Monterey Bay Aquarium Seafood Watch®

Snapper (US)

Red Snapper *(Lutjanus campechanus)*
Vermilion Snapper *(Rhomboplites aurorubens)*
Yellowtail Snapper *(Ocyurus chrysurus)*

United States - Gulf of Mexico, US South Atlantic

Vertical lines

11/5/18

Seafood Watch Consulting Researcher

Seafood Watch Standard used in this assessment: Standard for Fisheries vF3

Table of Contents

About Seafood Watch

Monterey Bay Aquarium's Seafood Watch program evaluates the ecological sustainability of wild-caught and farmed seafood commonly found in the United States marketplace. Seafood Watch defines sustainable seafood as originating from sources, whether wild-caught or farmed, which can maintain or increase production in the long-term without jeopardizing the structure or function of affected ecosystems. Seafood Watch makes its science-based recommendations available to the public in the form of regional pocket guides that can be downloaded from www.seafoodwatch.org. The program's goals are to raise awareness of important ocean conservation issues and empower seafood consumers and businesses to make choices for healthy oceans.

Each sustainability recommendation on the regional pocket guides is supported by a Seafood Watch Assessment. Each assessment synthesizes and analyzes the most current ecological, fisheries and ecosystem science on a species, then evaluates this information against the program's conservation ethic to arrive at a recommendation of "Best Choices," "Good Alternatives" or "Avoid." This ethic is operationalized in the Seafood Watch standards, available on our website here. In producing the assessments, Seafood Watch seeks out research published in academic, peer-reviewed journals whenever possible. Other sources of information include government technical publications, fishery management plans and supporting documents, and other scientific reviews of ecological sustainability. Seafood Watch Research Analysts also communicate regularly with ecologists, fisheries and aquaculture scientists, and members of industry and conservation organizations when evaluating fisheries and aquaculture practices. Capture fisheries and aquaculture practices are highly dynamic; as the scientific information on each species changes, Seafood Watch's sustainability recommendations and the underlying assessments will be updated to reflect these changes.

Parties interested in capture fisheries, aquaculture practices and the sustainability of ocean ecosystems are welcome to use Seafood Watch assessments in any way they find useful.

Guiding Principles

Seafood Watch defines sustainable seafood as originating from sources, whether fished[1] or farmed that can maintain or increase production in the long-term without jeopardizing the structure or function of affected ecosystems.

The following guiding principles illustrate the qualities that fisheries must possess to be considered sustainable by the Seafood Watch program (these are explained further in the Seafood Watch Standard for Fisheries):

- Follow the principles of ecosystem-based fisheries management.
- Ensure all affected stocks are healthy and abundant.
- Fish all affected stocks at sustainable levels.
- Minimize bycatch.
- Have no more than a negligible impact on any threatened, endangered or protected species.
- Managed to sustain the long-term productivity of all affected species.
- Avoid negative impacts on the structure, function or associated biota of aquatic habitats where fishing occurs.
- Maintain the trophic role of all aquatic life.
- Do not result in harmful ecological changes such as reduction of dependent predator populations, trophic cascades, or phase shifts.
- Ensure that any enhancement activities and fishing activities on enhanced stocks do not negatively affect the diversity, abundance, productivity, or genetic integrity of wild stocks.

These guiding principles are operationalized in the four criteria in this standard. Each criterion includes:

- Factors to evaluate and score
- Guidelines for integrating these factors to produce a numerical score and rating

Once a rating has been assigned to each criterion, we develop an overall recommendation. Criteria ratings and the overall recommendation are color coded to correspond to the categories on the Seafood Watch pocket guide and online guide:

Best Choice/Green: Are well managed and caught in ways that cause little harm to habitats or other wildlife.

Good Alternative/Yellow: Buy, but be aware there are concerns with how they're caught.

Avoid/Red Take a pass on these for now. These items are overfished or caught in ways that harm other marine life or the environment.

[1] "Fish" is used throughout this document to refer to finfish, shellfish and other invertebrates

Summary

Although many snapper are caught in the US, only the three most commercially important species relative to landed weight and value (red snapper (*Lutjanus campechanus*), vermilion snapper (*Rhomboplites aurorubens*), and yellowtail snapper (*Ocyurus chrysurus*), are discussed here. This report discusses snapper caught in the South Atlantic (SA) and Gulf of Mexico (GOM) by vertical gear types including hydraulic/electric reel, rod and reel, and handline. Snapper caught by bottom longline in the GOM and SA will not be discussed since they represent a small proportion of the total snapper catch.

Red snapper are considered the most highly targeted reef fish in the GOM (SEDAR 2016b) and the Gulf of Mexico Fishery Management Council (GMFMC) have worked toward rebuilding the red snapper stock since 1997. The stock is expected to be rebuilt by 2032. The 2018 stock assessment for GOM red snapper indicates that the stock is no longer overfished, and overfishing is no longer occurring. However, the new non-overfished status is partly due to a change to the reference points and has not considered the fact that the private red snapper sector exceeded its annual catch limit (ACL) by over 50% in the 2017 season.

The 2016 SA red snapper stock assessment update indicated that the SA red snapper stock was overfished and the fishery has been managed with a conservative ACL, but it has recently been closed for all or most of the year to prevent further overfishing. Management measures have been implemented, aiming to rebuild the stock, and some progress has been made (SEDAR 2016c). The fishery has been re-opened in the 2018 season.

The GOM vermilion snapper biomass appears to be above biological thresholds and fishing at a reasonable level, despite a moderate degree of uncertainty.

The 2018 SA vermilion snapper stock assessment concluded that the stock is neither overfished or undergoing overfishing.

Yellowtail snapper in the SA and GOM have not been assessed since 2012. They are considered to have maintained a healthy biomass and a sustainable level of fishing pressure. Yellowtail snapper are not considered to be undergoing overfishing.

A wide variety of fish are caught in the GOM and SA snapper fisheries. Species caught include red grouper, gag, gray snapper, gray triggerfish and various other snapper and grouper species. Many of these species are not of conservation concern and therefore are not assessed in further detail in this report. Retained and bycatch species analyzed in this assessment have been chosen based on either the percent of the catch they make up in the snapper fishery or their conservation status (endangered, threatened, overfished, etc.). In the GOM, these species include speckled hind (*Epinephelus drummondhayi*), Warsaw grouper (*Hyporthodus nigritus*), red porgy (*Pagrus pagrus*), snowy grouper (*Hyporthodus niveatus* or *Epinephelus niveatus*), gray triggerfish (*Balistes capriscus*), red grouper (*Epinephelus morio*) and gray snapper (*Lutjanus griseus*).
In the SA, these species include: speckled hind (*Epinephelus drummondhayi*), gag (*Mycteroperca microlepis*), red grouper (*Epinephelus morio*), snowy grouper (*Hyporthodus niveatus* or *Hyporthodus niveatus*), scamp (*Mycteroperca phenax*), gray triggerfish (*Balistes capriscus*), black seabass (*Centropristis striata*) and red porgy (*Pagrus pagrus*). These species have been selected for discussion because they either limit the score for this criterion or they are a main catch in the fishery.

Management of the GOM fishery is deemed "moderately effective" because, although it has increased management for diminishing stocks such as red, vermilion, and yellowtail snapper, there are still some concerns regarding the red snapper fishery and some other retained species in the reef-fish fishery.

Management of the SA fishery is deemed "moderately effective" because it has implemented a series of measures largely to prevent overfishing. However, management of the SA fisheries is limited by the red

snapper, since it is currently overfished and is undergoing overfishing. There is a rebuilding plan in place and the abundance is slowly increasing.

Management of bycatch is also deemed "moderately effective" since managers respond with regulatory action regarding increases in bycatch and bycatch mortality; however, data are lacking on the stock status of some of these species and the impact of the snapper fisheries on these species. NMFS have concluded that the GOM reef fish fishery is unlikely to hinder endangered, threatened, and protected (ETP) populations, nor the existence of sea turtles.

Vertical line gear in the GOM and SA including hydraulic/electric reel, rod and reel, and handlines have low impact on the ecosystem and there have been some minimal measures implemented to mitigate the impacts of fishing through the implementation of marine protected areas (MPAs) that cover a very small representation of habitat including less than 0.5% in the GOM. Whether removal of snapper biomass has an effect on the ecosystem in general is questionable, but it is reasonable to assume there are moderate ecosystem effects associated with the volume of biomass removal. NMFS has concluded that the GOM reef fish fishery is not likely to jeopardize designated critical habitat.

Final Seafood Recommendations

SPECIES/FISHERY	CRITERION 1: IMPACTS ON THE SPECIES	CRITERION 2: IMPACTS ON OTHER SPECIES	CRITERION 3: MANAGEMENT EFFECTIVENESS	CRITERION 4: HABITAT AND ECOSYSTEM	OVERALL RECOMMENDATION
Yellowtail snapper United States of America Gulf of Mexico, Vertical lines, United States of America, Yellowtail snapper	Green (5.000)	Red (1.000)	Yellow (3.000)	Green (3.873)	**Good Alternative (2.760)**
Red snapper United States of America Gulf of Mexico, Vertical lines, United States of America, Red Snapper	Yellow (2.644)	Red (1.000)	Yellow (3.000)	Green (3.464)	**Good Alternative (2.289)**
Red snapper United States of America Western Central Atlantic, Vertical lines, United States of America, Red Snapper	Red (1.000)	Red (1.000)	Yellow (3.000)	Green (3.464)	**Avoid (1.795)**
Vermilion snapper United States of America Western Central Atlantic, Vertical lines, United States of America, Vermilion Snapper	Green (5.000)	Red (1.000)	Yellow (3.000)	Green (3.464)	**Good Alternative (2.684)**
Yellowtail snapper United States of America Western Central Atlantic, Vertical lines, United States of America, Yellowtail snapper	Green (5.000)	Red (1.000)	Yellow (3.000)	Green (3.873)	**Good Alternative (2.760)**
Vermilion snapper United States of America Gulf of Mexico, Vertical lines, United States of America, Vermilion Snapper	Green (5.000)	Red (1.000)	Yellow (3.000)	Green (3.464)	**Good Alternative (2.684)**

Scoring Guide

Scores range from zero to five where zero indicates very poor performance and five indicates the fishing operations have no significant impact.

Final Score = geometric mean of the four Scores (Criterion 1, Criterion 2, Criterion 3, Criterion 4).

- **Best Choice/Green** = Final Score >3.2, and no Red Criteria, and no Critical scores
- **Good Alternative/Yellow** = Final score >2.2-3.2, and neither Harvest Strategy (Factor 3.1) nor Bycatch

Management Strategy (Factor 3.2) are Very High Concern2, and no more than one Red Criterion, and no Critical scores

- **Avoid/Red** = Final Score ≤2.2, or either Harvest Strategy (Factor 3.1) or Bycatch Management Strategy (Factor 3.2) is Very High Concern or two or more Red Criteria, or one or more Critical scores.

[2] Because effective management is an essential component of sustainable fisheries, Seafood Watch issues an Avoid recommendation for any fishery scored as a Very High Concern for either factor under Management (Criterion 3).

Introduction

Scope of the analysis and ensuing recommendation

In the US, red snapper (*Lutjanus campechanus*), vermilion snapper (*Rhomboplites aurorubens*), and yellowtail snapper (*Ocyurus chrysurus*) are the three most commercially important species relative to landed weight and value (NMFS 2017a). This report discusses these snapper species caught in the South Atlantic (SA) and Gulf of Mexico (GOM) (Figure 1) by vertical gear types including hydraulic/electric reel, rod and reel, and handline. Snapper caught by bottom longline in the GOM and SA will not be discussed since they comprised a small percentage of the total species catch in 2016 (2.9% and 0%) (NMFS 2017a).

Species Overview

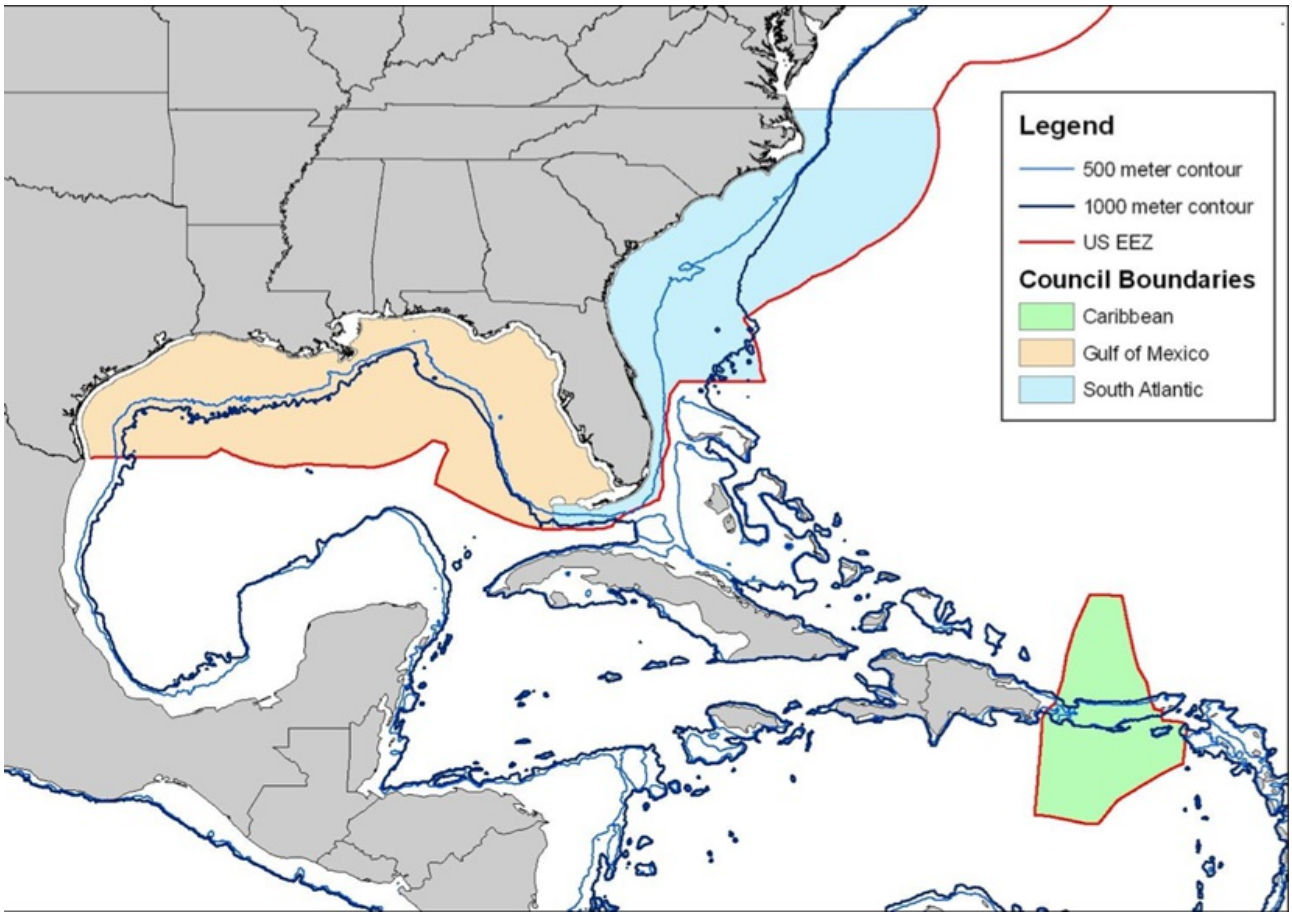

Figure 1 South Atlantic and Gulf of Mexico management extent. Source: (SEDAR 2008)

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Ecology and depth of capture

Red snapper: Half of the red snapper population generally mature between 40 to 45cm TL or around 3 to 5 years old (Cowan et al. 2012) and spawn from June to October. They live to over 20 years old (SAFMC 2017c), though the oldest estimated snapper was 57 years old (Cass-Calay et al. 2015). Red snapper inhabit the continental shelves of the GOM and northwest Atlantic Ocean from the Bay of Campeche, Mexico, to Massachusetts (Wilson and Nieland 2001). Adults are usually found in offshore waters, over rocky bottoms on the continental shelf and juveniles are found over sandy or mud bottoms. A study which used commercial logbook records from the GOM found that red snapper are usually caught between 10 to 190 ft (Farmer et al. 2016). Red snapper usually feeds on crustaceans and fish (SAFMC 2017c).

Vermilion snapper: Vermilion snapper mature at two years old (7.9 inches [in] total length) and reach up to 24 in. They spawn from April to September. Vermilion snapper range from North Carolina to the GOM and south to Brazil (Grimes 1978). Vermilion snapper form schools above the seafloor and are found over hard, irregular reef-like bottom substrates in waters 80 to 350 ft (SAFMC 2017e). A study which used commercial logbook records from the GOM found that vermilion snapper are normally caught between 130 to 980 ft (Farmer et al. 2016). They are found in very similar habitats to its close relative, the yellowtail snapper, and feed on small animals found high in the water column (SAFMC 2017e).

Yellowtail snapper: Yellowtail snapper mature at around three years old (9 in) and spawn from April through August. Yellowtail snapper in the SA range from North Carolina to south eastern Brazil, and are most abundant off southern Florida and the Bahamas (Manooch 1987); schools form above the seafloor and are found over hard substrates in waters 60 to 300 ft deep. Their diet is mostly formed of benthic fish and large invertebrates (SAFMC 2017d). A study which used commercial logbook records from the GOM found that yellowtail snapper are normally caught between 0 to 180 ft deep (Farmer et al. 2016). Yellowtail is generally caught as shallower depths than the other snapper included in this report as it is a shallow-water species (NMFS 2013b).

In the US, fishermen target snapper using hydraulic/electric reel in deeper water, and rod and reel and handline gear in shallow water (particularly for yellowtail snapper, which is generally caught in shallower depths) (NMFS 2017a).

Management

Domestic red, vermilion, and yellowtail snapper management is divided between the Gulf of Mexico Fishery Management Council (GMFMC) and South Atlantic Fishery Management Council (SAFMC). The GMFMC began managing these species in 1983 with the development of the Reef Fish Fishery Management Plan (FMP). The National Marine Fisheries Service (NMFS) has implemented a number of regulations on red, vermilion, and yellowtail snapper to ensure rebuilding (when necessary) and the continued viability of the stocks (GMFMC 1981) (GMFMC 2012b). All species are managed under an annual catch limit (ACL), which, when exceeded, automatically leads to the fishery's closure.

Red snapper, GOM: Red snapper is arguably one of the most important snapper in the GOM multispecies reef fish fishery, with a catch worth an average of USD 27 million in 2015 (NMFS 2016b). The individual fishing quota (IFQ) program was one of the major shifts in how red snapper were managed in the GOM, and since its implementation, landings have not exceeded the quota (Table 12; (NMFS 2017c)). It is now in year 13 out of a 27 year rebuilding plan (NMFS 2016d). More than 20 amendments to the FMP have addressed red snapper management including the establishment of minimum size limits, quotas, limited entry programs, seasonal closures, and stock rebuilding plans (Table 1).

Vermilion snapper, GOM: Vermilion snapper are managed under the reef fish FMP (measures include a minimum size limit, seasons, gear requirements, area closures and a required permit). They are managed under an ACL, which is combined for the recreational and commercial fishery. The ACL is currently set at 3.42 million lb whole weight (ww). The ACL has never been exceeded since its implementation in 2012 (GMFMC 2017e).

Vermilion snapper, SA: Vermilion snapper are managed through the snapper-grouper complex FMP (measures include a minimum size limit, area closures, gear restrictions, trip limits for commercial sector and a required permit). The species is managed under an ACL of 431,000 lb for each of the two six-month seasons in 2018 (NOAA 2018a).

Yellowtail snapper GOM and SA: Yellowtail snapper straddles the jurisdictions of the Gulf and South Atlantic Councils and is managed by both Councils for stock reasons. The stock is managed through a stock ACL (which

covers both recreational and commercial sectors). The South Atlantic ACL for 2017 to 2018 is 1,596,510 lb (NOAA 2018a) and the GOM ACL for the 2017 to 2018 season is 901,125 lb (NOAA 2018b). The other measures include gear restrictions and minimum size limits (SAFMC 2017d).

Production Statistics

The majority of snapper landed in the US are red, vermilion and yellowtail snapper (Figure 2) and the majority of US red snapper are caught in the GOM (Figure 3).

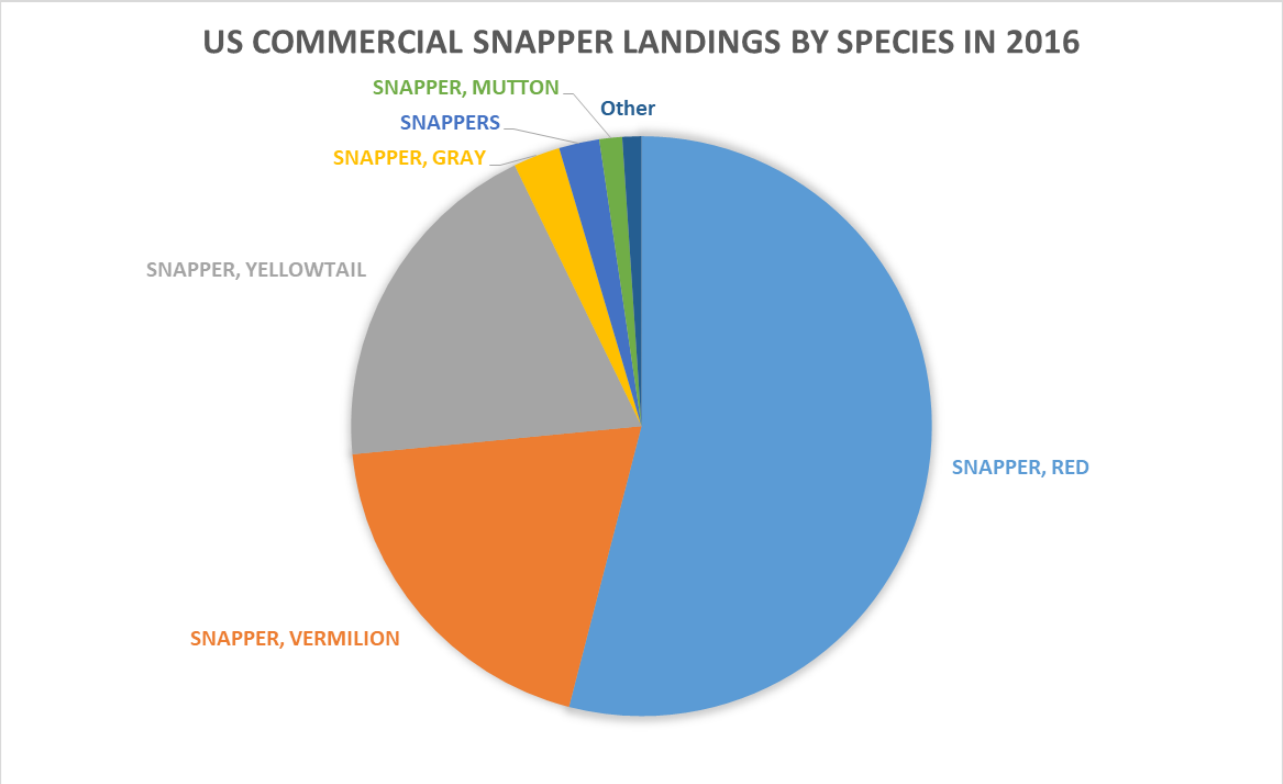

Figure 2 2016 US commercial snapper landings by species. Other includes: Silk Snapper, Lane Snapper, Queen Snapper, Cubera Snapper, Blackfin Snapper, Black Snapper, Dog Snapper, Caribbean Red Snapper and Schoolmaster Snapper. Source: NMFS Commercial landings data

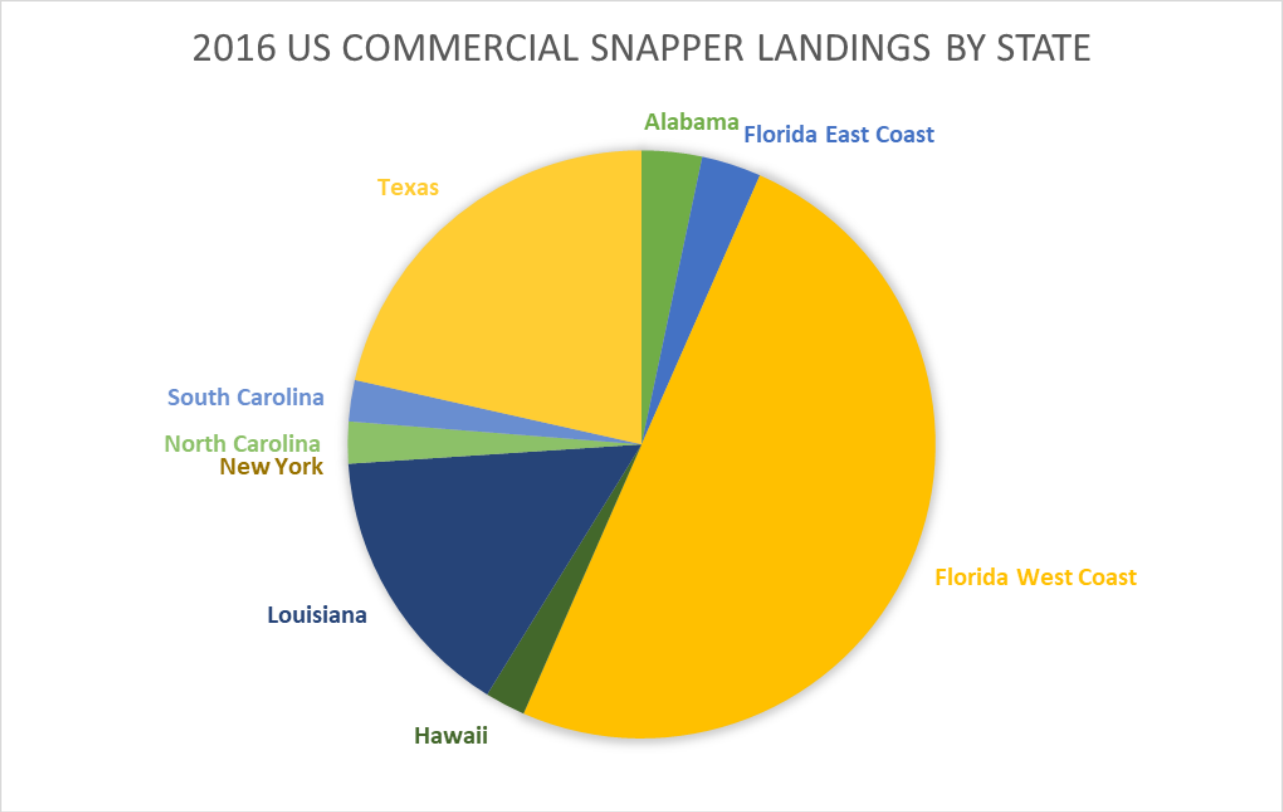

Figure 3 2016 US commercial snapper landings by state. Source: NMFS Commercial landings

Gulf of Mexico

GOM red snapper landings have decreased over time, but have been increasing since 2008 (Figure 4). Vermilion snapper landings have generally declined since 2009 (Figure 5) and yellowtail snapper landings have gradually increased since 2006 (Figure 6).

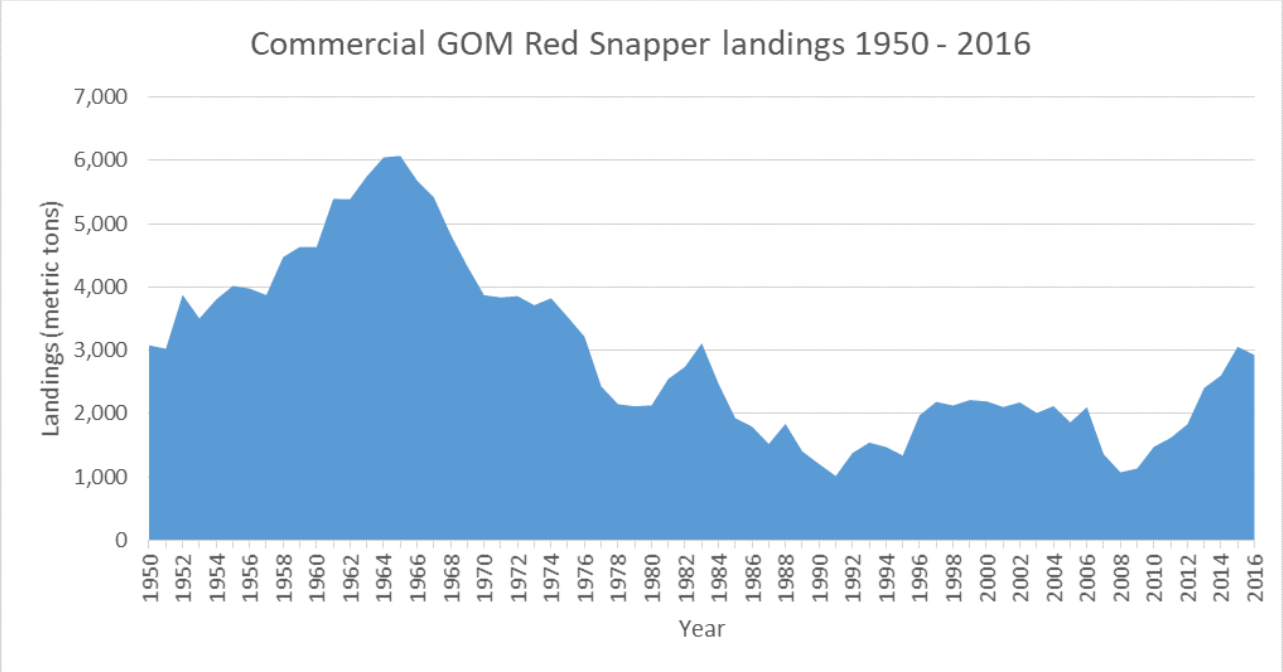

Figure 4 US commercial landings of GOM Red Snapper 1950-2016. Source: NMFS Commercial landings data

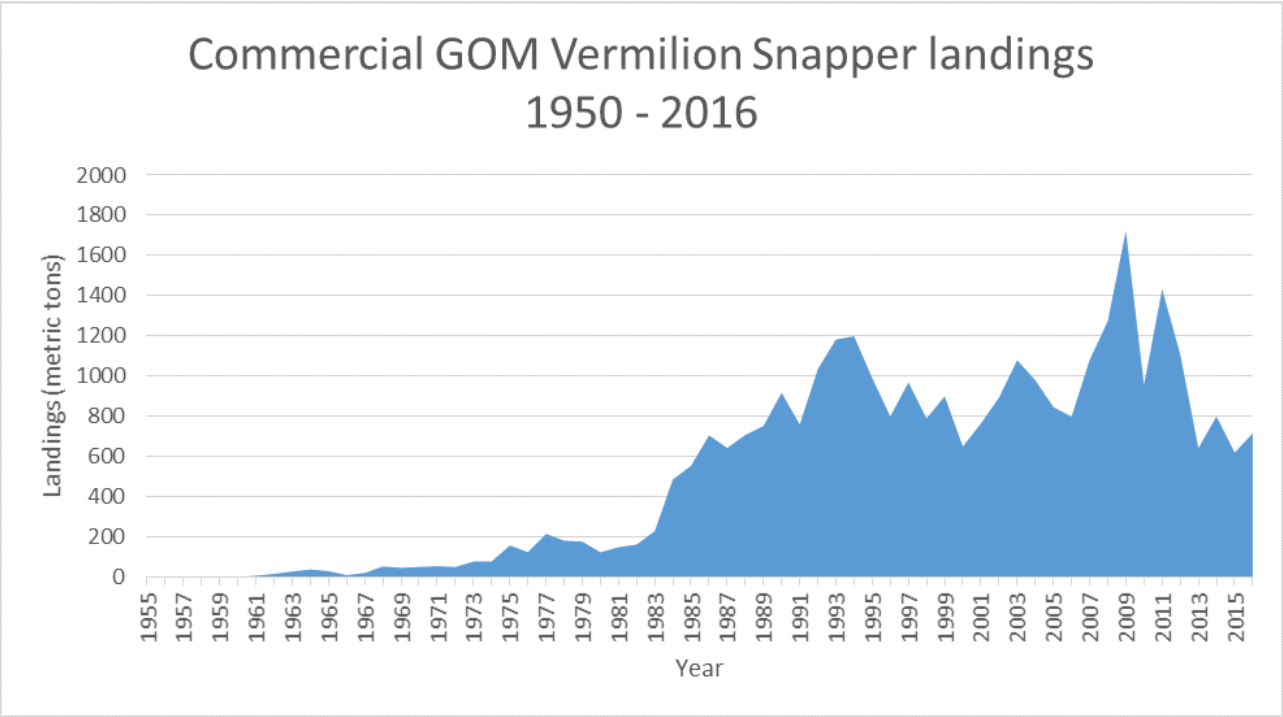

Figure 5 US commercial landings of GOM Vermilion Snapper 1950-2016. Source: NMFS Commercial landings data

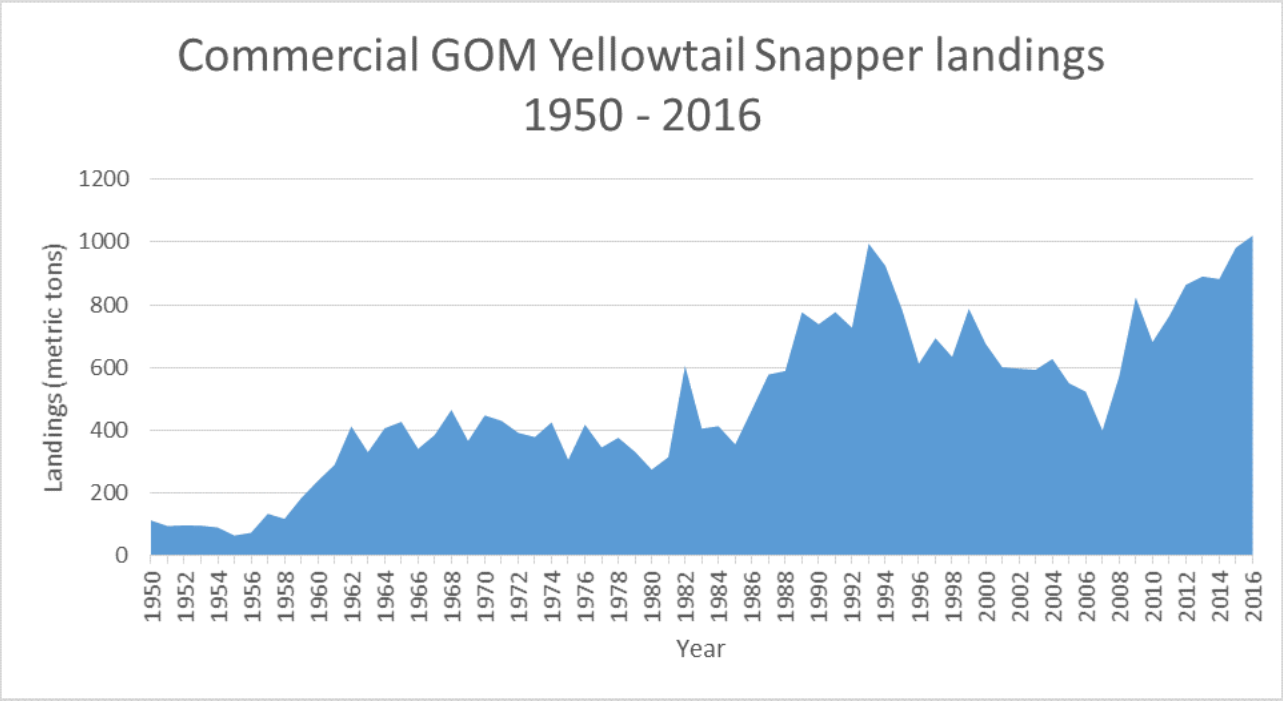

Figure 6 US commercial landings of GOM Yellowtail Snapper 1950-2016. Source: NMFS Commercial landings data

South Atlantic

Landings have substantially decreased over time in the SA red snapper fishery (Figure 7). Vermilion snapper landings have fluctuated and have slightly declined since 2010 (Figure 8). Yellowtail snapper landings have

sharply declined since 2010 and have recently started increasing over the past couple of years (Figure 9).

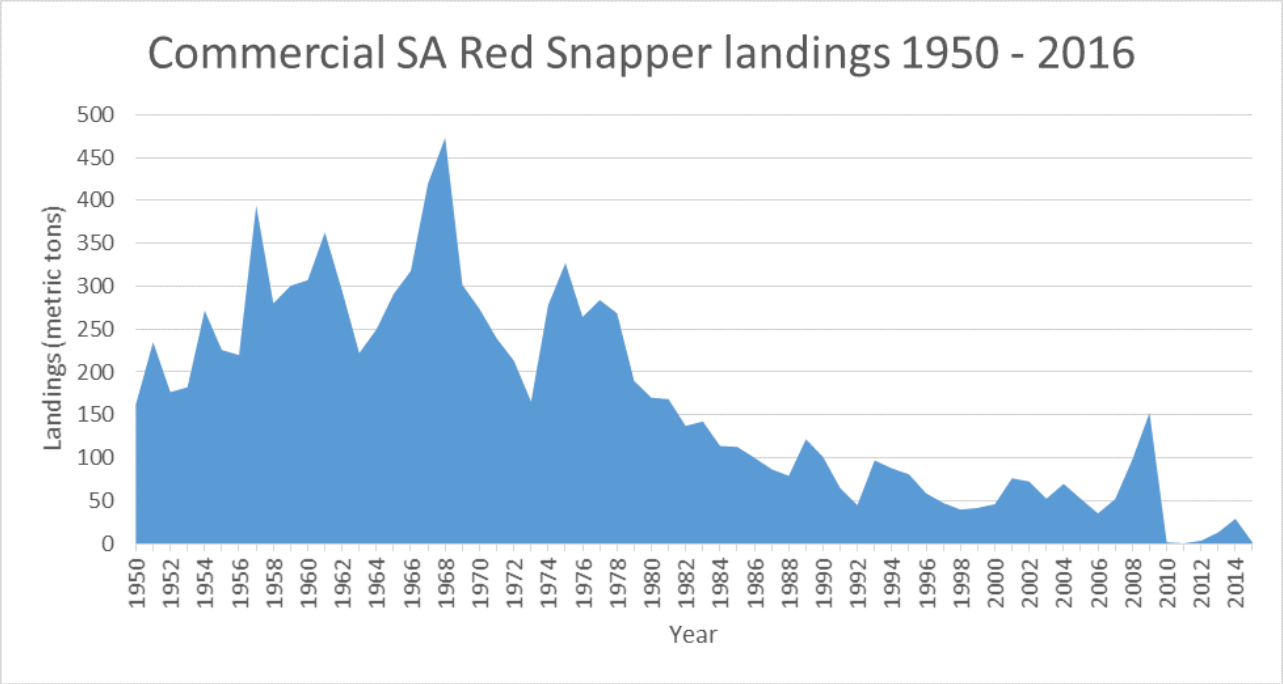

Figure 7 US commercial landings of SA Red Snapper 1950-2016. Source: NMFS Commercial landings data

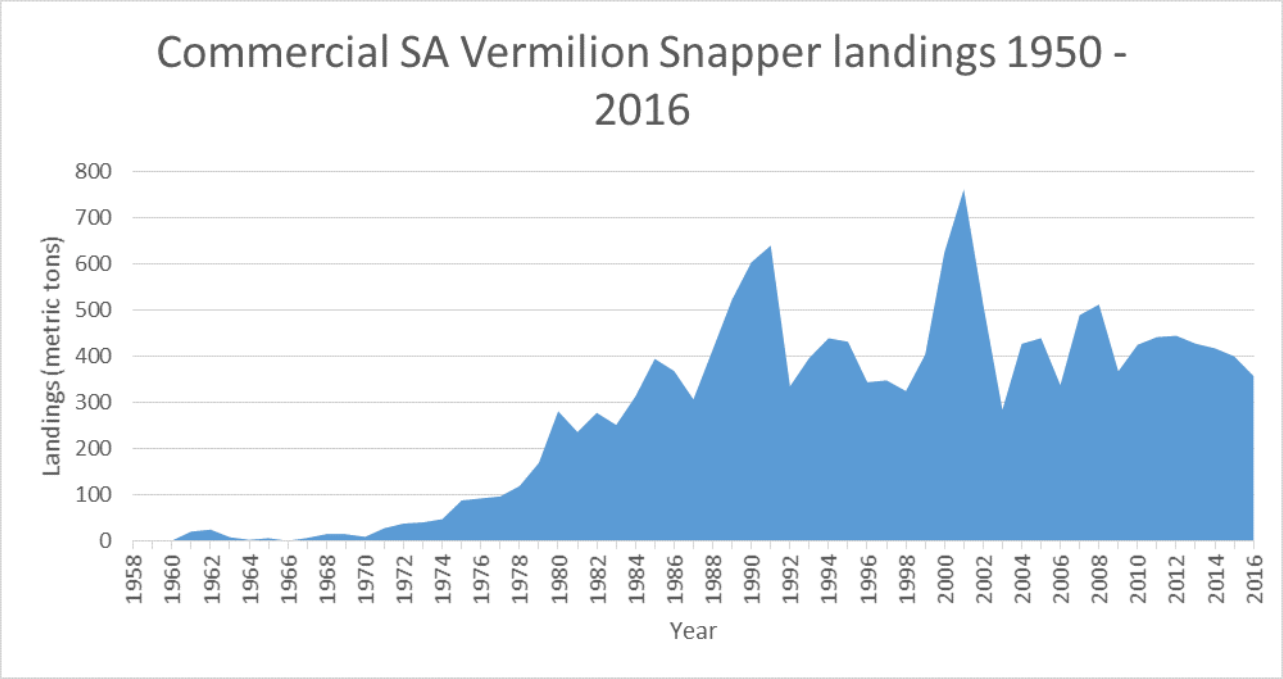

Figure 8 US commercial landings of SA Vermilion Snapper 1958-2015. Source: NMFS Commercial landings data

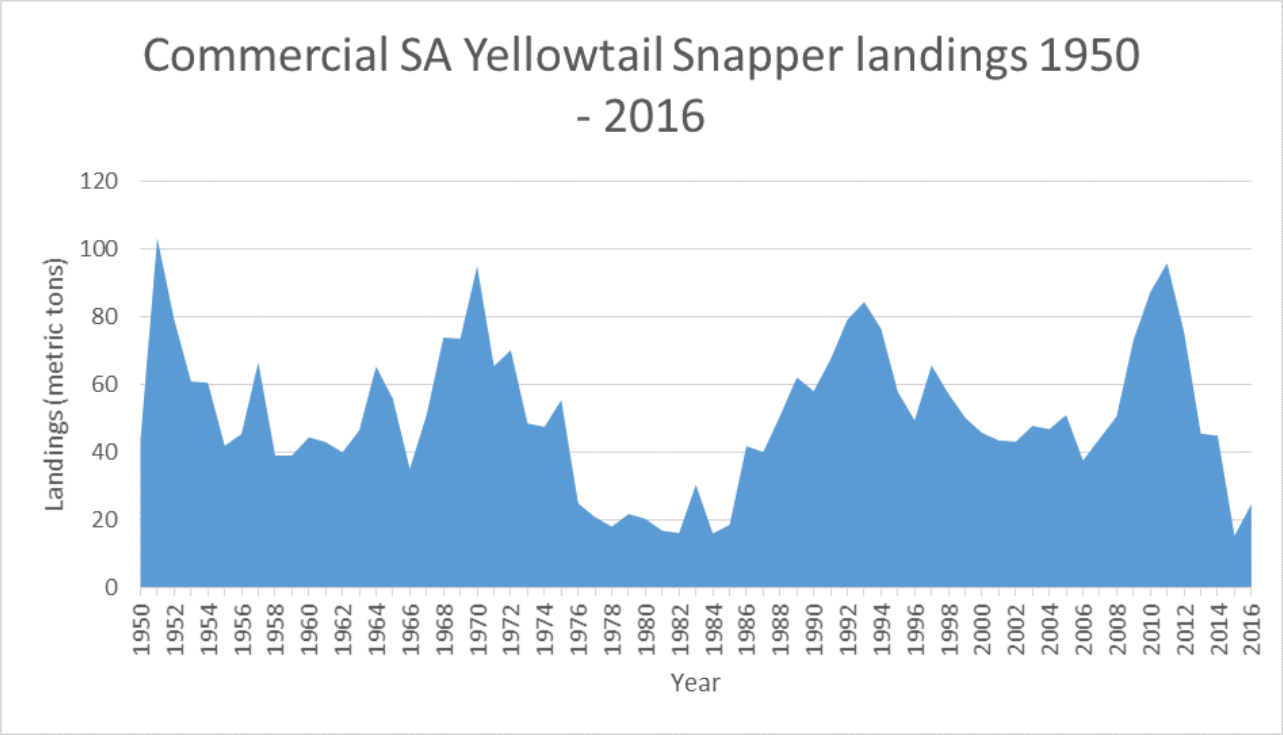

Figure 9 US commercial landings of SA Yellowtail Snapper 1950-2016. Source: NMFS Commercial landings data

Importance to the US/North American market.

The US does not export snapper: the domestic catch of snapper is sold solely in the US market (NMFS 2016b). Domestic GOM red, vermilion, and yellowtail snapper catch was worth more than USD 26.4 million, USD 6.9 million, and USD 6.8 million in 2016, respectively (NMFS 2017a). Domestic SA red, vermilion, and yellowtail snapper catch was worth more than USD 8,800, USD 2.7 million, and USD 209,000 in 2016, respectively (NMFS 2017a). The combination of imports and domestic catch for all snapper resulted in over 25,382 metric tons (MT): 5,426.4 MT (domestic landings of all Snapper in 2016), and 19,955 MT (imports) (NMFS 2017a).

From 2007 to 2012, imports decreased, though there has been recent increase in imports in the last couple of years (Figure 10). In 1999 almost 900,000 kg (900 MT) were imported; in 2017 around 20,000,000 kg (20,000 MT) of snapper were imported from various countries, most notably Mexico, Brazil, Nicaragua, and Panama (Figure 11).

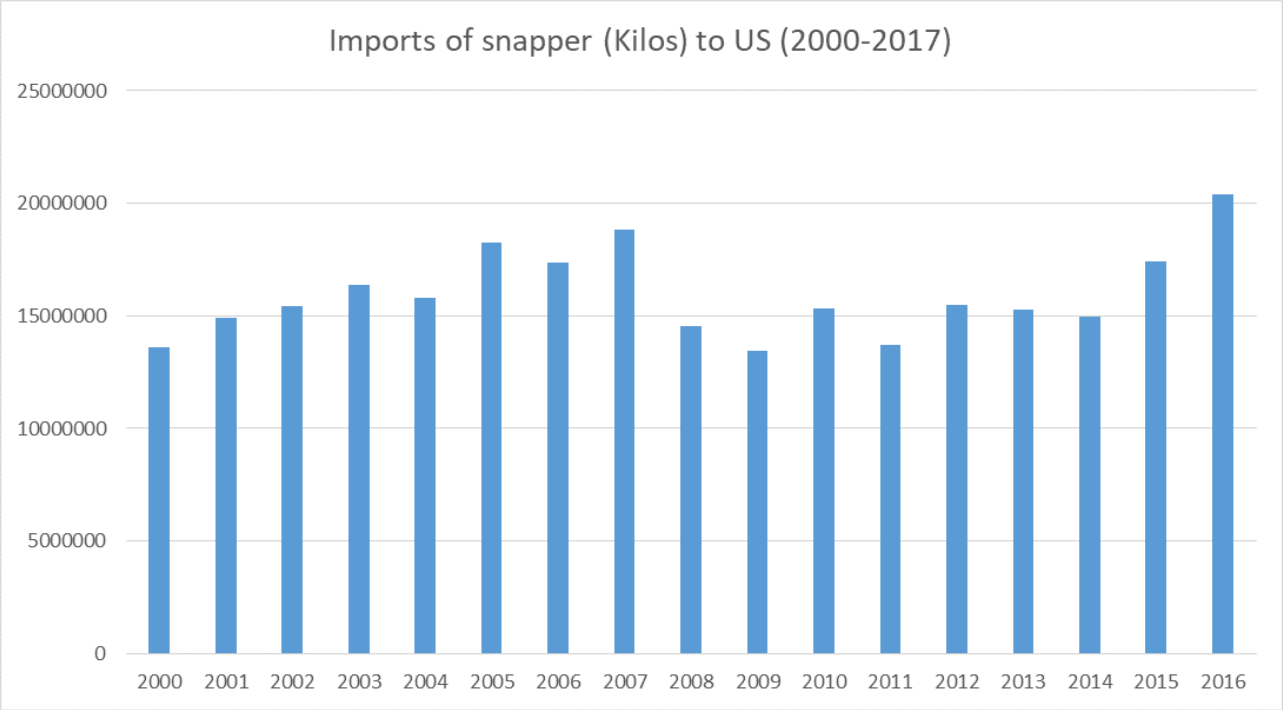

Figure 10 Imports of snapper (Kilos) into US from 2000-2017. Source: NMFS Foreign Trade data.

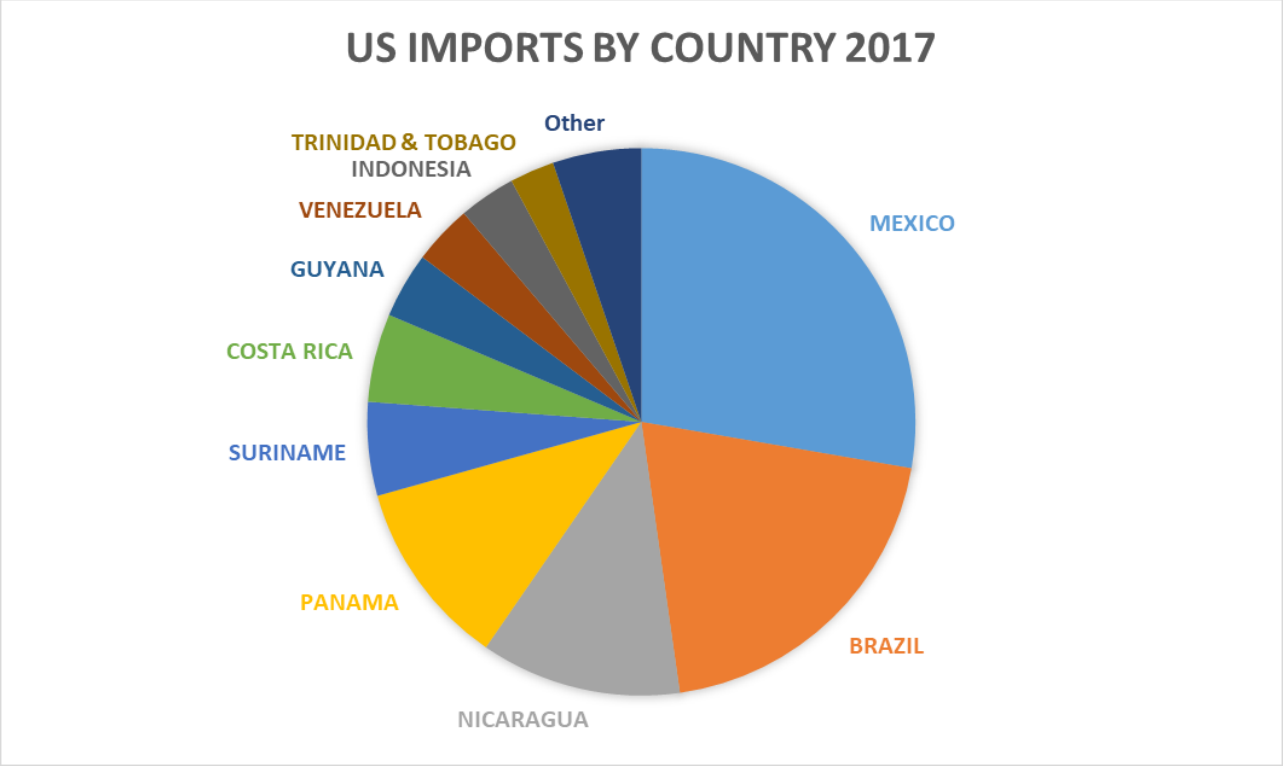

Figure 11 2017 US Imports by Country of origin. other includes: Other includes: New Zealand, Ecuador, El Salvador, Guatemala, Honduras, Tonga, Viet Nam, Australia, Netherlands, Fiji, Oman, India, Seychelles, Thailand, Maldives, Japan. Source: NMFS Foreign Trade data.

