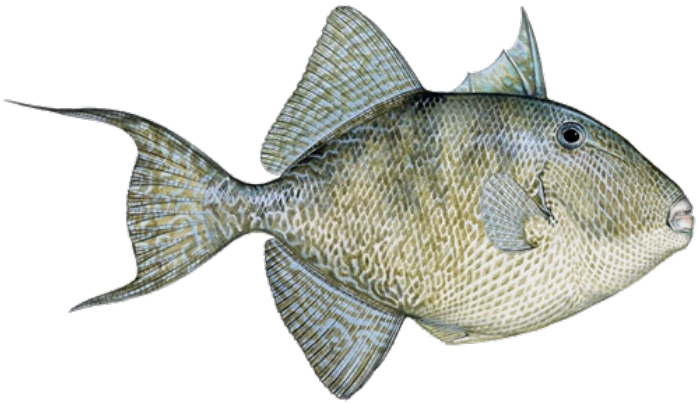
The Safina Center
at Stony Brook University
AND
Monterey Bay Aquarium
Seafood Watch®

Gray triggerfish

Balistes capriscus



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United States: Western Central Atlantic & Gulf of Mexico

Diver, Handlines

November 7, 2016

The Safina Center Seafood Analysts

Disclaimer

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

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About The Safina Center

The Safina Center (formerly Blue Ocean Institute) translates scientific information into language people can understand and serves as a unique voice of hope, guidance, and encouragement. The Safina Center (TSC) works through science, art, and literature to inspire solutions and a deeper connection with nature, especially the sea. Our mission is to inspire more people to actively engage as well-informed and highly motivated constituents for conservation.

Led by conservation pioneer and MacArthur fellow, Dr. Carl Safina, we show how nature, community, the economy and prospects for peace are all intertwined. Through Safina's books, essays, public speaking, PBS television series, our Fellows program and Sustainable Seafood program, we seek to inspire people to make better choices.

The Safina Center was founded in 2003 by Dr. Carl Safina and was built on three decades of research, writing and policy work by Dr. Safina.

The Safina Center's Sustainable Seafood Program
The Center's founders created the first seafood guide in 1998. Our online seafood guide now encompasses over 160-wild-caught species. All peer-reviewed seafood reports are transparent, authoritative, easy to understand and use. Seafood ratings and full reports are available on our website under Seafood choices. tsc's sustainable seafood program helps consumers, retailers, chefs and health professionals discover the connection between human health, a healthy ocean, fishing and sustainable seafood.

- Our online guide to sustainable seafood is based on scientific ratings for more than 160 wild-caught seafood species and provides simple guidelines. Through our expanded partnership with the Monterey Bay Aquarium, our guide now includes seafood ratings from both The Safina Center and the Seafood Watch® program.
- We partner with Whole Foods Market (WFM) to help educate their seafood suppliers and staff, and provide our scientific seafood ratings for WFM stores in the US and UK.
- Through our partnership with Chefs Collaborative, we created Green Chefs/Blue Ocean, a free, interactive, online sustainable seafood course for chefs and culinary professionals.
- Our website features tutorials, videos, blogs, links and discussions of the key issues such as mercury in seafood, bycatch, overfishing, etc.

Check out our Fellows Program, learn more about our Sustainable Seafood Program and Carl Safina's current work at www.safinacenter.org .

The Safina Center is a 501 (c) (3) nonprofit organization based in the School of Marine & Atmospheric Sciences at Stony Brook University, Long Island, NY. www.safinacenter.org admin@safinacenter.org | 631.632.3763

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

The Safina Center and Seafood Watch define 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.

Based on this principle, Seafood Watch and the Safina Center have developed four sustainability **criteria** for evaluating wild-catch fisheries for consumers and businesses. These criteria are:

- How does fishing affect the species under assessment?
- How does the fishing affect other, target and non-target species?
- How effective is the fishery's management?
- How does the fishing affect habitats and the stability of the ecosystem?

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 the Safina Center's 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

This report provides recommendations for gray triggerfish *(Balistes capriscus)* captured in the U.S. Gulf of Mexico and Southeast Atlantic. Gray triggerfish is caught with handlines in both regions, and by divers in the Southeast Atlantic.

Gray triggerfish is widely distributed throughout the Atlantic Ocean, and is commonly found from Brazil to North Carolina in the western North Atlantic. Adults are highly associated with reefs and hard structure, spawn during the summer months, and feed on benthic invertebrates. In the U.S., the commercial fishery for gray triggerfish is centered around Florida. In the Gulf of Mexico, gray triggerfish has been overfished, but is not currently experiencing overfishing. Gray triggerfish abundance and fishing mortality are unknown in the Southeast Atlantic, where more research is needed.

The handline and diver fisheries also catch other snapper and grouper species, most of which are moderately abundant. A few species in the fishery are overfished, including hogfish, red porgy, and red snapper.

Gray triggerfish is independently managed as two populations by the Gulf of Mexico and South Atlantic Fishery Management Councils, despite genetic homogeneity across both regions. Managers have put in place several regulations including an annual catch limit and minimum size limit, and have made efforts to decrease commercial catches and increase the minimum size, to allow the population to recover in the Gulf of Mexico. Overfishing in the Gulf of Mexico has ceased, but abundance has not yet recovered.

The handline and diver fisheries have limited contact with bottom substrates. In both regions, managers are working toward the development of ecosystem-based management policies, but have not implemented changes to this effect in a large-scale way. These fisheries are not expected to have large negative effects on the Gulf of Mexico and Southeast Atlantic ecosystems.

Overall, gray triggerfish caught in the handline and diver fisheries in the Southeast Atlantic and the handline fishery in the Gulf of Mexico are rated **Good Alternative/Yellow**.

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
Gray triggerfish United States Western Central Atlantic, Diver, United States	Yellow (2.64)	Red (1.00)	Yellow (3.00)	Green (3.46)	**Good Alternative (2.29)**
Gray triggerfish United States Western Central Atlantic, Handlines, United States	Yellow (2.64)	Red (1.00)	Yellow (3.00)	Green (3.46)	**Good Alternative (2.29)**
Gray triggerfish United States Gulf of Mexico, Handlines, United States	Red (1.73)	Yellow (2.24)	Yellow (3.00)	Green (3.46)	**Good Alternative (2.52)**

Summary

Gray triggerfish caught in the handline and diver fisheries in the Southeast Atlantic and the handline fishery in the Gulf of Mexico are rated **Good Alternative/Yellow**.

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 either Criterion 1 or Criterion 3 (or both) is Green, 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

This report assesses the sustainability of the U.S. Gulf of Mexico and Southeast Atlantic fisheries for gray triggerfish *(Balistes capriscus)*. The majority of commercial catches come from Florida, with fewer landings reported from other states in the Southeast Atlantic through North Carolina and the northeastern Gulf of Mexico. This assessment covers gray triggerfish caught with handlines in both regions and by divers using spears in the Southeast Atlantic.

Species Overview

Gray triggerfish belongs to the family Balistidae, which are laterally compressed marine fish that are commonly referred to as "triggerfish." Gray triggerfish is widespread throughout the Atlantic Ocean from 58º N. to 37º S., and is common from Brazil to North Carolina in the western North Atlantic Ocean ((Robins & Ray 1986) and (Froese & Pauly 2016)).

Adult gray triggerfish are highly associated with reefs and hard structure ((Johnson & Salomon 1984) and (Vose & Nelson 1994)) while larvae and juveniles spend a period of time in the pelagic zone associated with *Sargassum* species and other floating material ((Vose & Nelson 1994) and (Simmons & Szedlmayer 2011)). They feed on benthic invertebrates including polychaetes, molluscs, crustaceans, and sand dollars (Vose & Nelson 1994). Gray triggerfish is unique compared to most other reef fish: it displays territorial behavior, creates demersal nests, guards eggs, and forms harems of one male and several females (Simmons & Szedlmayer 2012). Spawning is most likely to occur between May and August ((Kelly 2014) and (Lang & Fitzhugh 2015)), and sexual maturity occurs at approximately 25 cm in length (1–2 years of age, (Ingram 2001), (Burton et al. 2015) and (Lang and Fitzhugh 2015)). Gray triggerfish grows to a maximum size of nearly 60 cm and 6.2 kg and theoretically can live to 16 years ((Froese & Pauly 2016) and (SEDAR 2006)). Gray triggerfish is considered to have a moderate vulnerability to overfishing ((Jing et al. 2015) and (Froese & Pauly 2016)).

