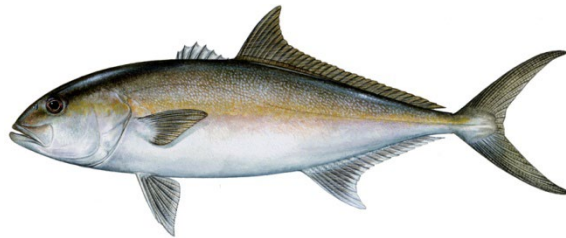


# Draft Framework Action to Modify the Greater Amberjack Recreational Fixed Closed Season and Commercial Trip Limit



## Draft Framework Action to the Fishery Management Plan for the Reef Fish Resources in the Gulf of Mexico

August 2023



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# ENVIRONMENTAL ASSESSMENT COVER SHEET

Draft Framework Action to Modify the Greater Amberjack Recreational Fixed Closed Season and the Commercial Trip Limit

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This Environmental Assessment is being prepared using the 2020 CEQ NEPA Regulations as modified by the Phase I 2022 revisions. The effective date of the 2022 revisions was May 20, 2022, and reviews begun after this date are required to apply the 2020 regulations as modified by the Phase I revisions unless there is a clear and fundamental conflict with an applicable statute. This Environmental Assessment began on January 6, 2023 and accordingly proceeds under the 2020 regulations as modified by the Phase I revisions.

## ABBREVIATIONS USED IN THIS DOCUMENT

ABC	acceptable biological catch
ACL	annual catch limit
AM	accountability measure
BEA	Bureau of Economic Analysis
BiOp	biological opinion
BLL	bottom longline
CFR	code of federal regulations
CHTS	Coastal Household Telephone Survey
CFpA	cash flow per angler
Council	Gulf of Mexico Fishery Management Council
CS	consumer surplus
CV	coefficient of variation
Data Calibration FA	Gulf of Mexico Red Snapper Recreational Data Calibration and Recreational Catch Limits Framework Action
DLMTToolkit	Data Limited Methods Toolkit
DPS	distinct population segment
EA	environmental assessment
EEZ	exclusive economic zone
EIS	economic impact statement
EFH	essential fish habitat
EFP	exempted fishing permit
EJ	environmental justice
E.O.	executive order
ESA	Endangered Species Act
F	fishing mortality rate
FES	fishing effort survey
FMP	Fishery Management Plan
GDP	Gross Domestic Product
GRSC	Great Red Snapper Count
GSAD	Gulf and South Atlantic Dealers
Gulf	Gulf of Mexico
gw	gutted weight
HCR	harvest control rule
IFQ	individual fishing quota
IPCC	Intergovernmental Panel on Climate Change
LDWF	Louisiana Department of Wildlife and Fisheries
Magnuson-Stevens Act	Magnuson-Stevens Fishery Conservation and Management Act
MFMT	maximum fishing mortality threshold
MMPA	Marine Mammal Protection Act
mp	million pounds
MRIP	Marine Recreational Information Program
MSST	minimum stock size threshold
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration

OFL	overfishing limit
PAH	polycyclic aromatic hydrocarbons
PS	producer surplus
PW	product weight
Reef Fish FMP	Fishery Management Plan for Reef Fish Resources in the Gulf of Mexico
RFA	Regulatory Flexibility Act
RFFA	reasonably foreseeable future actions
RIR	regulatory impact review
RQ	regional quotient
Secretary	Secretary of Commerce
SEDAR	Southeast Data and Review
SEFSC	Southeast Fisheries Science Center
SERO	Southeast Regional Office
SPR	spawning potential ratio
SRHS	Southeast Region Headboat Survey
SSC	Scientific and Statistical Committee
TAC	total allowable catch
TL	total length
TNR	trip net revenue
TPWD	Texas Parks and Wildlife Department
tpy	tons per year
UCB	uncharacterized bottom
VOC	volatile organic compounds
VMS	vessel monitoring system\
ww	whole weight

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# CHAPTER 1. INTRODUCTION

## 1.1 Background

In 2020, a Southeast Data Assessment and Review (SEDAR) stock assessment was completed for Gulf of Mexico (Gulf) greater amberjack (SEDAR 70, 2020). The Gulf of Mexico Fishery Management Council's (Council) Scientific and Statistical Committee (SSC) reviewed the assessment results and concluded that greater amberjack was still overfished and experiencing overfishing. The result also indicates that the stock has been overfished and undergoing overfishing almost continuously since 1980. Since 2000, when the first stock assessment was completed, all greater amberjack assessments have indicated the stock is overfished and undergoing overfishing and this condition has continued despite the implementation of several management measures to constrain catch and reduce the fishing mortality of juveniles (Table 1.1.1).

**Table 1.1.1.** Summary of stock assessments, outcomes, and subsequent management actions for greater amberjack.

<b>Stock Assessment</b>	<b>Stock Status</b>	<b>Management Action</b>
Turner et al. 2000	Overfished and overfishing	Secretarial Amendment 2 (GMFMC 2002)
SEDAR 9 2006	Overfished and overfishing	Amendment 30A (GMFMC 2008)
SEDAR 9 Update 2011	Overfished and overfishing	Amendment 35 (2012)
SEDAR 33 2014	Overfished and overfishing	Framework Action (2015)
SEDAR 33 Update 2016	Overfished and overfishing	Framework Action (2017)
SEDAR 70 2020	Overfished and overfishing	Amendment 54 (under review by Secretary of Commerce)

The results of SEDAR 70 required additional reductions to greater amberjack catch limits in order to meet the 2027 rebuilding timeline put in place through a 2017 framework action (GMFMC 2017a). The Council developed Amendment 54 to the Fishery Management Plan (FMP) for the Reef Fish Resources of the Gulf of Mexico (Amendment 54; GMFMC 2023) to immediately end overfishing by reducing the greater amberjack catch limits so stock rebuilding would be met by 2027. Amendment 54 also adjusted sector allocations.

Based on the results of SEDAR 70, the Council's SSC recommended a decrease in the overfishing level (OFL) and acceptable biological catch (ABC) to end overfishing of greater amberjack and allow the stock to meet its current rebuilding time. SEDAR 70 used updated recreational landings estimates from the Marine Recreational Information Program (MRIP) Fishing Effort Survey (FES), which replaced the legacy Coastal Household Telephone Survey (CHTS) in 2018. Recreational landings estimates generated from MRIP-FES are generally higher than MRIP-CHTS estimates, and the Southeast Fisheries Science Center (SEFSC) completed an analysis that considered the resulting management advice from the prior stock

assessment (SEDAR 33 Update) if MRIP-FES data had been available at the time. These results suggest that the stock annual catch limit (ACL) recommendations considered in Amendment 54 would have resulted in a 65% - 83%<sup>1</sup> decrease in yield, depending on the year and allocation scenario. The harvest reductions in the projections necessary to end overfishing and rebuild the stock resulted in the Council requesting National Marine Fisheries Service (NMFS) to promulgate emergency regulations to modify the Gulf greater amberjack recreational fixed closed season, while development of Amendment 54 continued, to reduce overfishing and avoid a possible payback for the recreational sector from occurring that could have prevented a 2023/2024 fishing season<sup>2</sup>.

In Amendment 54, the Council considered alternatives to modify the allocation of greater amberjack between the recreational and commercial sectors based on updated historical recreational harvest data and the associated alternative OFL and ABC recommendations provided by the SSC. The SSC’s recommendations allowed for an increase in the allowable harvest over time as the stock rebuilds. However, the Council recognized that the greater amberjack stock is overfished and has not rebuilt as expected under the current and previous rebuilding plans. Thus, the Council determined that a more cautious approach was warranted and adopted a constant catch strategy, which retains lower catch levels than required by the SSC to increase likelihood of rebuilding the stock by 2027 (Table 1.1.2).

**Table 1.1.2.** OFL, ABC, total ACL, sector ACLs and sector annual catch targets (ACT), and allocation for greater amberjack as recommended by the Council in Amendment 54 (GMFMC 2023). Values are in lbs ww. The recreational portion of the catch limits uses MRIP-FES units.

Year	OFL	ABC	Total ACL	Rec ACL	Rec ACT	Com ACL	Com ACT	Allocation (Rec/Com)
<b>2023 (22-23 Rec Fishing Year<sup>3</sup>)</b>	2,033,000	505,000	505,000	404,000	335,320	101,000	93,930	80:20

At its August 2022 meeting, the Council directed staff to begin development of a framework action for greater amberjack to modify commercial and recreational management measures in order to extend the season for both sectors to the extent practicable under the reduced catch limits to be implemented with Amendment 54. These measures are addressed in this framework action and include modifications to the recreational fixed-closed season and modifications to the commercial trip limit.

### *Management Measures*

<sup>1</sup> Based on the yield stream from 2023 through 2027.

<sup>2</sup> <https://www.fisheries.noaa.gov/bulletin/effective-july-25-2022-gulf-mexico-greater-amberjack-recreational-fixed-closed-season>

<sup>3</sup> The recreational fishing year begins August 1 each year.

Recreational and commercial management measures for the harvest of greater amberjack are summarized in Table 1.1.3. The 2023/2024 recreational season will open August 1 and close August 25 when the ACT is projected to be met. The fishing year for commercial greater amberjack is January 1 – December 31 with a fixed-closed season from March 1 – May 31 (GMFMC 1981 and 1997). The fishing year for recreational greater amberjack is August 1 – July 31 with fixed closed seasons from November 1 – April 30 and June 1 – July 31 (GMFMC 2017a and 2017b).<sup>4</sup> The minimum size limits for greater amberjack are 36-inch fork length (FL) for the commercial sector (GMFMC 1989) and 34-inch FL for the recreational sector (GMFMC 2015). The commercial trip limit is 1,000 lbs gutted weight (gw) with a step down to 250 lbs gw when 75% of the ACT has been harvested (GMFMC 2019). The recreational bag limit is one fish per person per day (GMFMC 1995).

**Table 1.1.3.** Recreational and commercial management measures for the harvest of greater amberjack.

	<b>Recreational</b>	<b>Commercial</b>
<b>Fishing Year</b>	Aug 1 – July 31	Jan 1 – Dec 31
<b>Fixed Closed Season(s)</b>	Nov 1 – Apr 30 and June 1 – July 31	Mar 1 – May 31
<b>Minimum Size Limit</b>	34-inch FL	36-inch FL
<b>Bag/Trip Limit</b>	1 fish per person per day	1,000 lbs gw until 75% of ACT is reached, then 250 lbs gw

Currently, the commercial and recreational sectors have ACTs set at 7% and 17% below their respective ACLs (GMFMC 2023). Both sectors have an in-season accountability measure (AM) such that when either sector’s landings reach or are projected to reach its ACT, that sector is closed to harvest for the remainder of its fishing year. If either sector’s landings exceed its ACL, then in the following fishing year, a post-season AM overage adjustment (“payback”) is applied that reduces that sector’s ACL in the following fishing year by the amount of the overage in the previous fishing year and adjusts the ACT accordingly (GMFMC 2008). Table 1.1.4 provides recreational landings, commercial landings, and total landings for greater amberjack from 1981 to 2021 compared to the reduced catch limits and OFL implemented by Amendment 54.

**Table 1.1.4.** Commercial, recreational, and total landings of greater amberjack for calendar years 1981-2021. Units in lbs whole weight (ww). Recreational portion of the landings in MRIP- FES units.

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<sup>4</sup> An emergency rule, effective for 180 days starting July 25, 2022, modified the recreational fixed closed season to be August 1 – 31, 2022 and November 1, 2022 through July 31, 2023. On January 23, 2023, NMFS extended the emergency rule an additional 186 days. At the end of the emergency rule time period, or implementation of Reef Fish Amendment 54, whichever comes first, the recreational fixed closed season will revert back to what is presented in Table 1.1.3.

<b>Year</b>	<b>Commercial</b>	<b>Recreational</b>	<b>Total (Com + Rec)</b>
1981	232,739	1,535,588	1,768,327
1982	221,683	14,249,538	14,471,221
1983	276,074	8,744,054	9,020,128
1984	523,645	1,933,531	2,457,176
1985	761,646	5,788,808	6,550,454
1986	1,129,479	7,741,413	8,870,892
1987	1,561,381	18,301,807	19,863,188
1988	2,077,356	3,267,167	5,344,523
1989	1,968,751	8,948,748	10,917,499
1990	1,264,664	1,417,110	2,681,774
1991	1,782,934	6,030,388	7,813,322
1992	1,062,769	11,920,679	12,983,448
1993	1,623,943	4,857,808	6,481,751
1994	1,287,402	3,364,206	4,651,608
1995	1,243,250	1,109,144	2,352,394
1996	1,246,440	2,623,428	3,869,868
1997	1,069,462	2,211,032	3,280,494
1998	655,805	1,901,048	2,556,853
1999	728,441	2,540,025	3,268,466
2000	850,537	2,369,875	3,220,412
2001	706,405	2,270,655	2,977,060
2002	768,941	4,339,407	5,108,348
2003	960,552	6,463,326	7,423,878
2004	951,048	6,671,435	7,622,483
2005	717,170	3,262,366	3,979,536
2006	591,947	3,034,526	3,626,473
2007	587,865	1,287,113	1,874,978
2008	468,859	2,561,504	3,030,363
2009	594,833	2,482,621	3,077,454
2010	554,510	2,992,744	3,547,254
2011	519,564	2,082,231	2,601,795
2012	315,165	2,987,024	3,302,189
2013	471,301	3,217,306	3,688,607
2014	532,032	2,327,463	2,859,495
2015	500,613	2,618,841	3,119,454
2016	478,545	2,353,695	2,832,240
2017	484,024	1,011,487	1,495,511
2018	325,545	2,508,766	2,834,311
2019	362,126	701,480	1,063,606
2020	311,484	1,451,031	1,762,515
2021	328,092	945,542	1,273,634
2022	261,455	660,311	921,766

Source: Recreational landings from ACL dataset MRIP\_FES\_rec81\_22wv6\_01Mar23w2014to2021LAcreel.xlsx. Commercial landings from SEDAR 70 (2020) for 1981-2018 and ACL dataset WH\_ACLS\_2014-2022\_12APR2023.xlsx for 2019-2022.

### *Modifications of the Greater Amberjack Recreational Fixed Closed Season*

In January 2018, NMFS implemented a framework action<sup>5</sup> (GMFMC, 2017a) that modified the recreational fixed closed season for greater amberjack from June 1 through July 31 (established in Amendment 35 to the FMP [GMFMC, 2012]) to a longer closure that spanned each year from January 1 through June 30. The intent of the rule was to protect greater amberjack during their peak spawning months (March through April) in the majority of the Gulf, and modify catch limits to contribute to rebuilding the stock while a second framework was being developed, which would modify the recreational fishing year and again modify the recreational fixed closed season.

In April 2018, NMFS implemented a second framework action (GMFMC 2017b) that changed the Gulf recreational greater amberjack fishing year from January 1 – December 31 to August 1 – July 31. The intent of this change was to allow for greater amberjack recreational harvest to occur later in the year and provide an opportunity to harvest greater amberjack when harvest of many other reef fish species was prohibited due to in-season closures. In this framework action, the Council modified the recreation fixed closed season to be November 1 – April 30 and June 1 – July 31, to be more closely aligned with the newly modified fishing year, still protect greater amberjack during the spawning season, and allow for regional access. Starting the fishing year in August permitted the year’s allowable harvest to begin in the fall, when harvest was historically lower. NMFS and the Council expected the recreational fixed closed season to reduce recreational landings, the likelihood of an in-season closure, and landings exceeding the recreational ACL, while still allowing for fishing to occur in different areas of the Gulf during different peak times (spring or fall) for fishermen depending on their location.

At the Council’s request, NMFS recently issued (87 FR 44027; July 25, 2022), and extended (87 FR 77526; December 19, 2022), an emergency rule that adjusted the recreational fixed closed season to only allow recreational harvest from September 1 through October 31 for the 2022-2023 fishing year. This emergency rule was in effect through the end of the 2022-2023 fishing year.

Because the emergency rule expired at the end of the 2022/2023 greater amberjack recreational fishing year and previous measures have returned to being effective (Table 1.1.3), the Council is considering more permanent changes to the fixed closed season in order to reduce the likelihood of exceeding the recreational ACL and protect greater amberjack during spawning, while also allowing recreational fishermen the longest opportunity to harvest greater amberjack.

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<sup>5</sup> <https://www.federalregister.gov/documents/2018/01/26/2018-01374/fisheries-of-the-caribbean-gulf-of-mexico-and-south-atlantic-reef-fish-fishery-of-the-gulf-of-mexico>

## *Modifications of Greater Amberjack Commercial Trip Limits*

A commercial trip limit is a cap on the amount of fish (either numbers or weight) that may be possessed on board or landed, purchased, or sold from a federally permitted commercial vessel per trip. Federal commercial trip limits may not be combined with any trip or possession limits applicable to state waters. Greater amberjack harvested in the Exclusive Economic Zone (EEZ) cannot be transferred at sea, regardless of where such transfer takes place. The commercial sector harvest of greater amberjack is managed to an ACT and harvest is closed for the remainder of the fishing year when the ACT is met or projected to be met. The commercial season opens January 1 each year, has a fixed closed season from March 1 through May 31 to protect the stock during the spawning period, and re-opens on June 1 if the ACT has not yet been met. Greater amberjack is no longer a common target species for the reef fish commercial sector and is typically caught while fishermen are targeting other reef fish. As a result, the majority (approximately 75%) of Gulf reef fish commercial trips land 500 lbs whole weight (ww) or less of greater amberjack (Appendix A; Figure 3).

As catch limits have been reduced for greater amberjack, the Council has also reduced the commercial trip limits in order to extend the fishing season. A trip limit of 2,000 lbs whole weight (ww) (1,923 lbs gw) was first implemented in 2013 (GMFMC 2012), and 1,500 lbs gw in 2016 (GMFMC 2015). In a 2020 final rule (85 FR 20611; April 14, 2020), the Gulf greater amberjack commercial trip limit was reduced again, this time to 1,000 lbs gw, with a step down to 250 lbs gw when 75% of the commercial ACT has been landed (GMFMC 2019). Before the implementation of the current trip limit, commercial landings for greater amberjack routinely met the ACT before the end of the commercial fishing year, requiring an in-season closure and, if necessary, a payback of any overage in excess of the commercial ACL. Since implementation of the 1,000-lbs gw trip limit, the commercial ACT has not been met, nor has the 250-lbs gw step down trip limit been triggered. However, due to the substantial catch limit reductions of Amendment 54, it is necessary to reevaluate the commercial trip limit to potentially extend the duration of the commercial fishing season.

### **1.2 Purpose and Need**

The purpose of this framework action is to modify the greater amberjack recreational fixed-closed season and commercial trip limit to extend the fishing season durations. Additionally, a modification to the recreational season is needed to reduce the likelihood of exceeding the Annual Catch Limit (ACL) and eliminate harvest during the spawning period.

The need for this framework action is to maintain recreational and commercial access to the greater amberjack component of the reef fish fishery, given the substantial ACL decreases under Amendment 54, which are consistent with the objectives of the greater amberjack rebuilding plan.

### **1.3 History of Management**



The **Reef Fish FMP** (with environmental impact statement [EIS]) was implemented in November 1984 and set a calendar fishing year for those species in the FMP. The original list of species included in the management unit consisted of snappers, groupers, and sea basses. *Seriola* species, including greater amberjack, were in a second list of species included in the fishery, but not in the management unit. The species in this list were not considered to be target species, because they were generally taken incidentally to the directed fishery for species in the management unit. Their inclusion in the Reef Fish FMP was for purposes of data collection, and their take was not regulated. This history of management covers actions pertinent to the harvest of Gulf greater amberjack. A complete history of management for the Reef Fish FMP is available on the Council's website.<sup>6</sup>

**Amendment 1** (with environmental assessment [EA], regulatory impact review [RIR], and regulatory flexibility analyses [RFA]) implemented in 1990, added greater amberjack and lesser amberjack to the list of species in the management unit. It set a greater amberjack recreational minimum size limit of 28 inches fork length (FL), a 3-fish recreational bag limit, and a commercial minimum size limit of 36 inches FL.

**Amendment 12** (with EA, RIR, and RFA), implemented in 1997, reduced the greater amberjack bag limit from three fish to one fish per person, and created an aggregate bag limit of 20 reef fish for all reef fish species not having a bag limit (including lesser amberjack, banded rudderfish, and almaco jack). Check about minimum size limit for jacks

**Amendment 15** (with EA, RIR, and RFA), implemented in 1998, established a fixed closed season for the commercial harvest of greater amberjack in the Gulf during the months of March, April, and May.

**Amendment 16b** (with EA, RIR, and RFA), implemented in 1999, set a slot limit for banded rudderfish and lesser amberjack of 14 inches to 22 inches FL, and set an aggregate recreational bag limit of 5 fish for banded rudderfish and lesser amberjack to reduce harvest of misidentified juvenile greater amberjack.

**Generic Sustainable Fisheries Act Amendment** (with EA), partially approved and implemented in 1999, set the maximum fishing mortality threshold (MFMT) for greater amberjack at the fishing mortality (F) necessary to achieve 30% of the unfished spawning potential ratio (SPR) or  $F_{30\% SPR}$ .

**Secretarial Amendment 2** (with EA, RIR, and RFA), implemented in 2003, specified maximum sustainable yield (MSY) for greater amberjack as the yield associated with  $F_{30\% SPR}$  (proxy for fishing mortality rate corresponding to an equilibrium yield of MSY [ $F_{MSY}$ ]) when the stock is at equilibrium, optimum yield as the yield associated with an  $F_{40\% SPR}$  when the stock is at equilibrium, MFMT equal to  $F_{30\% SPR}$ , and minimum stock size threshold (MSST) equal to  $(1-M)*B_{MSY}$  (where  $M$  = natural mortality and  $B_{MSY}$  = stock biomass level capable of producing an equilibrium yield of MSY) or 75% of  $B_{MSY}$ . It also set a rebuilding plan expected to rebuild the

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<sup>6</sup> [http://www.gulfcouncil.org/fishery\\_management\\_plans/reef\\_fish\\_management.php](http://www.gulfcouncil.org/fishery_management_plans/reef_fish_management.php)

stock in 7 years (by 2009). Regulations implemented in 1997 and 1998 (Amendments 12 and 15) were deemed sufficient to comply with the rebuilding plan so no new regulations were implemented.

**Amendment 30A** (with EIS, RIR, and RFA), implemented in 2008, was developed to stop overfishing of greater amberjack. The amendment established ACLs and AMs for greater amberjack. The rebuilding plan was modified to be rebuilt by 2012, the recreational minimum size limit was increased to 30 inches FL, and a zero bag limit was implemented for captain and crew of for-hire vessels. **Amendment 30A** also established an allocation for greater amberjack harvest of 73% recreational and 27% commercial, which would be in effect until such time that the Council, through the recommendations of an Ad Hoc Allocation Committee, could implement a separate amendment that fairly and equitably allocated Reef Fish FMP resources between recreational and commercial sectors.

**A Regulatory Amendment** (with EA, RIR, and RFA), implemented in 2011, specified the greater amberjack recreational fixed closed season during the months of June and July. The intended effect of this final rule was to mitigate the social and economic impacts associated with implementing in-season closures.

**Amendment 35** (with EA, RIR, and RFA), implemented in 2012 in response to a 2010 update stock assessment, modified the greater amberjack rebuilding plan and established a reduced the total stock ACL and set it equal to the ABC. Reducing the ABC by 18% was expected to end overfishing. The rule also established a commercial trip limit of 2,000 lbs ww throughout the fishing year and set commercial and recreational ACTs.

**2015 Framework Action** (with EA, RIR, and RFA), implemented in 2016 created a new rebuilding plan (stock rebuilt by 2019), reduced the total stock ACL, reduced the commercial trip limit from 2,000 lbs ww to 1,500 lbs gw, and increased the recreational minimum size limit from 30 inches FL to 34 inches FL.

**Amendment 44** (with EA), was implemented in December 21, 2017. This amendment changed the MSST for seven species in the Reef Fish FMP. For greater amberjack, the MSST was set as  $(1-M) * B_{30\% SPR}$ . After the approval of Amendment 44, the greater amberjack stock was still classified as overfished and undergoing overfishing.

The Council approved two framework actions in 2017 that addressed management of Gulf greater amberjack. **Modifications to Greater Amberjack Allowable Harvest and Rebuilding Plan** (with EA, RIR, and RFA), implemented on January 27, 2018 modified the rebuilding time period to end in 2027 and set the sector-specific ACLs and ACTs for 2018 to 2020 and beyond. In addition, this framework action modified the fixed season closure for the recreational sector to be January 1 through June 30 each year.

**Modifications to the Greater Amberjack Fishing Year and the Recreational Fixed Closed Season** (with EA, RIR, and RFA), implemented on April 20, 2018 modified the recreational fishing year to begin on August 1 and run through July 31 of the following year. It also modified

the fixed closed season so that recreational harvest is prohibited from November 1 – April 30 and June 1 – July 31.

**2019 Framework Action** (with EA, RIR, and RFA), implemented in 2020 reduced the commercial trip limit from 1,500 lbs gw to 1,000 lbs gw with a step down to 250 lbs gw when 75% of the commercial ACL was harvested.

**2022 Emergency Rule** modified the recreational fixed closed season to be August 1 – 31, 2022 and November 1, 2022 through July 31, 2023. The rule became effective July 25, 2022 and was extended on January 23, 2023.

**Amendment 54** (with EA, RIR, and RFA), final rule in 2023, modified the greater amberjack rebuilding plan including changes to catch limits and sector allocations.

## CHAPTER 2. MANAGEMENT ALTERNATIVES

### 2.1 Action 1: Modify the Recreational Fixed Closed Season for Greater Amberjack

**Alternative 1:** No Action. Do not modify the current recreational fixed closed season. The current fixed closed season is November 1 – April 30 and June 1 – July 31 (open August 1 – October 31 and May 1 – May 31).<sup>7</sup>

**Preferred Alternative 2:** Modify the recreational fixed closed season to be August 1 – August 31 and November 1 – July 31 (open September 1 – October 31).

**Alternative 3:** Modify the recreational fixed closed season to be August 1 – August 31, October 1 – April 30, and June 1 - July 31 (open September 1 – 30 and May 1 - 31).

#### **Discussion:**

An analysis of the projected season duration for each alternative was prepared and can be found in Appendix A. **Alternative 1** maintains the current regulatory recreational fixed closed season from November 1 – April 30 and June 1 – July 31. The current recreational fixed closed season was originally put in place to extend the season length, allow for a seasonal harvest of a species when others species are closed, and to provide better regional access to greater amberjack (GMFMC 2017). Fishermen expressed interest in regional access due to varied timing for when they prefer to fish for greater amberjack; fall for the western Gulf of Mexico (Gulf) and spring for the eastern and northern Gulf. Due to the reduction in allowable harvest in Amendment 54 to the Fishery Management Plan for Reef Fish Resources of the Gulf of Mexico (Reef Fish FMP; GMFMC 2023) the Council is considering changing the recreational fixed closed season to a period of the year where effort has historically been lower in effort extend the duration of the fishing season (Appendix A; Figure 1).

Splitting recreational fishing into two open seasons was intended to allow greater amberjack to be harvested during times of the year when the harvest of many other reef fish species was prohibited due to in-season closures. By starting the fishing year in August, when fishing effort is lower than in the peak spring months, the National Marine Fisheries Service (NMFS) and the Gulf of Mexico Fishery Management Council (Council) expected enough of the recreational annual catch target (ACT) to remain unharvested from the first open season to allow harvest of fish during May of the following calendar year. Splitting the recreational season into two open seasons was also intended to address regional considerations in setting the fishing season. The

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<sup>7</sup> An emergency rule, effective July 25, 2022, modified the recreational fixed closed season to be August 1 – 31, 2022 and November 1, 2022 through July 31, 2023 for the 2022/2023 fishing year. The emergency rule was extended on January 23, 2023 so that it would last the full 2022/2023 fishing year.

split season (i.e., open August 1 – October 31, open May 1 – 31) has not always worked as intended. In the 2018/2019 fishing year, the May recreational season did not open because the recreational catch limit was caught in the August 1 – October 31 fishing season. However, this may have occurred due to initial change in fishing effort that occurred after multiple changes to the recreational fixed closed season in a short timeframe. The May season has occurred in every fishing year until the emergency rule<sup>8</sup> was implemented in 2022. Based on the current projections of recreational harvest under the proposed catch limits from Amendment 54, the estimated harvest is expected to reach the ACT by mid-August (Table 2.1.1) under **Alternatives 1**. By modifying the fixed closed season under **Preferred Alternative 2 and Alternative 3**, the season is expected to be longer. However, the recreational sector is subject to in-season closure whenever the ACT is projected to be met. Recreational season duration projection analyses (Appendix A) indicates that the season would likely close early for all considered action alternatives.

**Alternative 1** results in a projected season duration of only 21 days (Table 2.1.1). While the fixed closed season under **Alternative 1** does not protect the greater amberjack stock during spawning, the fishing season would be expected to close prior to spawning under the new reduced Amendment 54 catch limits GMFMC 2023). The projections in **Alternative 1** rely on the assumption that future year harvest rates will be similar to recent years; however, it is possible that fishing effort may change from previous seasons due to the shorter season set in **Alternative 1**. Due to the short-projected season duration under Amendment 54 (GMFMC 2023) catch limits, it is possible that a “derby-like” (a race to fish before the season ends) effort from recreational anglers may occur. This also increases the possibility of the annual catch limit (ACL) being exceeded as it is difficult to accurately estimate landings within the season given the lag between when fishing takes place and landing estimates are available (e.g. recreational landing estimates from August would not be available until mid-October, and landings estimates from September and October would not be available until mid-December). When fishing seasons open and close within a data collection wave,<sup>9</sup> there is no time to evaluate those landings data to ensure precision in closing the fishery when the ACL is expected to be met. Therefore, a season closure date would be projected prior to receiving any landings data in a given year. Large overages of the ACL under **Alternative 1** could still occur even if a projection shows the ACL is not expected to be reached. Since greater amberjack is under a rebuilding plan until 2027, reduced catch limits will continue. Therefore, short seasons under **Alternative 1** are expected for the next five years.

The projected season duration under **Preferred Alternative 2** is longer (56 days) than under **Alternative 1** (21 days, Table 2.1.1). **Preferred Alternative 2** is consistent with the 2022 Emergency Rule that modified the recreational fixed closed season to be August 1 – 31, 2022 and November 1, 2022 through July 31, 2023 (open September – October 31). **Preferred Alternative 2** also prohibits recreational harvest of greater amberjack during spawning, as is the

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<sup>8</sup> An emergency rule, effective July 25, 2022, modified the recreational fixed closed season to be August 1 – 31, 2022 and November 1, 2022 through July 31, 2023 for the 2022/2023 fishing year. The emergency rule was extended so that it would last the full 2022/2023 fishing year on January 23, 2023.