Common and market names.

Common names for snapper species often differ among regions, sometimes making snapper identification difficult. The common name "red snapper" applies to at least three species of snapper around the globe; only one of which is the *L. campechanus* found in the Western Atlantic and approved by the FDA to bear the

authentic "red snapper" label (FDA 2017). There is only one species of red snapper in the Western Atlantic (Gomes et al. 2012). Other names for red snapper include sow, rat (northwest coast of Florida), mule, chicken (northeast coast of Florida), northern red snapper, American red snapper (Moran 1988), and spot snapper (FishWatch 2015). When used for sushi or sashimi, red snapper is commonly sold as *tai.* Vermilion snapper are often referred to as beeliners, night snappers (Manooch 1987), and clubhead snapper (Gulf Info 2016a). Yellowtail snapper is distinctive in color and occasionally called "flag" (Gulf Info 2016b).

Primary product forms

Snapper is available both fresh (whole, dressed, headed-and-gutted (H & G), fillets) and frozen (dressed, H & G, fillets) (Frimodt 1995) in the US market. Most fillets are sold with their skin still attached to assist with species identification.

Acronyms

ABC	Acceptable Biological Catch	**MFMT**	Maximum Fishing Mortality Threshold
ACL	Annual Catch Limit	**MP**	Million Pounds
		MT	Metric Tons
ACT	Annual Catch Target	**MRFSS**	Marine Recreational Fisheries Statistics Survey
AR	Artificial Reef	**MRIP**	Marine Recreational Information Program
BRD	Bycatch Reduction Device	**MSST**	Minimum Stock Size Threshold
DWG	Deep-Water Grouper	**MSY**	Maximum Sustainable Yield
DWH	Deep Water Horizon	**NMFS**	National Marine Fisheries Service
ESA	Endangered Species Act	**NOAA**	National Oceanic Atmospheric Association
ETP	Endangered, Threatened and Protected Species	**OFL**	Overfishing Limit
F	Fishing Mortality	**OY**	Optimal Yield
FIP	Fishery Improvement Project	**SA**	South Atlantic
FL	Fork Length	**SAFMC**	South Atlantic Fishery Management Council
FMP	Fishery Management Plan	**SEAMAP**	Southeast Area Monitoring and Assessment Program
FSPR	Fishing mortality rate that corresponds to the SPR	**SEDAR**	Southeast Data, Assessment, and Review

FWC	Florida Fish and Wildlife Conservation Commission	**SMZ**	Special Management Zones
FWRI	Florida Fish and Wildlife Research Institute	**SPR**	Spawning Potential Ratio
GOM	Gulf of Mexico	**SSB**	Spawning Stock Biomass
GMFMC	Gulf of Mexico Fishery Management Council	**SSF**	Spawning Stock Fecundity
H&G	Headed-and-Gutted		
ICAAT	The International Commission for the Conservation of Atlantic Tunas	**SSC**	Scientific and Statistical Committee
IFQ	Individual Fishing Quota	**TL**	Total Length
LRP	Limit Reference Point	**TRP**	Target Reference Point
MARMAP	South Carolina Department of Natural Resources Marine Resources Monitoring, Assessment, and Prediction	**VMS**	Vessel Monitoring System
MCB	Monte Carlo and Bootstrap		

Assessment

This section assesses the sustainability of the fishery(s) relative to the Seafood Watch Standard for Fisheries, available at www.seafoodwatch.org. The specific standard used is referenced on the title page of all Seafood Watch assessments.

Criterion 1: Impacts on the Species Under Assessment

This criterion evaluates the impact of fishing mortality on the species, given its current abundance. When abundance is unknown, abundance is scored based on the species' inherent vulnerability, which is calculated using a Productivity-Susceptibility Analysis. The final Criterion 1 score is determined by taking the geometric mean of the abundance and fishing mortality scores. The Criterion 1 rating is determined as follows:

- *Score >3.2=Green or Low Concern*
- *Score >2.2 and ≤3.2=Yellow or Moderate Concern*
- *Score ≤2.2=Red or High Concern*

Rating is Critical if Factor 1.3 (Fishing Mortality) is Critical

Guiding Principles

- *Ensure all affected stocks are healthy and abundant.*
- *Fish all affected stocks at sustainable level.*

Criterion 1 Summary

RED SNAPPER			
Region | Method	**Abundance**	**Fishing Mortality**	**Score**
United States of America/Gulf of Mexico | Vertical lines | United States of America | Red Snapper	2.33: Moderate Concern	3.00: Moderate Concern	Yellow (2.644)
United States of America/Western Central Atlantic | Vertical lines | United States of America | Red Snapper	1.00: High Concern	1.00: High Concern	Red (1.000)

VERMILION SNAPPER			
Region | Method	**Abundance**	**Fishing Mortality**	**Score**
United States of America/Western Central Atlantic | Vertical lines | United States of America | Vermilion Snapper	5.00: Very Low Concern	5.00: Low Concern	Green (5.000)

United States of America/Gulf of Mexico | Vertical lines | United States of America | Vermilion Snapper	5.00: Very Low Concern	5.00: Low Concern	Green (5.000)

YELLOWTAIL SNAPPER			
Region | Method	**Abundance**	**Fishing Mortality**	**Score**
United States of America/Gulf of Mexico | Vertical lines | United States of America | Yellowtail snapper	5.00: Very Low Concern	5.00: Low Concern	Green (5.000)
United States of America/Western Central Atlantic | Vertical lines | United States of America | Yellowtail snapper	5.00: Very Low Concern	5.00: Low Concern	Green (5.000)

Criterion 1 Assessment

SCORING GUIDELINES

Factor 1.1 - Abundance

Goal: Stock abundance and size structure of native species is maintained at a level that does not impair recruitment or productivity.

- *5 (Very Low Concern) — Strong evidence exists that the population is above an appropriate target abundance level (given the species' ecological role), or near virgin biomass.*
- *3.67 (Low Concern) — Population may be below target abundance level, but is at least 75% of the target level, OR data-limited assessments suggest population is healthy and species is not highly vulnerable.*
- *2.33 (Moderate Concern) — Population is not overfished but may be below 75% of the target abundance level, OR abundance is unknown and the species is not highly vulnerable.*
- *1 (High Concern) — Population is considered overfished/depleted, a species of concern, threatened or endangered, OR abundance is unknown and species is highly vulnerable.*

Factor 1.2 - Fishing Mortality

Goal: Fishing mortality is appropriate for current state of the stock.

- *5 (Low Concern) — Probable (>50%) that fishing mortality from all sources is at or below a sustainable level, given the species ecological role, OR fishery does not target species and fishing mortality is low enough to not adversely affect its population.*
- *3 (Moderate Concern) — Fishing mortality is fluctuating around sustainable levels, OR fishing mortality relative to a sustainable level is uncertain.*
- *1 (High Concern) — Probable that fishing mortality from all source is above a sustainable level.*

RED SNAPPER

Factor 1.1 - Abundance

UNITED STATES OF AMERICA/GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, RED SNAPPER

Moderate Concern

Maximum Sustainable Yield (MSY) is undetermined for the GOM red snapper fishery since the stock-recruitment variable is incalculable. The 2018 stock assessment used proxy reference points to determine the biomass for GOM red snapper, where the limit reference point (LRP) is spawning stock biomass $(SSB)_{CURRENT}$/minimum stock size threshold (MSST) ratio is $SSB_{CURRENT}$/MSST, which is estimated at 1.41. The target reference point (TRP) is $SSB_{CURRENT}/SSB_{FSPR26\%}$ = 0.7 , where SPR is the spawning potential ratio (SEDAR 2018b)(Figure 12). However, $SSB_{CURRENT}/SSB_0$ is 0.18 (SEDAR 2018b) and Seafood Watch standards require that appropriate reference points do not allow biomass to fall below 30% of B_0. The stock is in a rebuild program with a target date of 2032 (SEDAR 2018b).

The red snapper's biological status has changed from overfished in the 2015 assessment to not overfished in the recent 2018 assessment. These changes are the result of stock recovery, but also important changes to the reference point MSST (discussed below) (SEDAR 2018b).

Since the 2018 stock assessment deems that GOM red snapper is no longer overfished, the SSB is well above the LRP, but below the TRP and well below virgin levels, Seafood Watch deems abundance as a "moderate" concern.

Justification:

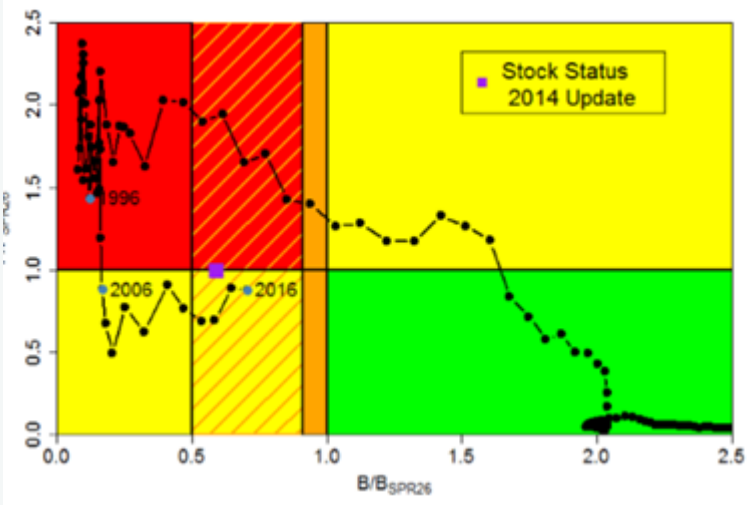

Figure 12 Kobe plot showing the timeseries of stock status for the SEDAR 52 Base Model. Orange coloring indicates the region where the stock is below the biomass target (SSBSPR26%), but above the old biomass threshold (MSSTOLD). The orange striped region represents the region where the stock is below the biomass target (SSBSPR26%), but above the current biomass threshold (MSSTNEW). The purple square represents the terminal year stock status estimated by the 2014 SEDAR 31 Update Assessment (SEDAR 2018b).

According to reference points, GOM red snapper have been overfished since 1988, but managers believe that the tide is shifting (SEDAR 2005) (GMFMC 2011b). Stock abundance and commercial landings have exhibited

declines in the long-term. In the short-term, trends are increasing due to high recruitment and the presence of strong year classes between 2004 and 2006, particularly in the western component of the fishery (SEDAR 2009a).

There have been significant differences between the results of the last two stock assessments: the most recent GOM red snapper stock assessment (published in 2018) declared that the stock is no longer overfished. The previous report (published in 2015) estimated $SSB_{2013}/SSB_{FSPR26\%}$ = 0.54; deeming the stock as overfished (Cass-Calay et al. 2015); biomass was showing signs of increasing, but was well below the LRP (Cass-Calay et al. 2015).

These changes have largely been a result of the reduction in MSST. MSST has reduced due to changes in how it is calculated, following requirements in Amendment 44 of the Gulf of Mexico Reef Fish Fishery Management Plan. In the previous stock assessment, MSST was calculated as "(1-M) * $SSB_{FSPR26\%}$, where M = 0.09 (i.e., the average value of M from the Lorenzen M curve for fully selected ages)" (Cass-Calay et al. 2015). This has been changed to 0.5 * $SSB_{FSPR26\%}$ (SEDAR 2018b). If the previous MSST calculation had still been used with the most up-to-date stock information, the 2018 stock assessment states "the red snapper resource would still be considered overfished ($SSB_{2016}/MSST_{OLD}$ = 0.77)" (SEDAR 2018b).

The biggest uncertainty in the 2018 stock assessment is still the poor understanding of the stock-recruit relationship (SEDAR 2018b). This has meant that MSY is incalculable. The stock-recruit function relationship is poorly defined because of the unpredictable recruitment and a lack of data. Proxies have been created to replace MSY. The SPR of $SPR_{26\%}$ has been selected as the optimal proxy. However, $SPR_{26\%}$ does not include recruitment into the calculation and, therefore, does not aim to determine the maximum yield for economic gain. An SPR at 26% has been considered as too low a percentage for such a long-lived species (SEDAR 2013b). Other proxies of varying SPR including $F_{SPR22\%}$, $F_{SPR24\%}$, $F_{SPR30\%}$ and F_{SPRmax} or $F_{SPR20\%}$ have been suggested. When $F_{SPR30\%}$ was considered, it was suggested that $F_{SPR26\%}$ would be the optimum proxy for MSY. If a different proxy to the current one is adopted, the projected rebuild timeframe would also likely change; the Magnuson-Stevens Act would require the rebuild timeframe to be 10 years or less, which could require stricter management measures to be implemented (SEDAR 2015h).

Another important issue with the red snapper stock assessment is the difference in recovery in the eastern and western regions of the GOM. In general red snapper have been steadily rebuilding across both regions since the mid-2000s, but rebuilding in the eastern region appears to have leveled off or declined over the last 3 to 5 years. The population sizes in the eastern region are expected to decline rapidly, while the western region's sizes are continuing to steadily rebuild (SEDAR 2018b).

UNITED STATES OF AMERICA/WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, RED SNAPPER

High Concern

The 2016 stock assessment estimated that $SSB_{2014}/MSST$ = 0.22 and $SSB_{2014}/SSB_{F30\%}$ = 0.16. Therefore, red snapper in the South Atlantic is deemed overfished (SEDAR 2016c). There is no MSY determined, as the stock-recruitment variable is incalculable, therefore $SSB_{2014}/SSB_{F30\%}$ serves as a proxy for MSY.

SA red snapper is in a rebuilding plan, which is discussed in Criterion 3.

Due to its overfished status, abundance is deemed a “high” concern.

Justification:

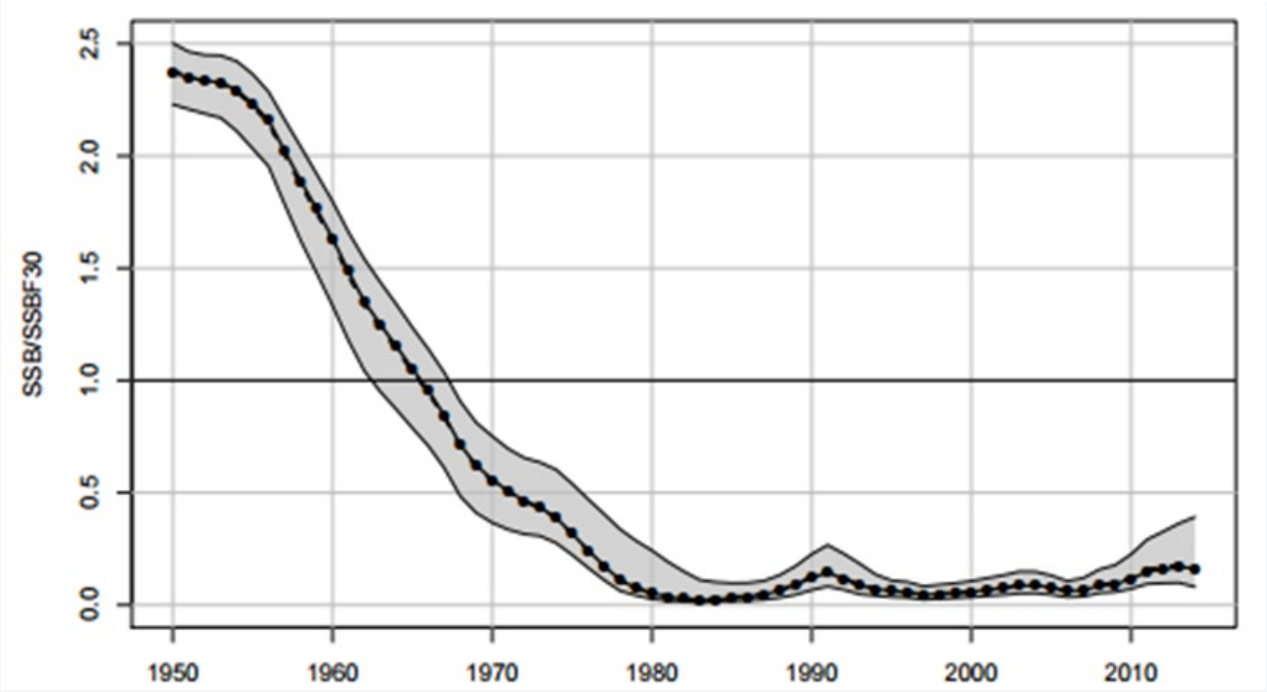

Figure 13 SA Red Snapper biomass relative to SSBF30%. Source: (SEDAR 2016c)

In the late 1980s, the ratio of the SSB to the MSST declined steeply and has been static since (SEDAR 2010b). The 2009 biomass was estimated at SSB_{2009}/MSST=0.09 (SEDAR 2010b) and increased to SSB_{2014}/MSST=0.22 in the most recent assessment (Figure 13). In the recent assessment, most indices of abundance show that the stock is increasing (Figure 1) (SEDAR 2017b). The previous two stock assessments are associated with high levels of uncertainty; therefore, the validity of the assessment's results are in question (SEDAR 2010b) (SEDAR 2016c). The likelihood of meeting rebuilding timeframe targets is limited by the stock's demographics, which is heavily truncated to younger fish: 84% of the sampled fish were below age 7 and the maximum age was 21 years (less than half of the expected life span of 50 years). Rebuilding time may be delayed because young mature snapper produce fewer eggs than older snapper (Lowerre-Barbieri et al. 2014).

Factor 1.2 - Fishing Mortality

UNITED STATES OF AMERICA/GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, RED SNAPPER

Moderate Concern

$F_{CURRENT}$/MFMT = 0.823 (SEDAR 2018b) (Figure 12) where MFMT is the maximum fishing mortality threshold (defined as $F_{SPR26\%}$). Overfishing is not occurring. Fishing mortality is fluctuating around sustainable proxy levels, and has decreased since previous stock assessments. There is concern that the 2017 landings (which have not been included in the 2018 stock assessment) may change the outcome of the overfishing status due to quota overages (of 50%) in the private sector (NOAA 2017f).

Since fishing mortality trending downwards and is fluctuating around the F_{MSY} proxy, fishing mortality is rated as a "moderate" concern.

Justification:

While overfishing is not occurring, some concerns about the long-term prognosis of the stock remain. The

most recent stock assessment does not contain the provisional landings data for 2017 (SEDAR 2018b); yet, in 2017, the length of the recreational seasons was extended by 39 days (NOAA 2017f) and the state water management area in Louisiana were increased from 0 to 3 miles to 0 to 9 miles in 2016 (NMFS 2017d), which has caused the private (the recreational fishery accounts for just over half of the GOM red snapper quota (GMFMC 2017c) (50 CFR §622.2017) red snapper sector to exceed its ACL by over 50% (NOAA 2017f). The Department of Commerce stated that the overages will likely delay the rebuilding timeline by six years, but will still allow the continued growth of the stock (albeit at a reduced rate) (50 CFR §622.2017).

Other sources of mortality originate mainly from recreational fishery, discards (in both the commercial and recreational fisheries) and when snapper are caught as bycatch in the shrimp trawl fishery. In three out of the past five years, the recreational fishery has exceeded its quota (NMFS 2016a). Additionally, discards contribute to a major source of red snapper fishing mortality in the GOM (NMFS 2016b), particularly due to barotrauma (where large changes in pressure causes swim bladders to inflate) (NMFS 2016b). Discard mortality is variable according to depth, handling techniques, gear type, speed of retrieval from depths, and the size of the fish, water/air temperature and predation (Cass-Calay et al. 2015). Reliable discard estimates are unavailable, yet critical in estimating overall fishing mortality.

Historically, a main source of GOM red snapper fishing mortality has been attributed to shrimp trawls: the shrimp fishery has been estimated to cause up to 90% of age-0 and 1 red snapper mortality (Brandt and Jackson 2013). Therefore, shrimp trawls operating in the US South Atlantic and western GOM have been required to use bycatch reduction devices (BRDs) since 1997 (GMFMC 2016c). Many authors have claimed that the reduction in shrimp trawl effort (by around 75% to 85% ((SEDAR 2009a) (Hart et al. 2012)) and reduction of red snapper bycatch in the shrimp trawl fishery, was instrumental in reducing overall red snapper mortality (Gillig et al. 2001) (Peabody 2004) (Saillant et al. 2006) (McDonough 2009)).

UNITED STATES OF AMERICA/WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, RED SNAPPER

High Concern

$F_{2012\text{-}2014}/F_{SPR30\%}$= 2.52 (Figure 15). Overfishing is occurring, with fishing mortality estimated at levels 2 ½ times that recommended in the rebuilding projection $F_{SPR30\%}$ (SEDAR 2016c). Like the red snapper in the GOM, the stock assessment cannot use MSY to determine the optimal yield (OY) due to an incalculable stock-recruitment relationship, therefore SPR30% is used as a proxy. High levels of mortality are caused by the commercial and recreational fishery.

Since the stock is experiencing overfishing, Seafood Watch deems fishing mortality as a "high" concern.

Justification:

Through the 1970s, estimated fishing mortality rates steadily increased and have been widely variable in the past few decades (SEDAR 2010b). The 2008 SA red snapper stock assessment indicated that the SA red snapper stock was overfished and undergoing overfishing (SEDAR 2008b). In response to this assessment, fishery managers began developing Amendment 17A to the snapper-grouper Fishery Management Plan (FMP) that would draw out long-term stock rebuilding measures (SAFMC 2010a).

The 2010 SA red snapper stock assessment indicated that any mortality in the directed fishery along with additional mortality in the indirect fisheries would cause overfishing to continue (SEDAR 2010b). Therefore, managers implemented a moratorium on all red snapper landings until further notice.

In 2012, the moratorium was lifted and a commercial "mini-season" was opened with a quota set for 20,818 lb (Newswire 2012). Managers assess the fishery on a yearly basis using fishery dependent and independent

data to modify the harvest limits and to ensure fishing mortality does not exceed F_{MSY} (Newswire 2012).

In 2013, the SAFMC and the National Oceanic Atmospheric Association (NOAA) implemented a process to ensure that any removals (landings plus discards) must not exceed the number of fish required for rebuild. In 2014, mini-seasons continued, though landings exceeded quotas. An increased allowance of landings have been permitted under Amendment 28, which denotes that a limited harvest is allowed depending on the last year's harvest and available stock (NOAA 2013). Since 2014 quotas were exceeded, both the commercial and recreational fishery were closed in 2015; however, discard mortality rates remained high (NOAA 2015b). The fishery remained closed throughout 2016 as the total removals in 2015 were estimated to be 162,729 more fish than recommended by scientific advice to ensure stock recovery (where 114,000 fish were recommended and 276,729 fish were removed) (NOAA 2016b). Landings have decreased over time (Figure 14) and the fishery was closed in the 2016 season (NOAA 2016b). Both the recreational and commercial SA red snapper fisheries are open in 2018: and the commercial fishery will close when the ACL of 124,815 lb ww or 12,854 fish is reported, or by December 31, 2018 (further management measures mandated in the 2018 season are discussed in Criteria 3) (SAFMC 2018h).

An overwhelming majority of mortality occurs in the recreational fishery (Figure 14); therefore, this assessment will cover recreational mortality and management in Criteria 1 and 3, respectively. Landings have been dominated by the recreational fishery in recent years: in all fisheries, landings remain below the level of landings where fishing mortality rate at which $F_{30\%}$ can be attained ($L_{F30\%}$), discards are above the level of discards where fishing mortality rate at which $F_{30\%}$ can be attained ($D_{F30\%}$) through most of the moratorium years (SEDAR 2016c).

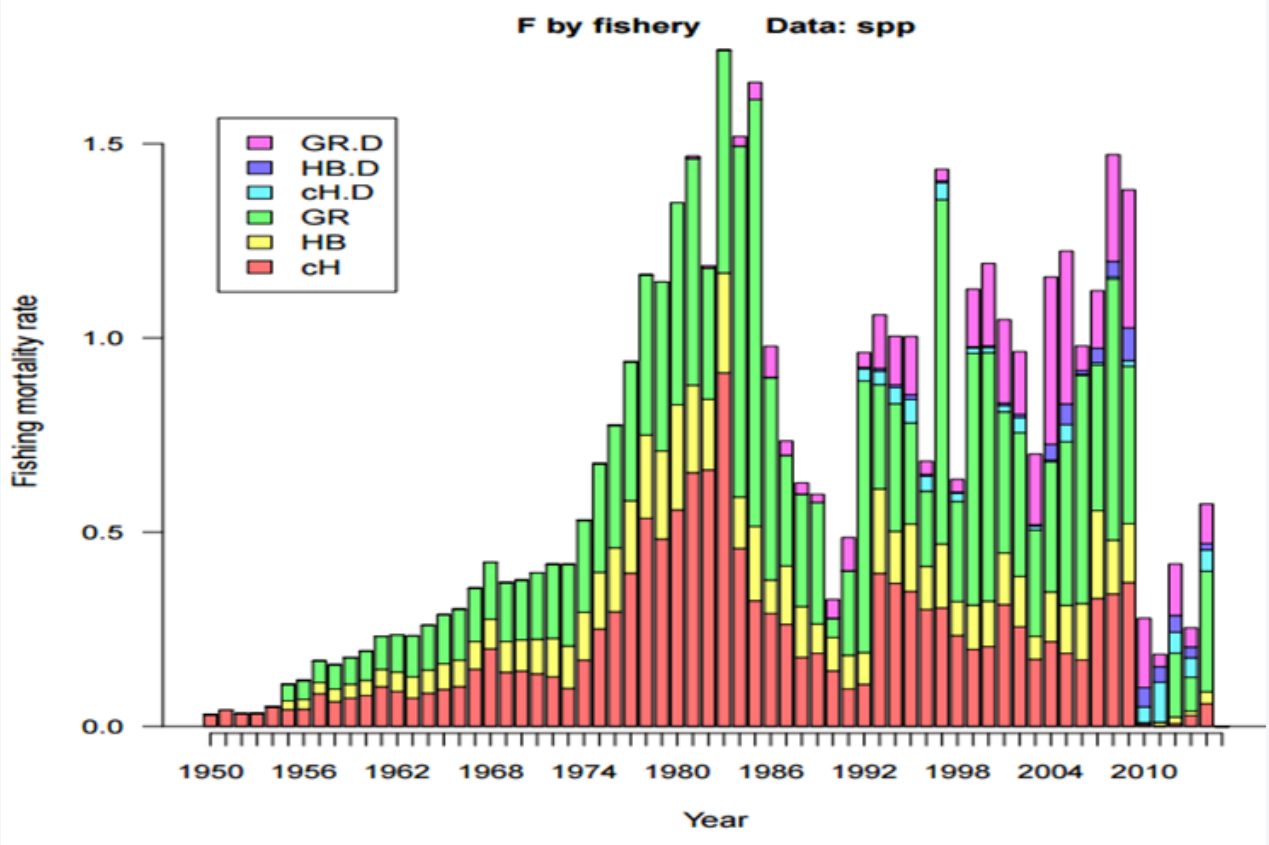

Figure 14 Estimated fishing mortality per year per fleet: cH = commercial handline, HB = headboat, GR = general recreation, D = discard mortality Source: (SEDAR 2016c).

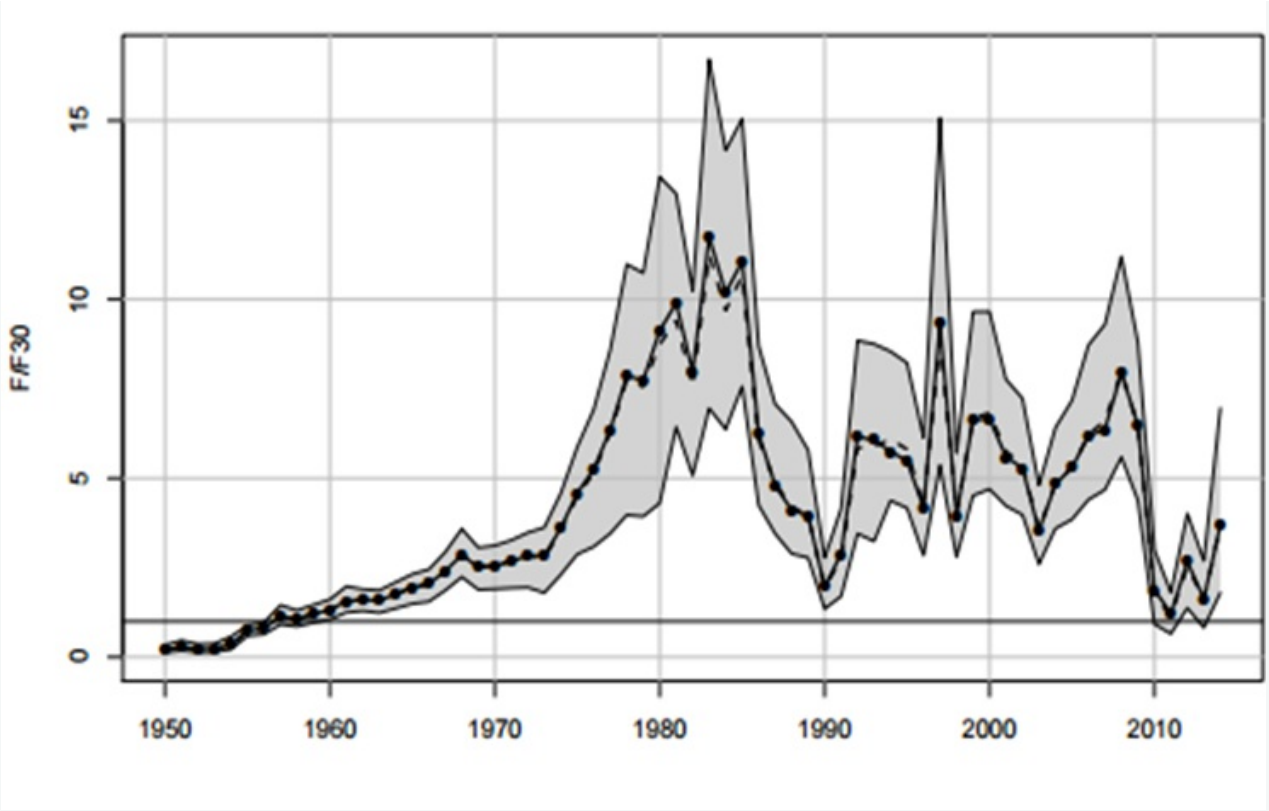

Figure 15 F relative to F30% in the SA Red Snapper fishery 1950 – 2014. Source: (SEDAR 2016c)

Discarding of juvenile red snapper is a large source of mortality in the SA (discard mortality ranges from 28% to 48% in the commercial fishery and 20% to 36% in the recreational fishery) (SEDAR 2016c). Other factors that affect mortality rates include the size of fish, temperature, and predation; however, there is a lack of data regarding discard mortality (SEDAR 2016c).

VERMILION SNAPPER

Factor 1.1 - Abundance

UNITED STATES OF AMERICA/WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, VERMILION SNAPPER

Very Low Concern

The last stock assessment update for vermilion snapper in the SA was published in April 2018. SSB_{2016}/MSST = 1.51 and SSB_{2016}/SSB_{MSY} = 1.13 (SEDAR 2018c)(Figure 16). Therefore, the biomass is above both the LRP and the TRP but is quite close to MSY. The age structure in the 2016 model run showed there is an increasing proportion of old fish compared to previous years, with strong recruitment in the 2000s and slightly fewer young fish. There was average- to below-average recruitment in recent years (SEDAR 2018c).

Since a recent stock assessment suggests that biomass is above the target reference point with no scientific controversy, Seafood Watch scores vermilion snapper in the South Atlantic as a "very low" concern

Justification:

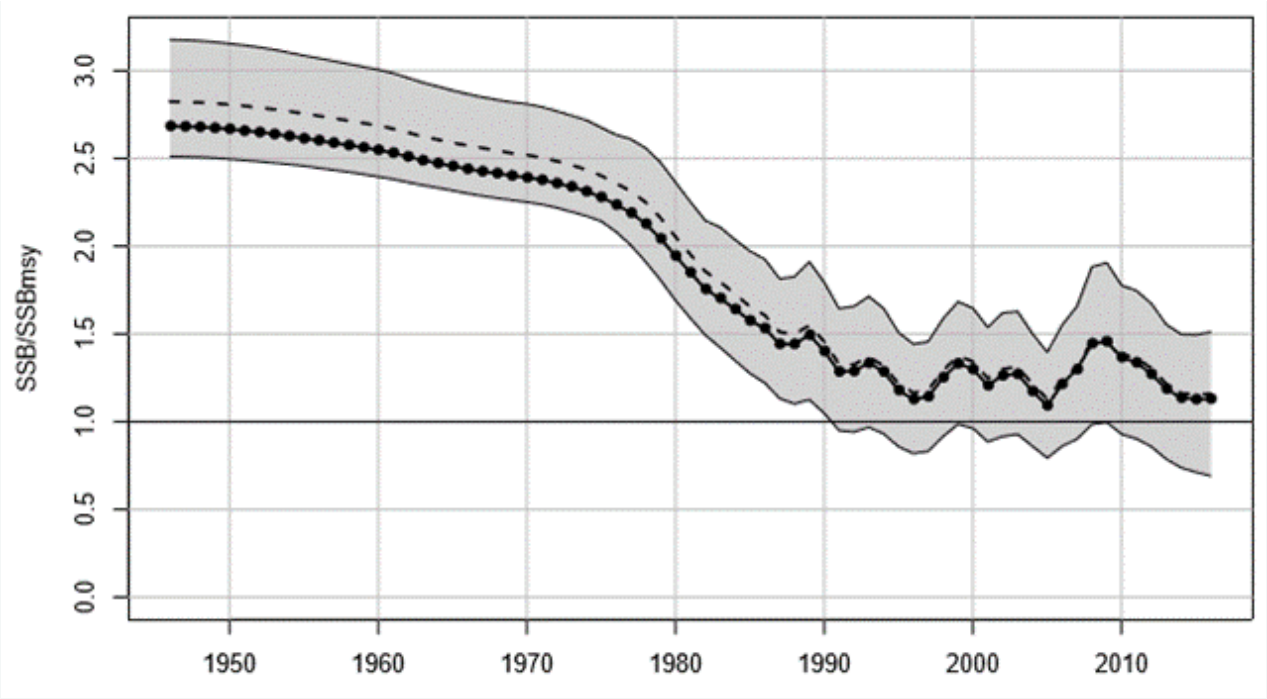

Figure 16 Estimated time series of spawning biomass relative to SSBMSY. Solid line indicates estimates from base run of the Beaufort Assessment Model; dashed lines represent median values; gray error bands indicate 5th and 95th percentiles of the MCB trials. Source: (SEDAR 2018c)

UNITED STATES OF AMERICA/GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, VERMILION SNAPPER

Very Low Concern

$SSB_{Current}/MSST_{FSPR30\%}$ = 1.40 and $SSB_{Current}/ SSB_{FSPR30\%}$ = 1.05 (SEDAR 2016d). The vermilion snapper stock is healthy and is above the target reference point (TRP) and LRP in 2014. The stock is not overfished, though may have been overfished during years 1986 to 2006. The species' ability to quickly recover from overfishing (relative to other snapper species), is attributable to its fast growth rates, moderate level of natural mortality and young maturity (SEDAR 2016d).

Since the recent robust stock assessment suggests that the stock is above or fluctuating around a TRP, abundance is deemed a "very low" concern.

Justification:

The GOM vermilion snapper stock was first assessed in 1991 (GMFMC 2012b). By the 1996 assessment, a decrease in landings, CPUE, and mean fish size indicated that the stock was showing signs of overfishing (Porch and Cass-Calay 2001). The 2001 assessment concluded that the GOM vermilion snapper stock was overfished with overfishing occurring. The update (2011), concluded that the stock is neither overfished nor undergoing overfishing with $SSB_{2010}/SSB_{SPR30\%}$ = 1.55 and $SSB_{2010}/MSST$ = 2.07 (SEDAR 2011a). SSB had declined to the lowest levels recorded. Since the year 2000, SSB has been slowly increasing; recruitment has fluctuated considerably (Figure 18) (SEDAR 2016d).

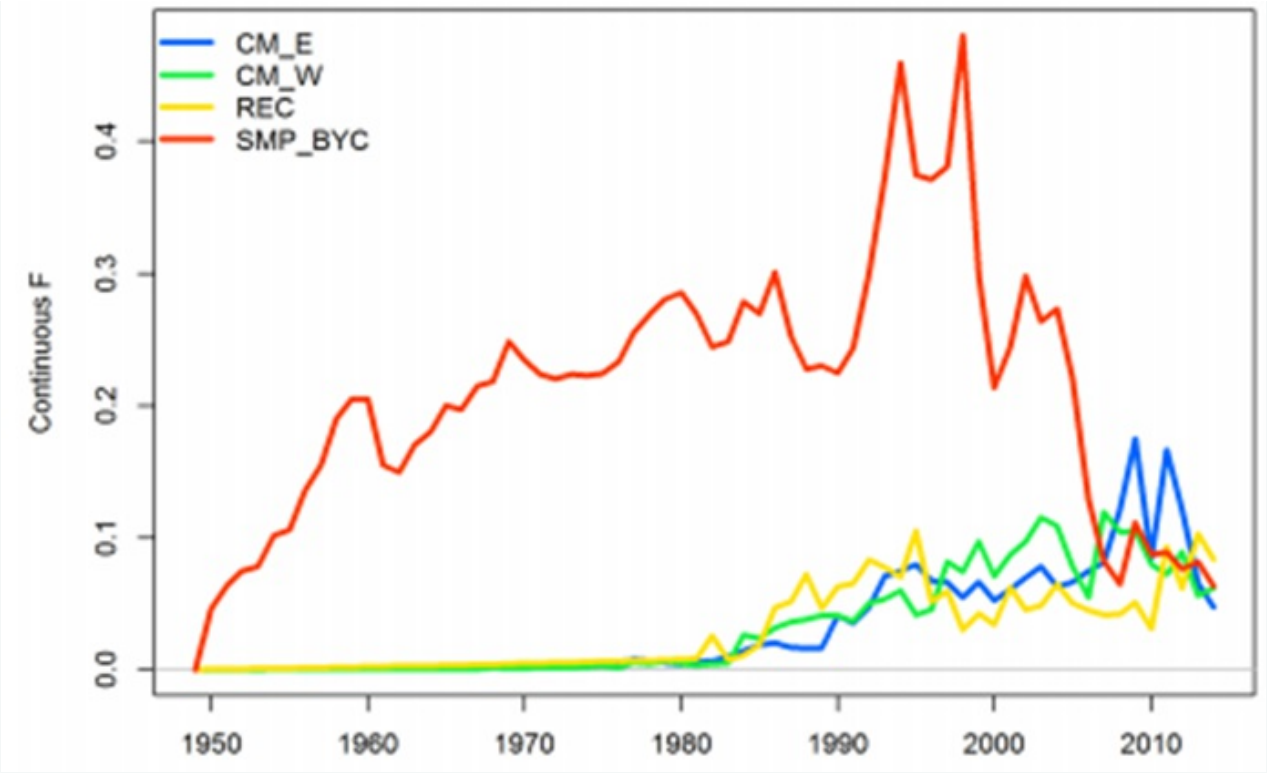

Figure 17 Fishing mortality by fleet. Cm = commercial, Rec = recreational, SMP_BYC= shrimp bycatch. Source: (SEDAR 2016d)

Factor 1.2 - Fishing Mortality

UNITED STATES OF AMERICA/WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, VERMILION SNAPPER

Low Concern

The most recent update stock assessment in the SA vermilion fishery found that the current F (with the geometric mean from the period 2014 to 2016), was estimated by the base run to be $F_{2014-2016}/F_{MSY}$ = 0.609, and the median value was $F_{2014-2016}/F_{MSY}$ = 0.564 (SEDAR 2018c) (Figure 17). There is much uncertainty in the assessment (see Justification) but there is less than a 50% chance that fishing mortality is less than the sustainable level. Since fishing mortality is much lower than F_{MSY}, the stock is considered to be a "low" concern.

Justification:

Around 83.2% of MCB runs agreed with the base run that the stock is currently not experiencing overfishing, but there is "much uncertainty in the terminal years," which is demonstrated in Figure 17 (SEDAR 2018c).

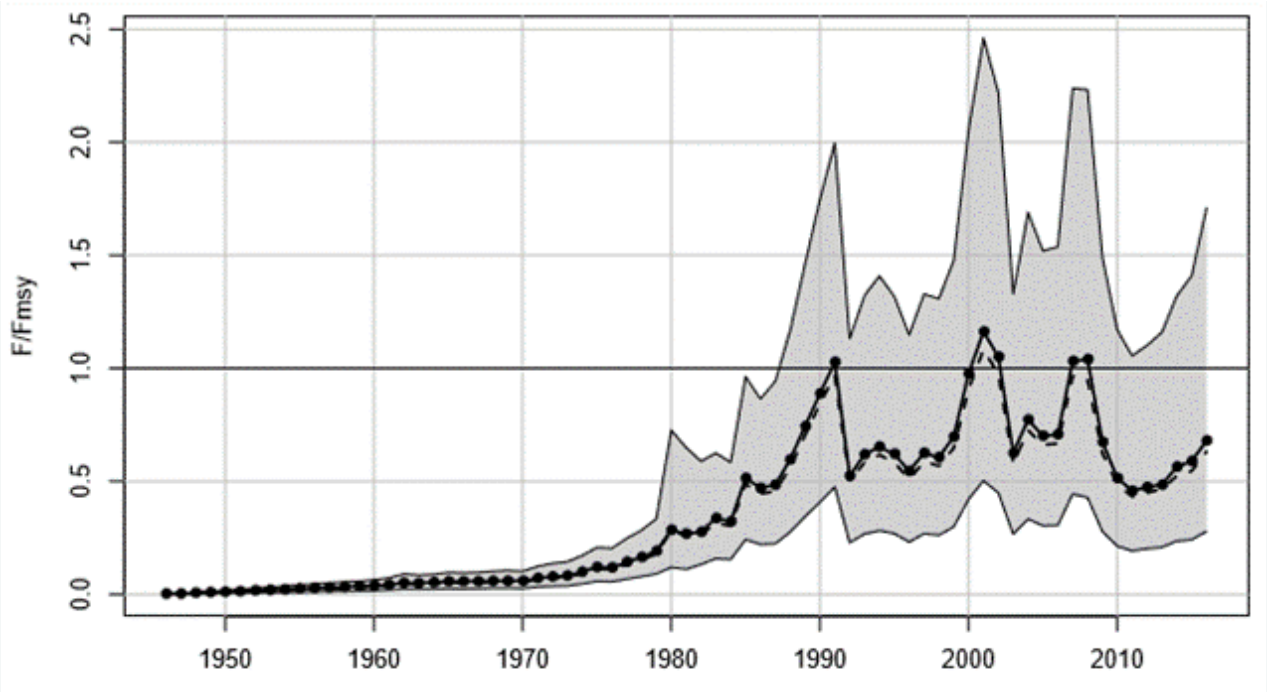

Figure 18 Estimated time series of F relative to FMSY. Solid line indicates estimates from base run of the Beaufort Assessment Model; dashed lines represent median values; gray error bands indicate 5th and 95th percentiles of the MCB trials. Source: (SEDAR 2018c)

UNITED STATES OF AMERICA/GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, VERMILION SNAPPER

Low Concern

$F_{CURRENT}/MFMT_{FSPR30\%}$ = 0.73 (SEDAR 2016d), the population is currently not experiencing overfishing. Since the last assessment, there has been a reduction in mortality and therefore fishing mortality is deemed as "low" concern.

Justification:

The most recent stock assessment indicated that fishing mortality (F) relative to F_{MSY} and $F_{SPR30\%}$ is 0.73, indicating that the population is currently not experiencing overfishing (SEDAR 2016d). An acceptable biological catch (ABC) has been recommended by the Scientific and Statistical Committee (SSC) for GOM vermilion snapper such that when commercial landings reach an acceptable target set by the GMFMC, the fishery is closed (FishWatch 2016b) (SEDAR 2011a).

In the 2011 stock assessment update, the SSC recommended that the ABC could be increased (SEDAR 2011a). At this time, the GMFMC has opted not to increase the annual catch limit (ACL) of GOM vermilion snapper: Southeast Data, Assessment, and Review (SEDAR) report 45 advised that the yield could be moderately increased; however, considering the uncertainty (attributable to model inputs such as natural mortality, length-weight relationship) in the assessments, the current yields are suitable with projected ABCs.

The decrease in fishing mortality is due to decreases in bycatch from the shrimp trawl fishery and recent decreases in commercial exploitation in the eastern GOM. There is a rise in recreational mortality, which is larger than commercial mortality (Figure 19).

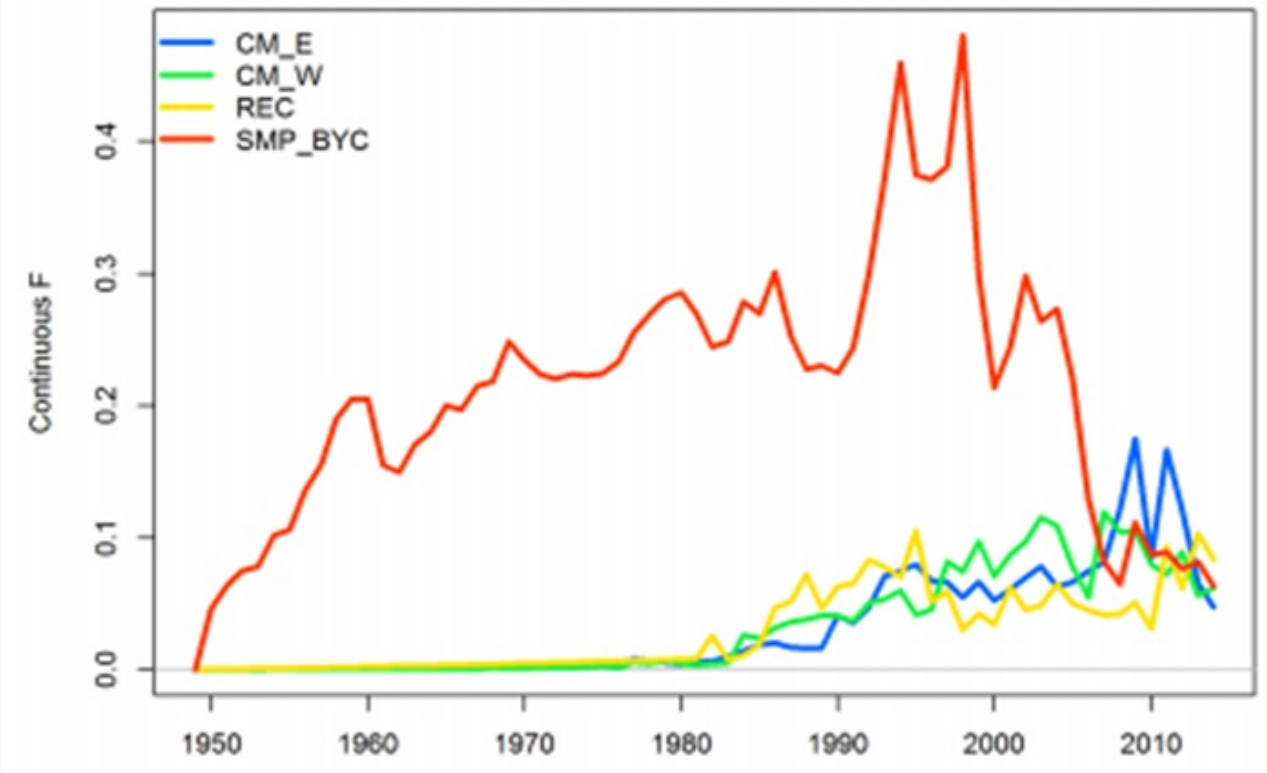

Figure 19 Fishing mortality by fleet. Cm = commercial, Rec = recreational, SMP_BYC= shrimp bycatch. Source: (SEDAR 2016d)

YELLOWTAIL SNAPPER

Factor 1.1 - Abundance

UNITED STATES OF AMERICA/GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, YELLOWTAIL SNAPPER
UNITED STATES OF AMERICA/WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, YELLOWTAIL SNAPPER

Very Low Concern

Yellowtail snapper in the SA and GOM have a $SSB_{2011}/SSB_{30\%SPR}$ of 1.21 (NMFS 2012b). The most recent stock assessment was conducted in 2012, SEDAR 27. It indicated that the stock is not overfished with high recruitment, but has experienced some decline in abundance (especially for the yellowtail snapper in the age-12 group) (SEDAR 2012a). The NOAA Fisheries' 2017 Third Quarter Report to Congress (NMFS 2017b) updated the B/B_{MSY} proxy to 3.36; therefore, biomass is above the TRP.

The GOM and SA unit are often managed together. They are monitored together since they are a single genetic stock and because the effort is concentrated in the Florida Keys area which straddles both the GOM and SA jurisdictions. For this report, the stock will be considered as a single stock. Since the stock is above the LRP and TRP, the abundance is deemed a "very low" concern.

Factor 1.2 - Fishing Mortality

UNITED STATES OF AMERICA/GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, YELLOWTAIL SNAPPER
UNITED STATES OF AMERICA/WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, YELLOWTAIL SNAPPER

Low Concern

Since the last stock assessment, yellowtail snapper landings have slightly decreased in the GOM commercial fishery. In the recreational fishery, there have been vast fluctuations in landings: recorded landings show 294,538 fish were caught in 2012, whereas, 563,273 fish were caught in 2015 (Gulf Info 2016b). F_{2010}: $F_{30\%SPR}$ = 0.154 for the SA and GOM (SEDAR 2012a) indicating that the population is currently not experiencing overfishing. Therefore, fishing mortality is deemed a "low" concern.

Criterion 2: Impacts on Other Species

All main retained and bycatch species in the fishery are evaluated under Criterion 2. Seafood Watch defines bycatch as all fisheries-related mortality or injury to species other than the retained catch. Examples include discards, endangered or threatened species catch, and ghost fishing. Species are evaluated using the same guidelines as in Criterion 1. When information on other species caught in the fishery is unavailable, the fishery's potential impacts on other species is scored according to the Unknown Bycatch Matrices, which are based on a synthesis of peer-reviewed literature and expert opinion on the bycatch impacts of each gear type. The fishery is also scored for the amount of non-retained catch (discards) and bait use relative to the retained catch. To determine the final Criterion 2 score, the score for the lowest scoring retained/bycatch species is multiplied by the discard/bait score. The Criterion 2 rating is determined as follows:

- *Score >3.2=Green or Low Concern*
- *Score >2.2 and ≤=3.2=Yellow or Moderate Concern*
- *Score ≤=2.2=Red or High Concern*

Rating is Critical if Factor 2.3 (Fishing Mortality) is Crtitical

Guiding Principles

- *Ensure all affected stocks are healthy and abundant.*
- *Fish all affected stocks at sustainable level.*
- *Minimize bycatch.*

Criterion 2 Summary

Only the lowest scoring main species is/are listed in the table and text in this Criterion 2 section; a full list and assessment of the main species can be found in Appendix A.