In the U.S., gray triggerfish is managed within the reef fish fishery by the Gulf of Mexico Fishery Management Council and within the snapper grouper fishery by the South Atlantic Fishery Management Council. Landings are too low to necessitate management in the Mid-Atlantic or North Atlantic regions. Although gray triggerfish are managed as two separate populations, genetic analyses suggest that there is homogeneity across the Southeast Atlantic and Gulf of Mexico regions (Antoni et al. 2011).

Production Statistics

Handline gear accounts for about 90% of all gray triggerfish commercial landings in the U.S., while divers in the Southeast Atlantic account for approximately 7% (NMFS 2016a). Most gray triggerfish are landed incidentally on trips that target vermilion snapper, red porgy ((Shertzer & Williams 2008) and (Stephen & Harris 2010)), red snapper, and red grouper in both regions (TIP 2015).

Historically, commercial landings peaked in the Gulf of Mexico in the early 1990s at around 550,000 lb (Figure 1), followed by a precipitous decline in the mid- to late 1990s (SEDAR 2015a). Today, the majority of gray triggerfish landings come from the Southeast Atlantic fishery (NOAA 2016a). Since the mid-1990s, commercial landings in the Southeast Atlantic have been much larger (Figure 2), with total commercial landings about seven times greater than in the Gulf of Mexico in 2015 (328,730 and 47,480 lb, respectively, (NOAA SERO 2016b) and (NOAA SERO 2016c)). The commercial fishery is centered around Florida ((Saul 2006) and (SEDAR 2016)).

In the Gulf of Mexico, recreational landings are more than twice the landings in the commercial fishery (114,058

and 47,480 lb, respectively, in 2015), with a majority occurring in the eastern Gulf of Mexico (Figure 1) (SEDAR 2015a). Landings are approximately even between the two fisheries in the Southeast Atlantic (recreational catch was 313,580 lb in 2015) (NOAA SERO 2016a). In 2015, all triggerfish landed in the southeastern U.S. were valued at around $1,050,000, of which $704,000 was attributed to gray triggerfish (ACCSP 2016b).

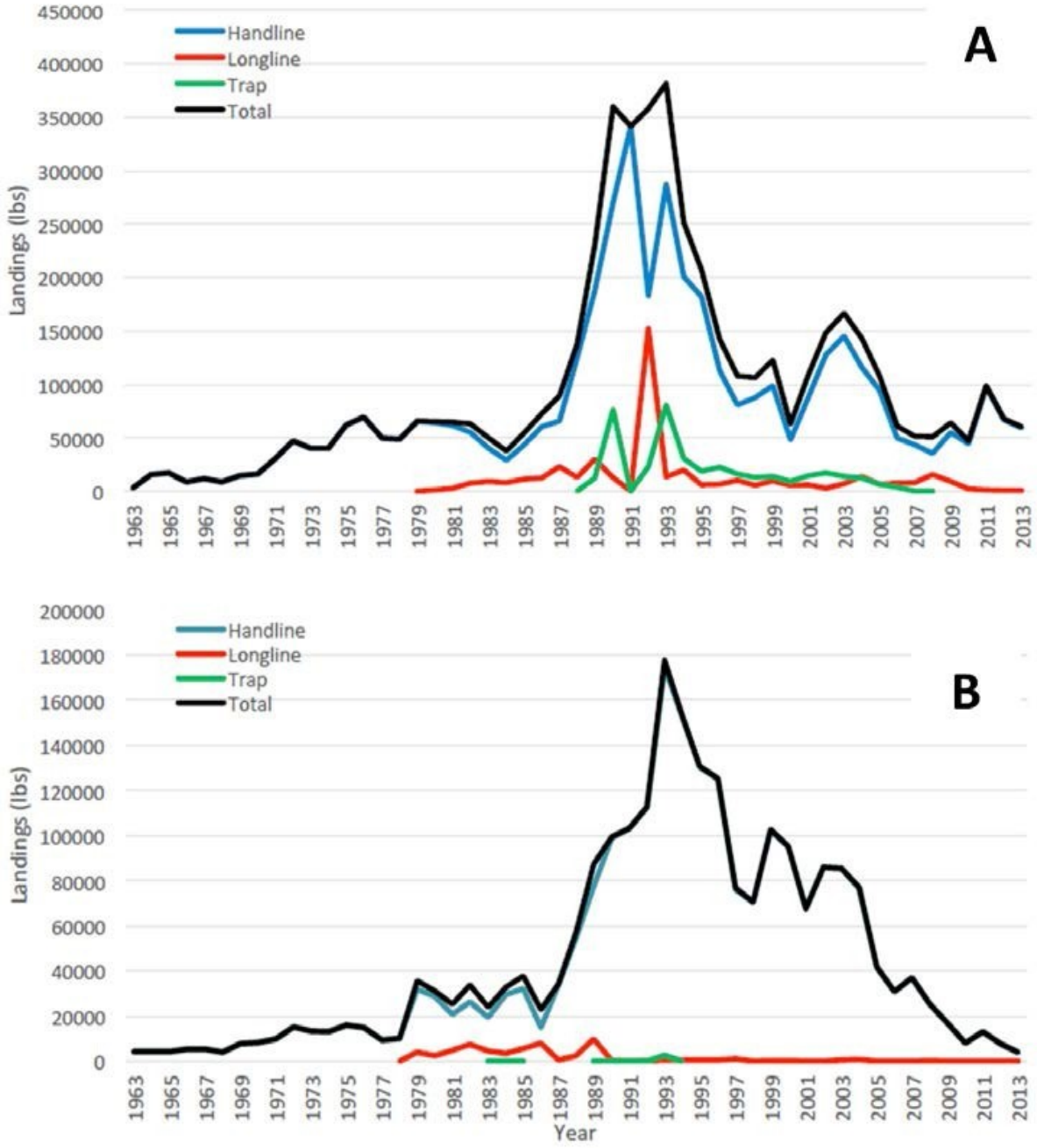

Figure 1 Commercial landings of gray triggerfish in the U.S. Gulf of Mexico (A: East; B: West) by gear type (from SEDAR 2015a).