<sup>9</sup> MRIP-FES collects data in six 2-month waves (wave 1: January and February; wave 2: March and April; and so on), with preliminary landings estimates from those waves available beginning 45 days after the end of that wave.

case with the commercial sector fixed closed season. **Preferred Alternative 2** is projected to result in lower landings than **Alternative 1** due to less fishing pressure historically occurring later in the fall (Appendix A: Figure 1). It is possible, assuming discard mortality is higher than estimated, that targeting greater amberjack out of season as part of a catch-and-release fishery may still affect the recovery schedule of the stock even if landings are reduced. Additionally, the increase in season duration length may reduce “derby-like” behavior compared to **Alternative 1**. However, modifying the fixed closed season could increase daily effort within the season when compared to previous fishing years. Heavy effort as is seen with an August 1 start date may occur with a September 1 start date if fishermen adjust their fishing practices.

**Alternative 3** meets the same need as **Alternative 1**, but also provides a higher probability that improved access occurs due to fishing only being open one month in the fall and one month in the spring. Although uncertainty surrounds future estimates of landings because of possible effort shifting, there has been an historic trend of lower landings occurring later in the fall. Based on average historical landings in September, some fish are expected to be available for harvest in May. However, like **Alternative 1**, **Alternative 3** does not prohibit harvest of greater amberjack during at least a portion of the spawning season (Beasley 1993). While **Alternative 3** potentially address a spatiotemporal management goal of regional access (fall season [desirable for the western Gulf] and a spring season [desirable in the eastern Gulf]), it may not be best for recovering the stock.

Overall, **Alternative 1** results in the fewest open fishing days. **Preferred Alternative 2** and **Alternative 3** both result in a similar number of open fishing days and address the need to extend the season duration and allow for harvest of a species when others are closed. However, only **Alternative 3** addresses the original fishing season need to allow the opportunity for improved regional access. Conversely, only **Preferred Alternative 2** protects the stock during spawning.

**Table 2.1.1.** Summary of the open months, maximum season duration, recreational ACL, recreational ACT, projected ACT met date, and resulting open fishing days.

<b>Recreational Open Month Alternatives</b>	<b>Max Open Days</b>	<b>Rec ACL</b>	<b>Rec ACT</b>	<b>Projected ACT Met Date</b>	<b>Projected Days Open</b>
<b>Alt. 1: Aug 1-Oct 31; May 1-31</b>	123	404,000	335,320	August 21	21
<b>Preferred Alt. 2: Sep 1-Oct 31</b>	61	404,000	335,320	October 26	56
<b>Alt. 3: Sep 1-30 and May 1-31</b>	61	404,000	335,320	May 18	48

Note: Values are in pounds whole weight. The ACL and ACT listed are from Reef Fish Amendment 54 and are in MRIP-FES units.

## 2.2 Action 2: Modify the Greater Amberjack Commercial Trip Limit

**Alternative 1:** No Action. Do not modify the current commercial trip limit for Gulf greater amberjack of 1,000 lbs gutted weight (gw) (1,040 lbs whole weight [ww]). When 75% of the ACT is projected to be met, reduce the commercial trip limit to 250 lbs gw (260 lbs ww).

**Alternative 2:** Establish a commercial trip limit of 8 fish (~257 lbs gw [267 lbs ww]).

**Alternative 3:** Establish a commercial trip limit of 7 fish (~ 210 lbs gw [218 lbs ww]).

**Alternative 4:** Establish a commercial trip limit of 5 fish (~ 150 lbs gw [155 lbs ww]).

*Note: Alternatives 2-4 will establish trip limits in number of fish; however, catch limits will still be monitored in weight. Presented weight values are provided as reference based on an estimated average weight of 32.1 lbs gw (33.4 lbs ww) for an individual commercially harvested greater amberjack.*

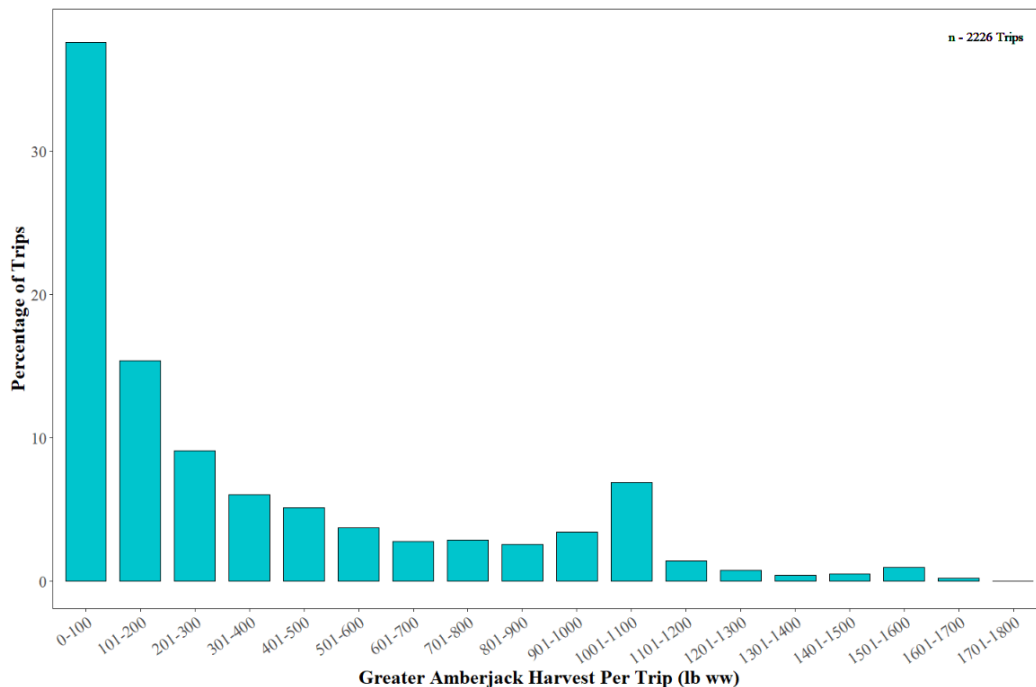
### **Discussion:**

Commercially harvested greater amberjack are typically landed gutted rather than whole. Therefore, the management alternatives are provided for both noted in parentheses where applicable.

In 2020, the commercial trip limit was reduced from 1,500 lb gw to 1,000 lbs gw with a step-down to 250 lbs gutted weight (gw) when 75% of the commercial ACT is harvested. This likely reduced the number of trips presumed to directly target greater amberjack; although, some may still occur (Figure 2.2.1). Most commercial fishermen have moved to incidentally harvesting greater amberjack as they stated a trip limit of less than 1,500 lbs made greater amberjack no longer economically viable as a target species. As with Action 1 for the recreational sector, further reductions in the commercial trip limit are considered in this action in order to extend the fishing season duration. Although this would further reduce the economic viability of targeting of greater amberjack, commercial fishermen have expressed a desire for a longer season rather than a directed fishery given the relatively small commercial ACTs that are expected throughout the duration of the rebuilding plan. A description of the commercial season projection analyses for each alternative can be found in Appendix B.

Since the implementation of the current trip limit in May 2020 (i.e. **Alternative 1**), approximately 75% of trips harvest 500 lbs gw or less. (Figure 2.2.1). Approximately 20% of trips harvested between 501 lbs gw and 1,000 lbs gw per trip, suggesting some commercial trips harvest up to the allowable trip limit, with approximately 6% of commercial harvest in excess of the trip limit. However, this could be a result of fishermen underestimating the weight of their fish while out at sea. The step-down provision to 250 lbs gw has never been implemented because 75% of the commercial ACT has never been reached since the step-down provision has been effective. However, given the recent 83% decrease in commercial catch limits

(Amendment 54; GMFMC 2023), it is more likely that the lower ACT in future fishing seasons will be reached, even with the step-down provision (**Alternative 1**) that is intended to slow harvest as the ACT is approached. (Table 2.2.1).



**Figure 2.2.1.** Distribution of Gulf of Mexico greater amberjack harvested per trip from the SEFSC Commercial Logbook program between 2020 and 2022, all years combined (lbs ww). Commercial logbook data were provided by the SEFSC on March 1, 2023.

**Alternatives 2-4** would establish a new commercial trip limit based on numbers of fish rather than weight. The Council’s Reef Fish Advisory Panel (AP) discussed greater amberjack commercial trip limits at its October 2022 meeting. The Reef Fish AP discussed that the stock is depleted and that the commercial reef fish fishery currently treats greater amberjack as incidental harvest given the low abundance and previous implementation of trip limits. The Reef Fish AP discussed that further reductions in trip limits may be necessary to promote recovery of the stock and allow for an extended season. They also discussed the variability in the weights observed of greater amberjack and recommended setting a trip limit in numbers of fish instead of pounds.

Commercial harvest of greater amberjack will continue to be monitored in pounds and the weight of individual greater amberjack does vary. Therefore, calculating an estimate of average weight for an individual greater amberjack helps provide context when selecting trip limits defined as number of fish. To calculate this value, commercial landings data from 2019 and 2021 were used (Appendix B). This resulted in an estimated average weight of 32.1 lbs gw (33.4 lbs ww) for a commercially harvested greater amberjack. Recognizing the uncertainty about the estimated average, an additional weight value representing an upper bound as defined as the 75<sup>th</sup> percentile weight was also calculated as 36.7 lbs gw (38.2 lbs ww). These average weight estimates influence the season duration projection analyses. The season duration estimations



derived from the average weight result in longer commercial fishing seasons (Table 2.2.1) relative to commercial season durations calculated based on a considered upper bound (75<sup>th</sup> percentile) calculated average (Table 2.2.2).

**Table 2.2.1.** Summary of commercial season projection analyses results. These analyses targeted an ACL of 101,000 lbs gw and ACT of 93,930 lbs gw and assumes an individual greater amberjack average weight of 32.1 lbs gw. The maximum season duration is 255 days.

Commercial Trip Limit Alternatives	Projected Closure Date	Days Open	Predicted Change in Annual Landings (%)	Proportion of Trips Landing the Trip Limit or less (%)
Alt. 1: No Action	June 3 (Step down – February 4)	61	0.0	93.7
Alt. 2: 8 fish ~257 lbs gw (267 lbs ww)	August 31	150	-53.6	59.3
Alt 3: 7 fish ~225 lbs gw (234 lbs ww)	September 20	170	-57.6	56.6
Alt 4: 5 fish ~161 lbs gw (167 lbs ww)	December 14	255	-66.5	49.6

**Table 2.2.2.** Summary of commercial season projection analyses results. These analyses targeted an ACL of 101,000 lbs gw and ACT of 93,930 lbs gw and assumes a consideration of an upper bound (75<sup>th</sup> percentile) for an individual greater amberjack weight of 36.7 lbs gw. The maximum season duration is 215 days.

Commercial Trip Limit Alternatives	Projected Closure Date	Days Open	Predicted Change in Annual Landings (%)	Proportion of Trips Landing the Trip Limit or less (%)
Alt. 1: No Action	February 27 (Step down – February 4)	57	0.0	93.7
Alt. 2: 8 fish ~294 lbs gw (306 lbs ww)	August 11	130	-49.3	62.4
Alt 3: 7 fish ~257 lbs gw (267 lbs ww)	August 31	150	-53.6	59.3
Alt 4: 5 fish ~184 lbs gw (191 lbs ww)	November 4	215	-63.2	52.2

The intent of **Alternatives 2-4** is to make it easier for commercial fishermen to know when they have harvested their trip limit as recommended by the Reef Fish AP while extending the season longer than **Alternative 1**. Similarly, the Council’s Law Enforcement Technical Committee advised implementing commercial trip limits as number of fish, as count of fish is easier to quantify while at sea.<sup>10</sup> **Alternative 2** will implement a commercial trip limit of 8 fish and is

<sup>10</sup> <https://gulfcouncil.org/wp-content/uploads/L-4-Draft-Minutes-October-2022-LEC-LETC-Meeting.pdf>

intended to reduce greater amberjack harvest rate by the commercial fleet in an effort to extend the season duration while retaining a trip limit reduction that was originally acceptable as a step-down amount by stakeholders. If implemented, this alternative will likely further cause commercial harvest of greater amberjack to be incidental rather than the result of targeting, and is expected to extend the season duration as compared to **Alternative 1**. **Alternative 3** would implement a commercial trip limit of 7 greater amberjack while **Alternative 4** would implement a commercial trip limit of 5 greater amberjack. In comparison to **Alternatives 1** and **2**, **Alternative 3** would further reduce the commercial trip limit while retaining a trip limit that is similar to what is caught on most commercial trips harvesting greater amberjack. **Alternative 4** is the most restrictive of the alternatives; however, the intent is to reduce the trip limit in order to result in the longest commercial season duration compared to **Alternatives 1-3**. However, all alternatives allow for the same amount of total harvest for the fishing season.

Figure 2.2.1 demonstrates that approximately 6% of trips that harvest greater amberjack exceed the current commercial trip limit. Although there may be several reasons for this, a possible factor could be attributable to difficulty in accurately estimating the weight of landed greater amberjack, which would make implementing a catch limit based on fish number desirable. However, by defining a trip limit based on number of fish, it is possible that high grading (discarding an already harvested fish with a larger one) could confound management measures. Effectively enforcing or quantifying high grading is difficult given the cryptic nature of the practice and may result in an undesirable outcome where fish are discarded dead to stay within the implemented trip limit yet maximize harvest. If discard mortality in the fishery is high, this could lead to a situation where management measures are not aligned with rebuilding plan objectives.

## CHAPTER 3. AFFECTED ENVIRONMENT

### 3.1 Description of the Physical Environment

#### General Description of the Physical Environment

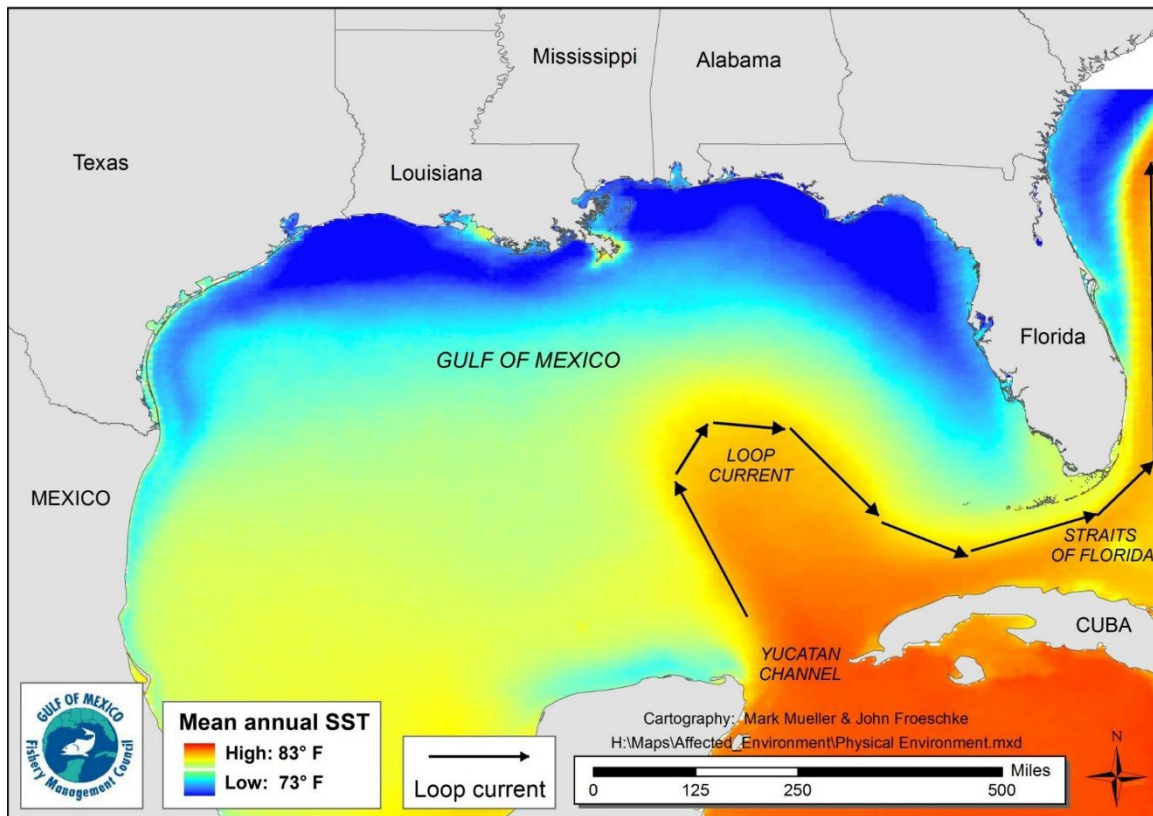
The physical environment for Gulf reef fish is detailed in the Environmental Impact Statement (EIS) for the Generic Essential Fish Habitat (EFH) Amendment (GMFMC 2004), Generic EFH Amendment 3 (GMFMC 2005b), and the Generic ACL/AM Amendment (GMFMC 2011a), which are hereby incorporated by reference and summarized below.

The Gulf has a total area of approximately 600,000 square miles (1.5 million km<sup>2</sup>), including state waters (Gore 1992). It is a semi-enclosed, oceanic basin connected to the Atlantic Ocean by the Straits of Florida and to the Caribbean Sea by the Yucatan Channel (Figure 3.2.1).

Oceanographic conditions are affected by the Loop Current, discharge of freshwater into the northern Gulf, and a semi-permanent, anti-cyclonic gyre in the western Gulf. The Gulf includes both temperate and tropical waters (McEachran and Feckhelm 2005). Gulf water temperatures range from 54° F to 84° F (12° C to 29° C) depending on time of year and depth of water. Mean annual sea surface temperatures ranged from 73° F through 83° F (23-28° C) including bays and bayous (Figure 3.1.1) between 1981 to present, according to satellite-derived measurements<sup>11</sup>. In general, mean sea surface temperature increases from north to south with large seasonal variations in shallow waters.

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<sup>11</sup> [AVHRR Pathfinder version 5.3 level 3 collated \(L3C\) global 4km sea surface temperature for 1981-Present \(noaa.gov\)](http://noaa.gov)



**Figure 3.2.1.** Mean annual sea surface temperature derived from the Advanced Very High-Resolution Radiometer Pathfinder Version 5 sea surface temperature data set.<sup>12</sup>

### General Description of the Reef Fish Physical Environment

In general, reef fish are widely distributed in the Gulf, occupying both pelagic and benthic habitats during their life cycle. A planktonic larval stage lives in the water column and feeds on zooplankton and phytoplankton (GMFMC 2004). Juvenile and adult reef fish are typically demersal and usually associated with bottom topographies on the continental shelf (less than 100 m) which have high relief, i.e., coral reefs, artificial reefs, rocky hard-bottom substrates, ledges and caves, sloping soft-bottom areas, and limestone outcroppings. However, several species are found over sand and soft-bottom substrates. For example, juvenile red snapper is common on mud bottoms in the northern Gulf, particularly off Texas through Alabama. Also, some juvenile snapper (e.g., mutton, gray, red, dog, lane, and yellowtail snappers) and grouper (e.g., goliath, red, gag, and yellowfin groupers) are associated with inshore seagrass beds, mangrove estuaries, lagoons, and larger bay systems.

Fish species within the genus *Seriola*, including greater amberjack, are distributed circumglobally (Swart et al. 2015). In the Gulf, they are found primarily offshore and have been documented in depths up to 187 m (Reed et al. 2005). Burns et al. (2004) tagged greater amberjack from the Florida Keys to Pulley Ridge and collected them from a minimum depth of

<sup>12</sup> <http://pathfinder.nodc.noaa.gov>

4.6 m. All life stages can be water column associated. Additionally, post larvae and juveniles are found in drifting algae (Hoffmayer et al. 2005). Late juveniles and adults are associated with hard bottom (Gledhill and David 2004) and adults and spawning adults have been documented on reefs based on research conducted in the U.S. south Atlantic and Caribbean (Harris et al. 2007; Heyman and Kierfye 2008). Another habitat type identified for adults were banks/shoals (Kraus et al. 2006). Lastly, while artificial reefs are not identified as EFH habitat type, greater amberjack have been documented utilizing them (Dance et al. 2011; Patterson et al. 2014).

### **Habitat Areas of Particular Concern (HAPC) and Environmental Sites of Special Interest**

Detailed information pertaining to HAPCs is provided in Generic Amendment 3 for addressing EFH, HAPC (GMFMC 2005b) and Amendment 9 to the Fishery Management Plan for the Coral and Coral Reefs of the Gulf of Mexico, U.S. Waters (GMFMC 2018). Detailed information pertaining to the Gulf area closures and marine reserves is provided in Amendment 32 to the Fishery Management Plan for the Reef Fish Resources in the Gulf of Mexico (GMFMC 2011b). There are environmental sites of special interest that are discussed in the Generic EFH Amendment (GMFMC 2004) that are relevant to Reef Fish management. These documents are hereby incorporated by reference.

### **Northern Gulf of Mexico Hypoxic Zone**

Every summer in the northern Gulf, a large hypoxic zone forms. It is the result of allochthonous materials and runoff from agricultural lands resulting in increasing nutrient inputs to multiple rivers. These tributaries feed in to the Mississippi River, which disperses to the Gulf, and creates a temperature and salinity dependent layering of waters. The nutrient rich fresh waters from the Mississippi create seasonal, large algal blooms at the surface that eventually die, sink to the bottom, and decompose. This creates the oxygen-poor, hypoxic, bottom water layer unless front or storm events occur, which allows for mixing of the layers (Rabalais and Turner 2019). Mapping of the hypoxic zone began in 1985. For 2022, the extent of the hypoxic area was 3,275 square miles, almost double what it was in 2020 (2,116 square miles), but still less than the extent of the 2017 hypoxic area (8,776 square miles). However, the 2022 size is the eighth smallest in 36 years of coast wide hypoxia data. The changes in hypoxic area can be attributed to changing amounts of river discharge and its associated nutrient load and storm events. The major factor for the reduced size in 2020 was the active storm season with Hurricane Hanna passing right over the zone, allowing for mixing of the waters. The 2022 hypoxia area was lower than the 5-year hypoxic area average (5,408 square miles), but larger than the 1,930 square mile goal set by the Interagency Mississippi River and Gulf of Mexico Hypoxia Task Force to be reached by 2035.<sup>13</sup> The hypoxic conditions in the northern Gulf directly impact less mobile benthic macroinvertebrates (e.g., polychaetes) by influencing density, species richness, and community composition (Baustian and Rabalais 2009; Breitburg et al. 2018). However, more mobile macroinvertebrates and demersal fishes, such as greater amberjack, are able to detect lower dissolved oxygen levels and move away from hypoxic conditions. Therefore, these

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<sup>13</sup> <http://gulfhypoxia.net>

organisms are indirectly affected by limited prey availability and constrained available habitat (Baustian and Rabalais 2009; Craig 2012).

### Greenhouse gases

The Intergovernmental Panel on Climate Change (IPCC) has indicated greenhouse gas emissions are one of the most important drivers of recent changes in climate. Wilson et al. (2019) 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 3.2.1 with respect to total emissions and fishing. Commercial fishing and recreational vessels make up a small percentage of the total estimated greenhouse gas emissions from the Gulf (2.04% and 1.67%, respectively).

**Table 3.2.1.** Total Gulf greenhouse gas 2017 emissions estimates (in tons per year) from oil platform and non-oil platform sources, commercial fishing, and percent greenhouse gas emissions from commercial fishing vessels of the total emissions\*.

Emission source	CO <sub>2</sub>	Greenhouse CH <sub>4</sub>	Gas N <sub>2</sub> O	Total CO <sub>2e</sub> **
<b>Oil platform</b>	6,857,360	187,894	118	11,589,943
<b>Non-platform</b>	13,177,451	1,957	2,651	14,016,393
<b>Total</b>	<b>20,034,811</b>	<b>189,851</b>	<b>2,769</b>	<b>25,606,336</b>
<b>Commercial fishing</b>	439,598	3	21	445,931
<b>Recreational fishing</b>	382,631	2	17	387,642
<b>Percent commercial fishing</b>	2.19%	>0.01%	0.76%	1.74%
<b>Percent recreational fishing</b>	1.91%	>0.01%	0.61%	1.51%

\*Compiled from Tables 6–11, 6–12, 6–14, 6-15, 6-16, and 6-17 in Wilson et al. (2019). \*\*The CO<sub>2</sub> equivalent (CO<sub>2e</sub>) emission estimates represent the number of tons of CO<sub>2</sub> emissions with the same global warming potential as one ton of another greenhouse gas (e.g., CH<sub>4</sub> and N<sub>2</sub>O). Conversion factors to CO<sub>2e</sub> are 25 for CH<sub>4</sub> and 298 for N<sub>2</sub>O.

## 3.2 Description of the Biological/Ecological Environment

The biological environment of the Gulf, including the species addressed in this amendment, is described in detail in the Generic EFH Amendment (GMFMC 2004), Generic ACL/AM Amendment (GMFMC 2011a), and Reef Fish Amendments 30A (GMFMC 2008) and 35 (GMFMC 2012) which are hereby incorporated by reference and summarized below.

### Greater Amberjack Life History and Biology

Studies conducted in the Gulf have estimated that peak spawning occurs during the months of March and April (Wells and Rooker 2002; Murie and Parkyn 2008). There is also evidence for separate and limited connectivity of the greater amberjack population structure within the Gulf, where the northern Gulf population does not appear to mix often with the Florida Keys population (Gold and Richardson 1998; Murie et al. 2011).

Early studies on greater amberjack conducted in south Florida indicated that maximum gonad development occurred in the spring months (Burch 1979), although larvae and small juveniles were reported year-round in the entire Gulf (Aprieto 1974). Similarly, based on observed increasing gonadosomatic index data of greater amberjack collected in the northern Gulf off of Louisiana, peaks spawning occurs in the months of April to June (Beasley 1993). Harris et al. (2007) provided information on reproduction in the southeastern U.S. Atlantic using fishery-dependent and fishery-independent samples from 2000 - 2004. Additionally, sexual dimorphism was evident with females generally being larger than males (Harris et al. 2007). Fifty percent of females reach sexual maturity by 733 millimeters (mm) FL and 50% of males attain maturity by 644 mm FL (Harris et al. 2007). However, Murie and Parkyn (2008) documented that, for Gulf females, 50% of individuals were mature at 35 inches FL (900 mm FL), larger than what Harris et al. (2007) documented off south Florida. Greater amberjack in spawning condition were captured from North Carolina to the Florida Keys; however, spawning was concentrated in areas off south Florida and the Florida Keys. Harris et al. (2007) documented evidence of spawning from January - June with peak spawning during April and May within this area. They estimated a spawning season of approximately 73 days off south Florida, with a spawning periodicity of 5 days, and that an individual female could spawn as frequently as 14 times during the season. Wells and Rooker (2004) conducted studies in the northwestern Gulf on larval and juvenile fish associated with floating *Sargassum* spp. Based on the size and season when larvae and juvenile greater amberjack were captured, they suggested peak spawning season occurred in March and April although they did find that peak spawning began as early as February off Texas. Murie and Parkyn (2008) provided updated information on reproduction of greater amberjack throughout the Gulf using fishery-dependent and fishery-independent data from 1989-2008. They reported peak spawning occurring during March and April, and by May, they documented low gonad weights indicating spawning was ending.

After spawning, greater amberjack eggs and larvae are pelagic. Smaller juvenile greater amberjack that are less than one inch standard length (20 mm) were associated with pelagic *Sargassum* mats (Aprieto 1974; Bortone et al. 1977; Wells and Rooker 2004). Juveniles then shift to demersal habitats (5 - 6 months), where they congregate around reefs, rocky outcrops, and wrecks (GMFMC 2004). Greater amberjack is only seasonally abundant in certain parts of their range; thus, they likely utilize a variety of habitats and/or areas each year throughout their range. Greater amberjack have been documented on artificial structures as well as natural reefs (Ingram and Patterson 2001). Greater amberjack in the Gulf have been reported to live as long as 15 years and commonly reach sizes greater than 40 inches FL (1,016 mm FL) (Manooch and Potts 1997).

### **Status of the Greater Amberjack Stock**

See Chapter 1.1 Background. In summary, according to SEDAR 70, the greater amberjack stock has been overfished and undergoing overfishing almost continuously since 1980. Since 2003, the greater amberjack stock has been under a rebuilding plan.

### **Bycatch**

Studies have documented low bycatch and bycatch mortality of finfish while targeting greater amberjack due to the ability for fishermen to specifically target schools of greater amberjack when the season is open and avoid them during times of closure. Other reef fish species known to be incidentally caught include almaco jack, vermilion snapper and some deep-water groupers. Of these species, the jacks complex, which includes almaco jack, is currently undergoing overfishing. However, the stock status of almaco jack and deep-water groupers is unknown (National Marine Fisheries Service [NMFS] 1<sup>st</sup> quarter 2023 Update Summary of Stock Status for non-Federal Strategic Sourcing Initiative [FSSI] stocks).<sup>14</sup> Minimum size limits are estimated to be the greatest source of regulatory discards for the majority of reef fish species. The greater amberjack recreational sector is currently constrained to a 34-inch FL minimum size limit and the commercial sector is constrained to a 36-inch FL minimum size limit. Bag and trip limits can also play a part in bycatch, although not as significant a role as minimum size limits. Due to the ability for fishermen to be selective of greater amberjack, very little bycatch of target or non-target species is expected in the greater amberjack portion of the reef fish fishery for either sector, even under reduced catch limits and reduced open seasons. Additionally, a study by Jackson et al. (2018) showed that greater amberjack post-release mortality averages 18.8 %, +/- 6.9%, which is very similar to the estimates used in Southeast Data Assessment and Review (SEDAR) 70. Release mortality used in the SEDAR 33 stock assessment (20% commercial, 10% recreational) has been carried through from SEDAR 33 to SEDAR 70. Further, this study showed that smaller size fish had less discard mortality than larger ones and that depth captured was not a predictor of post-release mortality, suggesting greater amberjack are resilient. Interactions with other species such as sea turtles and sea birds are known to occur, but are minimal (see next section).