RED SNAPPER - UNITED STATES OF AMERICA/GULF OF MEXICO - VERTICAL LINES - UNITED STATES OF AMERICA - RED SNAPPER					
Subscore:	**1.000**	**Discard Rate:**	**1.00**	**C2 Rate:**	**1.000**
Species	**Abundance**		**Fishing Mortality**	**Subscore**	
Speckled hind	1.00:High Concern		1.00:High Concern	Red (1.000)	
Greater amberjack	1.00:High Concern		1.00:High Concern	Red (1.000)	
Red porgy	1.00:High Concern		3.00:Moderate Concern	Red (1.732)	
Gray triggerfish	1.00:High Concern		3.00:Moderate Concern	Red (1.732)	
Snowy grouper	1.00:High Concern		3.00:Moderate Concern	Red (1.732)	
Scamp	1.00:High Concern		3.00:Moderate Concern	Red (1.732)	
Silk snapper	2.33:Moderate Concern		3.00:Moderate Concern	Yellow (2.644)	
Gag	2.33:Moderate Concern		5.00:Low Concern	Green (3.413)	
Red grouper	3.67:Low Concern		5.00:Low Concern	Green (4.284)	
King mackerel	5.00:Very Low Concern		5.00:Low Concern	Green (5.000)	

Vermilion snapper	5.00:Very Low Concern	5.00:Low Concern	Green (5.000)

RED SNAPPER - UNITED STATES OF AMERICA/WESTERN CENTRAL ATLANTIC - VERTICAL LINES - UNITED STATES OF AMERICA - RED SNAPPER					
Subscore:	**1.000**	**Discard Rate:**	**1.00**	**C2 Rate:**	**1.000**
Species	**Abundance**	**Fishing Mortality**	**Subscore**		
Red grouper	1.00:High Concern	1.00:High Concern	Red (1.000)		
Scamp	1.00:High Concern	3.00:Moderate Concern	Red (1.732)		
Red porgy	1.00:High Concern	5.00:Low Concern	Yellow (2.236)		
Gray triggerfish	2.33:Moderate Concern	3.00:Moderate Concern	Yellow (2.644)		
Almaco jack	2.33:Moderate Concern	3.00:Moderate Concern	Yellow (2.644)		
Greater amberjack	2.33:Moderate Concern	3.00:Moderate Concern	Yellow (2.644)		
Gag	3.67:Low Concern	3.00:Moderate Concern	Green (3.318)		
Black seabass	2.33:Moderate Concern	5.00:Low Concern	Green (3.413)		
Atlantic sharpnose shark	5.00:Very Low Concern	5.00:Low Concern	Green (5.000)		
Vermilion snapper	5.00:Very Low Concern	5.00:Low Concern	Green (5.000)		

VERMILION SNAPPER - UNITED STATES OF AMERICA/GULF OF MEXICO - VERTICAL LINES - UNITED STATES OF AMERICA - VERMILION SNAPPER					
Subscore:	**1.000**	**Discard Rate:**	**1.00**	**C2 Rate:**	**1.000**
Species	**Abundance**	**Fishing Mortality**	**Subscore**		
Speckled hind	1.00:High Concern	1.00:High Concern	Red (1.000)		
Greater amberjack	1.00:High Concern	1.00:High Concern	Red (1.000)		
Gray snapper	2.33:Moderate Concern	1.00:High Concern	Red (1.526)		
Gray triggerfish	1.00:High Concern	3.00:Moderate Concern	Red (1.732)		
Red porgy	1.00:High Concern	3.00:Moderate Concern	Red (1.732)		
Scamp	1.00:High Concern	3.00:Moderate Concern	Red (1.732)		
Snowy grouper	1.00:High Concern	3.00:Moderate Concern	Red (1.732)		
Lane snapper	1.00:High Concern	5.00:Low Concern	Yellow (2.236)		
Silk snapper	2.33:Moderate Concern	3.00:Moderate Concern	Yellow (2.644)		
Red snapper	2.33:Moderate Concern	3.00:Moderate Concern	Yellow (2.644)		
Almaco jack	2.33:Moderate Concern	3.00:Moderate Concern	Yellow (2.644)		
Red grouper	3.67:Low Concern	5.00:Low Concern	Green (4.284)		

VERMILION SNAPPER - UNITED STATES OF AMERICA/WESTERN CENTRAL ATLANTIC - VERTICAL LINES - UNITED STATES OF AMERICA - VERMILION SNAPPER					
Subscore:	**1.000**	**Discard Rate:**	**1.00**	**C2 Rate:**	**1.000**

Species	Abundance	Fishing Mortality	Subscore
Red grouper	1.00:High Concern	1.00:High Concern	Red (1.000)
Red snapper	1.00:High Concern	1.00:High Concern	Red (1.000)
Red porgy	1.00:High Concern	5.00:Low Concern	Yellow (2.236)
Snowy grouper	1.00:High Concern	5.00:Low Concern	Yellow (2.236)
Gray triggerfish	2.33:Moderate Concern	3.00:Moderate Concern	Yellow (2.644)
Greater amberjack	2.33:Moderate Concern	3.00:Moderate Concern	Yellow (2.644)
Gag	3.67:Low Concern	3.00:Moderate Concern	Green (3.318)
Black seabass	2.33:Moderate Concern	5.00:Low Concern	Green (3.413)
Atlantic sharpnose shark	5.00:Very Low Concern	5.00:Low Concern	Green (5.000)

YELLOWTAIL SNAPPER - UNITED STATES OF AMERICA/GULF OF MEXICO - VERTICAL LINES - UNITED STATES OF AMERICA - YELLOWTAIL SNAPPER					
Subscore:	**1.000**	**Discard Rate:**	**1.00**	**C2 Rate:**	**1.000**

Species	Abundance	Fishing Mortality	Subscore
Speckled hind	1.00:High Concern	1.00:High Concern	Red (1.000)
Gray snapper	2.33:Moderate Concern	1.00:High Concern	Red (1.526)
Red porgy	1.00:High Concern	3.00:Moderate Concern	Red (1.732)
Lane snapper	1.00:High Concern	5.00:Low Concern	Yellow (2.236)
Red grouper	3.67:Low Concern	5.00:Low Concern	Green (4.284)
Mutton snapper	5.00:Very Low Concern	5.00:Low Concern	Green (5.000)

YELLOWTAIL SNAPPER - UNITED STATES OF AMERICA/WESTERN CENTRAL ATLANTIC - VERTICAL LINES - UNITED STATES OF AMERICA - YELLOWTAIL SNAPPER					
Subscore:	**1.000**	**Discard Rate:**	**1.00**	**C2 Rate:**	**1.000**

Species	Abundance	Fishing Mortality	Subscore
Red grouper	1.00:High Concern	1.00:High Concern	Red (1.000)
Speckled hind	1.00:High Concern	1.00:High Concern	Red (1.000)
Hogfish	1.00:High Concern	1.00:High Concern	Red (1.000)
Grunts (unspecified)	2.33:Moderate Concern	3.00:Moderate Concern	Yellow (2.644)
Black grouper	2.33:Moderate Concern	5.00:Low Concern	Green (3.413)

Blue runner	2.33:Moderate Concern	5.00:Low Concern	Green (3.413)
Lane snapper	3.67:Low Concern	5.00:Low Concern	Green (4.284)
Mutton snapper	5.00:Very Low Concern	5.00:Low Concern	Green (5.000)
Atlantic sharpnose shark	5.00:Very Low Concern	5.00:Low Concern	Green (5.000)

Data sources used to determine Criteria 2 species caught in or significantly impacted by the Gulf of Mexico and SA snapper fisheries under assessment included:

- NMFS Trip Interview Program (TIP) Aggregated Catch Composition Data 2005-2016, obtained by request on July 1, 2016. Hereafter named "TIP data"
- NOAA Bycatch report update 2013 (NOAA 2016k).
- Scientific literature (Scott-Denton and Williams 2013) (Scott-Denton et al. 2011).

Retained and bycatch species that were analyzed in this assessment have been chosen based on either the percent of the catch they make up in the snapper fishery or their conservation status (endangered, threatened, overfished, etc.). These species have been selected for discussion because they either limit the score for this criterion or they are a main catch in the fishery.

In the GOM, these species include speckled hind (*Epinephelus drummondhayi*), red porgy (*Pagrus pagrus*), snowy grouper (*Hyporthodus niveatus* or *Epinephelus niveatus*), gray triggerfish (*Balistes capriscus*), red grouper (*Epinephelus morio*), gag (*Mycteroperca microlepis*), scamp (*Mycteroperca phenax*), greater amberjack (*Seriola dumerili*), snowy grouper (*Hyporthodus niveatus* or *Hyporthodus niveatus*), silk snapper (*Lutjanus vivanus*), king mackerel (*Scomberomorus cavalla*), lane snapper (*Lutjanus synagris*), almaco jack (*Seriola rivoliana*), mutton snapper (*Lutjanus analis*) and gray snapper (*Lutjanus griseus*).

In the SA, these species include: speckled hind (*Epinephelus drummondhayi*), gag (*Mycteroperca microlepis*), red grouper (*Epinephelus morio*), snowy grouper (*Hyporthodus niveatus* or *Hyporthodus niveatus*), scamp (*Mycteroperca phenax*), gray triggerfish (*Balistes capriscus*), greater amberjack (*Seriola dumerili*), black seabass (*Centropristis striata*), almaco jack (*Seriola rivoliana*), Atlantic sharpnose shark (*Rhizoprionodon terraenovae*), hogfish (*Lachnolaimus maximus*), unspecified grunt species, black grouper (*Mycteroperca bonaci*), blue runner (*Caranx crysos*), lane snapper (*Lutjanus synagris*), mutton snapper (*Lutjanus analis*) and red porgy (*Pagrus pagrus*). Red porgy was among the most commonly caught species in an SA pilot observer study (Helies and Jamison 2013) and therefore it has been considered as part of Criteria 2.

Turtles have not been considered in this report due to their very low level of interactions with the handline snapper fishery. Loggerhead turtles (*Caretta caretta*) are listed as "threatened" through the Endangered Species Act (NOAA 2016g) due to the nest abundance declining by half from 1994 to 2010 (Lamont et al. 2012) and overall population declines by 17% in the Northern GOM (Lamont et al. 2014). Green sea turtles have been listed by the US Endangered Species Act as threatened (NOAA 2016l). Leatherback turtles have been listed as endangered since 1970 (NOAA 2016g) and designated under CITES as Appendix 1 since 1975. However, catch rates are low: green and leatherback turtle catch rates in the GOM vertical line fisheries are low and do not appear to be adversely impacting the populations (NOAA 2016i). During a recent observer study, only one turtle was captured out of nearly 90,000 fish on handline gear: loggerhead (Scott-Denton et al. 2011). Additionally, most sea turtles caught via handline gear are likely to be released alive (NOAA 2009). Since catch rates for turtles are believed to be low and the fishery is not a substantial contributor to their mortality, they will not be

assessed in Criteria 2.

The previous Seafood Watch report on red snapper, vermilion snapper, and yellowtail snapper used observer data from July 2006 to December 2009 (GMFMC 2016a). Since, then a bycatch report has followed, suggesting that the main species caught by the vertical line snapper-grouper fishery was red snapper, red grouper, vermilion snapper, red porgy (>5%), gag, and yellowtail snapper (<5%) (in terms of fish abundance of 80,128 fish caught). However, some catch rates had drastically changed e.g., scamp catches had approximately halved and yellowtail snapper catches had also decreased substantially in the recent bycatch report (Scott-Denton et al. 2011). Bycatch studies conducted in the SA targeting vermilion snapper, found that vermilion were the most frequently caught species at 81%, and no other species accounted for more than 5% of the catch (Stephen and Harris 2010).

For the vertical line gear in the GOM, speckled hind and greater amberjack limit the Criteria 2 score due to their very high vulnerability, level of uncertainty regarding stock status, fishing mortality, and "Endangered" status with the IUCN and NMFS.

For the vertical line gear in the SA, red grouper, speckled hind, and hogfish are the limiting species with a "high" concern for abundance and "moderate" concern for fishing mortality, attributable to their ETP statuses.

Criterion 2 Assessment

SCORING GUIDELINES

Factor 2.1 - Abundance

(same as Factor 1.1 above)

Factor 2.2 - Fishing Mortality

(same as Factor 1.2 above)

SPECKLED HIND

Factor 2.1 - Abundance

UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, YELLOWTAIL SNAPPER
UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, RED SNAPPER
UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, VERMILION SNAPPER

High Concern

A data-limited stock assessment for speckled hind in the Gulf of Mexico was conducted and peer reviewed through SEDAR 49 (SEDAR 2016f). Only catch data are available for speckled hind, limiting the assessment to three catch-based models. One of these models did not meet specified performance criteria within the management strategy evaluation, and another is not suitable for providing management advice because it does not take into account historic harvest levels (SEDAR 2016f). The remaining method indicates that there is greater than a 50% probability that stock biomass is below 50% of B_{MSY} (SEDAR 2016f). The GMFMC commonly sets biomass thresholds at 75% of B_{MSY} (or its proxy). The peer review concluded that data limitations prevented development of reference points for speckled hind (SEDAR 2016f) (GMFMC 2017), assuming similar reference point criteria as used for other species suggests there is an overwhelming probability that stock biomass is below a biomass threshold.

Speckled hind is listed as "Critically Endangered" by the IUCN Grouper and Wrasse Specialist Group (Chuen and Huntsman 2006a). Speckled hind have also been identified as a "species of concern" under the US Endangered Species Act, indicating there is concern regarding its status but insufficient data to inform a formal determination (NMFS 2017h).

Since speckled hind is considered a "species of concern" and has only been assessed using a data-limited assessment, which indicates poor stock status, Seafood Watch deems abundance as a “high” concern.

Justification:

SEDAR 49 uses three methods to assess the speckled hind in the GOM. The methods showed mixed results: the probability of biomass being above 50% B_{MSY} was 77.2 (CC1 method) (Figure 20) and 45.1 (Tier3BStatusQuo_ABC method); the probability of the biomass being below 20% B_{MSY} was 14.8 (CC1 method) and 43.8 (Tier3BStatusQuo_ABC method) (SEDAR 2016f). The CC1 method was preferred; however, no abundance index has been used in the assessment (Table 2.3; (SEDAR 2016f)).

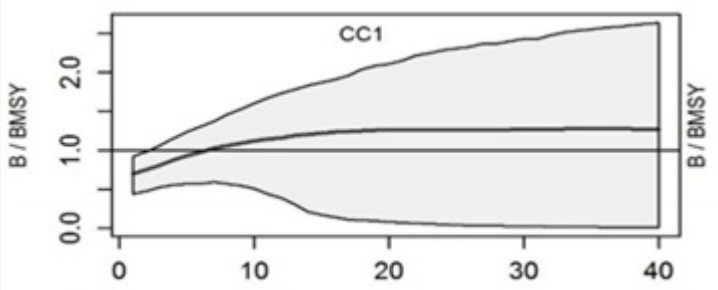

Figure 20 Ratio of biomass to biomass at maximum sustainable yield (B/BMSY) outputs for methods CC1 for Speckled Hind over the 40-year simulation period where an assessment is conducted every three years. CC1 method has been used as it was the only method to meet the performance criteria for PNOF and B50 (SEDAR 2016f). Solid black lines identify the mean across 1,000 simulations whereas the shaded area bounds the 25th and 75th percentiles.

UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, YELLOWTAIL SNAPPER

High Concern

Speckled hind is listed as "Critically Endangered" by the IUCN Grouper and Wrasse Specialist Group (Chuen and Huntsman 2006a). The last assessment for the fishery was in 2001. The 2017 NFMS’ 4th quarter update indicated that the stock status and B/B_{MSY} or B/B_{MSY} proxy for speckled hind in the SA, is unknown (NMFS 2017e).

Since the species is critically endangered, Seafood Watch deems abundance a “high” concern.

Factor 2.2 - Fishing Mortality

UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, YELLOWTAIL SNAPPER
UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, RED SNAPPER
UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, VERMILION SNAPPER

High Concern

No explicit fishing mortality reference points are defined for Gulf of Mexico speckled hind, but the data-limited methods conducted in SEDAR 49 indicate that the probability that overfishing is not occurring is between 33.1 and 73% (SEDAR 2016f).

Since data-limited methods have been used to assess the overfishing status—which yields extremely variable results and potential overfishing—Seafood Watch deems fishing mortality a "high" concern.

Justification:

While overfishing may be occurring, the majority of removals of speckled hind occur in the commercial longline fishery (SEDAR 2016f); therefore, the vertical line fishery may not be a large contributor to mortality.

UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, YELLOWTAIL SNAPPER

High Concern

Since the 2017 NFMS' 4th quarter update states that speckled hind is undergoing overfishing (NMFS 2017e), Seafood Watch deems fishing mortality a "high" concern.

Factor 2.3 - Modifying Factor: Discards and Bait Use

Goal: Fishery optimizes the utilization of marine and freshwater resources by minimizing post-harvest loss. For fisheries that use bait, bait is used efficiently.

Scoring Guidelines: The discard rate is the sum of all dead discards (i.e. non-retained catch) plus bait use divided by the total retained catch.

RATIO OF BAIT + DISCARDS/LANDINGS	FACTOR 2.3 SCORE
<100%	1
>=100	0.75

UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, YELLOWTAIL SNAPPER
UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, RED SNAPPER
UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, VERMILION SNAPPER

< 100%

Data regarding discard and bait use in the GOM reef fish fisheries are limited.

The bulk of the discards are considered regulatory discards, which include fish that are too small to be retained or that are prohibited due to closures or quotas (Stephen and Harris 2010). Some of the stock assessments on domestic fisheries contain some discard data that are attributed to a single species rather than the whole fishery (SEDAR 2010b).

Bait use in one study located in the GOM found that it mostly comprised tomtate, white grunt, pigfish, and sand perch in the vertical line fishery and 2% of the catch (number of fish) was used for bait (Scott-Denton and Williams 2013). However, Gulf reef fish species are prohibited to be used as bait (CFR §622.9 [e]).

Discard data are lacking in both fisheries: in the GOM, logbooks often claimed that "no discards" took place in fishing trips, which contradicted observer data, which found that an instance of having no discards was uncommon (McCarthy 2012). Scott-Denton et al. (2011) found that, in the vertical line fishery, 75% fish were retained, with 19% released alive, but this was with some signs of barotrauma; nearly 7% were discarded either dead, unknown, or kept for bait. Similarly, in Scott-Denton et al. (2013), 71% of the individuals were kept, 19% were released alive, and 11% were either discarded dead, unknown, or retained for bait.

Since most sources show that discarding is generally below 20% and bait use is low (<10%) in the GOM , discards and bait are less than 100% of landings, which gains a score of 1.

UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, YELLOWTAIL SNAPPER

< 100%

Data regarding discards and bait use in the commercial SA snapper-grouper fisheries are limited.

When targeting vermilion snapper in the SA, bait comprised around 14% of the catch, consisting mainly of vermilion snapper, red porgy, tomtate, bank sea bass and scamp (Stephen and Harris 2010).

The bulk of the discards are considered regulatory discards, which include fish that are too small to be retained or that are prohibited due to closures or quotas (Stephen and Harris 2010). A pilot observer program conducted from 2007 to 2009 collected information on species composition and disposition (kept or discarded) (GSAFF 2008) (GSAFF 2010). The (bait + discards)/landings ratio uses the total discarded CPUE (all species combined) divided by total retained CPUE. This ratio should be considered a minimum estimate because it does not account for bait needs, nor does it distinguish between species retained for food vs. bait. Based on 2,664 stations sampled between 2007 and 2009, the (bait + discards)/landings ratio is 29.9% (GSAFF 2008) (GSAFF 2010).

A ratio less than 100% warrants a score modifier of 1.0.

Justification:

The discard-to-landings ratio for the SA handline fishery is generally around 18%, but this figure can range vastly, mainly due to the amount of fish that have to be discarded due to landing size requirements or the moratorium; this can cause discards to far exceed the kept catch (Helies and Jamison 2013). The Gulf and South Atlantic Fisheries Foundation (2008) suggested that around 27% of catches are not retained (Gulf and South Atlantic Fisheries Foundation 2008). However, in the SA vertical line fishery, red snapper discards were shown to far exceed kept fish (Helies and Jamison 2013).

RED GROUPER

Factor 2.1 - Abundance

UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, YELLOWTAIL SNAPPER
UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, RED SNAPPER
UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, VERMILION SNAPPER

Low Concern

The most recent benchmark stock assessment for red grouper in the Gulf of Mexico was conducted through the SEDAR process with data through 2013 (SEDAR 2015c).

The assessment team developed stock status determinations using MSY-based reference points, but the review panel recommended the use of MSY proxies based on spawning potential ratio (SPR) (SEDAR 2015c). Specifically, the biomass target was set to the spawning biomass equal to 30% of maximum spawning potential, $SSB_{30\%SPR}$ = 1.204 million lb under the base model (SEDAR 2015c). Terminal year spawning biomass was estimated as SSB_{2013} = 2.223 million lb, approximately 83% greater than the biomass target and more than double the biomass threshold (SEDAR 2015c).

Spawning biomass exceeds the biomass target reference point; however, recent survey data indicate the stock is declining despite the quota not being reached in recent years (pers. comm., R. Ellis, FL FWC). This suggests some uncertainty in the stock assessment results. Although biomass appears to be above target levels, the uncertainty moderates the score for red grouper in the Gulf of Mexico to "low" concern.

UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, RED SNAPPER
UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, VERMILION SNAPPER
UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, YELLOWTAIL SNAPPER

High Concern

The last stock assessment was conducted in 2017: biomass is below the TRP (SSB_{2015}/SSB_{MSY} = 0.29) and the LRP (SSB_{2015}/MSST = 0.38)(Figure 21). The species is in a ten-year rebuilding plan, which is planned to end in 2020 (SEDAR 2017a).

Since red grouper are considered to be overfished in the South Atlantic, Seafood Watch deems abundance as a "high" concern.

Justification:

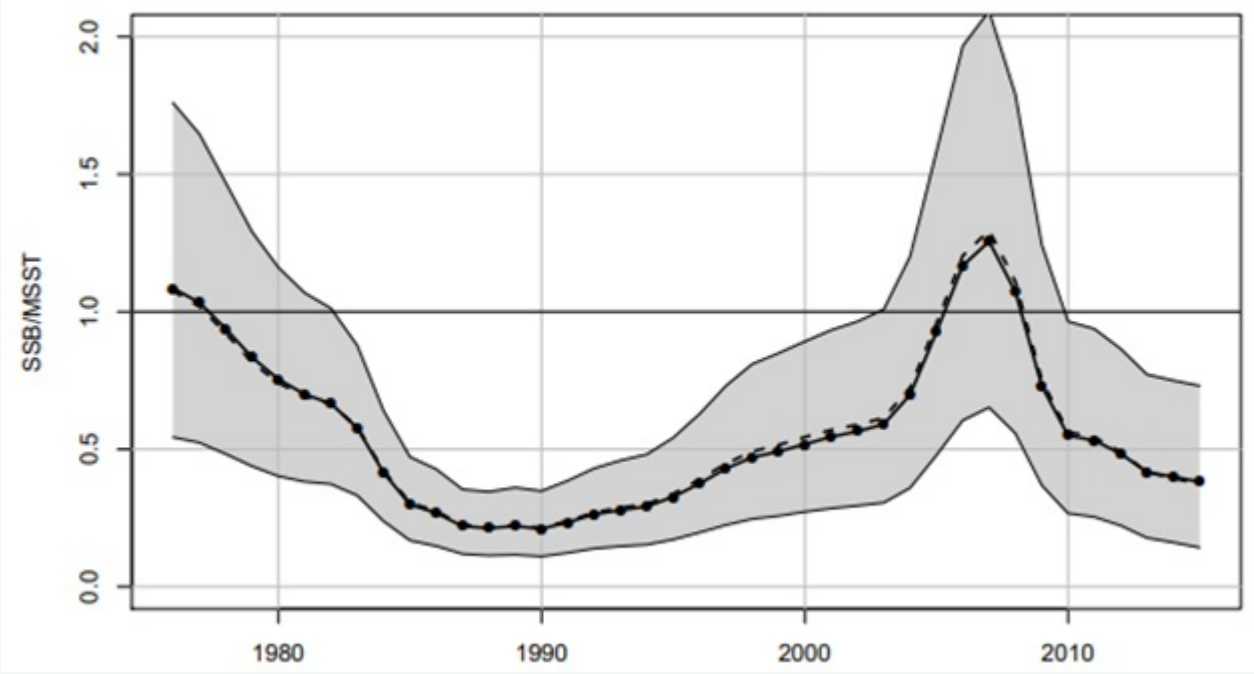

Figure 21 Estimated time series relative to benchmarks. Solid line indicates estimates from base run of the Beaufort Assessment Model; dashed lines represent median values; gray error bands indicate 5th and 95th percentiles of the MCB trials. Spawning biomass relative to the minimum stock size threshold (MSST).

Factor 2.2 - Fishing Mortality

UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, YELLOWTAIL SNAPPER
UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, RED SNAPPER
UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, VERMILION SNAPPER

Low Concern

Red grouper in the GOM is not experiencing overfishing (SEDAR 2015c)(NOAA 2016c). Fishing mortality was estimated to be below the fishing mortality at MSY in both recent stock assessments (F/F_{MSY} = 0.778 in 2008; F/F_{MSY} = 0.76 in 2013) (SEDAR 2015c).

Since red grouper are likely not to be undergoing overfishing, fishing mortality is a "low" concern.

UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, RED SNAPPER
UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, VERMILION SNAPPER
UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, YELLOWTAIL SNAPPER

High Concern

$F_{2013\text{-}2015}/F_{MSY}$ = 1.54 (Figure 22). There is some uncertainty in the stock assessment, but 89.1% of MCB runs agree that the stock is experiencing overfishing (SEDAR 2017a).

Since red grouper are likely experiencing overfishing, Seafood Watch deems fishing mortality as a "high" concern.

Justification:

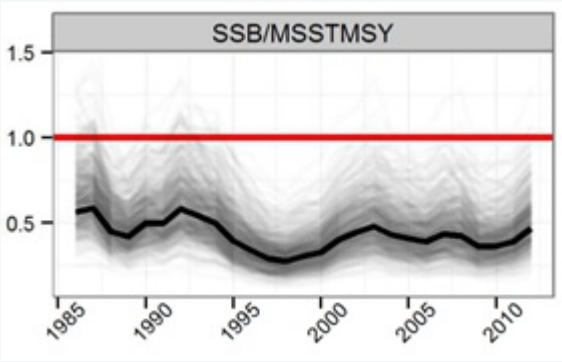

Figure 22 Figure 22. Estimated time series of F relative to FMSY. Solid line indicates estimates from base run of the Beaufort Assessment Model; dashed lines represent median values; gray error bands indicate 5th and 95th percentiles of the MCB trials (SEDAR 2017a).

Factor 2.3 - Modifying Factor: Discards and Bait Use

Goal: Fishery optimizes the utilization of marine and freshwater resources by minimizing post-harvest loss. For fisheries that use bait, bait is used efficiently.

Scoring Guidelines: The discard rate is the sum of all dead discards (i.e. non-retained catch) plus bait use divided by the total retained catch.

RATIO OF BAIT + DISCARDS/LANDINGS	FACTOR 2.3 SCORE
<100%	1
>=100	0.75

UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, YELLOWTAIL SNAPPER
UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, RED SNAPPER
UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, VERMILION SNAPPER

< 100%

Data regarding discard and bait use in the GOM reef fish fisheries are limited.

The bulk of the discards are considered regulatory discards, which include fish that are too small to be retained or that are prohibited due to closures or quotas (Stephen and Harris 2010). Some of the stock assessments on domestic fisheries contain some discard data that are attributed to a single species rather than the whole fishery (SEDAR 2010b).

Bait use in one study located in the GOM found that it mostly comprised tomtate, white grunt, pigfish, and sand perch in the vertical line fishery and 2% of the catch (number of fish) was used for bait (Scott-Denton

and Williams 2013). However, Gulf reef fish species are prohibited to be used as bait (CFR §622.9 [e]).

Discard data are lacking in both fisheries: in the GOM, logbooks often claimed that "no discards" took place in fishing trips, which contradicted observer data, which found that an instance of having no discards was uncommon (McCarthy 2012). Scott-Denton et al. (2011) found that, in the vertical line fishery, 75% fish were retained, with 19% released alive, but this was with some signs of barotrauma; nearly 7% were discarded either dead, unknown, or kept for bait. Similarly, in Scott-Denton et al. (2013), 71% of the individuals were kept, 19% were released alive, and 11% were either discarded dead, unknown, or retained for bait.

Since most sources show that discarding is generally below 20% and bait use is low (<10%) in the GOM , discards and bait are less than 100% of landings, which gains a score of 1.

UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, RED SNAPPER
UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, VERMILION SNAPPER
UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, YELLOWTAIL SNAPPER

< 100%

Data regarding discards and bait use in the commercial SA snapper-grouper fisheries are limited.

When targeting vermilion snapper in the SA, bait comprised around 14% of the catch, consisting mainly of vermilion snapper, red porgy, tomtate, bank sea bass and scamp (Stephen and Harris 2010).

The bulk of the discards are considered regulatory discards, which include fish that are too small to be retained or that are prohibited due to closures or quotas (Stephen and Harris 2010). A pilot observer program conducted from 2007 to 2009 collected information on species composition and disposition (kept or discarded) (GSAFF 2008) (GSAFF 2010). The (bait + discards)/landings ratio uses the total discarded CPUE (all species combined) divided by total retained CPUE. This ratio should be considered a minimum estimate because it does not account for bait needs, nor does it distinguish between species retained for food vs. bait. Based on 2,664 stations sampled between 2007 and 2009, the (bait + discards)/landings ratio is 29.9% (GSAFF 2008) (GSAFF 2010).

A ratio less than 100% warrants a score modifier of 1.0.

Justification:

The discard-to-landings ratio for the SA handline fishery is generally around 18%, but this figure can range vastly, mainly due to the amount of fish that have to be discarded due to landing size requirements or the moratorium; this can cause discards to far exceed the kept catch (Helies and Jamison 2013). The Gulf and South Atlantic Fisheries Foundation (2008) suggested that around 27% of catches are not retained (Gulf and South Atlantic Fisheries Foundation 2008). However, in the SA vertical line fishery, red snapper discards were shown to far exceed kept fish (Helies and Jamison 2013).

GREATER AMBERJACK

Factor 2.1 - Abundance

UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, RED SNAPPER
UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, VERMILION SNAPPER

High Concern

SSB_{2015}/MSST = 0.40 (Figure 23). Greater amberjack are currently overfished and have been overfished in all years since ~ 1987. The SSB has been slightly increasing since 2010 and has plateaued in recent years (SEDAR 2016g). Greater amberjack in the GOM were in a 10-year rebuilding plan, but did not achieve the rebuilding target. Therefore a new plan was implemented in January 2016 with a target of rebuilding by 2019 (NMFS 2017e). Due to its overfished status, Seafood Watch deems abundance as a "high" concern.

Justification:

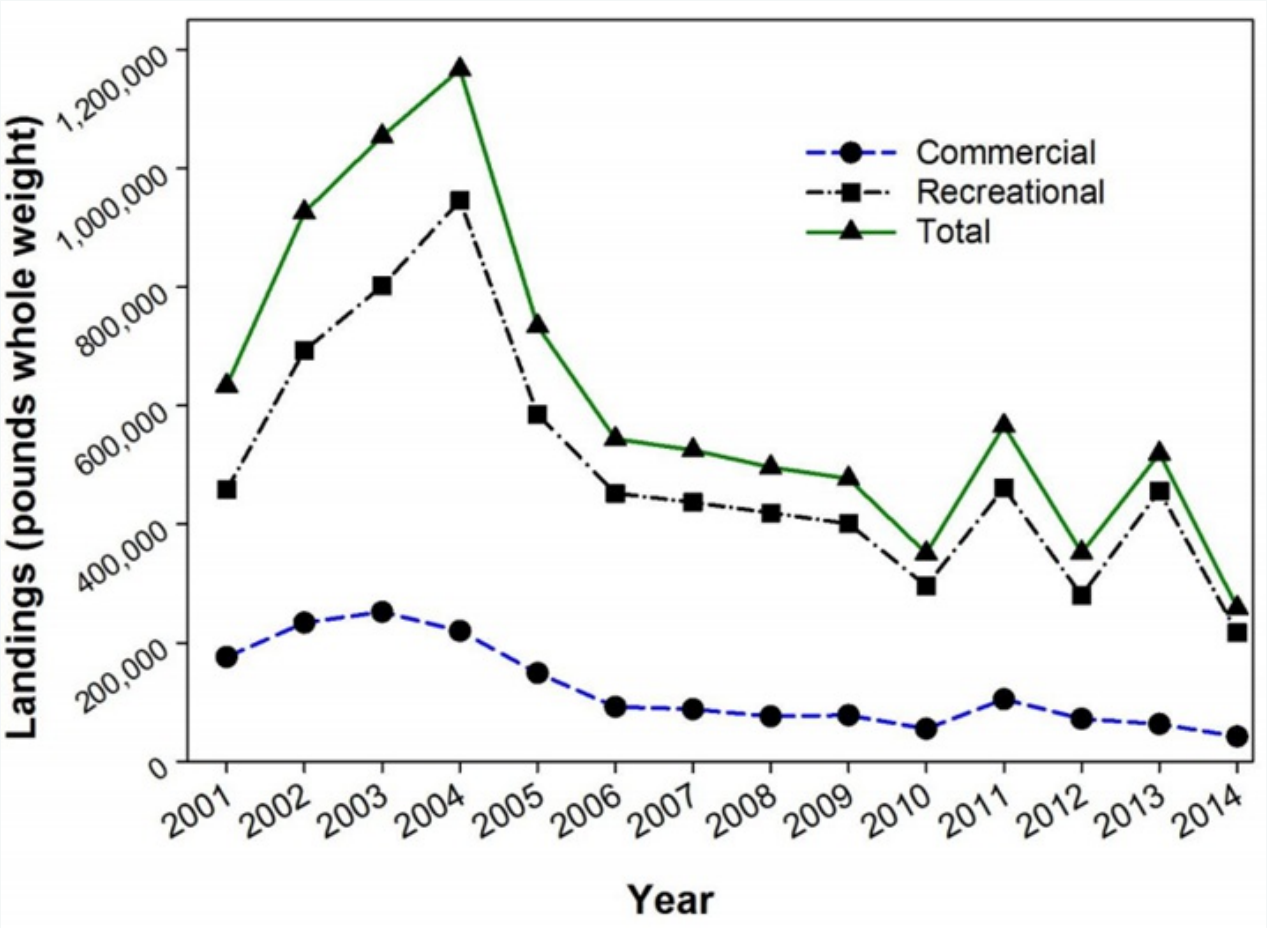

Figure 23 Gulf of Mexico Gray Triggerfish recreational, commercial, and total landings in pounds whole weight from 2001 through 2014. Source: Commercial landings from commercial ACL dataset (data accessed December 24, 2015). Recreational landings from the recreational ACL dataset (data accessed July 11, 2016). Source: (GMFMC 2016d).

UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, RED SNAPPER
UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, VERMILION SNAPPER

Moderate Concern

The most recent stock assessment in 2008 evaluated greater amberjack in the South Atlantic as not overfished as of 2006, with the SSB near the target level of biomass at maximum sustainable yield and well above the LRP of minimum sustainable stock size (SSB/SSB_{MSY} = 1.10, SSB/MSST = 1.46) (SEDAR 2008c). South Atlantic greater amberjack has not been assessed or analyzed since 2008, so the last stock assessment uses data that are over ten years old (SEDAR 2008c). A new stock assessment is due in December 2018 (SEDAR 2017c).

Since stock assessments use data that are over ten years old and Seafood Watch deems the stock status as unknown, a PSA has been used to determine greater amberjack abundance. Since the PSA deems greater amberjack to have medium vulnerability, Seafood Watch deems abundance as a "moderate" concern.

Justification:

Productivity-Susceptibility Analysis:

Since the PSA calculates V = 2.889, vulnerability is scored medium.

ATTRIBUTE	RESULT	SCORE
Productivity Attribute		
Average age-at-maturity	1.3 years (Harris et al. 2011)	1
Average maximum age	17 years (Manooch and Potts 1997)	2
Fecundity	15–50 million eggs per female in the Atlantic (FAO 2018)	1
Average maximum size	190 cm TL male/unsexed (Paxton et al.1989)	2
Average size-at-maturity	73.3cm (Harris et al. 2011)	2
Reproductive strategy	Broadcast spawner (Whitehead et al. 1986)	1
Trophic level	4.5 (Froese and Pauly 2018a)	3
Quality of habitat	Moderately altered from non-fishing sources (SAFMC 2017i).	2
Susceptibility Attribute		
Areal overlap	Unknown	3
Vertical overlap	18-360 (Harris et al. 2011)	3
Selectivity of fishery	Unknown	2
Post-Capture mortality	Unknown but discards are low (SAFMC 2013e) and therefore, most are likely retained	3

P = 1.75

P^2 = 3.0625

S = 2.325

S^2 = 5.4056

V = 2.910004

Factor 2.2 - Fishing Mortality

UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, RED SNAPPER
UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, VERMILION SNAPPER

High Concern

$F_{CURRENT}$/MFMT=1.68. Greater amberjack has been undergoing overfishing since 1985 (SEDAR 2016g). Since the species is undergoing overfishing, Seafood Watch deems fishing mortality as a "high" concern.

UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, RED SNAPPER
UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, VERMILION SNAPPER

Moderate Concern

Greater amberjack along the South Atlantic Coast is not subject to overfishing (NOAA 2017e).

In the most recent 2008 stock assessment, fishing mortality was estimated to be 53% of the target level of fishing at MSY (F/F_{MSY} = 0.53), and fishing mortality consistently declined over the years 1999 to 2006 (SEDAR 2008c).

Since there hasn't been a stock assessment for over ten years and therefore fishing mortality is unknown, but greater amberjack are not considered to be undergoing overfishing, Seafood Watch deems fishing mortality as a "moderate" concern.

Factor 2.3 - Modifying Factor: Discards and Bait Use

Goal: Fishery optimizes the utilization of marine and freshwater resources by minimizing post-harvest loss. For fisheries that use bait, bait is used efficiently.

Scoring Guidelines: The discard rate is the sum of all dead discards (i.e. non-retained catch) plus bait use divided by the total retained catch.

RATIO OF BAIT + DISCARDS/LANDINGS	FACTOR 2.3 SCORE
<100%	1
>=100	0.75

UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, RED SNAPPER
UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, VERMILION SNAPPER

< 100%

Data regarding discard and bait use in the GOM reef fish fisheries are limited.

The bulk of the discards are considered regulatory discards, which include fish that are too small to be retained or that are prohibited due to closures or quotas (Stephen and Harris 2010). Some of the stock assessments on domestic fisheries contain some discard data that are attributed to a single species rather than the whole fishery (SEDAR 2010b).

Bait use in one study located in the GOM found that it mostly comprised tomtate, white grunt, pigfish, and sand perch in the vertical line fishery and 2% of the catch (number of fish) was used for bait (Scott-Denton and Williams 2013). However, Gulf reef fish species are prohibited to be used as bait (CFR §622.9 [e]).

Discard data are lacking in both fisheries: in the GOM, logbooks often claimed that "no discards" took place in fishing trips, which contradicted observer data, which found that an instance of having no discards was uncommon (McCarthy 2012). Scott-Denton et al. (2011) found that, in the vertical line fishery, 75% fish were retained, with 19% released alive, but this was with some signs of barotrauma; nearly 7% were discarded either dead, unknown, or kept for bait. Similarly, in Scott-Denton et al. (2013), 71% of the individuals were kept, 19% were released alive, and 11% were either discarded dead, unknown, or retained for bait.

Since most sources show that discarding is generally below 20% and bait use is low (<10%) in the GOM , discards and bait are less than 100% of landings, which gains a score of 1.

UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, RED SNAPPER
UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, VERMILION SNAPPER

< 100%

Data regarding discards and bait use in the commercial SA snapper-grouper fisheries are limited.

When targeting vermilion snapper in the SA, bait comprised around 14% of the catch, consisting mainly of vermilion snapper, red porgy, tomtate, bank sea bass and scamp (Stephen and Harris 2010).

The bulk of the discards are considered regulatory discards, which include fish that are too small to be retained or that are prohibited due to closures or quotas (Stephen and Harris 2010). A pilot observer program conducted from 2007 to 2009 collected information on species composition and disposition (kept or discarded) (GSAFF 2008) (GSAFF 2010). The (bait + discards)/landings ratio uses the total discarded CPUE (all species combined) divided by total retained CPUE. This ratio should be considered a minimum estimate because it does not account for bait needs, nor does it distinguish between species retained for food vs. bait. Based on 2,664 stations sampled between 2007 and 2009, the (bait + discards)/landings ratio is 29.9% (GSAFF 2008) (GSAFF 2010).

A ratio less than 100% warrants a score modifier of 1.0.

Justification:

The discard-to-landings ratio for the SA handline fishery is generally around 18%, but this figure can range vastly, mainly due to the amount of fish that have to be discarded due to landing size requirements or the moratorium; this can cause discards to far exceed the kept catch (Helies and Jamison 2013). The Gulf and South Atlantic Fisheries Foundation (2008) suggested that around 27% of catches are not retained (Gulf and South Atlantic Fisheries Foundation 2008). However, in the SA vertical line fishery, red snapper discards were shown to far exceed kept fish (Helies and Jamison 2013).

RED SNAPPER

Factor 2.1 - Abundance

UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, RED SNAPPER
UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, VERMILION SNAPPER

Moderate Concern

Maximum Sustainable Yield (MSY) is undetermined for the GOM red snapper fishery since the stock-recruitment variable is incalculable. The 2018 stock assessment used proxy reference points to determine the biomass for GOM red snapper, where the limit reference point (LRP) is spawning stock biomass $(SSB)_{CURRENT}$/minimum stock size threshold (MSST) ratio is $SSB_{CURRENT}$/MSST, which is estimated at 1.41. The target reference point (TRP) is $SSB_{CURRENT}/SSB_{FSPR26\%}$ = 0.7 , where SPR is the spawning potential ratio (SEDAR 2018b)(Figure 12). However, $SSB_{CURRENT}/SSB_0$ is 0.18 (SEDAR 2018b) and Seafood Watch standards require that appropriate reference points do not allow biomass to fall below 30% of B_0. The stock is in a rebuild program with a target date of 2032 (SEDAR 2018b).

The red snapper's biological status has changed from overfished in the 2015 assessment to not overfished in the recent 2018 assessment. These changes are the result of stock recovery, but also important changes to the reference point MSST (discussed below) (SEDAR 2018b).

Since the 2018 stock assessment deems that GOM red snapper is no longer overfished, the SSB is well above the LRP, but below the TRP and well below virgin levels, Seafood Watch deems abundance as a "moderate" concern.

Justification:

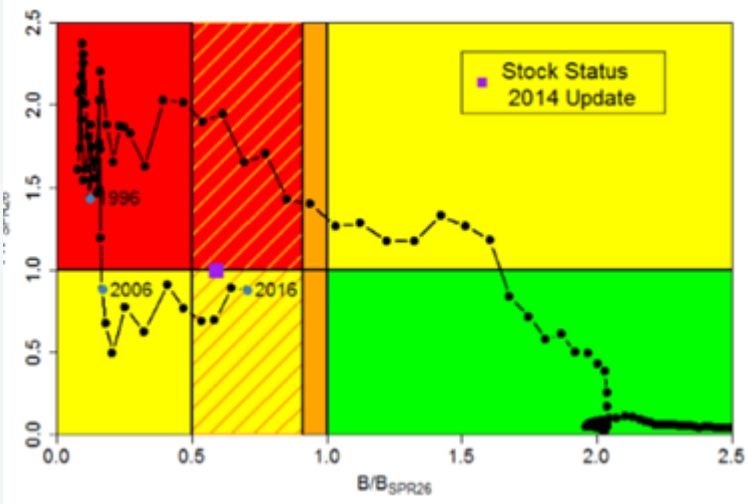

Figure 24 Kobe plot showing the timeseries of stock status for the SEDAR 52 Base Model. Orange coloring

indicates the region where the stock is below the biomass target (SSBSPR26%), but above the old biomass threshold (MSSTOLD). The orange striped region represents the region where the stock is below the biomass target (SSBSPR26%), but above the current biomass threshold (MSSTNEW). The purple square represents the terminal year stock status estimated by the 2014 SEDAR 31 Update Assessment (SEDAR 2018b).

According to reference points, GOM red snapper have been overfished since 1988, but managers believe that the tide is shifting (SEDAR 2005) (GMFMC 2011b). Stock abundance and commercial landings have exhibited declines in the long-term. In the short-term, trends are increasing due to high recruitment and the presence of strong year classes between 2004 and 2006, particularly in the western component of the fishery (SEDAR 2009a).

There have been significant differences between the results of the last two stock assessments: the most recent GOM red snapper stock assessment (published in 2018) declared that the stock is no longer overfished. The previous report (published in 2015) estimated $SSB_{2013}/SSB_{FSPR26\%} = 0.54$; deeming the stock as overfished (Cass-Calay et al. 2015); biomass was showing signs of increasing, but was well below the LRP (Cass-Calay et al. 2015).

These changes have largely been a result of the reduction in MSST. MSST has reduced due to changes in how it is calculated, following requirements in Amendment 44 of the Gulf of Mexico Reef Fish Fishery Management Plan. In the previous stock assessment, MSST was calculated as "(1-M) * $SSB_{FSPR26\%}$, where M = 0.09 (i.e., the average value of M from the Lorenzen M curve for fully selected ages)" (Cass-Calay et al. 2015). This has been changed to 0.5 * $SSB_{FSPR26\%}$ (SEDAR 2018b). If the previous MSST calculation had still been used with the most up-to-date stock information, the 2018 stock assessment states "the red snapper resource would still be considered overfished ($SSB_{2016}/MSST_{OLD} = 0.77$)" (SEDAR 2018b).

The biggest uncertainty in the 2018 stock assessment is still the poor understanding of the stock-recruit relationship (SEDAR 2018b). This has meant that MSY is incalculable. The stock-recruit function relationship is poorly defined because of the unpredictable recruitment and a lack of data. Proxies have been created to replace MSY. The SPR of $SPR_{26\%}$ has been selected as the optimal proxy. However, $SPR_{26\%}$ does not include recruitment into the calculation and, therefore, does not aim to determine the maximum yield for economic gain. An SPR at 26% has been considered as too low a percentage for such a long-lived species (SEDAR 2013b). Other proxies of varying SPR including $F_{SPR22\%}$, $F_{SPR24\%}$, $F_{SPR30\%}$ and F_{SPRmax} or $F_{SPR20\%}$ have been suggested. When $F_{SPR30\%}$ was considered, it was suggested that $F_{SPR26\%}$ would be the optimum proxy for MSY. If a different proxy to the current one is adopted, the projected rebuild timeframe would also likely change; the Magnuson-Stevens Act would require the rebuild timeframe to be 10 years or less, which could require stricter management measures to be implemented (SEDAR 2015h).

Another important issue with the red snapper stock assessment is the difference in recovery in the eastern and western regions of the GOM. In general red snapper have been steadily rebuilding across both regions since the mid-2000s, but rebuilding in the eastern region appears to have leveled off or declined over the last 3 to 5 years. The population sizes in the eastern region are expected to decline rapidly, while the western region's sizes are continuing to steadily rebuild (SEDAR 2018b).

UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, RED SNAPPER
UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, VERMILION SNAPPER

High Concern

The 2016 stock assessment estimated that $SSB_{2014}/MSST = 0.22$ and $SSB_{2014}/SSB_{F30\%} = 0.16$. Therefore, red

snapper in the South Atlantic is deemed overfished (SEDAR 2016c). There is no MSY determined, as the stock-recruitment variable is incalculable, therefore $SSB_{2014}/SSB_{F30\%}$ serves as a proxy for MSY.

SA red snapper is in a rebuilding plan, which is discussed in Criterion 3.

Due to its overfished status, abundance is deemed a "high" concern.

Justification:

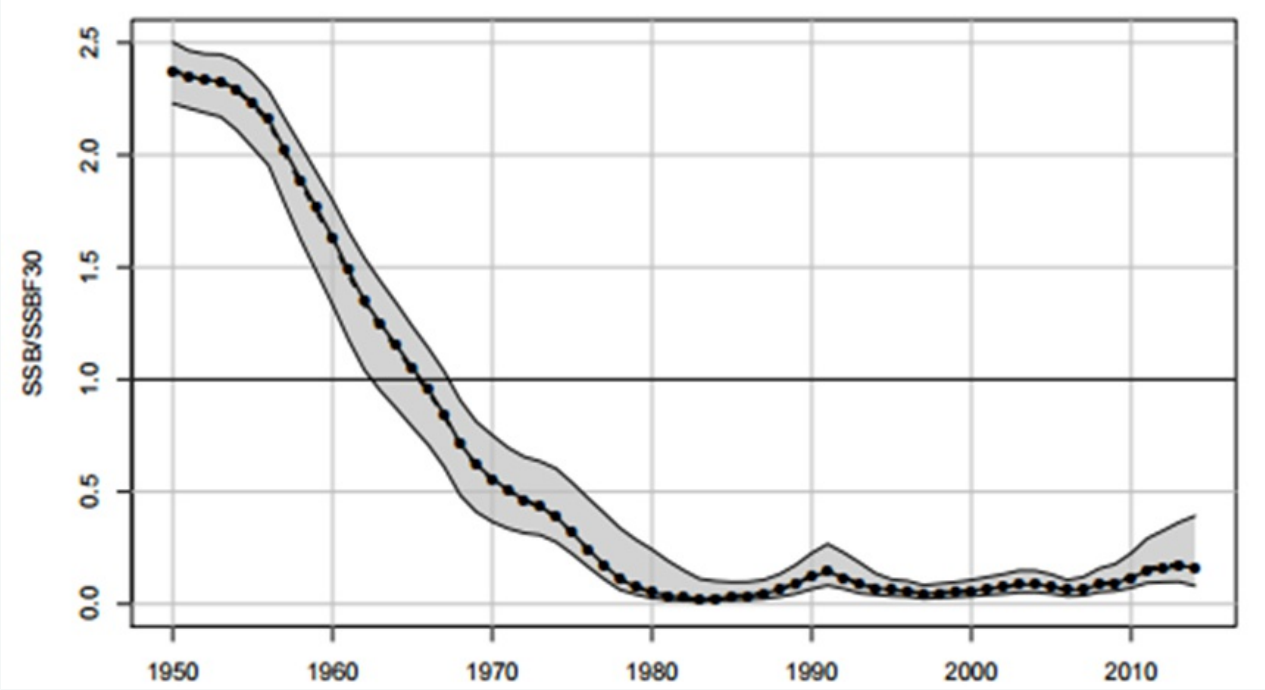

Figure 25 SA Red Snapper biomass relative to SSBF30%. Source: (SEDAR 2016c)

In the late 1980s, the ratio of the SSB to the MSST declined steeply and has been static since (SEDAR 2010b). The 2009 biomass was estimated at $SSB_{2009}/MSST=0.09$ (SEDAR 2010b) and increased to $SSB_{2014}/MSST=0.22$ in the most recent assessment (Figure 13). In the recent assessment, most indices of abundance show that the stock is increasing (Figure 1) (SEDAR 2017b). The previous two stock assessments are associated with high levels of uncertainty; therefore, the validity of the assessment's results are in question (SEDAR 2010b) (SEDAR 2016c). The likelihood of meeting rebuilding timeframe targets is limited by the stock's demographics, which is heavily truncated to younger fish: 84% of the sampled fish were below age 7 and the maximum age was 21 years (less than half of the expected life span of 50 years). Rebuilding time may be delayed because young mature snapper produce fewer eggs than older snapper (Lowerre-Barbieri et al. 2014).

