can sell the fish they catch.
- Give the commercial fishermen quota from the recreational sector until the recreational sector is landing 80% of its quota.
- The three million pounds of fish being left in the water by the recreational sector is not being caught, and using a "use it or lose it" for a million of those pounds over 5 years doesn't make sense.

How should the king mackerel annual catch limit be allocated?

- The recreational sector should lend portion of their quota to commercial sector because they're not using it and fish are being wasted. Try lending program for a year and see how it works.
- Attendees in favor of proportional allocation, where the Western Zone would get 45.53%; the Northern Zone, 7.61%; and each component of the Southern Zone, 23.43%.
- The allocation in the northern areas doesn't make sense. Those areas were never where the heart of the fishery was.

Galveston, Texas
April 27, 2015

Meeting Attendees:
Shane Cantrell

Gulf King Mackerel Sector Allocation

Should the Gulf Council adjust the commercial and recreational allocations for king mackerel?

- More recreational input is needed before a decision on allocation is made. We should have more information on why the recreational sector isn't harvesting their allocation. They shouldn't necessarily be penalized for under harvesting.

How should the king mackerel annual catch limit be allocated?

- A bag limit analysis and research on mortality rate of king mackerel releases should be performed to inform this decision.

Grand Isle, Louisiana
April 28, 2015

Meeting Attendees:
Dean Blanchard
Kelty Readenour
Michael Frazier
Abigail Frazier
Brian Hardcastle

Sector Reallocation of Gulf King Mackerel

Should the Gulf Council adjust the commercial and recreational allocations for king mackerel?

- Do not move recreational allocation to commercial sector. You don't want to mess with those guys, or you'll never hear the end of it.

APPENDIX B. ECONOMIC ANALYSIS OF REALLOCATION SCENARIOS FOR GULF MIGRATORY GROUP KING MACKEREL

July 6, 2015

Social Science Research Group and Sustainable Fisheries Division
NOAA Southeast Fisheries Science Center

This communication addresses the request to conduct an economic analysis of Gulf of Mexico king mackerel reallocation proposals in support of Amendment 24 to the Fishery Management Plan for the Coastal Migratory Pelagic Resources in the Gulf of Mexico and Atlantic Region. The request solicited an analysis of alternatives that could redistribute 2%, 5%, 10%, or 20% of the king mackerel quota from the recreational sector to the commercial sector. Table 1 shows the current allocation and proposed alternatives.

Table 1. Status quo and allocation alternatives

		Percent from Recreational to Commercial			
Sector	SQ	2%	5%	10%	20%
		--Allocation in Percent--			
Commercial	32%	34%	37%	42%	52%
Recreational	68%	66%	63%	58%	48%
		--Allocation in million lbs--			
Commercial	3.456	3.672	3.996	4.536	5.616
Recreational	7.344	7.128	6.804	6.264	5.184

The methods and data used in the short-run allocation economic analysis are documented in the Appendices A and B. Table 2 summarizes the main results of the analysis. The short-run analysis suggests that the largest (20%) reallocation proposal could increase the welfare of the commercial sector and the nation by almost $1 million dollars per year. Any reallocation to the commercial sector would increase the amount harvested and decrease recreational and commercial catch rates because the recreational sector does not harvest their entire annual catch limit (ACL). Because in the short-run the reduction in commercial and recreational catch rates is likely to be minor, commercial harvesting costs and the quality of the recreational experience are not expected to be impacted. However, in the medium and long-run, large reallocations could lead to significant catch rate reductions, particularly in the recreational sector, which could reduce the welfare of this sector because anglers value catching and releasing king mackerel. Presently, the long-run impacts of these reallocation proposals cannot be estimated. Preliminary estimates from the king mackerel stock assessment model suggests that reductions in catch rates could be significant if a large portion of the surplus (un-harvested) recreational ACL is reallocated to the commercial sector (Appendix B and C). Additional research is necessary to compare the longer-term economic costs of recreational catch rate reductions with the economic benefits of reallocating to the commercial sector.

Table 2. Inflation-adjusted annual net benefits from quota reallocation proposals (2014=100).

Reallocation Alternative	Anticipated annual added benefits ($) to the commercial sector	Anticipated annual losses ($) to the recreational sector	Annual net benefit ($) from the reallocation alternative
2%	92,532	Negligible	92,532
5%	231,331	Negligible	231,331
10%	462,664	Negligible	462,664
20%	925,328	Negligible	925,328

*This short-run analysis assumes that the quality of the fishing experience is not diminished by potentially lower catch rates.