This amendment considers measures that are expected to affect greater amberjack discard mortality due to reducing the open season for the recreational sector and reducing the trip limit, thereby reducing the open season for the commercial sector. However, there is some biological benefit to the managed species that outweigh any increases in discards from the action due to the ability for fisherman to target this species and for more fish to remain in the water due to reducing harvest. Discard mortality increase for reef fish has been positively correlated with warmer water temperatures (Pulver 2017). The proposed recreational fixed closed season has harvest closed for this sector while the commercial sector is already closed during these times, in addition to both sectors being closed during spawning. While general discard mortality for greater amberjack has been found to be variable and at times high (Stephen and Harris 2010), Murie and Parkyn (2008) and Jackson et al. (2018) found that release mortality for greater amberjack was lower and not affected by capture depth. Jackson et al. (2018) further found that mortality rates were less for smaller sized fish.

### **General Information on Reef Fish Species**

The currently are 31 species managed under the Fishery Management Plan (FMP) for the Reef Fish Resources of the Gulf of Mexico (Reef Fish FMP). The NMFS Office of Sustainable

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<sup>14</sup> <https://www.fisheries.noaa.gov/national/population-assessments/fishery-stock-status-updates>



Fisheries updates its Status of U.S. Fisheries Report to Congress on a quarterly basis utilizing the most current stock assessment information. Stock assessments and status determinations have been conducted and designated for 14 stocks and can be found on the Gulf of Mexico Fishery Management Council (Council)<sup>15</sup> and SEDAR<sup>16</sup> websites. Of the 14 stocks for which stock assessments have been conducted and accepted by the Council's Scientific and Statistical Committee, the first quarter 2023 Update Summary of Stock Status for fish stock sustainability index (FSSI) species and non-FSSI species classifies two stocks as overfished (greater amberjack and gag) and six stocks undergoing overfishing (cobia, greater amberjack, gag, cubera, jacks complex, and mid-water snapper complex). The status of both assessed and unassessed stocks, as of the writing of this framework is provided on the status of the stocks' webpage.<sup>17</sup>

## Protected Species and Protected Species Bycatch

NMFS manages marine protected species in the Southeast region under the Endangered Species Act (ESA) and the Marine Mammal Protection Act (MMPA). A brief summary of these two laws and more information is available on NMFS Office of Protected Resources website.<sup>18</sup> ESA-listed species or Distinct Population Segments (DPS) of marine mammals, sea turtles, fish, and corals occur in the exclusive economic zone (EEZ) of the Gulf. There are numerous stocks of marine mammals managed within the Southeast region. All marine mammals in U.S. waters are protected under the MMPA.

The five whale species that may be present in the Gulf (blue, sperm, sei, fin, and Rice's<sup>19</sup>) are listed as endangered under the ESA. Rice's whales are the only resident baleen whales in the Gulf recently being listed as endangered. Manatees, listed as threatened under the ESA, also occur in the Gulf and are the only marine mammal species in this area managed by the U.S. Fish and Wildlife Service.

Sea turtles, fish, and corals that are listed as threatened or endangered under the ESA occur in the Gulf. These include the following: five species (six DPS) of sea turtles (Kemp's ridley, loggerhead (Northwest Atlantic Ocean DPS), green (North Atlantic and South Atlantic DPSs), leatherback, and hawksbill); five species of fish (Gulf sturgeon, smalltooth sawfish, Nassau grouper, oceanic whitetip shark and giant manta ray); and six species of coral (elkhorn, staghorn, lobed star, mountainous star, boulder star, and rough cactus). Habitat designated under the ESA for smalltooth sawfish, Gulf sturgeon, and the Northwest Atlantic Ocean DPS of loggerhead sea turtles occur in the Gulf, though only loggerhead critical habitat occurs in federal waters.

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<sup>15</sup> [www.gulfcouncil.org](http://www.gulfcouncil.org)

<sup>16</sup> <http://sedarweb.org/>

<sup>17</sup> <https://www.fisheries.noaa.gov/national/population-assessments/fishery-stock-status-updates>

<sup>18</sup> <https://www.fisheries.noaa.gov/about/office-protected-resources>

<sup>19</sup> The Gulf Bryde's whale has recently been identified as morphologically and genetically distinct from other whales under the Bryde's whale complex, warranting classification as a new species of baleen whale living in the Gulf to be named *Balaenoptera ricei* or Rice's whale.

The most recent biological opinion (BiOp) for the FMP was completed on September 30, 2011. The BiOp determined the operation of the Gulf reef fish fishery managed under the Reef Fish FMP is not likely to adversely affect ESA-listed marine mammals or coral, and was not likely to jeopardize the continued existence of sea turtles (loggerhead, Kemp's ridley, green, hawksbill, and leatherback) or smalltooth sawfish. Since issuing the opinion, in memoranda dated September 16, 2014, and October 7, 2014, NMFS concluded that the activities associated with the Reef Fish FMP are not likely to adversely affect critical habitat for the Northwest Atlantic Ocean loggerhead sea turtle DPS and four species of corals (lobed star, mountainous star, boulder star, and rough cactus). On September 29, 2016, NMFS requested re-initiation of Section 7 consultation on the operation of reef fish fishing managed by the Reef Fish FMP because new species (i.e., Nassau grouper [81 FR 42268] and green sea turtle North Atlantic and South Atlantic DPSs [81 FR 20057]) were listed under the ESA that may be affected by the proposed action. NMFS documented a determination that the operation of the fishery to continue during the re-initiation period is not likely to adversely affect these species.

On January 22, 2018, NMFS published a final rule (83 FR 2916) listing the giant manta ray as threatened under the ESA. On January 30, 2018, NMFS published a final rule (83 FR 4153) listing the oceanic whitetip shark as threatened under the ESA. In a memorandum dated March 6, 2018, NMFS revised the request for re-initiation of consultation on the Reef Fish FMP to address the listings of the giant manta and oceanic whitetip. In that memorandum, NMFS also determined that fishing under the Reef Fish FMP during the extended re-initiation period will not jeopardize the continued existence of the giant manta ray, oceanic whitetip shark, Nassau grouper, or the North Atlantic and South Atlantic DPSs of green sea turtles.

NMFS published a final rule on April 15, 2019, listing the Gulf Rice's whale as endangered. In a memorandum dated June 20, 2019, NMFS revised the re-initiation request to include the Gulf Rice's whale and determined that fishing under the Reef Fish FMP during the re-initiation period will not jeopardize the continued existence of any of the newly listed species discussed above.<sup>20</sup>

There is no information to indicate marine mammals and birds rely on greater amberjack for food, and they are not generally caught by fishermen harvesting greater amberjack. The primary gear in the Gulf Reef Fish fishery used to harvest greater amberjack is hook-and-line. This gear is classified in the 2023 MMPA List of Fisheries as a Category III fishery (88 FR 16899), meaning the annual mortality and serious injury of a marine mammal resulting from the fishery is less than or equal to 1% of the maximum number of animals, not including natural mortalities, that may be removed from a marine mammal stock while allowing that stock to reach or maintain its optimum sustainable population. Additionally, there is no evidence that the Gulf greater amberjack portion of the reef fish fishery as a whole is adversely affecting seabirds. Dolphins are the only species documented as interacting with the reef fish fishery. Bottlenose dolphin prey upon bait, catch, and/or released discards of fish from the reef fish fishery. They are also a common predator around reef fish vessels, feeding on the discards.

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<sup>20</sup> Any official change to the name of the species listed under the ESA as the Gulf of Mexico Bryde's whale has no effect on NMFS's conclusion that the activities associated with the Reef Fish FMP will not jeopardize the continued existence of the species during the revised reinitiation period.

## ***Deepwater Horizon MC252 Oil Spill***

The presence of polycyclic aromatic hydrocarbons (PAH), which are highly toxic chemicals that tend to persist in the environment for long periods of time, in marine environments can have detrimental impacts on marine finfish, especially during the more vulnerable larval stage of development (Whitehead et al. 2012). The future reproductive success of 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).

In addition to the crude oil, over a million gallons of the dispersant, Corexit 9500A®, was applied to the ocean surface and an additional hundreds of thousands of gallons of dispersant was pumped to the mile-deep wellhead (National Commission 2010). No large-scale applications of dispersants in deep water had been conducted until the *Deepwater Horizon* MC252 oil spill. Thus, no data exist on the environmental fate of dispersants in deep water. 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). The effect of oil, dispersants, and the combination of oil and dispersants on fishes of the Gulf remains an area of concern. More information about the *Deepwater Horizon* MC252 oil spill is available on the National Oceanic and Atmospheric Administration (NOAA) Southeast Regional Office website.<sup>21</sup>

## **Climate Change**

Climate change projections predict increases in sea-surface temperature and sea level; decreases in sea-ice cover; and changes in salinity, wave climate, and ocean circulation (IPCC).<sup>22</sup> 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 affect temperature changes in coastal and marine ecosystems that can influence organism metabolism and alter ecological processes such as productivity and species interactions; change precipitation patterns and cause a rise in sea level which could change the water balance of coastal ecosystems; altering patterns of wind and water circulation in the ocean environment; and influence the productivity of critical coastal ecosystems such as wetlands, estuaries, and coral reefs. The NOAA Climate Change Web Portal<sup>23</sup> predicts the average sea surface temperature in the Gulf and South Atlantic will increase

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<sup>21</sup> <https://www.fisheries.noaa.gov/news/deepwater-horizon-10-years-later-10-questions>

<sup>22</sup> <http://www.ipcc.ch/>

<sup>23</sup> <https://www.esrl.noaa.gov/psd/ipcc/>

by 2–4°F (1–3°C) for 2010–2070 compared to the average over the years 1950–2010. For reef fishes and snapper-grouper species, Burton (2008) and Morley et al. (2018) speculated climate change could cause shifts in spawning seasons, changes in migration patterns, and changes to basic life history parameters such as growth rates.

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 (Sokolow 2009; Hollowed et al. 2013; Maynard et al. 2015; Wells et al. 2015; Gobler 2020). Some stocks have already shown increases in abundance in the northern Gulf (Fodrie et al. 2010) and Texas estuaries (Tolan and Fisher 2009). Integrating the potential effects of climate change into the fisheries assessment process is currently difficult due to the assessment rarely projecting through a time span that would include detectable climate change effects (Hollowed et al. 2013). However, there are ecosystem models available or being developed that incorporate future, potential, climate change effects (King and McFarlane 2006; Pinsky and Mantua 2014; Gruss et al. 2017; Chagaris et al. 2019). While complex, these factors do not change the reality of climate change impacts on managed species and the need to incorporate this information into stock assessments. Better planning and collaboration with managers are currently being pursued to include this type of data into the assessment process.

The SEFSC has developed climate vulnerability analyses (CVA)<sup>24</sup> that can be used to determine the vulnerability of greater amberjack to climate change stressors. According to the SEFSC CVA, and as is the case for many species in the Gulf, greater amberjack has a high projected exposure to climate-driven changes in environmental variables, especially to sea surface temperatures, ocean acidification, dissolved oxygen, and salinity. However, greater amberjack's biological traits (Figure 3.3.1) resulted in low sensitivity. While greater amberjack has moderate life history requirements (biological traits were generally ranked moderate to low), they can also move around moderately well to find sufficient conditions, and so it has a low overall climate vulnerability with some probability that overall vulnerability could be moderate. Generally, the Gulf is projected by the SEFSC models used (CMIP5) to become warmer, saltier, less oxygenated, and more acidic everywhere during the current fifty years. Conditions will have similar, but amplified, patterns in the 2056–2099 period (Quinlan et al. in press).

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<sup>24</sup> <https://www.fisheries.noaa.gov/national/climate/climate-vulnerability-assessments>

<i>Seriola dumerili</i>		Attribute Mean	Data Quality	Expert Scores Plots (tallies by bin)		
Sensitivity Attributes	Habitat Specificity	1.7	2.6		<div style="display: flex; flex-direction: column; align-items: center;"> <div style="width: 10px; height: 10px; background-color: green; margin-bottom: 5px;"></div> Low           <div style="width: 10px; height: 10px; background-color: yellow; margin-bottom: 5px;"></div> Moderate           <div style="width: 10px; height: 10px; background-color: orange; margin-bottom: 5px;"></div> High           <div style="width: 10px; height: 10px; background-color: red; margin-bottom: 5px;"></div> Very High         </div>	
	Prey Specificity	1.6	2.4			
	Adult Mobility	1.6	2.8			
	Dispersal of Early Life Stages	2.1	2.2			
	Early Life History Survival and Settlement Requirements	1.9	1.6			
	Complexity in Reproductive Strategy	2	2			
	Spawning Cycle	1.7	2.6			
	Sensitivity to Temperature	1.6	2.2			
	Sensitivity to Ocean Acidification	1.6	2			
	Population Growth Rate	1.8	2.2			
	Stock Size/Status	2.1	2.4			
	Other Stressors	1.9	1.8			
	<b>Sensitivity Score</b>		Low			
	Exposure Factors	Air Temperature	1	0		
Hypoxia		1.6	2.2			
Ocean Acidification		4	2			
Precipitation		1	0			
Primary Productivity		1.8	2			
Salinity		3.5	3			
Sea Level Rise		1	0			
Sea Surface Temperature		4	3			
<b>Exposure Score</b>		High				
<b>Overall Vulnerability Rank</b>		Low				

**Figure 3.3.1.** Greater amberjack biological processes analyzed for climate change sensitivities.

## 3.3 Description of the Economic Environment

### 3.3.1 Commercial Sector

#### Permits

Greater amberjack (*Seriola dumerili*) is one of 31 reef fish species managed by the Gulf of Mexico Fishery Management Council (Council). Greater amberjack is in the Council's Fishery Management Plan (FMP) for the Reef Fish Resources of the Gulf of Mexico. Any fishing vessel that harvests and sells greater amberjack from the Gulf exclusive economic zone (EEZ) must have a valid Gulf reef fish commercial permit. Commercial Gulf reef fish permits are a limited access permit. After a permit expires, it can be renewed or transferred up to one year after the date of expiration. As of August 26, 2021, there were 814 valid or renewable Gulf reef fish permits. As shown in Table 3.3.1.1, the number of permits that were valid at any point in a given

year decreased steadily from 2016-2020. There were approximately 2% fewer valid permits in 2020 relative to 2016.

**Table 3.3.1.1.** Number of valid Gulf commercial permits for reef fish, 2016-2020.

Year	Number of Permits
2016	852
2017	850
2018	845
2019	842
2020	837

Source: NMFS SERO Sustainable Fisheries (SF) Access permits database (accessed 05/17/22).

## Vessels

The information in Tables 3.3.1.2 and 3.3.1.3 describes the landings and revenue for vessels that harvested Gulf greater amberjack in each year from 2017 through 2021, as well as their revenue from other species. Vessel participation has been highly variable from 2017-2021, with a 38% decline in active vessels in 2018, relative to 2017, but an 11% decrease overall in vessels that harvested greater amberjack by 2021. Overall landings of greater amberjack were also variable during this time period, but fell by 36% in 2021 relative to 2017 which can be attributed to lower catch limits (see below). Alternatively, landings of jointly caught species on greater amberjack trips (i.e. trips that harvested greater amberjack) increased by 136% in 2021 relative to 2017. The decrease in greater amberjack landings and subsequent increase of other species landed in 2020 onward may be attributed to the 2020 Gulf of Mexico Greater Amberjack Commercial Trip Limits Framework Action<sup>25</sup> and the COVID19 pandemic.<sup>26</sup> On average from 2017-2021, greater amberjack accounted for only 15% of total landings by vessels harvesting Gulf greater amberjack.

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<sup>25</sup> The 2020 Greater Amberjack Commercial Trip Limits Framework Action reduced the greater amberjack commercial trip limit from 1,500 pounds (lbs) gutted weight (gw) to 1,000 lbs gw with a step-down to 250 lbs gw when 75 percent of the quota has been landed.

<sup>26</sup> Stakeholders in the commercial sector of the Gulf greater amberjack portion of the reef fish fishery indicated that specific species directed trips such as greater amberjack trips were no longer economically viable. Stakeholders expressed that an increased mixture of jointly caught species are needed more now than in previous years.

**Table 3.3.1.2.** Number of vessels, trips, and landings (lbs gw) by year for Gulf greater amberjack (GAJ).

Year	# of vessels that caught GAJ (> 0 lbs gw)	# of trips that caught GAJ	GAJ landings (lbs gw)	Other species' landings jointly caught w/ GAJ	# of Gulf trips that only caught other species	Other species' landings on trips w/o GAJ	All species landings on Gulf trips (lbs gw)
2017	223	679	424,259	1,209,130	3,258	762,632	30,800,525
2018	162	403	291,928	704,475	2,174	554,520	22,433,576
2019	186	511	322,602	990,425	2,705	609,761	30,302,137
2020	225	789	287,461	2,564,885	2,571	581,153	29,982,338
2021	198	783	271,533	2,853,574	2,353	578,204	29,320,051
Average	199	633	319,557	1,664,498	2,612	617,254	28,567,725

Source: SEFSC-SSRG Socioeconomic Panel (Jan 2022 version)

Overall dockside revenue of greater amberjack was also variable during this time period, but fell by 24% in 2021 relative to 2017. Alternatively, revenue from jointly caught species on Gulf greater amberjack trips increased by 181% in 2021, relative to 2017. The maximum revenue earned by a single vessel from Gulf greater amberjack landings during this time period was approximately \$36,700. On average from 2017-2021 greater amberjack accounted only for only 7% of total revenue by vessels harvesting Gulf greater amberjack. In addition, the percentage landings of greater amberjack that accounted for total revenue has dwindled from approximately 13% down to 4% in this time period, suggesting there is little financial dependency on Gulf greater amberjack landings.

**Table 3.3.1.3.** Number of vessels and ex-vessel revenues by year (2021 dollars) for Gulf greater amberjack (GAJ).

Year	# of vessels that caught GAJ (> 0 lbs gw)	Dockside revenue from GAJ	Dockside revenue from 'other species' jointly caught w/ GAJ	Dockside revenue from 'other species' caught w/o GAJ	Dockside revenue from 'all species' caught on SA trips	Total dockside revenue	Average total dockside revenue per vessel
2017	223	\$841,522	\$5,345,963	\$33,986,658	\$180,533	\$40,354,676	\$180,963
2018	162	\$597,519	\$3,325,423	\$24,173,139	\$81,051	\$28,177,132	\$173,933
2019	185	\$645,467	\$4,826,935	\$32,076,538	\$87,730	\$37,636,670	\$203,441
2020	225	\$607,257	\$11,959,815	\$31,329,098	\$24,708	\$43,920,878	\$195,204
2021	198	\$578,204	\$13,629,252	\$29,320,051	\$107,313	\$43,634,820	\$220,378
Average	199	653994	\$7,817,478	\$30,177,097	\$96,267	\$38,744,835	\$194,784

Source: SEFSC-SSRG Socioeconomic Panel (Jan 2022 version)

The information in Tables 3.3.1.4 and 3.3.1.5 describes the average landings and revenue for vessels that harvested Gulf greater amberjack for each month, as well as their revenue from other

species. On average, the greatest number of greater amberjack trips were taken in January and February (51%). Landings were also predominant in those months, 33% and 35% of the total annual landings respectively.

**Table 3.3.1.4.** Average number of vessels, trips, and landings (lbs gw) by month for Gulf greater amberjack (GAJ) 2017-2021\*.

Month	# of vessels that caught GAJ (> 0 lbs gw)	# of trips that caught GAJ	GAJ landings (lbs gw)	Other species' landings jointly caught w/ GAJ	Other species' landings caught w/o GAJ	Landings from 'all species' caught on SA trips	All species landings trips (lbs gw)
January	98	177	109,659	299,545	397,289	8,345	814,838
February	110	196	117,943	426,355	361,544	5,340	910,114
March	*	*	*	*	*	*	*
April	*	*	*	*	*	*	*
May	*	*	*	*	*	*	*
June	50	78	41,430	221,675	442,814	4,142	710,060
July	29	42	13,392	171,701	507,750	7,495	663,319
August	45	58	14,643	225,877	483,276	7,691	633,740
September	27	34	9,028	147,334	498,029	9,059	632,178
October	27	36	11,220	148,907	485,048	7,436	588,560
November	23	28	5,441	115,918	535,939	3,675	636,701
December	25	34	9,977	123,171	622,764	5,154	761,065

Source: SEFSC-SSRG Socioeconomic Panel (Jan 2022 version)

\*Data is confidential

Similar to landings, Gulf greater amberjack dockside revenue is highest on average in the months of February, January, and June in that order. Joint caught species revenues were also highest in these months as well.



**Table 3.3.1.5.** Number of vessels and ex-vessel revenues by month (2021 dollars) for Gulf greater amberjack (GAJ)\*.

Month	# of vessels that caught GAJ (> 0 lbs gw)	Dockside revenue from GAJ	Dockside revenue from 'other species' jointly caught w/ GAJ	Dockside revenue from 'other SATL species'	Dockside revenue from 'Other species caught w/o GAJ '	Total dockside revenue	Average total dockside revenue per vessel
January	98	\$210,870	\$1,303,400	\$26,175	\$1,780,215	\$3,320,660	\$22,861.69
February	110	\$222,187	\$1,884,390	\$16,963	\$1,576,074	\$3,696,220	\$24,118.89
March	*	*	*	*	*	*	*
April	*	*	*	*	*	*	*
May	*	*	*	*	*	*	*
June	50	\$82,239	\$951,981	\$16,642	\$1,902,662	\$2,953,524	\$24,612.70
July	29	\$28,319	\$811,778	\$29,386	\$2,133,532	\$2,834,996	\$24,439.62
August	45	\$28,267	\$1,056,698	\$24,668	\$2,059,353	\$2,730,066	\$23,234.60
September	27	\$17,355	\$702,782	\$31,402	\$2,162,457	\$2,769,968	\$22,987.28
October	27	\$23,453	\$679,217	\$21,884	\$2,149,682	\$2,593,168	\$23,467.59
November	23	\$11,615	\$555,728	\$12,577	\$2,334,804	\$2,801,256	\$24,148.76
December	25	\$20,410	\$583,879	\$16,954	\$2,719,882	\$3,341,126	\$27,163.63

\*Data is confidential

Source: SEFSC-SSRG Socioeconomic Panel (Jan 2022 version)

### Economic Value

Changes in commercial greater amberjack landings may result in economic effects because of potential changes in ex-vessel prices due to less (or more) domestic greater amberjack being available in markets. In turn, if the ex-vessel price is expected to change, gross revenue and thus consumer surplus (CS) would also be expected to change. The potential effects on ex-vessel price, gross revenue, and CS can typically be estimated utilizing elasticity or demand flexibility estimates such as those found in Keithly and Tabarestani (2018). However, Keithly and Tabarestani (2018) do not have estimates for greater amberjack nor does NMFS have such estimates.

Estimates of economic returns are not directly available for the greater amberjack commercial sector in the Gulf. The most recent analysis which calculated estimates of economic returns for Gulf commercial fishing vessels was Liese (SEFSC, Pers. Communication, Feb. 24, 2023). Liese (SEFSC, Pers. Communication, Feb. 24, 2023) calculated economic returns for Gulf reef fish vessels as well as other segments of interest (SOI). In most cases, these SOIs are at the species or species group and/or at the gear-level, such as red snapper or longline trips. Liese

(SEFSC, Pers. Communication, Feb. 24, 2023) produce estimates for a Gulf Jacks<sup>27</sup> SOI, which can be used as a proxy for greater amberjack estimates. These estimates are specific to economic performance in 2014-2018. The analysis also provides average estimates of economic returns across 2014-2018, which are the most useful for current purposes. Estimates in the analysis are based on a combination of Southeast Coastal logbook data, a supplemental economic add-on survey to the logbooks, and an annual economic survey at the vessel level. The economic surveys collect data on gross revenue, variable costs, fixed costs, as well as some auxiliary economic variables (e.g., market value of the vessel). The analysis provides estimates of critical economic variables for the commercial sector in the Gulf reef fish fishery. In addition, estimates are provided at the trip level and the annual vessel level, of which the latter are most important for current purposes. Findings from the analysis are summarized below.

From an economic returns perspective, the two most critical results at the trip level are the estimates of trip net cash flow and trip net revenue. Trip net cash flow is trip revenue minus the costs for fuel, bait, ice, groceries, miscellaneous, hired crew, and purchases of annual allocation from other allocation holders. Thus, this estimate represents the amount of cash generated by a typical Gulf jacks trip over and above the cash cost of taking the trip (i.e., variable costs of the trip) and is a proxy for producer surplus (PS) at the trip level. Trip net revenue is trip revenue minus the costs for fuel, bait, ice, groceries, miscellaneous, hired crew, and the opportunity cost of owner's time as captain. By including opportunity cost of the owner's time and excluding purchases of annual allocation, trip net revenue is a measure of the commercial fishing trip's economic profit.

Table 3.3.1.6 illustrates the economic "margins" generated on Gulf jacks trips, i.e., trip net cash flow and trip net revenue as a percentage of trip revenue. As shown in this table, 16% and 33.4% (or 49.4% in total) of the average revenues generated on Gulf jacks trips were used to pay for fuel/supplies costs and crew labor costs, while the remaining 38% was net cash flow back to the owner(s). The margin associated with trip net revenue about 50%. Thus, trip cash flow and trip net revenue were both positive on average from 2014 through 2018, generally indicating that Gulf Jacks trips were profitable during this time.

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27 Per Liese (SEFSC, Pers. Communication, Feb. 24, 2023) the jacks SOI "consists of all logbook trips by permitted vessels where at least one pound of jack species managed by the Gulf Reef Fish FMP was landed in 2016 using any gear type. Jack species managed include greater amberjack, lesser amberjack, banded rudderfish, and almaco jack. Greater amberjack is by far the most important species in this SOI, accounting for the majority of SOI landings."

**Table 3.3.1.6.** Economic characteristics of Gulf Jacks trips 2014-2018 (2021\$).

	2014	2015	2016	2017	2018	Average
Number of Observations	343	407	477	457	337	
Response Rate (%)	79%	81%	98%	96%	92%	
Trips						
Owner-Operated	67%	57%	63%	56%	63%	61.2%
Fuel Used per Day at Sea (gallons/day)	52	50	44	50	44	48
Total Revenue	100%	100%	100%	100%	100%	100%
Costs (% of Revenue)						
Fuel	7.5%	5.1%	3.9%	5.0%	6.4%	5.6%
Bait	3.2%	3.5%	3.2%	3.7%	4.3%	3.6%
Ice	1.6%	1.7%	1.7%	1.5%	1.7%	2%
Groceries	2.6%	2.2%	3.0%	2.9%	2.9%	2.7%
Miscellaneous	2.7%	2.5%	3.3%	2.1%	2.9%	2.7%
Hired Crew	26.7%	26.7%	26.8%	29.6%	25.3%	27.0%
IFQ Purchase	14%	24%	20%	16%	18%	19%
Owner-Captain Time	7.3%	5.7%	5.7%	6.1%	7.2%	6.4%
Trip Net Cash Flow	42%	33.9%	38.1%	39.4%	38.6%	38%
Trip Net Revenue	48%	52.5%	52.4%	49.1%	49%	50%
Labor - Hired & Owner	34%	32.4%	32.5%	35.7%	32.6%	33.4%
Fuel & Supplies	18%	15.1%	15.1%	15.2%	18.2%	16%
Input Prices						
Fuel Price (per gallon)	\$4.16	\$2.95	\$2.37	\$2.57	\$2.86	\$2.98
Hire Crew Wage (per crew-day)	\$330	\$322	\$331	\$343	\$231	\$311
Productivity Measures						
Landings/Fuel Use (lbs./gallon)	12.6	13.3	13.5	12.4	11	13
Landings/Labor Use (lbs./crew-day)	219	225	214	222	175	211

Source: Liese (SEFSC, Pers. Communication, Feb. 24, 2023)

Table 3.3.1.7 provides estimates of the important economic variables at the annual level for all vessels that had Gulf jack landings from 2014 through 2018. Similar to the trip level, the three most important estimates of economic returns from a financial perspective are net cash flow, net revenue from operations, as well as economic return on asset value. Of these measures, net revenue from operations most closely represents economic profits to the owner(s). Net cash flow is total annual revenue minus the costs for fuel, other supplies, hired crew, vessel repair and maintenance, insurance, overhead, loan payments, and purchases of annual allocation. Net revenue from operations is total annual revenue minus the costs for fuel, other supplies, hired

crew, vessel repair and maintenance, insurance, overhead, and the opportunity cost of an owner's time as captain as well as the vessel's depreciation. Economic return on asset value is calculated by dividing the net revenue from operations by the vessel value.

Net cash flow and net revenue from operations at the annual vessel level were both positive from 2014-2018, generally indicating that Gulf Jacks vessels in the commercial sector were profitable during this time. Specifically, net cash flow and net revenue from operations averaged 27% and 36%, respectively.

In general, producer surplus (PS) is the difference between total annual revenue and variable costs. PS is a measure of net economic benefits to producers. Overstreet and Liese (2018b) state that "sale of IFQ allocation or shares is also not accounted for, as these transactions cannot be associated with a vessel." If revenue from the sale of allocation is not accounted for, then the cost of buying allocation should also not be considered in the calculation of PS. Therefore, a more accurate estimate of PS in percentage terms would be 49.6% of gross revenue based on estimates of variable costs in Table 3.3.1.6.<sup>28</sup>

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<sup>28</sup>  $PS = TR\% - (Labor\% + Fuel\&Supplies\%)$

**Table 3.3.1.7.** Economic characteristics of Gulf jacks vessels from 2016-2018 (2021\$).

	2014	2015	2016	2017	2018	Average
Number of Observations	51	63	68	75	63	
Response Rate (%)	64%	76%	86%	79%	81%	
Vessels						
Owner-Operated	71%	63%	68%	60%	62%	65%
For-Hire Active	15%	17%	17%	24%	14%	17%
Vessel Value	\$182,004	\$133,724	\$117,307	\$117,565	\$115,803	\$133,281
Total Revenue	100%	100%	100%	100%	100%	100%
Costs (% of Revenue)						
Fuel	8.5%	5.2%	5.7%	6.7%	7.2%	6.7%
Other Supplies	9.8%	9.2%	10.1%	11.4%	11.7%	10.4%
Hired Crew	26.8%	25.4%	24.9%	25.3%	24.4%	25.4%
Vessel Repair & Maintenance	7.0%	6.2%	6.7%	9.6%	8.4%	7.6%
Insurance	1.3%	0.6%	0.9%	0.9%	0.6%	0.9%
Overhead	5.8%	5.1%	3.7%	6.7%	3.6%	5.0%
Loan Payment	1.2%	1.1%	1.1%	1.4%	1.2%	1.2%
IFQ Purchase	11.3%	27.3%	15.6%	10.6%	14.9%	15.9%
Owner-Captain Time	4.4%	4.4%	5.4%	5.0%	5.5%	4.9%
Net Cash Flow	28.0%	19.8%	31.2%	27.5%	28.1%	27.0%
Net Revenue for Operations	33.0%	41.5%	40.0%	31.3%	35.4%	36.0%
Depreciation	3.3%	2.4%	2.6%	3.1%	3.3%	2.9%
Fixed Costs	14.0%	11.9%	11.3%	17.2%	12.6%	13.0%
Labor - Hired & Owner	31.0%	29.8%	30.3%	30.4%	29.9%	30.0%
Fuel & Supplies	18.0%	14.4%	15.8%	18.1%	18.9%	17.0%
Economic Return (on asset value)	50.3%	86.8%	77.4%	49.9%	53.8%	63.6%

Source: Liese (SEFSC, Pers. Communication, Feb. 24, 2023)

## Dealers

The information in Table 3.3.1.8 illustrates the purchasing activities of dealers that bought Gulf greater amberjack landings from vessels from 2017 through 2021. The total number of dealers purchasing greater amberjack varied from 2017-2021. On average, from 2017-2021 there were 73 dealers purchasing Gulf greater amberjack landings. In 2018, the total number of dealers purchasing greater amberjack was approximately 23% fewer relative to 2017. However, in 2021, the total number of purchasing dealers increased by 9% relative to 2018. Overall, there were 20% fewer total dealers purchasing Gulf greater amberjack landings in 2021 relative to 2017.