Factor 2.2 - Fishing Mortality

UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, RED SNAPPER
UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, VERMILION SNAPPER

Moderate Concern

$F_{CURRENT}/MFMT = 0.823$ (SEDAR 2018b) (Figure 12) where MFMT is the maximum fishing mortality threshold (defined as $F_{SPR26\%}$). Overfishing is not occurring. Fishing mortality is fluctuating around sustainable proxy

levels, and has decreased since previous stock assessments. There is concern that the 2017 landings (which have not been included in the 2018 stock assessment) may change the outcome of the overfishing status due to quota overages (of 50%) in the private sector (NOAA 2017f).

Since fishing mortality trending downwards and is fluctuating around the F_{MSY} proxy, fishing mortality is rated as a "moderate" concern.

Justification:

While overfishing is not occurring, some concerns about the long-term prognosis of the stock remain. The most recent stock assessment does not contain the provisional landings data for 2017 (SEDAR 2018b); yet, in 2017, the length of the recreational seasons was extended by 39 days (NOAA 2017f) and the state water management area in Louisiana were increased from 0 to 3 miles to 0 to 9 miles in 2016 (NMFS 2017d), which has caused the private (the recreational fishery accounts for just over half of the GOM red snapper quota (GMFMC 2017c) (50 CFR §622.2017) red snapper sector to exceed its ACL by over 50% (NOAA 2017f). The Department of Commerce stated that the overages will likely delay the rebuilding timeline by six years, but will still allow the continued growth of the stock (albeit at a reduced rate) (50 CFR §622.2017).

Other sources of mortality originate mainly from recreational fishery, discards (in both the commercial and recreational fisheries) and when snapper are caught as bycatch in the shrimp trawl fishery. In three out of the past five years, the recreational fishery has exceeded its quota (NMFS 2016a). Additionally, discards contribute to a major source of red snapper fishing mortality in the GOM (NMFS 2016b), particularly due to barotrauma (where large changes in pressure causes swim bladders to inflate) (NMFS 2016b). Discard mortality is variable according to depth, handling techniques, gear type, speed of retrieval from depths, and the size of the fish, water/air temperature and predation (Cass-Calay et al. 2015). Reliable discard estimates are unavailable, yet critical in estimating overall fishing mortality.

Historically, a main source of GOM red snapper fishing mortality has been attributed to shrimp trawls: the shrimp fishery has been estimated to cause up to 90% of age-0 and 1 red snapper mortality (Brandt and Jackson 2013). Therefore, shrimp trawls operating in the US South Atlantic and western GOM have been required to use bycatch reduction devices (BRDs) since 1997 (GMFMC 2016c). Many authors have claimed that the reduction in shrimp trawl effort (by around 75% to 85% ((SEDAR 2009a) (Hart et al. 2012)) and reduction of red snapper bycatch in the shrimp trawl fishery, was instrumental in reducing overall red snapper mortality (Gillig et al. 2001) (Peabody 2004) (Saillant et al. 2006) (McDonough 2009)).

UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, RED SNAPPER
UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, VERMILION SNAPPER

High Concern

$F_{2012\text{-}2014}/F_{SPR30\%}$= 2.52 (Figure 15). Overfishing is occurring, with fishing mortality estimated at levels 2 ½ times that recommended in the rebuilding projection $F_{SPR30\%}$ (SEDAR 2016c). Like the red snapper in the GOM, the stock assessment cannot use MSY to determine the optimal yield (OY) due to an incalculable stock-recruitment relationship, therefore SPR30% is used as a proxy. High levels of mortality are caused by the commercial and recreational fishery.

Since the stock is experiencing overfishing, Seafood Watch deems fishing mortality as a "high" concern.

Justification:

Through the 1970s, estimated fishing mortality rates steadily increased and have been widely variable in the

past few decades (SEDAR 2010b). The 2008 SA red snapper stock assessment indicated that the SA red snapper stock was overfished and undergoing overfishing (SEDAR 2008b). In response to this assessment, fishery managers began developing Amendment 17A to the snapper-grouper Fishery Management Plan (FMP) that would draw out long-term stock rebuilding measures (SAFMC 2010a).

The 2010 SA red snapper stock assessment indicated that any mortality in the directed fishery along with additional mortality in the indirect fisheries would cause overfishing to continue (SEDAR 2010b). Therefore, managers implemented a moratorium on all red snapper landings until further notice.

In 2012, the moratorium was lifted and a commercial "mini-season" was opened with a quota set for 20,818 lb (Newswire 2012). Managers assess the fishery on a yearly basis using fishery dependent and independent data to modify the harvest limits and to ensure fishing mortality does not exceed F_{MSY} (Newswire 2012).

In 2013, the SAFMC and the National Oceanic Atmospheric Association (NOAA) implemented a process to ensure that any removals (landings plus discards) must not exceed the number of fish required for rebuild. In 2014, mini-seasons continued, though landings exceeded quotas. An increased allowance of landings have been permitted under Amendment 28, which denotes that a limited harvest is allowed depending on the last year's harvest and available stock (NOAA 2013). Since 2014 quotas were exceeded, both the commercial and recreational fishery were closed in 2015; however, discard mortality rates remained high (NOAA 2015b). The fishery remained closed throughout 2016 as the total removals in 2015 were estimated to be 162,729 more fish than recommended by scientific advice to ensure stock recovery (where 114,000 fish were recommended and 276,729 fish were removed) (NOAA 2016b). Landings have decreased over time (Figure 14) and the fishery was closed in the 2016 season (NOAA 2016b). Both the recreational and commercial SA red snapper fisheries are open in 2018: and the commercial fishery will close when the ACL of 124,815 lb ww or 12,854 fish is reported, or by December 31, 2018 (further management measures mandated in the 2018 season are discussed in Criteria 3) (SAFMC 2018h).

An overwhelming majority of mortality occurs in the recreational fishery (Figure 14); therefore, this assessment will cover recreational mortality and management in Criteria 1 and 3, respectively. Landings have been dominated by the recreational fishery in recent years: in all fisheries, landings remain below the level of landings where fishing mortality rate at which $F_{30\%}$ can be attained ($L_{F30\%}$), discards are above the level of discards where fishing mortality rate at which $F_{30\%}$ can be attained ($D_{F30\%}$) through most of the moratorium years (SEDAR 2016c).

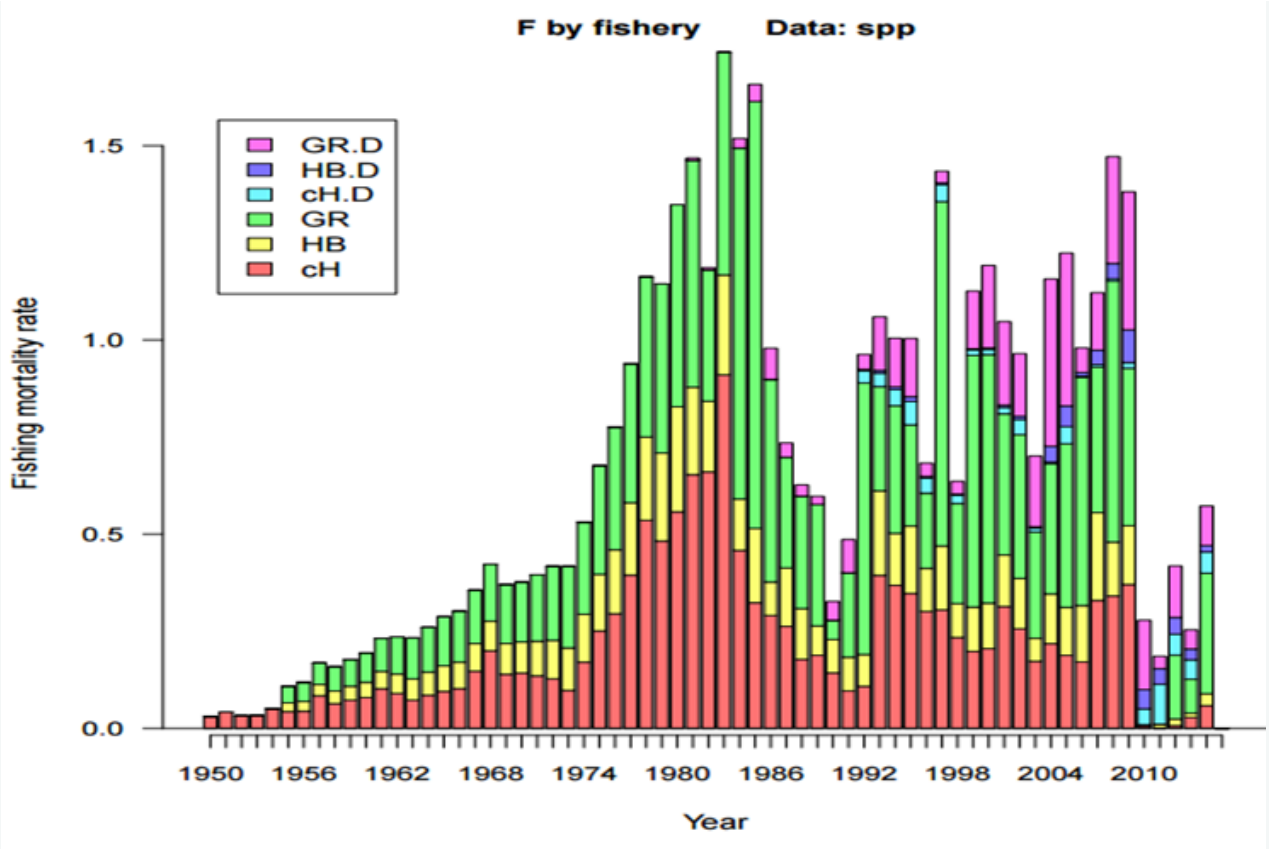

Figure 26 Estimated fishing mortality per year per fleet: cH = commercial handline, HB = headboat, GR = general recreation, D = discard mortality Source: (SEDAR 2016c).

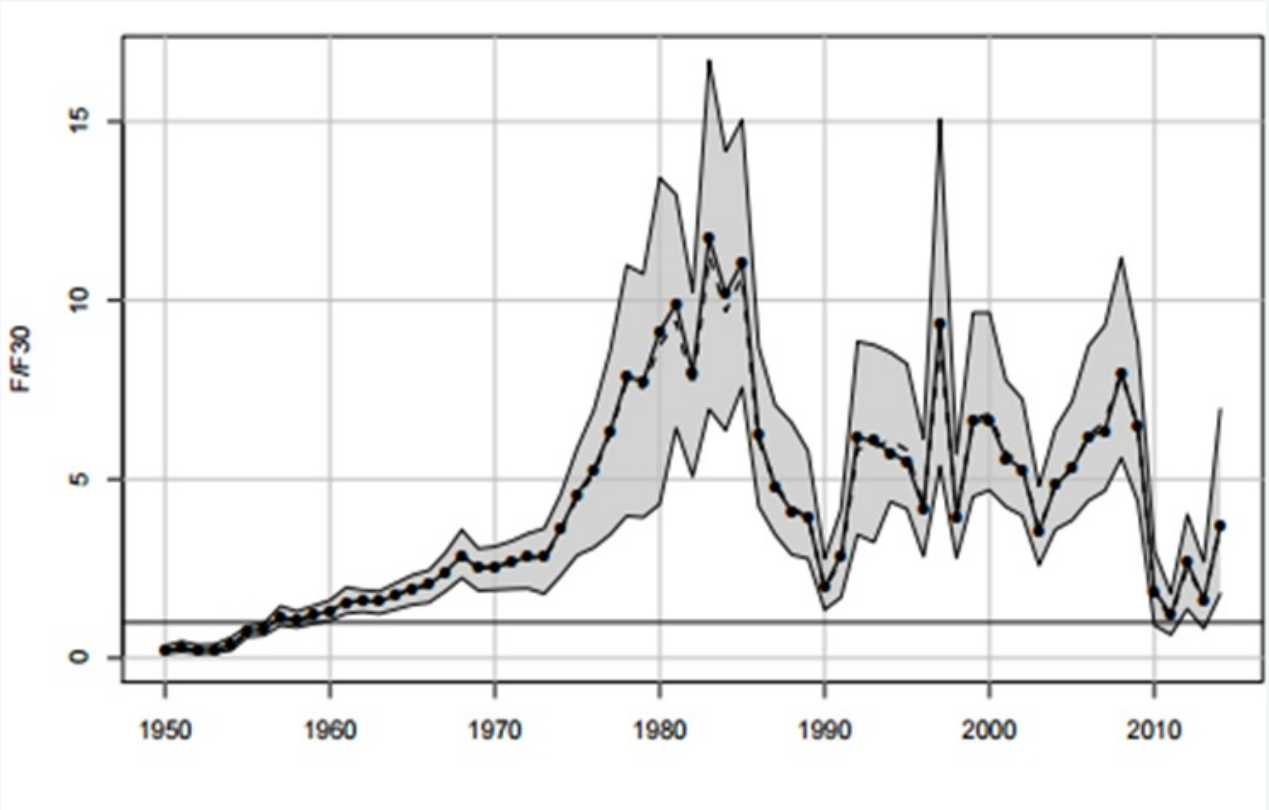

Figure 27 F relative to F30% in the SA Red Snapper fishery 1950 – 2014. Source: (SEDAR 2016c)

Discarding of juvenile red snapper is a large source of mortality in the SA (discard mortality ranges from 28% to 48% in the commercial fishery and 20% to 36% in the recreational fishery) (SEDAR 2016c). Other factors that affect mortality rates include the size of fish, temperature, and predation; however, there is a lack of data regarding discard mortality (SEDAR 2016c).

Factor 2.3 - Modifying Factor: Discards and Bait Use

Goal: Fishery optimizes the utilization of marine and freshwater resources by minimizing post-harvest loss. For fisheries that use bait, bait is used efficiently.

Scoring Guidelines: The discard rate is the sum of all dead discards (i.e. non-retained catch) plus bait use divided by the total retained catch.

RATIO OF BAIT + DISCARDS/LANDINGS	FACTOR 2.3 SCORE
<100%	1
>=100	0.75

UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, VERMILION SNAPPER

< 100%

Data regarding discard and bait use in the GOM reef fish fisheries are limited.

The bulk of the discards are considered regulatory discards, which include fish that are too small to be retained or that are prohibited due to closures or quotas (Stephen and Harris 2010). Some of the stock assessments on domestic fisheries contain some discard data that are attributed to a single species rather than the whole fishery (SEDAR 2010b).

Bait use in one study located in the GOM found that it mostly comprised tomtate, white grunt, pigfish, and sand perch in the vertical line fishery and 2% of the catch (number of fish) was used for bait (Scott-Denton and Williams 2013). However, Gulf reef fish species are prohibited to be used as bait (CFR §622.9 [e]).

Discard data are lacking in both fisheries: in the GOM, logbooks often claimed that "no discards" took place in fishing trips, which contradicted observer data, which found that an instance of having no discards was uncommon (McCarthy 2012). Scott-Denton et al. (2011) found that, in the vertical line fishery, 75% fish were retained, with 19% released alive, but this was with some signs of barotrauma; nearly 7% were discarded either dead, unknown, or kept for bait. Similarly, in Scott-Denton et al. (2013), 71% of the individuals were kept, 19% were released alive, and 11% were either discarded dead, unknown, or retained for bait.

Since most sources show that discarding is generally below 20% and bait use is low (<10%) in the GOM , discards and bait are less than 100% of landings, which gains a score of 1.

UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, VERMILION SNAPPER

< 100%

Data regarding discards and bait use in the commercial SA snapper-grouper fisheries are limited.

When targeting vermilion snapper in the SA, bait comprised around 14% of the catch, consisting mainly of vermilion snapper, red porgy, tomtate, bank sea bass and scamp (Stephen and Harris 2010).

The bulk of the discards are considered regulatory discards, which include fish that are too small to be retained or that are prohibited due to closures or quotas (Stephen and Harris 2010). A pilot observer program conducted from 2007 to 2009 collected information on species composition and disposition (kept or discarded) (GSAFF 2008) (GSAFF 2010). The (bait + discards)/landings ratio uses the total discarded CPUE (all species combined) divided by total retained CPUE. This ratio should be considered a minimum estimate because it does not account for bait needs, nor does it distinguish between species retained for food vs. bait. Based on 2,664 stations sampled between 2007 and 2009, the (bait + discards)/landings ratio is 29.9% (GSAFF 2008) (GSAFF 2010).

A ratio less than 100% warrants a score modifier of 1.0.

Justification:

The discard-to-landings ratio for the SA handline fishery is generally around 18%, but this figure can range vastly, mainly due to the amount of fish that have to be discarded due to landing size requirements or the moratorium; this can cause discards to far exceed the kept catch (Helies and Jamison 2013). The Gulf and South Atlantic Fisheries Foundation (2008) suggested that around 27% of catches are not retained (Gulf and South Atlantic Fisheries Foundation 2008). However, in the SA vertical line fishery, red snapper discards were shown to far exceed kept fish (Helies and Jamison 2013).

HOGFISH

Factor 2.1 - Abundance

UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, YELLOWTAIL SNAPPER

High Concern

Hogfish have historically been managed as a single stock within the US South Atlantic and Gulf of Mexico; however, recent genetic analysis indicates several distinct stocks within this management area (SAFMC 2013f).

The last assessment assessed three separate stocks: the Western Florida (WFL), the Florida Keys and East Florida (FLK/EFL), and Georgia to North Carolina (GA-NC)(SAFMC 2013f). Subsequently, Amendment 37 was passed which split the SAFMC management unit into two separate stocks, consistent with the genetic evidence presented in the stock assessment (SAFMC 2017g). The following analysis is relevant to the FLK/EFL stock of hogfish under SAFMC rule. Amendment 37 defined MSY-based reference points for the FLK/EFL stock of Hogfish (SAFMC 2017g). The biomass threshold is defined as 75% of the equilibrium spawning biomass that would occur at a fishing mortality equal to the fishing mortality target (0.75*SSB = 856.64 MT) (SEDAR 2013f). Terminal year spawning biomass was estimated as 399.29 MT, indicating the stock is overfished (SSB_{2012}/MSST = 0.466) (Figure 24) (SEDAR 2013f). Further, the IUCN lists hogfish as "Vulnerable" with declining biomass (Choat et al. 2010).

Since the FLK/EFL stock of Hogfish is deemed overfished, Seafood Watch deems abundance as a "high" concern.

Justification:

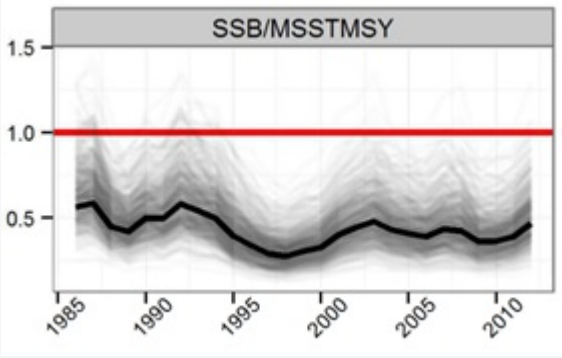

Figure 28 Figure 24. Time-series of stock status time series for the FLK-EFL stock for the 500 bootstrap iterations (lighter gray lines) and the base model configuration (solid darker lines). Red line represents reference point. (SEDAR 2013f).

Factor 2.2 - Fishing Mortality

UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, YELLOWTAIL SNAPPER

High Concern

Amendment 37 establishes the fishing mortality threshold as 0.138 (SAFMC 2017g). The base run of the recent stock assessment for FLK/EFL hogfish estimated terminal year fishing mortality as 0.219 (SAFMC 2013d), indicating that the stock is undergoing overfishing (Figure 25).

Uncertainty analyses suggested that this finding is robust, and the 2017 NFMS' 4th quarter update indicates overfishing is occurring (NMFS 2017e).

Since the FLK/EFL stock of Hogfish is undergoing overfishing, Seafood Watch deems abundance as a "high" concern.

Justification:

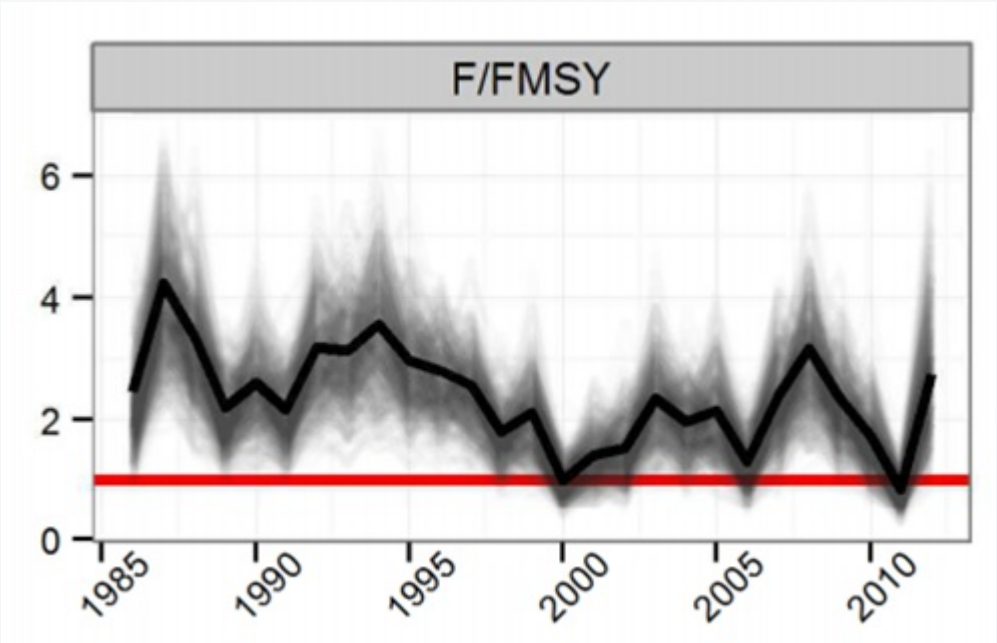

Figure 29 Time-series of stock status time series for the FLK-EFL stock for the 500 bootstrap iterations (lighter gray lines) and the base model configuration (solid darker lines).Source: (SEDAR 2013f)

Factor 2.3 - Modifying Factor: Discards and Bait Use

Goal: Fishery optimizes the utilization of marine and freshwater resources by minimizing post-harvest loss. For fisheries that use bait, bait is used efficiently.

Scoring Guidelines: The discard rate is the sum of all dead discards (i.e. non-retained catch) plus bait use divided by the total retained catch.

RATIO OF BAIT + DISCARDS/LANDINGS	FACTOR 2.3 SCORE
<100%	1
>=100	0.75

UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, YELLOWTAIL SNAPPER

< 100%

Data regarding discards and bait use in the commercial SA snapper-grouper fisheries are limited.

When targeting vermilion snapper in the SA, bait comprised around 14% of the catch, consisting mainly of vermilion snapper, red porgy, tomtate, bank sea bass and scamp (Stephen and Harris 2010).

The bulk of the discards are considered regulatory discards, which include fish that are too small to be retained or that are prohibited due to closures or quotas (Stephen and Harris 2010). A pilot observer program conducted from 2007 to 2009 collected information on species composition and disposition (kept or discarded) (GSAFF 2008) (GSAFF 2010). The (bait + discards)/landings ratio uses the total discarded CPUE (all species combined) divided by total retained CPUE. This ratio should be considered a minimum estimate because it does not account for bait needs, nor does it distinguish between species retained for food vs. bait. Based on 2,664 stations sampled between 2007 and 2009, the (bait + discards)/landings ratio is 29.9% (GSAFF 2008) (GSAFF 2010).

A ratio less than 100% warrants a score modifier of 1.0.

Justification:

The discard-to-landings ratio for the SA handline fishery is generally around 18%, but this figure can range vastly, mainly due to the amount of fish that have to be discarded due to landing size requirements or the moratorium; this can cause discards to far exceed the kept catch (Helies and Jamison 2013). The Gulf and South Atlantic Fisheries Foundation (2008) suggested that around 27% of catches are not retained (Gulf and South Atlantic Fisheries Foundation 2008). However, in the SA vertical line fishery, red snapper discards were shown to far exceed kept fish (Helies and Jamison 2013).

Criterion 3: Management Effectiveness

Five factors are evaluated in Criterion 3: Management Strategy and Implementation, Bycatch Strategy, Scientific Research/Monitoring, Enforcement of Regulations, and Inclusion of Stakeholders. Each is scored as either 'highly effective,' 'moderately effective,' 'ineffective,' or 'critical'. The final Criterion 3 score is determined as follows:

- *5 (Very Low Concern) — Meets the standards of 'highly effective' for all five factors considered.*
- *4 (Low Concern) — Meets the standards of 'highly effective' for 'management strategy and implementation' and at least 'moderately effective' for all other factors.*
- *3 (Moderate Concern) — Meets the standards for at least 'moderately effective' for all five factors.*
- *2 (High Concern) — At a minimum, meets standards for 'moderately effective' for Management Strategy and Implementation and Bycatch Strategy, but at least one other factor is rated 'ineffective.'*
- *1 (Very High Concern) — Management Strategy and Implementation and/or Bycatch Management are 'ineffective.'*
- *0 (Critical) — Management Strategy and Implementation is 'critical'.*

The Criterion 3 rating is determined as follows:

- *Score >3.2=Green or Low Concern*
- *Score >2.2 and ≤3.2=Yellow or Moderate Concern*
- *Score ≤2.2 = Red or High Concern*

Rating is Critical if Management Strategy and Implementation is Critical.

GUIDING PRINCIPLE

- The fishery is managed to sustain the long-term productivity of all impacted species.

Criterion 3 Summary

Fishery	Management Strategy	Bycatch Strategy	Research and Monitoring	Enforcement	Stakeholder Inclusion	Score
Fishery 1: United States of America / Gulf of Mexico | Vertical lines | United States of America | Red Snapper	Moderately Effective	Moderately Effective	Moderately Effective	Moderately Effective	Highly Effective	Yellow (3.000)
Fishery 2: United States of America / Gulf of Mexico | Vertical lines | United States of America | Vermilion Snapper	Moderately Effective	Moderately Effective	Moderately Effective	Moderately Effective	Highly Effective	Yellow (3.000)
Fishery 3: United States of America / Gulf of Mexico | Vertical lines | United States of America | Yellowtail snapper	Moderately Effective	Moderately Effective	Moderately Effective	Moderately Effective	Highly Effective	Yellow (3.000)

Fishery 4: United States of America / Western Central Atlantic | Vertical lines | United States of America | Red Snapper	Moderately Effective	Moderately Effective	Moderately Effective	Moderately Effective	Highly Effective	Yellow (3.000)
Fishery 5: United States of America / Western Central Atlantic | Vertical lines | United States of America | Vermilion Snapper	Moderately Effective	Moderately Effective	Moderately Effective	Moderately Effective	Highly Effective	Yellow (3.000)
Fishery 6: United States of America / Western Central Atlantic | Vertical lines | United States of America | Yellowtail snapper	Moderately Effective	Moderately Effective	Moderately Effective	Moderately Effective	Highly Effective	Yellow (3.000)

GOM

The GMFMC began managing red, yellowtail and vermilion snapper species in 1983 with the development of the Reef Fish FMP. The goal of the FMP was to rebuild declining fish stocks, improve data availability and address overcapitalization of the fisheries {GMFMC 1981}. To accomplish these goals, managers have used limited entry programs, gear restrictions, minimum size limits, area closures, ACLs, quotas, accountability measures, IFQ programs, and mortality reduction methods such as venting and artificial reefs (AR) (Table 1) {Stephan et al. 2012} {GMFMC 2012b}).

SA

SAFMC began managing red, vermilion, and yellowtail snapper species in 1984 with the development of the Snapper-Grouper FMP, which hosts many other species. The goal of the FMP is to rebuild declining fish stocks, improve data availability and address overcapitalization of the fisheries {SAFMC 1983}.

Table 1. Commercial catch management measures for red, vermilion, and yellowtail snapper caught domestically.

Fishery / Management Jurisdiction	**Commercial Regulations**

Red Snapper, GMFMC	**Min. Size Limit**: 13" Total length (TL) **Commercial Quota**: 6 million lb (MP) {GMFMC 2017a}. Commercial – IFQ program, seasonal closed areas for longline gears; Recreational – 16" TL and 2 fish bag limit and season beginning 1 June and ending when quota is expected to exceed the annual catch target (ACT) {SEDAR 2015b}. **Gear Restrictions**: Yes. Non-stainless steel circle hooks must be used {GMFMC 2012b}. Venting tools must be used as necessary. **Closures**: IFQ year-round fishery; fishermen must stop fishing or obtain more allocation when their allocation has been exhausted; Recreational season opens 1 June until the quota has been reached. The federal seasons are predicted in advance, based on state days open. Recreation seasons may be different for private anglers compared to for-hire vessels. Recreational closure dates vary annually depending on when the quota is projected to have been reached {GMFMC 2017b}. Seasons are set differently for the for-hire component and the private angler components (Amendment 40 and 45). Rule 80 FR 06294 denotes that a 20% reduction ACL should be applied to create a reduced ACT in the recreational fishery. Amendment 40 created two recreational components (private angler and for-hire fleet), while Amendment 45 extended the sunset date for Amendment 40 {NOAA 2015a}. Amendment 14/EIS (2007) established seasonal closures for juvenile red snapper mortality to reach the juvenile red snapper mortality goal {GMFMC 2016c}. Amendment 14 protects juvenile snapper in the western Gulf by banning fishing in statistical zones 10 to 21 and 10 to 30 fathoms. **Limited Entry Program:** commercial: Yes, for-hire: yes; private angler: no. **Other:** The GMFMC proposed amendment 17b, which would limit the amount of growth in the shrimp fishery so that any optimal yield (OY) would require that juvenile red snapper bycatch was limited enough to maintain a goal of 67% of reduced target effort agreed in Amendment 4 {GMFMC 2016c}. Shrimp trawl bycatch mortality of red snapper has been reduced through time-area closures {GMFMC 2012b}.

Red Snapper, SAFMC	**Min. Size Limit:** None **Trip Limit:** 75 lb (gw) daily. SAFMC has amended MSST calculations to allow for varying natural mortality rates in the SA red snapper fishery, which acts as a precautionary rule {GMFMC 2015h}. **Season:** "Mini-seasons" may open as determined by the ACL when available. The red snapper fishery has been closed in recent years, but re-opened its commercial and recreational components in 2018 (between 26 July and 31 December, unless the ACL is met prior to the end of the season). The commercial ACL is 124,815 lb whole weight (12,854 fish) {SAFMC 2018h}. **Gear restrictions:** Fishers are required to use de-hooking tools when fishing for snapper and grouper species. Non-stainless steel circle hooks are required for all species in the snapper-grouper complex when using hook-and-line gear with natural baits in waters north of 28 degrees (circle hooks cause less fatal bycatch). **Limited entry**: Limited access permit required **Other:** SA red snapper are in a rebuilding plan. The SA has closed areas for all snapper and groupers {SAFMC 2017c}, deep water MPAs for red snappers and artificial reefs {SEDAR 2016c}.
Vermilion Snapper, GMFMC	**Min. Size Limit**: 10" Total length (TL) **Annual Catch Limit**: ACL is combined for the commercial and recreational fishery. The season can close early if the quota is projected to be reached. **Gear Restrictions**: Yes, with restrictions to reduce bycatch **Closures**: If ACL is met. The season opens from 1 January with the season closing on 31 December, with no specific seasonal closure (as this is to be adapted where necessary). **Limited Entry Program:** Yes, limited by permits **Other:** Closed areas. Bag limit of 10/person/day {SEDAR 2016d}. Areas to protect Essential Fish Habitat.

Vermilion Snapper, SAFMC	**Min. Size Limit**: 12" Total length (TL) **Quota**: Yes. Commercial is divided into two 6-month fishing seasons: 315,523 lb, gutted January–June; 302,523 lb, gutted July–December. ACL is divided between commercial and recreational sectors. The trip limit will be reduced to 500 lb (gw) when 75% of the quota has been met. **Gear Restrictions**: Yes. Gear restrictions on trawls, traps and longlines (in some areas) to reduce bycatch. **Closures**: The SA has closed areas for all snapper and groupers or if quota is met. Area closures to protect population and habitats. **Limited Entry Program:** Yes. The commercial fishery is permit-limited **Other:** 1,500 lb, gutted weight trip limit. There are trip limits for commercial vessels {FishWatch 2016b}.
Yellowtail Snapper, GMFMC	**Min. Size Limit**: 12" Total length (TL) **Annual Catch Limit**: 725,000 lb (com & rec). 10-bag limit for recreational sector. There is no commercial trip or vessel limit. **Gear Restrictions**: Yes: yellowtail snapper has relatively low mortality rates, which is considered to be "not unreasonable" since it inhabits shallower waters {SEDAR 2012a}. Trawling is prohibited. De-hooking and venting tools required when releasing reef fish. In a recent rule regarding fishing gear in the GOM, non-stainless steel circle hooks and other non-stainless steel hook types, such as J-hooks, (in the area south of a line extending due west from 25°09′ N. lat. off the west coast of Monroe County, Florida, to the Gulf and South Atlantic Councils' shared boundary) when fishing with natural bait. This is to reduce the post-release mortality of Gulf reef fish {50 C.F.R. Part 622.10309 2017}. The efficacy of different gears at reducing discard rates is widely debated in both fisheries: while circle hooks have been shown to cause lower mortality rates {Sauls and Ayala 2012}, commercial fishermen argue that J-hooks can be more easily and quickly removed from an individual, thereby reducing de-hooking times where discard mortality is inclined to increase when the fish is fighting when being removed from the hook {50 C.F.R. Part 622.10309 2017}. However, circle hooks have been found to present lower gut-hooking incidences on red grouper than J-hooks {SEDAR 2016a}. **Closures**: The commercial and recreational fishing season has been recently changed from 1 January through 31 December, to be from 1 August to 31 July, each year {50 C.F.R. Part 622.10309 2017}. The fishery closes after the ACL is met. Permits are required for commercial vessels and limits on numbers of fish. Marine reserves along the states of the Gulf of Mexico. **Limited Entry Program:** Yes

Yellowtail Snapper, SAFMC	**Min. Size Limit**: 12" Total length (TL) **Quota**: 1,596,510 lb. Managed under an ACL {SAFMC 2017d}. Once the ACL is met, the harvest and/or possession is limited to the recreational bag limit {SAFMC 2017d}. **Gear Restrictions**: Yes. Trawl restrictions. Longline prohibited < 50 fathoms. Required de-hooking devices for releasing reef fish in both commercial and recreational sectors. Non-stainless steel circle hooks are required for all species in the snapper-grouper complex when using hook-and-line gear with natural baits in waters **north of 28 degrees** {SAFMC 2017d}. **Closures**: The SA has closed areas for all snapper and groupers. The SA's fishing season opens from 1 August to 31 July {SEDAR 2016a}. A moratorium since 2012 and mini-seasons thereafter. Yellowtail snapper has relatively low mortality rates, which is considered to be "not unreasonable" since it inhabits shallower waters {SEDAR 2012a}. **Limited Entry Program:** Yes. Limited by transferable permits. **Other:** Trip limits

Criterion 3 Assessment

Factor 3.1 - Management Strategy and Implementation

Considerations: What type of management measures are in place? Are there appropriate management goals, and is there evidence that management goals are being met? Do manages follow scientific advice? To achieve a highly effective rating, there must be appropriately defined management goals, precautionary policies that are based on scientific advice, and evidence that the measures in place have been successful at maintaining/rebuilding species.

UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, RED SNAPPER
UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, VERMILION SNAPPER
UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, YELLOWTAIL SNAPPER

Moderately Effective

The GMFMC began managing red, yellowtail and vermilion snapper species in 1983 with the development of the reef-fish FMP. The original FMP and a comprehensive list of all amendments, along with a summary of each one, is available on the GMFMC website (GMFMC 2017g). Overall, the management strategy implemented by the GMFMC for reef-fish is deliberate and appropriate for the species in the complex.

Management regulations - for all species - include size limits, effort controls, and season and area closures (Table 1). The IFQ program has been one of the major management developments for the reef-fish fishery, which was implemented to minimize overcapacity, to achieve and maintain optimum yield in the fishery (GMFMC 2008b). The IFQ program prohibits the risk of overfishing in the commercial reef-fish fishery using a variety of management tools (GMFMC 2017b). A review of the red snapper IFQ program deemed the program successful in reaching its major goals (NMFS 2016g) (Ropicki et al. 2018), particularly by reducing overcapacity, the 'race to fish', fishing mortality, discard rates and improving compliance (GMFMC 2015i).

Commercial quotas have not been exceeded in the red snapper since its establishment in 2012 (Table 12; (NMFS 2017c)). However, reviews of the red snapper IFQ program suggest that high discard levels (Agar et al. 2014), overcapacity (NMFS 2016g), and socio-economic issues (Ropicki et al. 2018), remain to be problems in the fishery.

Reference points have been established for all species, control rules are in place to minimize overfishing and rebuild overfished stocks as necessary, and there is evidence that management has mostly been effective for the data-rich species. Management has been effective to ensure that the red, vermilion and yellowtail snapper are neither overfished or undergoing overfishing (SEDAR 2012a) (SEDAR 2016d) (SEDAR 2018b). For data-poor species, management implementation is hampered due to data deficiencies. The stock status is unknown for more than one third of the species in the reef-fish complex, but control rules are in place to minimize overfishing (GMFMC 2017i).

While the 2018 red snapper stock assessment declared that the stock are no longer overfished, a change in reference points has been the main driver to the change in status (SEDAR 2018b). There have been increases in spawning biomass; the eastern stock is experiencing low recruitment and biomass increases have begun to level off (SEDAR 2018b). GOM red snapper remain in a rebuilding program: the rebuild date has been extended multiple times, with the current target date of 2032 (NMFS 2017e). This target date has been recently undermined and delayed for an estimated six years due to quota overages in the recreational sector in 2017 (where the recreational fishery accounts for just over half of the GOM red snapper quota (GMFMC 2017c) (50 CFR §622.2017). These overages haven't been considered in the recent stock assessment (SEDAR 2018b). Management measures are of mixed success and attract debate (see justification).

There is a suite of management measures to protect species in the reef-fish program. Rebuilding strategies are in place for overfished species, but the need for increased precaution for the red snapper fishery limits the score. Therefore, Seafood Watch scores management strategy and implementation of reef-fish as "moderately" effective.

Justification:

The original GMFMC goal for the FMP was to rebuild declining fish stocks, improve the quantity of data available and address overcapitalization of the fisheries (GMFMC 1981). Management measures at the time included establishment of a Special Management Zone (SMZ), gear restrictions, possession limits and size limits for certain species, permitting requirements, development of a reporting system to monitor the reef-fish harvest, and in-season adjustments to management measures (GMFMC 1981). Since then, and the Sustainable Fisheries Act in 1997, the GMFMC has actively managed the GOM reef-fish fishery to achieve the objectives of federal fisheries management in the US (GMFMC 2017g). In particular, the Sustainable Fisheries Act Amendment (GMFMC 1999a) implemented changes to all FMPs under the purview of GMFMC to bring management requirements in line with the Sustainable Fisheries Act of 1997, such as specification of overfishing criteria and rebuilding periods, and implementation of measures to address fishery bycatch. This amendment established biological reference points for biomass and fishing mortality for all species in the reef-fish FMP (GMFMC 1999a), although several have since been refined (GMFMC 2017g). The Generic Annual Catch Limits/Accountability Measures Amendment was later adopted (GMFMC 2011c) for all reef-fish species in order to maintain compliance with federal requirements.

In addition to the SMZ, several other closed areas or seasons have been established to protect spawning aggregations and habitat for reef-fish, e.g., Amendment 30B (GMFMC 2008a) and Amendment 19 (GMFMC 2001). All fishing operations and anchoring of fishing vessels is prohibited in these two areas to promote stock rebuilding and improve fishery habitat (GMFMC 2001). The GMFMC has also addressed overcapitalization in the reef-fish fishery through implementation of an Individual Fishing Quota (IFQ) program in Amendment 29 (GMFMC 2008b).

Multi-species shares are also available for other shallow-water grouper, deep-water grouper, and tilefish. These species complexes were developed in the Generic ACL/AM Amendment for the purpose of developing multi-species ACLs (GMFMC 2011c) and in the IFQ program. Despite the active and intentional management measures implemented by the GMFMC for the species covered under the reef-fish FMP, management is not as effective as it could be, primarily due to data limitations. Of the 31 species managed in the reef-fish fishery, only 12 have accepted quantitative stock assessments. Another 10 species have had stock assessments attempted; however, assessments for these species were either prematurely terminated, deemed unsuitable for management advice, or there were insufficient data to conduct the assessment (pers. comm. GMFMC staff, 11 April 2018); several of the data-limited species did not pass peer review.

A tiered approach for developing ACLs was developed under the generic ACL/AM amendment (GMFMC 2011c), based on the data availability and assessment model used, but of the 20 species with formal assessments, ACLs for four of the species were developed using an unspecified methodology. Accountability measures are in place to minimize overfishing and promote stock rebuilding where necessary, but the appropriateness of the ACLs for these species is less certain. Finally, the generic ACL/AM amendment established species complexes that allow multispecies ACLs (GMFMC 2011c). The ACL setting process for species assemblages incorporates additional uncertainty than that for single species, but interannual variability in species composition of the catch and lack of information on stock status for many species in the assemblage make it difficult to know if harvest detrimentally affects any of the stocks.

The efficacy of measures to reduce the mortality of reef-fish species are limited for some groupers, since deep-water species are affected by barotrauma and experience high levels of immediate post-capture mortality. Venting procedures have been advised to reduce discard mortality caused by barotrauma. A seasonal closure (aimed at the commercial sector) was implemented in 2000 to prevent the capture of retained FMP species such as gag/red/black grouper (Coleman et al. 2004). NMFS has designated 38 marine areas throughout the GOM and Atlantic as critical habitat to protect the loggerhead turtle and vulnerable habitats, which snappers and their associated species rely on (79 FR 39855)(US Government Publishing Office 2014). Artificial reefs have been established to provide habitats for snapper-grouper species.

All three snapper species-under-assessment receive independent and peer-reviewed stock assessments by SEDAR which contain reference points and account for scientific uncertainty. Red and vermilion snapper assessments are conducted approximately every four years. SEDAR assessments for yellowtail snapper are infrequent (the last assessment was completed in 2012 (SEDAR 2012a); however, management has maintained the stock by adopting a risk-neutral approach (setting the OY at equilibrium yield level for F_{MSY}) (GMFMC 2015d); once the ACL is exceeded, the fishery is closed (e.g. (SAFMC 2017f)) and the forthcoming year's ACL is reduced (SAFMC 2017f).

Of concern in the red snapper assessments are the reference points. As MSY is incalculable, $SSB_{SPR26\%}$ has been used as a proxy; yet, it has been considered too low for stock recovery (SEDAR 2013b) and there are major sources of uncertainty around the stock-recruitment relationship (SEDAR 2018b). Of recent concern, is the revised MSST level for red snapper, which has changed from the original (1-M) * $SSB_{SPR26\%}$ to 50% $SSB_{SPR26\%}$ (GMFMC 2017i). The MSST level was reduced for seven reef-fish species (including red snapper) to provide a larger buffer between the MSST and MSY proxy. The original MSST (where MSST = (1-M) * $SSB_{SPR26\%}$) value was very high relative to the MSY proxy (0.9 * MSY proxy) because red snapper has a low natural mortality rate (0.1). Therefore, the MSST level was considered to be too sensitive to detecting an overfished determination and was reduced to account for natural mortality fluctuations and uncertainty in the biomass (GMFMC 2017i). This is of concern because the original MSST calculation was deemed more "conservative," and thus more reactive to changes in the stock (GMFMC 2017i). The new overfished determination will not change the fact that red snapper are in a rebuilding plan (SEDAR 2018b).

Precautionary measures are in place to reduce the risk of overfishing on both vermilion snapper (GMFMC

2017e) and yellowtail snapper. Yellowtail snapper fisheries are managed between the GOM and SA together because the stock crosses, and can be caught over both jurisdictions. The GMFMC is only responsible for a relatively small proportion (25%) of the ABC of the stock (GMFMC 2015d). There have been recent gear amendments to improve gear consistency; however, the efficacy of different gears at reducing discard rates is widely debated in both fisheries (Table 1).

GOM red snapper was declared as overfished, from its first stock assessment (in 1988) to its recent assessment in 2018 (SEDAR 2018b). The original assessment advised a 60% to 70% reduction in fishing mortality to rebuild the stock to the recommended SPR20% (SEDAR 2005). Management responded in 1990 by establishing a quota (NMFS, GMFMC) and in 1991, management declared that the stock should be rebuilt by 2007 (GMFMC 2012b). This date continued to be extended until 2001 when the target rebuild date was set at 2032 (where it currently stands) (NMFS 2017e). Red snapper are in year 13 of its 27-year rebuilding plan (NMFS 2017e); SSB has been increasing since the early 2000s and the stock is no longer undergoing overfishing (SEDAR 2018b).

To rebuild the stock, a suite of measures has been implemented to the red snapper fishery (Table 1). Until the introduction of the IFQ system, GOM red snapper fisheries regularly exceeded their allocated quotas (NMFS 2016b). Commercial quotas have not been exceeded since its establishment in 2012 (Table 12; (NMFS 2017c)). The IFQ program prohibits the risk of overfishing in the commercial GOM red snapper fishery by: closing the fishing season when the ACL is projected to be met (GMFMC 2017b); establishing Rule 80 FR 06294 in April 2015 to ensure a 20% annual catch target (ACT) buffer was implemented into the ACL to reduce the risk of exceeding quota from 50% to 15%; reducing a quota when a previous year's quota was exceeded; ACTs are set via season length rather than through quotas (NOAA 2015a); establishing NOAA's revised National Standard 1 Guidelines, which require that if the ACL is exceeded more than once in four years, the methods used to calculate and implement ACLs is revisited (NMFS 2016a).

Despite these precautionary measures, red snapper may not meet its rebuilding target: the red snapper fishery is limited by the number of days that the season is federally open to be fished by commercial and recreational sectors. However, in 2017, the length of the recreational seasons was extended by 39 days (NOAA 2017f), and the State water management area in Louisiana was increased from 0–3 miles to 0–9 miles in 2016 (NMFS 2017d); this caused the private red snapper sector to exceed its ACL by over 50% (NOAA 2017f). The Department of Commerce stated that that will likely set back the rebuilding timeline by six years, but will still allow the continued growth of the stock (albeit at a reduced rate) (50 CFR §622.2017).

Further measures adopted to rebuild the red snapper stock have attracted debate on their effectiveness:

- It is debated whether artificial reefs attract or produce red snapper biomass (e.g., (Karnauskas et al. 2017b)). Artificial reefs are believed to be an important source of red snapper recruits and they support snapper populations in the GOM (Shipp and Bortone 2009), but Cowan et al. (2010) argues that artificial reefs might only attract snapper from other areas rather than encourage increased productivity. Further, artificial reefs may actually hinder their population growth, since it not only aggregates the species, increasing their catchability, but also means that juveniles are more susceptible to capture as they roam away from the artificial reef to feed. Red snapper found on these artificial structures only contribute 8% to the population biomass and 6.5% to spawning potential (Karnauskas et al. 2017b). While the number of artificial reefs have been increasing since the 1980s, the potential increase in artificial reefs is decreasing with a decline in rig installations, increased rig removals and degredation of current artificial reefs (Karnauskas et al. 2017a).
- It is unknown if fishing method restrictions (e.g., descending devices impact) reduce fishing mortality (Diamond et al. 2011) (Curtis et al. 2015) (Campbell et al. 2014) (Pulver 2017).
- The minimum landing size (13 in, or 33 cm) is lower than average (50%) size-at-maturity (SAM) at 40 to 45cm (Cowan et al. 2012).

- The efficacy of circle hooks is contested as they may not reduce the capture of undersized red snapper (Burns and Parnell 2004), and previous studies on the impact of descending devices on mortality have shown mixed results (Diamond et al. 2011) (Curtis et al. 2015) (Campbell et al. 2014) (Pulver 2017).
- In 2012, NMFS mandated measures on the shrimp trawl fisheries to reduce red snapper bycatch (Cass-Calay et al. 2015): effort reductions have proven to be successful in reducing red snapper mortality (Gillig et al. 2001) (Peabody 2004) (Saillant et al. 2006) (McDonough 2009). Shrimp fisheries are required to have BRDs in shrimp trawls; however, they are only required to be 30% effective at reducing snapper bycatch, which Parsons and Foster (2015) suggest is insufficient.

UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, RED SNAPPER
UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, VERMILION SNAPPER
UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, YELLOWTAIL SNAPPER

Moderately Effective

The original FMP document, with a comprehensive list of all amendments, as well as a summary of each one, is available on the SAFMC website (SAFMC 2018a). Overall, the management strategy implemented by the SAFMC for snapper-grouper species is deliberate and appropriate for the species in the complex.

Management measures are in place for all species, including minimum sizes, effort control, and season and area closures. Reference points have been established for all species, control rules are in place to minimize overfishing and rebuild overfished stocks as necessary, and there is evidence that management has been effective for most data-rich species. For data-poor species, management implementation is hampered due to data deficiencies.

Management effectiveness of yellowtail snapper is unknown, but it is unlikely that the fishery presents serious negative impacts because they are neither overfished or undergoing overfishing (SEDAR 2012a). Management has been successful in rebuilding the vermilion snapper stock and it is not undergoing overfishing (SEDAR 2018c), but despite a rebuild plan and measures taken by the SAFMC to improve the SA red snapper stock, the SEDAR stock assessment suggests a 50% probability of this target being met (SEDAR 2016c). ACL were set to zero in 2015, 2016 and 2017; however, total removals (landings plus dead discards) still exceeded the ABC (calculated in Amendment 28) in 2014, 2015 and 2016 (SAFMC 2017i). The red snapper season re-opened in 2018 for both the commercial and recreational components: the commercial fishery will open July 26 and will close on December 31, 2018, unless the ACL is met prior to the end of the season. The commercial ACL is 124,815 lb whole weight (12,854 fish), and there are further trip limits in place (SAFMC 2018h).

The stock status is not known for nearly 75% of the species in the complex, but control rules are in place to establish harvest limits that minimize overfishing. However, the score is limited by the red snapper fishery, since management is currently insufficient to prevent overfishing. Therefore, the management strategy and implementation for SAFMC snapper-grouper receives a score of "moderately" effective.

Justification:

The SAFMC Snapper-Grouper Fishery Management Plan was first enacted in 1983 with the goals of addressing observed or predicted overfishing, and improving data collection to support management (SAFMC 1983). Specific measures of the original FMP included minimum size limits, gear and timing restrictions,

designation of artificial reefs as Special Management Zones, and authorization of increased data collection efforts (SAFMC 1983). Since initial implementation, and particularly since passage of the Sustainable Fisheries Act in 1997, the SAFMC has actively managed the South Atlantic snapper-grouper fishery to achieve the objectives of federal fisheries management in the US (SAFMC 2018a).