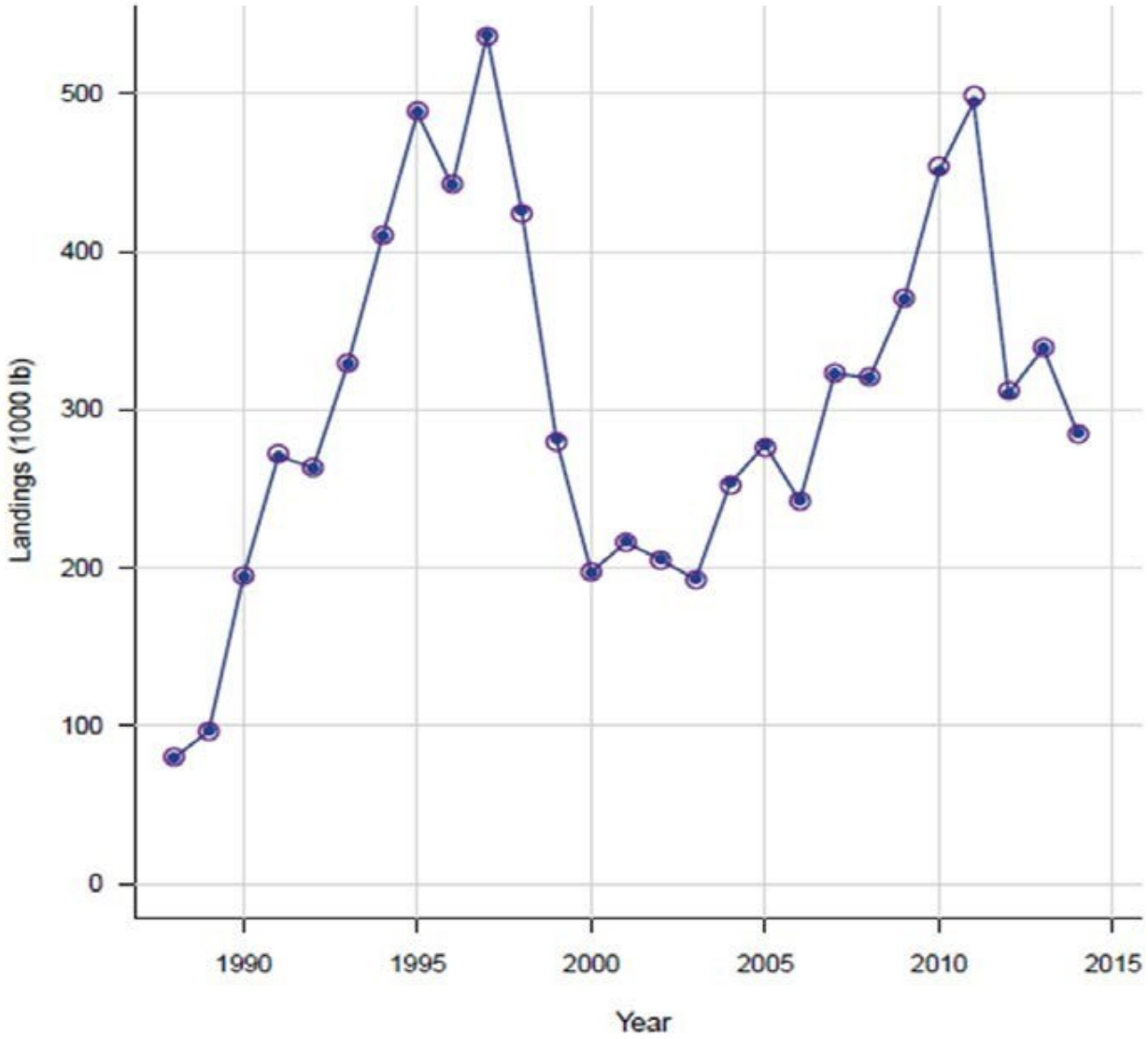

Figure 2 Commercial landings of gray triggerfish in the U.S. Southeast Atlantic. Observed landings are in open circles, estimated landings in closed circles (indistinguishable) (from SEDAR 2016).

Importance to the US/North American market.

There is no available information on triggerfish import or export data (NOAA 2016a), suggesting that all commercial triggerfish landed is sold in the U.S.

Common and market names.

Gray triggerfish is also called grey triggerfish, triggerfish, leatherjacket, pig-faced, turbot, and filefish (Jing et al. 2015).

Primary product forms

Gray triggerfish is typically marketed fresh (Matsuura 2002).

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

Criterion 1 Summary

GRAY TRIGGERFISH			
Region | Method | Country | Custom Group	**Abundance**	**Fishing Mortality**	**Score**
United States/Western Central Atlantic | Diver | United States	2.33: Moderate Concern	3.00: Moderate Concern	Yellow (2.64)
United States/Western Central Atlantic | Handlines | United States	2.33: Moderate Concern	3.00: Moderate Concern	Yellow (2.64)
United States/Gulf of Mexico | Handlines | United States	1.00: High Concern	3.00: Moderate Concern	Red (1.73)

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.*

GRAY TRIGGERFISH

Factor 1.1 - Abundance

UNITED STATES/WESTERN CENTRAL ATLANTIC, DIVER, UNITED STATES
UNITED STATES/WESTERN CENTRAL ATLANTIC, HANDLINES, UNITED STATES

Moderate Concern

The abundance of gray triggerfish in the U.S. Southeast Atlantic is uncertain. The International Union for the Conservation of Nature assessed gray triggerfish to be a "Vulnerable" species due to declines in many parts of its range; however, no evidence of decline was reported for the U.S. Atlantic (Jing et al. 2015).

Gray triggerfish in the Southeast Atlantic region is managed by the South Atlantic Fishery Management Council (SAFMC) under the Snapper-Grouper Fishery. 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 2016a) and (NOAA 2016c)). The review panel for the assessment stated "that there was no evidence of a decline in abundance or biomass at this time" (SEDAR 2016a). A previous assessment in 2011 also concluded that abundance status was "highly uncertain" due to a small data set (Broome et al. 2011). There have been a few other limited studies on gray triggerfish abundance in this region. Potts and Brennan (Potts & Brennan 2001) found that 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 they also indicated that the spawning potential ratio (SPR) at the time was 62%, indicating a healthy biomass (Potts & Brennan 2001). Rudershausen et al. (Rudershausen et al. 2008) found that gray triggerfish in the vertical line fishery off the coast of North Carolina had declined both in catch per unit of fishing 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).

Because there is conflicting and uncertain abundance information for gray triggerfish in the Southeast Atlantic, and the Productivity-Susceptibility Analysis indicates that this species has a medium vulnerability to fishing (see detailed scoring below), we have awarded a score of "moderate" concern.

Justification:

The PSA score for gray triggerfish = 2.81. For this reason, the species is deemed as having a "medium" vulnerability. Detailed scoring of each attribute is shown below.

Productivity Attribute	Relevant Information	Score (1 = low risk, 2 = medium risk, 3 = high risk)
Average age at maturity	< 1 (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/yr (Lang and Fitzhugh 2015)	1
Average maximum size (fish only)	60 cm (Lombardi et al. 2015)	1
Average size at maturity (fish only)	17–19 cm (Fitzhugh et al. 2015) (Kelly 2014)	1
Reproductive strategy	Demersal egg layer	2
Trophic level	4.1 (Froese and Pauly 2016)	3
Density dependence (invertebrates only)	N/A	N/A

Susceptibility Attribute	Relevant Information	Score (1 = low risk, 2 = medium risk, 3 = high risk)
Areal overlap (Considers all fisheries)	Fished in nearly all of the species' range	3
Vertical overlap (Considers all fisheries)	Fished in nearly all of the vertical distribution by various fisheries	3
Selectivity of fishery (Specific to fishery under assessment)	Targeted and important contribution to reef fish fishery	2
Post-capture mortality (Specific to fishery under assessment)	Gray triggerfish is a retained species	3

Figure 3

UNITED STATES/GULF OF MEXICO, HANDLINES, UNITED STATES

High Concern

In the Gulf of Mexico, gray triggerfish was last assessed in 2015, and was evaluated as overfished. Spawning stock biomass was assessed at 88% of the limit abundance reference point (SSB/MSST = 0.88) and 64% of the target abundance reference point (SSB/SSBMSY = 0.64) ((GMFMC 2015) and (SEDAR 2015a)).

Several assessments prior to this also evaluated gray triggerfish as overfished or approaching an overfished condition (SEDAR 2011a). Gray triggerfish is currently in year 9 of a 10-year rebuilding plan (NOAA 2016c), but is not expected to reach its rebuilding deadline in 2017 (GMFMC 2015). Biomass has declined steadily since the 1950s (Figure 3) ((SEDAR 2015a) and (Jing et al. 2015)) partly because of lower than historically averaged recruitment, despite fishing mortality restrictions (SEDAR 2015a). Genetic analysis indicates a homogenous stock between the Gulf of Mexico and Southeast Atlantic (Antoni et al. 2011), and in the Gulf of Mexico, all gray triggerfish are considered a single stock due to similar exploitation and habitat use (SEDAR 2011a). Gulf of Mexico gray triggerfish is managed by the Gulf of Mexico Fishery Management Council (GMFMC) within the reef fish fishery.

The International Union for the Conservation of Nature (IUCN) lists this population as "Near Threatened" (Jing et al. 2015), which may stem partly from high site fidelity (Addis et al. 2016). 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 ((Saul 2006) and (SEDAR 2015a)). Because gray triggerfish is overfished in the Gulf of Mexico, abundance is rated as a "high" concern.