Total value of greater amberjack landings purchases by dealers also varied between 2017 and 2021. Overall purchases of greater amberjack landings decreased by 21% in 2021 relative to 2017. On average from 2017-2021 the value of Gulf greater amberjacks purchases were \$698,891. The average value of greater amberjack purchases per dealer declined by 6% from 2017-2021.

The overall value of other species purchases increased by 2% in 2021, relative to 2017. The average value of other South Atlantic species purchases declined by about 50% in 2021, relative to 2017. Total purchases for all species by dealers purchasing Gulf greater amberjack on average from 2017-2021 were approximately \$97.7 million (2021\$). Overall, greater amberjack made up approximately less than 1% of total purchases by greater amberjack dealers, indicating that there is a very low financial dependency on greater amberjack landings. Additionally, because of federal dealers' ability to switch to purchasing other species, changes to those values as a result of the management measures considered in this amendment are likely to be relatively small. Similarly, any additional PS and profit generated from greater amberjack sales further up the distribution chain to wholesalers/distributors, grocers, and restaurants is likely minimal, given the vast number of seafood and other products they handle and their even greater ability to shift to purchasing other products.

Estimates on the mark-ups between the ex-vessel price and dealer sales price of greater amberjack are unavailable. Keithly and Wang (2018) estimated the most recent mark-ups between the ex-vessel price and dealer sales price. However, those estimates only apply to grouper and tilefish. Further, these are insufficient to estimate PS or profit for greater amberjack dealers, or changes to such as a result of regulatory changes, in part because costs other than the raw fish costs (which are equivalent to the ex-vessel value) are not considered. NMFS does not have estimates of those other costs for greater amberjack dealers or seafood dealers more broadly, and thus does not have estimates of net cash flow or net revenue from operations for greater amberjack dealers comparable to those in the commercial harvesting sector. Thus, while it is likely that the harvest of greater amberjack generates some PS and profit for greater amberjack dealers, NMFS does not possess the data to estimate PS and profit.

**Table 3.3.1.8.** Dealer statistics for dealers that purchased greater amberjack landings by year, 2017-2021. All dollar estimates are in 2021\$.

Year	Number Dealers	Statistic	GAJ Purchases	Other Gulf Species Purchases	Other SA Species Purchases	Total Purchases
2017	84	Maximum	\$210,566	\$10,860,938	\$5,438,813	\$10,861,071
		Mean	\$10,254	\$1,100,622	\$269,491	\$1,380,367
		Total	\$861,320	\$92,452,207	\$22,637,275	\$115,950,802
2018	64	Maximum	\$147,074	\$9,036,431	\$3,342,297	\$9,046,163
		Mean	\$9,844	\$1,089,982	\$126,936	\$1,226,762
		Total	\$630,001	\$69,758,828	\$8,123,917	\$78,512,747
2019	72	Maximum	\$88,188	\$10,939,722	\$4,143,452	\$10,957,197
		Mean	\$9,655	\$1,163,000	\$198,797	\$1,371,452
		Total	\$695,159	\$83,735,965	\$14,313,386	\$98,744,510
2020	74	Maximum	\$82,313	\$9,787,921	\$4,388,604	\$9,821,705
		Mean	\$8,531	\$1,068,926	\$125,540	\$1,202,997
		Total	\$631,295	\$79,100,539	\$9,289,980	\$89,021,813
2021	70	Maximum	\$109,077	\$11,091,737	\$4,800,599	\$11,099,160
		Mean	\$9,667	\$1,347,169	\$161,510	\$1,518,346
		Total	\$676,682	\$94,301,834	\$11,305,719	\$106,284,235

Source: SEFSC Fishing Communities Web Query Tool, Version 1.

## Imports

Imports of foreign seafood products compete in the domestic seafood market and have in fact dominated 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 can have downstream effects on the local fish market. At the harvest level, imports can affect the returns to fishermen through the ex-vessel prices they receive for their landings. As substitutes to domestic production, imports tend to cushion the adverse economic effects on consumers resulting from a reduction in domestic landings. The following describes the imports of fish products that directly compete with domestic harvest of snapper grouper species including the species in this framework. According to NMFS' foreign trade data, Gulf greater amberjack are not exported from the U.S. to other countries. Therefore, this section describes the foreign trade for reef fish species which are substitutes to domestic production of greater amberjack.

## Snappers

According to NMFS' foreign trade data, snapper are not exported from the U.S. to other countries. Thus, the following describes the imports of fresh and frozen snapper products, which directly compete with domestic harvest of snapper species. All monetary estimates are in 2021 dollars. As shown in Table 3.3.1.9, imports of fresh snapper products were 31.2 million lbs product weight (pw) in 2017. They peaked at 36.0 million lbs pw in 2021, an increase of 15% relative to 2017. Total revenue from snapper imports increased from \$99.0 million (2021 dollars) in 2017 to a five-year high of \$148.6 million in 2021. The average price per pound for fresh snapper products was \$3.54 from 2017-2021 and has been steadily increasing reaching the highest price per pound in 2021. Imports of fresh snapper products primarily originated in Mexico or Central America and primarily entered the U.S. through the port of Miami.

**Table 3.3.1.9.** Annual pounds and value of fresh snapper imports and share of imports by country, 2017-2021.

	2017	2018	2019	2020	2021
Pounds of fresh snapper imports (product weight, million pounds)	31.2	30.5	32.8	32.4	36.0
Value of fresh snapper imports (millions \$, 2021\$)	99.0	103.5	115.3	113.4	148.6
Average price per lb (2021\$)	\$3.17	\$3.39	\$3.52	\$3.50	\$4.13
Share of Imports by Country					
Mexico	35.8	32.5	34.9	40.4	32.8
Nicaragua	15.4	17.0	14.6	15.1	13.3
Panama	14.8	16.6	13.9	11.0	14.0
All others	33.9	33.9	36.6	33.5	39.9

Source: NOAA Foreign Trade Query Tool, accessed 11/16/22

As shown in Table 3.3.1.10, imports of frozen snapper products were 12.8 million lbs pw in 2017. They peaked at 18.2 million lbs pw in 2021, an increase of 42% relative to 2017. Total revenue from frozen snapper imports increased from \$38.2 million (2021 dollars) in 2017 to a five-year high of \$66.6 million in 2021. The average price per pound for frozen snapper products was \$3.20 from 2017-2021, but has been increasing in recent years. Imports of frozen snapper products primarily originated in Brazil or South America and primarily entered the U.S. through the port of Miami.



**Table 3.3.1.10.** Annual pounds and value of frozen snapper imports and share of imports by country, 2017-2021.

	2017	2018	2019	2020	2021
Pounds of frozen snapper imports (product weight, million pounds)	12.8	12.2	11.4	15.9	18.2
Value of frozen snapper imports (millions \$, 2021\$)	38.2	37.6	36.7	48.4	66.6
Average price per lb (2021\$)	\$2.98	\$3.08	\$3.22	\$3.05	\$3.65
Share of Imports by Country					
Brazil	61.0	63.8	54.6	55.4	58.6
Indonesia	11.0	11.3	6.8	5.4	3.9
Suriname	7.9	6.9	13.5	10.3	10.5
All others	20.1	17.9	25.0	28.9	27.0

Source: NOAA Foreign Trade Query Tool, accessed 11/16/22

### Groupers

According to NMFS' foreign trade data,<sup>29</sup> grouper are not exported from the U.S. to other countries. Thus, the following describes the imports of fresh and frozen grouper products, which directly compete with domestic harvest of reef fish species. As shown in Table 3.3.1.11, imports of fresh grouper products were 12.3 million lb. pw in 2017. They peaked at 12.4 million lb. pw in 2018, but declined to 10.4 million lb. pw by 2020. Total revenue from fresh grouper imports decreased from 2018 to 2020, but in 2021 remained the same as in 2016 at 55.7 million dollars. The average price per pound for fresh grouper products was \$4.49 from 2017-2021, with a large decrease coming in 2020. Imports of fresh grouper products primarily originated in Mexico, Panama and Brazil.

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<sup>29</sup> <https://www.fisheries.noaa.gov/foss/>

**Table 3.3.1.11.** Annual pounds and value of fresh grouper imports and share of imports by country, 2017-2021.

	2017	2018	2019	2020	2021
Pounds of fresh Grouper imports (product weight, million pounds)	12.3	12.4	11.3	10.4	12.2
Value of fresh Grouper imports (millions \$, 2021\$)	55.7	57.2	53.0	40.6	57.7
Average price per lb (2021\$)	\$4.54	\$4.61	\$4.68	\$3.89	\$4.73
Share of Imports by Country					
Mexico	58.8	58.0	57.9	67.6	53.8
Panama	12.2	9.0	8.1	8.0	12.0
Brazil	10.1	15.9	16.9	12.3	17.7
All others	19.0	17.1	17.0	12.2	16.5

Source: NOAA Foreign Trade Query Tool, accessed 01/25/23

As shown in Table 3.3.1.12, imports of frozen grouper products were 1.4 million lb. pw in 2017. They peaked at 4.6 million lb. pw in 2018, but declined to 2.2 million lb. pw by 2021. Total revenue from frozen grouper increased from \$2.0 million (2021 dollars) in 2017 to \$6.2 million in 2018, but subsequently declined to \$5.1 million in 2021. The average price per pound for frozen grouper products was \$1.67 from 2017-2021, and increased by 60% in 2021 relative to 2017. Imports of frozen grouper products primarily originated in Mexico, India, and Indonesia.

**Table 3.3.1.12.** Annual pounds and value of frozen grouper imports and share of imports by country, 2017-2021.

	2017	2018	2019	2020	2021
Pounds of frozen Grouper imports (product weight, million pounds)	1.4	4.6	3.5	0.8	2.2
Value of frozen Grouper imports (millions \$, 2021\$)	2.0	6.2	4.8	1.5	5.1
Average price per lb (2021\$)	\$1.46	\$1.34	\$1.37	\$1.85	\$2.33
Share of Imports by Country					
Mexico	47.2	79.2	79.2	33.7	54.3
India	29.3	11.2	11.2	25.9	18.1
Indonesia	16.3	4.0	3.0	1.1	10.9
All others	7.2	5.5	6.5	39.3	16.7

Source: NOAA Foreign Trade Query Tool, accessed 05/14/22

## Economic Impacts

The commercial harvest and subsequent sales and consumption of fish generates business activity as fishermen expend funds to harvest the fish and consumers spend money on goods and services, such as greater amberjack 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 and services. As a result, the analysis presented below represents a distributional analysis only; that is, it only shows how economic impacts 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.

In addition to these types of impacts, economic impact models can be used to determine the sources of the impacts. Each impact can be broken down into direct, indirect, and induced economic impacts. “Direct” economic impacts are the results of the money initially spent in the study area (e.g., country, region, state, or community) by the fishery or industry being studied. This includes money spent to pay for labor, supplies, raw materials, and operating expenses. The direct economic impacts from the initial spending create additional activity in the local economy, i.e., “indirect” economic impacts. Indirect economic impacts are the results of business-to-business transactions indirectly caused by the direct impacts. For example, businesses initially benefiting from the direct impacts will subsequently increase spending at other local businesses. The indirect economic impact is a measure of this increase in business-to-business activity, excluding the initial round of spending which is included in the estimate of direct impacts. “Induced” economic impacts are the results of increased personal income caused by the direct and indirect economic impacts. For example, businesses experiencing increased revenue from the direct and indirect impacts will subsequently increase spending on labor by hiring more employees, increasing work hours, raising salaries/wage rates, etc. In turn, households will increase spending at local businesses. The induced impact is a measure of this increase in household-to-business activity.

Estimates of the U.S. average annual business activity associated with the commercial harvest of Gulf greater amberjack were derived using the model developed for and applied in NMFS (2022)<sup>30</sup> and are provided in Table 3.3.1.13. Specifically, these impact estimates reflect the expected impacts from average annual gross revenues generated by landings of Gulf greater amberjack from 2017 through 2021. This business activity is characterized as jobs (full time equivalents), income impacts (wages, salaries, and self-employed income), value-added impacts (the difference between the value of goods and the cost of materials or supplies), and output impacts (gross business sales). Income impacts should not be added to output (sales) impacts because this would result in double counting

The results provided should be interpreted with caution. These results are based on average relationships developed through the analysis of many fishing operations that harvest many different species. Separate models specific to individual species such as greater amberjack are not available. Between 2017 and 2021, landings of Gulf greater amberjack resulted in approximately \$617,000 (2021\$) in gross revenue on average. In turn, this revenue generated employment, income, value-added, and output impacts of 74 jobs, \$2.4 million, \$3.2 million, and \$6.1 million per year, respectively, on average.

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<sup>30</sup> A detailed description of the input/output model is provided in NMFS (2022).

**Table 3.3.1.13** Average annual economic impacts in the commercial sector of the Gulf greater amberjack fishery. All monetary estimates are in thousands of 2021 dollars and employment is measured in full-time equivalent jobs.

Harvesters	Direct	Indirect	Induced	Total
Employment impacts	13	2	3	18
Income impacts	333	62	150	545
Total value-added impacts	355	223	256	834
Output Impacts	617	502	497	1,616
Primary dealers/processors	Direct	Indirect	Induced	Total
Employment impacts	3	1	2	6
Income impacts	109	100	95	304
Total value-added impacts	116	128	178	422
Output impacts	350	264	349	962
Secondary wholesalers/distributors	Direct	Indirect	Induced	Total
Employment impacts	1	0	1	3
Income impacts	65	19	68	152
Total value-added impacts	69	32	116	218
Output impacts	174	63	226	463
Grocers	Direct	Indirect	Induced	Total
Employment impacts	5	1	1	7
Income impacts	133	44	67	244
Total value-added impacts	142	71	113	327
Output impacts	228	116	222	566
Restaurants	Direct	Indirect	Induced	Total
Employment impacts	33	2	5	41
Income impacts	535	162	306	1,003
Total value-added impacts	570	290	516	1,375
Output impacts	1,042	453	1,018	2,513
Harvesters and seafood industry	Direct	Indirect	Induced	Total
Employment impacts	55	6	12	74
Income impacts	1,175	388	686	2,248
Total value-added impacts	1,252	744	1,180	3,176
Output impacts	2,410	1,398	2,312	6,121

## Recreational Sector

The recreational sector is comprised of the private and for-hire modes. The private mode includes anglers fishing from shore (all land-based structures) and private/rental boats. The for-hire mode is composed of charter boats and headboats (also called party boats). 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

This section contains landings data<sup>31</sup> from the Southeast Fisheries Science Center (SEFSC) Marine Recreational Information Program (MRIP) ACL monitoring data set, with the addition of landings estimates provided by the Louisiana Department of Wildlife and Fisheries (LDWF), and the Texas Parks and Wildlife Department (TPWD).

Recreational greater amberjack landings peaked in 2018, and declined overall in subsequent years. However, there was an increase in landings in 2020 from 2019 (Table 3.3.2.1). From 2018-2020, the recreational sector of the greater amberjack portion of the reef fish fishery was subject to a multitude of management measure that include changing the fishing year, modifying the fixed-closed season, and an in-season closures and post-season paybacks. Landings in 2021 were 36% lower relative to 2018. The distribution of landings between modes was volatile during this time period. The majority of landings oscillated between private and charter modes from 2018-2021.<sup>32</sup> Private vessels on average from 2018-2021 accounted for 57% of greater amberjack landings, charter vessels 40%, and headboats making up the remaining 3%. No landings for greater amberjack were recorded shore modes. The majority of landings on average occurred in Florida (57%) (Figure 3.3.2.1). Waves 4 and 5, which include the months of July-August<sup>33</sup> and September-October, accounted for the majority of landings on average from 2018-2021 (Figure 3.3.2.2).

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<sup>31</sup> It should be noted, while the recreational sector is managed on a split fishing year, economic analyses presented in this chapter are reported in a calendar year format. Therefore, recreational landings in this section are also reported in calendar year terms.

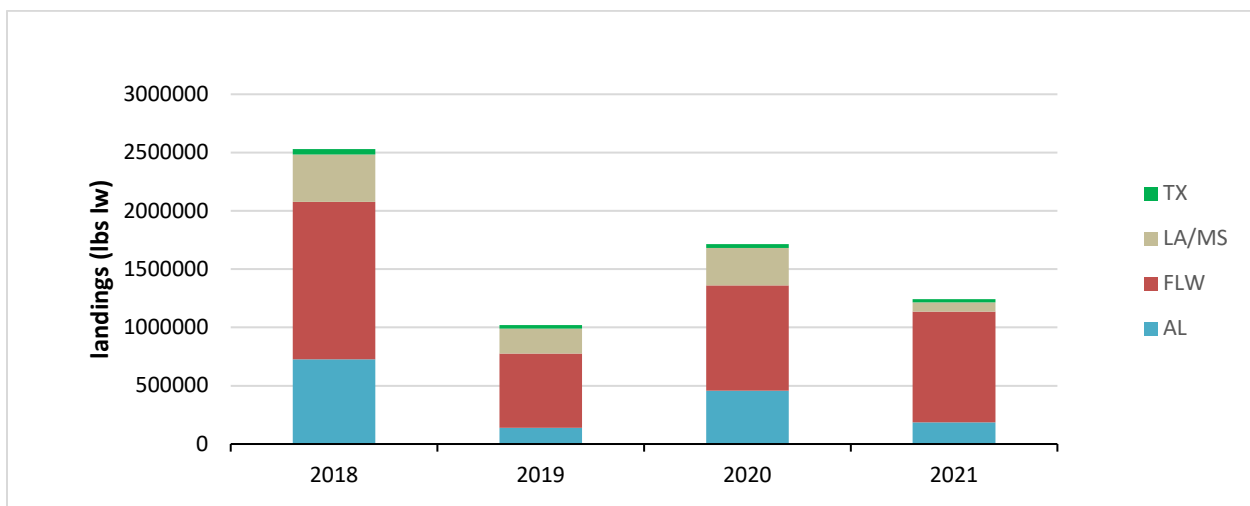
<sup>32</sup> Modifications to the Greater Amberjack Fishing Year and the Recreational Fixed Closed Season implemented on April 20, 2018 modified the recreational fishing year to begin on August 1 and run through July 31 of the following year. It also modified the fixed closed season so that recreational harvest is prohibited from November 1 – April 30 and June 1 – July 31. The second half 2019-2020 fishing year was impacted by the COVID19 Pandemic, and several stakeholders voiced that for-hire trips during this period were reduced as such.

<sup>33</sup> July is part of the fixed closed season, it is assumed recreational landings that occur in this Wave occur in August.

**Table 3.3.2.1.** Recreational landings (lbs ww) and percent distribution of greater amberjack across all states by mode for 2018-2021.

Year	Landings (pounds ww)				Percent Distribution		
	Charter vessel	Headboat	Private	Total	Charter vessel	Headboat	Private
2018	646,999	71,400	1,811,433	2,529,832	0.26	0.03	0.72
2019	542,936	33,410	445,019	1,021,366	0.53	0.03	0.44
2020	450,449	31,626	1,233,019	1,715,094	0.26	0.02	0.72
2021	683,816	28,076	530,682	1,242,575	0.55	0.02	0.43
AVG	581,050	41,128	1,005,038	1,627,217	0.40	0.03	0.57

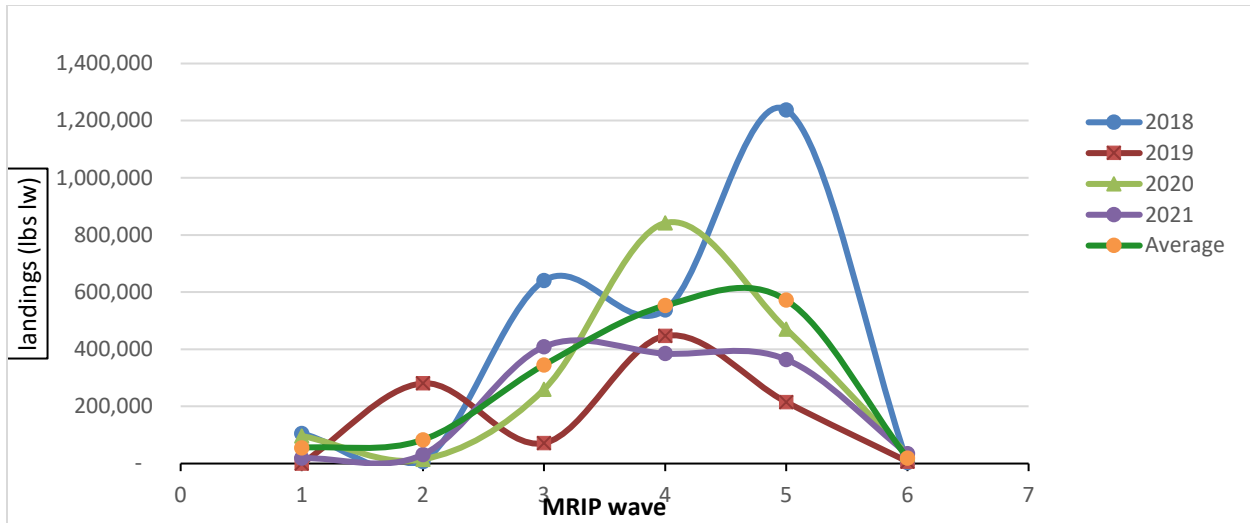
Source: SEFSC MRIP ACL data set (April 2022).



**Figure 3.3.2.1.** Recreational landings of Gulf greater amberjack by state.\*

Source: SEFSC MRIP ACL data set (April 2022).

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



**Figure 3.3.2.2.** Recreational landings of Gulf greater amberjack by wave.  
Source: SEFSC MRIP ACL data set (April 2022).

### Angler Effort

Recreational effort derived from the MRIP database can be characterized in terms of the number of angler 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.

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 greater amberjack target or catch effort for additional years, and other measures of directed effort, are available.<sup>34</sup>

Tables 3.3.2.2 – 3.3.2.5 describe the recreational target and catch trips for greater amberjack in the Gulf from 2018-2021. There are no catch or target trips for the shore mode for greater amberjack in the Gulf. Private vessels represent more than 89% of target effort in the recreational sector. The majority of target effort occurs by private vessels in Florida, followed by Alabama’s private vessel target effort. On average, May and June had the greatest target effort followed by July and August. These include two months when the federal harvest season is opened for greater amberjack in the Gulf (May and August). It is noted, that while the season

<sup>34</sup> <https://www.st.nmfs.noaa.gov/recreational-fisheries/data-and-documentation/queries/index>

is closed to harvest from November-April and June-July, target trips are greater than zero in June and July indicating that amberjack are sought as a catch and release fish as well.

Similarly, private vessels are also responsible for the vast majority of catch effort for greater amberjack (77%). Catch effort by charter vessels represents about 23% of the total catch effort. Similarly, private vessels in Florida account for the majority of catch effort for greater amberjack (51%). However, relatively significant amounts of catch effort also occur in Alabama's private vessel sector (20%), and Florida's charter sector (18%). As expected, the trends in catch effort mimic the trends in landings, with the peak occurring in 2018, declines thereafter, and a significant decline in 2021. The decline in catch effort can be in part attributed to the 2017 Modifications to the Greater Amberjack Fishing Year and the Recreational Fixed Closed Season Framework Action implemented on April 20, 2018 and limited for-hire opportunities due to the onset of COVID19 and following restrictions on public gatherings..



**Table 3.3.2.2.** Greater Amberjack recreational target trips, by mode and state\*, 2018-2021.

Mode	Year	Mississippi	Alabama	Florida	Louisiana	Total
Charter	2018	0	1,245	18,392	4,117	23,754
	2019	0	424	5,373	2,187	7,984
	2020	0	1,610	13,319	1,083	16,012
	2021	0	1,600	6,964	1,201	9,765
	Average	0	1,220	11,012	2,147	14,379
<b>Private</b>						
Private	2018	4,750	25,486	161,835	7,273	199,344
	2019	2,542	26,557	21,375	6,196	56,670
	2020	25,762	42,032	82,585	4,394	154,773
	2021	1,615	14,930	38,444	2,831	57,820
	Average	8,667	27,251	76,060	5,174	117,152
<b>All</b>						
All	2018	4,750	26,731	180,227	11,390	223,098
	2019	2,542	26,981	26,748	8,383	64,654
	2020	25,762	43,642	95,904	5,477	170,785
	2021	1,615	16,530	45,408	4,032	67,585
	Average	8,667	28,471	87,072	7,321	131,531

Sources: MRIP Survey Data available at <https://www.fisheries.noaa.gov/recreational-fishing-data/recreationalfishing-data-downloads>. Effort estimates for Texas are from the Texas Parks and Wildlife Department’s Marine Sport-Harvest Monitoring Program and assumed equivalent to MRIP-FES estimates. Target effort estimates for most reef fish species in Texas are unavailable. Louisiana recreational effort estimates came from the Louisiana Department of Wildlife and Fisheries Recreational Creel Survey and were adjusted to MRIP FES equivalents using the ratios in NMFS (2020). Headboat target effort is unavailable.

**Table 3.3.2.3. Greater Amberjack recreational catch trips, by mode and state 2018-2021**

Mode	Year	Mississippi	Alabama	Florida	Louisiana	Texas	Total
Charter	2018	0	5,211	27,832	1,143	1,143	35,329
	2019	0	4,631	36,633	467	467	42,198
	2020	0	4,171	21,755	1,997	1,997	29,920
	2021	0	4,036	22,824	3,069	3,069	32,998
	Average	0	4,512	27,261	1,669	1,669	35,111
<b>Private</b>							
Private	2018	2,788	42,812	132,000	9,267	1,251	188,118
	2019	2,865	11,931	88,125	7,797	1,354	112,072
	2020	5,323	43,519	72,945	3,228	204	125,219
	2021	4,152	26,173	17,690	5,067	678	53,760
	Average	3,782	31,109	77,690	6,340	872	119,792
<b>All</b>							
All	2018	2,788	48,023	159,832	10,410	2,394	223,447
	2019	2,865	16,562	124,758	8,264	1,821	154,270
	2020	5,323	47,690	94,700	5,225	2,201	155,139
	2021	4,152	30,209	40,514	8,136	3,747	86,758
	Average	3,782	35,621	104,951	8,009	2,541	154,904

Sources: MRIP Survey Data available at <https://www.fisheries.noaa.gov/recreational-fishing-data/recreationalfishing-data-downloads>. Effort estimates for Texas are from the Texas Parks and Wildlife Department’s Marine Sport-Harvest Monitoring Program and assumed equivalent to MRIP-FES estimates. Target effort estimates for most reef fish species in Texas are unavailable. Louisiana recreational effort estimates came from the Louisiana Department of Wildlife and Fisheries Recreational Creel Survey. Headboat target effort is unavailable.

\* No recorded target trips in Texas.

**Table 3.3.2.4. Greater Amberjack recreational target trips, by wave and mode\* from 2018-2021**

	1 (Jan-Feb)	2 (Mar-Apr)	3 (May-Jun)	4 (Jul-Aug)	5 (Sep-Oct)	6 (Nov-Dec)	Total
<b>Charter</b>							
2018	1,283	6,506	8,932	2,701	3,892	441	23,755
2019	765	228	0	1,937	5,054	0	7,984
2020	2,051	3,464	2,935	7,128	434	0	16,012
2021	439	0	5,019	3,371	937	0	9,766
Average	1,135	2,550	4,222	3,784	2,579	110	14,379
<b>Private</b>							
2018	16,713	4,802	93,158	28,489	49,921	6,261	199,344
2019	4,702	0	2,881	33,739	15,348	0	56,670
2020	1,391	3,467	57,964	49,458	42,492	0	154,772
2021	0	0	23,076	26,177	8,567	0	57,820
Average	5,702	2,067	44,270	34,466	29,082	1,565	117,152
<b>All</b>							
2018	17,996	11,308	102,090	31,190	53,813	6,702	223,099
2019	5,467	228	2,881	35,676	20,402	0	64,654
2020	3,442	6,931	60,899	56,586	42,926	0	170,784
2021	439	0	28,095	29,548	9,504	0	67,586
Average	6,836	4,617	48,491	38,250	31,661	1,676	131,531

Sources: MRIP Survey Data available at <https://www.fisheries.noaa.gov/recreational-fishing-data/recreational-fishing-data-downloads>. Effort estimates for Texas are from the Texas Parks and Wildlife Department’s Marine Sport-Harvest Monitoring Program and assumed equivalent to MRIP-FES estimates. Target effort estimates for most reef fish species in Texas are unavailable. Louisiana recreational effort estimates came from the Louisiana Department of Wildlife and Fisheries Recreational Creel Survey. Headboat target effort is unavailable.