Management objectives for the SAFMC Snapper-Grouper FMP have been defined as achieving optimum yield (OY) for species that are not overfished or currently in a rebuilding plan (SAFMC 2012f), and mostly rebuilding overfished stocks to target biomass in a specified time frame while minimizing socio-economic impacts. Biological reference points for both fishing mortality and stock biomass were established for all species through Amendment 11 (SAFMC 1998), although many of these have since been revised through subsequent amendments based on improved biological information and monitoring, such as Regulatory Amendment 21, which adjusted minimum stock size thresholds (MSST) for a number of species with low natural mortality rates (SAFMC 2014). Further, control rules and accountability measures that prevent overfishing and allow rebuilding of overfished stocks were first established in Amendment 17B for overfished stocks and Amendment 25 for stocks not considered to be overfished (SAFMC 2018a). Control rules and accountability measures were updated in Amendment 29 and are currently being reviewed (SAFMC 2018a).

Management has been effective at preventing overfishing in the vermilion and yellowtail snapper fisheries; however, the yellowtail snapper fishery has not received a stock assessment since 2012 (SEDAR 2012a). In the vermilion snapper fishery, management has been successful in rebuilding the stock from an overfished state (SEDAR 2018c). Overfishing issues were mitigated because SAFMC implemented Amendment 13C to the Snapper-Grouper FMP that involved establishing an annual commercial fishing quota of 1.1 million lb (SAFMC 2017j). Although the quota was not exceeded in 2007, managers decreased the quota again in 2009 over concerns that overfishing was still occurring (SAFMC 2009a). Quotas were exceeded in 2010 by more than 315,000 lb (NMFS 2016b). For the 2016 to 2017 season, the ACL was increased; once the quota was nearly met, the fishery was closed (NOAA 2016a).

Yellowtail snapper management measures are recommended by the GOM and SA Councils and state waters are managed by the FWC (SEDAR 2012a). The stock is jointly managed because the stock crosses both jurisdictions and the majority of the landings occur in the Florida Keys. The SAFMC manages the area where the largest proportion (75%) of the ABC can be removed from the fishery (GMFMC 2015d). Fishermen often catch yellowtail snapper in both jurisdictions in the same day; hence, both the stock and the management are determined by both jurisdictions together. There are some differences between each jurisdiction's management for yellowtail snapper: the GOM mandates gear restrictions related to circle hooks when fishing with natural bait (50 CFR 622.41), but there is no requirement for this in the South Atlantic (south, extending west of 25°09′ North) (NOAA 2017d). Since most (75%) of the catch is caught by SA fishers, the prevalence of J-hooks and the diversity of gears in the fishery can be much larger in the Florida Keys area. The SA's season, opening from 1 August to 31 July, allows for greater flexibility in fishing behavior (SEDAR 2016a). Management effectiveness in the yellowtail snapper fishery is unknown, but it is unlikely that the fishery is having serious negative impacts on yellowtail snapper because it is neither overfished or undergoing overfishing (SEDAR 2012a). The ACL will not be changed until a new stock assessment has been created (GMFMC 2015d); however, managers have adopted a risk-neutral approach to managing yellowtail snapper e.g., by setting the OY at equilibrium yield level for F_{MSY} (GMFMC 2015d).

Additional amendments have established spatial and temporal closures to protect snapper-grouper species covered by this FMP. For example, Amendment 14 (SAFMC 2007) established 8 deep-water Marine Protected Areas (MPAs) that prohibited targeting or possession of deep water snapper-grouper species. Other area closures include Specialized Management Zones (SMZs) established on artificial reef locations in Georgia and South Carolina through Regulatory Amendments 7 and 8, respectively (SEDAR 2017b). Amendment 16 (SAFMC 2008) implemented a spawning closure for gag during January through April. The 2016–2017 Action Plan aims to implement spawning areas for the snapper-grouper complex, particularly to protect Warsaw

grouper and speckled hind. They also recognize inconsistencies of protection for these species between state and federal waters, since their capture is permitted in state waters but prohibited in federal waters, which undermines conservation goals (Florida Fish and Wildlife Conservation Commission 2015). Bycatch reduction techniques are encouraged, e.g., venting procedures to reduce discard mortality among fishes affected by barotrauma. This is particularly important for deep-water species such as groupers, though the efficacy of these methods is challenged (Wilde 2009). Once ACLs are projected to be met, commercial fisheries are closed (NOAA 2017g) (SAFMC 2017d) and precautionary measures are incorporated into the ACLs to reduce the risk of overfishing (SEDAR 2012c).

Despite the active and intentional management measures implemented by the SAFMC for the snapper-grouper complex, management is not as effective as it could be, primarily due to data limitations. To establish harvest limits under Amendment 29, stocks are ranked into one of five levels based on the types of data available and the type of stock assessment model they can support, with increasing levels signifying decreasing data availability (SAFMC 2015c). Level 1 stocks have data to support a full quantitative assessment, while Levels 2 and 3 rely on data-limited modelling approaches. Stocks classified as Level 4 or 5 are the most data-poor and rely on mostly qualitative criteria to determine harvest levels (SAFMC 2015c). Of the 55 target species covered by the SAFMC snapper-grouper FMP, only 14 are classified as Level 1 stocks, with the remaining 41 stocks classified as either Level 4 or 5 (pers. comm., M. Errigo, SAFMC). No estimates of fishing mortality or stock abundance are available for these stocks, resulting in unknown stock status for the majority of species covered in the FMP. For these species, control rules and accountability measures are in place to establish annual catch targets, but these are generally based on expert judgement rather than quantitative analyses, and their effectiveness is unknown. For the species that do have formal stock assessments, new assessments are only conducted once every 8 to 10 years (SEDAR 2018a). Red and vermilion snapper are assessed approximately every four years but the yellowtail snapper stock assessment was published in 2012 (SEDAR 2012a); therefore, data used to evaluate the stock are over five years old. The speckled hind will be receiving a stock assessment in early 2017 under the data-limited species report (SEDAR 2016f).

Red Snapper

Stock assessment base runs have shown that the spawning biomass has remained below the minimum stock size threshold (MSST) since the 1970's (SEDAR 2016c). In 2008, the SA red snapper stock assessment indicated that the stock was overfished and that overfishing had been occurring (SEDAR 2008a). In 2009, the SAFMC closed the commercial and recreational SA Red Snapper fishery to await the results of the 2010 stock assessment. In 2010, red snapper was still considered to be overfished and experiencing overfishing (SEDAR 2010b). The SAFMC implemented Amendment 17A prohibiting all take of red snapper, and the moratorium continued to allow older fish time to reproduce (SEDAR 2010b). Despite the fact that low numbers of older, more productive fish are still lacking in the stock, managers temporarily lifted the moratorium in 2012 and a commercial "mini-season" was opened with a quota set for 20,818 lb (NMFS 2012b). There is currently evidence for strong year classes for age 1 and 2 snapper (SAFMC 2016e). However, the current demographics show a skewed population of mainly younger brood stock, thereby limiting the spawning potential of the fishery. Recent models have shown increases in older fish since 2006, though this is not as high as was originally predicted (SEDAR 2016c). The SA red snapper is in year 7 out of a 35 year management plan (NMFS 2017b). Despite the extreme measures taken by the SAFMC to improve the SA red snapper stock (Table 1), the SEDAR stock assessment suggests a 50% probability of this target being met (SEDAR 2016c).

Red snapper is in a rebuilding plan which requires that the stock is rebuilt in 35 years, by 2044, with a fixed exploitation rate of F=98% of $F_{30\%SPR.}$ (SEDAR 2016c). To significantly reduce fishing mortality, landings were significantly reduced in recent years, but zero ACLs have failed to cease overfishing as red snapper are still caught with co-occuring species and are subsequently discarded (SAFMC 2017i). Mortality rates are highest from the recreational fishery, recreational fishery discards, and commercial handline discards (SEDAR 2016c). Discard mortality (from hooking injuries, barotrauma and/or predation) are limiting the red snapper's

populations ability to rebuild (SAFMC 2017i), since discard mortality exceeds that recommended by discards at MSY (SEDAR 2016c). Commercial and recreational SA discard mortality has decreased from the pre-2007 and pre-2011 levels respectively, due to implemented policies, but remain high (SEDAR 2016c). Furthermore, stock assessments contain reference points, though they may not be suitable to rebuild the stock. The SEDAR 24 review panel and the SSC recommend that the current proxy be changed to $F_{SPR40\%}$ (Southeast Fisheries Science Center 2015).

Due to low levels of monitoring, it difficult for fisheries managers to monitor catch rates and ensure that they remain below the ACL; consequently, discards are often under-reported (SAFMC 2017i). Discards are often under-reported in the fishery because the ABC is based on total removals from the fishery. Therefore, when fishermen aim to under-report discards, the ABC is not used up as fast, which enables increased fishing mortality (Southeast Fisheries Science Center 2015). Since, the fishery does not have an observer program and their report cards are not verified for discard information, the risk of under-reporting increases (Southeast Fisheries Science Center 2015). Therefore, quicker reactions or stronger precautionary measures are required when the season is open.

Factor 3.2 - Bycatch Strategy

Considerations: What type of management strategy/measures are in place to reduce the impacts of the fishery on bycatch species and when applicable, to minimize ghost fishing? How successful are these management measures? To achieve a Highly Effective rating, the fishery must have no or low bycatch, or if there are bycatch or ghost fishing concerns, there must be effective measures in place to minimize impacts.

UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, RED SNAPPER
UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, VERMILION SNAPPER
UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, YELLOWTAIL SNAPPER

Moderately Effective

In addition to target species regulations, the GMFMC has taken steps to address bycatch issues in the reef-fish fishery. In particular, a fishery observer program was established in the Gulf of Mexico reef-fish fishery through Amendment 22 (GMFMC 2004b) (Scott-Denton et al. 2011). These data indicate that target species (those covered under the reef-fish FMP) make up the majority of the catch.

A biological opinion developed under Section 7 of the Endangered Species Act identified a number of marine mammal and sea turtle species that may be encountered in the Gulf of Mexico reef-fish fishery. The Biological Opinion concluded there was no impact to marine mammals (GMFMC 2010b). Little information is available regarding interactions with marine mammals in this fishery, but interactions are considered to be low. No interactions were reported in the Coastal Fishery Logbook program (Benaka et al. 2016) (NMFS 2013d) or the 2010 to 2011 observer program (Scott-Denton and Williams 2013), but the 2018 List of Fisheries (NMFS 2018c) indicates that snapper-grouper fisheries (hook and line and bottom longline) in the South Atlantic, Gulf of Mexico and Caribbean collectively, interact with greater than 5,000 Gulf of Mexico bottlenose dolphins. However, the NMFS List of Fisheries 2018 still designates the fishery with a Tier III rating, indicating little potential harm to the population (NOAA 2018c).

Incidental take of sea turtles have been largely associated with the bottom longline fishery, rather than the vertical line fishery. To reduce the risk of capture, multiple management measures were implemented in the GOM bottom longline fishery. The 2011 Biological Opinion concluded that the GOM reef fish fishery is not likely

to jeopardize the continued existence of any listed sea turtles (NOAA 2015h).

The hook-and-line components of the reef-fish fishery have likely always had the most adverse effects on smalltooth sawfish; however, the fishery is not likely to jeopardize the continued existence of the species (NOAA 2015h).

Further, Amendment 18A (GMFMC 2005a) established careful release protocols for sea turtles. Regardless, gears used in the reef-fish fishery are non-selective, resulting in bycatch of numerous species, many of which are unassessed, resulting in uncertainty in appropriate harvest rates. For this reason, the Gulf of Mexico vertical line reef-fish fishery receives a score of "moderately effective" for bycatch strategy.

Justification:

The GMFMC is required to "minimize bycatch" by the Magnuson-Stevens Fishery Conservation Act "to the extent bycatch cannot be avoided, [to] minimize the mortality of such bycatch" (GMFMC 2017h). Managers have taken measures to reduce bycatch and bycatch mortality through selective fishing gear (SAFMC 2008) (GMFMC 2009), seasonal closures (NMFS 2011), and quotas (GMFMC 2007), observer coverage, size restrictions, and MPAs and ARs (which potentially allow for increased production of the bycatch species) in both commercial and recreational sectors (Table 1).

Commercial reef-fish harvester reporting requirements were implemented in 2001 (50 CFR 622.5), with bycatch reporting requirements for selected harvesters (20% per year) added in August 2001 (GMFMC 2004b). Amendment 22 (GMFMC 2004b) replaced the harvester reporting program with an at-sea observer program. Data collected from this program include species composition, disposition of the catch, and fish condition (Scott-Denton and Williams 2013) (Scott-Denton et al. 2011). Information on interactions with protected species are also recorded. The SEFSC Coastal Fishery Logbook program also collects harvester-reported information on discards and protected species (Benaka et al. 2016) (NMFS 2013d). Amendment 18A (GMFMC 2005a) established careful release protocols for sea turtles incidentally captured by this fishery.

An observer program in the GOM reef-fish fishery was implemented in 2006 as a requirement of Amendment 22 to the GMFMC reef-fish FMP (GMFMC 2004b) (Scott-Denton et al. 2011). Several reports have been published summarizing the data collected from this program, such as catch composition, disposition, and condition (Scott-Denton et al. 2011) (Scott-Denton and Williams 2013). Proportional coverage of the fishery is not reported by gear, but sampling effort (number of trips sampled) was proportional to fishing effort (sea days), stratified by season, gear, and region, with overall coverage increasing from 1.4% during 2006 to 2009, to 5.4% for 2010 to 2011 (Scott-Denton et al. 2011) (Scott-Denton and Williams 2013). Updated data on catch composition for the years 2012 to 2016 were obtained for this report (pers. somm., E. Scott-Denton, NMFS). According to these data, species covered under the reef-fish FMP accounted for approximately 92.5% of the total catch in the reef-fish handline fishery (pers. comm., E. Scott-Denton, NMFS). The remaining 7.5% was composed of 218 species, although 51 of these species were seen only once in the five years of sampling, and an additional 53 species were only seen 2 to 5 times in those years. White grunt had the highest proportion of the total catch (1.1%) for species not included in the FMP (pers. comm., E. Scott-Denton, NMFS). Data from 2012 to 2016 provided for this report do not break down catch by disposition, but data from a previous report indicate that target species make up between 81.7% of retained catch and 90.1% of discarded catch (Scott-Denton and Williams 2013). Landings data from the SEFSC Trip Interview Program (TIP) (pers. comm., L. Beerkircher, NMFS) and discard data from the SEFSC Coastal Fishery Logbook program (Benaka et al. 2016) corroborate that species in the reef-fish FMP constitute the vast majority (>85%) of the harvest and discards in the hand line fishery. Unfortunately, many of the species captured in this fishery, both targeted and non-targeted, do not have formal stock assessments, so acceptable harvest rates are unknown.

In 2008, a report was published using available observer and other monitoring data that found sea turtle interactions in the hand line fishery were in line with the anticipated take, and was not excessive (GMFMC

2010b).The Biological Opinion allows 98 sea turtle takes over a three-year period (GMFMC 2010b). Scott-Denton and Williams (2013) reported zero turtle interactions on 54 observed trips during 2010 to 2011. Harvesters reported an average of 26.5 interactions with sea turtles per year during 2006 to 2008, and 81 interactions in 2012, based on data in the coastal fishery logbook program (Benaka et al. 2016) (NMFS 2013d). No turtles were reported in the logbook data from this fishery in any other year between 2006 and 2013 (Benaka et al. 2016) (NMFS 2013d). NMFS has not issued any statement that this level of take is unacceptable.

To further protect sea turtles and smalltooth sawfish, NMFS requires owners and operators of vessels with federal commercial or charter vessel/headboat permits to comply with release protocols and always carry specific sea turtle release gear Amendment 15B to the Snapper Grouper FMP (74 FR 31225; June 30, 2009; SAFMC 2008) (NOAA 2015h). Further protection for sea turtles includes NMFS' final rule in 2014 (79 FR 39855), which designated 38 occupied marine areas within the Atlantic Ocean and Gulf of Mexico as critical habitat for the Northwest Atlantic Ocean Loggerhead Sea Turtle Distinct Population Segment (US Government Publishing Office 2014).

Bycatch in the GOM reef-fish vertical line fishery includes a wide range of species, including marine mammals, sea turtles, and numerous fish species. Measures are in place to monitor bycatch issues, and regulations have been implemented to reduce interactions with sea turtles. However, uncertainty remains regarding the effectiveness of these measures for unassessed species.

UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, RED SNAPPER
UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, VERMILION SNAPPER
UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, YELLOWTAIL SNAPPER

Moderately Effective

There have been few studies to determine the bycatch, discards, and bait use in the fishery (Stephen and Harris 2010)(Stephen et al. 2011) (Helies and Jamison 2013). Although there is no standardized observer program for the SAFMC snapper-grouper handline fishery, a pilot observer program was conducted in this fishery during 2007 to 2009 (GSAFF 2008) (GSAFF 2010). Data from all years showed that species included in the snapper-grouper FMP accounted for approximately 93.6% of the total catch (retained plus discards) in numbers (GSAFF 2008) (GSAFF 2010). The remaining catch was composed of 61 non-target species, with the most common non-target species (Atlantic sharpnose shark) accounting for only 2.2% of the total catch. The proportion of total catch that was discarded varied by season and area (GSAFF 2008), but overall accounted for approximately 23% of the total catch numerically. Species managed under the snapper-grouper FMP made up over 97% of the retained catch and approximately 80% of the discarded catch (GSAFF 2008) (GSAFF 2010). Landings data from the SEFSC Trip Interview Program (TIP) (pers. comm., L. Beerkircher, NMFS) and discard data from the SEFSC Coastal Fishery Logbook Program (NMFS 2013d) (Benaka et al. 2016) corroborate that snapper-grouper species constitute the vast majority of the harvest and discards in the hand line fishery.

Little information is available regarding interactions with protected species, such as sea turtles and marine mammals, but interactions with these species are considered to be low and these vertical line fisheries are not likely to jeopardize sea turtles (Finkbeiner et al. 2011). The most recent consultation was completed in 2006. Sea turtles, Atlantic sturgeon, and smalltooth sawfish are both vulnerable to capture on hook-and-line gear, but the techniques used to target the species under assessment are often incompatible with that

required to catch these ETP species: Atlantic sturgeon and smalltooth sawfish are largely bottom-dwelling species and smalltooth sawfish are normally caught when fishing for snook, redfish, or sharks (NOAA 2015h). The 2016 Biological Opinion found that, by far, the majority of estimated sea turtle captures are likely to occur in the recreational vertical lines targeting snapper-grouper species (as the snapper-grouper fishery receives a large proportion of effort) and vessels moving between fishing areas also increase the threat to sea turtles via strikes (SAFMC 2017i).

No information is available for marine mammal interactions for this fishery specifically (no interactions reported in the Coastal Fishery Logbook Program) (NMFS 2013d) (NMFS 2017e), but the 2018 List of Fisheries (NMFS 2018c) indicates that snapper-grouper fisheries (hook and line and bottom longline) in the South Atlantic, Gulf of Mexico and Caribbean collectively interact with greater than 5,000 Gulf of Mexico bottlenose dolphins, but still receives a Tier III rating from NMFS (NOAA 2018c), indicating little potential harm to the population.

The harvest and landings of blacknose sharks is now prohibited north of 34°00′ N latitude as of August 2015, which is expected to reduce mortality in the region (US Government Federal Register 2015).

Although SAFMC adopted Amendment 15B to reduce bycatch levels—which involved a plan to monitor and assess bycatch in the snapper-grouper fisheries (SAFMC 2008b) (ACCSP 2012)—the program has not received sufficient funding for comprehensive implementation. In the meantime, the SAFMC will use a variety of methods to collect bycatch information, such as logbooks, observers, and video monitoring (SAFMC 2008b). For example, the SEFSC Coastal Fisheries Logbook Program collects discard information from select fishermen within the US South Atlantic snapper-grouper fishery (NMFS 2017i).

Bycatch of non-target (non snapper-grouper) species is low, but exceeds the 5% level required for a "highly effective" classification. The bycatch monitoring program adopted by SAFMC has not been fully implemented due to funding constraints. Measures are in place to minimize the impacts of incidental takes on sea turtles, but their effect is unquantified. For these reasons, the bycatch strategy for the South Atlantic snapper-grouper hand line fishery receives a score of "moderately effective."

Justification:

The SAFMC are required by the Magnuson-Stevens Fishery Conservation Act to “minimize bycatch and bycatch mortality to the extent practical” (SAFMC 2008). Managers have taken measures to reduce bycatch and bycatch mortality through the use of selective gear, observer coverage, and seasonal and temporal closures, size restrictions, MPAs and ARs (which potentially allow for increased production of the bycatch species) in both commercial and recreational sectors. Regulations also require the use of venting tools and de-hooking devices to reduce discards, discard mortality, and the incidental catch of undersized fish.

Estimates of turtle mortalities in the South Atlantic snapper-grouper fishery over three years show that the commercial vertical line fishery poses the largest threat to loggerhead turtles, compared to Kemp’s ridley, green, hawksbill, and leatherback (Table 3.2.6.1 (SAFMC 2017i). According to the National Bycatch Report, harvesters reported 56 interactions with sea turtles in 2007 and 215 in 2012 (NMFS 2013d) (Benaka et al. 2016). No turtles were reported from this fishery in any other year between 2006 and 2013 (NMFS 2013d) (Benaka et al. 2016), but it is unclear if this indicates there were no interactions, or harvesters did not report their interactions. The pilot observer program collected information on sea turtle interactions, but the data were not reported in the final report (GSAFF 2008).

To protect sea turtles and Smalltooth Sawfish, the NMFS requires owners and operators of vessels with federal commercial or charter vessel/headboat permits to comply with release protocols and always carry specific sea turtle release gear Amendment 15B to the snapper-grouper FMP (74 FR 31225; June 30, 2009; SAFMC 2008) (NOAA 2015h). This was later amended to standardize regulations to mirror the GOM fishery

regulations (76 FR 82183; December 30, 2011) (SAFMC 2011e). Sea turtles receive protection as all snapper-grouper vessels are required to have appropriate gear to ensure safe and swift release (SAFMC 2016c). To protect critical habitat for the northwest Atlantic Ocean loggerhead sea turtle and a further five species in the region, NMFS published two rules (79 FR 39855 & 79 FR 53851) (SEDAR 2016b) and reserves.

Factor 3.3 - Scientific Research and Monitoring

Considerations: How much and what types of data are collected to evaluate the fishery's impact on the species? Is there adequate monitoring of bycatch? To achieve a Highly Effective rating, regular, robust population assessments must be conducted for target or retained species, and an adequate bycatch data collection program must be in place to ensure bycatch management goals are met.

UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, RED SNAPPER
UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, VERMILION SNAPPER
UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, YELLOWTAIL SNAPPER

Moderately Effective

While stock assessments for GOM red snapper and vermilion snapper are up-to-date, other species caught in the reef-fish fishery are assessed irregularly. GOM and SA yellowtail snapper has not been assessed since 2012 (SEDAR 2012a).

Stock assessments are robust and address various sources of mortality; however, habitat assessments are infrequent, which inhibits the snapper population's ability to rebuild. Moreover, there can be great uncertainties within assessments. For example, there is considerable uncertainty about the stock-recruitment relationship in the red snapper stock assessment (SEDAR 2018b).

Observer monitoring is limited in the GOM. Logbooks are kept, but contain considerable uncertainties. Fishery-independent studies have collected data on bycatch or on other retained species in the fishery (using observer data), though these are irregular and do not address bycatch from the red, vermilion or yellowtail snapper fisheries specifically.

Due to the uncertainties within assessments and data gaps in the fishery, scientific research and monitoring has been scored as "moderately" effective in the GOM.

Justification:

GOM stock assessments are performed through the SEDAR process, which requires data reviews, assessment workshops, and assessment reviews before delivery to the GMFMC. Although managers have been generally known to follow the advice and recommendations in the stock assessments, there is debate over the recommended management measures (see section 3.1).

GOM red, vermilion, and yellowtail snapper have been assessed at irregular intervals using the best available fishery-dependent and independent data. The red snapper in the GOM has been assessed approximately every 3 to 4 years. In the GOM, the last stock assessment for red snapper was in 2018, vermilion snapper in 2016, and yellowtail snapper in 2012 (SEDAR 2012a) (SEDAR 2016d) (SEDAR 2018b).

The 2018 GOM red snapper assessment uses a "stock synthesis," which is a catch-at-age model (SEDAR 2018b). This was used in association with a stock/region model that hosts data from the the eastern and

western Gulf and includes data regarding recruitment, gear selectivity, the IFQ program, and discard mortality. Changes in data-inputs and models have occurred in the recent assessment. For example, there is a new recommended methodology for calculating observed discards in headboat fleets, truncated recreational CPUE indices, and updates for recreational discard mortality estimates. Fishery-dependent data include landings, discards, CPUE, size and age composition, and vessel monitoring system (VMS) data (for both the east and western GOM (SEDAR 2018b). Fishery-independent indices in the red snapper report included the Southeast Area Monitoring and Assessment Program (SEAMAP) reef fish video, SEAMAP larval survey, SEAMAP groundfish survey, SEAMAP vertical line survey, NMFS bottom longline surveys, combined video survey, the Recruitment Index Based on the Connectivity Modeling System (CMS), age-composition surveys, and ground fish and artificial reef surveys using remote operated vehicles (ROV)s (SEDAR 2018b). Therefore, ROV reef survey observes some red snapper stocks on artificial reefs (SEDAR 2018b).

The GOM vermilion snapper stock assessment considers larval, groundfish trawl, and reef-fish video surveys to determine the stock status and other variables, e.g., habitat type (SEDAR 2016d). The stock assessments for vermilion and yellowtail snapper recommended that additional fishery-independent data be collected to better inform the assessments (SEDAR 2016d) (SEDAR 2012a) on discards, snapper bycatch from shrimp trawl fisheries, and recreational fishery catch. Relevant sources of mortality are considered and calculated during modelling in GOM assessments, particularly surrounding shrimp trawl, recreational, and discard mortality.

There is much uncertainty remaining in GOM assessments: the main areas of uncertainty in the red snapper assessment are regarding the stock-recruitment relationship; therefore, the assessment assumes constant recruitment in the models (SEDAR 2018b). In the GOM vermilion snapper stock assessment, uncertainty is accounted for in recreational discard estimates, post-IFQ data and OFL. However, uncertainty has reduced since the previous assessment, and better reflects improved natural mortality estimates, length-weight relationships, and a very small stock recruitment variance (SEDAR 45) (SEDAR 2016d).

Bycatch has not been sufficiently monitored since observer programs only sample small amounts of the fishery. The accuracy of discard data from logbooks is frequently questioned (McCarthy 2012). Over recent decades, commercial logbook reporting in the GOM has increased (Porch and Cass-Calay 2001). Observer programs and logbooks are in place to monitor bycatch mortality and interaction rates e.g., (Scott-Denton et al. 2011). Logbooks host high levels of uncertainty as they mostly state "no discards" when observer studies show that the instance of no discards is highly unlikely (NMFS 2011). Observer coverage began in 2006, and discard rates were calculated using observer data (Cass-Calay et al. 2015). Amendment 22 of the GOM Reef Fish FMP mandated observer coverage in the reef fish fishery to monitor bycatch and discard rates (Scott-Denton et al. 2011). Observer coverage is only 5% in the GOM reef fish fishery (Benaka et al. 2016). The most recent bycatch data have been collected by NMFS, which are not, however, specific to the targeted red/vermilion/yellowtail snapper fisheries (Benaka et al. 2016).

The previous GOM snapper bycatch reports specific to the fishery were conducted in 2011 (Scott-Denton and Williams 2013). There have been specific improvements planned for future bycatch reports, which are expected to be incorporated in the US National Bycatch Report in 2017.

UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, RED SNAPPER
UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, VERMILION SNAPPER
UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, YELLOWTAIL SNAPPER

Moderately Effective

While stock assessments for SA red snapper and vermilion snapper are up-to-date, other species that are caught in the reef-fish fishery are assessed irregularly. GOM and SA yellowtail snapper have not been assessed since 2012.

Stock assessments are robust and address various sources of mortality; however, habitat assessments are infrequent, which inhibits the snapper population's ability to rebuild. Moreover, there are great uncertainties within assessments, including the magnitude of discard mortality.

There is no observer program in the SA. Logbooks are kept, but host great uncertainties. There have been fishery-independent studies that have collected data on bycatch or other retained species in the fishery (using observer data), though these are irregular and do not address bycatch from the red, vermilion, or yellowtail snapper fisheries specifically.

Due to the uncertainties within assessments and data gaps in the fishery, scientific research and monitoring has been scored as "moderately effective" in the SA.

Justification:

Red, vermilion, and yellowtail snapper are assessed irregularly using the best available fishery-dependent data (landings, CPUE, etc.) and limited fishery-independent surveys including visual surveys by the NMFS and the University of Miami, Marine Resources Monitoring, Assessment, and Prediction (MARMAP) fishery-independent monitoring program, and the MARMAP/SERFS trap survey. The data from these sources were used to determine biomass, fishing level targets, provide estimates of relative stock abundance and structure, provide predictions for future years, and characterize uncertainties in estimates (SEDAR 2008b).

The most recent assessments use both a catch-age model and a surplus production model that rely heavily on forecasts and projections, but there is a great deal of uncertainty associated with previous models and SEDAR assessments recommend that additional fishery-independent data be collected to better inform future assessments (SEDAR 2003) (SEDAR 2010b) (SAFMC 2012c).

The red snapper fishery in the SA hosts significant areas of uncertainty including the composition and magnitude of recreational discards, the stock-recruitment relationship, changes in CPUE, catchability, and selectivity for each fleet's fishing gears (SEDAR 2016c).

Research recommendations in the red snapper fishery particularly relate to discard rates, catch-composition and age-composition in the fishery (SEDAR 2016c). Monitoring of bycatch and discards in the southeastern vertical line snapper-grouper fishery by using electronic video is currently being trialled and is proving successful in the fisheries (Benaka et al. 2016).

Stock assessments are performed through the SEDAR process, which requires data reviews, assessment workshops, and assessment reviews before delivery to the SAFMC (Cowan 2011). All snapper assessments consider possible mortality sources including through the recreational fishery.

Management has sometimes proved ineffective in following scientific advice: SEDAR has recommended a proxy for MSY of $F_{SPR40\%,}$ instead of the current $F_{SPR30\%,}$ to reduce the risk of further overfishing and allow stock recovery (Southeast Fisheries Science Center 2015) (SAFMC 2010b). Though this has been recommended to managers, the advice has not been taken. SEDAR advised that the ABC should not be exceeded and ACL was set to zero to ensure this, although ACLs have been exceeded in recent years (NOAA 2016b). Overfishing is expected to continue through bycatch mortality as fishermen catch other species in the snapper-grouper complex (SAFMC 2010b).

To monitor recreational bycatch in the recreational fishery, the Marine Recreational Fisheries Statistics Survey (MRFSS), and more recently the improved Marine Recreational Information Program (MRIP), capture bycatch and discard data (SEDAR 2016c). However, bycatch data are severely lacking with no regular observer programs in the SA.

Studying the reef visual census, and discard mortality variation while using circle or J-hook gears, have been outlined as prioritized research areas for yellowtail snapper in both SA and GOM jurisdictions for the years 2015 to 2019 (GMFMC 2015c).

NMFS engages with recreational fishermen from both the GOM and SA through the Marine Recreational Fisheries Statistics Survey (MRFSS) and the MRIP to collect data on the magnitude of discards. This has helped improve accuracy of recreational data within the red snapper stock assessments, though this area is considered to host a high level of uncertainty.

Yellowtail *s*tock assessments are completed around every five to six years. Fishery-dependent data includes commercial logbooks, MRFSS/MRIP, and head-boat survey. However, MRFSS and MRIP data are considered to host high levels of uncertainty for this species. Fishery-independent data come from NMFS/University of Miami Reef Visual Census surveys and the FWC (GMFMC 2015d). Yellowtail snapper are managed together with the GMFMC and the studies are coordinated with SEDAR (SEDAR 2012a).

Factor 3.4 - Enforcement of Management Regulations

Considerations: Do fishermen comply with regulations, and how is this monitored? To achieve a Highly Effective rating, there must be regular enforcement of regulations and verification of compliance.

UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, RED SNAPPER
UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, VERMILION SNAPPER
UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, YELLOWTAIL SNAPPER

Moderately Effective

The GOM snapper-grouper commercial fisheries are enforced through VMS (required in the Gulf of Mexico for all reef-fish permitted fishers) logbooks, observers, dockside monitoring, and real-time IFQ tracking. Though the observer coverage is considered inadequate for evaluating bycatch, the other enforcement techniques are completed on a suitable scale, with the result that vermilion snapper stocks are no longer overfished. An IFQ program, VMS, and enforcement for the shrimp fishery have also enabled improved enforcement for the red and vermilion snapper specifically. Porter et al. (2013) suggest that IFQ compliance/enforcement has increased. Whenever snappers are landed, law enforcement officers and dispatch personnel are notified via e-mail. All landings data are updated in real-time and transactions (between fishers and dealers) are processed. Random monitoring of vessels is conducted. The number of federal red snapper IFQ-related enforcement cases has decreased since the implementation of the IFQ program (NMFS 2017c). GMFMC are moving towards electronic reporting for commercial fisheries, and pilot studies have already been completed.

Since the Reef Fish FMP is managed using permits, regulations, biological opinions, which receive regular enforcement (e.g., through VMS, logbook reports, dockside monitoring), and an IFQ real-time tracking system to respond and report compliance reactively, but effectiveness of enforcement is currently unknown, Seafood Watch deems the enforcement as "moderately effective" for the GOM.

Justification:

Monitoring and enforcement of the reef-fish fishery has improved over the years. Before 1993, only 20% of Florida's commercial vessels (reef-fish permit holders) were required to provide logbook catch data; reporting is now mandatory (Porch and Cass-Calay 2001). Amendment 22 of the reef-fish FMP mandated observer coverage in the reef-fish fishery to monitor bycatch and discard rates (Scott-Denton et al. 2011). More recently, an electronic reporting system was developed so that managers could track landings in real-time and respond more rapidly to quota overages (NMFS 2012a). Finally, all vessels participating in the GOM reef-fish fishery are required to have VMS on board to prevent the incidence of fishing in closed areas (NOAA 2015d). For commercial fishermen with reef-fish permits, VMS is required to be on, constantly, and provide real-time data on boat position. Vessels that have VMS systems are required to declare gear type and fishing activity before leaving port (GMFMC 2013).

More recently, NOAA have increased the level of patrols and enforcement activities in the GOM and targeted them specifically to the red snapper fishery. This has resulted in an increased level of fines; NOAA reported a "significant level of willful non-compliance" with most violations attributed to fishing outside of the federal season (NOAA 2017b).

Since shrimp trawls have been a major cause of mortality of red snapper in the GOM, observers ensure that BRDs are checked in shrimp trawls to reduce the risk of overfishing (NMFS 2015a). Porter et al. (2013) and GMFMC (2013) suggest that compliance has increased, though non‐compliance is still a substantial obstacle to gaining accurate data, and increased dockside enforcement is required.

Management has a mixed track record in regards to red, vermilion, and yellowtail snapper management. Management has employed a variety of tools including IFQs (which are for many species including shallow-water grouper, red grouper, gag, deep-water grouper, and tilefishes), quotas, artificial reefs, size limits, and area closures to improve the condition of the stock.

The grouper-tilefish fisheries are now enforced using an IFQ program since 2010 (NMFS 2016c), and red snapper had a IFQ program beginning in 2007 (Agar et al. 2014); both reviews have reported increased compliance rates throughout the programs (GMFMC 2013) (GMFMC 2018b).

UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, RED SNAPPER
UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, VERMILION SNAPPER
UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, YELLOWTAIL SNAPPER

Moderately Effective

In terms of enforcement, the SA Council states that VMS would be particularly useful to help enforce fishing area restrictions (SAFMC 2013b). Currently, those who own a commercial permit may be selected by NOAA's Science and Research Director to provide electronic logbooks and/or partake in a video monitoring program (NOAA 2015e). However, for the majority of vessels quota enforcement relies on mandatory trip report non-electronic forms that report catch for all snapper‐grouper vessels. SAFMC are moving towards electronic reporting for commercial fisheries, and pilot studies have already been completed (SAFMC 2012c). There are a lack of real-time data, particularly from up-to-date state-reported landings; this has led to quota breaches before seasonal closures (SAFMC 2017i). There are also known breaches of gear restriction regulations within the yellowtail snapper fishery (GMFMC 2015d).

The fishery does enforce a mandatory trip reporting program and enforcement duties are being improved, e.g., through improvements in electronic monitoring; therefore, enforcement is deemed as "moderately effective" in the SA.

Justification:

Management has a mixed track record of improving and maintaining fish stocks. The fishery is enforced through limited-access permit and logbook reporting, although the SAFMC are considering implementing electronic reporting to adequately enforce quota restrictions in the fishery (SAFMC 2012c), which, historically, have often been exceeded (SAFMC 2012c). However, electronic monitoring has not been welcomed (Scott Baker and Von Harten 2013). There is no observer coverage in the fishery and there are concerns about levels of compliance.

Factor 3.5 - Stakeholder Inclusion

Considerations: Are stakeholders involved/included in the decision-making process? Stakeholders are individuals/groups/organizations that have an interest in the fishery or that may be affected by the management of the fishery (e.g., fishermen, conservation groups, etc.). A Highly Effective rating is given if the management process is transparent, if high participation by all stakeholders is encouraged, and if there a mechanism to effectively address user conflicts.

UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, RED SNAPPER
UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, VERMILION SNAPPER
UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, YELLOWTAIL SNAPPER

Highly Effective

Stakeholder inclusion has been considered "highly effective" in both the GOM and SA fisheries, since there are opportunities to involve all the major user-groups within decision-making and scientific research. User-groups are kept up-to-date via both management agency's websites and meetings are open to the public. There are opportunities for the public to challenge decision-making and address conflicts at meetings, which are held regularly in the respective jurisdictions. Programs such as ISnapper and MRIP allow recreational fishers to collect research, and universities encourage fisher-science partnerships to capture data (NOAA 2015e).

Justification:

The GMFMC meets five times per year for discussion on fishery management in the Gulf (GMFMC 2018a). They have an app, newsletters, e-newsletters, an up-to-date website and public forums to inform stakeholders on multiple platforms. Meetings are public, conflicts are openly discussed on forums, and opinions are addressed in the management process. For example, where the 2011 vermilion snapper stock assessment recommended that vermilion snapper catch could be moderately increased, the GMFMC did not increase their yield due to fishermen's concerns (GMFMC 2013). There are also independent organizations, like the Shareholders' Alliance and Gulf Wild, that involve and advocate for Gulf fishers active participation in management (Bonini et al. 2011).

UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, RED SNAPPER
UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, VERMILION SNAPPER
UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, YELLOWTAIL SNAPPER

Highly Effective

Stakeholder inclusion has been considered "highly effective" in both the GOM and SA fisheries, since there are opportunities to involve all the major user-groups within decision-making and scientific research. User-groups are kept up-to-date via both management agency websites and meetings are open to the public. There are opportunities for the public to challenge decision-making and address conflicts at meetings, which are held regularly in the respective jurisdictions. Programs such as ISnapper and MRIP allow recreational fishers to collect research and universities encourage fisher-science partnerships to capture data.

Justification:

The SAFMC meets four times a year. Public scoping meetings, public hearings, and public input at council meetings are carried out prior to final action on any proposed rule changes (SAFMC 2012e). The SAFMC draws upon the expertise of stakeholders, scientists, state and federal agencies, universities, and the public, and requests that they serve on advisory panels, the Scientific and Statistical Committee, and Stock Assessment Panels. A calendar of meetings is posted on their website (http://www.safmc.net/Meetings/CouncilMeetings/tabid/400/Default.aspx). Information is kept up-to-date on websites. Citizen-science partnerships are available to engage with the recreational sector, and increasing the amount of science-fishery partnerships is one of their key objectives (SAFMC 2015). The citizen science program aims to fill data gaps and has been collecting data on snapper populations, catches, and discarding (SAFMC 2016g).

Criterion 4: Impacts on the Habitat and Ecosystem

This Criterion assesses the impact of the fishery on seafloor habitats, and increases that base score if there are measures in place to mitigate any impacts. The fishery's overall impact on the ecosystem and food web and the use of ecosystem-based fisheries management (EBFM) principles is also evaluated. Ecosystem Based Fisheries Management aims to consider the interconnections among species and all natural and human stressors on the environment. The final score is the geometric mean of the impact of fishing gear on habitat score (factor 4.1 + factor 4.2) and the Ecosystem Based Fishery Management score. The Criterion 4 rating is determined as follows:

- *Score >3.2=Green or Low Concern*
- *Score >2.2 and ≤3.2=Yellow or Moderate Concern*
- *Score ≤2.2=Red or High Concern*

GUIDING PRINCIPLES

- Avoid negative impacts on the structure, function or associated biota of marine habitats where fishing occurs.
- Maintain the trophic role of all aquatic life.
- Do not result in harmful ecological changes such as reduction of dependent predator populations, trophic cascades, or phase shifts.
- Ensure that any enhancement activities and fishing activities on enhanced stocks do not negatively affect the diversity, abundance, productivity, or genetic integrity of wild stocks.
- Follow the principles of ecosystem-based fisheries management.

Rating cannot be Critical for Criterion 4.

Criterion 4 Summary

Region / Method	Gear Type and Substrate	Mitigation of Gear Impacts	EBFM	Score
United States of America / Gulf of Mexico / Vertical lines / United States of America / Yellowtail snapper	5	0	Moderate Concern	Green (3.873)
United States of America / Gulf of Mexico / Vertical lines / United States of America / Red Snapper	4	0	Moderate Concern	Green (3.464)
United States of America / Gulf of Mexico / Vertical lines / United States of America / Vermilion Snapper	4	0	Moderate Concern	Green (3.464)
United States of America / Western Central Atlantic / Vertical lines / United States of America / Red Snapper	4	0	Moderate Concern	Green (3.464)
United States of America / Western Central Atlantic / Vertical lines / United States of America / Vermilion Snapper	4	0	Moderate Concern	Green (3.464)
United States of America / Western Central Atlantic / Vertical lines / United States of America / Yellowtail snapper	5	0	Moderate Concern	Green (3.873)

Vertical line gear in the GOM and SA, including hydraulic/electric reel, rod and reel, and handlines, have a very low impact on the ecosystem, but their cumulative impact at such a large scale could increase impacts {GMFMC 2015f}.

There have been some minimal measures implemented to mitigate the impacts of fishing on the habitat including MPAs. MPAs cover around 0.5% of the habitat in the GOM {NOAA 2011}, but no estimate is available for the SA.

Whether the removal of snapper biomass has an effect on the ecosystem in general is questionable, but it is reasonable to assume that moderate ecosystem effects are associated with the volume of biomass removal.

Criterion 4 Assessment

SCORING GUIDELINES

Factor 4.1 - Physical Impact of Fishing Gear on the Habitat/Substrate

Goal: The fishery does not adversely impact the physical structure of the ocean habitat, seafloor or associated biological communities.

- *5 - Fishing gear does not contact the bottom*
- *4 - Vertical line gear*
- *3 - Gears that contacts the bottom, but is not dragged along the bottom (e.g. gillnet, bottom longline, trap) and is not fished on sensitive habitats. Or bottom seine on resilient mud/sand habitats. Or midwater trawl that is known to contact bottom occasionally. Or purse seine known to commonly contact the bottom.*
- *2 - Bottom dragging gears (dredge, trawl) fished on resilient mud/sand habitats. Or gillnet, trap, or bottom longline fished on sensitive boulder or coral reef habitat. Or bottom seine except on mud/sand. Or there is known trampling of coral reef habitat.*
- *1 - Hydraulic clam dredge. Or dredge or trawl gear fished on moderately sensitive habitats (e.g., cobble or boulder)*
- *0 - Dredge or trawl fished on biogenic habitat, (e.g., deep-sea corals, eelgrass and maerl)*
  Note: When multiple habitat types are commonly encountered, and/or the habitat classification is uncertain, the score will be based on the most sensitive, plausible habitat type.

Factor 4.2 - Modifying Factor: Mitigation of Gear Impacts

Goal: Damage to the seafloor is mitigated through protection of sensitive or vulnerable seafloor habitats, and limits on the spatial footprint of fishing on fishing effort.

- *+1 —>50% of the habitat is protected from fishing with the gear type. Or fishing intensity is very low/limited and for trawled fisheries, expansion of fishery's footprint is prohibited. Or gear is specifically modified to reduce damage to seafloor and modifications have been shown to be effective at reducing damage. Or there is an effective combination of 'moderate' mitigation measures.*
- *+0.5 —At least 20% of all representative habitats are protected from fishing with the gear type and for trawl fisheries, expansion of the fishery's footprint is prohibited. Or gear modification measures or other measures are in place to limit fishing effort, fishing intensity, and spatial footprint of damage caused from fishing that are expected to be effective.*
- *0 —No effective measures are in place to limit gear impacts on habitats or not applicable because gear used is benign and received a score of 5 in factor 4.1*

Factor 4.3 - Ecosystem-Based Fisheries Management

Goal: All stocks are maintained at levels that allow them to fulfill their ecological role and to maintain a functioning ecosystem and food web. Fishing activities should not seriously reduce ecosystem services provided by any retained species or result in harmful changes such as trophic cascades, phase shifts or reduction of genetic diversity. Even non-native species should be considered with respect to ecosystem impacts. If a fishery is managed in order to eradicate a non-native, the potential impacts of that strategy on native species in the ecosystem should be considered and rated below.

- *5 — Policies that have been shown to be effective are in place to protect species' ecological roles and ecosystem functioning (e.g. catch limits that ensure species' abundance is maintained at sufficient levels to provide food to predators) and effective spatial management is used to protect spawning and foraging areas, and prevent localized depletion. Or it has been scientifically demonstrated that fishing practices do not have negative ecological effects.*
- *4 — Policies are in place to protect species' ecological roles and ecosystem functioning but have not proven to be effective and at least some spatial management is used.*
- *3 — Policies are not in place to protect species' ecological roles and ecosystem functioning but detrimental food web impacts are not likely or policies in place may not be sufficient to protect species' ecological roles and ecosystem functioning.*
- *2 — Policies are not in place to protect species' ecological roles and ecosystem functioning and the likelihood of detrimental food impacts are likely (e.g. trophic cascades, alternate stable states, etc.), but conclusive scientific evidence is not available for this fishery.*
- *1 — Scientifically demonstrated trophic cascades, alternate stable states or other detrimental food web impact are resulting from this fishery.*

Factor 4.1 - Physical Impact of Fishing Gear on the Habitat/Substrate

UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, RED SNAPPER
UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, VERMILION SNAPPER
UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, RED SNAPPER
UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, VERMILION SNAPPER

4

Red and vermilion snapper are caught with vertical line gear including hydraulic/electric reel, rod and reel, and handlines on hard bottom substrates in the SA and GOM (Scott-Denton et al. 2011). Since the vertical line gear is used to fish for reef-associated species, a subscore of 4 is provided to subfactor 4.1a.

Justification:

Gear has minimal contact with the seafloor where red, vermilion, and yellowtail Snapper are observed (Scott-Denton et al. 2011). Fishing gear used to catch snapper in the GOM and SA are mainly hook and line based (mostly through reel, electric or hydraulic lines, electrical devices, or troll and hand lines (NMFS 2016b)), which, compared with more invasive trawling gears, shows minimal signs of impacting habitat (Scott-Denton et al. 2011).

Nearshore and inner shelf hard bottom habitat is important nursery and settlement habitat for a host of snapper species (SAFMC 2009a). For this reason, most of the fishing for these species is performed over rocky substrates including rocky bottoms, coral, and artificial reefs (Scott-Denton et al. 2011).

UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, YELLOWTAIL SNAPPER
UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, YELLOWTAIL SNAPPER

5

Yellowtail Snapper are caught with vertical line gear including hydraulic/electric reel, rod and reel, and handlines; the fishing methods used to target Yellowtail Snapper "primarily target upper water layers" (pers. comm., FWC 2017).

Since the vertical line gear is used to fish for reef-associated species and is not likely to be in contact with the seafloor, a subscore of 5 is provided to subfactor 4.1a.

Justification:

Gear has minimal contact the seafloor where Red, Vermilion, and Yellowtail Snapper are observed (Scott-Denton et al. 2011). Fishing gear used to catch snapper in the GOM and SA are mainly hook and line based (mostly through reel, electric or hydraulic lines, electrical devices, or troll and hand lines (NMFS 2016b), which, compared with more invasive trawling gears, show minimal signs of impacting habitat (Scott-Denton et al. 2011).

Factor 4.2 - Modifying Factor: Mitigation of Gear Impacts

UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, RED SNAPPER
UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, VERMILION SNAPPER
UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, YELLOWTAIL SNAPPER

0

The GOM has established MPAs, the Rigs-to-Reefs program (offering more habitat for snapper), gear modifications, seasonal closures, and identified nursery areas and effort controls to mitigate the effect of gear. Vertical line gear is perceived to have minimal contact or adverse effect on sensitive habitats. The GMFMC reef fish vertical line fishery therefore is not eligible to receive a habitat score modifier.

Justification:

The GMFMC Reef Fish FMP and subsequent amendments have established management measures that protect coral and hard bottom habitats for many species managed through this plan. The original FMP established a “stressed area” akin to a specialized management zone (SMZ) within which several bottom damaging gears, including fish traps and rollerhead trawls, were prohibited (GMFMC 1981). The intent of this gear restriction was to prevent further damage from these gears and allow re-growth in areas previously affected. A regulatory amendment in 1999 created the Steamboat Lumps and Madison-Swanson marine reserves, which prohibited fishing with any gear within the combined 219 square-mile reserves (GMFMC 1999b). The reserves were originally created for a limited time, but their duration was extended through Amendment 21 (GMFMC 2004c), and made permanent through Amendment 30B (GMFMC 2008a). Additional closed areas were established through Amendment 19 (GMFMC 2002a), which developed the Tortugas Ecological Reserves and prohibited all fishing activity and anchoring within the Reserves.

In addition to the habitat protection measures implemented through the Reef Fish FMP, a number of beneficial measures have been implemented through other means. In particular, the joint GMFMC/SAFMC Fishery

Management Plan for Coral and Coral Reefs (GMFMC 1982) established three coral habitat areas of particular concern (HAPC) within the Gulf of Mexico where fishing with certain bottom tending gear (including longlines) is prohibited. The Coral FMP also prohibits the harvest of stony corals and most gorgonian corals. Subsequent amendments to the Plan also address harvest of live rock.

Spatial measures have been proven ineffective when intensified fishing occurs in unprotected sites (Coleman et al. 2011)(Coleman et al. 2004). Therefore, effectiveness here has been measured by the coupling of spatial management and reduced fishing pressure. Fishing effort has been reduced in the GOM, so that commercial overfishing of red, vermilion and yellowtail snapper is not occurring (NMFS 2017e), though the recreational red snapper fishery has recently been exceeded (NOAA 2017f).

Managers have closed several areas in the GOM to all fishing (NOAA 2011). Commercial and recreational seasonal closures implemented in 1992 and 1997 respectively and shrimp trawling area closures were established in 1979, 1981 and 1984. MPAs and selected areas prohibit gears at certain depths in both the GOM and SA. Reef fishes received specific MPAs in 1994 where conflicts were arising between commercial and recreational sectors (Brandt and Jackson 2013). Approximately 40% of the GOM is declared an MPA, but only 0.5% of GOM is closed to fishing (NOAA 2011). There is a limited capacity to encourage recruitment into the fishery due to the lack of support for spawning grounds and juvenile snapper (Karnauskas et al. 2013). Various area closures have been established throughout the GOM to protect spawning aggregation sites (Figure 35). Nursery area maps have been created, e.g., for the Freeport Rocks (GMFMC 2010), and were used in coordination with VMS and observer coverage to facilitate area-based management.