Justification:

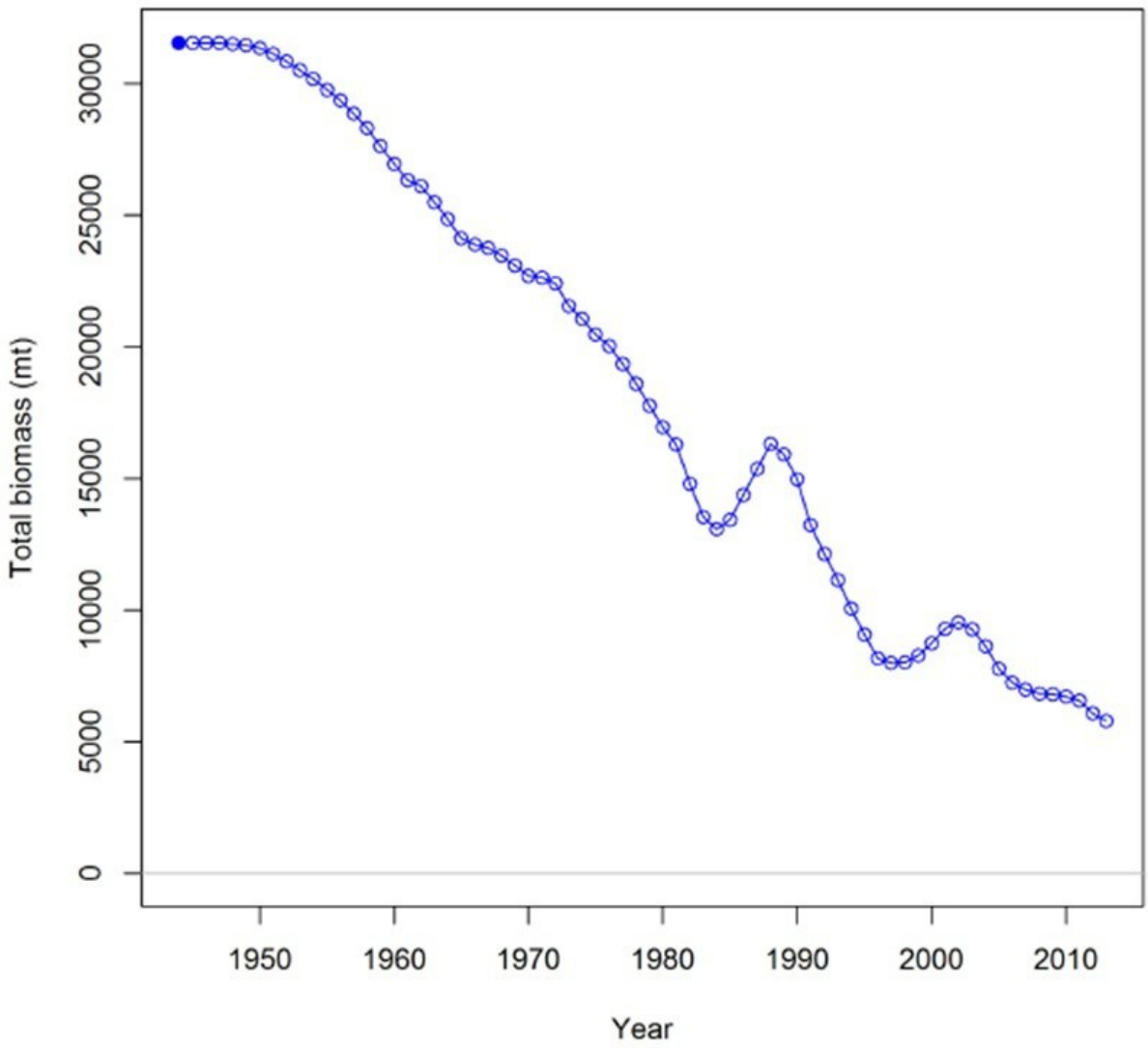

Figure 4 Predicted biomass of gray triggerfish in the Gulf of Mexico (from SEDAR 2015a).

Factor 1.2 - Fishing Mortality

UNITED STATES/WESTERN CENTRAL ATLANTIC, DIVER, UNITED STATES
UNITED STATES/WESTERN CENTRAL ATLANTIC, HANDLINES, UNITED STATES

Moderate Concern

The first SEDAR assessment was completed for U.S. Southeast Atlantic gray triggerfish in April 2016, and it determined that exploitation status is unknown due to uncertainty in the assessment model (SEDAR 2016a). Gray triggerfish are targeted by commercial, recreational, and headboat fishers using vertical lines, and made up the sixth-highest landings by weight in the snapper-grouper management complex for the Southeast Atlantic region (Burton et al. 2015). Landings are roughly evenly split between the commercial (54.6%) and recreational (45.4%) sectors for this species (Burton et al. 2015). Landings increased sharply in the 1990s as a result of increased consumer demand for this species, declined from 1999 to 2003, and have increased again from 2004 to 2010 (Burton et al. 2015). But 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 (pers. comm., J. Myers, SEDAR 2016). Because of the unknown fishing mortality for this species, we have scored this as "moderate" concern.

UNITED STATES/GULF OF MEXICO, HANDLINES, UNITED STATES

Moderate Concern

Based on the recent 2015 assessment, Gulf of Mexico gray triggerfish is no longer experiencing overfishing ((SEDAR 2015a), (GMFMC 2015) and (NOAA 2016c)). Fishing mortality was estimated to be well below the fishing mortality at maximum sustainable yield (FMSY) threshold (F/FMSY = 0.62) (SEDAR 2015a), and below the overfishing limit since 2008, but there were a number of uncertainties and concerns with the assessment (GMFMC 2015). Several previous assessments since 2001 have all indicated that overfishing was occurring in the past ((SEDAR 2011a) and (SEDAR 2015a)). Landings in the Gulf of Mexico were 64,343 lbs for the commercial fishery and 157,418 lbs for the recreational fishery in 2013, with the majority of landings coming from the eastern Gulf of Mexico (SEDAR 2015a). Additionally, age-0 and age-1 juvenile gray triggerfish are common discards in the shrimp trawl fishery in the Gulf of Mexico ((SEDAR 2011a) and (Monk et al. 2015)). 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, we have awarded a score of "moderate" 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.

GRAY TRIGGERFISH - UNITED STATES/GULF OF MEXICO - HANDLINES - UNITED STATES					
Subscore:	**2.24**	**Discard Rate:**	**1.00**	**C2 Rate:**	**2.24**
Species	**Abundance**	**Fishing Mortality**	**Subscore**		
Red snapper / Gulf of Mexico	1.00:High Concern	5.00:Low Concern	Yellow (2.24)		
Scamp	2.33:Moderate Concern	3.00:Moderate Concern	Yellow (2.64)		
Red porgy	3.67:Low Concern	3.00:Moderate Concern	Green (3.32)		
Gag grouper / Gulf of Mexico	2.33:Moderate Concern	5.00:Low Concern	Green (3.41)		
Red grouper / Gulf of Mexico	3.67:Low Concern	5.00:Low Concern	Green (4.28)		
Vermilion snapper / Gulf of Mexico	5.00:Very Low Concern	5.00:Low Concern	Green (5.00)		

GRAY TRIGGERFISH - UNITED STATES/WESTERN CENTRAL ATLANTIC - DIVER - UNITED STATES					
Subscore:	**1.00**	**Discard Rate:**	**1.00**	**C2 Rate:**	**1.00**
Species	**Abundance**	**Fishing Mortality**	**Subscore**		
Hogfish / South Atlantic	1.00:High Concern	1.00:High Concern	Red (1.00)		

Greater amberjack	3.67:Low Concern	5.00:Low Concern	Green (4.28)
Gag grouper / South Atlantic	3.67:Low Concern	5.00:Low Concern	Green (4.28)