\*No reported shore trips

**Table 3.3.2.5. Greater Amberjack recreational catch trips, by wave and mode\* from 2018-2021**

	1 (Jan-Feb)	2 (Mar-Apr)	3 (May-Jun)	4 (Jul-Aug)	5 (Sep-Oct)	6 (Nov-Dec)	Total
<b>Charter</b>							
2018	709	2,187	16,074	13,515	8,355	0	40,840
2019	2,236	11,812	10,357	5,523	10,245	4,179	44,352
2020	355	1,412	11,014	13,471	2,257	622	29,131
2021	1,752	1,678	11,942	9,982	4,811	1,262	31,427
Average	1,263	4,272	12,347	10,623	6,417	1,516	36,438
<b>Private</b>							
2018	7,742	5,541	61,321	67,446	53,426	11,175	206,651
2019	15,354	15,261	10,766	60,803	20,303	5,177	127,664
2020	13,065	6,050	28,820	38,394	41,386	3,961	131,676
2021	2,748	4,905	19,966	19,208	15,438	1,629	63,894
Average	9,727	7,939	30,218	46,463	32,638	5,486	132,471
<b>All</b>							
2018	7,742	5,541	54,519	57,538	51,854	10,923	188,117
2019	15,354	15,261	10,400	46,253	19,625	5,177	112,070
2020	13,065	4,902	27,618	34,858	40,816	3,961	125,220
2021	2,748	4,403	12,410	18,348	15,308	543	53,760
Average	9,727	7,527	26,237	39,249	31,901	5,151	119,792

Sources: MRIP Survey Data available at <https://www.fisheries.noaa.gov/recreational-fishing-data/recreationalfishing-data-downloads>. Effort estimates for Texas are from the Texas Parks and Wildlife Department’s Marine Sport-Harvest Monitoring Program and assumed equivalent to MRIP-FES estimates. Louisiana recreational effort estimates came from the Louisiana Department of Wildlife and Fisheries Recreational Creel. Headboat target effort is unavailable.  
\*No reported shore trips

Similar analysis of recreational effort is not possible for the headboat mode in the Gulf 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 number of standardized 12-hour fishing days that account for the different half-, three-quarter-, and full-day fishing trips by headboats. The stationary “fishing for demersal (bottom-dwelling) species” nature of headboat fishing, as opposed to trolling, suggests that most, if not all, headboat trips and, hence, angler days, are demersal or snapper grouper trips by intent.

Headboat angler days, similar to angler effort and landings, declined overall across the Gulf States from 2018 through 2020, but increased by about 9% in 2021, relative to 2018 (Table 3.3.2.6). Texas, however, saw little decline in headboat angler days from 2018-2020, and had a large increase in 2021. On average (2018 through 2021), Florida accounted for the majority of headboat angler days reported, followed by Texas and Alabama; whereas, Mississippi and Louisiana combined, accounted for only a small percentage (Table 3.3.2.7). Headboat effort in terms of angler days for the entire Gulf was concentrated most heavily during the summer months of June through August on average (2018 through 2021; Table 3.3.2.7), again showing the popularity of greater amberjack being a catch and release species.

**Table 3.3.2.6.** Gulf headboat angler days and percent distribution by state (2018 through 2021).

	Angler Days				Percent Distribution			
	FL	AL	MS-LA*	TX	FL	AL	MS-LA	TX
2018	171,996	19,851	3,235	52,160	69.6%	8.0%	1.3%	21.1%
2019	161,564	18,607	2,632	52,456	68.7%	7.9%	1.1%	22.3%
2020	126,794	13,091	1,728	51,498	65.7%	6.8%	0.9%	26.7%
2021	181,632	13,844	3,197	71,344	67.3%	5.1%	1.2%	26.4%
Average	160,497	16,348	2,698	56,865	67.8%	7.0%	1.1%	24.1%

Source: NMFS SRHS (February, 2022).

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

**Table 3.3.2.7.** Gulf headboat angler days and percent distribution by month (2018 – 2021).

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Headboat Angler Days												
2018	5,524	13,694	20,762	17,584	16,876	54,251	53,304	24,819	13,235	10,633	8,183	8,377
2019	2,330	12,819	21,796	16,299	18,271	46,046	47,594	24,212	11,369	13,687	10,389	10,447
2020	8,147	10,906	11,426	385	11,130	43,930	42,021	20,647	12,190	14,497	8,710	9,122
2021	6,871	8,584	21,301	17,746	22,019	51,773	55,201	24,978	15,768	20,446	12,117	13,213
Avg	5,718	11,501	18,821	13,004	17,074	49,000	49,530	23,664	13,141	14,816	9,850	10,290
Percent Distribution												
2018	2.2%	5.5%	8.4%	7.1%	6.8%	21.9%	21.6%	10.0%	5.4%	4.3%	3.3%	3.4%
2019	1.0%	5.4%	9.3%	6.9%	7.8%	19.6%	20.2%	10.3%	4.8%	5.8%	4.4%	4.4%
2020	4.2%	5.6%	5.9%	0.2%	5.8%	22.7%	21.8%	10.7%	6.3%	7.5%	4.5%	4.7%
2021	2.5%	3.2%	7.9%	6.6%	8.2%	19.2%	20.4%	9.3%	5.8%	7.6%	4.5%	4.9%
Avg	2.5%	5.0%	7.9%	5.2%	7.1%	20.9%	21.0%	10.1%	5.6%	6.3%	4.2%	4.4%

Source: NMFS SRHS (Feb, 2022)

### Permits

There are no specific federal permitting requirements for private recreational anglers to fish for or harvest greater amberjack. The same is true of private recreational vessel owners. Instead, private 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 private anglers or private recreational vessels would be expected to be affected by the actions in this amendment.

Charter vessel/headboat vessels in the Gulf are required to have a limited access charter vessel/headboat for reef fish permit (Gulf RCG for-hire permit) to fish for or possess coastal reef fish species. As of August 26, 2021, there were 1,273 valid or renewable reef fish permits. The total number of valid or renewable RCG permits has been relatively stable with less than 1% change in valid or renewable RCG permits from year to year (Table 3.3.2.8).

Although the 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, if a vessel meets the selection criteria used by the SRHS and is selected to report by the Science Research Director of the SEFSC, it is determined to operate primarily as a headboat and is required to submit harvest and effort information to the SRHS.

**Table 3.3.2.8.** Number of valid or renewable RCG permits, 2016-2020.

Year	Number of Permits
2016	1,282
2017	1,280
2018	1,279
2019	1,277
2020	1,289

Source: NMFS SERO SF Access Permits Database.

### Economic Value

Economic value can be measured in the form of consumer surplus (CS) per additional greater amberjack kept on a trip for anglers (the amount of money that an angler would be willing to pay for a fish in excess of the cost to harvest the fish). There is no direct available estimate of CS for greater amberjack, but other estimates can serve as close proxies. Haab et al. (2012) used data from the 2000 MRFSS southeast intercept survey combined with the economic add-on to produce estimated values of the CS per fish for a small game fish (which includes greater amberjack) and snappers (which includes the amberjack genus) kept on a trip are approximately \$31, and \$15, respectively (2021 dollars).<sup>35</sup> Carter, Lovell and Liese (2020) used a 2014 mail survey of recreational anglers fishing in the Gulf of Mexico (GOM) to produce values of the CS for an additional fish kept. Carter, Lovell and Liese 2020 estimated for a snapper species the value of one additional snapper kept was \$58 (2021 dollars). Averaging the three estimates from these two studies yields a proxy of the value for CS of greater amberjack at \$34 (2021) dollars.

Economic value for the for-hire component of the recreational sector can be measured in many ways. According to Savolainen et al. (2012), the average charter vessel operating in the Gulf is estimated to receive approximately \$94,781 (2021 dollars) in gross revenue and \$28,122 in net income (gross revenue minus variable and fixed costs) annually. The average headboat is

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<sup>35</sup> The word "small" says nothing about the actual size of the fish, but is rather a label to distinguish the fish in that category from the fish in the "big game" category. The big game species were: Atlantic tarpon, billfish family, blackfin tuna, cobia, little tunny, sailfish, swordfish, tuna genus, wahoo, and yellowfin tuna.

The small game species were: common snook, sand seatrout, seatrout genus, Florida pompano, striped bass, bonefish, mackerel genus, bluefish, silver seatrout, permit, greater amberjack, great barracuda, drum family, ladyfish, weakfish, Irish pompano, jack family, lookdown, tarpon family, and fat snook. The other snapper species were: amberjack genus, Atlantic spadefish, black sea bass, blackfin snapper, crevalle jack, gray snapper, gray triggerfish, silver seatrout, snapper family, vermilion snapper, white grunt, yellowtail snapper, and Atlantic thread herring.

estimated to receive approximately \$286,426 (2021 dollars) in gross revenue and \$83,324 in net income annually. More recent estimates of average annual gross revenue for Gulf headboats are provided in Abbott and Willard (2017) and David Carter (SEFSC pers. comm., 2018). Abbott and Willard (2017) suggest that Savolainen, et al.'s estimate of average annual gross revenue for headboats may be an underestimate, as data in the former suggest that average gross revenue in 2009 for the vessels in their sample was about \$506,193 (2021 dollars). Further, their data suggest average annual gross revenue per vessel had increased to about \$611,389 (2021 dollars) by 2014. However, Abbott and Willard's estimates are based on a sample of 17 headboats that chose to participate in the headboat Collaborative Program in 2014, while Savolainen, et al.'s are based on a random sample of 20 headboats. The headboats that participated in the Collaborative may be economic highliners, in which case Abbott and Willard's estimates would overestimate average annual gross revenue for Gulf headboats. Carter (SEFSC pers. comm., 2018) recently estimated that average annual gross revenue for Gulf headboats were approximately \$450,838(2021 dollars) in 2017. This estimate is likely the best current estimate of annual gross revenue for Gulf headboats, as it is based on a relatively large sample of 63 boats, or more than 90% of the active fleet, and is more recent.

However, gross revenues overstate the annual economic value and profits generated by for-hire vessels. Economic value for for-hire vessels can be measured by producer surplus (PS) per passenger trip (the amount of money that a vessel owner earns in excess of the cost of providing the trip). Estimates of revenue, costs, and trip net revenue trips taken by headboats and charter vessels in 2017 are available from Souza and Liese (2019). They also provide estimates of trip net cash flow per angler trip, which approximate PS per angler trip. After accounting for transactions fees, supply costs, and labor costs, net revenue per trip was 42% of revenue for Gulf charter vessels and 54% of revenue for Southeast headboats, or \$822 and \$1,910 (2021 dollars), respectively (Table 3.3.2.9). Trip net revenue (TNR), which is the return used to pay all labor wages, returns to capital. When TNR is divided by the number of anglers on a trip, it represents cash flow per angler (CFpA). The estimated CFpA value for an average Gulf charter angler trip is \$149 (2021 dollars) and the estimated CFpA value for an average Gulf headboat angler trip is \$68 (Souza and Liese 2019). Estimates of CFpA for all individual Reef Fish species target trips, in particular, are not available.



**Table 3.3.2.9.** Trip economics for offshore trips by Gulf charter vessels and Southeast headboats in 2017 (2021\$).

	Gulf Charter Vessels	Southeast Headboats
Revenue	100%	100%
Transaction Fees (% of revenue)	3%	6%
Supply Costs (% of revenue)	27%	19%
Labor Costs (% of revenue)	27%	22%
Net Revenue per trip including Labor costs (% of revenue)	42%	54%
Net Revenue per Trip	\$822	\$1,910
Average # of Anglers per Trip	5.5	28.2
Trip Net Cash Flow per Angler Trip	\$149	\$68

### 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 is 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 greater amberjack were calculated using average trip-level impact coefficients derived from the 2018 Fisheries Economics of the U.S. report (NMFS 2021) and underlying data provided by the National Oceanic and Atmospheric Administration (NOAA) Office of Science and Technology. Economic impact estimates in 2016 dollars were adjusted to 2021 dollars using the annual, not seasonally adjusted GDP implicit price deflator provided by the U.S. Bureau of Economic Analysis.

Business activity (economic impacts) for the recreational sector is characterized in the form of jobs (full- and part-time), income impacts (wages, salaries, and self-employed income), output impacts (gross business sales), and value-added impacts (contribution to the GDP in a state or region). Estimates of the average annual economic impacts (2018–2021) resulting from Gulf greater amberjack charter and private vessel target trips are provided in Table 3.3.2.10. To calculate the multipliers from Table 3.3.2.10, simply divide the desired impact measure (sales impact, value-added impact, income impact or employment) associated with a given state by the number of target trips for that state.

The estimates provided in Table 3.3.2.10 only apply at the state-level. Addition of the state-level estimates to produce a regional (or national) total may underestimate the actual amount of total business activity, because state-level impact multipliers do not account for interstate and

interregional trading. It is also important to note that these economic impacts estimates are based on trip expenditures only and do not account for durable expenditures. Durable expenditures cannot be reasonably apportioned to individual species. As such, the estimates provided in Table 3.3.2.10 may be considered a lower bound on the economic activity associated with those trips that targeted greater amberjack.

Estimates of the business activity associated with headboat effort are not available. Headboat vessels are not covered in MRIP in the Southeast, so, in addition to the absence of estimates of target effort, estimation of the appropriate business activity coefficients for headboat effort has not been conducted.

**Table 3.3.2.10.** Estimated average annual economic impacts (2018-2021) from Gulf charter and private vessel greater amberjack target trips, by state,\* using state-level multipliers. All monetary estimates are in 2021 dollars in thousands.

	FL	AL	MS	LA
<b>Charter Mode</b>				
Target Trips	11,012	1,220	0	2,147
Value Added Impacts	\$3,853	\$508	\$0	\$1,018
Sales Impacts	\$6,470	\$924	\$0	\$1,913
Income Impacts	\$2,251	\$290	\$0	\$600
Employment (Jobs)	60	10	0	22
<b>Private/Rental Mode</b>				
Target Trips	76,060	27,251	8,667	5,714
Value Added Impacts	\$2,742	\$1,232	\$189	\$853
Sales Impacts	\$4,250	\$1,906	\$314	\$1,459
Income Impacts	\$1,439	\$479	\$100	\$461
Employment (Jobs)	39	18	3	11
<b>All Modes</b>				
Target Trips	87,072	28,471	8,667	7,861
Value Added Impacts	\$6,595	\$1,740	\$189	\$1,871
Sales Impacts	\$10,720	\$2,830	\$314	\$3,372
Income Impacts	\$3,690	\$769	\$100	\$1,061
Employment (Jobs)	98	28	3	34

Source: Effort data from MRIP, LDWF LA Creel; economic impact results calculated by NMFS SERO using NMFS (2021) and underlying data provided by the NOAA Office of Science and Technology.

\* There are no target trips for Texas.

Note: Headboat information is unavailable.

## 3.4 Description of the Social Environment

This section describes select aspects of the social context associated with recreational and commercial pursuit of greater amberjack in the Gulf. The principal intent of the section is to provide sufficient descriptive context for regulatory effects analysis in Chapter 4. In keeping with Executive Orders that call for examination of environmental equity and justice (EEJ) issues in the context of federal regulatory actions, the following also identifies social vulnerabilities among Gulf communities where the greater amberjack resource is of known importance.

### 3.4.1 Greater Amberjack Commercial Sector

As a member of the Carangid family of fishes (Carangidae or jacks), greater amberjack exhibit affinity with wrecks, reefs, and other bathymetric features at approximate depths of between 60 and 235 feet (GMFMC 2022). This affinity has implications for the location, depth, and manner in which captains and crew pursue or incidentally capture the species in federal waters. Participants in the commercial sector may allowably use vertical hook and line gear, bottom longline gear, or commercial dive gear (spear and powerhead gear) to land the fish. Circle hooks must be used, and a dehooking device is required onboard (GMFMC 2022). Commercial participants harvesting greater amberjack with bottom longline gear must possess a Gulf reef fish longline endorsement.

#### Greater Amberjack Commercial Landings by Gulf State

The geographic distribution of greater amberjack landings provides an indication of states and communities where harvest of the species is of local consequence. During 2021, 71.2% of greater amberjack landings accrued to fleets in West Florida, followed by 13.5% in Alabama, 7.6% in Louisiana, 4.9% in Alabama, and less than 1% in Mississippi. West Florida-specific landings of greater amberjack consistently exceeded commercial landings of the species elsewhere in the Gulf during a 2017 through 2021 time-series (SEFSC Community ALS File, June 2023).

#### Distribution of Gulf Commercial Reef Fish Permits

A commercial reef fish permit is required for commercial harvest of greater amberjack and other reef fish in the Gulf. The distribution of such permits therefore indicates the states and communities from which participants in the fishery may operate. At 81.1%, most such permits were issued to residents or persons with mailing addresses in Florida during 2020, followed by 8% in Texas, 4.7% in both Louisiana and Alabama, and less than 1% in Mississippi. Single permits were issued during 2020 to persons with mailing addresses in West Virginia, Georgia, South Carolina, New York, and California. The state-level distribution of Gulf commercial reef fish permits has varied little in recent years, with the vast majority of permits consistently held for use by participants in communities around West Florida. As depicted in Table 3.4.1.1, numerous commercial reef fish permits were held by captains operating from the communities of Panama City and Key West during 2020.

**Table 3.4.1.1.** Distribution of commercial reef fish permits among the top permit-holding communities in the Gulf of Mexico: calendar year 2020.

State	Community	Number of Permits in 2020
Florida	Panama City	72
Florida	Key West	63
Florida	Destin	40
Texas	Galveston	37
Florida	Madeira Beach	31
Florida	Cortez	26
Florida	Tarpon Springs	25
Florida	Apalachicola	20
Florida	Pensacola	19
Florida	St. Petersburg	16
Florida	Clearwater	14
Alabama	Dauphin Island	13
Florida	Naples	13
Florida	Steinhatchee	11
Florida	Hernando Beach	11
Florida	Indian Shores	10
Florida	Seminole	10
Florida	Key Largo	9
Florida	Panama City Beach	9
Florida	Crystal River	9
Louisiana	Venice	9
Florida	Hudson	9
Texas	Freeport	8
Florida	Redington Shores	8

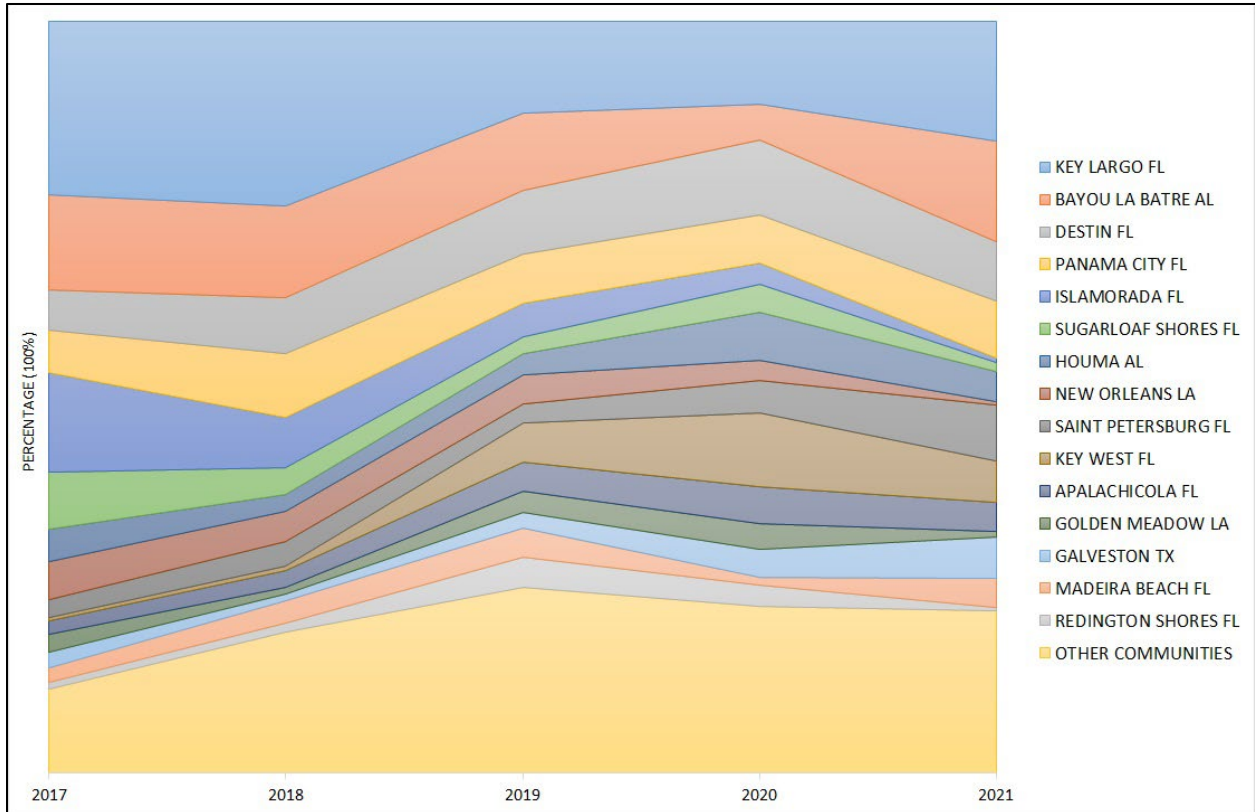
**Source:** NMFS SERO Sustainable Fisheries (SF) Access permits database.

As noted above, commercial participants who (purposely or incidentally) harvest greater amberjack using bottom longline gear must possess a Gulf reef fish longline endorsement (LLE). During 2020 and recent prior years, the greatest proportion of the 62 allotted LLEs were held by commercial harvesters operating from the Florida communities of Cortez and Madeira Beach.

### **Regional and Local Quotients: Gulf Commercial Greater Amberjack Landings**

Figure 3.4.1.1 below depicts the community-level distribution of greater amberjack landings during the period 2017 through 2021. The distribution is expressed as a regional quotient, or the share of community-specific landings divided by landings of the species for the overall region. Communities are presented based on a ranking of landings averaged across the time-series. As can be discerned from the figure, commercial participants based in Key Largo collectively account for the greatest proportion of community-specific commercial greater amberjack landings during 2020 and throughout the period of interest. However, it is noted here that fishing effort undertaken by captains operating from the Keys cannot readily be ascribed to the Atlantic

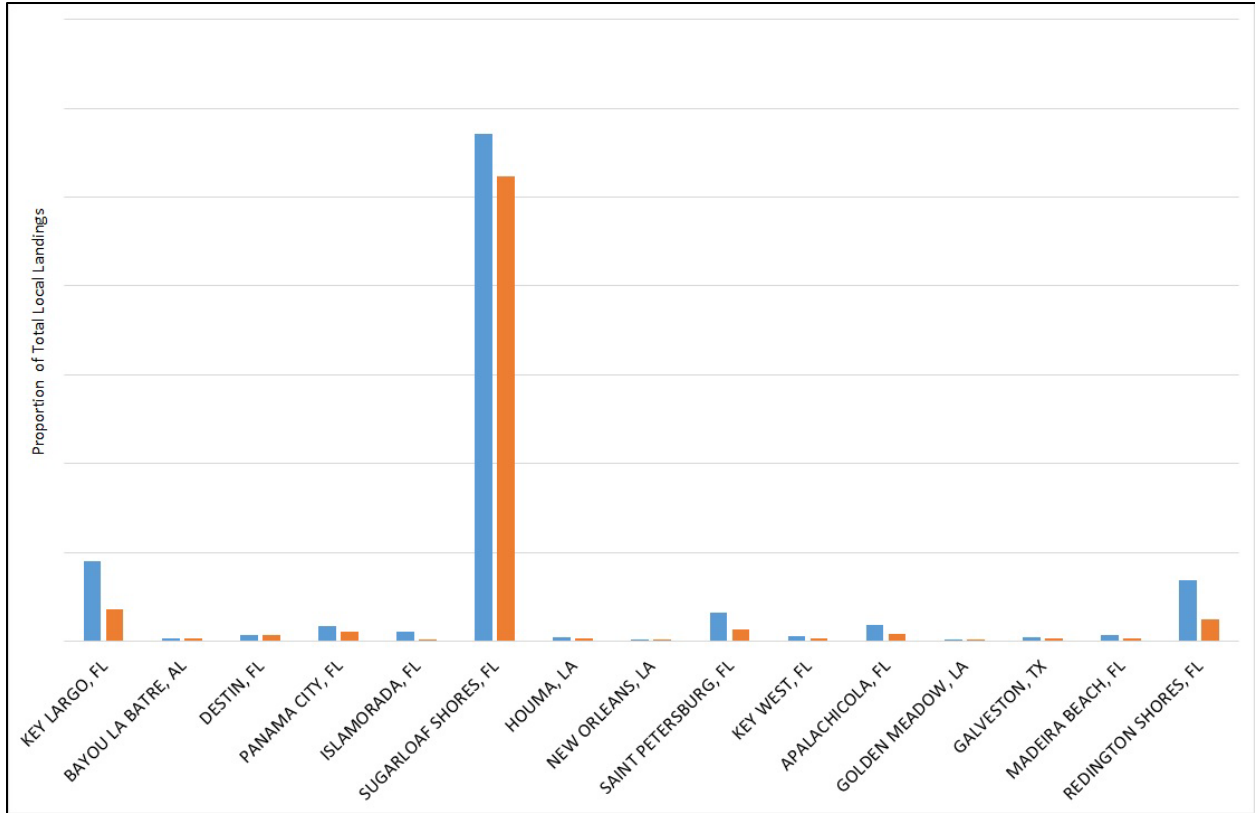
or Gulf side of Florida, while participants operating from communities such as Bayou LaBatre in Alabama and Destin in Florida very likely do harvest primarily in Gulf waters. When considered in relation to Table 3.4.1.1 above, the data suggest that harvest of greater amberjack is relatively extensive in certain communities despite a limited local pool of permit holders.



**Figure 3.4.1.1.** Distribution of regional landings among the top Gulf of Mexico commercial greater amberjack landings communities: 2017 through 2021.

**Source:** SEFSC, Community ALS Data File, Accessed June 2023.

Finally, Figure 3.4.1.2 depicts the Local Quotient (LQ) of greater amberjack landings for each of the communities depicted in the previous figure. The LQ metric specifies the relative extent of community-specific landings for a given species vis-à-vis all local landings accrued in that community during a given year or years. In this case, the LQ is presented for the top greater amberjack landings communities for 2021. Of note in the table is the relatively high proportion of such landings accrued by commercial operators associated with the community of Sugarloaf Shores in Monroe County, Florida, though again, landings here or elsewhere in the Florida Keys are not definitively associated with fishing effort undertaken solely in the Gulf.

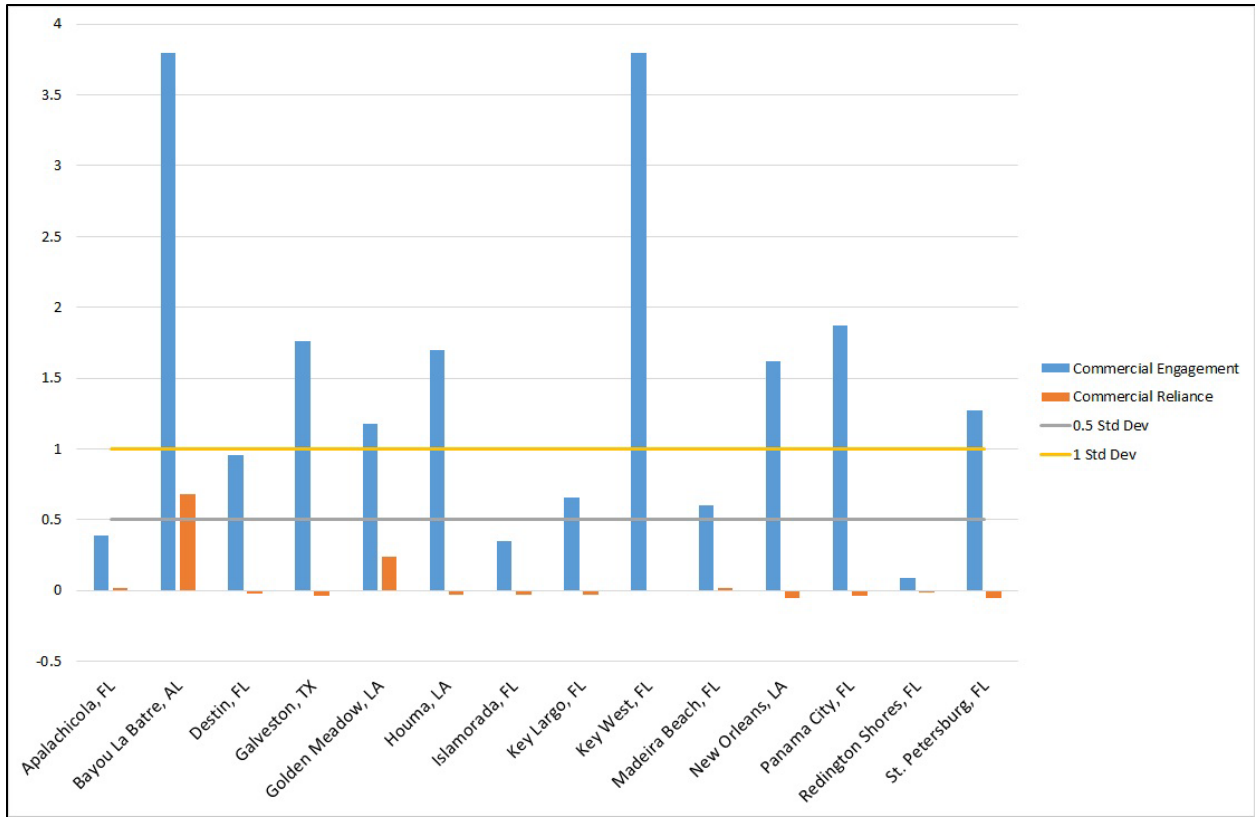


**Figure 3.4.1.2** Local quotient of greater amberjack landings and associated ex-vessel value among the top Gulf of Mexico landings communities during 2021.

**Source:** SEFSC, Community ALS Data File, Accessed June 2023.

### Measures of Community Engagement and Reliance

Figure 3.4.1.3 below provides measures of engagement and reliance for communities with the greatest average percentage of commercial greater amberjack landings during the 2017 through 2021 time-series. As can be discerned from the graphic, Bayou LaBatre in Alabama and Key West in Florida register particularly high scores in terms of overall engagement in Gulf commercial fisheries. The Florida communities of Panama City and St. Petersburg; the Louisiana communities of Houma, New Orleans, and Golden Meadow; and the Texas community of Galveston also score above the one standard deviation threshold for engagement in the region’s commercial fisheries. The measure of engagement provided here is a generalizable composite indicator based on: (a) pounds of fish landed by the local commercial fleets, (b) associated ex-vessel revenue, and (c) the number of commercial fishery participants and seafood dealers present in a given community. The measure of reliance used here incorporates the same variables noted above, divided by the total local population figure. Both measures are useful means for indicating where any prospective effects of greater amberjack management actions are likely to be experienced. Notably, none of the communities exceed the one standard deviation threshold for *reliance* on commercial fisheries, suggesting local economic alternatives to the fishing and seafood industries. Of note, the community of Bayou LaBatre does exceed the 0.5 standard deviation threshold for reliance on Gulf commercial fisheries.



**Figure 3.4.1.3.** Measures of engagement and reliance among Gulf communities with the greatest volume of commercial greater amberjack landings during 2021.