In the GOM, old oil platforms are converted into reefs through the Rigs to Reefs program. Their efficacy is debated: whether the rig exhibits higher abundances of snapper due to the site attraction or offers suitable habitat to increase production, is currently unknown and a prioritized research area (Ajemian et al. 2015). Shipp and Bortone (2009) have suggested that reefs cause increased harvest potential for the red snapper (Cowan et al. 2010). However, ARs may have actually increased vulnerability of snapper as it increases aggregative behavior, increasing their catchability and also enabling increased predation particularly on juveniles. Site fidelity and site attachment is low to moderate because snappers have to diurnally migrate for feeding, and thus use energy for travelling to and from feeding habitats, reducing the nutritional benefits of living on ARs. With increased AR abundance, there is a decrease in reef fish biomass (Ajemian et al. 2015). Recent research concludes that positioning and spacing of the ARs is critical for snapper survival (Cowan et al. 2010) (Brandt et al. 2013).

Circle hooks are required for all vessels in the US Gulf of Mexico reef fish fishery and the Southeast Atlantic snapper grouper fishery (Sauls and Ayala 2012) (GMFMC 2015b)(SAFMC 2010b); circle hooks are expected to be less likely to snag the substrate (Cooke and Suski 2004), though limited data exist to substantiate this point.

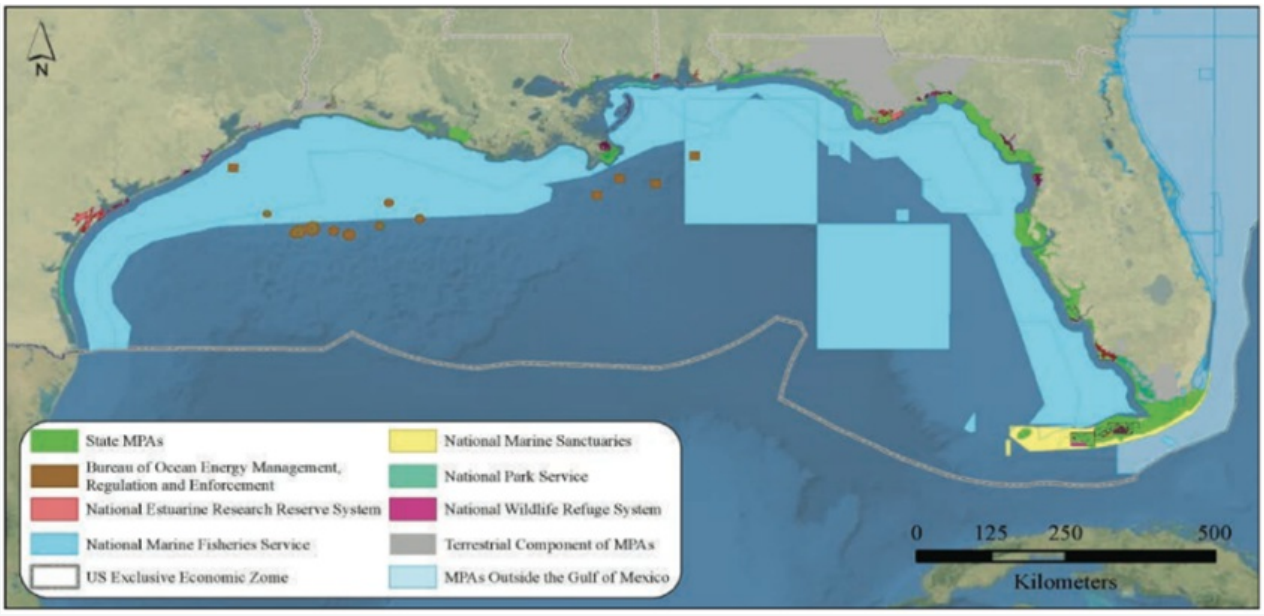

Figure 43 Map of MPAs in the GOM (Figure from NOAA 2011a) Source: (Sustainable Fisheries Partnership 2016a).

UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, RED SNAPPER
UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, VERMILION SNAPPER
UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, YELLOWTAIL SNAPPER

0

The SAFMC Snapper-Grouper FMP and subsequent amendments have established management measures that protect coral and hard bottom habitats necessary to many snapper-grouper species. Management measures include gear restrictions, closed areas, and effort restrictions. Recently, eight marine-protected areas have been established in the SA to protect spawning aggregations and particularly deep-water grouper species (SAFMC 2018a), but several are known to protect habitat of vermilion snapper (SAFMC 2018b) (SAFMC 2018c) (SAFMC 2018d) and red snapper (SAFMC 2018e) (Figure 36). However, many of these regulations apply to the handline fishery.

There is insufficient area is protected from the vertical line fishery, no mitigation has been awarded.

Justification:

The original FMP prevented the use of explosives and poisons throughout the management area and established a process to designate artificial reefs and other modified habitats as SMZs (SAFMC 1983), while Regulatory Amendment 1 prohibited all gears except handheld hook and line and spear fishing within SMZs (SAFMC 2017g). Original documentation could not be acquired, but the SAFMC Snapper-Grouper FMP website indicates that SMZs were later designated in Florida in 1988 (Regulatory Amendment 2) and 1989 (Regulatory Amendment 3), South Carolina in 1992 (Regulatory Amendment 5) and 1998 (Regulatory Amendment 7), and Georgia in 2000 (Regulatory Amendment 8). Further, Amendment 6 created the 92 mi^2 Oculina Experimental Closed Area in 1994, which prohibits targeting or harvesting snapper-grouper using any gear within the area, and also prohibits anchoring within the closed area. These regulations not only provide a refuge free from exploitation for snapper-grouper species, but protect critical habitat as well.

A number of management measures have also been implemented that, although not specific to the handline fishery, are beneficial for snapper-grouper habitat and therefore relevant to discuss:

- The SAFMC established the 92 mi^2 Oculina Habitat Area of Particular Concern (HAPC) in 1984 through the Coral, Coral Reef and Live/Hardbottom Habitat Plan in conjunction with the GMFMC (SAFMC 2005b). The boundaries of the Oculina HAPC were later expanded to incorporate an area closed to trawling for rock shrimp, and added two "satellite" Oculina areas (SAFMC 2005b), bringing the total area of the HAPC to approximately 300 mi^2.
- The SAFMC then approved the Comprehensive Ecosystem-Based Amendment (SAFMC 2009d) that established Coral HAPC covering more than 23,000 mi^2 to protect what may be the largest contiguous distribution of pristine deep water corals in the world. Regulations within all of the HAPC established by the SAFMC prohibit the use of all bottom-tending gear, including bottom trawls, bottom longlines, dredges, fish pots, and fish traps, to protect the sensitive coral and other hard bottom habitats within the HAPC.
- Amendment 4 to the Snapper-Grouper FMP (SAFMC 1991) prohibited the use of longline gear shoreward of 50 fathoms to protect live bottom areas.
- Amendment 36 (effective on 31 July 2017) designated five SMZs to protect spawning, or reproducing, fish and their habitat. The SMZs are aimed at the snapper-grouper complex and prohibit fishing for, retaining, or possessing fish of the snapper-grouper complex all year round. Anchoring is also prohibited in most areas. SMZs have been designated throughout the Florida, North and South Carolina areas each ranging from about 3 to 5 mi^2 (NOAA 2017e).

Circle hooks are required to be used by all vessels in the US Gulf of Mexico reef fish fishery and the Southeast Atlantic snapper-grouper fishery (Sauls and Ayala 2012) (GMFMC 2015b) (SAFMC 2010b); circle hooks are expected to be less likely to snag the substrate (Cooke and Suski 2004), though limited data exist to substantiate this point.

Spatial measures generally have been proven ineffective when intensified fishing occurs in unprotected sites (Coleman et al. 2011) (Coleman et al. 2004). Therefore, effectiveness here has been measured by the coupling of spatial management and reduced fishing pressure. Fishing pressure remains high for red snapper, but vermilion and yellowtail snapper are not experiencing overfishing (NMFS 2017e).

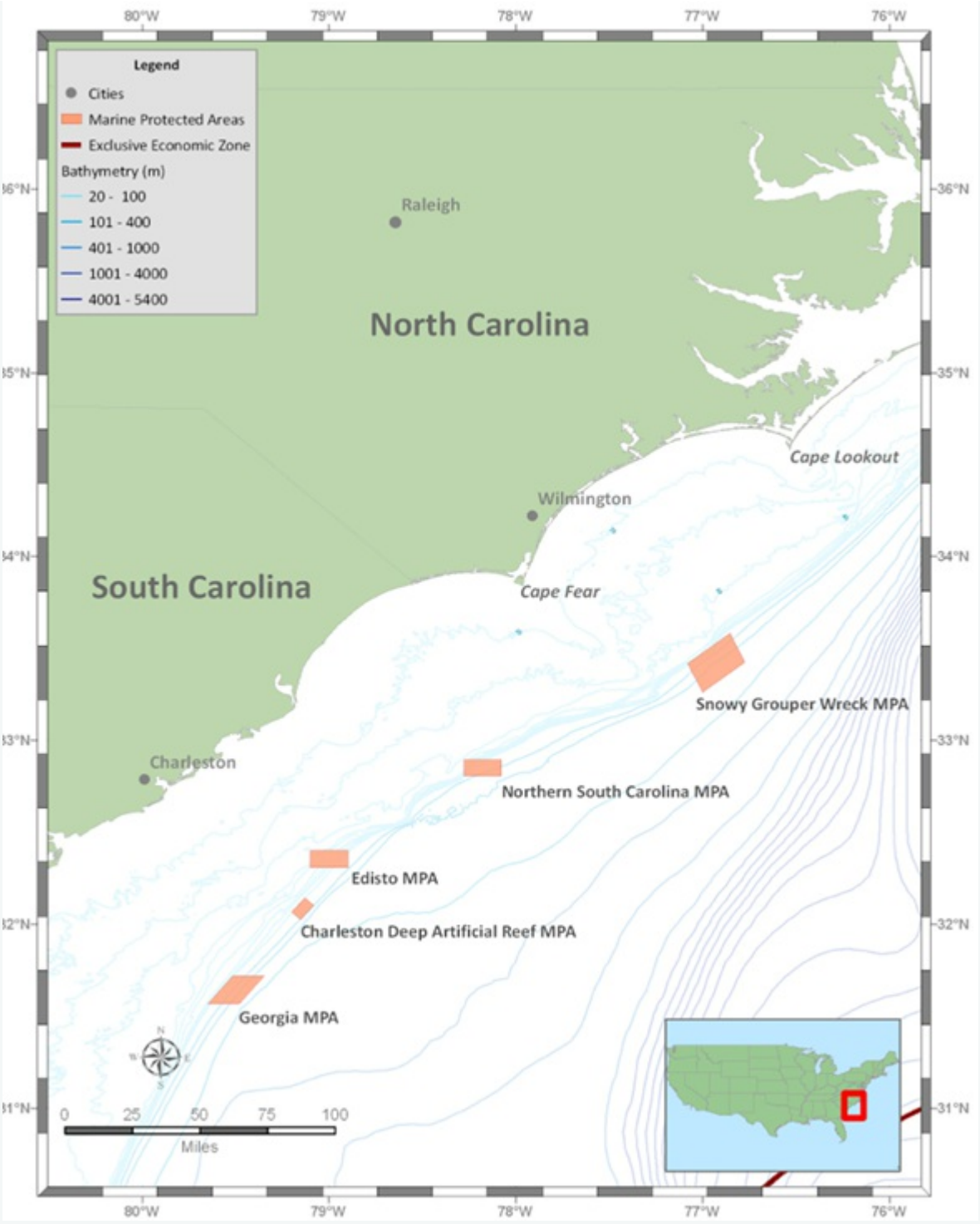

Figure 44 Map of the MPAs off the coast of North Carolina, South Carolina, and Georgia (SAFMC 2012b)

Factor 4.3 - Ecosystem-Based Fisheries Management

UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, RED SNAPPER
UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, VERMILION SNAPPER
UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, YELLOWTAIL SNAPPER

Moderate Concern

No information could be found that describes explicit ecosystem-based fishery management within the Gulf of Mexico. However, the GMFMC have enacted many regulations within the Reef Fish FMP and other FMP that indirectly address ecosystem function. A comprehensive essential fish habitat (EFH) amendment was implemented in 1998 that describes EFH for 26 representative species managed by the GMFMC (GMFMC 1998). These 26 species account for approximately one third of all species managed by the GMFMC, but represent the majority of landings in the region and occur in all habitat types within the Gulf of Mexico, so additional species would not result in additional areas of EFH (GMFMC 1998). The EFH amendment defines EFH for each species or species complex, identifies threats to these habitats, describes predator-prey relationships for the included species, and provides recommendations to minimize impacts to these habitats (GMFMC 1998).

The GMFMC implements harvest control rules and accountability measures for all managed species, and considers relevant species groupings when setting quotas. For example, in the reef fish fishery, quotas and IFQ shares for overfished red grouper and gag are separate from other shallow water grouper species that are not considered overfished (GMFMC 2017i). This strategy promotes stock rebuilding for the overfished species, but allows harvest of non-overfished shallow water groupers proportional to their ecological occurrence. Because no deep water grouper species are considered overfished, a single deep water quota and IFQ share system also promotes proportional harvest for this species complex. GMFMC management take into consideration the diversity and abundance of the various grouper species; however, the harvest of top predators may lead to impacts on food webs.

The GOM has addressed EBFM by implementing the Ecosystem Based Fishery Management Working Group with a purpose to develop objectives related to ecosystem-based management (NOAA 2014); however, this report examined few risks of fishing on the ecological role of the snapper species. O'Farrell et al. (2017) suggests that environmental factors are considered in single-species stock assessments, but it is not clear how and when these factors should be considered. The GMFMC is not currently incorporating ecological impacts into statistical assessments as the GMFMC's ecosystem scientific and statistical committee no longer exists (GMFMC 2015g). Additionally, the GMFMC Amendment 28 concurs, stating "The relationships among species in marine ecosystems are complex and poorly understood" (SEDAR 2015b).

The GOM has implemented EBFM through tools such as MPAs, bycatch reduction methods and ecosystem considerations into single-species stock assessments and species regulations (O'Farrell et al. 2017). ACLs have been implemented to mitigate ecological impacts (e.g., to ensure that further pressure isn't applied to gag or fisheries similar to red snapper) (GMFMC 2015e). MPAs, ARs and other protected areas offer refuge to the snapper species. However, it is debated whether ARs are attributable to the increased productivity of snapper or merely attract them from other, less preferable habitat (Ajemian et al. 2015).

Many grouper species are mid-level to apex predators and have been shown to have direct or indirect cascading effects on the ecosystem (Stallings 2008) but most grouper in the Reef Fish FMP are not considered to be undergoing overfishing (NMFS 2017e).

Red snapper has been considered to impact competitor species abundance when red snapper populations are

calculated to be increasing; yet, changes to the amount of red snapper bycatch is not expected to directly impact other species in the ecosystem (SEDAR 2015b).

Although there is a general lack of understanding of ecosystem roles and the effectiveness of EBFM in the GOM, measures are in place that protect ecosystem function, e.g., spatial and effort management. The GOM has been successful in rebuilding many species within the Reef Fish FMP; therefore, detrimental food impacts are not likely, and ecosystem-based fisheries management is scored "moderate" concern.

Justification:

Ecological implications have been evident in the GOM between red and vermilion snapper. Since both species compete for similar food sources, the intense fishing pressure, followed by sharp re-growth and artificial reefs, have swiftly altered interactions between the two species (SEDAR 2015a). The GMFMC have considered that changes to the snapper fishery are likely to impact population size structure. In turn, this could result in changing fishing behavior and changes in stock abundance of other reef fish species (e.g., if red snapper abundance increases, their predator abundance is likely to increase). As red snapper average size increases, the recreational quota is reached faster with fewer fish caught, which requires shorter seasons, despite quota increase. Such changes in snapper population structure can potentially displace fishing behavior on to other reef species, e.g., vermilion snapper, gray triggerfish, and gag (GMFMC 2015e).

UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, RED SNAPPER
UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, VERMILION SNAPPER
UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, YELLOWTAIL SNAPPER

Moderate Concern

The SAFMC implemented an ecosystem approach to fishery management for all its managed species in 2010 with the adoption of a Fishery Ecosystem Plan (FEP) (SAFMC 2009c) and the first Comprehensive Ecosystem-Based Amendment (SAFMC 2009d). The SAFMC views habitat preservation as a primary role in achieving ecosystem management, and as such the FEP and Comprehensive Ecosystem-Based Amendment focus heavily on protecting sensitive coral and live bottom habitats on which many of the SAFMC managed species rely (SAFMC 2009d) (SAFMC 2009c). The FEP was crafted to guide ecosystem policy, with specific management measures implemented through the first and subsequent Comprehensive Ecosystem-Based Amendments. Specific ecosystem management goals identified in the FEP include maintaining or improving 1) ecosystem structure and function, 2) social, economic, and cultural benefits derived from the natural resources, and 3) biological, economic, and cultural diversity (SAFMC 2009c).

Through several volumes, the FEP addresses ecosystem interactions (e.g., food webs), human interactions, essential fish habitat, fishing and non-fishing threats to the South Atlantic ecosystem, and research needs. Comprehensive Ecosystem-based Amendment 1 and Comprehensive Ecosystem-based Amendment 2 focus primarily on development of protection of habitat, while CE-BA 3 (under development) deals specifically with improved bycatch data collection (SAFMC 2018f).

While management is in place to reflect ecosystem variability, stock assessments are not yet based on ecosystem-based models (SAFMC 2017k) and the ecological role and function of red, vermilion and yellowtail snapper are not discussed in stock assessments (SEDAR 2017b) (SEDAR 2012a) (SEDAR 2012c). The SAFMC recognizes that there are few situations where food web properties or predator-prey interactions have been reflected in the management framework (SAFMC 2017k). This is a particular concern since some species of snapper and grouper are considered overfished, e.g., red grouper (NMFS 2017e).

The FEP provides a well-defined plan for advancing and guiding the ecosystem approach to fishery management within the region. However, the ecosystem approach was only recently implemented, and many data gaps still exist (such as bycatch monitoring) that make it difficult to evaluate the effectiveness of the FEP. Since the stock assessments rarely consider the ecological role of the species under assessment, but detrimental food web impacts are not likely (because of the fishery management in place), the SAFMC snapper-grouper fishery scores as a "moderate" concern for ecosystem-based fishery management.

Justification:

The SAFMC implements harvest control rules and accountability measures for all managed species to minimize overfishing and promote stock rebuilding for overfished species (SAFMC 2018a). Many grouper species are mid-level to-apex predators and have been shown to have direct or indirect cascading effects on the ecosystem (Stallings 2008). Further, heavy localized exploitation may affect local species composition.

The SAFMC states that environmental variability is seldomly reflected in stock assessments (SAFMC 2017k). For example, the red snapper stock assessment recommends that more research is required on the effects of environmental variation on the changes in recruitment or survivorship in further stock assessments (SEDAR 2017b). Stock assessments mostly assume that the environment remains, and therefore life-history parameters remain constant, mostly due to the lack of available data (SAFMC 2017k).

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Appendix A: Extra By Catch Species

RED PORGY

Factor 2.1 - Abundance

UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, YELLOWTAIL SNAPPER
UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, RED SNAPPER
UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, VERMILION SNAPPER

High Concern

There are no formal stock assessments published for this species in the Gulf of Mexico. Therefore, a PSA has been used to determine the abundance of red porgy (see Justification). Since red porgy has a high vulnerability, Seafood Watch deems abundance as a "high" concern.

Justification:

The PSA score for red porgy in the GOM = 3.35. For this reason, the species is deemed to have a "high" vulnerability. Detailed scoring of each attribute is shown below.

ATTRIBUTE	RESULT	SCORE
Productivity Attribute		
Average age at maturity	2 years (Hood and Johnson 2000)	1
Average maximum age	15 years (Hood and Johnson 2000)	2
Fecundity	48,000 to 488,000 eggs/year	1
Average maximum size	91cm (FishBase 2016b)	1
Average size at maturity	22cm (Hood and Johnson 2000)	1
Reproductive strategy	Broadcast spawner	1
Trophic level	3.9 (FishBase 2016b)	3
Quality of habitat	Moderately altered from non-fishing sources (Chen 2017)	2
Susceptibility Attribute		
Areal overlap	Default score	3
Vertical overlap	Default score	3

Selectivity of fishery	Protogynous hermaphrodites (Harris and McGovern 1997) (Kokokiris et al. 1999)	3
Post-capture mortality	Red porgy are a retained species	3

PSA Calculation

P = 1.5

P^2 = 2.25

S = 3

S^2 = 9

V = 3.3541

UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, RED SNAPPER
UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, VERMILION SNAPPER

High Concern

The last stock assessment for red porgy was completed in 2012 and concluded that the stock is overfished with a $SSB_{2011}/MSST$ = 0.61 (SEDAR 2012b) and SSB_{2011}/SSB_{MSY} = 0.48 (NMFS 2016d). The fishery is in year 19 out of the 18 year rebuilding plan (NMFS 2018a).

Since the stock is overfished, Seafood Watch considers abundance as a "high" concern.

Factor 2.2 - Fishing Mortality

UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, YELLOWTAIL SNAPPER
UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, RED SNAPPER
UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, VERMILION SNAPPER

Moderate Concern

Red porgy has not been formally assessed and therefore, fishing mortality is unknown relative to reference points, therefore, Seafood Watch deems fishing mortality as a "moderate" concern.

Justification:

Red porgy in the northeastern Gulf of Mexico had reduced sizes and earlier maturity compared to other populations, which could be evidence of size-selective fishing pressure (Hood and Johnson 2000). Red Porgy is commonly targeted by commercial fishers, headboats, and private recreational boats using vertical lines. Landings for the Gulf of Mexico in 2014 were 213,015 lb by the commercial fishery (NMFS 2016b) and 374,340

lb by the recreational fishery (NMFS 2015b).

UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, RED SNAPPER
UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, VERMILION SNAPPER

Low Concern

The stock is not undergoing overfishing: $F_{2009-2011}/F_{MSY}$ = 0.64, but this calculation hosts much uncertainty (SEDAR 2012b), particularly regarding natural mortalities (ranging between 0.2 and 0.25) and discard mortalities (ranging between 0.25 and 0.45) (SEDAR 2012b).

Red porgy is a highly discarded species (Helies and Jamison 2013), caught in large numbers during fishing trips targeting vermilion snapper (Stephen and Harris 2010) and red snapper (Pulver et al. 2016). When discarded, post-release mortality varies: SEDAR 1 (2012) deems the discard mortality rate at 0.35 but another study considers that post-release morality rates are high (~80%) (Stephen and Harris 2010). Red porgy are particularly susceptible to post-capture mortality due to barotrauma as they are caught in deep water and are also susceptible to gear-induced mortality (Overton et al. 2008).

Landings of red porgy have increased by eight-fold since the year 2000 and have been relatively stable since 2007, with the most recent landings at 67 MT (NOAA 2016c).

Although there is some uncertainty in fishing mortality estimates, since overfishing is not occurring Seafood Watch deems fishing mortality as a "low" concern.

Factor 2.3 - Discard Rate

UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, YELLOWTAIL SNAPPER
UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, RED SNAPPER
UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, VERMILION SNAPPER

< 100%

Data regarding discard and bait use in the GOM reef fish fisheries are limited.

The bulk of the discards are considered regulatory discards, which include fish that are too small to be retained or that are prohibited due to closures or quotas (Stephen and Harris 2010). Some of the stock assessments on domestic fisheries contain some discard data that are attributed to a single species rather than the whole fishery (SEDAR 2010b).

Bait use in one study located in the GOM found that it mostly comprised tomtate, white grunt, pigfish, and sand perch in the vertical line fishery and 2% of the catch (number of fish) was used for bait (Scott-Denton and Williams 2013). However, Gulf reef fish species are prohibited to be used as bait (CFR §622.9 [e]).

Discard data are lacking in both fisheries: in the GOM, logbooks often claimed that "no discards" took place in fishing trips, which contradicted observer data, which found that an instance of having no discards was uncommon (McCarthy 2012). Scott-Denton et al. (2011) found that, in the vertical line fishery, 75% fish were

retained, with 19% released alive, but this was with some signs of barotrauma; nearly 7% were discarded either dead, unknown, or kept for bait. Similarly, in Scott-Denton et al. (2013), 71% of the individuals were kept, 19% were released alive, and 11% were either discarded dead, unknown, or retained for bait.

Since most sources show that discarding is generally below 20% and bait use is low (<10%) in the GOM , discards and bait are less than 100% of landings, which gains a score of 1.

UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, RED SNAPPER
UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, VERMILION SNAPPER

< 100%

Data regarding discards and bait use in the commercial SA snapper-grouper fisheries are limited.

When targeting vermilion snapper in the SA, bait comprised around 14% of the catch, consisting mainly of vermilion snapper, red porgy, tomtate, bank sea bass and scamp (Stephen and Harris 2010).

The bulk of the discards are considered regulatory discards, which include fish that are too small to be retained or that are prohibited due to closures or quotas (Stephen and Harris 2010). A pilot observer program conducted from 2007 to 2009 collected information on species composition and disposition (kept or discarded) (GSAFF 2008) (GSAFF 2010). The (bait + discards)/landings ratio uses the total discarded CPUE (all species combined) divided by total retained CPUE. This ratio should be considered a minimum estimate because it does not account for bait needs, nor does it distinguish between species retained for food vs. bait. Based on 2,664 stations sampled between 2007 and 2009, the (bait + discards)/landings ratio is 29.9% (GSAFF 2008) (GSAFF 2010).

A ratio less than 100% warrants a score modifier of 1.0.

Justification:

The discard-to-landings ratio for the SA handline fishery is generally around 18%, but this figure can range vastly, mainly due to the amount of fish that have to be discarded due to landing size requirements or the moratorium; this can cause discards to far exceed the kept catch (Helies and Jamison 2013). The Gulf and South Atlantic Fisheries Foundation (2008) suggested that around 27% of catches are not retained (Gulf and South Atlantic Fisheries Foundation 2008). However, in the SA vertical line fishery, red snapper discards were shown to far exceed kept fish (Helies and Jamison 2013).

GRAY SNAPPER

Factor 2.1 - Abundance

UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, YELLOWTAIL SNAPPER
UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, VERMILION SNAPPER

Moderate Concern

The latest stock assessment was published in April 2018. The stock is not deemed as overfished: $SSB_{2015}/MSST = 1.408$, but $SSB_{2015}/SSB_{SPR30} = 0.703$ (SEDAR 2018a) (Figure 26).

Since a recent stock assessment shows that the gray snapper biomass is above the LRP, but is below 75% of the TRP, Seafood Watch scores abundance as a "moderate" concern.

Justification:

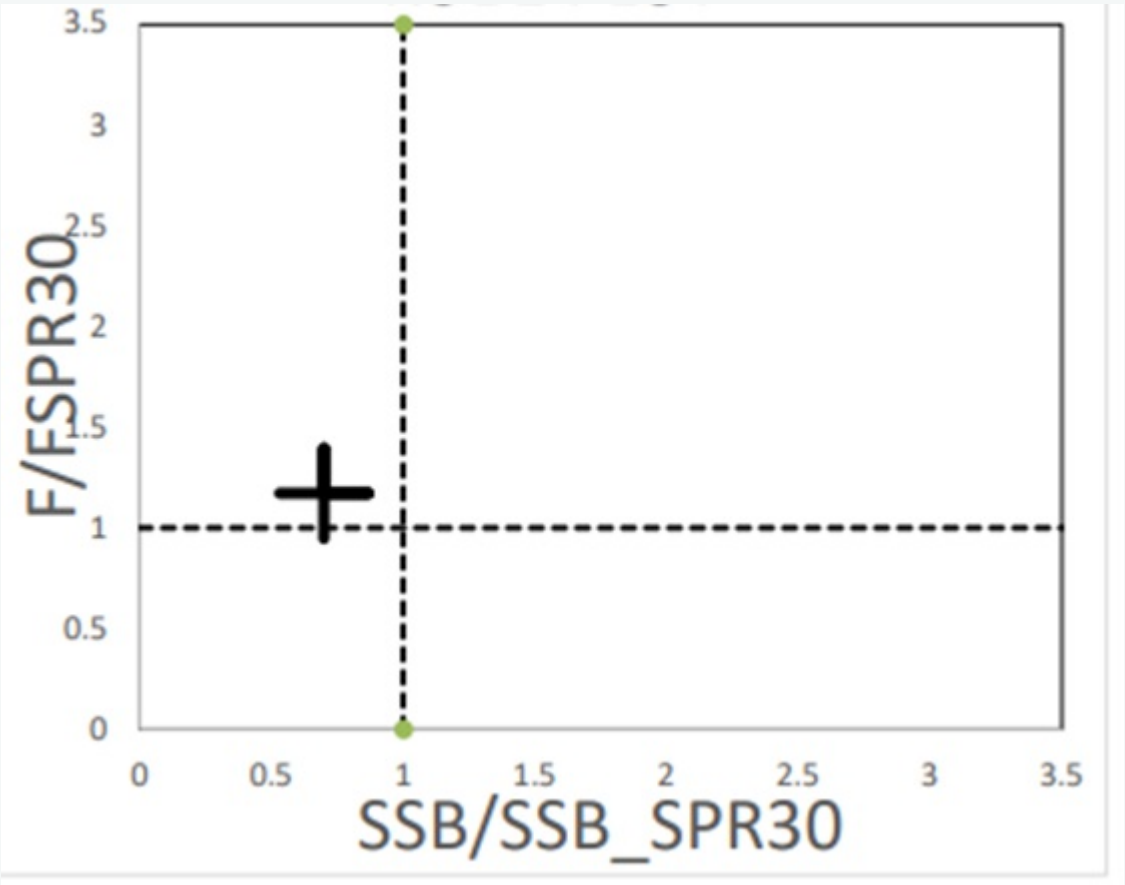

Figure 30 Terminal year of a Kobe Plot illustrating Spawning Potential Ratio and exploitation ratio (95% confidence limits) for the Gulf of Mexico Gray Snapper stock assessment. Source: (SEDAR 2018e)

The stock assessment suggests that total biomass and egg production have decreased throughout the time series, and are currently at or around the lowest annual value. Management regulations were implemented in 1990 to protect the stock; however, there has been little improvement in the stock biomass. It is unclear why this increase has not occurred, but the stock assessment has suggested that unexpectedly high discards in both the commercial and recreational fleets following size limit regulations may be a key contributor (SEDAR 2018a).

Factor 2.2 - Fishing Mortality

UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, YELLOWTAIL SNAPPER
UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, VERMILION SNAPPER

High Concern

$F_{CURRENT}/F_{SPR30}$ = 1.20. The stock is undergoing overfishing and the stock assessment suggests that the stock has generally been experiencing overfishing since 1976 (SEDAR 2018a) (Figure 26).

Since the gray snapper is undergoing overfishing, Seafood Watch deems fishing mortality as a "high"

concern.

Factor 2.3 - Discard Rate

UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, YELLOWTAIL SNAPPER
UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, VERMILION SNAPPER

< 100%

Data regarding discard and bait use in the GOM reef fish fisheries are limited.

The bulk of the discards are considered regulatory discards, which include fish that are too small to be retained or that are prohibited due to closures or quotas (Stephen and Harris 2010). Some of the stock assessments on domestic fisheries contain some discard data that are attributed to a single species rather than the whole fishery (SEDAR 2010b).

Bait use in one study located in the GOM found that it mostly comprised tomtate, white grunt, pigfish, and sand perch in the vertical line fishery and 2% of the catch (number of fish) was used for bait (Scott-Denton and Williams 2013). However, Gulf reef fish species are prohibited to be used as bait (CFR §622.9 [e]).

Discard data are lacking in both fisheries: in the GOM, logbooks often claimed that "no discards" took place in fishing trips, which contradicted observer data, which found that an instance of having no discards was uncommon (McCarthy 2012). Scott-Denton et al. (2011) found that, in the vertical line fishery, 75% fish were retained, with 19% released alive, but this was with some signs of barotrauma; nearly 7% were discarded either dead, unknown, or kept for bait. Similarly, in Scott-Denton et al. (2013), 71% of the individuals were kept, 19% were released alive, and 11% were either discarded dead, unknown, or retained for bait.

Since most sources show that discarding is generally below 20% and bait use is low (<10%) in the GOM , discards and bait are less than 100% of landings, which gains a score of 1.

GRAY TRIGGERFISH

Factor 2.1 - Abundance

UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, RED SNAPPER
UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, VERMILION SNAPPER

High Concern

In the Gulf of Mexico, gray triggerfish was last assessed in 2015, and was evaluated as overfished. SSBCurrent/MSST = 0.89 (GMFMC 2017f).Several assessments prior to this also evaluated gray triggerfish as overfished or approaching an overfished condition (SEDAR 2011b). Gray triggerfish is currently in year 10 of a 10-year rebuilding plan (NMFS 2017e) but is not rebuilding at adequate rates (GMFMC 2017f).

Since gray triggerfish are overfished, Seafood Watch scores abundance as a "high" concern.

Justification:

Abundance metrics for gray triggerfish are difficult to discern from commercial and recreational data because

this species was grouped with and reported as "triggerfish" (including gray, ocean, and queen triggerfish) for much of the time series (SEDAR 2015g). Biomass has declined steadily since the 1950s (Figure 27) partly because of lower than historically averaged recruitment, despite fishing mortality restrictions (SEDAR 2011b). Genetic analysis indicates a homogenous stock between the Gulf of Mexico and Southeast Atlantic (Antoni et al. 2011); in the Gulf of Mexico, all gray triggerfish are considered a single stock due to similar exploitation and habitat use (SEDAR 2011b). Its vulnerability is thought to be partly due to its high site fidelity (Addis et al. 2016).

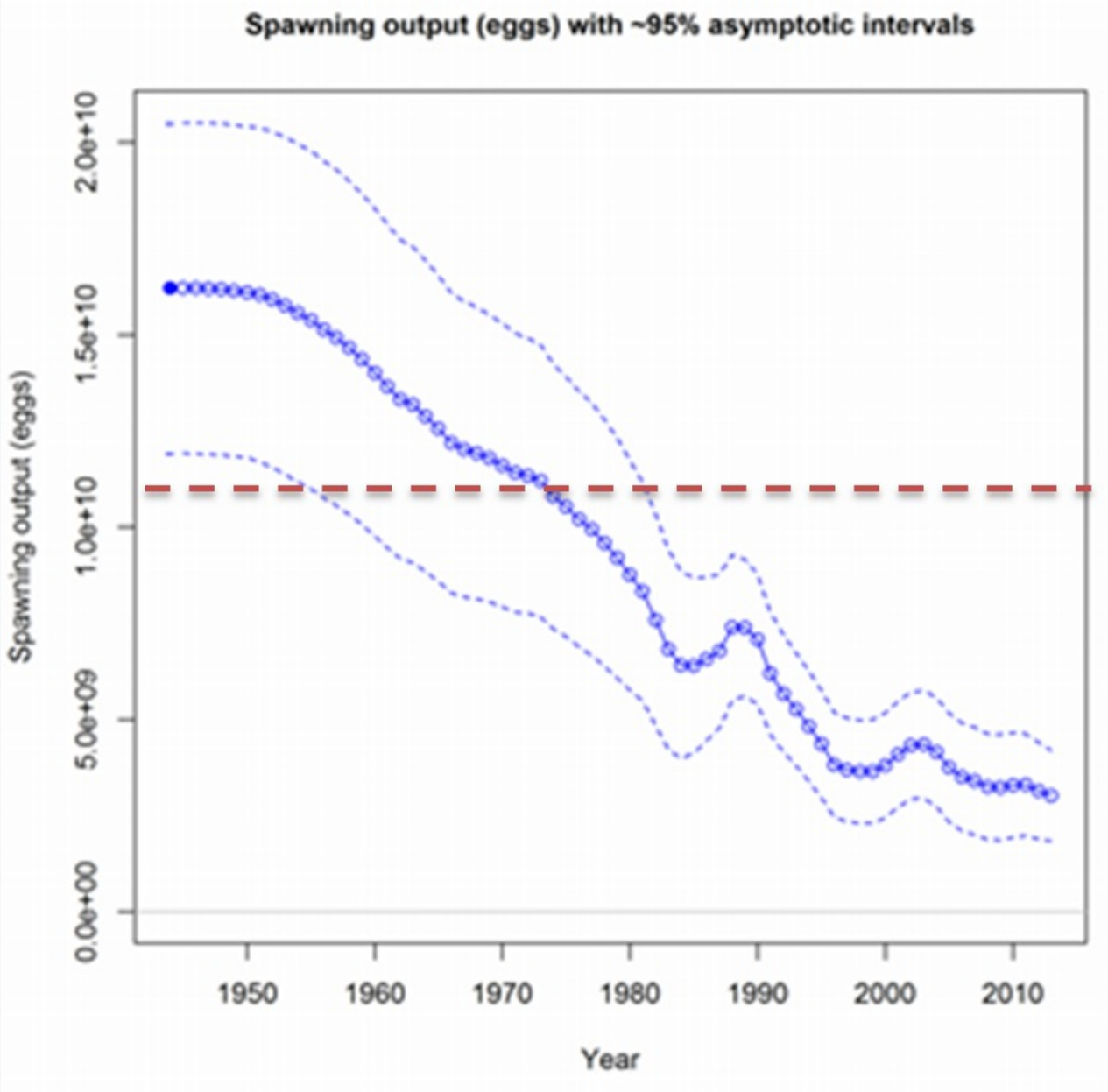

Figure 31 Estimated spawning output for Gulf of Mexico Gray Triggerfish. The red dashed line has been added to show approximate location of biomass threshold (1.11x10^10) (Table 3.2.3). Figure reprinted from SEDAR 43 (Figure 3.2.48).

UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, RED SNAPPER
UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, VERMILION SNAPPER

Moderate Concern

A recent assessment of Southeast Atlantic gray triggerfish could not estimate abundance relative to target and overfished abundance reference points because of high uncertainty in the assessment model (SEDAR 2015f) (NMFS 2016e). The review panel for the assessment stated "that there was no evidence of a decline in abundance or biomass at this time" (SEDAR 2015f). A previous assessment in 2011 also concluded that abundance status was "highly uncertain" due to a small data set (Broome et al. 2011).

Because there is conflicting and uncertain abundance information for gray triggerfish in the Southeast Atlantic, and the Productivity-Susceptibility Analysis indicates that this species does not have a high vulnerability to fishing (see detailed scoring below), we have awarded a score of "moderate" concern.

Justification:

There have been a few other limited studies on gray triggerfish abundance in this region. The mean weights of gray triggerfish had declined in both the commercial and recreational fishery from 1983 to 1999, possibly indicating a drop in abundance, but the spawning potential ratio (SPR) at the time was 62%, indicating a healthy biomass (Potts and Brennan 2001). Gray Triggerfish in the vertical line fishery off the coast of North Carolina have declined both in catch per unit of effort (CPUE), and as a percentage of total species caught from the 1970s to 2005–2006, indicating possible declines in biomass in this area (Rudershausen et al. 2008).

The PSA score for gray triggerfish in the SA = 2.837. For this reason, the species is deemed to have a "low" vulnerability. Detailed scoring of each attribute is shown below.

ATTRIBUTE	RESULT	SCORE
Productivity Attribute		
Average age at maturity	<1 year (Kelly 2014) to 1.5 years (Fitzhugh et al. 2015)	1
Average maximum age	10+ years (Lombardi et al. 2015)	2
Fecundity	8,000,000 eggs/year (Lang & Fitzhugh 2015)	1
Average maximum size	60 cm (Lombardi et al. 2015)	1
Average size at maturity	17-19 cm (Kelly 2014) (Fitzhugh et al. 2015)	1
Reproductive strategy	Demersal egg layer (SEDAR 2016a)	2
Trophic level	4.1 (Froese and Pauly 2016a)	3
Quality of habitat	Moderately altered from non-fishing sources (SAFMC 2017i)	2
Susceptibility Attribute		
Areal overlap	Fished in nearly all of the species' range	3
Vertical overlap	Fished in nearly all of the species' vertical distribution	3

Selectivity of fishery	Targeted and important contribution to the reef fish fishery	2
Post-capture mortality	Retained species	3

PSA Calculation

P = 1.625

P^2 = 2.640625

S= 2.325

S^2 = 5.405625

V = 2.836591

Factor 2.2 - Fishing Mortality

UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, RED SNAPPER
UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, VERMILION SNAPPER

Moderate Concern

Based on the recent 2015 assessment, Gulf of Mexico gray triggerfish is no longer experiencing overfishing (SEDAR 2015g)(NMFS 2017e). Fishing mortality was estimated to be well below the fishing mortality at maximum sustainable yield (F_{MSY}) threshold (F/F_{MSY} = 0.62) (SEDAR 2015f), and below the overfishing limit since 2008, but there were a number of uncertainties and concerns with the assessment (GMFMC 2015b). The commercial fishery exceeded its annual catch target (ACT) in 2012 and 2013, but not since the implementation of Reef Fish Amendment 37 in 2013 (GMFMC 2017f).

Because of the recent removal of gray triggerfish from overfishing status, but a lengthy prior period of overfishing and concerns over the lack of recovery of the gray triggerfish population, Seafood Watch has scored fishing mortality a "moderate" concern.

Justification:

Several previous assessments since 2001 have all indicated that overfishing was occurring in the past (SEDAR 2015g). Landings have significantly decreased in recent decades (Figure 28).

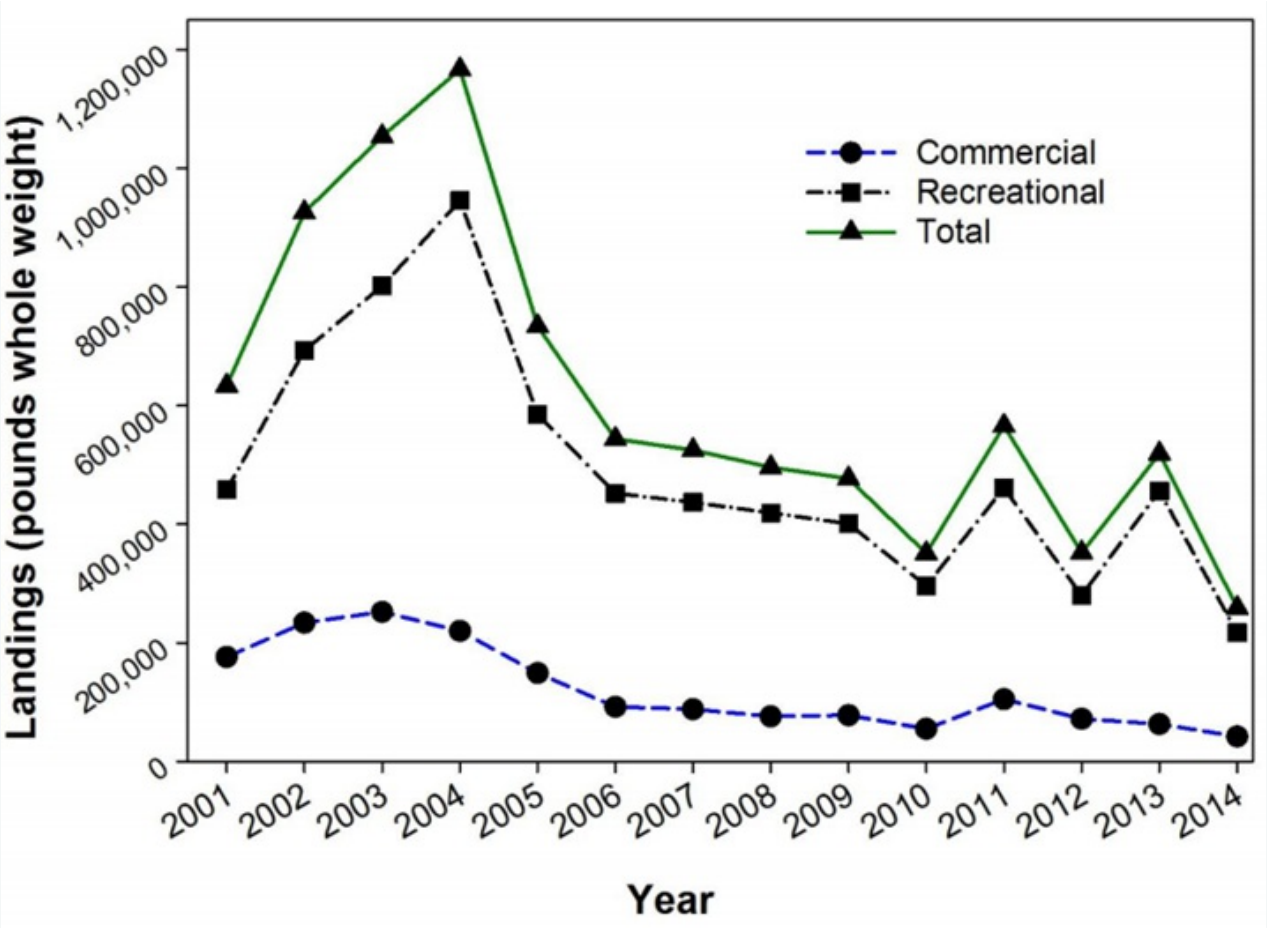

Figure 32 Gulf of Mexico Gray Triggerfish recreational, commercial, and total landings in pounds whole weight from 2001 through 2014. Source: Commercial landings from commercial ACL dataset (data accessed December 24, 2015). Recreational landings from the recreational ACL dataset (data accessed July 11, 2016). Source: (GMFMC 2016d).

UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, RED SNAPPER
UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, VERMILION SNAPPER

Moderate Concern

The first SEDAR assessment was completed for US Southeast Atlantic gray triggerfish in April 2016, and it determined that exploitation status is unknown due to uncertainty in the assessment model (SEDAR 2016a). The review panel's report from the SEDAR assessment states that, based on the information available to the panel, "there was no evidence that current levels of removals have resulted in overfishing" (SEDAR 2016a). Landings of this species are difficult to quantify because gray triggerfish is often listed in dealer reports as generic "triggerfishes," which include queen, ocean, and gray triggerfish in the Southeast Atlantic; however, Florida state now reports triggerfishes at the species level (pers. Comm.. J. Myers, SEDAR 2018). Gray triggerfish represent around 7% of the catch in the red snapper fishery, 10% in the vermilion fishery and 2% in the yellowtail snapper fishery. Therefore, the snapper fisheries assessed are not substantial contributors to gray triggerfish mortality. However, as fishing mortality is unknown for this species, we have scored this as "moderate" concern.

Factor 2.3 - Discard Rate

UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, RED SNAPPER
UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, VERMILION SNAPPER

< 100%

Data regarding discard and bait use in the GOM reef fish fisheries are limited.

The bulk of the discards are considered regulatory discards, which include fish that are too small to be retained or that are prohibited due to closures or quotas (Stephen and Harris 2010). Some of the stock assessments on domestic fisheries contain some discard data that are attributed to a single species rather than the whole fishery (SEDAR 2010b).

Bait use in one study located in the GOM found that it mostly comprised tomtate, white grunt, pigfish, and sand perch in the vertical line fishery and 2% of the catch (number of fish) was used for bait (Scott-Denton and Williams 2013). However, Gulf reef fish species are prohibited to be used as bait (CFR §622.9 [e]).

Discard data are lacking in both fisheries: in the GOM, logbooks often claimed that "no discards" took place in fishing trips, which contradicted observer data, which found that an instance of having no discards was uncommon (McCarthy 2012). Scott-Denton et al. (2011) found that, in the vertical line fishery, 75% fish were retained, with 19% released alive, but this was with some signs of barotrauma; nearly 7% were discarded either dead, unknown, or kept for bait. Similarly, in Scott-Denton et al. (2013), 71% of the individuals were kept, 19% were released alive, and 11% were either discarded dead, unknown, or retained for bait.

Since most sources show that discarding is generally below 20% and bait use is low (<10%) in the GOM , discards and bait are less than 100% of landings, which gains a score of 1.

UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, RED SNAPPER
UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, VERMILION SNAPPER

< 100%

Data regarding discards and bait use in the commercial SA snapper-grouper fisheries are limited.

When targeting vermilion snapper in the SA, bait comprised around 14% of the catch, consisting mainly of vermilion snapper, red porgy, tomtate, bank sea bass and scamp (Stephen and Harris 2010).

The bulk of the discards are considered regulatory discards, which include fish that are too small to be retained or that are prohibited due to closures or quotas (Stephen and Harris 2010). A pilot observer program conducted from 2007 to 2009 collected information on species composition and disposition (kept or discarded) (GSAFF 2008) (GSAFF 2010). The (bait + discards)/landings ratio uses the total discarded CPUE (all species combined) divided by total retained CPUE. This ratio should be considered a minimum estimate because it does not account for bait needs, nor does it distinguish between species retained for food vs. bait. Based on 2,664 stations sampled between 2007 and 2009, the (bait + discards)/landings ratio is 29.9% (GSAFF 2008) (GSAFF 2010).

A ratio less than 100% warrants a score modifier of 1.0.

Justification:

The discard-to-landings ratio for the SA handline fishery is generally around 18%, but this figure can range vastly, mainly due to the amount of fish that have to be discarded due to landing size requirements or the moratorium; this can cause discards to far exceed the kept catch (Helies and Jamison 2013). The Gulf and South Atlantic Fisheries Foundation (2008) suggested that around 27% of catches are not retained (Gulf and South Atlantic Fisheries Foundation 2008). However, in the SA vertical line fishery, red snapper discards were shown to far exceed kept fish (Helies and Jamison 2013).

BLACK SEABASS

Factor 2.1 - Abundance

UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, RED SNAPPER
UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, VERMILION SNAPPER

Moderate Concern

The most recent population assessment update for the US South Atlantic population of black sea bass was published in April 2018. SSB_{2016}/MSST = 1.15 and SSB_{2016}/SSB_{MSY} = 0.71 (figure 29). Therefore, SSB is above the LRP but below 75% of the TRP. There is a low level of uncertainty for the estimate of SSB/MSY, but SSB/MSST is less certain (see justification) (SEDAR 2018d).

Since biomass is estimated to be above the LRP, but less than 75% above the TRP, Seafood Watch deems abundance as a "moderate" concern.

Justification:

Biomass and recruitment have been estimated to be declining in recent years. There have been proportionately fewer older fish in the last decade than expected in the MSY-based age structure; however, there has been improved age-structure in 2016, particularly for ages younger than six (SEDAR 2018d).

There is some uncertainty regarding the estimate for SSB/MSST: 76.7% agreed that the stock is not overfished (SSB_{2016}/MSST > 1.0). There is a very low level of uncertainty regarding SSB/MSY: about 99.8% of MCB runs indicate the stock is below SSB_{MSY} (SEDAR 2018d).