GRAY TRIGGERFISH - UNITED STATES/WESTERN CENTRAL ATLANTIC - HANDLINES - UNITED STATES					
Subscore:	**1.00**	**Discard Rate:**	**1.00**	**C2 Rate:**	**1.00**
Species	**Abundance**	**Fishing Mortality**	**Subscore**		
Red snapper / South Atlantic	1.00:High Concern	1.00:High Concern	Red (1.00)		
Red porgy / South Atlantic	1.00:High Concern	5.00:Low Concern	Yellow (2.24)		
Gag grouper / South Atlantic	3.67:Low Concern	5.00:Low Concern	Green (4.28)		
Vermilion snapper / South Atlantic	3.67:Low Concern	5.00:Low Concern	Green (4.28)		
Red grouper	3.67:Low Concern	5.00:Low Concern	Green (4.28)		

Retained and bycatch species in the gray triggerfish fishery were included by evaluating species that are commonly caught on trips that catch gray triggerfish and constitute more than 5% of the landings from those trips. These data come from commercial dealer reports ({ACCSP 2016} and {GMFMC 2016}) and are cross-referenced with Trip Interview Program reports for inclusion {TIP 2016}. We assessed the most recent 10 years of available data. Because gray triggerfish is unlikely to be the primary target of any commercial fishing trip, we confirmed some of these associations from the primary literature that notes trips for reef fish species that also tend to catch gray triggerfish ({Stephen & Harris 2010} and {Shertzer & Williams 2008}). No endangered, threatened, or protected species were included because there is very little interaction between those species and the fisheries included in this report.

For the handline fishery in the Gulf of Mexico, red snapper is the lowest scoring species because of its overfished status. In the Southeast Atlantic handline fishery, red snapper is the lowest scoring species because of its overfished status and continual overfishing. Diver-caught hogfish in the Southeast Atlantic is also overfished and undergoing overfishing, which makes it the lowest scoring species in this fishery.

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)

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 / Gulf of Mexico | Handlines | United States	Moderately Effective	Moderately Effective	Moderately Effective	Highly Effective	Highly Effective	Yellow (3.00)
Fishery 2: United States / Western Central Atlantic | Diver | United States	Moderately Effective	Highly Effective	Moderately Effective	Moderately Effective	Highly Effective	Yellow (3.00)
Fishery 3: United States / Western Central Atlantic | Handlines | United States	Moderately Effective	Moderately Effective	Moderately Effective	Moderately Effective	Highly Effective	Yellow (3.00)

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 / GULF OF MEXICO, HANDLINES, UNITED STATES

Moderately Effective

Genetic analyses to date point to a homogenous population of gray triggerfish across the U.S. South Atlantic and Gulf of Mexico regions. But gray triggerfish in the Gulf of Mexico is managed as an independent stock by the Gulf of Mexico Fishery Management Council within the reef fish fishery ((Antoni et al. 2011) and (SEDAR 2015a)). State agencies manage gray triggerfish in nearshore waters. The total commercial annual catch limit (ACL) was set at 64,100 lb for gray triggerfish in 2015, when 74% of the ACL was reached. Prior to this, the ACL was exceeded by 12% to 15% in 2012 and 2013 (NOAA SERO 2016a) b). Additional regulations in federal and state waters include bag or trip limits, minimum size limits, and a restricted species endorsement needed for commercially harvested gray triggerfish in Florida waters ((GMFMC 2015a) and (FFWCC 2013)). Gray triggerfish is overfished, but it was recently removed from the list of stocks experiencing overfishing ((SEDAR 2015a) and (NOAA 2016c)) due to reductions in fishing mortality (SEDAR 2016), along with likely improvement in the way it is managed in the Gulf of Mexico. Recent implementation of circle hooks in the fishery was thought to contribute to reduced catchability of gray triggerfish (SEDAR 2015a). Gray triggerfish is in year 9 of a 10-year rebuilding plan (NOAA 2016c), but the population has not yet shown signs of recovery and is not expected to rebuild on time (GMFMC 2015). The rebuilding plan was modified based on the 2011 update stock assessment, with a reduction in the recreational and commercial ACLs, the establishment of a closed season and reduced bag limit (SEDAR 2015a). It is unclear if these changes will be enough to rebuild the population within an appropriate timeframe.

Several other species are caught and retained along with gray triggerfish, including red snapper, red and gag grouper, red and vermilion snapper, scamp, and red porgy. Generally, these are all well managed, with red snapper as the only species for which abundance is a high concern. These species are also managed through bag, size, and annual catch limits that are closely monitored by NOAA (NOAA SERO 2016a).

Effective management strategies are in place for most species, but to date there has been no substantial recovery of the gray triggerfish population. This results in a score of "moderately effective."

UNITED STATES / WESTERN CENTRAL ATLANTIC, DIVER, UNITED STATES
UNITED STATES / WESTERN CENTRAL ATLANTIC, HANDLINES, UNITED STATES

Moderately Effective

Genetic analyses to date point to a homogenous population of gray triggerfish across the U.S. Southeast Atlantic and Gulf of Mexico regions. But in the U.S. Southeast Atlantic, gray triggerfish is managed as an independent stock by the South Atlantic Fishery Management Council within the Snapper-Grouper fishery (SEDAR 2016). State agencies manage gray triggerfish in nearshore waters. The commercial annual catch limit (ACL) was 272,880 lb for gray triggerfish in 2015, and landings ranged from 89% to 133% of the catch limit between 2012 and 2015 (NOAA SERO 2016c). Additional regulations in federal and state waters include aggregate snapper bag limits and minimum size limits (GMFMC 2015a), and all Southeast Atlantic states follow federal regulations (SEDAR 2016). The biomass and fishing mortality of gray triggerfish are unknown ((SEDAR 2016), (NOAA 2016c)). In 2015, the federal government introduced new accountability measures to implement new ACLs, while better assessing any need for early closures for gray triggerfish, by splitting the commercial season in two (January to June and July to December).

The minimum size limit was adjusted to 12" (GA to NC) or 14" (FL), and the commercial trip limit was decreased to 1,000 lbs based on concerns over state-to-state variation among minimum sizes (Federal Register 2015b).

Several other species are caught and retained in the South Atlantic along with gray triggerfish, including vermilion and red snapper, red grouper, scamp, gag, and red porgy ((Stephen & Harris 2010), (Shertzer & Williams 2008) and (ACCSP 2016)). Greater amberjack and hogfish are also caught in the diver fishery. These species are also managed through federal and state bag, size, and catch limits (SAFMC 2015). Concern exists over the abundance of red snapper, red porgy, and hogfish, and fishing mortality remains high for red snapper and hogfish (NOAA 2016c). Other species are abundant, which suggests effective management for some but not all species.

Because gray triggerfish abundance and fishing mortality are unknown, and management of other species caught in the fishery is mixed, a score of "moderately effective" is awarded.

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 / GULF OF MEXICO, HANDLINES, UNITED STATES

Moderately Effective

The most common discards in the commercial handline fishery in the Gulf of Mexico are red snapper, vermilion snapper, red grouper, and gag grouper (Scott-Denton et al. 2011). Gray triggerfish is the 8th to 10th most commonly landed species in the fishery, with discard rate estimates ranging from 7%–35% (Scott-Denton et al. 2011) (Scott-Denton & Williams 2013). The majority of studies estimating post- release survival of gray triggerfish indicate that mortality is low (< 5%) ((Ingram et al. 2001), (Patterson et al. 2002), (SEDAR 2006a) and (Addis 2009)).

Changes to regulations, such as the introduction of Individual Fishing Quotas (IFQs) in 2007, were implemented partly to reduce bycatch associated with "derby" fishing situations (NOAA 2011).