**Source:** SERO, Community Social Vulnerability Indicators Database, Accessed June 2023.

### 3.4.2 Greater Amberjack Recreational Sector

Greater amberjack is widely known as a powerful reef-associated species, with large specimens often capable of testing an angler’s gear and endurance. The fish is increasingly targeted by for-hire captains and their patrons, and by anglers active in the private recreational sector. The species is often found at considerable depth, which in the Gulf typically requires travel to distant offshore grounds. Various approaches are used to pursue greater amberjack, including but not limited to drifting with cut or live bait suspended in the water column, vertical jigging at or near the bottom, and slow trolling with planers at appropriate depth. Greater amberjack behavior, ecological cues of their presence, and specific locations where the fish and other species of interest are likely to be found on any given day comprise important forms of information among recreational participants and social networks thereof. Recreational participants fishing in federal waters may retain one greater amberjack per day providing that fork length is equal to or greater than 34 inches (GMFMC 2022).

Cummings and McLellan (2000) provide insight into the historic nature fishing for greater amberjack in the Gulf, noting that prior to and during the 1990s, most recreational landings occurred primarily outside of state jurisdiction waters. The authors suggest that a surge in recreational pursuit of the species transpired after a St. Petersburg-based fleet of charter vessels

gradually emerged with the capacity to undertake single-day trips to offshore grounds (Cummings and McLellan 2000). The trend toward use of fast and efficient for-hire and private recreational vessels continues today (cf. Cooke et al. 2021) and in part explains the growing popularity of offshore recreational fishing in the Gulf region.

A deeper history of greater amberjack fishing in the western central Atlantic and Gulf of Mexico is provided in Berry and Burch (1979). The authors assert that landings of the species were on the rise during the 1970s, and notably state that the species “might be overfished, before catch records and management-related biological data are available to define current status of the stocks or to predict their fate.”

### **Distribution of Greater Amberjack Recreational Landings**

As discussed in Amendment 54 to the FMP for the Reef Fish Resources of the Gulf (GMFMC 2023), recreational pursuit of greater amberjack in the Gulf occurs primarily along the west coast of Florida. While the number of for-hire operators specifically targeting greater amberjack is not readily available, 803 of the 1,289 charter or headboat vessels permitted for take of Gulf reef fish (62.2%) were homeported in Florida during 2020 (CFR 2023).

#### **For-Hire Permits**

For-hire captains pursuing greater amberjack in the Gulf must possess a for-hire/headboat permit for reef fish. A total of 1,289 such permits were issued during 2020, the vast majority to residents or persons with mailing addresses in Alabama, Mississippi, Louisiana, Texas, and especially Florida (Table 3.4.2.1). Single permits were issued during 2020 to persons with mailing addresses in New Hampshire, New York, Ohio, Pennsylvania, Delaware, and Virginia.

The number of for-hire reef fish permits held for use by vessel owners and captains operating from the communities of Orange Beach in Alabama and Destin in the Florida Panhandle have, since at least 2008, far exceeded those held for use from other communities along the Gulf coastline. This merits summary description of place. Situated in Baldwin County, Orange Beach was home to 8,095 persons in 2020, having grown from 5,441 residents during the 2010 census count—a local population increase of 48.7% (U.S. Census Bureau 2020a). The community is situated on a barrier island along the easternmost inhabited portion of the state’s coastline, affording locally moored vessels rapid access to the Gulf via Perdido Pass. Destin, in Okaloosa County, was home to 13,931 persons in 2020, an increase of 1,626 persons above the 2010 census count (U.S. Census Bureau 2020b). Located on a peninsula adjacent to Choctawhatchee Bay, Destin fleets also have easy access to Gulf waters, in this case via East Pass. Both communities are popular Gulf tourist destinations.

**Table 3.4.2.1.** Distribution of Gulf of Mexico for-hire/headboat reef fish permits among the top permit-holding communities in the region during 2020.

<b>State</b>	<b>Community</b>	<b>Number of Permits in 2020</b>
<b>Alabama</b>	Orange Beach	102
<b>Florida</b>	Destin	101
<b>Florida</b>	Panama City	53



State	Community	Number of Permits in 2020
Louisiana	Venice	49
Texas	Galveston	48
Florida	Key West	47
Florida	Naples	45
Texas	Freeport	36
Florida	Panama City Beach	43
Texas	Port Aransas	30
Florida	Pensacola	26
Florida	Clearwater	26
Florida	St. Petersburg	25
Florida	Sarasota	21
Alabama	Dauphin Island	19
Florida	Crystal River	18
Mississippi	Biloxi	17
Florida	Madeira Beach	16
Florida	Marco Island	16
Florida	Tarpon Springs	15
Florida	Fort Myers	15
Louisiana	Grand Isle	15
Florida	Fort Myers Beach	14
Texas	Matagorda	13
Louisiana	Chauvin	12
Florida	Venice	12
Florida	Apalachicola	12
Florida	Bradenton	12

Source: NMFS SERO SF Access permits database, accessed June 2023.

### Community Engagement & Reliance: Gulf Recreational Greater Amberjack Fishery

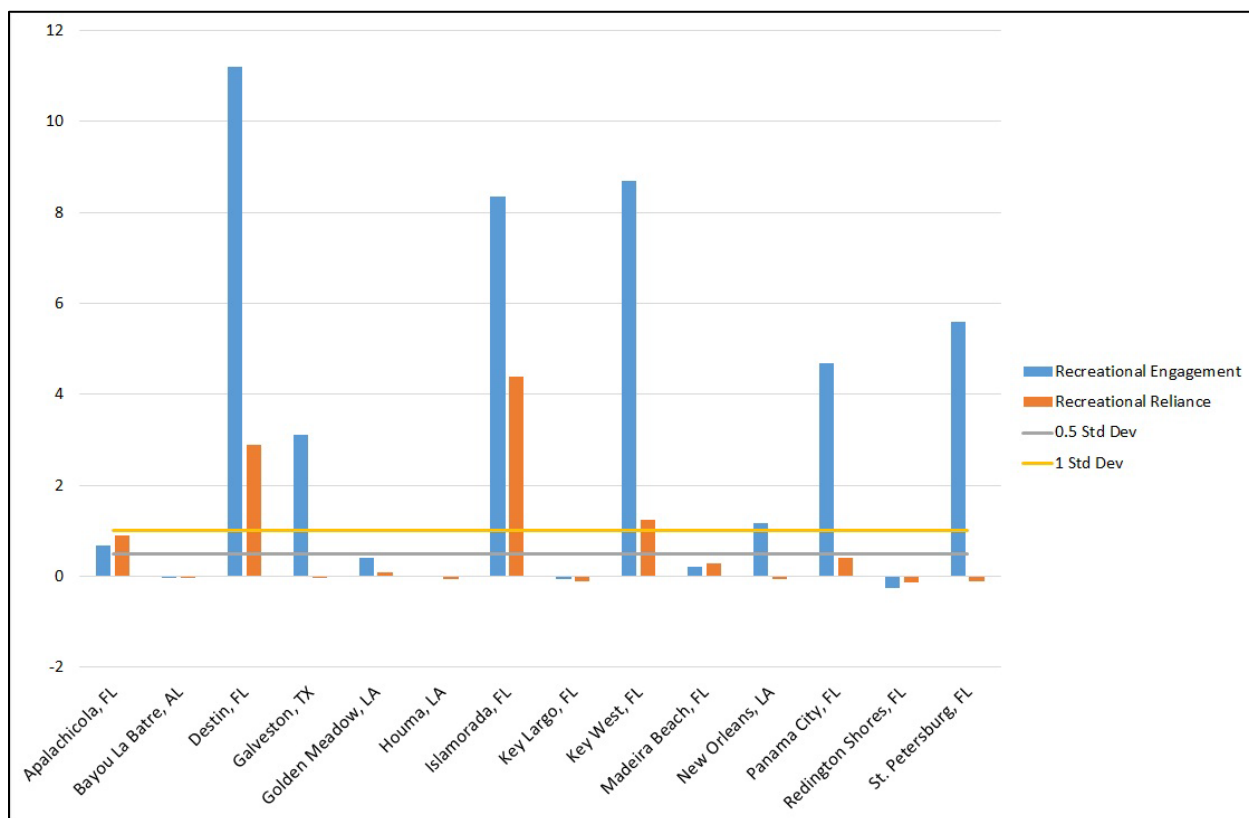
The full range of data indicative of social involvement in the Gulf greater amberjack recreational sector is not readily available at the level of the community. As such, it is not possible with available information to identify communities that are specifically engaged in and/or reliant on recreational fishing for this species in particular.

Given that information regarding community-specific interaction with any given species is limited for the recreational sector, NMFS social scientists have developed indices of utility for identifying communities where recreational and commercial fishing are important components of local economy and society in general. Discussion of the methods, approach, and rationale for development of the indices are available in Jacob et al. (2013), Jepson and Colburn (2013), and Hospital and Leong (2021).

Based on the indices provided here, and by selecting for presentation those communities with the greatest number of Gulf for-hire/headboat reef fish permits, Figure 3.4.2.1 below depicts measures of engagement and reliance among Gulf communities most likely involved in the

greater amberjack recreational fishing sector. The measure of engagement depicted in the figure derives from the number of all for-hire permits and recreational vessels actively used by residents in a given community, while the measure of reliance derives from the same variables divided by the total local population figures as per 2020 census data.

While numerous communities depicted here demonstrate extensive engagement in recreational fisheries of the Gulf region, the Florida communities of Destin, Islamorada, and Key West meet the one standard deviation threshold for reliance on the recreational sector. The measures of engagement and reliance provided here are useful means for indicating where any prospective effects of greater amberjack regulatory actions are likely to be experienced.



**Figure 3.4.2.1.** Measures of community involvement in the Gulf of Mexico recreational fishing sector during 2020.

**Source:** SERO, Community Social Vulnerability Indicators (CSVI) Database, Accessed June 2023.

### 3.4.3 Environmental Justice

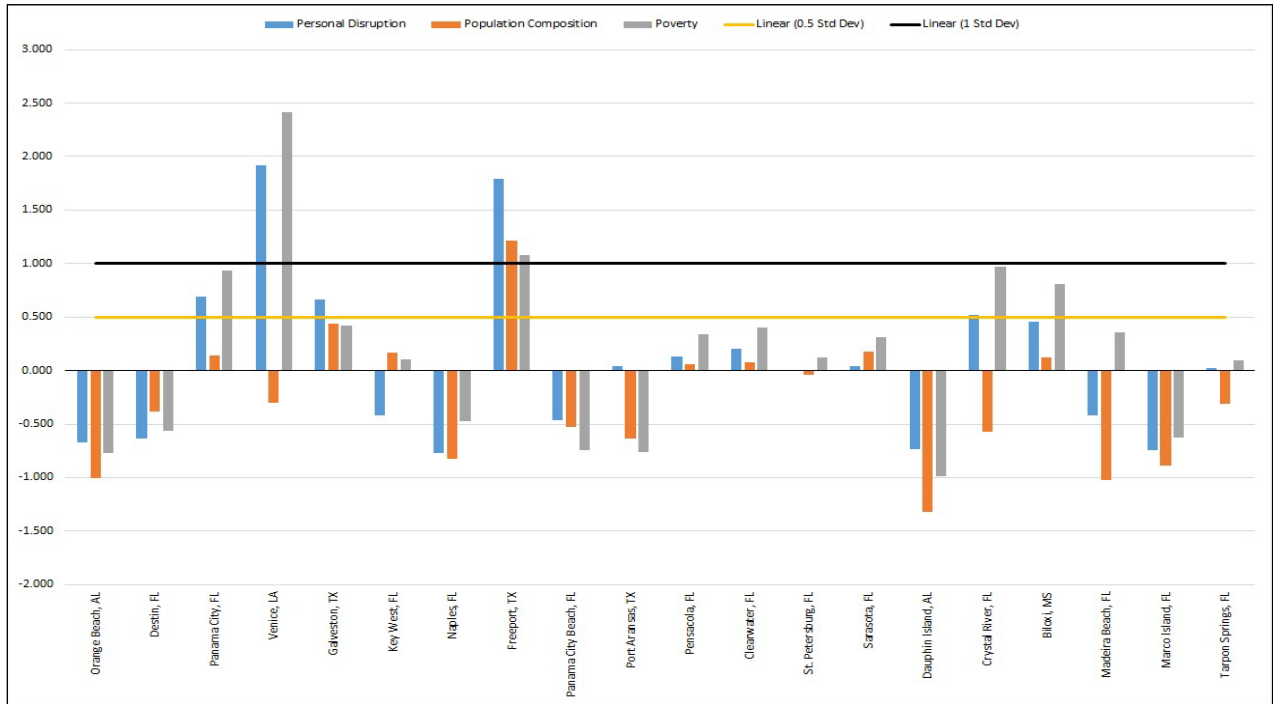
Executive Order (EO) 12898 (Environmental Justice) was established in 1994 to require that federal actions be undertaken in a manner that identifies and avoids adverse human health and/or social and economic effects among low-income and minority groups and populations around the nation and its territories. Federal regulatory decisions must be undertaken in ways that ensure no individuals or populations are excluded, denied the benefits of, or are subjected to discrimination due to race, color, or nation of origin. Of relevance in the context of marine fisheries, federal

agencies are further required to collect, maintain, and analyze data regarding patterns of consumption of fish and wildlife among persons who rely on such foods for purposes of subsistence. Established in 2021, *EO 13985* calls for human equity in the context of federal decision-making and policy actions. Titled “Advancing Racial Equity and Support for Underserved Communities through the Federal Government,” the new order requires that federal policies and programs are designed and undertaken in a manner that delivers resources and benefits equitably to all citizens, including members of historically underserved communities. Here, the phrase “underserved communities” refers to populations and persons that have been systematically denied full and equitable opportunity to participate in economic, social, and civic aspects of life in the nation. Finally, *EO 14008*, established in 2021, calls on agencies to make the achievement of environmental equity and justice part of their missions “by developing programs, policies, and activities that address disproportionately high and adverse human health, environmental, climate-related and/or other cumulative impacts on disadvantaged communities, as well as the accompanying economic challenges of such impacts.”

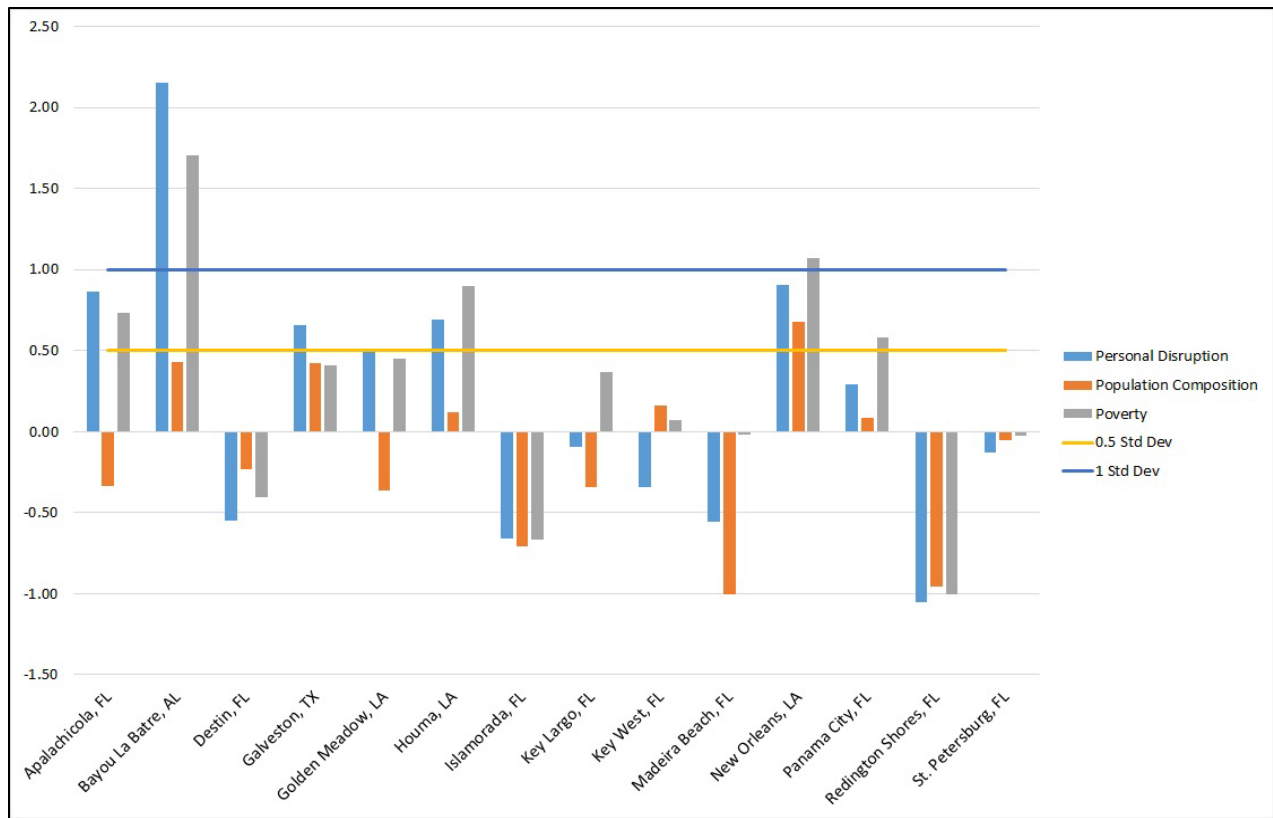
Various data are available to indicate environmental justice issues among minority and low-income populations and/or indigenous communities potentially affected by federal regulatory and other actions. With the intent of enhancing capacity to determine whether such issues may be affecting communities around the U.S. where fishing-related industry is an important aspect of local economy and society, NMFS social scientists undertook an extensive series of deliberations and review of pertinent data and literature. The scientists ultimately selected key social, economic, and demographic variables that could function to identify social vulnerabilities at the community level of analysis (Jacob et al. 2013, Jepson and Colburn 2013). Census data such as community-specific rates of poverty, number of households maintained by single females, number of households with children under the age of five, rates of crime, and rates of unemployment exemplify the types of information chosen to aid in community analysis. Pertinent variables were subsequently used to develop composite indices that could be applied to assess vulnerability to environmental, regulatory, and other sources of change among the nation’s fishing- and/or seafood-oriented communities.

As depicted in the following figures, three composite indices—termed here as poverty, population composition, and personal disruption—are used to indicate relative degrees of vulnerability among communities most thoroughly engaged in the Gulf greater amberjack fishery sectors. Mean standardized scores for each community are provided along the y-axis, with means for the vulnerability measures and threshold standard deviations along the x-axis. Scores exceeding the 0.5 standard deviation level indicate social vulnerability to regulatory and other sources of change. Figure 3.4.3.1 below depicts social vulnerability measures for Gulf communities most extensively involved in the recreational fishing industry. The data presented here indicate vulnerabilities in multiple communities, and especially in Venice, Louisiana, and Freeport, Texas. Figure 3.4.3.2 depicts Community Social Vulnerability Indicators (CSVI) scores for the top commercial greater amberjack landings communities in the Gulf region. Bayou LaBatre in Alabama and Golden Meadow and Houma in Louisiana notably exceed the designated one standard deviation threshold for one or more indices. Both figures derive from data available in the SERO CSVI database. Although the depicted communities bear the potential for environmental justice concerns in this context, the full range of pertinent data is not available to assess the issue in full. As such, although no specific environmental justice

problems are identified here specifically in relation to the greater amberjack fishery sectors, the absence of such issues cannot be assumed.



**Figure 3.4.3.1.** Social vulnerability measures for Gulf of Mexico communities with the greatest number of locally held for-hire reef fish permits in 2020. **Source:** SERO CSVI Database, June 2023.



**Figure 3.4.3.2.** Social vulnerability measures for Gulf of Mexico communities with the greatest volume of commercial greater amberjack landings in 2021. **Source:** SERO, CSVI Database, June 2023.

## 3.5 Description of the Administrative Environment

### 3.5.1 Federal Fishery Management

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

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

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

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

### 3.5.2 State Fishery Management

The purpose of state representation at the Council level is to ensure state participation in federal fishery management decision-making and to promote the development of compatible regulations in state and federal waters. The state governments of Texas, Louisiana, Mississippi, Alabama, and Florida have the authority to manage their respective state fisheries. Each of the five states exercises legislative and regulatory authority over their states' natural resources through discrete administrative units. Although each agency is the primary administrative body with respect to the states' natural resources, all states cooperate with numerous state and federal regulatory agencies when managing marine resources. A more detailed description of each state's primary regulatory agency for marine resources is provided on their respective web pages (Table 3.5.2.1).

**Table 3.5.2.1.** State marine resource agencies and web pages.

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

## CHAPTER 4. ENVIRONMENTAL CONSEQUENCES

### 4.1 Action 1: Modify the Recreational Fixed Closed Season for Greater Amberjack

#### 4.1.1 Direct and Indirect Effects on the Physical Environment

It is unknown how many recreational anglers leave the dock intending to target greater amberjack, or how fishing behavior would change based on the various alternatives for closed seasons. The following comparison of alternatives is based on the number of projected available fishing days under each alternative. This comparison does not take into account fishing during the closed season or effort shifting outside of the closed season. The impacts to the physical environment may be underestimated in this analysis if there is increased effort shifting outside the closed season. Physical impacts to the environment could occur when gear such as weights, hooks, and anchors hit and damage the substrate and surrounding habitat. Recreational fishermen typically use rod and reel (vertical lines) or spears to harvest greater amberjack.

##### *Vertical lines*

Concentrations of many managed reef fish species are higher on hard bottom areas than on sand or mud bottoms, thus, vertical line gear fishing generally occurs over hard bottom areas (GMFMC 2004). Vertical lines include multi-hook lines known as bandit gear, handlines, and rod-and-reels. Vertical-line gear is less likely to contact the bottom than longlines, but still has the potential to snag and entangle bottom structures and cause attached organisms, such as soft corals and sponges, to tear off or be abraded (Barnette 2001). In using bandit gear, a weighted line is lowered to the bottom, and then the lead is raised slightly off the bottom (Siebenaler and Brady 1952). The gear is in direct contact with the bottom for only a short period of time. Barnette (2001) suggests that physical impacts may include entanglement and minor degradation of benthic species from line abrasion and the use of weights (sinkers).

Anchor damage is also associated with vertical-line fishing vessels, particularly by the recreational sector where fishermen may repeatedly visit well marked or known fishing locations. Hamilton (2000) points out that “favorite” fishing areas, such as reefs, are targeted and revisited multiple times, particularly with the advent of global positioning technology. The cumulative effects of repeated anchoring could damage the hard bottom areas and Essential Fish Habitat (EFH) where fishing for greater amberjack and other reef fish occurs. The for-hire sector and commercial sector that uses vertical line gear are typically known to anchor more frequently over the reef sites.

##### *Spear and Powerhead*

Spear guns are used by both the recreational and commercial sector to harvest greater amberjack, but represent a relatively minor component of both. Barnette (2001) summarizes a previous

study that concluded spearfishing on reef habitat may result in some coral breakage. In addition, there could be some impacts from divers touching coral with hands or from re-suspension of sediment by fins (Barnette 2001). However, greater amberjack tend to be speared by platforms or in more open water locations.

**Alternative 1** retains the closure dates of November 1 – April 30 and June 1 – July 31. If a closed recreational season for greater amberjack deters fishermen from making a fishing trip, then **Alternative 1** would likely have the greatest positive impacts on the physical environment because it results in the smallest number of fishing days open (21 days). However, it is expected effort would shift to one or multiple other species. Additionally, it has been shown in recent years that greater amberjack is becoming a popular recreational catch and release species. **Preferred Alternative 2** (open September - October) is projected to result in a 56 day fishing season and **Alternative 3** (open September and May) is projected to result in a 48 day fishing season. The comparison of the various fixed closed seasons and their associated fishing days can be found in Table 2.1.1. The alternatives in Action 1 will change the times of the year that recreational fishing for greater amberjack occurs. However, any impacts to the physical environment are expected to be minor because modifications to this specific fixed closed season will not change the fishing methods used or alter the current execution of the reef fish fishery as a whole. It is expected catch and release for greater amberjack would continue, even if the season is closed.

#### 4.1.2 Direct and Indirect Effects on the Biological Environment

Action 1 would modify the recreational fixed closed season for greater amberjack. Based on the spawning season for greater amberjack, **Preferred Alternative 2** may provide the greatest benefit to the resource and biological environment as the recreational fishing season would be closed during peak spawning for all of the Gulf (March - May) (Harris et al. 2007; Murie and Parkyn 2008). Broadly, spawning has been observed throughout the Gulf from February through June (Beasley 1993; Wells and Rooker 2004; Harris et. al 2007). This would entirely remove a spring recreational season for greater amberjack. Being closed during spawning, as the commercial sector is, is expected to be more beneficial to the biological environment and would assist with helping the stock recover as fishing would be closed during months of the majority of peak recreational fishing effort (May - August). However, it is unknown if greater amberjack are more susceptible to fishing mortality during the spawning season and if there is a subsequent effect on spawning success or year class strength in future years. However, a study by Harris et al. (2007) suggested spawning aggregations of greater amberjack were targeted by fishermen in the South Atlantic, but no evidence of this was presented. Diver observations in Belize documented greater amberjack in pair courtship while in schools of 120 fish (Graham and Castellanos 2005). It is unknown if fishermen target these schools or aggregations of greater amberjack more heavily during spawning than at other times of the year, however anecdotal stakeholder conversation suggests this is occurring. **Alternatives 1** and **3** allow for harvest to occur during peak spawning (May) and during peak recreational effort (May under both and August under **Alternative 1**), which could affect rebuilding. While both **Preferred Alternative 2** and **Alternative 3** start recreational fishing at the beginning of a wave, which would help with more accurate landings estimates, **Preferred Alternative 2** is expected to provide the greatest



positive benefits to the resource by protecting greater amberjack during peak spawning and highest recreational effort. This could increase the reproductive success of the greater amberjack stock and is expected to assist with rebuilding. Overall, it is unlikely that changes to the Gulf greater amberjack recreational fixed closed season would substantially change recreational reef fish fishing effort and result in any significant effects on the biological environment, including non-target species, because this action would not substantially change the prosecution of the reef fish fishery. It is expected catch and release trips for greater amberjack would continue as they already do. For this same reason, no additional impacts to Endangered Species Act (ESA)-listed species or introduction of invasive species are anticipated as a result of this action.

### 4.1.3 Direct and Indirect Effects on the Economic Environment

**Alternative 1** (No Action) would maintain the current recreational fixed closed season for greater amberjack. Therefore, **Alternative 1** would not be expected to affect recreational fishing practices or recreational greater amberjack harvests and would not be expected to result in economic effects.

**Preferred Alternative 2** and **Alternative 3** would modify the recreational fixed closed season for greater amberjack and would potentially open the greater amberjack recreational season between September 1 and October 31 (**Preferred Alternative 2**) and between September 1 and 31 and May 1 to May 31 (**Alternative 3**). Based on the projected number of days open provided in Table 2.1.1, both **Preferred Alternative 2** and **Alternative 3** are expected to lengthen the recreational fishing season for greater amberjack.

Economic effects to result from modifications to recreational fishing seasons would typically include changes in consumer surplus (CS) to recreational anglers and changes in producer surplus (PS) to for-hire operators. CS per additional fish kept during a trip is defined as the amount of money an angler would be willing to pay for a fish in excess of the cost to harvest the fish. PS per trip is defined as the amount of money that a vessel owner earns in excess of the cost of providing the trip. Because **Preferred Alternative 2** and **Alternative 3** would both allow the recreational sector to harvest the totality of its allotted quota, changes in CS to anglers would not be expected to result from this action. Therefore, economic effects expected to result from **Preferred Alternative 2** and **Alternative 3** are evaluated based on PS changes relative to status quo.

Because detailed information on targeting behavior is not available for headboats, the analysis presented here is based on expected changes in target trips for charter operators. As indicated in Section 3.3.2, PS per angler trip is estimated at \$149 (\$2021). Expected changes in charter trips targeting greater amberjack were derived from projected closure dates for **Preferred Alternative 2** and **Alternative 3** provided in Table 2.1.1 and from the average distribution of greater amberjack target trips by wave and mode between 2018 and 2021 provided in Table 3.3.2.4. Estimates provided in this section assume that charter target trips are uniform within a wave.

For **Preferred Alternative 2** and **Alternative 3**, estimated number of greater amberjack charter target trips, and estimated changes in number of target trips and in economic value (PS) relative

to **Alternative 1** are provided in Table 4.1.3.1. It is emphasized that, due to the uncertainty in the projected closure dates, the actual season lengths post-implementation could be adjusted when NMFS subsequently reviews the most recent data.

**Table 4.1.3.1.** Estimated number of trips targeting greater amberjack, and changes in trips and in economic value (\$2021) to the for-hire sector.

Alternative	Season Length (Days)	Trips	Difference relative to <b>Alternative 1</b>	
			Trips	Producer Surplus
Alternative 1	21	2,563		
<b>Preferred Alternative 2</b>	56	2,368	-195	-\$29,108
Alternative 3	48	3,720	1,156	\$172,317

**Although Preferred Alternative 2** would set the longest recreational fishing season for greater amberjack, it is expected to result in a smaller number of target trips relative to status quo. The reduction in target trips is due to the switch from a wave with a greater average number of trips (high intensity) to a wave with a relatively smaller average number of trips (lower intensity). **Preferred Alternative 2** is expected to decrease the number of trips targeting greater amberjack by 195 trips and reduce PS to the for-hire sector by \$29,108 (\$2021). Relative to **Alternative 1**, **Alternative 3** is expected to result in 1,156 additional greater amberjack target trips and increase PS to the for-hire sector by \$172,317 (\$2021). In addition, the longer greater amberjack recreational fishing seasons set by **Preferred Alternative 2** and **Alternative 3** would be expected to result in economic benefits due to the greater flexibility afforded to charter operators. The added flexibility would allow charter operators to adjust their fishing operations to mitigate unforeseen events, e.g., rescheduling trips to avoid inclement weather conditions.