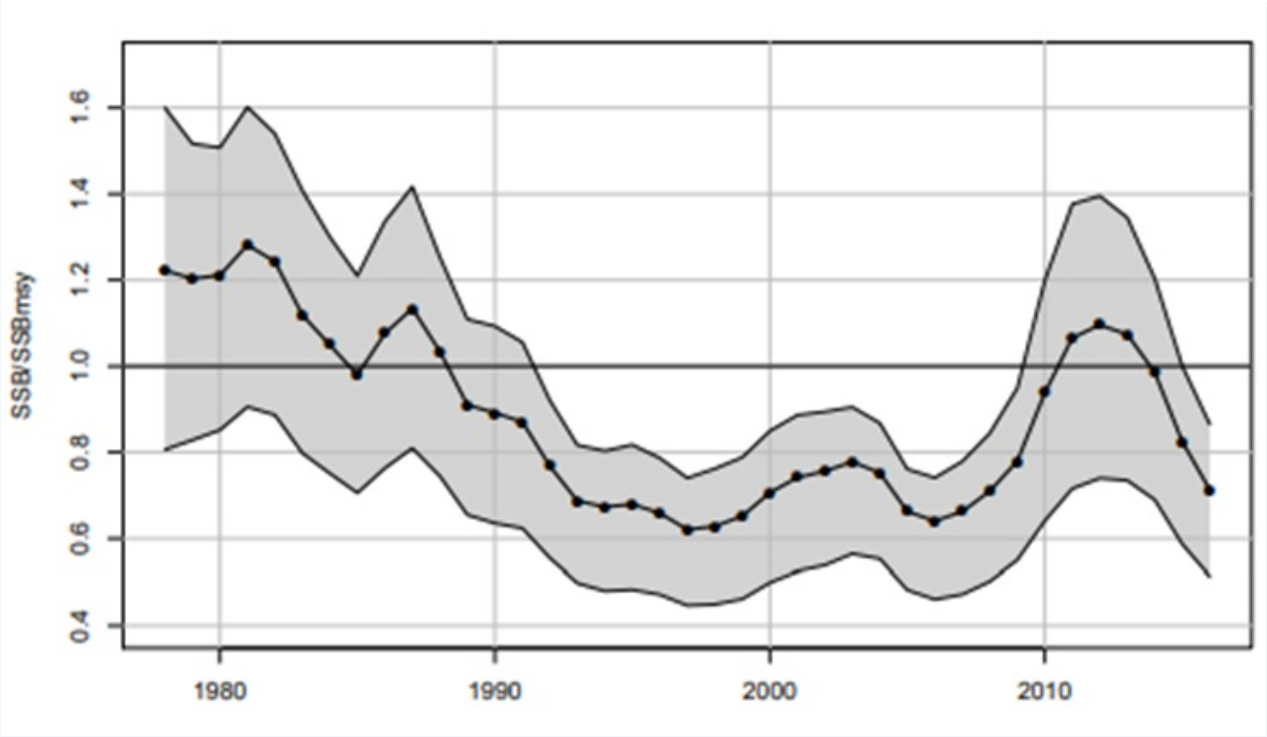

Figure 33 Figure 29. Estimated time series of spawning biomass relative to SSBMSY.. Solid line indicates estimates from base run of the Beaufort Assessment Model; gray error bands indicate 5th and 95th percentiles of the MCB trials.

Factor 2.2 - Fishing Mortality

UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, RED SNAPPER
UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, VERMILION SNAPPER

Low Concern

$F_{2014\text{-}2016}/F_{MSY}$ = 0.64 and therefore the stock is not undergoing overfishing (SEDAR 2018d). Since the last stock assessment determined that fishing mortality is below the $F_{MSY,}$ Seafood Watch deems fishing mortality as a "low" concern.

Justification:

Overfishing has occurred through most of the assessment period for black sea bass, though fishing mortality fell below the overfishing threshold in only the last two years (Figure 30). This reduction is due to a combination of reductions in fishing mortality (Table 8; (SEDAR 2018d)), improvements in data, changes in fishery selectivity, and slight reductions in F_{MSY} (SEDAR 2018d).

There has been much uncertainty in F/F_{MSY} throughout the assessment period; however, in the 2018 assessment, only 5.2% of runs indicated that overfishing was occurring (SEDAR 2018d).

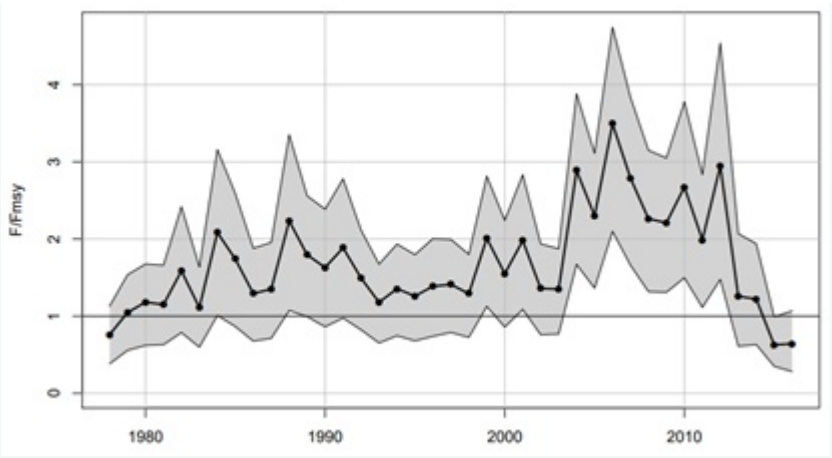

Figure 34 Estimated time series of F relative to FMSY. Solid line indicates estimates from base run of the Beaufort Assessment Model; gray error bands indicate 5th and 95th percentiles of the MCB trials (SEDAR 2018d).

Factor 2.3 - Discard Rate

UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, RED SNAPPER
UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, VERMILION SNAPPER

< 100%

Data regarding discards and bait use in the commercial SA snapper-grouper fisheries are limited.

When targeting vermilion snapper in the SA, bait comprised around 14% of the catch, consisting mainly of vermilion snapper, red porgy, tomtate, bank sea bass and scamp (Stephen and Harris 2010).

The bulk of the discards are considered regulatory discards, which include fish that are too small to be retained or that are prohibited due to closures or quotas (Stephen and Harris 2010). A pilot observer program conducted from 2007 to 2009 collected information on species composition and disposition (kept or discarded) (GSAFF 2008) (GSAFF 2010). The (bait + discards)/landings ratio uses the total discarded CPUE (all species combined) divided by total retained CPUE. This ratio should be considered a minimum estimate because it does not account for bait needs, nor does it distinguish between species retained for food vs. bait. Based on 2,664 stations sampled between 2007 and 2009, the (bait + discards)/landings ratio is 29.9% (GSAFF 2008) (GSAFF 2010).

A ratio less than 100% warrants a score modifier of 1.0.

Justification:

The discard-to-landings ratio for the SA handline fishery is generally around 18%, but this figure can range vastly, mainly due to the amount of fish that have to be discarded due to landing size requirements or the moratorium; this can cause discards to far exceed the kept catch (Helies and Jamison 2013). The Gulf and South Atlantic Fisheries Foundation (2008) suggested that around 27% of catches are not retained (Gulf and South Atlantic Fisheries Foundation 2008). However, in the SA vertical line fishery, red snapper discards were shown to far exceed kept fish (Helies and Jamison 2013).

SCAMP

Factor 2.1 - Abundance

UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, RED SNAPPER

High Concern

Scamp has been managed as part of the SAFMC Snapper-Grouper complex since the inception of the FMP (SAFMC 1983), but a formal stock assessment has never been conducted for this species. A fishery-independent index of abundance from the Southeast Area Monitoring and Assessment Program (SEAMAP) chevron trap survey during 1990 to 2012 indicates a general decline in abundance from the mid 1990s to the mid 2000s, falling from nearly twice the time series mean in 1995 to less than half the time series mean by 2006 (Figure 31) (SAFMC 2013f). By 2012, the stock size had increased slightly, but is still well below the time-series mean abundance. Although the time-series mean is not indicative of any management reference point (but is a data-limited indicator), the sharp decline in abundance raises concern for the stock status.

The abundance score for scamp is therefore based on the negative data-limited indicator, as well as proxy information (PSA) that takes into account the species life history and characteristics of the fishery, and available proxy information on stock abundance. The PSA = 3.41, which indicates that scamp have high inherent vulnerability. Because this species is highly vulnerable and there is some evidence that stock size has decreased over time, scamp in the US South Atlantic receive an abundance rating of "high" concern.

Justification:

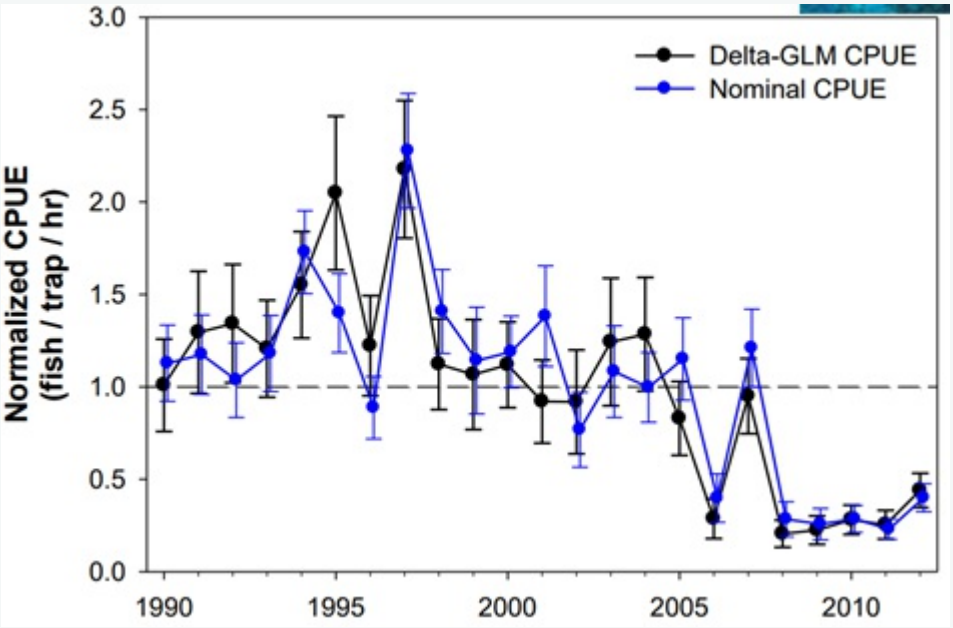

Figure 35 Normalized catch per unit effort of scamp in the SEAMAP South Atlantic chevron trap survey. Figure used directly from SEAMAP (2013). Source: (SAFMC 2013f)

The PSA score for scamp = 3.41. For this reason, the species is deemed to have a “high” vulnerability. Detailed scoring of each attribute is shown below.

ATTRIBUTE	RESULT	SCORE
Productivity Attribute		

Average age at maturity	50% mature by age 2 (Harris et al. 2002) (Lombardi-Carlson et al. 2012)	1
Average maximum age	30+ years (Harris et al. 2002) (Lombardi-Carlson et al. 2012)	3
Fecundity	1.3 million (as estimated from Figure 11) (Harris et al. 2002)	1
Average maximum size	80 to 90 cm based on growth curves (Harris et al. 2002) (Lombardi-Carlson et al. 2012)	1
Average size at maturity	50% mature by approximately 35 cm (Harris et al. 2002) (Lombardi-Carlson et al. 2012)	1
Reproductive strategy	Broadcast spawner (SAFMC 2018g)	1
Trophic level	4.5 (Froese and Pauly 2016b)	3
Quality of habitat	Moderately altered from non-fishing sources (SAFMC 2017i)	2
Susceptibility Attribute		
Areal overlap	Heavily fished throughout much of its range (Rocha et al. 2008)	3
Vertical overlap	Likely to be fished by multiple gears over its depth range (Rocha et al. 2008)	3
Selectivity of fishery	Not a main targeted species in the fishery (Rocha et al. 2008), but is a protogynous hermaphrodite (Lombardi-Carlson et al. 2012)	3
Post-capture mortality	Retained species: >65 to 75% of captured scamp are retained (GSAFF 2008) (GSAFF 2010)	3

PSA Calculation

P = 1.625

P^2 = 2.64

S = 3

S^2 = 9

V= 3.41184

UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, RED SNAPPER
UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, VERMILION SNAPPER

High Concern

Scamp have not received a formal stock assessment and therefore, a PSA has been used to score their abundance. Since the PSA deems the species to be highly vulnerable and there is no evidence to suggest that the stock is either above or below reference points, Seafood Watch score abundance as a "high" concern.

Justification:

Productivity-Susceptibility Analysis:

A PSA score of 3.473 indicates that scamp have high inherent vulnerability.

ATTRIBUTE	RESULT	SCORE
Average age-at-maturity	50% mature by age 2 (Harris et al. 2002)	1
Average maximum age	30+ years recorded (Harris et al. 2002)	3
Fecundity	1.3 million (estimated from Figure 11 (Harris et al. 2002))	1
Average maximum size	107 cm (Rocha et al. 2008)	2
Size-at-maturity	50% by~ 35 cm (Harris et al. 2002)	1
Reproductive strategy	Broadcast spawner (Harris et al. 2002)	1
Trophic level	4.5	3
Quality of habitat	Moderately altered from non-fishing sources (Chen 2017)	2
Areal overlap	>30% of geographic range is fished.	3
Vertical overlap	Unknown	3
Selectivity of fishery	Protogynous hermaphrodite	3
Post-capture mortality	>90% of captured scamp are retained (Scott-Denton and Williams 2013)	3

P = 1.75

P^2 = 3.0625

S = 3

S^2 = 9

V = 3.473111

Factor 2.2 - Fishing Mortality

UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, RED SNAPPER

Moderate Concern

There is no full and recent stock assessment for scamp in the South Atlantic, so fishing mortality is unknown (NMFS 2017e). Scamp is not experiencing overfishing, but it is unclear what this is based on. Pilot observer data from the vertical line fishery in this region, covering 316 sea days over 3 seasons (2007–2008, 2008–2009, 2010–2011) recorded scamp as the fourth highest-caught species, and the third most-discarded species with 2,276 caught (1,745 kept) (Helies and Jamison 2013). Trip Interview Program (TIP) data suggest that in the red snapper fishery, scamp is the third highest-caught species, fourth in the vermilion snapper fishery and fifth in the yellowtail snapper fishery (Trip Interviewer Program (TIP) 2016).

Scamp is deemed a "moderate" concern because fishing mortality is unknown.

UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, RED SNAPPER
UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, VERMILION SNAPPER

Moderate Concern

No formal stock assessment has been conducted for scamp in the Gulf of Mexico, so fishing mortality rate is unknown. NMFS indicates that overfishing status of this complex is unknown (NMFS 2017b). Since fishing mortality is unknown, Seafood Watch deem fishing mortality as a "moderate" concern.

Factor 2.3 - Discard Rate

UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, RED SNAPPER

< 100%

Data regarding discards and bait use in the commercial SA snapper-grouper fisheries are limited.

When targeting vermilion snapper in the SA, bait comprised around 14% of the catch, consisting mainly of vermilion snapper, red porgy, tomtate, bank sea bass and scamp (Stephen and Harris 2010).

The bulk of the discards are considered regulatory discards, which include fish that are too small to be retained or that are prohibited due to closures or quotas (Stephen and Harris 2010). A pilot observer program conducted from 2007 to 2009 collected information on species composition and disposition (kept or discarded) (GSAFF 2008) (GSAFF 2010). The (bait + discards)/landings ratio uses the total discarded CPUE (all species combined) divided by total retained CPUE. This ratio should be considered a minimum estimate because it does not account for bait needs, nor does it distinguish between species retained for food vs. bait. Based on 2,664 stations sampled between 2007 and 2009, the (bait + discards)/landings ratio is 29.9% (GSAFF 2008) (GSAFF 2010).

A ratio less than 100% warrants a score modifier of 1.0.

Justification:

The discard-to-landings ratio for the SA handline fishery is generally around 18%, but this figure can range vastly, mainly due to the amount of fish that have to be discarded due to landing size requirements or the moratorium; this can cause discards to far exceed the kept catch (Helies and Jamison 2013). The Gulf and South Atlantic Fisheries Foundation (2008) suggested that around 27% of catches are not retained (Gulf and South Atlantic Fisheries Foundation 2008). However, in the SA vertical line fishery, red snapper discards were shown to far exceed kept fish (Helies and Jamison 2013).

UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, RED SNAPPER
UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, VERMILION SNAPPER

< 100%

Data regarding discard and bait use in the GOM reef fish fisheries are limited.

The bulk of the discards are considered regulatory discards, which include fish that are too small to be retained or that are prohibited due to closures or quotas (Stephen and Harris 2010). Some of the stock assessments on domestic fisheries contain some discard data that are attributed to a single species rather than the whole fishery (SEDAR 2010b).

Bait use in one study located in the GOM found that it mostly comprised tomtate, white grunt, pigfish, and sand perch in the vertical line fishery and 2% of the catch (number of fish) was used for bait (Scott-Denton and Williams 2013). However, Gulf reef fish species are prohibited to be used as bait (CFR §622.9 [e]).

Discard data are lacking in both fisheries: in the GOM, logbooks often claimed that "no discards" took place in fishing trips, which contradicted observer data, which found that an instance of having no discards was uncommon (McCarthy 2012). Scott-Denton et al. (2011) found that, in the vertical line fishery, 75% fish were retained, with 19% released alive, but this was with some signs of barotrauma; nearly 7% were discarded either dead, unknown, or kept for bait. Similarly, in Scott-Denton et al. (2013), 71% of the individuals were kept, 19% were released alive, and 11% were either discarded dead, unknown, or retained for bait.

Since most sources show that discarding is generally below 20% and bait use is low (<10%) in the GOM , discards and bait are less than 100% of landings, which gains a score of 1.

GAG

Factor 2.1 - Abundance

UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, RED SNAPPER
UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, VERMILION SNAPPER

Low Concern

SSB_{2012}/SSB_{MSY} =0.97, median: SSB_{2012}/SSB_{MSY} =1.04 and $SSB_{2012}/MSST$ =1.13, median: $SSB_{2012}/MSST$ =1.21. The last assessment for gag in the SA was completed in 2014 and determined that the species is not overfished (SEDAR 2014c).

Spawning biomass in the terminal year was approximately 97% of the biomass target and has been increasing since a recent low in 2009 (SEDAR 2014c). Projections show a decline in SSB immediately after 2012, due to poor recruitment in 2010 and 2011 (SEDAR 2014c).

Stock projections indicate a greater than 50% probability that SSB will fall below the minimum stock size threshold (MSST) of 1373.8 MT during 2014 to 2017, even when fishing at FMSY, due to low recruitment near the end of the time series (SEDAR 2014c). The biomass is above the LRP and 75% of the TRP on both the base and median estimates.

Since it is uncertain if abundance is above the target level, and abundance is projected to decline in the near term, Seafood Watch deems abundance as a "low" concern.

UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, RED SNAPPER

Moderate Concern

The most recent benchmark stock assessment for gag in the GOM (SEDAR 2014e) provided conflicting evidence regarding abundance, depending on whether SSB included both males and females (overfished) or females only (not overfished). The stock assessment peer review panel recommended using the more conservative result based on combined sexes (SEDAR 2014e). The assessment was recently updated with data through 2015 (SEDAR 2016j). The base model of the update assessment determined the current biomass of SSB = 9,688 MT. The biomass target uses an MSY proxy of SSB = 7,171 MT (SEDAR 2016j). The GMFMC accepted the base model, and the stock is therefore considered not overfished, with terminal year biomass greater than the biomass target. However, an alternative model that incorporated a different assumption in recreational discarding practices concluded that recent spawning biomass was only 32% of the associated biomass threshold, indicating some uncertainty in the stock status results (SEDAR 2016j). Further, the assessment team noted concerns that the recent stock growth estimated by the model was excessive given other available information (SEDAR 2016j).

Since gag are not considered to be undergoing overfishing, but there is conflicting evidence regarding biomass ratios in the benchmark and update assessment, Seafood Watch deem abundance as "moderate" concern.

Factor 2.2 - Fishing Mortality

UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, RED SNAPPER
UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, VERMILION SNAPPER

Moderate Concern

The 2014 stock status is determined using the average fishing mortality in the most recent three years of the assessment. A fishing mortality ratio of $F_{2010-2012}/F_{MSY}$ = 1.23 indicates the stock was experiencing overfishing at the time (SEDAR 2014c). However, the South Atlantic Council's Scientific and Statistical Committee (SSC) noted that the fishing mortality rate for 2012, and the projected fishing mortality rate in 2013 based on the actual landings, suggested that overfishing did not occur in 2012 and 2013 (SAFMC 2015a).

Following the 2014 assessment, managers took action to revise the ACL for gag for the 2015 to 2019 fishing years to ensure that overfishing does not occur (SAFMC 2015a). NOAA Fisheries currently considers gag in the South Atlantic to no longer be experiencing overfishing (NMFS 2017b).

Gag are commonly targeted by commercial fishers using vertical lines, as well as by divers, and by headboat and private recreational fishers using vertical lines. Around 323,000 lb of gag were caught in the commercial fishery (NMFS 2016b) and 4,957 lb were caught in the recreational fishery in the SA in 2015 (NOAA 2017).

Since gag are not considered to be undergoing overfishing, Seafood Watch deems fishing mortality as a "moderate" concern.

Justification:

The SAFMC Scientific and Statistical Committee (SSC) discussed the fishing mortality status determination at length during their April 2014 meeting (SAFMC 2014b). It was noted that, although the recent three-year average was above the F_{MSY} value, there was a noticeable downward trend in fishing mortality in recent years, possibly due to a spawning closure implemented a few years previously. It was also noted that, because landings in 2012 were approaching the ACL prior to the end of the open season, there was an early closure to the fishery. The SSC discussed how these actions may have addressed the concerns of overfishing in recent years and considered using only the terminal year for status determination. However, the SSC then reviewed the uncertainty analysis which showed that, despite the declining trend, there was a high probability that overfishing was occurring in the terminal year. They concluded that a three-year average fishing mortality rate was the most appropriate for status determination (SAFMC 2014b). Regardless, NMFS concluded that overfishing was not occurring (NMFS 2017b).

UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, RED SNAPPER

Low Concern

The NMFS 4th quarter report to Congress stated that gag are not undergoing overfishing in the GOM (NMFS 2017e). NMFS considers the stock fully rebuilt and no longer within a rebuilding plan (NMFS 2017e). For the 2016 update assessment, the GMFMC selected an MSY proxy fishing mortality threshold of F = 0.1964 for the base model (SEDAR 2016j). The recent three-year average fishing mortality was estimated as F = 0.0817, which is less than half of the threshold reference point, indicating the stock is not experiencing overfishing (SEDAR 2016j). Since implementation of harvest reduction measures in 2009, commercial harvest has been cut by more than 50%, and total harvest has dropped from an average of 4.2 million pounds for 2006 to 2008, to less than 1.8 million pounds for 2013 to 2015 (NMFS 2017f)(NMFS 2017g), which may have contributed to the stock growth indicated in the assessment results (SEDAR 2016j). During both these time periods, recreational harvest has accounted for approximately two thirds of the total harvest.

NMFS considers the stock as fully rebuilt and no longer within a rebuilding plan (NMFS 2017e). Gag in the Gulf of Mexico receives a fishing mortality score of "low" concern.

Justification:

Following a determination from the 2009 stock assessment update (SEDAR 2009b) that the stock was experiencing overfishing, the GMFMC enacted measures through Amendment 32 to reduce harvest of gag and implement a ten-year rebuilding plan (GMFMC 2011d).

Factor 2.3 - Discard Rate

UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, RED SNAPPER
UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, VERMILION SNAPPER

< 100%

Data regarding discards and bait use in the commercial SA snapper-grouper fisheries are limited.

When targeting vermilion snapper in the SA, bait comprised around 14% of the catch, consisting mainly of vermilion snapper, red porgy, tomtate, bank sea bass and scamp (Stephen and Harris 2010).

The bulk of the discards are considered regulatory discards, which include fish that are too small to be

retained or that are prohibited due to closures or quotas (Stephen and Harris 2010). A pilot observer program conducted from 2007 to 2009 collected information on species composition and disposition (kept or discarded) (GSAFF 2008) (GSAFF 2010). The (bait + discards)/landings ratio uses the total discarded CPUE (all species combined) divided by total retained CPUE. This ratio should be considered a minimum estimate because it does not account for bait needs, nor does it distinguish between species retained for food vs. bait. Based on 2,664 stations sampled between 2007 and 2009, the (bait + discards)/landings ratio is 29.9% (GSAFF 2008) (GSAFF 2010).

A ratio less than 100% warrants a score modifier of 1.0.

Justification:

The discard-to-landings ratio for the SA handline fishery is generally around 18%, but this figure can range vastly, mainly due to the amount of fish that have to be discarded due to landing size requirements or the moratorium; this can cause discards to far exceed the kept catch (Helies and Jamison 2013). The Gulf and South Atlantic Fisheries Foundation (2008) suggested that around 27% of catches are not retained (Gulf and South Atlantic Fisheries Foundation 2008). However, in the SA vertical line fishery, red snapper discards were shown to far exceed kept fish (Helies and Jamison 2013).

UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, RED SNAPPER

< 100%

Data regarding discard and bait use in the GOM reef fish fisheries are limited.

The bulk of the discards are considered regulatory discards, which include fish that are too small to be retained or that are prohibited due to closures or quotas (Stephen and Harris 2010). Some of the stock assessments on domestic fisheries contain some discard data that are attributed to a single species rather than the whole fishery (SEDAR 2010b).

Bait use in one study located in the GOM found that it mostly comprised tomtate, white grunt, pigfish, and sand perch in the vertical line fishery and 2% of the catch (number of fish) was used for bait (Scott-Denton and Williams 2013). However, Gulf reef fish species are prohibited to be used as bait (CFR §622.9 [e]).

Discard data are lacking in both fisheries: in the GOM, logbooks often claimed that "no discards" took place in fishing trips, which contradicted observer data, which found that an instance of having no discards was uncommon (McCarthy 2012). Scott-Denton et al. (2011) found that, in the vertical line fishery, 75% fish were retained, with 19% released alive, but this was with some signs of barotrauma; nearly 7% were discarded either dead, unknown, or kept for bait. Similarly, in Scott-Denton et al. (2013), 71% of the individuals were kept, 19% were released alive, and 11% were either discarded dead, unknown, or retained for bait.

Since most sources show that discarding is generally below 20% and bait use is low (<10%) in the GOM , discards and bait are less than 100% of landings, which gains a score of 1.

SNOWY GROUPER

Factor 2.1 - Abundance

UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, RED SNAPPER
UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, VERMILION SNAPPER

High Concern

IUCN has listed snowy grouper as "Vulnerable" (IUCN 2008).

A stock assessment for snowy grouper in the Gulf of Mexico was conducted using data-limited methods with data through 2014, and peer reviewed through the SEDAR process (SEDAR 2016h). Only one of three candidate models met the performance criteria (e.g., model convergence) for all the methods evaluated. This model, which uses a short time series of data (2010 to 2014), indicated the biomass in recent years was below threshold levels and fishing mortality exceeded a sustainable level; however, the time series was considered too short to provide reliable management advice (SEDAR 2016h). A similar model run with a longer time series of data (1990 to 2014) provided similar results for stock status, but did not meet all the performance criteria (SEDAR 2016h). Further, no index of abundance is available for this species due to recent changes in the fishery distribution (SEDAR 2016h). For these reasons, the scores for Gulf of Mexico snowy grouper are based on proxy information, including a PSA analysis.

The PSA results indicates that snowy grouper have high vulnerability. The combination of high vulnerability and a lack of data to evaluate stock status of snowy grouper in the Gulf of Mexico leads to an abundance score of "high" concern.

Justification:

The PSA calculated V = 3.411836, therefore, Snowy Grouper are scored high vulnerability.

ATTRIBUTE	RESULT	SCORE
Productivity Attribute		
Average age-at-maturity	4 to 5 years (Wyanski et al. 2000)	2
Average maximum age	16+ years (Wyanski et al. 2000) or max reported age of 27 years (FishBase 2016c)	2
Fecundity	2 million eggs (SAFMC 2017b)	1
Average maximum size	90 to 100 cm (Wyanski et al. 2000)	1
Average size-at-maturity	47 to 55cm (Wyanski et al. 2000)	2
Reproductive strategy	Broadcast spawner	1
Trophic level	4 (FishBase 2016c)	3
Quality of habitat	Moderately altered from non-fishing sources (Chen 2017)	2
Susceptibility Attribute		
Areal overlap	Greater than 30% of main geographic range is fished	3

Vertical overlap	Unknown	3
Selectivity of fishery	Protogynous hermaphrodites (Wyanski et al. 2000)	3
Post-capture mortality	Unknown but likely retained	3

PSA Calculation

P = 1.75

P^2 = 2.640625

S = 3

S^2 = 9

V = 3.411836

UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, VERMILION SNAPPER

High Concern

Snowy grouper are overfished (SSB_{2012}/SSB_{MSY} = 0.49) and the most recent assessment (2013) suggests that there are low levels of SSB in the fishery (SEDAR 2014b). Terminal year spawning biomass of SSB_{2012} = 427 MT is only 65% of the minimum stock size threshold (MSST = .75*SSB_{MSY}) of 654.2 MT (SEDAR 2014b). Snowy grouper are listed as "Vulnerable" according to the IUCN Red List (IUCN 2008), based on an assessment conducted in 2008 (Thierry et al. 2008); it is a data-limited species. The snowy grouper is in year 12 of a 34-year rebuilding plan in the Snapper-Grouper FMP (NMFS 2017b). Due to the continued overfished status, as determined from the 2012 stock assessment (SEDAR 2013), Amendment 20 was passed to adjust the rebuilding strategy and recovery plan (SAFMC 2014a).

The species is overfished; therefore, it is deemed as “high” concern.

Factor 2.2 - Fishing Mortality

UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, RED SNAPPER
UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, VERMILION SNAPPER

Moderate Concern

Reported commercial harvest, which generally accounts for more than 90% of total harvest, has fluctuated without trend between 150,000 and 250,000 lb since the early 1980s (NMFS 2017g). NMFS manages snowy grouper as part of the “deep water grouper” complex, which is not considered to be experiencing overfishing (NMFS 2017e). However, no quantitative information could be found for fishing mortality of Gulf of Mexico snowy grouper.

Since fishing mortality is unknown relative to reference points, Seafood Watch deems fishing mortality as a "moderate" concern.

UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, VERMILION SNAPPER

Low Concern

The most recent assessment claims that the snowy grouper is not experiencing overfishing ($F_{2010–2012}/F_{MSY}$ = 0.59) (SEDAR 2014b). Since $F_{2010-2012}/F_{MSY}$ = 0.59 and F_{MSY} = 0.14, $F_{2010-2012}$ = 0.0826. F_{TARGET} = 0.11 (where F_{TARGET} is defined as 75% FMSY) (SEDAR 2014b), $F_{2010-2012}/F_{TARGET}$ =0.751. Therefore, current fishing mortality is 75% of F_{TARGET}.

The fishery is not a substantial contributor to the species' mortality (TIP 2016). Although the fishery is not undergoing overfishing, the recreational handline sector exceeded the MFMT in 2012. This was not identified in the F/F_{MFMT} plot (Figure 33) as it covers a three-year mean (SEDAR 2014b).

Since recent fishing mortality is around F_{TARGET}, Seafood Watch deems fishing mortality as "low" concern.

Justification:

Landings of snowy grouper fluctuate annually at around 30 MT per year (NMFS 2016b) and have exhibited declining long-term and stable short-term trends (Figure 32).

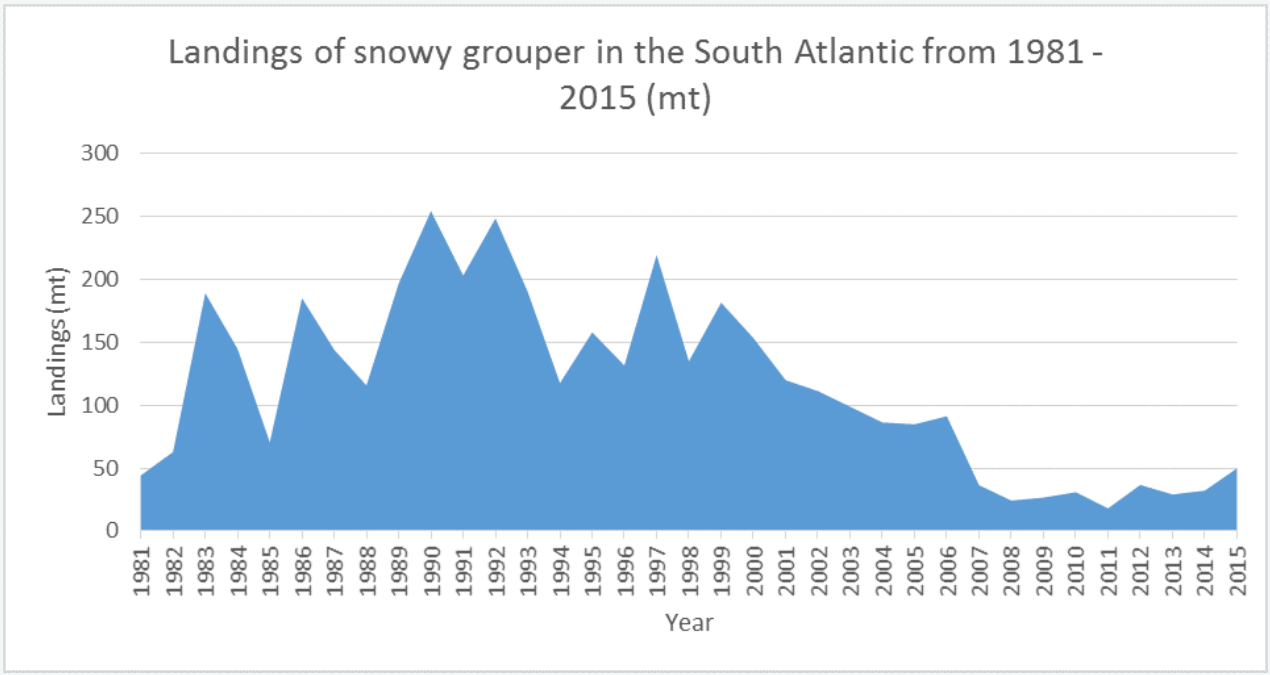

Figure 36 Snowy Grouper landings (mt) in the South Atlantic from 1981-2015. Source (NOAA 2016d).

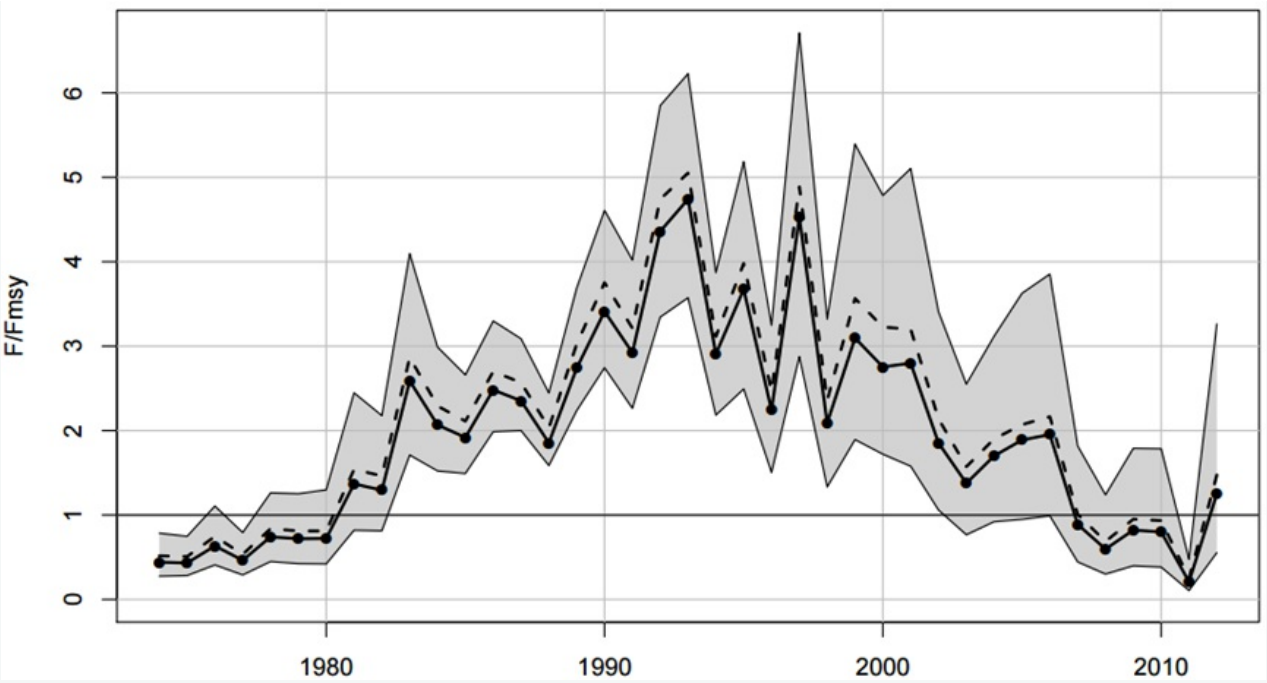

Figure 37 Fishing mortality relative to FMSY for Snowy Grouper in South Atlantic. The Solid line shows base run of the Beaufort Assessment Model estimates; dashed lines represent median values; Gray error bands indicate 5th and 95th percentiles of the MCB trials. Source (SEDAR 2014b).

Factor 2.3 - Discard Rate

UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, RED SNAPPER
UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, VERMILION SNAPPER

< 100%

Data regarding discard and bait use in the GOM reef fish fisheries are limited.

The bulk of the discards are considered regulatory discards, which include fish that are too small to be retained or that are prohibited due to closures or quotas (Stephen and Harris 2010). Some of the stock assessments on domestic fisheries contain some discard data that are attributed to a single species rather than the whole fishery (SEDAR 2010b).

Bait use in one study located in the GOM found that it mostly comprised tomtate, white grunt, pigfish, and sand perch in the vertical line fishery and 2% of the catch (number of fish) was used for bait (Scott-Denton and Williams 2013). However, Gulf reef fish species are prohibited to be used as bait (CFR §622.9 [e]).

Discard data are lacking in both fisheries: in the GOM, logbooks often claimed that "no discards" took place in fishing trips, which contradicted observer data, which found that an instance of having no discards was uncommon (McCarthy 2012). Scott-Denton et al. (2011) found that, in the vertical line fishery, 75% fish were retained, with 19% released alive, but this was with some signs of barotrauma; nearly 7% were discarded either dead, unknown, or kept for bait. Similarly, in Scott-Denton et al. (2013), 71% of the individuals were kept, 19% were released alive, and 11% were either discarded dead, unknown, or retained for bait.

Since most sources show that discarding is generally below 20% and bait use is low (<10%) in the GOM , discards and bait are less than 100% of landings, which gains a score of 1.

UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, VERMILION SNAPPER

< 100%

Data regarding discards and bait use in the commercial SA snapper-grouper fisheries are limited.

When targeting vermilion snapper in the SA, bait comprised around 14% of the catch, consisting mainly of vermilion snapper, red porgy, tomtate, bank sea bass and scamp (Stephen and Harris 2010).

The bulk of the discards are considered regulatory discards, which include fish that are too small to be retained or that are prohibited due to closures or quotas (Stephen and Harris 2010). A pilot observer program conducted from 2007 to 2009 collected information on species composition and disposition (kept or discarded) (GSAFF 2008) (GSAFF 2010). The (bait + discards)/landings ratio uses the total discarded CPUE (all species combined) divided by total retained CPUE. This ratio should be considered a minimum estimate because it does not account for bait needs, nor does it distinguish between species retained for food vs. bait. Based on 2,664 stations sampled between 2007 and 2009, the (bait + discards)/landings ratio is 29.9% (GSAFF 2008) (GSAFF 2010).

A ratio less than 100% warrants a score modifier of 1.0.

Justification:

The discard-to-landings ratio for the SA handline fishery is generally around 18%, but this figure can range vastly, mainly due to the amount of fish that have to be discarded due to landing size requirements or the moratorium; this can cause discards to far exceed the kept catch (Helies and Jamison 2013). The Gulf and South Atlantic Fisheries Foundation (2008) suggested that around 27% of catches are not retained (Gulf and South Atlantic Fisheries Foundation 2008). However, in the SA vertical line fishery, red snapper discards were shown to far exceed kept fish (Helies and Jamison 2013).

KING MACKEREL

Factor 2.1 - Abundance

UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, RED SNAPPER

Very Low Concern

SSB_{2012}/SSB_{MSY} = 2.1 (SEDAR 2014d). Since biomass is above the target reference point, Seafood Watch deems abundance as a "very low" concern.

Factor 2.2 - Fishing Mortality

UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, RED SNAPPER

Low Concern

F_{2012}/F_{MSY} = 0.507 (SEDAR 2014d). Since fishing mortality is below F_{MSY}, Seafood Watch deems fishing

mortality as a "low" concern.

Factor 2.3 - Discard Rate

UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, RED SNAPPER

< 100%

Data regarding discard and bait use in the GOM reef fish fisheries are limited.

The bulk of the discards are considered regulatory discards, which include fish that are too small to be retained or that are prohibited due to closures or quotas (Stephen and Harris 2010). Some of the stock assessments on domestic fisheries contain some discard data that are attributed to a single species rather than the whole fishery (SEDAR 2010b).

Bait use in one study located in the GOM found that it mostly comprised tomtate, white grunt, pigfish, and sand perch in the vertical line fishery and 2% of the catch (number of fish) was used for bait (Scott-Denton and Williams 2013). However, Gulf reef fish species are prohibited to be used as bait (CFR §622.9 [e]).

Discard data are lacking in both fisheries: in the GOM, logbooks often claimed that "no discards" took place in fishing trips, which contradicted observer data, which found that an instance of having no discards was uncommon (McCarthy 2012). Scott-Denton et al. (2011) found that, in the vertical line fishery, 75% fish were retained, with 19% released alive, but this was with some signs of barotrauma; nearly 7% were discarded either dead, unknown, or kept for bait. Similarly, in Scott-Denton et al. (2013), 71% of the individuals were kept, 19% were released alive, and 11% were either discarded dead, unknown, or retained for bait.

Since most sources show that discarding is generally below 20% and bait use is low (<10%) in the GOM , discards and bait are less than 100% of landings, which gains a score of 1.

SILK SNAPPER

Factor 2.1 - Abundance

UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, RED SNAPPER
UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, VERMILION SNAPPER

Moderate Concern

The abundance of silk snapper is unknown. The 4th quarter report to Congress in 2017 included the silk snapper as a mid-water snapper complex and deemed their overfished status as unknown (NMFS 2017e). Since there is no stock assessment available, nor data-limited indicators, a PSA has been used to score the stock status. The PSA deems silk snapper to be of medium vulnerability, and therefore Seafood Watch deems abundance to be a "moderate" concern.

Justification:

The PSA score for Silk Snapper in the GOM = 2.837. For this reason, the species is deemed to have a "medium" vulnerability. Detailed scoring of each attribute is shown below.

ATTRIBUTE	RESULT	SCORE
Productivity Attribute		
Average age at maturity	3 to 6 years (Bryan et al. 2011)	2
Average maximum age	Between 9 and 33 years (Bryan et al. 2011)	2
Fecundity	108,000 eggs (9,000 to 299,000) (Sylvester et al. 1980)	1
Average maximum size	598 to 830 mm (Bryan et al. 2011)	1
Average size at maturity	400 to 500 mm (Bryan et al. 2011)	2
Reproductive strategy	Broadcast spawner	1
Trophic level	3.1 (FishBase 2016d)	2
Quality of habitat	Moderately altered from non-fishing sources (Chen 2017)	2
Susceptibility Attribute		
Areal overlap	Default score	3
Vertical overlap	Silk snapper is a mid-water species, caught mostly with vermilion and red snapper (Farmer et al. 2016)	3
Selectivity of fishery	Default score	2
Post-capture mortality	Retained	3

PSA Calculation

P = 1.625

P^2 = 2.640625

S = 2.325

S^2 = 5.405625

V = 2.836591

Factor 2.2 - Fishing Mortality

UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, RED SNAPPER
UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, VERMILION SNAPPER

Moderate Concern

There have been no formal population assessments for the silk snapper; therefore, fishing mortality is unknown. According to research on commercial logbook data, Silk Snapper are rarely encountered, but are caught alongside red and vermilion snapper (Farmer et al. 2016).

Since fishing mortality is unknown relative to reference points, Seafood Watch deems fishing mortality as "moderate" concern for fishing mortality.

Factor 2.3 - Discard Rate

UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, RED SNAPPER
UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, VERMILION SNAPPER

< 100%

Data regarding discard and bait use in the GOM reef fish fisheries are limited.

The bulk of the discards are considered regulatory discards, which include fish that are too small to be retained or that are prohibited due to closures or quotas (Stephen and Harris 2010). Some of the stock assessments on domestic fisheries contain some discard data that are attributed to a single species rather than the whole fishery (SEDAR 2010b).

Bait use in one study located in the GOM found that it mostly comprised tomtate, white grunt, pigfish, and sand perch in the vertical line fishery and 2% of the catch (number of fish) was used for bait (Scott-Denton and Williams 2013). However, Gulf reef fish species are prohibited to be used as bait (CFR §622.9 [e]).

Discard data are lacking in both fisheries: in the GOM, logbooks often claimed that "no discards" took place in fishing trips, which contradicted observer data, which found that an instance of having no discards was uncommon (McCarthy 2012). Scott-Denton et al. (2011) found that, in the vertical line fishery, 75% fish were retained, with 19% released alive, but this was with some signs of barotrauma; nearly 7% were discarded either dead, unknown, or kept for bait. Similarly, in Scott-Denton et al. (2013), 71% of the individuals were kept, 19% were released alive, and 11% were either discarded dead, unknown, or retained for bait.

Since most sources show that discarding is generally below 20% and bait use is low (<10%) in the GOM , discards and bait are less than 100% of landings, which gains a score of 1.

VERMILION SNAPPER

Factor 2.1 - Abundance

UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, VERMILION SNAPPER
UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, RED SNAPPER

Very Low Concern

$SSB_{Current}/MSST_{FSPR30\%}$ = 1.40 and $SSB_{Current}/ SSB_{FSPR30\%}$ = 1.05 (SEDAR 2016d). The vermilion snapper stock is healthy and is above the target reference point (TRP) and LRP in 2014. The stock is not overfished, though may have been overfished during years 1986 to 2006. The species' ability to quickly recover from overfishing (relative to other snapper species), is attributable to its fast growth rates, moderate level of natural mortality and young maturity (SEDAR 2016d).

Since the recent robust stock assessment suggests that the stock is above or fluctuating around a TRP, abundance is deemed a "very low" concern.

Justification:

The GOM vermilion snapper stock was first assessed in 1991 (GMFMC 2012b). By the 1996 assessment, a decrease in landings, CPUE, and mean fish size indicated that the stock was showing signs of overfishing (Porch and Cass-Calay 2001). The 2001 assessment concluded that the GOM vermilion snapper stock was overfished with overfishing occurring. The update (2011), concluded that the stock is neither overfished nor undergoing overfishing with $SSB_{2010}/SSB_{SPR30\%}$ = 1.55 and $SSB_{2010}/MSST$ = 2.07 (SEDAR 2011a). SSB had declined to the lowest levels recorded. Since the year 2000, SSB has been slowly increasing; recruitment has fluctuated considerably (Figure 18) (SEDAR 2016d).

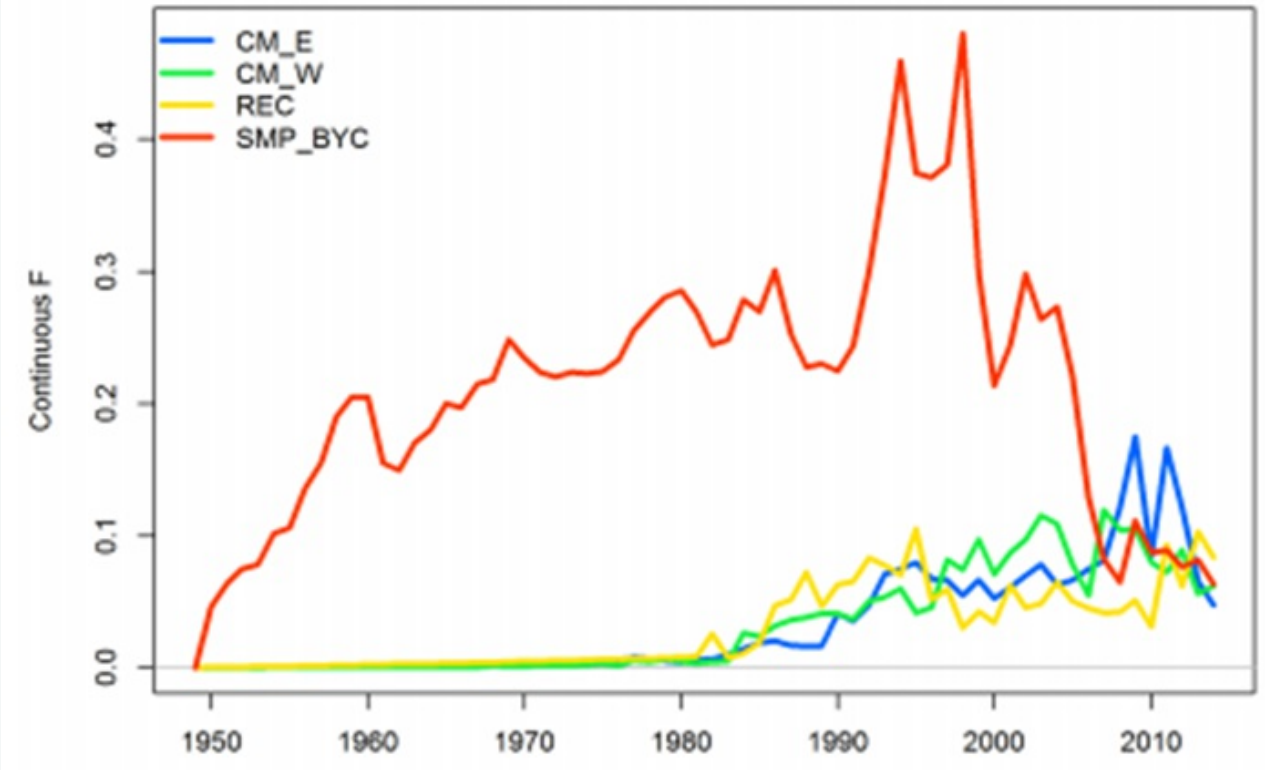

Figure 38 Fishing mortality by fleet. Cm = commercial, Rec = recreational, SMP_BYC= shrimp bycatch. Source: (SEDAR 2016d)

UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, VERMILION SNAPPER
UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, RED SNAPPER

Very Low Concern

The last stock assessment update for vermilion snapper in the SA was published in April 2018. SSB_{2016}/MSST = 1.51 and SSB_{2016}/SSB_{MSY} = 1.13 (SEDAR 2018c)(Figure 16). Therefore, the biomass is above both the LRP and the TRP but is quite close to MSY. The age structure in the 2016 model run showed there is an increasing proportion of old fish compared to previous years, with strong recruitment in the 2000s and slightly fewer young fish. There was average- to below-average recruitment in recent years (SEDAR 2018c).