Appendix B-A. Commercial Sector Analysis

Overview

King mackerel (*Scomberomorus cavalla)* is a migratory coastal pelagic species that supports important commercial and recreational fisheries in the Gulf of Mexico and South Atlantic regions. In the Gulf of Mexico the recreational sector is assigned 68% of the overall quota and the commercial sector is assigned the remaining 32%. The recreational sector typically harvests less than half of their allocation of the Gulf of Mexico king mackerel quota whereas commercial sector harvests have consistently been at or above their quota allocation. Consequently, the Gulf the Mexico Fishery Management Council is considering policies that would redistribute 2%, 5%, 10%, or 20% the king mackerel quota from the recreational sector to the commercial sector.
In the 2013/14 fishing season, the commercial fleet landed over 2.5 million pounds (mp) of king mackerel gutted weight (gw) worth $5.6 million in revenues in the Gulf of Mexico. Handlines, trolls and to a lesser extent gillnets are the main fishing gear used. The Gulf king mackerel commercial fishery is managed with limited entry, area and gear specific quotas, fishing seasons, trip limits and minimum size limits. Issuance of new king mackerel vessel permits is under a moratorium, but existing permits are transferable. The harvest of king mackerel using gillnet in the Florida west coast subzone requires a gillnet endorsement. Table 1 provides an overview of the main regulations affecting the commercial sector.

Table 1. Main commercial regulations for the Gulf of Mexico king mackerel fishery.

Zones	Subzone	Gear Sector	Quota (lbs)	Trip limit (lbs)	Fishing year
Western			1,071,360	3,000	Jul 1-Jun 30
Eastern	East Coast		1,102,896	50/75 fish[1]	Nov 1-Mar31
	Northern		178,848	1,250/500 (H&L)	Jul 1-Jun 30
	Southern	Hook and line	551,448	1,250/500	Jul 1-Jun 30
		Gillnet	551,448	25,000	MLK(Feb) [2]-Jun 30

[1]The average weight for a king mackerel in the South Atlantic region is about 9.8 lbs. (John Walter, pers. comm.). The conversion ratio from gutted weight to whole weight is 1.04.
[2] Martin Luther King (MLK) holiday.

Conceptual Model

To investigate the potential economic gains of quota redistribution proposals to the commercial sector, we assume that commercial fishermen that land king mackerel want to maximize net benefits subject to the king mackerel trip limit (i.e., trip quota). Therefore, when king mackerel landings make up the majority of the trip landings, we posit that fishermen maximize net benefits by minimizing their harvesting costs because they face an exogenously set trip limit (i.e., revenues are fixed). Conversely, when king mackerel landings do not account for the majority of the trip landings we assume that fishermen maximize net benefits over the entire catch mix, not

only king mackerel.[9] In other words, fishermen maximize profits by controlling both harvesting costs and the catch composition. This profit maximizing behavioral assumption implicitly assumes that when fishermen reach their king mackerel trip limit they stop fishing. King mackerel acts a constraint on the trip level harvesting process. Hence, the economic value of a king mackerel at the trip limit is the added net revenue obtained from the entire catch mix obtained by relaxing the king mackerel trip limit by one unit (i.e., its shadow price). If the trip limit is not binding then the marginal benefit from easing the trip limit is zero.
Under the cost minimizing behavioral model, we assume that fishermen can only select the optimal input or factor mix since they face an exogenously determined king mackerel trip limit. Mathematically,

$$\text{Min C}(w, y) = \sum_{j=1}^{m} w_j x_j(w, y) \tag{1}$$

where C is the restricted (short-run) cost function, y is harvest of king mackerel, w_j is the price of input j, and x_j is the amount of input j used. As is customary in production analyses, we presume that the cost function is non-decreasing in input prices and output, linearly homogenous in input prices and concave and continuous in input prices.
Differentiating the cost function with the respect to the fixed (or regulated) output (i.e., king mackerel) we obtain the marginal cost function

$$\frac{\partial C}{\partial y} = MC(w, y). \tag{2}$$

The marginal cost function captures the cost of harvesting an additional unit of king mackerel. The net benefit of harvesting an additional unit of king mackerel is the difference between the king mackerel dockside price and the marginal cost. Mathematically,

$$\lambda_1^c = \text{p}_1 - \frac{\partial C(w, y)}{\partial y}. \tag{3}$$

Note that because we cannot directly observe marginal costs, we need to recover the marginal cost function from the estimates of the system of input demand functions, which are obtained by applying Shepard's lemma. Mathematically,

$$\frac{\partial C}{\partial w_j} = x_j(w, y). \tag{4}$$

Input demand functions describe the optimal adjustment of inputs in response to changes in input prices given an exogenously determined output level.

[9] For analytical purposes, we (arbitrarily) assumed that "the majority of the landings" rule applies when king mackerel makes up 85% or more of the overall trip landings. This assumption lends greater confidence to the cost minimization assumption.

Now, when king mackerel landings do not make up the majority of the trip landings, we assume that fishermen maximize profits by selecting the economically optimal input use and catch mix and subject to the king mackerel trip limit. Mathematically,

$$Max\ \ \pi(p,w;q) = \sum_{i=1}^{n} p_i y_i - \sum_{j=1}^{m} w_j x_j + \lambda(q - y_1) \tag{5}$$

were π is the restricted (short-run) profit function, y_i is harvest of species i (i=1 king mackerel), w_j is the price of input j, x_j is the amount of input j used and q is the king mackerel trip limit. The marginal net benefit (or 'shadow price') of an additional king mackerel is given by the added profit from harvesting over the entire harvest mix when the king mackerel trip limit is relaxed by one additional unit. The shadow price of relaxing the king mackerel trip limit by one unit is simply found by differentiating the profit function with respect to the regulated output (king mackerel)

$$\frac{\partial \pi}{\partial q} = \lambda_1^p . \tag{6}$$

As in the case of the cost minimization model, we cannot directly observe the shadow price so we need to recover it from the estimates of the jointly estimated system of input demands and output supply.