#### 4.1.4 Direct and Indirect Effects on the Social Environment

This framework action is intended to provide extended seasonal access to the greater amberjack resource in the Gulf while the reduced ACLs specified in Amendment 54 are implemented to support the 2027 stock rebuilding timeline. As such, the intent of the current framework is to help alleviate challenges that unavoidably result from measures that constrain intentional and incidental take of the species in the near-term in order to improve the status of the stock and fishery over time. Because any *social effects* potentially resulting from implementation of the framework alternative necessarily follow from *fishing opportunity*, the focus here is on concise examination of how and to what extent the specified actions and alternatives may enable or constrain opportunities for participants to pursue and/or incidentally harvest or catch and release greater amberjack in the Gulf region. In this sense, opportunity may be considered a principal factor preceding a range of social effects and outcomes that include but are not limited to: the ability or inability to recreate, compete, or otherwise practice one’s profession or avocation on

the ocean (here with specific regard to pursuit of greater amberjack); acquisition or failed acquisition of the species for personal consumption, sale, barter, or sharing in various social settings; the ability or inability to accumulate and transmit ecological knowledge associated with greater amberjack in the context of family, community, or other social networks; and the ability or inability to develop and maintain social linkages with other commercial and/or non-commercial participants who also pursue or incidentally land the species.

The current framework proposes three alternatives to re-specify the fixed closed season for the greater amberjack recreational sector. **Alternative 1** would not change the presently determined fixed closed seasons, and thus the sector could continue to land the species during the months of May, August, September, and October. Recreational fishing opportunities would remain unaltered under this alternative, and thus no new regulation-induced social effects would occur in the near-term. Given the relatively high volume of recreational landings during August, however, the status quo alternative is projected to lead to exceedance of the ACTs specified in Reef Fish Amendment 54 early in the season, thereby defeating the framework objective of extending the number of days the resource can be landed by the recreational sector in upcoming years.

If implemented, **Preferred Alternative 2** would eliminate recreational take of greater amberjack during August while retaining an open season during the entirety of September and October. Barring a significant forward shift in effort during these months, this alternative would minimize both the likelihood of a sector closure and negated fishing opportunities due to ACT exceedance at the start of the allowable fishing season—and any negative social effects that would otherwise follow. Given that August is a peak month for tourism and for leisure-oriented activities among Gulf residents, however, negative social effects following from no greater amberjack-specific fishing opportunities during this month would be amplified accordingly, especially among for-hire and private recreational participants who target the species during late summer, and between such participants and businesses that support recreational fishing in the Gulf. Similarly, **Alternative 3**, which allows for landings of the species during the months of September and May, would prevent fishing opportunity during August and thereby magnify negative social effects during a period of peak activity, though again the likelihood of ACT exceedance at the start of the fishing season would be minimized. Of note, **Alternative 3** bears some potential for detrimentally affecting spawning activity and thus limiting the availability of greater amberjack and associated fishing opportunities over time, while **Preferred Alternative 2** does not.

Comparison of alternatives for the recreational fixed season requires deliberation regarding any beneficial or deleterious social effects that may accrue to recreational participants under the intense but time-limited **status quo alternative** on one hand, and any social benefits or problematic effects that may be generated by providing for the greatest number of allowable fishing days on the other. It should be kept in mind that perspectives on this matter likely vary among recreational participants around the Gulf, with some preferring intense activity in the short-term, and others relatively more stable and sustained opportunities to land greater amberjack during any given fishing year. An important feature of the latter preference is the relatively more sustained opportunity for captains and crew to pursue and/or incidentally land greater amberjack during times when other reef fish and/or pelagic species of interest are not readily available or legally accessible. Given that **Preferred Alternative 2** would maximize the

number of allowable fishing days (Table 4.1.3.1), it presents the greatest potential benefits in this regard.

With respect to the for-hire sector, social effects potentially resulting from implementation of **Preferred Alternative 2** or other action alternatives are, in probabilistic terms, most likely to be experienced in communities where numerous for-hire/headboat reef fish permits are held, such as in Destin, Florida and Orange Beach, Alabama (Table 3.4.2.1). This is not to suggest that social effects potentially resulting from the proposed action alternatives would not occur elsewhere, but rather that the scope of effects following from the decision-making process is most likely to be greatest in areas where recreational fleets and fishing activities are most extensive (see sections 3.3 and 3.4 above).

#### 4.1.5 Direct and Indirect Effects on the Administrative Environment

The alternatives in Action 1 are expected to create nominal differences in the direct and indirect impacts on the administrative environment. **Alternative 1** would have the least impact on the administrative environment, because the current fixed closed season is already established for the recreational sector (GMFMC 2017b). Changing the fixed closed season from **Alternative 1** would increase the burden for the National Marine Fisheries Service (NMFS), which would have to engage in rulemaking to implement this change in management. **Preferred Alternatives 2** and **Alternative 3** are expected to have similar impacts on the administrative environment because they would result in the current seasonal closure (**Alternative 1**) being modified. However, management measure changes are routinely completed for reef fish species. **Alternatives 1** and **3** and **Preferred Alternative 2** would all require a season projection and closure due to the new reduced catch limits. Continued public information and broadcasts by radio and press releases may be necessary to inform stakeholders when harvest for greater amberjack is closed, because it could be a different month and day each year based on natural changes in the resource and shifts in effort. However, in-season closures are routinely completed for reef fish species. There is also no effect on the administrative burden for law enforcement as law enforcement officers already monitor compliance with any established closed season. Therefore, no significant effects are expected for the administrative environment.

## 4.2 Action 2: Modify the Greater Amberjack Commercial Trip Limit

### 4.2.1 Direct and Indirect Effects on the Physical Environment

General effects on the physical environment from fishing are described in Section 4.1.1.

This action proposes a reduction to an established commercial trip limit for Gulf greater amberjack. The effects on the physical environment from the implementation of a commercial greater amberjack trip limit have been previously considered (GMFMC 2012, GMFMC 2020). In general, greater amberjack are opportunistically harvested (Figure 2.2.1) by fishermen targeting other reef fish species (e.g., snappers and groupers). Commercial fishermen have

stated that harvesting less than 1,000 lbs of greater amberjack is not viable for a direct harvest trip, with some stating even 1,000 lbs is not enough for direct harvest. However, some have stated that 500 lbs would be the lowest for direct harvest to occur. Commercial fishing gear can negatively affect the physical environment when coming into contact with ocean bottom, and these effects are gear-dependent. Commercial fishing for reef fish species is commonly conducted using vertical-line gear and less frequently with bottom longline and spear gear. All three of these gear types have the potential to snag and entangle bottom structures (Barnette 2001). Potential bottom substrate damage can also occur when deploying a vessel's anchor. Additionally, preferred fishing sites, like reefs, are targeted and revisited multiple times by fishing vessels which increases the potential for prolonged effects to the physical environment (Bohnsack 2000).

**Alternative 1** (No Action) would maintain the current commercial greater amberjack trip limit of 1,000 pounds (lbs) gutted weight (gw) with a step down to 250 lb gw when 75% of the annual catch target (ACT) is met, and therefore would not result in changes in effects to the physical environment. **Alternative 2, Preferred Alternative 3, and Alternative 4** would increase the duration of the commercial fishing season (Table 2.2.1) under the reduced catch limits, recently implemented with Reef Fish Amendment 54, through the establishment of a lower commercial trip limit, which would be in numbers of fish. **Alternative 2, Preferred Alternative 3, and Alternative 4** are all projected to extend the fishing season later in the calendar year. This extension under reduced catch limits would be similar to the current season length under **Alternative 1** prior to implementation of reduced catch limits. However, **Alternative 2, Preferred Alternative 3, and Alternative 4** would eliminate any commercial direct harvest that is still occurring for greater amberjack (approximately 27% of trips harvest 501 lbs or more. Figure 2.2.1). Gulf greater amberjack are typically harvested opportunistically within the broader commercial reef fish sector and the proposed trip limit action would not increase the ACT. Therefore, it is unlikely that changes to the Gulf greater amberjack commercial trip limit would substantially change commercial reef fish fishing effort and result in any significant effects on the physical environment.

#### 4.2.2 Direct and Indirect Effects on the Biological Environment

**Alternative 4** is expected to provide the greatest benefit to the resource and biological environment as the trip limit (5 fish) would be the lowest under this alternative and may prevent increased discard mortality if the season is closed earlier in the fishing year as fishermen can choose to directly target greater amberjack. Further, **Alternative 4** would eliminate direct harvest and possibly result in the ACT not being met. Only **Alternative 4** is projected to extend the commercial fishing year sufficiently to avoid an in-season closure. This could leave the most fish within the population to help it recover. **Alternative 2** and **Preferred Alternative 3** are expected to result in similar effects to the biological environment as the trip limit differences between **Alternative 2** and **Preferred Alternative 3** are minimal. **Alternative 2, Preferred Alternative 3, and Alternative 4** would all increase the duration of the fishing season under reduced catch limits and may reduce the number of commercial seasonal regulatory discards relative to **Alternative 1** if harvest occurs too quickly and the season cannot be closed before the ACL is exceeded. **Alternative 1** is expected to result in higher effects to the biological

environment as season length is the shortest and bycatch/mortality could occur if vessels that have greater amberjack onboard are still at sea when the season is closed. However, a numbers of fish trip limit under **Alternative 2, Preferred Alternative 3, and Alternative 4** may result in high grading to get the highest market return. **Alternative 2, Preferred Alternative 3, and Alternative 4** could all result in higher discard mortality if this occurs. While it is unclear how fishing behavior will change when constrained to the lower catch limits and with direct harvest being eliminated, no significant impacts to the biological environment, including non-target species are expected because this action is not expected to substantially change the prosecution of the reef fish fishery. For this same reason, no additional impacts to ESA-listed species or introduction of invasive species are anticipated as a result of this action.

### 4.2.3 Direct and Indirect Effects on the Economic Environment

**Alternative 1** (No Action) would maintain the current commercial trip limit for greater amberjack. Therefore, **Alternative 1** would not be expected to change fishing practices or commercial landings of greater amberjack and would not be expected to result in economic effects.

**Preferred Alternative 3** and **Alternatives 2** and **4** would reduce the commercial greater amberjack trip limit and, in contrast to **Alternative 1**, express the trip limit in number of fish rather than in pounds. **Preferred Alternative 3** and **Alternatives 2** and **4** would set the trip limit at 7, 8, and 5 fish, respectively. These reductions are considered to lengthen the commercial fishing season for greater amberjack. As illustrated in Table 2.2.2, other things equal, the smaller the trip limit, the longer the commercial season is expected to run.

Economic effects expected to result from changes in commercial trip limits would generally include changes in ex-vessel revenues and in producer surplus to commercial fishermen, changes in consumer surplus to consumer purchasing the fish, and changes in dealers' revenues. However, because commercial fishermen are expected to be constrained to the allotted commercial quota under all of the alternatives, given the existing accountability measures (AMs), none of the alternatives considered would be expected to result in these economic effects. Based on the magnitude of the commercial greater amberjack ACL, it is estimated that **Preferred Alternative 3** and **Alternatives 2** and **4** would all allow the commercial sector to harvest the totality of its allotted ACL. Therefore, changes in ex-vessel revenues would not be expected to result from these alternatives. Changes in producer surplus to commercial fishermen are also not expected to result from these alternatives because fishermen are expected to continue to harvest greater amberjack as incidental or supplemental catch during trips targeting other species. In other terms, reductions in trip limits considered in **Preferred Alternative 3** and **Alternatives 2** and **4** would not be expected to result in cancelled or additional fishing trips relative to **Alternative 1**. Because the amount of commercially-caught greater amberjack available to consumers is assumed to remain constant, i.e., commercial landings are estimated to equal the commercial ACL, changes in consumer surplus to greater amberjack buyers would not be expected to result from the trip limit reductions. Finally, for the same reason, revenues to dealers purchasing greater amberjack would not be expected to change. Given the small size of the commercial greater amberjack ACL, the discussion above is predicated upon NMFS' ability

to constrain commercial landings to the commercial ACL during the commercial fishing season. Based on the inherent uncertainty associated with the monitoring of commercial landings, **Preferred Alternative 3** and **Alternatives 2** and **4** could result in an overage which would in turn result in economic benefits commensurate with the size of the overage. However, because the accountability measures require that any overage be fully paid back at the beginning of the next fishing season, potential economic benefits associated with a given overage would be transitory and would be offset by corresponding losses the following season.

Economic benefits expected from **Preferred Alternative 3** and **Alternatives 2** and **4**, which would reduce the trip limit and express it in number of fish would result from the added flexibility afforded to commercial fishermen, the easier estimation of their greater amberjack catch, and from the increased predictability of the availability of commercially-caught greater amberjack to consumers. Other things equal, greater trip limits would be more prone to resulting in boom (harvest overages) and bust (shortened season due to payback provisions) cycles which would be detrimental to markets due to the uncertainty associated with fluctuating and long time periods with no greater amberjack availability in markets.

#### 4.2.4 Direct and Indirect Effects on the Social Environment

As discussed elsewhere, contemporary participants in the commercial sector typically harvest greater amberjack incidentally while pursuing other reef fish species. As such, successful landing of the species can help mitigate opportunity losses (and economic losses) when the targeted species are not available. Three alternatives have been proposed to extend the allowable fishing season and enable ongoing harvest opportunities and associated social benefits while simultaneously supporting the stock rebuilding effort under the 2027 timeline.

No action **Alternative 1** would not alter current regulations and thus would not alter existing fishing opportunities or generate new social effects. The risks of in-season closures and the need for potential paybacks of any harvest that exceeds the commercial ACL for the species would remain, however, with the opportunity-limiting nature of such outcomes deemed likely to generate a range of problematic social effects. No action would also preclude movement toward the overarching rebuilding objective and fail to mitigate any social impacts resulting from an overfished stock.

**Alternatives 2** and **4**, and **Preferred Alternative 3** were developed in part through input from commercial participants who indicated the need for a revised trip limit strategy that would establish limitations based on number of fish rather than volume of poundage. A key element of the rationale is to simplify at-sea reckoning of trip-specific harvest levels by participants. This outcome of itself would generate positive social effects insofar as it could serve to minimize (a) the potential for over-harvest, (b) stress associated with uncertainty about harvest levels among participants, and (c) the potential for individual and collective penalties that may follow from over-harvest during any given trip and season. Moreover, **Alternatives 2-4** would ideally function to enable an extended fishing season by reducing the rate of harvest, which in turn would support the stock rebuilding effort and its accompanying intent to improve fishing opportunities and generate positive social effects over time.

Finally, each of action **Alternatives 2-4** would serve to lengthen the allowable fishing season to greater and lesser extents. The alternatives would thereby provide for a more sustained alternative source of seafood for harvest and sale and/or potential use for consumption, sharing, or other non-market form of distribution when target species are not readily available. In this respect, greater amberjack offers a viable fishing opportunity that can complement pursuit and harvest of other species on a seasonal basis, with accompanying social benefits. Among the three action alternatives, **Alternative 2** would provide for the greatest number of harvestable fish per trip and the most immediate benefits in this regard. But the alternative also provides for the smallest projected number of allowable fishing days and the smallest relative percentage reduction of landings per season. As such, this alternative is the least forward-looking of the three action alternatives, and thus least likely to ensure social benefits in the long-run. Conversely, **Alternative 4** would provide for the greatest number of allowable fishing days and the greatest overall percentage reduction of greater amberjack landings during a given fishing season. The alternative is therefore at once relatively most attentive to the long-term stock rebuilding objective and most likely to reduce opportunity and incur negative social effects in the near-term. **Preferred Alternative 3** appears to strike a balance between **Alternatives 2 and 4** by providing for a mid-range projected number of allowable fishing days and associated fishing opportunities, while also affording a moderate (predicted) reduction in annual landings.

As for the recreational sector, social effects potentially resulting from any of the action alternatives above are most likely to be experienced in areas where commercial pursuit of reef fish is most extensive. While many commercial fishing vessels transit considerable distances to preferred fishing grounds, and certain permit holders reside in distant communities, addresses associated with commercial fishing vessels nevertheless provide good indications of communities from which extensive fishing activity originates. As such, social effects potentially resulting from the preferred and/or other alternatives are, in probabilistic terms, most likely to be experienced in towns and cities along the West Florida coastline, where over 71% of reef fish landings were documented during 2020. Again, social effects potentially resulting from the proposed action alternatives undoubtedly would also occur elsewhere, and in fact communities such as Bayou LaBatre in Alabama have registered particularly extensive greater amberjack landings in recent years. Readers may gain a more thorough understanding of the likely geographic distribution and extent of social effects potentially resulting from implementation of the various alternatives through review of section 3.4 above.

#### **4.2.5 Direct and Indirect Effects on the Administrative Environment**

**Alternative 1** is not expected to impact the administrative environment because it would not change the current commercial trip limit. **Alternative 2, Preferred Alternative 3, and Alternative 4** would result in a short-term increased burden on the administrative environment due to the establishment of a new commercial trip limit. Changing the trip limit from **Alternative 1** would increase the burden for the National Marine Fisheries Service (NMFS), which would have to engage in rulemaking to implement this change in management. However, this is expected to be minimal because management measure changes are routinely completed for reef fish species. The administrative burden for law enforcement would go largely unchanged,



as law enforcement officers would continue to monitor compliance with any established trip limit. **Alternative 4** is expected to have the lowest impact on the administrative environment among **Alternative 1, Alternative 2, Preferred Alternative 3, and Alternative 4** because the commercial fishing season is not expected to close, therefore requiring no action by NMFS to announce an in-season closure once the ACT is projected to be met. Continued public information and broadcasts by radio and press releases for **Alternative 1, Alternative 2, and Preferred Alternative 3** may be necessary to inform stakeholders when harvest for greater amberjack is closed, because it could be a different month and day each year based on natural changes in the resource and shifts in effort. However, in-season closures are routinely completed for reef fish species.

### 4.3 Cumulative Effects Analysis

To be completed.

# 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 proposed or final regulatory action; 2) it provides a review of the problems and policy objectives prompting the regulatory proposals and an evaluation of the major alternatives that 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 the regulations are a “significant regulatory action” under the criteria provided in Executive Order (E.O.) 12866. This RIR analyzes the impacts this action would be expected to have on the greater amberjack component of the Gulf of Mexico (Gulf) reef fish fishery.

## 5.2 Problems and Objectives

The problems and objectives addressed by this action are discussed in Section 1.2.

## 5.3 Description of Fisheries

A description of the Gulf of Mexico reef fish fishery is provided in Section 3.4.

## 5.4 Impacts of Management Measures

### 5.4.1 Action 1: Modify the Recreational Fixed Closed Season for Greater Amberjack

A detailed analysis of the economic effects expected to result from this action is provided in Section 4.1.3. The following discussion summarizes the expected economic effects of the preferred alternative.

Although **Preferred Alternative 2** would set a longer recreational fishing season for greater amberjack than Alternative 1, it is expected to result in a smaller number of target trips. The reduction in target trips is due to the switch from a wave with a greater average number of trips to a wave with a relatively smaller average number of trips. **Preferred Alternative 2** is expected to decrease the number of trips targeting greater amberjack by 195 trips and reduce PS to the for-hire sector by \$29,108 (\$2021). The longer greater amberjack recreational fishing season set by **Preferred Alternative 2** would also be expected to result in economic benefits due to the greater flexibility afforded to charter operators. **Preferred Alternative 2** would allow charter operators to adjust their fishing operations to mitigate unforeseen events by rescheduling trips to avoid adverse weather conditions.

## 5.4.2 Action 2: Modify the Greater Amberjack Commercial Trip Limit

A detailed analysis of the economic effects expected to result from this action is provided in Section 4.2.3. The following discussion summarizes the expected economic effects of the preferred alternative.

**Preferred Alternative 3**, which would reduce the trip limit and express it in number of fish, is expected to result in economic benefits due the added flexibility afforded to commercial fishermen, the easier compliance with the greater amberjack trip limit, and to the increased predictability of the availability of commercially-caught greater amberjack to consumers.

**Preferred Alternative 3** would lessen the likelihood of boom (harvest overages) and bust (shortened season due to payback provisions) cycles which would be damaging to markets due to the uncertainty associated with fluctuating and long time periods with no greater amberjack availability in markets.

## 5.5 Public and Private Costs of Regulations

The preparation, implementation, and monitoring of this or any federal action involves the expenditure of public and private resources which can be expressed as costs associated with the regulations. Estimated costs associated with this action include:

Council costs of document preparation, meetings, public hearings, and information dissemination.....	...\$
NMFS administrative costs of document preparation, meetings and review .....	\$
TOTAL .....	\$

## 5.6 Determination of Significant Regulatory Action

Pursuant to E.O. 12866, a regulation is considered a “significant regulatory action” if it is likely to result in: 1) an annual effect of \$200 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 legal or policy issues for which centralized review would meaningfully further the President’s priorities or the principles set forth in this Executive order, as specifically authorized in a timely manner by the Administrator of OIRA in each case. Based on the information provided above, this action has been determined to not be economically significant for the purposes of E.O. 12866.

# CHAPTER 6. REGULATORY FLEXIBILITY ANALYSIS

## 6.1 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 actions to assure 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 effects of various alternatives contained in the regulatory action and to ensure the agency considers alternatives that minimize the expected economic effects on small entities while meeting the goals and objectives of the applicable statutes (e.g., the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act)).

With certain exceptions, the RFA requires agencies to conduct an initial regulatory flexibility analysis (IRFA) for each proposed rule. The IRFA is designed to assess the effects various regulatory alternatives would have on small entities, including small businesses, and to determine ways to minimize those effects. An IRFA is primarily conducted to determine whether the proposed regulatory action would have a significant economic effect on a substantial number of small entities. In addition to analyses conducted for the Regulatory Impact Review (RIR), the IRFA provides: 1) a description of the reasons why action by the agency is being considered; 2) a succinct statement of the objectives of, and legal basis for, the proposed regulatory action; 3) a description and, where feasible, an estimate of the number of small entities to which the proposed regulatory action will apply; 4) a description of the projected reporting, record-keeping, and other compliance requirements of the proposed regulatory action, 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 practicable, 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 regulatory action which accomplish the stated objectives of applicable statutes and would minimize any significant economic effects of the proposed regulatory action on small entities.

In addition to the information provided in this section, additional information on the expected economic effects of the proposed action is included in the RIR.

## 6.2 Statement of the need for, objectives of, and legal basis for the rule

A discussion of the reasons why action by the agency is being considered is provided in Section 1.1. The purposes of this framework action are to modify the greater amberjack recreational fixed-closed season and commercial trip limit to extend the fishing season durations, reduce the likelihood of exceeding the recreational Annual Catch Limit (ACL), and eliminate recreational

harvest during the spawning period. The objectives of this proposed regulatory action are to maintain recreational and commercial access to the greater amberjack component of the reef fish fishery, given the substantial ACL decreases under the greater amberjack rebuilding plan in Amendment 54. The Magnuson-Stevens Act serves as the legal basis for the proposed regulatory action. All monetary estimates in the following analysis are in 2021 dollars.

### **6.3 Description and estimate of the number of small entities to which the proposed action would apply**

The proposed regulatory action would modify the recreational fixed closed season for Gulf greater amberjack from November 1 – April 30 and June 1 – July 31 (open August 1 – October 31 and May 1 – May 31) to August 1 – August 31 and November 1 – July 31 (open September 1 – October 31). The proposed regulatory action would also establish a new commercial trip limit based on numbers of fish rather than weight. The proposed regulatory action would modify the commercial trip limit from 1,000 lbs gutted weight (gw) (1,040 lbs whole weight [ww]) to 7 fish (approximately 210 lbs gw [218 lbs ww]). As a result, this proposed regulatory action is expected to regulate for-hire and commercial fishing businesses that harvest Gulf greater amberjack.

Although the proposed changes to the recreational season would apply to recreational anglers, the RFA does not consider recreational anglers to be entities. Small entities include small businesses, small organizations, and small governmental jurisdictions (5 U.S.C. 601(6) and 601(3)-(5)). Recreational anglers are not businesses, organizations, or governmental jurisdictions and so they are outside the scope of this analysis (5 U.S.C. 603).

A valid charter-headboat (for-hire) Gulf reef fish vessel permit is required in order for for-hire vessels to legally harvest greater amberjack in the Gulf. NMFS does not possess complete ownership data regarding vessels that hold charter-headboat (for-hire) Gulf reef fish vessel permits, and thus potentially harvest greater amberjack. Therefore, it is not currently feasible to accurately determine affiliations between these vessels and the businesses that own them. As a result, for purposes of this analysis, it is assumed each for-hire vessel is independently owned by a single business, which is expected to result in an overestimate of the actual number of for-hire fishing businesses regulated by this proposed regulatory action.

This proposed regulatory action would only be expected to alter the fishing behavior of for-hire vessels that target greater amberjack in the Gulf (i.e., the behavior of for-hire vessels that incidentally harvest greater amberjack in the Gulf is not expected to change). Therefore, only for-hire vessels that target greater amberjack in the Gulf are expected to be directly affected by this proposed regulatory action. NMFS does not possess data indicating how many for-hire vessels actually harvest or target Gulf greater amberjack in a given year. However, in 2020, there were 1,289 vessels with valid charter-headboat Gulf reef fish vessel permits. Further, Gulf greater amberjack is primarily targeted in waters off the west coast of Florida. Of the 1,289 vessels with valid charter-headboat Gulf reef fish vessel permits, 803 were homeported in Florida. Of these permitted vessels, 62 are primarily used for commercial fishing rather than for-hire fishing purposes and thus are not considered for-hire fishing businesses (i.e., 1,227 vessels

are for-hire fishing businesses). In addition, 46 of these permitted vessels are considered headboats, which are considered for-hire fishing businesses. However, headboats take a relatively large, diverse set of anglers to harvest a diverse range of species on a trip, and therefore do not typically target a particular species. Therefore, it is assumed that no headboat trips would be canceled, and thus no headboats would be directly affected as a result of this proposed regulatory action. However, charter vessels often target greater amberjack. Of the 803 vessels with valid charter-headboat Gulf reef fish vessel permits that are homeported in Florida, 695 vessels are charter vessels. Souza and Liese (2019) reported that 76% of charter vessels with valid charter-headboat permits in the Gulf were active in 2017 (i.e., 24% were not fishing). A charter vessel would only be directly affected by this proposed regulatory action if it is fishing. Given this information, our best estimate of the number of charter vessels that are likely to target Gulf greater amberjack in a given year is 528. Thus, this proposed regulatory action is estimated to regulate 528 for-hire fishing businesses.

The Small Business Administration (SBA) has established size standards for all major industry sectors in the U.S., including for-hire businesses (NAICS code 487210). A business primarily involved in for-hire fishing is classified as a small business if it is independently owned and operated, is not dominant in its field of operation (including its affiliates), and has annual receipts (revenue) not in excess of \$12.5 million for all its affiliated operations worldwide. NMFS does not have data to estimate the maximum gross revenue for charter vessels. However, the maximum annual gross revenue for a single headboat in the Gulf was about \$1.45 million in 2017 (D. Carter, pers. comm.), and according to Savolainen, et al. (2012), on average, annual gross revenue for headboats in the Gulf is about three times greater than annual gross revenue for charter vessels. Based on this information, all for-hire fishing businesses directly regulated by this proposed regulatory action are determined to be small businesses for the purpose of this analysis.

A valid commercial Gulf reef fish vessel permit is required in order for commercial fishing vessels to legally harvest greater amberjack in the Gulf. At the end of 2020, 837 vessels possessed valid commercial Gulf reef fish vessel permit. However, not all vessels with a commercial Gulf reef fish permit actually harvest greater amberjack in the Gulf. From 2017 through 2021, the average number of vessels that commercially harvested Gulf greater amberjack was 199. Ownership data regarding vessels that harvest Gulf greater amberjack is incomplete. Therefore, it is not currently feasible to accurately determine affiliations between these particular vessels. Because of the incomplete ownership data, for purposes of this analysis, it is assumed each of these vessels is independently owned by a single business, which is expected to result in an overestimate of the actual number of businesses directly regulated by this proposed action. Thus, it is assumed this proposed regulatory action would regulate 199 commercial fishing businesses.

On December 29, 2015, NMFS issued a final rule establishing a small business size standard of \$11 million in annual gross receipts (revenue) for all businesses primarily engaged in the commercial fishing industry (NAICS code 11411) for RFA compliance purposes only (80 FR 81194, December 29, 2015). In addition to this gross revenue standard, a business primarily involved in commercial fishing is classified as a small business if it is independently owned and operated, and is not dominant in its field of operations (including its affiliates). From 2017

through 2021, the maximum annual gross revenue earned by a single commercial reef fish vessel during this time was about \$3.19 million, while the average annual gross revenue for a vessel commercially harvesting Gulf greater amberjack was \$194,894. Based on this information, all commercial fishing businesses regulated by this proposed regulatory action are determined to be small entities for the purpose of this analysis.

## **6.4 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 requirement and the type of professional skills necessary for the preparation of the report of records**

This proposed regulatory action would not establish any new reporting or record-keeping requirements.

## **6.5 Identification of all relevant federal rules, which may duplicate, overlap or conflict with the proposed rule**

No duplicative, overlapping, or conflicting federal rules have been identified.

## **6.6 Significance of the economic effects on small entities**

### Substantial number criterion

If implemented, this proposed regulatory action is expected to directly affect 528 of the 1,227 for-hire fishing businesses with valid charter/headboat permits in the Gulf reef fish fishery, or approximately 43% of those for-hire fishing businesses. Further, this proposed regulatory action is expected to directly affect 199 of the 837 vessels with commercial Gulf reef fish permits, or approximately 24% of those commercial fishing businesses. All regulated for-hire and commercial fishing businesses have been determined, for the purpose of this analysis, to be small entities. Based on this information, the proposed regulatory action is expected to affect a substantial number of small businesses.

### Significant economic effects

The outcome of “significant economic impact” can be ascertained by examining two factors: disproportionality and profitability.

Disproportionality: Do the regulations place a substantial number of small entities at a significant competitive disadvantage to large entities?

All entities directly regulated by this regulatory action have been determined to be small entities. Thus, the issue of disproportionality does not arise in the present case.

Profitability: Do the regulations significantly reduce profits for a substantial number of small entities?

According to Savolainen, et al. (2012), which contains the most recent estimates of economic returns, including economic profits, in the for-hire sector, average annual economic profits are approximately \$27,000 per charter vessel. Net Cash Flow per Angler Trip (CFpA) is the best available estimate of profit per angler trip by charter vessels. According to Souza and Liese (2019), CFpA on charter vessels is estimated to be \$149 per angler trip (\$2021). Expected changes in charter trips targeting greater amberjack were derived from projected closure dates of the proposed regulatory action, and from the average distribution of greater amberjack target trips by wave and mode between 2018 and 2021. It is estimated that the proposed action would result in a decrease to the number of charter trips targeting greater amberjack by 195 trips, and subsequently decrease the profits to the for-hire sector by \$29,108 (\$2021). On average this would decrease profits by \$55.03 per vessel. Thus, economic profits are expected to be reduced by less than a percent on average per for-hire fishing business.