Regulatory requirements are in place to reduce mortality to any incidentally caught sawfish and sea turtles (NOAA 2011). All vessels in the reef fish fishery are required to use non-stainless steel circle hooks and have de-hooking tools aboard to minimize bycatch mortality (GMFMC 2015a). The effectiveness of circle hooks as a bycatch management tool remains uncertain and further study is required, but there is a suggestion of a 47% reduction in catchability of gray triggerfish with circle hooks (SEDAR 2015). One study concluded that there was no major difference in the size of individual gray triggerfish landed with J-hooks vs. circle hooks (Gray & Sauls 2015). Some studies have indicated that circle hooks have reduced bycatch and bycatch mortality of other species in the fishery, but other studies have been inconclusive ((Sauls & Ayala 2012) and (Garner et al. 2014)). Overall, bycatch management is considered "moderately effective."

UNITED STATES / WESTERN CENTRAL ATLANTIC, DIVER, UNITED STATES

Highly Effective

The diver fishery has very minimal bycatch, so a "highly effective" score is awarded.

UNITED STATES / WESTERN CENTRAL ATLANTIC, HANDLINES, UNITED STATES

Moderately Effective

The most frequently discarded species in the Southeast Atlantic snapper-grouper fishery include red snapper, red porgy, and vermilion snapper, which are commonly caught with gray triggerfish, along with scamp and Atlantic sharpnose shark ((ACCSP 2016) and (GSAFFI 2013)). Gray triggerfish is often the second or third most commonly kept species in the commercial fishery ((GSAFFI 2008) and (GSAFFI 2010)), and preliminary bycatch estimates from 2007 to 2011 indicated that fewer than 2% of gray triggerfish that are caught are discarded (GSAFFI 2013). The handline fishery is not expected to contribute to significant mortality of any threatened or endangered species; annual expected mortality of sea turtles is expected to be less than 30 individuals; and no mortality is expected for smalltooth sawfish (SAFMC 2014). All vessels in the fishery are required to use non-stainless steel circle hooks and have de-hooking tools aboard to minimize bycatch mortality (SAFMC 2015). The effectiveness of circle hooks as a bycatch management tool remains uncertain and further study is required, although evidence from the Gulf of Mexico suggests reduced catchability of gray triggerfish using circle hooks (SEDAR 2015a). Some studies have indicated that circle hooks have reduced bycatch and bycatch mortality of some co-landed species, but other studies have been inconclusive ((Wilson & Diaz 2012), (Sauls & Ayala 2012) and (Garner et al. 2014)). Overall, bycatch management is considered "moderately effective."

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 / GULF OF MEXICO, HANDLINES, UNITED STATES

Moderately Effective

Available data for gray triggerfish come from dealer reports (commercial catches), a small observer program, dockside interviews of fishers, and visual surveys ((Stebbins et al. 2009), (NMFS 2015) and (SEDAR 2015a)). Observer data for the Gulf of Mexico includes catch per unit effort (CPUE), species composition, sizes, and fate (Scott-Denton et al. 2011), but covers only 1% of commercial reef fish vessels in the Gulf of Mexico (Stebbins et al. 2009). Two preliminary stock status analyses were conducted for gray triggerfish in 2001, and both indicated that the stock was overfished and undergoing overfishing at the time. Regular assessments have since occurred, with the first benchmark assessment of stock status in 2006, an update assessment completed in 2011, and a new analysis completed in 2015 (SEDAR 2015a). In the most recent SEDAR assessment in 2015, new data were incorporated that included estimates of fecundity, age composition, and catch per unit effort (CPUE) (SEDAR 2015a). Red porgy and scamp have no formal assessments of abundance or fishing mortality, although most other species commonly caught with gray triggerfish have recently been assessed. Given the recent research and stock assessment of gray triggerfish but limited observer coverage and lack of assessments for two species, we have awarded a score of "moderately effective."

UNITED STATES / WESTERN CENTRAL ATLANTIC, DIVER, UNITED STATES
UNITED STATES / WESTERN CENTRAL ATLANTIC, HANDLINES, UNITED STATES

Moderately Effective

Available data for gray triggerfish come from commercial dealer reports, dockside interviews of fishers (Trip Interview Program, TIP), and visual surveys ((Stebbins et al. 2009), (NMFS 2015), (SEDAR 2016)). Gray triggerfish in the Southeast Atlantic was first assessed by the Southeast Data, Assessment, and Review (SEDAR) process in 2016, but no determinations could be made based on an inappropriate base model. Prior to this, a few independent assessments on stock status had been carried out with limited data (SEDAR 2016). The 2016 benchmark assessment was inconclusive, and the data workshop panel made recommendations for the need to understand gray triggerfish migrations, early life history, and potential delayed bycatch mortality, among other things (SEDAR 2016). Bycatch/discard data for this fishery come from a limited number of preliminary observer studies ((GSAFFI 2008), (GSAFFI 2010) and (GSAFFI 2013)), but no observer program currently exists (NMFS 2015). Some species that are commonly caught with gray triggerfish were assessed recently (2012–2015), such as gag, vermilion snapper, red porgy, and hogfish; but others were assessed more than 5 years ago (red snapper, red grouper, and greater amberjack).

The recent assessment of some targeted species in the fishery but the lack of a definitive assessment for gray triggerfish and an observer program result in a "moderately effective" rating.

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 / GULF OF MEXICO, HANDLINES, UNITED STATES

Highly Effective

Commercial annual catch limits (ACLs) in the Gulf of Mexico are monitored through paper logbooks, electronic reporting by dealers, vessel monitoring systems (VMS), and observers. Additionally, a pilot study is underway to assess the feasibility of the use of electronic logbooks for reef fish bycatch (NMFS 2015). Small but measurable improvements in compliance have been noted after the introduction of individual fishing quotas (IFQs) for some species in the fishery (such as red snapper) (Porter et al. 2012). Catches have consistently remained below ACLs for the majority of the species in the fishery in recent years (NOAA SERO 2016b). Enforcement is therefore rated as ""highly effective."

UNITED STATES / WESTERN CENTRAL ATLANTIC, DIVER, UNITED STATES
UNITED STATES / WESTERN CENTRAL ATLANTIC, HANDLINES, UNITED STATES

Moderately Effective

Commercial annual catch limits (ACL) in the Southeast Atlantic are monitored through paper logbooks and electronic reporting (NMFS 2015), but no vessel monitoring system (VMS) or observer program currently exist (SAFMC 2014). ACLs for some species (e.g., gag grouper, vermilion snapper, and red snapper) were exceeded in the past; however, in the most recent years, ACLs for most species in the fishery have not been met or exceeded. An improved dealer reporting amendment was implemented in 2014 (SAFMC 2014) and a pilot study is underway to assess the feasibility of the use of electronic logbooks (NMFS 2015). Enforcement is rated as "moderately effective."

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 / GULF OF MEXICO, HANDLINES, UNITED STATES

Highly Effective

The Gulf of Mexico Fishery Management Council posts draft regulation notices for public viewing, has public comment periods for all proposed regulations, and holds regular public meetings. Stakeholder inclusion is therefore rated as "highly effective."

UNITED STATES / WESTERN CENTRAL ATLANTIC, DIVER, UNITED STATES
UNITED STATES / WESTERN CENTRAL ATLANTIC, HANDLINES, UNITED STATES

Highly Effective

The South Atlantic Fishery Management Council posts draft regulation notices for public viewing, has public comment periods for all proposed regulations, and holds regular public meetings. Stakeholder inclusion is therefore rated as "highly effective."

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*

Rating cannot be Critical for Criterion 4.

Criterion 4 Summary

Region / Method	Gear Type and Substrate	Mitigation of Gear Impacts	EBFM	Score
United States / Gulf of Mexico / Handlines / United States	4	0	Moderate Concern	Green (3.46)
United States / Western Central Atlantic / Diver / United States	4	0	Moderate Concern	Green (3.46)
United States / Western Central Atlantic / Handlines / United States	4	0	Moderate Concern	Green (3.46)

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 / GULF OF MEXICO, HANDLINES, UNITED STATES
UNITED STATES / WESTERN CENTRAL ATLANTIC, HANDLINES, UNITED STATES

4

Handlines used for reef-associated species are in limited contact with the substrate. For this reason, the impact on the habitat is deemed a "very low" concern.