Differentiating the profit function with the respect to input prices we obtain input demand functions

$$\frac{\partial \pi}{\partial w_j} = -x_j . \tag{7}$$

Applying Hotelling's lemma, we obtain the output supply for species $i \neq 1$

$$\frac{\partial \pi}{\partial p_i} = y_i . \tag{8}$$

The input demand and output supply functions describe the optimal adjustment of outputs and inputs in response to changes in output and input prices.

Data

Detailed trip-level data on landings, gear, fishing effort, landing and fishing location, crew size, vessel characteristics, dockside prices and variable costs for those vessels that landed at least one hundred pounds of king mackerel (one thousand pounds for gillnets) were obtained from the National Marine Fisheries Service. The analysis was limited to hook and line (i.e., handline and troll) and gillnet vessels because they were responsible for the majority of the landings. The analysis focused on the last three complete fishing years (2011/12 through 2013/14) to mitigate potential confounding effects from the Deepwater Horizon oil spill.

The empirical model specified two inputs and one (or two) outputs depending on the behavioral model. The two outputs (species) were king mackerel and a residual or miscellaneous group. The price of the residual species was obtained by dividing the total gross revenue by the total landings (excluding king mackerel). The two inputs included energy (fuel consumption) and labor (crew size). Annual dummies were used to control for king mackerel resource abundance. Fishing year 2013/14 was defined as the base year. Because fuel consumption information is only collected on a subset of the fleet, we imputed fuel consumption for the remaining vessels as a function of vessel characteristics and trip duration. Diesel #2 prices were obtained from the US Energy Information Administration.

The return to the labor was measured by its opportunity cost. The crew's opportunity cost was set equal to wages of production employees, whereas captains received an arbitrary 20% premium over regular crew's earnings (Squires, 1988; Walden *et al.*, 2014). The labor earnings were obtained from the U.S. Bureau of Labor Statistics. The opportunity cost of captain and crew were aggregated into a single wage rate. All output and input prices were adjusted by the GDP deflator (2014=100). Table 4 summarizes the descriptive statistics.

Table 2. Descriptive statistics of the commercial fleet.

Variable	Units	Mean	Minimum	Maximum	Std. Deviation
King mackerel landings	lbs gw/trip	376.07	0.96	38,813.46	1,048.69
Other species landings	lbs gw/trip	127.89	0.01	11,995.00	515.24
Diesel # 2 price	$/gallon	3.24	2.86	3.55	0.16
Captain and crew wage	$/trip	226.24	165.06	2,642.99	150.03
Price of king mackerel	$/lbs gw	2.50	0.63	4.59	0.62
Price of other species	$/lbs gw	0.95	0.01	51.13	1.70

*All prices and wages are deflated using the GDP deflator (2014=100)

Empirical model

Broadly, we estimate the added benefits from redistributing quota to the commercial sector by assuming that the commercial sector is made up of cost minimizing and profit maximizing fishing vessels. Due to the multiplicity of area and gear specific quotas, we estimated indirect, trip-level cost and profit functions for the main area-gear combinations. Both cost minimizing and profit maximizing behavior were modelled using a generalized Leontief flexible function form.

The indirect restricted cost function is given by

$$C(w,y) = y\left(\sum_{i=1}^{2}\sum_{k=1}^{2}\beta_{ik}\left(w_i^{1/2}w_k^{1/2}\right) + \sum_{i=1}^{2}\sum_{l=1}^{2}\delta_{il}w_i D_l\right) \quad (9)$$

where w_i are input prices (fuel and labor), y is the king mackerel landings and *D is* a dichotomous variable to account for annual changes in king mackerel abundance. Symmetry is imposed by setting $\beta_{ik}=\beta_{ki}$ for $k\neq i$.

Applying Shepard's lemma, we obtain the factor demand which we divide by the output level to reduce the potential for heteroscedasticity (Parks, 1971). Mathematically,

$$\frac{1}{y}\frac{\partial \mathrm{C(w, y)}}{\partial w_i} = -\frac{x_i}{y} = \sum_{i=1}^{2}\beta_{ik}\left(\frac{w_k}{w_i}\right)^{1/2} + \sum_{l=1}^{2}\delta_{il}D_l \ . \tag{10}$$

Using the parameters estimated above, we recover the marginal cost function which is given by

$$\frac{\partial \mathrm{C(w, y)}}{\partial y} = \mathrm{MC(w, y)} = \sum_{i=1}^{2}\sum_{k=1}^{2}\beta_{ik}\left(w_i^{1/2}w_k^{1/2}\right) + \sum_{i=1}^{2}\sum_{l=1}^{2}\delta_{il}w_i D_l \ . \tag{11}$$