For vessels that commercially harvest greater amberjack in the Gulf, currently available data indicates that economic profits are approximately 38% of annual average gross revenue. Given that their average annual gross revenue is \$194,894, annual average economic profit per vessel is estimated to be approximately \$74,060. The proposed regulatory action would modify the commercial trip limit from 1,000 lbs gutted weight (gw) (1,040 lbs whole weight [ww]) to 7 fish (approximately 210 lbs gw [218 lbs ww]). This reduction is expected to lengthen the commercial fishing season for greater amberjack.

Economic effects expected to result from changes in commercial trip limits would generally include changes in ex-vessel revenues and profits of commercial fishing businesses. However, because commercial fishing businesses are expected to be constrained to the allotted commercial quota under all of the proposed regulatory action (given the existing accountability measures), no economic effects are expected. Based on the relatively small magnitude of the commercial greater amberjack ACL and harvest projections, the proposed action would allow the commercial sector to harvest the totality of its allotted ACL. Therefore, changes in ex-vessel revenues and profits would not be expected to result from these alternatives.

## **6.7 Description of significant alternatives to the proposed action and discussion of how the alternatives attempt to minimize economic impacts of small entities**

Two alternatives, including the status quo, were considered for the proposed action to modify the current recreational fixed closed season for Gulf greater amberjack. The first alternative, the status quo, would have retained the current recreational fixed closed season of November 1 – April 30 and June 1 – July 31. This alternative was not selected because it results in the shortest season (only 21 days) which could promote “derby-like” fishing behavior, and does not protect the stock during spawning periods (Beasley 1993; Wells and Rooker 2004; Harris et. al 2007). The Council also expressed a desire for a longer season length over a greater number of trips.



This alternative gives the least flexibility to for-hire operators with respect to rescheduling trips due to inclement weather or other constraints.

The second alternative would have modified the recreational fixed closed season to be August 1 – August 31, October 1 – April 30, and June 1 - July 31 (open September 1 – 30 and May 1 – 31). Although this alternative would have been expected to result in a greater amount of charter trips targeting greater amberjack compared to the status quo, it sets a split season. The second portion of the season under this alternative would be more susceptible to downward adjustments should the sector harvest more of the ACL than expected during first portion of the season. Ultimately this alternative was not selected because it does not protect the stock during spawning periods (Beasley 1993; Wells and Rooker 2004; Harris et. al 2007). The Council has advocated for conservative management measures to protect the stock due to the greater amberjack stock being overfished and rebuilding not occurring as expected under the current and previous rebuilding plans.

Three alternatives, including the status quo, were considered for the proposed action to establish a new commercial trip limit based on numbers of fish rather than weight. The first alternative, the status quo, would have retained the current commercial trip limit for Gulf greater amberjack of 1,000 lbs gutted weight (gw) (1,040 lbs whole weight [ww]). When 75% of the ACT is projected to be met, the commercial trip limit would be reduced to 250 lbs gw (260 lbs ww). Given substantial ACL decreases under the greater amberjack rebuilding plan in Amendment 54, further trip limit reductions are needed to slow the rate of harvest. This would allow for a longer season of incidental harvest, rather than a directed fishery as desired by commercial fishermen. This alternative was not selected because it does not implement any further trip reductions, and therefore results in the shortest overall season when comparing the season lengths under all the alternatives.

The second alternative would have established a commercial trip limit of 8 fish (approximately 257 lbs gw [267 lbs ww]). This alternative's commercial trip limit would have exceeded what is typically caught on most commercial trips harvesting greater amberjack. However, this alternative was not selected because the projected closure date is sooner than the other alternative which also implement further trip limit reductions (which are necessary to extend the commercial fishing season relative to the status quo).

The third alternative would establish a commercial trip limit of 5 fish (approximately 150 lbs gw [155 lbs ww]). Although this alternative's trip limit reduction would have resulted in the longest commercial season, this alternative was not chosen because it was deemed too restrictive compared to what is typically caught on an average commercial greater amberjack trip.

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GMFMC = Gulf of Mexico Fishery Management Council; NOAA GC = National Oceanic and Atmospheric Administration General Counsel; SEFSC = Southeast Fisheries Science Center; SERO = Southeast Regional Office of the National Marine Fisheries Service

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# APPENDIX A: RECREATIONAL SEASON PROJECTION ANALYSES

Greater amberjack (*Seriola dumerili*) are one of 31 reef fish species managed by the Gulf of Mexico Fishery Management Council (Council). Greater amberjack are in the Council's Fishery Management Plan (FMP) for the Reef Fish Resources of the Gulf of Mexico. The FMP provides management for reef fish species in the federal waters of the Gulf of Mexico.

In 2020, a stock assessment was conducted for the Gulf of Mexico greater amberjack (SEDAR 70). Results from the assessment showed the greater amberjack stock is overfished and experiencing overfishing. A Framework Action is currently being drafted and its purpose is to restrict harvest by modifying the recreational fixed closed season. The current management measures for the recreational sector are a closed fixed season from November 1 through April 30 and June 1 through July 31 (open May 1 – May 31 and August 1 – October 31), minimum size of 34 inches fork length, and one greater amberjack per angler bag limit. Additionally, the current fishing year is from August 1<sup>st</sup> to July 31<sup>st</sup>. The Framework Action is looking to change the fixed closed season to be January 1 – July 31, September 1 – December 31 (open August 1 – August 31), January 1 – August 31, November 1 – December 31 (open September 1 – October 31), or January 1 – October 31, (open November 1 – December 31), August 1 – August 31, November 1 – April 30, and June 1 - July 31 (open September 1 – October 31 and May 1 - 31), and August 1 – August 31, October 1 – April 30, and June 1 - July 31 (open September 1 – 31 and May 1 - 31).

The Framework Action is considering different fixed season with the goal of reducing harvest to prevent the 2023 ACT (Reef Fish Amendment 54) from being exceeded. The ACT is 335,320 pounds whole weight (lbs ww). Therefore, this analysis of the fixed closed seasons compares predicted landings to the ACT of 335,320 lbs ww.

## Data Sources

Recreational landings data for Gulf of Mexico greater amberjack are a collection of recreational landings from the Marine Recreational Information Program (MRIP), the Texas Parks and Wildlife Department (TPWD) Creel Survey, Louisiana Creel survey (LA Creel) and the Headboat Survey (Headboat). This data was provided from the Southeast Fisheries Science Center on March 1, 2023, and following SEDAR 70 the MRIP data used is from the Fishing Effort Survey. MRIP, TPWD, and LA Creel conducted dockside intercepts to collect information on the size and number of greater amberjack. Headboat collected size and number of greater amberjack through logbooks completed by headboat operators.

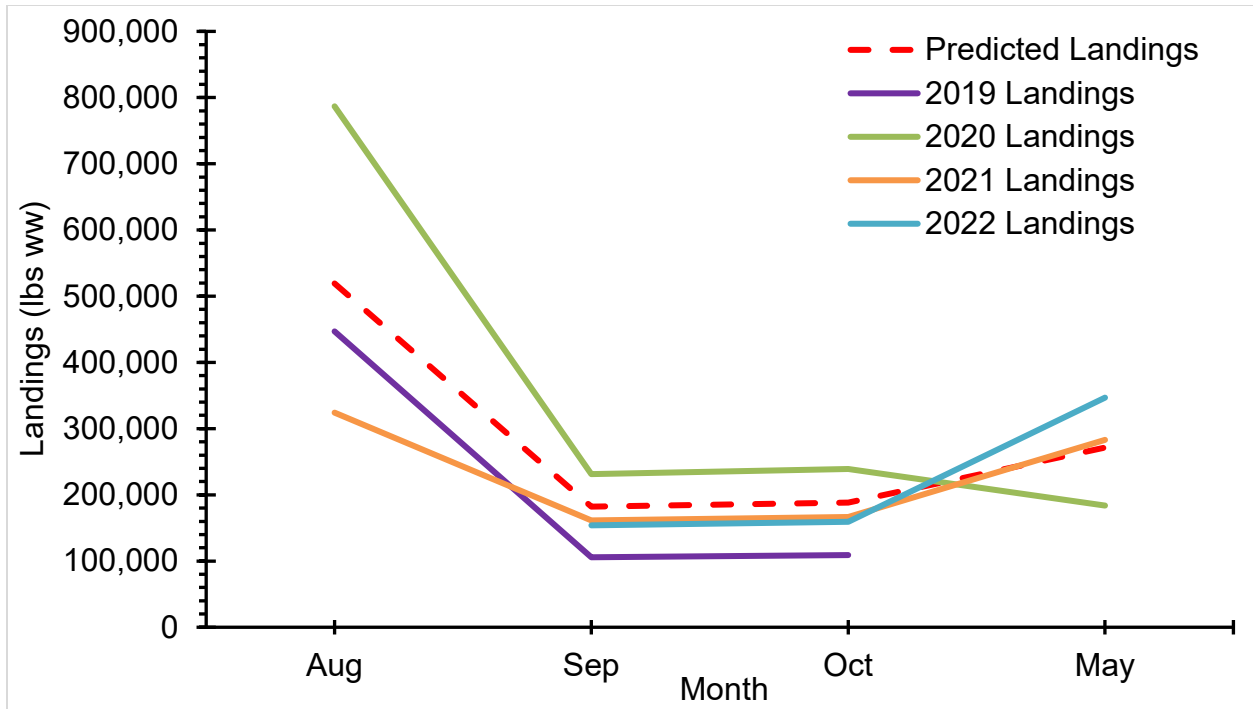
## Predicted Landings

The Framework Action currently being drafted will be imposed on future fishing years. However, the proposed Reef Fish Amendment 54 has 2023 catch limits assigned to the 2023/2024 recreational fishing year. An estimate of future landings are required to explore the impact of different fixed seasons and estimate when the ACT from Amendment 54 is expected to be met. The greater amberjack recreational fishery has had several regulatory changes over the

past seven years. For example, there have been changes to the start of the fishing year, bag limit, size limit, and changes to the periods of time when the recreational sector was open. Additionally, there have been numerous closures of the recreational sector since 2014. Since the recreational sector has had numerous regulation changes and closures over the past seven years it was assumed that landings in recent years are the best predictor of future landings. The Framework Acton is only considering changes to the fixed closed season in the months of May and from August through October, therefore predicted landings are only needed for these specific months. The landings were separated from two-month waves into single months by assuming the landings were uniform within a wave. However, if one of the months in a wave had a fixed closure then it was assumed all of the landings in that wave came from the open month in the wave. For example, the recreational sector has a fixed closure of July so all of the landings from the July/August wave were assumed to come from August. Predicted August recreational landings came from a three-year average of monthly landings from 2019, 2020, and 2021. Landings from August of 2022 were not used because there was a closure of the recreational sector at that time. Predicted October and September recreational landings came from a three-year average of 2020, 2021, and 2022 landings. Predicted May recreational landings came from a three-year average of 2020, 2021, and 2022 landings. Table 1 and Figure 1 provide the predicted landings from August through October and May.

**Table 1.** Predicted Gulf of Mexico greater amberjack recreational landings for August through October. These landings were generated from 2019 through 2022 landings.

Month	Average Landings
August	519,272
September	182,194
October	188,267
May	271,215



**Figure 1.** Gulf of Mexico greater amberjack recreational landings by month for August through October then for May from 2019, 2020, 2021, and 2022, and also an average of these landings (Predicted Landings). Only landings for years and month when the recreational sector was open are provided in the figure. All landings are in pounds whole weight (lbs ww).

### Predicted Closure Dates

Closure dates were determined from assuming uniform landings in each month and determining the landings per day for the predicted landings. Then the landings per day are cumulatively summed and comparing them to the 2023 ACT implemented with Reef Fish Amendment 54. Table 2 provides the predicted closure dates under the various proposed fixed closed seasons for the Framework Action.

**Table 2.** The projected dates the proposed Amendment 54 2023 ACT (335,320 lbs ww) would be met for the greater amberjack recreational sector for the range of fixed closed seasons from the Framework Action. No prediction was made for November and December due to lack of recreational landings from closures during these two months.

Alternative	Open Period	ACT Met Date
1	August 1-October 31, May 1-31	21-Aug
2	September 1-October 31	26-Oct
3	September 1-30, May 1-31	18-May

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## APPENDIX B: COMMERCIAL SEASON PROJECTION ANALYSES

The Gulf of Mexico Fisheries Management Council is considering changes to the commercial greater amberjack (*Seriola dumerili*) trip limit implemented in April 2020 with a 2019 Framework Action. The current commercial trip limit is 1,040 pounds whole weight (1,000 pounds gutted weight) per trip, with a reduction to 260 pound whole weight (250 pounds gutted weight) per trip when 75% of the commercial Annual Catch Target (ACT) has been landed. Reef Fish Amendment 54 proposes a 75% reduction in the greater amberjack ACT, from 421,411 lb ww to 93,930 lb ww. The following analysis explores how proposed changes to the trip limit in a 2023 Framework Action may impact commercial landings and season length for greater amberjack, with the modified ACT. This analysis evaluates the impact of four trip limit alternatives stated in the 2023 Framework Action: no action (current trip limit), 8 fish, 7 fish, and 5 fish trip limits, under a reduced ACT.

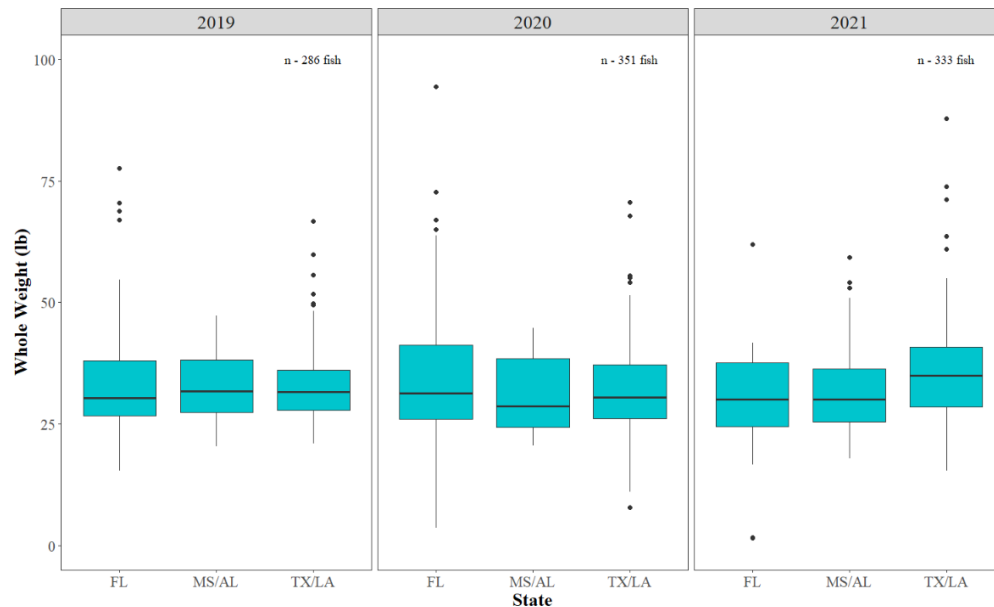
### *Greater Amberjack Average Weight Analysis*

The trip limit alternatives being evaluated are described either in pounds or number of fish. An analysis to determine a representative average weight per greater amberjack is necessary to calculate the number of fish associated with the weight of greater amberjack landed on commercial trips. A total of 2,278 records with length and / or weight data from commercial trips intercepted by the Trip Interview Program (TIP), occurring between 2016 and 2021, were provided by the South East Fisheries Science Center (SEFSC). Only 525 records had weight values collected directly from field sampling, but all samples had length data. To overcome small sample sizes in some years, the length to weight conversion used in SEDAR 70 was used to calculate weights for all records missing a weight (SEDAR 70 Final Report). Additionally, only the 3 most recent years of weight data were used to calculate the final average weight for greater amberjack, as these data are the most recent and likely the most representative of fish currently landed by commercial fishermen. Next, the weight data were investigated by state and year to determine if there were regional differences in the weight of fish landed across the Gulf of Mexico. The boxplots for each state overlap, indicating that there is no difference in the size distributions over time between the states (**Figure 1**). The final average weight and upper 75<sup>th</sup> percentile of greater amberjack weight measurements were calculated for pooled states and years between 2019 and 2021, 33.4 lb ww (32.1 lb gw) and 38.2 lb ww (36.7 lb gw), respectively. The mean weight corresponds with the most representative weight for an individual greater amberjack and the upper 75<sup>th</sup> percentile represents an upper weight limit expected for an individual. The average weight value calculated was used to determine the number of fish / weights associated with each alternative above in **Table 1**.

**Table 1.** Description of each alternative being evaluated, with gutted weight, whole weight and the number of fish associated with each alternative. The average weight used to calculate the number of fish for each scenario is 33.4 lb ww.

<b>Trip Limit Alternatives</b>	<b>Gutted Weight (lb)</b>	<b>Whole Weight (lb)</b>	<b>Number of Fish</b>
Alternative 1: No Action	1000	1040	~31
Alternative 2: 8 fish	257	267	8
Alternative 3: 7 fish	225	234	7

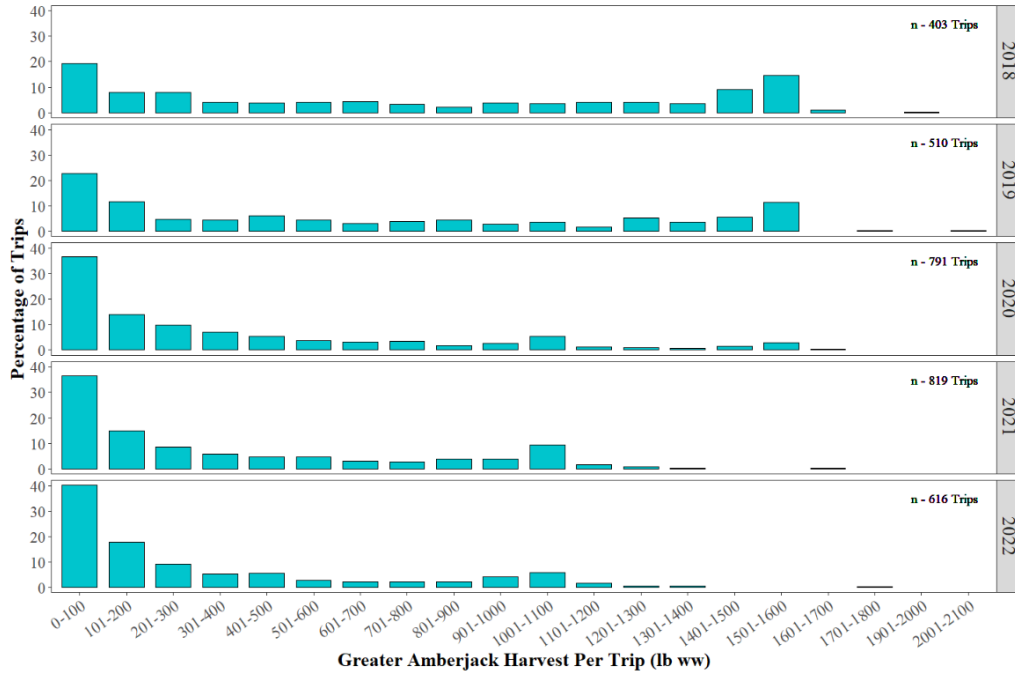




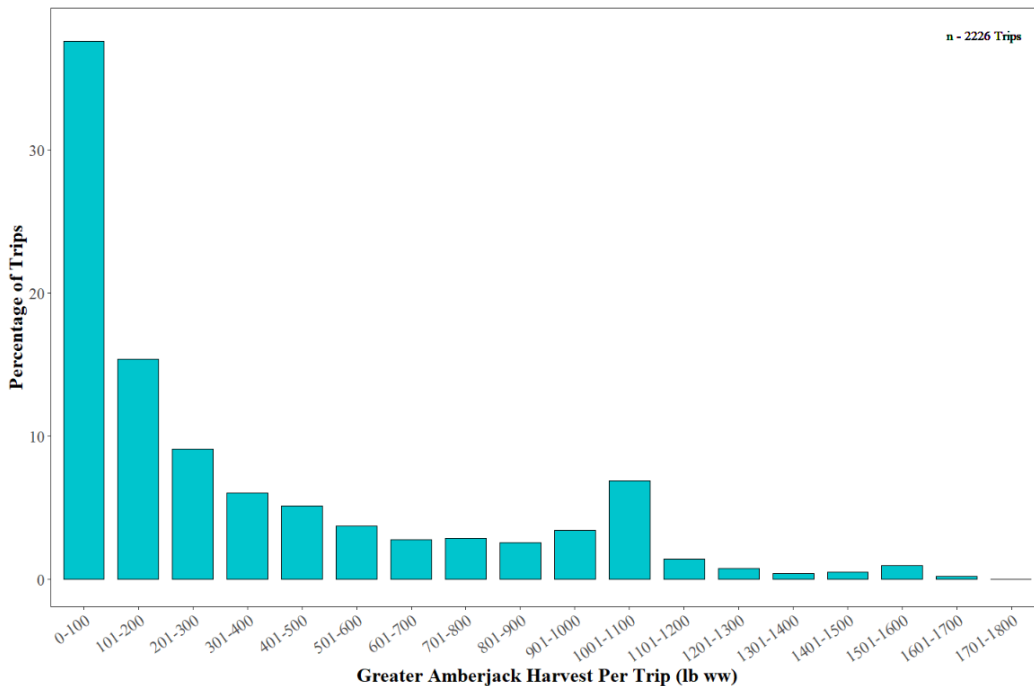
**Figure 1.** Boxplots of observed and converted greater amberjack lengths by state and year. Samples in some states were pooled due to low sample sizes in some years. Samples from Mississippi were pooled with those from Alabama and samples from Louisiana were pooled with those from Texas. The y-axes were truncated at 100 lb ww to exclude a single extreme outlier.

#### *Commercial Trip Limit Analysis*

Gulf of Mexico commercial catch-effort data (years: 2018-2022, provided March 1, 2023) from the SEFSC Commercial Logbook Program (CLB) had records for 3,140 trips that reported greater amberjack harvest. The distribution of landings per trip were investigated for the 5 most recent years to determine which years of data were most representative of the current landing behavior (**Figure 2**). A change in the distribution of trip landings is evident starting in 2020, likely as a function of the change in commercial trip limit in April of that year from the Framework Action. Starting in 2020, the proportion of trips landings more than 1,000 pounds per trip drops dramatically. For this reason, only data from 2020 through 2022 was used to evaluate the proposed trip limits in the 2023 Framework Action. **Figure 3** shows the distribution of greater amberjack landings per trip, for the three most representative years, with all years combined.



**Figure 2.** Distribution of Gulf of Mexico greater amberjack harvested per trip from the SEFSC Commercial Logbook program between 2018 and 2022, in pounds whole weight. Commercial logbook data were provided by the SEFSC on March 1, 2023.



**Figure 3.** Distribution of Gulf of Mexico greater amberjack harvested per trip from the SEFSC Commercial Logbook program between 2020 and 2022, all years combined, in pounds whole weight. Commercial logbook data were provided by the SEFSC on March 1, 2023.

A scalar was calculated to simulate the reduction of greater amberjack landings as a result of each alternative. For each trip limit scenario, the logbook records were modified by changing any

per trip landings that exceeded the proposed trip limit to instead equal the proposed trip limit. For example, for Alternative 2, if a trip landed more than the weight associated with 8 fish (33.4 lb ww \* 8 = 267 lb ww), the pounds landed was changed to 267 lb ww. For all trips that did not exceed each proposed trip limit, the landings were not modified. Next, the total greater amberjack landings in the three most recent years were summed to represent the No Action alternative (Alternative 1 – 1,040 lb ww trip limit). The final scalar was calculated by dividing the modified landings totals for each scenario by the un-modified No Action alternative landings sum. This process was repeated with the weight associated with the 75<sup>th</sup> percentile, for the 3 most recent years of weight data, to provide a set of scalars associated with the upper weight expected per fish. The predicted change in landings, based on these scalars are presented in **Table 2**. The predicted changes represent a potential shift in effort that removes the possibility of high landings trips, but maximizes the opportunity for incidental catch at each proposed trip limit value. It is not possible to predict exactly how fishers will change their practices to account for trips where high landings of greater amberjack would no longer be possible, but assumes that a similar number of trips would be taken by fishermen and estimates the total landings possible within each proposed trip limit alternative.

**Table 2.** The predicted change in landings from the current 1000 lb gw per trip limit, based on an average weight of 33.4 lb ww or an upper weight limit (75<sup>th</sup> percentile) of 38.2 lb ww for an individual greater amberjack.

Trip Limit Alternatives	Predicted Change in Annual Landings (%)	
	Average Weight = 33.4 lb ww	75th Percentile Weight = 38.2 lb ww
Alternative 1: No Action	0.0%	0.0%
Alternative 2: 8 fish	-53.6%	-49.3%
Alternative 3: 7 fish	-57.6%	-53.6%
Alternative 4: 5 fish	-66.5%	-63.2%

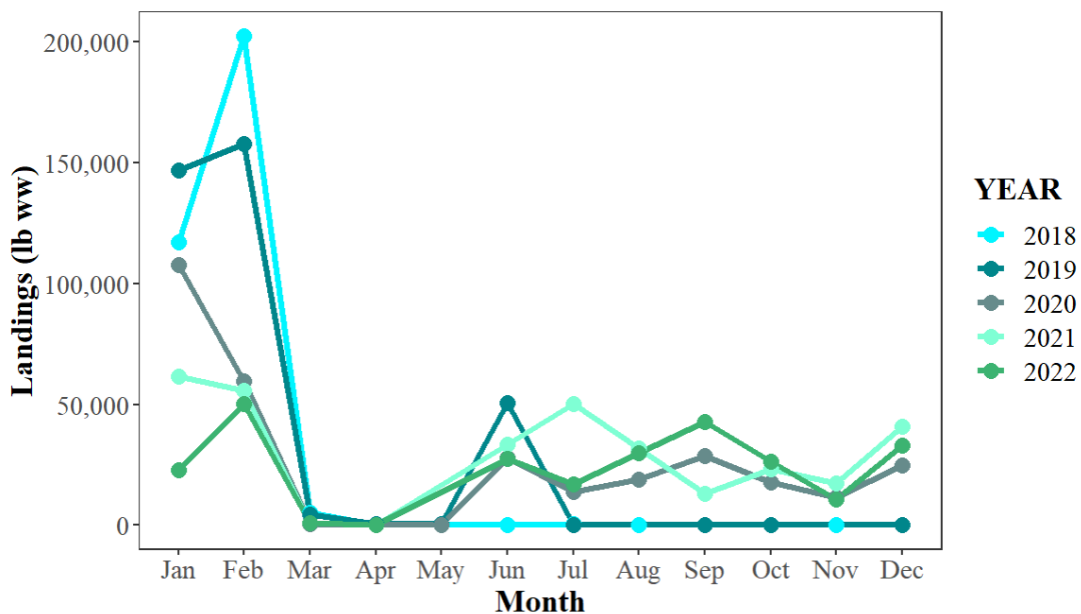
### Seasonal Closure Analysis

The SEFSC provided commercial landings in their ACL dataset on April 12, 2023. These landings were summed by month and year for the five most recent years of data (2018-2022). These data were evaluated to determine which years are most representative of recent trends in landings, by month (**Figure 4**). The trip limit change in 2020 impacted the landings per month in more recent years, so only landings for 2020-2022 were used to project for potential seasonal closures. The landings per month were averaged for 2020-2022 to generate a monthly projected landings estimate. Landings for each year in the analysis and the projected landings were plotted in **Figure 5**. The projected monthly landings were divided by the number of days in each month to provide a daily catch rate. The projected change in landings value was multiplied by the daily catch rate for each alternative. The projected daily landings for each alternative were then summed cumulatively to determine what day, if any, would result in a closure for greater amberjack. This process was repeated to correspond with the projected daily landings based on the 75<sup>th</sup> percentile weight. All alternatives, regardless of the individual fish weight used, result in a predicted closure (**Table 3**). The closure dates using the 75<sup>th</sup> percentile weight show a shorter season for each alternative, due to the larger size associated with an individual fish in that scenario. Alternative 1, the No Action Alternative, required a step down in landings when 75%

of the ACT was landed. For this Alternative, the step down was estimated to be triggered on February 4<sup>th</sup>. At this point, the daily catch rate was reduced to represent the daily landings associated with a 260 lb ww per trip limit, to incorporate the current trip limit step down. Alternatives 2-4 represent a larger reduction in the per trip limit for greater amberjack, with no stepdown provision included. Alternative 4 provides the longest possible season of the alternatives investigated.

**Table 3.** Projected season closure dates, based on both average and 75<sup>th</sup> percentile weight of an individual greater amberjack. The predicted season length is no more than 273 days because of the fixed closed commercial season from March 1 through May 31.

Trip Limit Alternatives	Average Weight = 33.4 lb ww		75 <sup>th</sup> Percentile Weight = 38.2 lb ww	
	Closure Date	Season Length (Days)	Closure Date	Season Length (Days)
Alternative 1: No Action	3-Jun (Step Down – Feb 4)	61	27-Feb (Step Down – Feb 4)	57
Alternative 2: 8 fish	31-Aug	150	11-Aug	130
Alternative 3: 7 fish	20-Sep	170	31-Aug	150
Alternative 4: 5 fish	14-Dec	255	4-Nov	215



**Figure 4.** Gulf greater amberjack monthly commercial landings (lb ww) for 2018 to 2022. Commercial landings were obtained from the Southeast Fisheries Science Center’s commercial ACL dataset provided on April 12, 2023.

## APPENDIX C: ALTERNATIVES CONSIDERED BUT REJECTED

At its June 2023 meeting, the Council made the following decisions about alternatives within both Actions 1 and 2. Below each alternative is the Council's rationale.

### Action 1:

**Alternative:** Modify the recreational fixed closed season to be September 1 – July 31 (open August 1 – August 31).

The Council decided this alternative was functionally the same as the no action (**Alternative 1**) by implementing the same season opening date of August 1; and therefore, was redundant.

**Alternative:** Modify the recreational fixed closed season to be August 1 – October 31 and January 1 – July 31 (open November 1 – December 31).

The lack of harvest data for the months of November and December results in no predictive season duration analysis for this alternative. The Council decided to not consider this alternative for this reason.

**Alternative:** Modify the recreational fixed closed season to be August 1 – August 31, November 1 – April 30, and June 1 - July 31 (open September 1 – October 31 and May 1 - 31).

The Council decided not pursue an alternative that would allow the season to be open for two months in fall and also allow the possibility of fishing in May during the spawning period.

### Action 2:

**Alternative:** Establish a commercial trip limit for Gulf greater amberjack of 250 lbs gw (260 lbs ww)

The Council decided that establishing a trip limit as number of fish was more feasible for fisherman and regulatory enforcement.