UNITED STATES / WESTERN CENTRAL ATLANTIC, DIVER, UNITED STATES

4

Diver-based fishing (spearfishing) may result in some incidental contact with the reef, but has little expected or observable impacts on benthic coral habitat (Frisch et al. 2012). Diver-based fishing on coral reefs is therefore considered a "very low" concern.

Factor 4.2 - Modifying Factor: Mitigation of Gear Impacts

UNITED STATES / GULF OF MEXICO, HANDLINES, UNITED STATES

0

Circle hooks are required for use by all reef fish fishery vessels in both the reef fish and snapper grouper fisheries ((Sauls & Ayala 2012), (GMFMC 2015a) and (SAFMC 2015)) and are expected to be less likely to snag the substrate (Cooke & Suski, 2004), although limited data exist to substantiate this point. A small portion of Gulf of Mexico waters (0.5%) are designated no-take marine protected areas (MPA) where fishing activity is prohibited (OOCRM 2011). Because very little habitat is protected from fishing, no additional points are awarded for gear mitigation.

UNITED STATES / WESTERN CENTRAL ATLANTIC, DIVER, UNITED STATES

0

Diver-based fishing (spearfishing) may result in some incidental contact with the reef, but has little expected or observable impacts on benthic coral habitat (Frisch et al. 2012). Thus, mitigation is not applicable for this fishery.

UNITED STATES / WESTERN CENTRAL ATLANTIC, HANDLINES, UNITED STATES

0

Circle hooks are required for use by all reef fish fishery vessels in both the reef fish and snapper grouper fisheries ((Sauls & Ayala 2012), (GMFMC 2015b) and (SAFMC 2015)) and are expected to be less likely to snag the substrate (Cooke & Suski, 2004), although limited data exists to substantiate this point. There are eight marine protected areas (MPA) in the Southeast Atlantic where fishing activity is prohibited; some of these MPAs protect triggerfish spawning habitat (SAFMC 2007). Contact between handline gear and the environment is minimal, and the gear type is suggested to minimize impact; however, less than 20% of gray triggerfish habitat is protected from fishing. Due to these factors, no additional points are awarded for gear mitigation.

Factor 4.3 - Ecosystem-Based Fisheries Management

UNITED STATES / GULF OF MEXICO, HANDLINES, UNITED STATES

Moderate Concern

The Gulf of Mexico Fishery Management Council (GMFMC) is in the planning phase of ecosystem-based management (EBM) development. The council has designated an Ecosystem-Based Fishery Management Working Group to develop objectives related to EBM implementation (ESMWG 2014). Additionally, NOAA commissioned a study to act as a framework from which ecosystem-based management of the Gulf of Mexico

will be built (Karnauskas et al. 2013).

There is no indication that the removal of gray triggerfish or most other species caught in the fishery would result in detrimental food web impacts. But red grouper may serve as a habitat modifier, potentially increasing biodiversity and abundance of economically and ecologically important species, such as spiny lobster, sponges, and corals (Coleman et al. 2010). Because the GMFMC has not yet implemented policies to account for species' ecological roles but large negative impacts to the ecosystem are unlikely, this results in a score of "moderate" concern.

UNITED STATES / WESTERN CENTRAL ATLANTIC, DIVER, UNITED STATES
UNITED STATES / WESTERN CENTRAL ATLANTIC, HANDLINES, UNITED STATES

Moderate Concern

The South Atlantic Fishery Management Council is working toward adopting an ecosystem-based approach to management through a Fishery Ecosystem Plan. The plan addresses five key areas needed to implement this ecosystem approach: 1) an overview of the South Atlantic system; 2) species, habitats, and essential fish habitat; 3) information on coastal fishing communities; 4) threats to the system and recommendations; and 5) research and data needs (SAFMC 2009). The most recent adoption the Comprehensive Ecosystem-Based Amendment 2 implements some goals of ecosystem-based management, including providing special management zones for snapper-grouper species in South Carolina and requiring the review of potential essential fish habitat closures in the future (NOAA 2011).

There is no indication that the removal of gray triggerfish or most other species caught in this fishery would result in detrimental food web impacts. But red grouper may serve as a habitat modifier, potentially increasing biodiversity and abundance of economically and ecologically important species, such as spiny lobster, sponges, and corals (Coleman et al. 2010). The South Atlantic Fishery Management Council has implemented few policies to account for species' ecological roles, but they did create eight deepwater marine protected areas in the South Atlantic (SAFMC 2009), which may confer some benefit to species such as gray triggerfish and red grouper. This results in a score of "moderate" concern.

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Scientific review does not constitute an endorsement of The Safina Center or Seafood Watch® program, or its seafood recommendations, on the part of the reviewing scientists. The Safina Center and Seafood Watch® are solely responsible for the conclusions reached in this report.

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References

Atlantic Coastal Cooperative Statistics Program (ACCSP). 2016. Query for most common species landed with gray triggerfish. Provided on February 17, 2015 by Joseph Myers. Available at: http://www.accsp.org/index.htm

Addis, D.T. 2009. Site fidelity and movement of reef fishes tagged at unreported artificial reef sites off northwest Florida. Master of Science thesis. The University of West Florida. 82 pp.

Addis, D.T., Patterson, W.F. III, & Dance, M.A. 2016. The potential for unreported artificial reefs to serve as refuges from fishing mortality of reef fishes. North American Journal of Fisheries Management, 36(1):131-139.

Antoni, L. Emerick, N. & Saillant, E. 2011. Genetic variation of gray triggerfish in U.S. waters of the Gulf of Mexico and Western Atlantic Ocean as inferred from mitochondrial DNA sequences. North American Journal of Fisheries Management. 31(4):714-721.

Bertoncini, A.A., Choat, J.H., Craig, M.T., Ferreira, B.P. & Rocha, L. 2008. Mycteroperca microlepis. The IUCN Red List of Threatened Species 2008: e.T14050A4386366. http://dx.doi.org/10.2305/IUCN.UK.2008.RLTS.T14050A4386366.en.

Broome, M., Claar, D., Hamman, E., Matthews, T., Salazar, M., Shugart-Schmidt, K., Tillman, A., Vincent, M., & Berson, J. 2011. Exploratory assessment of four stocks in the U.S. South Atlantic: Bank sea bass (Centropristis ocyurus), gray triggerfish (Balistes capriscus), sand perch (Deplectrum formosum), and tomtate (Haemulon aurolineatum). NOAA Technical Memorandum NMFS-SEFSC- 617, June 2011.

Brule, T., Deniel, C., Colas-Marrufo, T., & Renan, X. 2003. Reproductive biology of gag in the southern Gulf of Mexico. Journal of Fish Biology, 63:1505-1520.

Burton, M.L., Potts, J.C., Carr, D.R., Cooper, M. & Lewis, J. 2015. Age, growth, and mortality of gray triggerfish (Balistes capriscus) from the southeastern United States. Fishery Bulletin, 113:27–39.

Choat, J.H., Pollard, D. & Sadovy, Y.J. 2010. Lachnolaimus maximus. The IUCN Red List of Threatened Species 2010: e.T11130A3252395. http://dx.doi.org/10.2305/IUCN.UK.2010- 4.RLTS.T11130A3252395.en.

Coleman, F.C., Koenig, C.C., Scanlon, K.M., Heppell, S., Heppell, S., and Miller, M.W. 2010. Benthic habitat modification through excavation by red grouper, Epinephelus morio, in the northeastern Gulf of Mexico. The Open Fish Science Journal, 3:1-15.

Collins, L.A., Johnson, A.G., Koenig, C.C., & Baker Jr., M.S. 1998. Reproductive patterns, sex ratio, and fecundity in gag, Mycteroperca microlepis (Serranidae), a protogynous grouper from the northeastern Gulf of Mexico. Fishery Bulletin, 96(3); 415-427.

Cooke, S.J. & Suski, C.D. 2004. Are circle hooks an effective tool for conserving marine and freshwater recreational catch-and-release fisheries? Aquatic Conservation: Marine and Freshwater Ecosystems, 14:299-326.