Then, we obtain the net benefit from harvesting an additional unit by subtracting the king mackerel dockside price from the marginal cost. Mathematically,

$$\lambda_1^c = \mathrm{p_1} - \frac{\partial C(w, y)}{\partial y} \ . \tag{12}$$

The indirect restricted profit function captures the difference between dockside revenues and variable costs (fuel and labor) and is given by

$$\pi(p, y) = y_1\left(\sum_i\sum_j\beta_{ij}\left(p_i^{1/2}p_j^{1/2}\right) + \sum_i\sum_l\delta_{il}p_i D_l\right) \tag{13}$$

where π is the profit function, p_i are input and output prices, D is a dichotomous yearly dummy to control for changes in king mackerel abundance and y_1 is the fixed output, king mackerel. King mackerel was modeled as a fixed output because is subject to an exogenously determined trip limit. The fishing year 2013/14 is set as the base year. Symmetry is imposed by setting $\beta_{ij}=\beta_{ji}$ for $i\neq j$.

Applying Hotelling's lemma, we obtain the associated output supply for $i\neq 1$

$$\frac{1}{y_1}\frac{\partial \pi}{\partial p_i} = y_i = \left(\beta_{ii}E + \sum_{j\neq i}\beta_{ij}\left(\frac{p_j}{p_i}\right)^{1/2} + \sum_l\delta_{il}D_l\right) \tag{14}$$

and input demand equations

$$\frac{1}{y_1}\frac{\partial \pi}{\partial p_j} = -x_j = \left(\beta_{jj}E + \sum_{i\neq j}\beta_{ij}\left(\frac{p_i}{p_j}\right)^{1/2} + \sum_l\delta_{jl}D_l\right) \ . \tag{15}$$

These supply and demand functions describe the optimal adjustment of outputs and inputs in response to changes in output and input prices.

Differentiating the profit function with respect to the fixed output (y_1) we obtain the shadow price

$$\frac{\partial \pi}{\partial y_1} = \lambda_1^p = (\sum_i \sum_j \beta_{ij} (p_i^{1/2} p_j^{1/2}) + \sum_i \sum_l \delta_{il} p_i D_l) \quad (16)$$

To assess the economic consequences of reallocating quota to the commercial sector, we make the following additional assumptions. First, we conjecture that the quota increase would materialize in the form of trip limit increases (in proportion to the proposed quota change) since the length of the fishing season is not binding (while quota is available). Second, following Holzer and McConnell's (2014) recommendation we utilize the mean marginal WTP as proxy of net benefits since the current management regime does not ensure that fishermen who value the resource the most will have preferential access to it. In addition, we posit that fishermen would exhaust the added quota as long as the dockside revenue exceeds the marginal cost of harvesting under the cost minimization behavioral model. We also assume that the proportion of the landings that meet or exceed a given trip limit would be the same for the various reallocation proposals under the profit maximizing behavioral model.[10] These last two assumptions become more tenuous for the larger reallocation proposals (5%-20%).

Finally, we estimate the net benefit to the commercial sector for a given reallocation proposal by weighing the lambdas from equations (12) and (16) by the share of current quota taken by each benefit maximizing strategy (cost minimization vs. profit maximization) and multiply them by the proposed quota increase.

$$\Delta \text{ Net Benefit} = \lambda_1^c (\frac{h_t^{\text{cost min}}}{Quota_t}) \Delta\text{Quota} + \lambda_1^p \quad (\frac{Quota_t - h_t^{\text{cost min}}}{Quota_t}) \Big|_{\text{king mackerel trip landings} \geq \text{king mackerel trip limit}} \Delta\text{Quota} \quad . \quad (17)$$

Note that because of the profit maximizing behavioral assumption we only multiply the shadow price by the harvest of those trips that met or exceeded the trip limit (i.e., binding constraint).

Results

As noted earlier because we only had information on fuel consumption for about 20% of the fleet, we imputed fuel consumption for the remaining fleet using fishing effort and vessel characteristics as explanatory variables. The fuel consumption equations were estimated using ordinary least squares (OLS). The R^2 for the fuel equations ranged from 0.01 to 0.73. The system of input demand and output supply functions were jointly estimated using iterated

[10] For clarity, in the analysis we adopt the higher trip limit available, when multiple trip limits exist in one management area.

seemingly unrelated regression (ITSUR).[11] The generalized R^2 for the system of equations ranged from 0.09 to 0.41.[12] Marginal cost estimates range from $0.12/lbs gw to $1.50/lbs gw whereas king mackerel shadow prices range from $2.02/lbs gw to $33.54/lbs gw. Some of the shadow price estimates are high and should be viewed with caution (e.g., Western zone, Eastern zone, Northern subzone).

The preliminary analysis suggests that increasing the commercial quota by 2% would result in an increase in net benefits (i.e., quasi-rent or revenues minus fuel costs and the opportunity cost of labor) of $92,532 to the commercial sector whereas a 20% increase would result in a larger net increase of $925,328 (Table 3).