Since a recent stock assessment suggests that biomass is above the target reference point with no scientific controversy, Seafood Watch scores vermilion snapper in the South Atlantic as a "very low" concern

Justification:

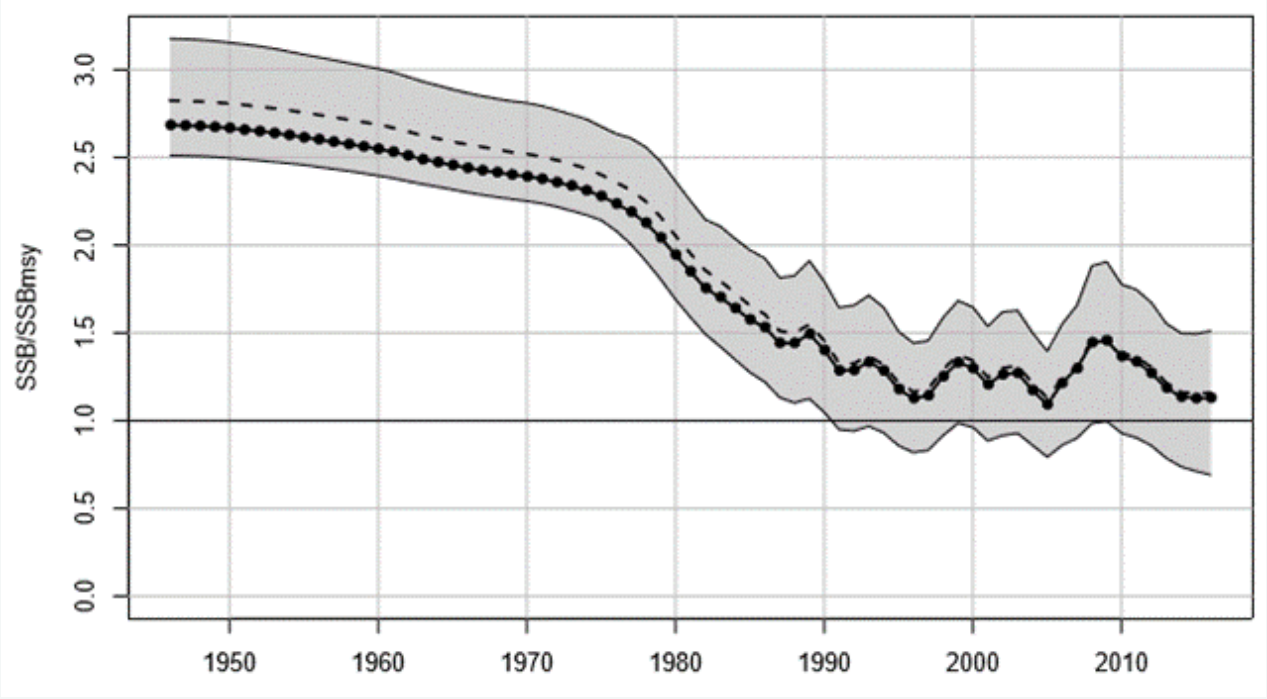

Figure 39 Estimated time series of spawning biomass relative to SSBMSY. Solid line indicates estimates from base run of the Beaufort Assessment Model; dashed lines represent median values; gray error bands indicate 5th and 95th percentiles of the MCB trials. Source: (SEDAR 2018c)

Factor 2.2 - Fishing Mortality

UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, VERMILION SNAPPER
UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, RED SNAPPER

Low Concern

$F_{CURRENT}/MFMT_{FSPR30\%}$ = 0.73 (SEDAR 2016d), the population is currently not experiencing overfishing. Since

the last assessment, there has been a reduction in mortality and therefore fishing mortality is deemed as "low" concern.

Justification:

The most recent stock assessment indicated that fishing mortality (F) relative to F_{MSY} and $F_{SPR30\%}$ is 0.73, indicating that the population is currently not experiencing overfishing (SEDAR 2016d). An acceptable biological catch (ABC) has been recommended by the Scientific and Statistical Committee (SSC) for GOM vermilion snapper such that when commercial landings reach an acceptable target set by the GMFMC, the fishery is closed (FishWatch 2016b) (SEDAR 2011a).

In the 2011 stock assessment update, the SSC recommended that the ABC could be increased (SEDAR 2011a). At this time, the GMFMC has opted not to increase the annual catch limit (ACL) of GOM vermilion snapper: Southeast Data, Assessment, and Review (SEDAR) report 45 advised that the yield could be moderately increased; however, considering the uncertainty (attributable to model inputs such as natural mortality, length-weight relationship) in the assessments, the current yields are suitable with projected ABCs.

The decrease in fishing mortality is due to decreases in bycatch from the shrimp trawl fishery and recent decreases in commercial exploitation in the eastern GOM. There is a rise in recreational mortality, which is larger than commercial mortality (Figure 19).

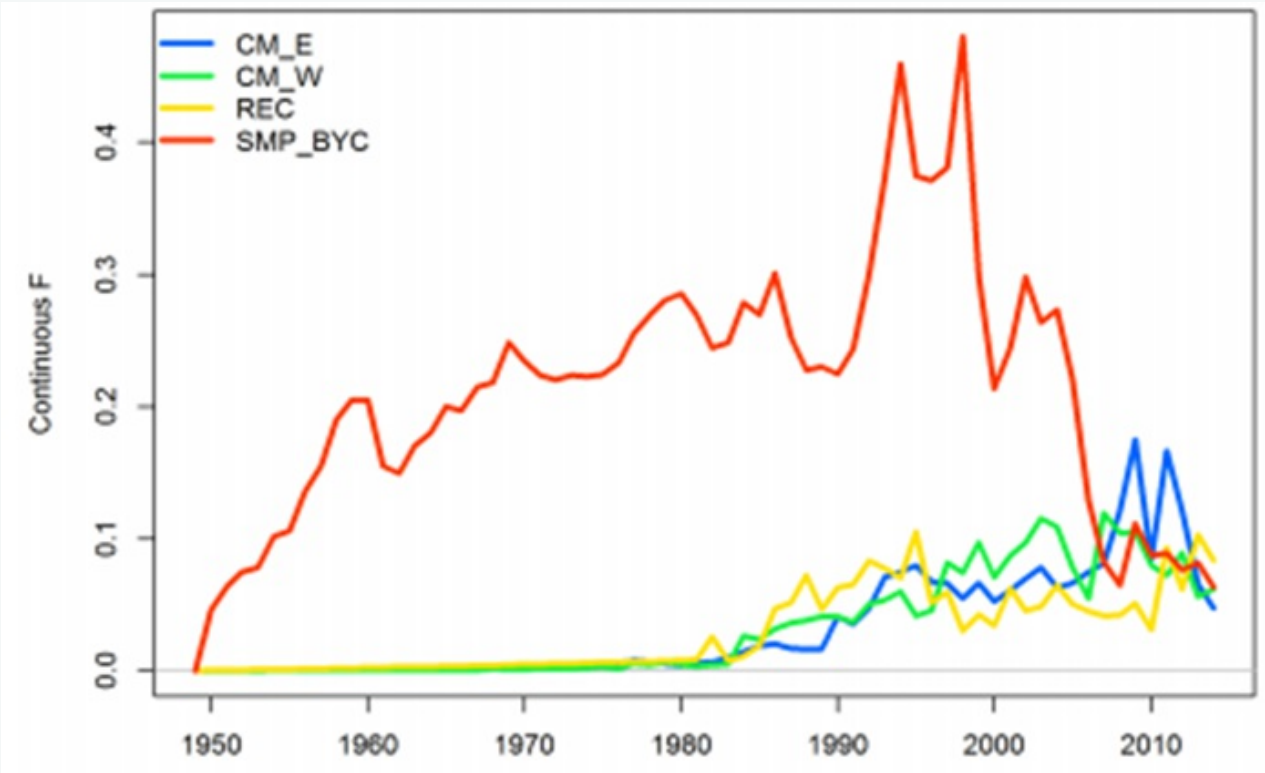

Figure 40 Fishing mortality by fleet. Cm = commercial, Rec = recreational, SMP_BYC= shrimp bycatch. Source: (SEDAR 2016d)

UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, VERMILION SNAPPER
UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, RED SNAPPER

Low Concern

The most recent update stock assessment in the SA vermilion fishery found that the current F (with the geometric mean from the period 2014 to 2016), was estimated by the base run to be $F_{2014–2016}/F_{MSY}$ = 0.609, and the median value was $F_{2014–2016}/F_{MSY}$ = 0.564 (SEDAR 2018c) (Figure 17). There is much uncertainty in the assessment (see Justification) but there is less than a 50% chance that fishing mortality is less than the sustainable level. Since fishing mortality is much lower than F_{MSY}, the stock is considered to be a "low" concern.

Justification:

Around 83.2% of MCB runs agreed with the base run that the stock is currently not experiencing overfishing, but there is "much uncertainty in the terminal years," which is demonstrated in Figure 17 (SEDAR 2018c).

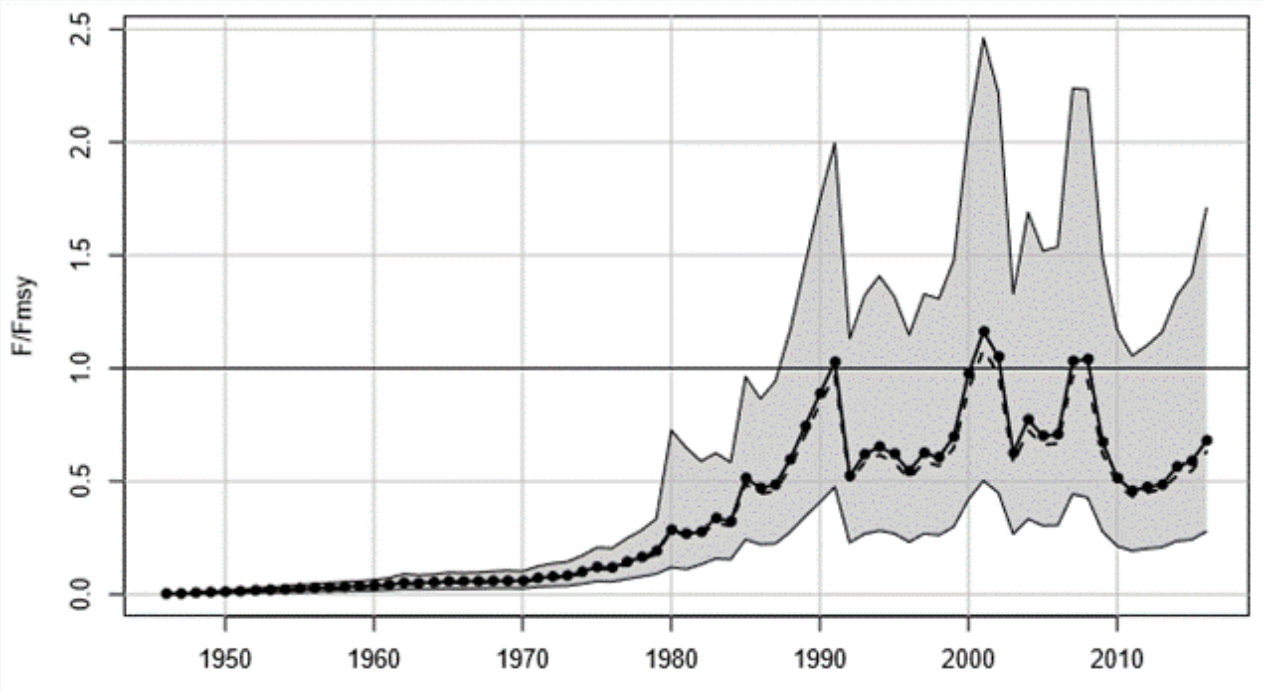

Figure 41 Estimated time series of F relative to FMSY. Solid line indicates estimates from base run of the Beaufort Assessment Model; dashed lines represent median values; gray error bands indicate 5th and 95th percentiles of the MCB trials. Source: (SEDAR 2018c)

Factor 2.3 - Discard Rate

UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, RED SNAPPER

< 100%

Data regarding discard and bait use in the GOM reef fish fisheries are limited.

The bulk of the discards are considered regulatory discards, which include fish that are too small to be retained or that are prohibited due to closures or quotas (Stephen and Harris 2010). Some of the stock assessments on domestic fisheries contain some discard data that are attributed to a single species rather than the whole fishery (SEDAR 2010b).

Bait use in one study located in the GOM found that it mostly comprised tomtate, white grunt, pigfish, and

sand perch in the vertical line fishery and 2% of the catch (number of fish) was used for bait (Scott-Denton and Williams 2013). However, Gulf reef fish species are prohibited to be used as bait (CFR §622.9 [e]).

Discard data are lacking in both fisheries: in the GOM, logbooks often claimed that "no discards" took place in fishing trips, which contradicted observer data, which found that an instance of having no discards was uncommon (McCarthy 2012). Scott-Denton et al. (2011) found that, in the vertical line fishery, 75% fish were retained, with 19% released alive, but this was with some signs of barotrauma; nearly 7% were discarded either dead, unknown, or kept for bait. Similarly, in Scott-Denton et al. (2013), 71% of the individuals were kept, 19% were released alive, and 11% were either discarded dead, unknown, or retained for bait.

Since most sources show that discarding is generally below 20% and bait use is low (<10%) in the GOM , discards and bait are less than 100% of landings, which gains a score of 1.

UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, RED SNAPPER

< 100%

Data regarding discards and bait use in the commercial SA snapper-grouper fisheries are limited.

When targeting vermilion snapper in the SA, bait comprised around 14% of the catch, consisting mainly of vermilion snapper, red porgy, tomtate, bank sea bass and scamp (Stephen and Harris 2010).

The bulk of the discards are considered regulatory discards, which include fish that are too small to be retained or that are prohibited due to closures or quotas (Stephen and Harris 2010). A pilot observer program conducted from 2007 to 2009 collected information on species composition and disposition (kept or discarded) (GSAFF 2008) (GSAFF 2010). The (bait + discards)/landings ratio uses the total discarded CPUE (all species combined) divided by total retained CPUE. This ratio should be considered a minimum estimate because it does not account for bait needs, nor does it distinguish between species retained for food vs. bait. Based on 2,664 stations sampled between 2007 and 2009, the (bait + discards)/landings ratio is 29.9% (GSAFF 2008) (GSAFF 2010).

A ratio less than 100% warrants a score modifier of 1.0.

Justification:

The discard-to-landings ratio for the SA handline fishery is generally around 18%, but this figure can range vastly, mainly due to the amount of fish that have to be discarded due to landing size requirements or the moratorium; this can cause discards to far exceed the kept catch (Helies and Jamison 2013). The Gulf and South Atlantic Fisheries Foundation (2008) suggested that around 27% of catches are not retained (Gulf and South Atlantic Fisheries Foundation 2008). However, in the SA vertical line fishery, red snapper discards were shown to far exceed kept fish (Helies and Jamison 2013).

LANE SNAPPER

Factor 2.1 - Abundance

UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, VERMILION SNAPPER
UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, YELLOWTAIL SNAPPER

High Concern

Genetic studies of lane snapper indicate that there is one stock in the northwest and north central GOM, and a second stock that includes western Florida, the Florida Keys, and eastern Florida (Karlsson et al. 2009). Other genetic assessments indicate differences between the Florida Keys and US Caribbean, and separate genetic stocks within the Columbian Caribbean indicating widespread subpopulation structure (Landinez-Garcia et al. 2009) (Gold et al. 2011).

No formal stock assessments have been conducted for lane snapper in the US waters of the South Atlantic, so abundance relative to target abundance reference points remains unknown (NOAA 2017e). A prior data-limited analysis of lane snapper in southern Florida estimated biomass to be near the biomass at MSY (B/B_{MSY} = 1.1) in 2002, indicating borderline abundant status at the time (Figure 2 (Ault et al. 2005)). But a more recent scientific study suggested that high fishing levels in the Florida Keys have reduced the effective population size, making this population prone to inbreeding (Gold et al. 2011). Most recently, the IUCN assessed Lane Snapper as "Near Threatened" in the Gulf of Mexico and globally because of large declines in landings that suggest at least 20% declines in biomass over three generations across its range (Lindeman et al. 2016). Declines in landings have been documented in the US Atlantic, US Gulf of Mexico, Cuba, Mexico, Brazil, and elsewhere (Lindeman et al. 2016).

Since the IUCN deems lane snapper as "Near Threatened," Seafood Watch scores abundance as a "high" concern.

UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, YELLOWTAIL SNAPPER

Low Concern

The 2017 NFMS' 4th quarter update has deemed the lane snapper's overfished status as "unknown" (NMFS 2017e). SEDAR 49 recently assessed lane snapper using data-limited methods. Over a 40 year period, the three methods showed varying results for B/B_{MSY}, although the final two methods—which were chosen to provide management advice—yielded positive results (with mean B/B_{MSY} ratios above 1.0) (SEDAR 2016f). These two methods were chosen to provide management advice because they performed relatively similar in both reliability of data and performance metrics (SEDAR 2016f). A third data-limited method, Tier3AStatusQuo_ABC, was not used to provide management advice, since it did not meet the performance metrics for any sensitivity run (SEDAR 2016f). Therefore, only two data-limited methods were adopted to provide management advice with no sound conflicting indicators.

Since Lane Snapper have medium vulnerability and the two final data-limited methods yielded positive performance metrics, Seafood Watch deems abundance as a "low" concern.

Justification:

Three methods were used to calculate the biomass performance metrics (Islope0, LstepCC0 and Tier3AStatusQuo_ABC). Two out of three methods scored positively in the performance metric measuring the probability that biomass is above 50% B_{MSY}, and all methods scored positively for the metric measuring the probability of biomass being below 20% B_{MSY}. The Islope0 and LstepCC0 methods—which yielded positive results—were favored methods used to provide management advice (SEDAR 2016f).

Productivity-Susceptibility Analysis:

Since the PSA calculates V = 2.77, therefore, vulnerability is scored medium.

ATTRIBUTE	RESULT	SCORE
Productivity Attribute		
Average age at maturity	Age at first maturity was 2.8 years (Aschenbrenner et al. 2017)	1
Average maximum age	19 years (Luckhurst et al. 2000)	2
Fecundity	595,700 eggs (Manickchand-Dass 1987)	1
Average maximum size	67 cm TL (Johnson et al. 1995)	1
Average size at maturity	240 mm FL (SAFMC 2017i)	1
Reproductive strategy	Broadcast spawner (Florida Museum 2018a)	1
Trophic level	3.8 (Froese and Pauly 2018e)	3
Quality of habitat	Moderately altered from non-fishing sources (SAFMC 2017i)	2
Susceptibility attribute		
Areal overlap	Unknown	3
Vertical overlap	Unknown	3
Selectivity of fishery	Lane Snapper are targeted by the recreational fishery (SAFMC 2017i)	2
Post-capture mortality	Unknown	3

P = 1.5

P^2 = 2.25

S = 2.325

S2 = 5.406

V = 2.76688

Factor 2.2 - Fishing Mortality

UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, VERMILION SNAPPER
UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, YELLOWTAIL SNAPPER

Low Concern

SEDAR 49 used data-limited methods to assess lane snapper in the GOM. Two models met the requirements to determine performance metrics related to overfishing. Both of these models yielded positive results, estimating the probability of not overfishing to be high (~70%) (SEDAR 2016f). The 2017 NFMS' 4th quarter update concurs, suggesting that lane snapper are not undergoing overfishing (NMFS 2017e).

Lane snapper are generally targeted by the recreational fishery (SEDAR 2016f) and therefore, the vermilion

and yellowtail snapper fisheries are likely not substantial contributors to lane snapper mortality.

Since data-limited methods suggest that lane snapper are not undergoing overfishing and both the vermilion and yellowtail snapper fisheries are unlikely to be substantial contributors to lane snapper mortality, Seafood Watch deems fishing mortality as a "low" concern.

UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, YELLOWTAIL SNAPPER

Low Concern

In the US Southeast Atlantic, lane snapper is not targeted by commercial fishers (SEDAR 2016f). The 2017 NFMS' 4th quarter update for the US Southeast Atlantic Snapper Complex (which includes lane snapper) indicate the overfishing status as unknown (NOAA 2017e).

Since lane snapper is not targeted and the commercial fishery's contribution to fishing mortality on this species is quite small, Seafood Watch deem fishing mortality as a "low" concern.

Factor 2.3 - Discard Rate

UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, VERMILION SNAPPER
UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, YELLOWTAIL SNAPPER

< 100%

Data regarding discard and bait use in the GOM reef fish fisheries are limited.

The bulk of the discards are considered regulatory discards, which include fish that are too small to be retained or that are prohibited due to closures or quotas (Stephen and Harris 2010). Some of the stock assessments on domestic fisheries contain some discard data that are attributed to a single species rather than the whole fishery (SEDAR 2010b).

Bait use in one study located in the GOM found that it mostly comprised tomtate, white grunt, pigfish, and sand perch in the vertical line fishery and 2% of the catch (number of fish) was used for bait (Scott-Denton and Williams 2013). However, Gulf reef fish species are prohibited to be used as bait (CFR §622.9 [e]).

Discard data are lacking in both fisheries: in the GOM, logbooks often claimed that "no discards" took place in fishing trips, which contradicted observer data, which found that an instance of having no discards was uncommon (McCarthy 2012). Scott-Denton et al. (2011) found that, in the vertical line fishery, 75% fish were retained, with 19% released alive, but this was with some signs of barotrauma; nearly 7% were discarded either dead, unknown, or kept for bait. Similarly, in Scott-Denton et al. (2013), 71% of the individuals were kept, 19% were released alive, and 11% were either discarded dead, unknown, or retained for bait.

Since most sources show that discarding is generally below 20% and bait use is low (<10%) in the GOM , discards and bait are less than 100% of landings, which gains a score of 1.

UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, YELLOWTAIL SNAPPER

< 100%

Data regarding discards and bait use in the commercial SA snapper-grouper fisheries are limited.

When targeting vermilion snapper in the SA, bait comprised around 14% of the catch, consisting mainly of vermilion snapper, red porgy, tomtate, bank sea bass and scamp (Stephen and Harris 2010).

The bulk of the discards are considered regulatory discards, which include fish that are too small to be retained or that are prohibited due to closures or quotas (Stephen and Harris 2010). A pilot observer program conducted from 2007 to 2009 collected information on species composition and disposition (kept or discarded) (GSAFF 2008) (GSAFF 2010). The (bait + discards)/landings ratio uses the total discarded CPUE (all species combined) divided by total retained CPUE. This ratio should be considered a minimum estimate because it does not account for bait needs, nor does it distinguish between species retained for food vs. bait. Based on 2,664 stations sampled between 2007 and 2009, the (bait + discards)/landings ratio is 29.9% (GSAFF 2008) (GSAFF 2010).

A ratio less than 100% warrants a score modifier of 1.0.

Justification:

The discard-to-landings ratio for the SA handline fishery is generally around 18%, but this figure can range vastly, mainly due to the amount of fish that have to be discarded due to landing size requirements or the moratorium; this can cause discards to far exceed the kept catch (Helies and Jamison 2013). The Gulf and South Atlantic Fisheries Foundation (2008) suggested that around 27% of catches are not retained (Gulf and South Atlantic Fisheries Foundation 2008). However, in the SA vertical line fishery, red snapper discards were shown to far exceed kept fish (Helies and Jamison 2013).

ALMACO JACK

Factor 2.1 - Abundance

UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, VERMILION SNAPPER

Moderate Concern

There is no recent stock assessment for almaco jack in the GOM (NMFS 2017e). They are a data-limited species (SEDAR 2016h). Data that are being used to estimate abundance include a recent index of abundance derived from the SEAMAP video survey and the recent mean length from the recreational (charterboat, headboat, private) fishery, however, these show conflicting trends (SEDAR 2016h).

Since almaco jack are not deemed to be highly vulnerable and there are conflicting trends in abundance, Seafood Watch deems abundance as a "moderate" concern.

Justification:

Productivity-Susceptibility Analysis:

The PSA scores vulnerability as 3.066859 and therefore almaco jack are scored medium vulnerability.

ATTRIBUTE	RESULT	SCORE
Productivity Attribute		
Average age-at-maturity	Unknown (Table 2.12.34 (SEDAR 2016h))	N/A
Average maximum age	Unknown (Table 2.12.34 (SEDAR 2016h))	N/A
Fecundity	Unknown (Table 2.12.34 (SEDAR 2016h))	N/A
Average maximum size	160 FL male/ unsexed (Froese & Pauly 2018b)	2
Average size-at-maturity	Unknown (Table 2.12.34 (SEDAR 2016h))	N/A
Reproductive strategy	Broadcast spawner (Froese and Pauly 2018b)	1
Trophic level	4.5 (Froese and Pauly 2018b)	3
Quality of habitat	Moderately altered from non-fishing sources (Chen 2017)	2
Susceptibility attribute		
Areal overlap	Unknown	3
Vertical overlap	Depth range is 15 to 160 m while vermilion snapper are usually found between 26 to 55m (SAFMC 2016h)	3
Selectivity of fishery	Unknown	2
Post-capture mortality	Unknown	3

$P = 2$

$P^2 = 4$

$S = 2.325$

$S^2 = 5.405625$

$P^2 + S^2 = 9.405625$

$V = \sqrt{P^2 + S^2}$

$V = 3.066859$

UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, RED SNAPPER

Moderate Concern

No stock assessment has been conducted for almaco jack in the US South Atlantic region. Scoring for almaco jack is based on a PSA. Although life history information for almaco jack is sparse, the results of the PSA indicate that the species has moderate inherent vulnerability. There is no information to indicate biomass is below a critical value, and the IUCN characterizes the species as "Least Concern" (Smith-Vaniz et al. 2015).

Since there is no stock assessment for almaco jack, and the species has a medium vulnerability, Seafood Watch deems abundance as a "moderate" concern.

Justification:

Productivity-Susceptibility Analysis:

The PSA scores vulnerability as 3.066859 and therefore Almaco Jack are scored medium vulnerability.

ATTRIBUTE	RESULT	SCORE
Productivity Attribute		
Average age-at-maturity	Unknown (Table 2.12.34 (SEDAR 2016h))	N/A
Average maximum age	Unknown (Table 2.12.34 (SEDAR 2016h))	N/A
Fecundity	Unknown (Table 2.12.34 (SEDAR 2016h))	N/A
Average maximum size	160 FL male/ unsexed (Froese and Pauly 2018d)	2
Average size-at-maturity	Unknown (Table 2.12.34 (SEDAR 2016h))	N/A
Reproductive strategy	Broadcast spawner (Froese and Pauly 2018d)	1
Trophic level	4.5 (Froese and Pauly 2018d)	3
Quality of habitat	Moderately altered from non-fishing sources (SAFMC 2017i).	2
Susceptibility Attribute		
Areal overlap	Unknown	3
Vertical overlap	Depth range is 5 to 245 m (Froese and Pauly 2018d) which coincides with general depth range of Red Snapper (10 to 190 m (SAFMC 2017i))	3

Selectivity of fishery	Unknown	2
Post-capture mortality	Unknown	3

PSA Calculation

P = 2

P^2 = 4

S = 2.325

S^2 = 5.405625

V = 3.066859

Factor 2.2 - Fishing Mortality

UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, VERMILION SNAPPER

Moderate Concern

No stock assessment has been conducted for almaco jack. Therefore, fishing mortality is unknown relative to reference points. The 2017 NFMS' 4th quarter update suggests that the Gulf of Mexico jacks complex (which includes almaco jack) are not undergoing overfishing (NMFS 2017e).

Since fishing mortality is unknown, Seafood Watch deems fishing mortality as a "moderate" concern.

UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, RED SNAPPER

Moderate Concern

No stock assessment has been conducted for almaco jack. The 2017 NFMS' 4th quarter update suggests that fishing mortality is unknown for the South Atlantic jack complex (which includes almaco jack, banded rudderfish, and lesser amberjack) (NMFS 2017e).

Since fishing mortality is unknown relative to reference points, Seafood Watch deems fishing mortality as a "moderate" concern.

Factor 2.3 - Discard Rate

UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, VERMILION SNAPPER

< 100%

Data regarding discard and bait use in the GOM reef fish fisheries are limited.

The bulk of the discards are considered regulatory discards, which include fish that are too small to be retained or that are prohibited due to closures or quotas (Stephen and Harris 2010). Some of the stock assessments on domestic fisheries contain some discard data that are attributed to a single species rather than the whole fishery (SEDAR 2010b).

Bait use in one study located in the GOM found that it mostly comprised tomtate, white grunt, pigfish, and sand perch in the vertical line fishery and 2% of the catch (number of fish) was used for bait (Scott-Denton and Williams 2013). However, Gulf reef fish species are prohibited to be used as bait (CFR §622.9 [e]).

Discard data are lacking in both fisheries: in the GOM, logbooks often claimed that "no discards" took place in fishing trips, which contradicted observer data, which found that an instance of having no discards was uncommon (McCarthy 2012). Scott-Denton et al. (2011) found that, in the vertical line fishery, 75% fish were retained, with 19% released alive, but this was with some signs of barotrauma; nearly 7% were discarded either dead, unknown, or kept for bait. Similarly, in Scott-Denton et al. (2013), 71% of the individuals were kept, 19% were released alive, and 11% were either discarded dead, unknown, or retained for bait.

Since most sources show that discarding is generally below 20% and bait use is low (<10%) in the GOM , discards and bait are less than 100% of landings, which gains a score of 1.

UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, RED SNAPPER

< 100%

Data regarding discards and bait use in the commercial SA snapper-grouper fisheries are limited.

When targeting vermilion snapper in the SA, bait comprised around 14% of the catch, consisting mainly of vermilion snapper, red porgy, tomtate, bank sea bass and scamp (Stephen and Harris 2010).

The bulk of the discards are considered regulatory discards, which include fish that are too small to be retained or that are prohibited due to closures or quotas (Stephen and Harris 2010). A pilot observer program conducted from 2007 to 2009 collected information on species composition and disposition (kept or discarded) (GSAFF 2008) (GSAFF 2010). The (bait + discards)/landings ratio uses the total discarded CPUE (all species combined) divided by total retained CPUE. This ratio should be considered a minimum estimate because it does not account for bait needs, nor does it distinguish between species retained for food vs. bait. Based on 2,664 stations sampled between 2007 and 2009, the (bait + discards)/landings ratio is 29.9% (GSAFF 2008) (GSAFF 2010).

A ratio less than 100% warrants a score modifier of 1.0.

Justification:

The discard-to-landings ratio for the SA handline fishery is generally around 18%, but this figure can range vastly, mainly due to the amount of fish that have to be discarded due to landing size requirements or the moratorium; this can cause discards to far exceed the kept catch (Helies and Jamison 2013). The Gulf and South Atlantic Fisheries Foundation (2008) suggested that around 27% of catches are not retained (Gulf and South Atlantic Fisheries Foundation 2008). However, in the SA vertical line fishery, red snapper discards were shown to far exceed kept fish (Helies and Jamison 2013).

ATLANTIC SHARPNOSE SHARK

Factor 2.1 - Abundance

UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, RED SNAPPER
UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, VERMILION SNAPPER
UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, YELLOWTAIL SNAPPER

Very Low Concern

Atlantic sharpnose shark are managed through the NMFS Highly Migratory Species program and are considered as a single stock through their range in US Atlantic and Gulf of Mexico waters (SEDAR 2013d). A benchmark stock assessment was conducted and peer reviewed through the SEDAR process with data through 2011 (SEDAR 2013d). The biomass target is the spawning stock fecundity that produces MSY, currently estimated at spawning stock fecundity (SSF) = 1.75x10 (SEDAR 2013d). The preferred model estimated terminal year fecundity as SSF = $3.03x10^7$, which is approximately 73% greater than the biomass target (Figure 34). Only long term projections were reported, but most runs (base and sensitivity) indicated that there was greater than 70% probability SSF would be exceed the target in all years (2032 to 2041) assuming constant landings similar to recent year averages (SEDAR 2013d).

Since a recent peer reviewed stock assessment indicates that stock abundance is greater than the biomass target, Seafood Watch deems abundance as a "very low" concern.

Justification:

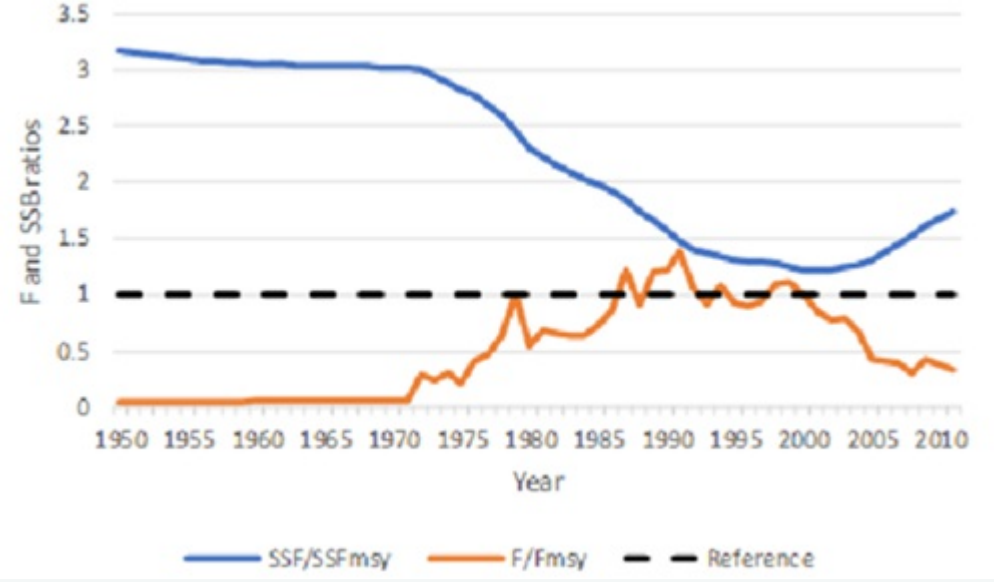

Figure 42 Atlantic sharpnose shark fishing mortality and spawning biomass from the preferred model run relative to MSY-based management reference points. Figure developed based on data provided in SEDAR 34 Tables 3.5.15 and 3.5.1

Factor 2.2 - Fishing Mortality

UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, RED SNAPPER
UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, VERMILION SNAPPER
UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, YELLOWTAIL SNAPPER

Low Concern

The fishing mortality threshold for Atlantic sharpnose shark is defined as F = 0.377 (SEDAR 2013d). Terminal year fishing mortality rate was estimated as F = 0.128 in the preferred model of the 2013 stock assessment (SEDAR 2013d). This results in a fishing mortality ratio of 0.34, indicating the stock is not experiencing overfishing.

Similar to the biomass projections, the majority of projection runs indicated there was less than a 30% probability that continuing to fish at recent harvest levels would result in fishing mortality rate greater than F in the future (SEDAR 2013d).

Since fishing mortality is below a sustainable level, Seafood Watch deems fishing mortality as a "low" concern.

Factor 2.3 - Discard Rate

UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, RED SNAPPER
UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, VERMILION SNAPPER
UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, YELLOWTAIL SNAPPER

< 100%

Data regarding discards and bait use in the commercial SA snapper-grouper fisheries are limited.

When targeting vermilion snapper in the SA, bait comprised around 14% of the catch, consisting mainly of vermilion snapper, red porgy, tomtate, bank sea bass and scamp (Stephen and Harris 2010).

The bulk of the discards are considered regulatory discards, which include fish that are too small to be retained or that are prohibited due to closures or quotas (Stephen and Harris 2010). A pilot observer program conducted from 2007 to 2009 collected information on species composition and disposition (kept or discarded) (GSAFF 2008) (GSAFF 2010). The (bait + discards)/landings ratio uses the total discarded CPUE (all species combined) divided by total retained CPUE. This ratio should be considered a minimum estimate because it does not account for bait needs, nor does it distinguish between species retained for food vs. bait. Based on 2,664 stations sampled between 2007 and 2009, the (bait + discards)/landings ratio is 29.9% (GSAFF 2008) (GSAFF 2010).

A ratio less than 100% warrants a score modifier of 1.0.

Justification:

The discard-to-landings ratio for the SA handline fishery is generally around 18%, but this figure can range vastly, mainly due to the amount of fish that have to be discarded due to landing size requirements or the moratorium; this can cause discards to far exceed the kept catch (Helies and Jamison 2013). The Gulf and

South Atlantic Fisheries Foundation (2008) suggested that around 27% of catches are not retained (Gulf and South Atlantic Fisheries Foundation 2008). However, in the SA vertical line fishery, red snapper discards were shown to far exceed kept fish (Helies and Jamison 2013).

MUTTON SNAPPER

Factor 2.1 - Abundance

UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, YELLOWTAIL SNAPPER
UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, YELLOWTAIL SNAPPER

Very Low Concern

The most recent stock assessment for South Atlantic and Gulf of Mexico mutton snapper indicates that the species is not overfished and abundance is above the target reference point (SAFMC 2017h), where SSB_{2013}/SSB_{OFL} = 1.13 (O'Hop et al. 2015).

Since mutton snapper biomass is deemed to be above the MSY proxy, Seafood Watch deems mutton snapper as a "very low" concern.

Factor 2.2 - Fishing Mortality

UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, YELLOWTAIL SNAPPER
UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, YELLOWTAIL SNAPPER

Low Concern

Mutton snapper in the South Atlantic and GOM is not subject to overfishing (NOAA 2017e). The most recent stock assessment estimates the fishing mortality as $F/F_{30\%SPR}$=0.65 (O'Hop et al. 2015).

Since fishing mortality is below the F_{MSY} proxy, Seafood Watch deems fishing mortality as a "low" concern.

Factor 2.3 - Discard Rate

UNITED STATES OF AMERICA / GULF OF MEXICO, VERTICAL LINES, UNITED STATES OF AMERICA, YELLOWTAIL SNAPPER

< 100%

Data regarding discard and bait use in the GOM reef fish fisheries are limited.

The bulk of the discards are considered regulatory discards, which include fish that are too small to be retained or that are prohibited due to closures or quotas (Stephen and Harris 2010). Some of the stock assessments on domestic fisheries contain some discard data that are attributed to a single species rather than the whole fishery (SEDAR 2010b).

Bait use in one study located in the GOM found that it mostly comprised tomtate, white grunt, pigfish, and sand perch in the vertical line fishery and 2% of the catch (number of fish) was used for bait (Scott-Denton and Williams 2013). However, Gulf reef fish species are prohibited to be used as bait (CFR §622.9 [e]).

Discard data are lacking in both fisheries: in the GOM, logbooks often claimed that "no discards" took place in fishing trips, which contradicted observer data, which found that an instance of having no discards was uncommon (McCarthy 2012). Scott-Denton et al. (2011) found that, in the vertical line fishery, 75% fish were retained, with 19% released alive, but this was with some signs of barotrauma; nearly 7% were discarded either dead, unknown, or kept for bait. Similarly, in Scott-Denton et al. (2013), 71% of the individuals were kept, 19% were released alive, and 11% were either discarded dead, unknown, or retained for bait.

Since most sources show that discarding is generally below 20% and bait use is low (<10%) in the GOM , discards and bait are less than 100% of landings, which gains a score of 1.

UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, YELLOWTAIL SNAPPER

< 100%

Data regarding discards and bait use in the commercial SA snapper-grouper fisheries are limited.

When targeting vermilion snapper in the SA, bait comprised around 14% of the catch, consisting mainly of vermilion snapper, red porgy, tomtate, bank sea bass and scamp (Stephen and Harris 2010).

The bulk of the discards are considered regulatory discards, which include fish that are too small to be retained or that are prohibited due to closures or quotas (Stephen and Harris 2010). A pilot observer program conducted from 2007 to 2009 collected information on species composition and disposition (kept or discarded) (GSAFF 2008) (GSAFF 2010). The (bait + discards)/landings ratio uses the total discarded CPUE (all species combined) divided by total retained CPUE. This ratio should be considered a minimum estimate because it does not account for bait needs, nor does it distinguish between species retained for food vs. bait. Based on 2,664 stations sampled between 2007 and 2009, the (bait + discards)/landings ratio is 29.9% (GSAFF 2008) (GSAFF 2010).

A ratio less than 100% warrants a score modifier of 1.0.

Justification:

The discard-to-landings ratio for the SA handline fishery is generally around 18%, but this figure can range vastly, mainly due to the amount of fish that have to be discarded due to landing size requirements or the moratorium; this can cause discards to far exceed the kept catch (Helies and Jamison 2013). The Gulf and South Atlantic Fisheries Foundation (2008) suggested that around 27% of catches are not retained (Gulf and South Atlantic Fisheries Foundation 2008). However, in the SA vertical line fishery, red snapper discards were shown to far exceed kept fish (Helies and Jamison 2013).

BLACK GROUPER

Factor 2.1 - Abundance

UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, YELLOWTAIL SNAPPER

Moderate Concern

A benchmark stock assessment for black grouper was completed in 2010 based on data up to the year 2008 (SEDAR 2010c). A new benchmark, originally scheduled for 2015, was delayed until 2017, and has since been delayed again, particularly due to concerns over data availability (e.g., species identification and other issues) (SEDAR 2017d).

The most recent stock assessment is therefore the 2010 benchmark (SEDAR 2010c). The black grouper stock assessment uses a spawning biomass target that would occur at a fishing mortality rate that produces 30% of maximum spawning potential as a proxy for the target spawning biomass at maximum sustainable yield (defined as $SSB_{F30\%SPR}$) (SEDAR 2010c). The biomass threshold is defined as (1-M)*SSB , where M = 0.14 is the natural mortality rate (SEDAR 2010c).

The 2010 assessment estimated $SSB_{F30\%SPR}$ = 5.92 million lb and SSB_{2008} = 8.3 million lb, indicating that terminal year biomass exceeded the target by approximately 40% (SEDAR 2010c). This indicates that spawning biomass is well above the target reference point, and is corroborated by the 2017 NFMS' 4th quarter update (NMFS 2017e). However, this status determination uses a terminal year of data from nearly 10 years ago. Further, Amendment 21 (SAFMC 2014) redefined biomass reference points for several species, including black grouper, which may affect status determination when the next assessment is completed.

Since the stock assessment is using data that are over ten years old and black grouper are not overfished in the South Atlantic and Gulf of Mexico, Seafood Watch deems abundance as a "moderate" concern.

Factor 2.2 - Fishing Mortality

UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, YELLOWTAIL SNAPPER

Low Concern

Both the SAFMC and GMFMC define their fishing mortality limit reference point for black grouper as the fishing mortality that achieves 30% of maximum spawning potential (SEDAR 2010c). The 2010 benchmark assessment estimated a terminal year fishing mortality rate of F = 0.108, which is well below the limit reference point F = 0.216 (SEDAR 2010c). Therefore F/Flim = 0.5.

A new benchmark, originally scheduled for 2015, was delayed until 2017, and has since been delayed again due to concerns over allocation of misreported gag landings in the early years of reporting (SEDAR 2017d) and changes to management in both regions that complicated index development (pers. comm., anonymous 10 May 2018). The most recent stock assessment is therefore the 2010 benchmark (SEDAR 2010c).

Stock projections that maintained fishing mortality at the 2008 level resulted in increases to spawning stock biomass. This is supported by indications that fishing mortality was relatively stable from 2000 to 2008 and resulted in stock growth (SEDAR 2010c). The Annual Catch Limits for Black Grouper in the South Atlantic were not exceeded in the previous fishing year: in 2017, the Annual Catch Limit was 96,844lbs (commercial fishery) (NOAA 2018a) and 165,750 lbs (recreational fishery) (NOAA 2018d), while reported landings for the same period were 79,576 lbs (commercial fishery) (NOAA 2018a) and 86,454 lbs (recreational fishery)(NOAA 2018d).

Since fishing mortality is below sustainable levels, Seafood Watch deems fishing mortality as a "low" concern.

Factor 2.3 - Discard Rate

UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, YELLOWTAIL SNAPPER

< 100%

Data regarding discards and bait use in the commercial SA snapper-grouper fisheries are limited.

When targeting vermilion snapper in the SA, bait comprised around 14% of the catch, consisting mainly of vermilion snapper, red porgy, tomtate, bank sea bass and scamp (Stephen and Harris 2010).

The bulk of the discards are considered regulatory discards, which include fish that are too small to be retained or that are prohibited due to closures or quotas (Stephen and Harris 2010). A pilot observer program conducted from 2007 to 2009 collected information on species composition and disposition (kept or discarded) (GSAFF 2008) (GSAFF 2010). The (bait + discards)/landings ratio uses the total discarded CPUE (all species combined) divided by total retained CPUE. This ratio should be considered a minimum estimate because it does not account for bait needs, nor does it distinguish between species retained for food vs. bait. Based on 2,664 stations sampled between 2007 and 2009, the (bait + discards)/landings ratio is 29.9% (GSAFF 2008) (GSAFF 2010).

A ratio less than 100% warrants a score modifier of 1.0.

Justification:

The discard-to-landings ratio for the SA handline fishery is generally around 18%, but this figure can range vastly, mainly due to the amount of fish that have to be discarded due to landing size requirements or the moratorium; this can cause discards to far exceed the kept catch (Helies and Jamison 2013). The Gulf and South Atlantic Fisheries Foundation (2008) suggested that around 27% of catches are not retained (Gulf and South Atlantic Fisheries Foundation 2008). However, in the SA vertical line fishery, red snapper discards were shown to far exceed kept fish (Helies and Jamison 2013).

BLUE RUNNER

Factor 2.1 - Abundance

UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, YELLOWTAIL SNAPPER

Moderate Concern

There is no recent stock assessment for blue runner. The 2017 NFMS' 4th quarter update stated that the SAFMC Jacks Complex have an unknown overfished and overfishing status (NMFS 2017e). In the absence of both a stock assessment and data-limited indicators, a PSA is used to determine the stock status of blue runner. The PSA deems blue runner to have medium vulnerability and therefore Seafood Watch scores abundance as a "moderate" concern.

Justification:

Productivity-Susceptibility Analysis

The PSA scores vulnerability at 2.76688, therefore, Blue Runner are deemed medium vulnerability.

ATTRIBUTE	RESULT	SCORE
Productivity Attribute		
Average age-at-maturity	Males = 2.4, Females = 2.8 (Sley et al. 2012)	1

Average maximum age	11 (Goodwin and Johnson 1986)	2
Fecundity	408606 (Oliveira et al. 2017)	1
Average maximum size	70cm (Oliveira et al. 2017)	1
Average size-at-maturity	267mm (Florida) (Oliveira et al. 2017)	1
Reproductive strategy	Broadcast spawner (UWI 2015)	1
Trophic level	4.1 (Froese and Pauly 2018c)	3
Quality of habitat	Moderately altered from non-fishing sources (SAFMC 2017i)	2
Susceptibility Attribute		
Areal overlap	Unknown	3
Vertical overlap	High degree of overlap between fishing depth and range of species (blue runner are found at depths between 0 to 100 m (UWI 2015) and Yellowtail Snapper are found between 10 to 70 m (SAFMC 2016i)	3
Selectivity of fishery	Unknown	2
Post-capture mortality	Unknown	3

PSA Calculation

P=1.5

S=2.325

$P^2 = 2.25$

$S^2 = 5.405625$

$P^2 + S^2 = 7.655625$

$V = \sqrt{P^2 + S^2} = 2.76688$

Factor 2.2 - Fishing Mortality

UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, YELLOWTAIL SNAPPER

Low Concern

Fishing mortality is unknown relative to reference points. The yellowtail snapper fishery is not likely to be a substantial contributor to blue runner mortality as blue runner are usually harvested with Spanish mackerel (NMFS 2013c).

Since the yellowtail snapper fishery is not likely to be a substantial contributor to fishing mortality, Seafood Watch scores blue runner as a "low" concern.

Factor 2.3 - Discard Rate

UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, YELLOWTAIL SNAPPER

< 100%

Data regarding discards and bait use in the commercial SA snapper-grouper fisheries are limited.

When targeting vermilion snapper in the SA, bait comprised around 14% of the catch, consisting mainly of vermilion snapper, red porgy, tomtate, bank sea bass and scamp (Stephen and Harris 2010).

The bulk of the discards are considered regulatory discards, which include fish that are too small to be retained or that are prohibited due to closures or quotas (Stephen and Harris 2010). A pilot observer program conducted from 2007 to 2009 collected information on species composition and disposition (kept or discarded) (GSAFF 2008) (GSAFF 2010). The (bait + discards)/landings ratio uses the total discarded CPUE (all species combined) divided by total retained CPUE. This ratio should be considered a minimum estimate because it does not account for bait needs, nor does it distinguish between species retained for food vs. bait. Based on 2,664 stations sampled between 2007 and 2009, the (bait + discards)/landings ratio is 29.9% (GSAFF 2008) (GSAFF 2010).

A ratio less than 100% warrants a score modifier of 1.0.

Justification:

The discard-to-landings ratio for the SA handline fishery is generally around 18%, but this figure can range vastly, mainly due to the amount of fish that have to be discarded due to landing size requirements or the moratorium; this can cause discards to far exceed the kept catch (Helies and Jamison 2013). The Gulf and South Atlantic Fisheries Foundation (2008) suggested that around 27% of catches are not retained (Gulf and South Atlantic Fisheries Foundation 2008). However, in the SA vertical line fishery, red snapper discards were shown to far exceed kept fish (Helies and Jamison 2013).

GRUNTS (UNSPECIFIED)

Factor 2.1 - Abundance

UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, YELLOWTAIL SNAPPER

Moderate Concern

The SAFMC manages grunts as part of the South Atlantic Grunts Complex and the 2017 NFMS' 4th quarter

update considers their overfished status as unknown (NMFS 2017e). Grunts that are caught in this fishery include white grunt, bluestriped grunt and other non-recorded grunts.

Since their abundance is unknown relative to reference points and there are no data-limited indicators to determine trends in their abundance, grunts have been scored according to their taxa, finfish. Seafood Watch scores finfish as a "moderate" concern.

Factor 2.2 - Fishing Mortality

UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, YELLOWTAIL SNAPPER

Moderate Concern

Fishing mortality for grunts is unknown relative to reference points: the 2017 NFMS' 4th quarter update suggests that the South Atlantic Grunts Complex overfishing status is unknown (NMFS 2017e). Since fishing mortality is unknown, Seafood Watch deems fishing mortality as a "moderate" concern.

Factor 2.3 - Discard Rate

UNITED STATES OF AMERICA / WESTERN CENTRAL ATLANTIC, VERTICAL LINES, UNITED STATES OF AMERICA, YELLOWTAIL SNAPPER

< 100%

Data regarding discards and bait use in the commercial SA snapper-grouper fisheries are limited.

When targeting vermilion snapper in the SA, bait comprised around 14% of the catch, consisting mainly of vermilion snapper, red porgy, tomtate, bank sea bass and scamp (Stephen and Harris 2010).

The bulk of the discards are considered regulatory discards, which include fish that are too small to be retained or that are prohibited due to closures or quotas (Stephen and Harris 2010). A pilot observer program conducted from 2007 to 2009 collected information on species composition and disposition (kept or discarded) (GSAFF 2008) (GSAFF 2010). The (bait + discards)/landings ratio uses the total discarded CPUE (all species combined) divided by total retained CPUE. This ratio should be considered a minimum estimate because it does not account for bait needs, nor does it distinguish between species retained for food vs. bait. Based on 2,664 stations sampled between 2007 and 2009, the (bait + discards)/landings ratio is 29.9% (GSAFF 2008) (GSAFF 2010).

A ratio less than 100% warrants a score modifier of 1.0.

Justification:

The discard-to-landings ratio for the SA handline fishery is generally around 18%, but this figure can range vastly, mainly due to the amount of fish that have to be discarded due to landing size requirements or the moratorium; this can cause discards to far exceed the kept catch (Helies and Jamison 2013). The Gulf and South Atlantic Fisheries Foundation (2008) suggested that around 27% of catches are not retained (Gulf and South Atlantic Fisheries Foundation 2008). However, in the SA vertical line fishery, red snapper discards were shown to far exceed kept fish (Helies and Jamison 2013).

Appendix B: A

The 2016 to 2017 Action Plan aims to implement spawning areas for the snapper-grouper complex, particularly to protect Warsaw grouper and speckled hind. They also recognize inconsistencies of protection of these species between state and federal waters since their capture is permitted in state waters, but prohibited in federal waters, which undermines conservation goals (Florida Fish and Wildlife Conservation Commission 2015).

The SEDAR Schedule of events documents have declared that the following stock assessments will be released on the following dates: Southeastern yellowtail snapper – November 2019
Gulf of Mexico gray triggerfish - August 2019
Gulf of Mexico red grouper - June 2019
South Atlantic red porgy - June 2019
South Atlantic greater amberjack - May 2019.
The Ecosystems Science Program Review is currently under review and expected soon; details can be found at http://www.st.nmfs.noaa.gov/science-program-review/.