Table 3. Inflation-adjusted net benefits from quota reallocation proposals (2014=100).

Zones	Subzone	Gear Sector	Added net benefits ($) from increasing the baseline quota by			
			2%	5%	10%	20%
Western			35,214	88,035	176,070	352,140
Eastern	East Coast		29,935	74,839	149,677	299,356
	Northern		7,917	19,792	39,586	79,171
	Southern	Hook and line	7,907	19,767	39,535	79,069
		Gillnet	11,559	28,898	57,796	115,592
Grand Total			92,532	231,331	462,664	925,328

[11] Due to the multiplicity of area-gear combinations, we do not report parameter estimates; however, these are available from the authors.

[12] The generalized R^2 was estimated as 1- exp[2(Lo - Lm)/N], where Lo (Lm) is the sample maximum of log-likelihood when all slope coefficients equal zero (unconstrained) and N is the sample size.

Appendix B-B. Recreational Sector Analysis

Research suggests that anglers value both keeping and releasing king mackerel (Carter and Liese, 2012). Therefore, the recreational sector would forgo economic benefits if un-harvested (or "surplus") quota is reallocated to the commercial sector because the quality of the fishing experience could be diminished by the lower catch rates. The timing and significance of this "stock effect" could vary depending on the amount of the surplus recreational ACL that is reallocated and harvested by the commercial sector. We do not expect that the stock effect to be strong enough in the initial years following any of the alternative reallocations to result in a reduction in recreational catch rates. Consequently, there would be little, if any, loss in economic value to the recreational sector in the first year following even the largest (20%) proposed reallocation to the commercial sector.

Potential Longer Term Effects of Reallocation Policies

We do not have the information at present to calculate the long-term foregone economic value in the recreational sector associated with reallocation policies. However, the current king mackerel stock assessment model (SEDAR 38) can be used to simulate the potential change in catch rates.[13] The two cases we simulate are purely illustrative and are not directly related to any of the reallocation policies currently under consideration. The first case is the situation where none of the current recreational ACL surplus is reallocated to the commercial sector and the second case considers the situation where all of the current recreational ACL surplus is reallocated to the commercial sector. The simulations are described in Appendix C.

The simulated king mackerel catch rates results for the two cases from 2016 to 2022 are shown in Figure 1. The graph shows that the catch rates for both recreational fishing fleets are expected to be lower if the surplus recreational ACL is reallocated to the commercial sector. The difference between catch rates for the two cases grows for about seven years and then stabilizes in equilibrium at around 20%. The difference in catch rates widens over time because the fish not reallocated to the commercial sector are left to accumulate in the water so that fishing is more effective.

Note that the results from the stock assessment model simulations cannot readily be used to calculate potential changes in economic value to the recreational sector that are comparable with the estimates calculated for the commercial sector. The commercial sector results are based on changes from the existing king mackerel ACL and the geographic definition of the stock structure (i.e., the mixing zone) used in the previous stock assessment. The simulations performed for the analysis of the recreational sector catch rates used the most recent stock assessment model (SEDAR 38) that uses an updated stock structure and the ACL stream. The results of SEDAR 38 have not yet been used to set new ACLs or to redefine the stock structure for regulator purposes.

[13] The SEDAR 38 king mackerel stock assessment model is documented at: http://sedarweb.org/sedar-38.

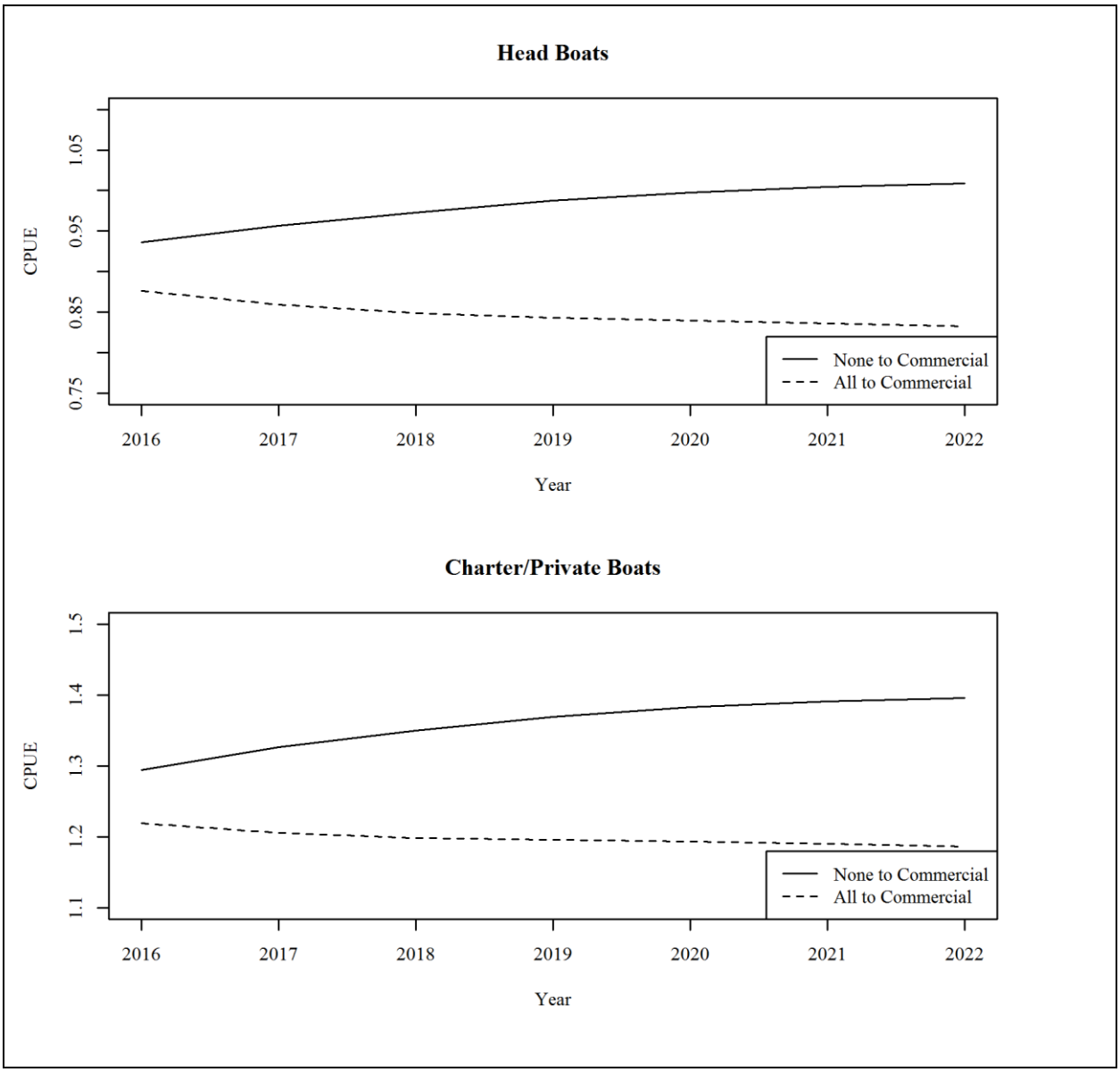

Figure 1. Catch rates (CPUE) when all or none of the surplus recreational ACL is reallocated to the commercial sector.

Appendix B-C. Effects on recreational CPUE of reallocation of the recreational of Gulf of Mexico king mackerel under-age to commercial sector

In recent years (fishing years 2011-2013, http://sero.nmfs.noaa.gov/sustainable_fisheries/acl_monitoring/) the recreational fishery for king mackerel in the Gulf of Mexico has only caught ~38% of its annual catch limit. Projections of the SEDAR 38 assessment assume that the recreational fishery will catch its ACL (Status quo scenario, in this analysis). However, there is the potential that the recreational underage could be reallocated to the commercial handline and gill net fishery (Reallocation scenario). This analysis evaluates the estimated impact on recreational catch per unit effort (CPUE) if such a reallocation occurs.

The analysis was conducted by projecting the population forward in time to year 2030 and then estimating the difference in expected recreational CPUE under the status quo allocation of landings and under the reallocation scenario. The analysis proceeded as follows:

1. Project the SEDAR 38 Base model forward to 2030 at F_{SPR30} to obtain the equilibrium (after all transient cohort effects have passed) allocation of landings by weight. The resulting allocation is 40:60 commercial:recreational

2. Assume that the recreational fleet only catches 38% of their allocation (0.60*0.38=23%). Reallocating the remainder of the retained biomass to the commercial fleet's results changes the allocation to this sector to 77%. This reallocation is achieved in the projections by assigning the commercial (handline and gillnet) and recreational (headboat and charter/private) to separate allocation groups and projecting a 77:23 reallocation. This reallocation achieves the same total ACL as the base projections but reallocates the retained yield.

3. Calculate the expected CPUE for the two recreational fleets under the status quo and reallocation scenarios.

4. The expected CPUE for each scenario was obtained by multiplying numbers at age *x* selectivity at age *x* catchability

Comparison between the Stock Assessment Status Quo and the Reallocation Scenarios

Under the Reallocation scenario, the expected equilibrium CPUE was ~0.7%higher for the headboat fleet (Figure 1.A) and ~1.3% higher for the charter/private fleet (not shown). This was due to the higher projected numbers of vulnerable fish (Figure 1.B). Note that the decline, under both scenarios, in the numbers, of vulnerable fish reflects the fishing down of the population currently above the B_{MSY} proxy towards the target level. This reduces the total fish available to each fleet, reducing the expected CPUE.

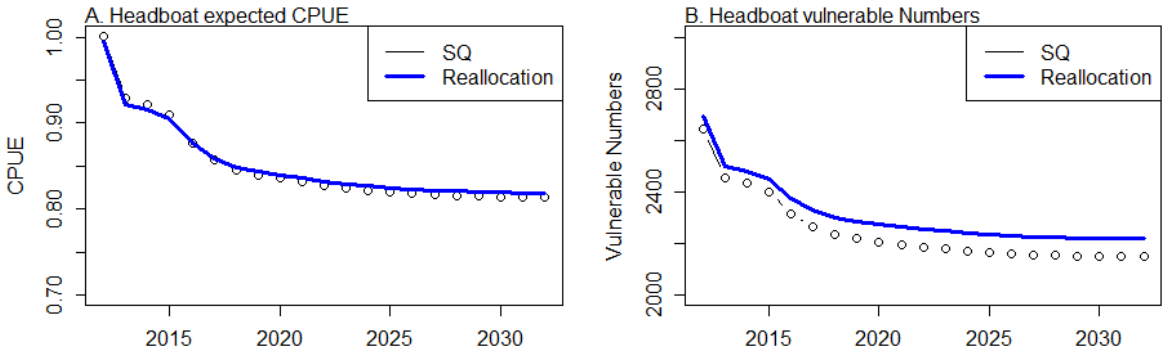

Figure 1. Projected CPUE (A) and vulnerable numbers (B) for headboat fleet under the status quo and reallocation scenarios.

The differences in expected CPUE are very minor and unlikely to be detectable. The major reason that the differences are very minor are that the selectivities for the different fleets are relatively similar (Figure 3) indicating that reallocation between the recreational and commercial fleets results in little change in the overall pattern of fishing mortality at age or size. Furthermore, while the recreational fishery has slightly higher levels of dead discards per landed fish than the commercial fishery, the reallocation does not greatly alter the total levels of discards. What minor differences exist between the two scenarios is likely a result of a very slightly higher level of SSB (Figure 3.A) as a result of a small the reduction (~15,000 per year) reduction in dead discards (Figure 3.B).

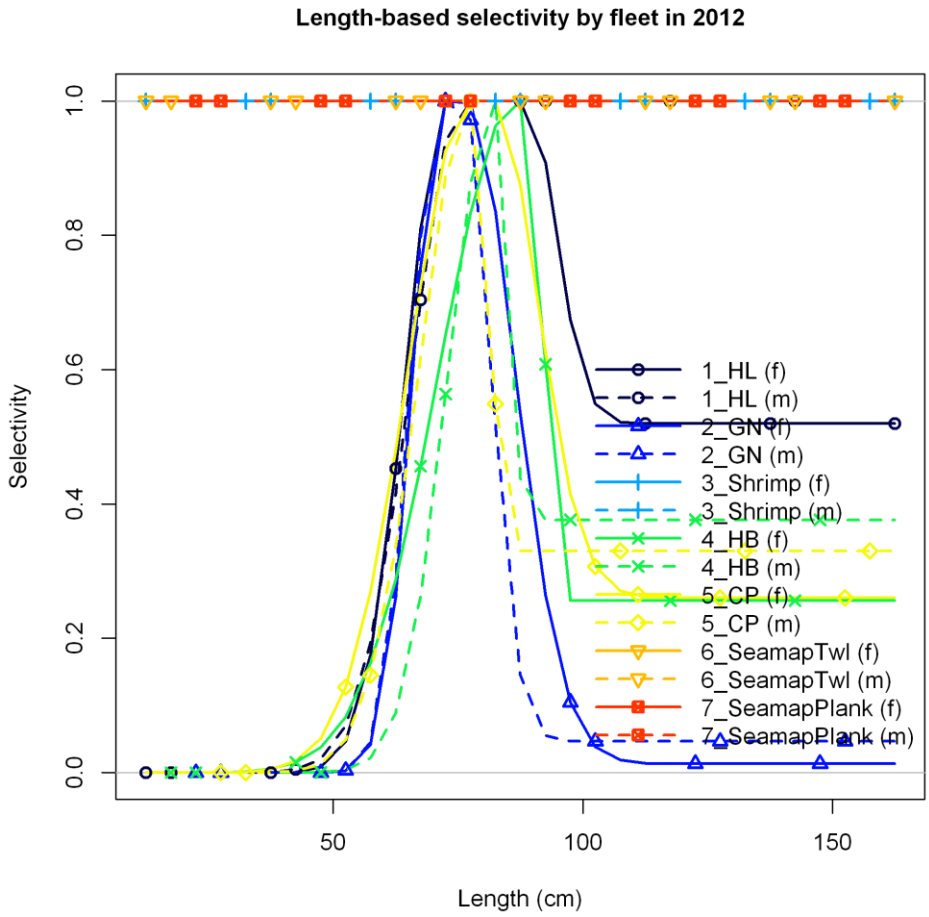

Figure 2. Estimated length-based selectivities for the each fleet from SEDAR 38 base model for Gulf of Mexico

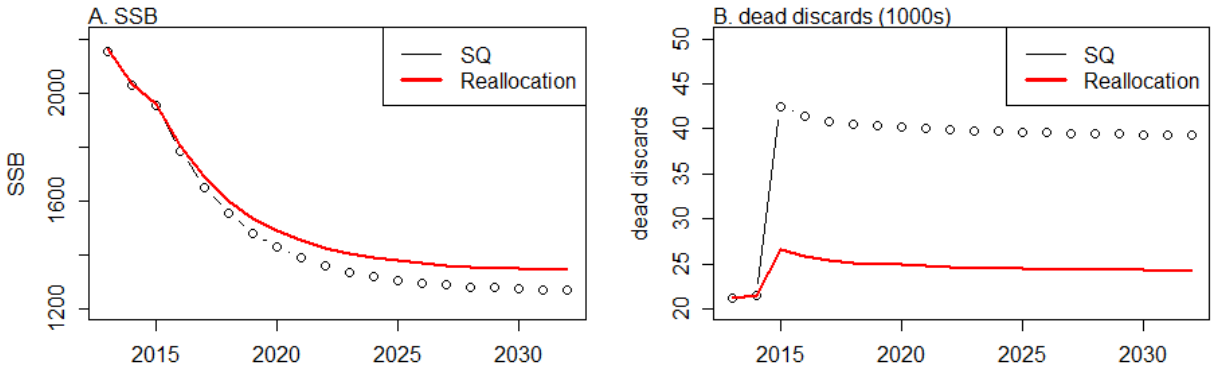

Figure 3. Estimated SSB (A) and dead discard (B) trends for the status quo and reallocation scenarios

Comparison between the Current Underage and the Reallocation Scenarios

If the current recreational fleet underage was perpetuated into the future then the overall ACL would not be caught. This would allow the population to remain at higher than target levels (Figure 4) into the future and impact CPUE. To evaluate the impact on CPUE the recreational underages were projected into the future by reducing the equilibrium fishing mortality rates for each recreational fleet to 38% of their original value and projecting forward with the following levels of fixed F.

	Handline	Gillnet	Shrimp	Headboat	Charter/Private
Equilibrium F	0.069	0.060	0.133	0.014	0.239
Rec reduced by 38%	0.069	0.060	0.133	0.005	0.091

This resulting equilibrium CPUE values were 21% (headboat) and 25% (private recreational, not shown) higher than expected values under the status quo scenario (Figure 4).

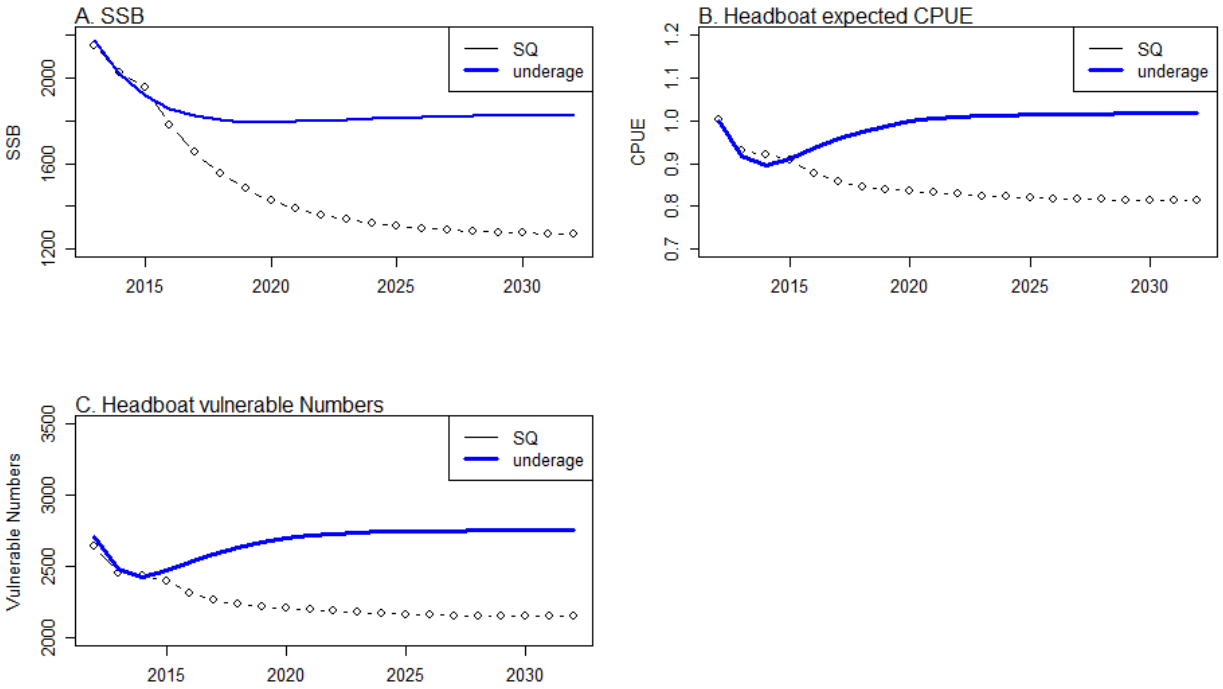

Figure 4. Projected SSB (A) CPUE (B) and numbers (C) for headboat fleet under the status quo and under the recreational underage scenario.

Appendix B References

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