Cowan, J., Zapp-Sluis, M., Carpenter, K.E., Sedberry, G. & Claro, R. 2015. Mycteroperca microlepis. The IUCN Red List of Threatened Species 2015: e.T14050A70329138.

ESMWG (Ecosystem Science and Management Working Group). 2014. Exploration of ecosytem based fishery management in the United States. Revised Draft Report to the NOAA Science Advisory Board, June 23, 2014. Available at: http://www.sab.noaa.gov/Meetings/2014/june/june_23_2014.html

FAO. 2016. Fisheries and aquaculture software. FishStatJ - software for fishery statistical time series. In: FAO Fisheries and Aquaculture Department [online]. Rome. Updated 23 June 2015. Accessed April 15, 2016.

Federal Register. 2015a. Fisheries of the Caribbean, Gulf of Mexico, and South Atlantic; Snapper- Grouper Fishery Off the Southern Atlantic States; Regulatory Amendment 22, [Docket No. 150305220–5469–01]. 80 (107):31880-31884. Available at: https://www.federalregister.gov/articles/2015/06/04/2015-13592/fisheries-of-the-caribbean-gulf- of-mexico-and-south-atlantic-snapper-grouper-fishery-off-the

Federal Register. 2015b. Fisheries of the Caribbean, Gulf of Mexico, and South Atlantic; Snapper- Grouper Fishery Off the Southern Atlantic States; Regulatory Amendment 29. [Docket No. 141107936–5399–02] RIN 0648–BE55 80 (104):30947-30954.

FFWCC. 2013. Florida Fish and Wildlife Conservation Commission. Commercial Saltwater Regulations. Available at myfwc.com

FishWatch 2016. Seafood Profiles, FishWatch. NOAA. Available at: http://www.fishwatch.gov/seafood_profiles/index.htm

Fitzhugh, G.R., Lyon, H.M., & Barnett, B.K. 2015. Reproductive parameters of Gray Triggerfish (Balistes capriscus) from the Gulf of Mexico: sex ratio, maturity and spawning fraction. SEDAR43-WP-03. SEDAR, North Charleston, SC. 11 pp.

Frisch, A.J., Baker, J., Hobbs, J-P.A., Nankervis, L. 2008. A quantitative comparison of recreational spearfishing and linefishing on the Great Barrier Reef: implications for management of multi-sector coral reef fisheries. Coral Reefs, 27:85-95.

Frisch A.J., Cole A.J., Hobbs J.-P.A., Rizzari J.R., Munkres K.P. 2012. Effects of spearfishing on reef fish populations in a multi-use conservation area. PLoS ONE 7(12): e51938. doi:10.1371/journal.pone.0051938.

Froese, R. & Pauly, D. Editors. 2016. FishBase. World Wide Web electronic publication. www.fishbase.org, (accessed 04/2016)

Garcia-Moliner, G. & Eklund, A.-M. (Grouper & Wrasse Specialist Group). 2004. Epinephelus morio. The IUCN Red List of Threatened Species 2004: e.T44681A10923778. http://dx.doi.org/10.2305/IUCN.UK.2004.RLTS.T44681A10923778.en.

Garner, S.B., Patterson III, W.F., Porch, C.E. & Tarnecki, J.H. 2014. Experimental assessment of circle hook performance and selectivity in the northern Gulf of Mexico recreational reef fish fishery. Marine and Coastal Fisheries: Dynamics, Management, and Ecosystem Science, 6(1):235-246.

GMFMC. 2015. Gulf of Mexico Fishery Management Council Scientific and Statistical Committee stock assessment review summary: SEDAR 43-Gulf gray triggerfish.

GMFMC. 2015a. Commercial fishing regulations for Gulf of Mexico federal waters - For species managed by the Gulf of Mexico Fishery Management Council. January 1, 2015.

GMFMC. 2015b. Reef Fish Management Committee, Gulf of Mexico Fishery Management Council. Meeting minutes. May 22, 2015.

GMFMC. 2016. Gulf of Mexico Fishery Management Council, request for data for all species caught with gray

triggerfish from 2003-2014. Data provided on February 17, 2016 by D. Bellais.

Gray, A.M. & Sauls, B. 2015. Hook Selectivity in Gulf of Mexico Gray Triggerfish when using circle or 'J' Hooks. SEDAR43-WP-09. SEDAR, North Charleston, SC. 6 pp.

GSAFFI. 2008. Catch characterization and discards within the snapper grouper vertical hook-and-line fishery of the south Atlantic United States. Final Report to NOAA, October 2008.

GSAFFI. 2010. A continuation of catch characterization and discards within the snapper-grouper vertical hook-and-line fishery in the south Atlantic United States. Final report to NOAA/NMFS, September 2010.

GSAFFI. 2013. Continuation of catch characterization and discards within the snapper-grouper vertical hook-and-line fishery of the south Atlantic United States. April, 2013.

Harris, P.J., & Collins, M.R. 2000. Age, growth and age at maturity of gag, Mycteroperca microlepis, from the southeastern United States during 1994-1995. Bulletin of Marine Science, 66(1):105-117.

Harris, P.J., Wyanski, D.M., White, D.B., & Moore, J.L. 2002. Age, growth, and reproduction of scamp, Mycteroperca phenax, in the southwestern North Atlantic, 197901997. Bulletin of Marine science, 70(1):113-132.

Hood, P.B. & Johnson A.K. 2000. Age, growth, mortality, and reproduction of red porgy, Pagrus pagrus, from the eastern Gulf of Mexico. Fishery Bulletin, 98:723-735.

Ingram, W.G. Jr. 2001. Stock structure of gray triggerfish, Balistes capriscus, on multiple spatial scales in the Gulf or Mexico. Ph.D. dissertation, University of South Alabama.

Jing, L., Zapfe, G., Shao, K.-T., Leis, J.L., Matsuura, K., Hardy, G., Liu, M. & Tyler, J. 2015. Balistes capriscus. The IUCN Red List of Threatened Species 2015: e.T193736A2269087. http://dx.doi.org/10.2305/IUCN.UK.2015-4.RLTS.T193736A2269087.en.

Johnson, A.G. & Saloman, C.H. 1984. Age, growth, and mortality of gray triggerfish, Balistes capriscus, from the northeastern Gulf of Mexico. Fishery Bulletin, 82(3):485-492.

Karnauskas, M., Schirripa, M.J., Kelble, C.R., Cook, G.S., & Craig, J.K. 2013. Ecosystem status report for the Gulf of Mexico. NOAA Technical Memorandum NMFS-SEFSC-653.

Kelleher K. 2005. Discards in the world's marine fisheries. An update. FAO Fisheries Technical Paper. No. 470. Rome, FAO. 131 pp.

Kelly, A.M. 2014. Age, growth, and reproduction of gray triggerfish, Balistes capriscus, off the southeastern U.S. Atlantic coast. Master of Science thesis. The College of Charleston. 62 pp.

Lang, E.T. & Fitzhugh G.R. 2015. Oogenesis and fecundity type of gray triggerfish in the Gulf of Mexico. Marine and Coastal Fisheries, 7(1):338-348.

Lombardi, L. R. Allman, and A. Pacicco. 2015. Description of age data and estimated growth for Gray Triggerfish from the northern Gulf of Mexico: 2003-2013. SEDAR43-WP-10. SEDAR, North Charleston, SC. 34 pp.

Matsuura, K. 2002. Balistidae. In: K.E. Carpenter (ed.), Living Marine Resources of the Western Central Atlantic, Food and Agriculture Organization, Rome.

Monk, M.H., Powers, J.E., & Brooks, E.N. 2015. Spatial patterns in species assemblages associated with the northwestern Gulf of Mexico shrimp trawl fishery. Marine Ecology Progress Series, 519:1-12.

NMFS. 2016a. Commercial Fisheries Statistics. National Marine Fisheries Service. Available at: http://www.st.nmfs.noaa.gov/commercial-fisheries/index

NMFS. 2015. Electronic Monitoring and Reporting Regional Implementation plan, National Marine Fisheries Service, Southeast Region. February 26, 2015.

NMFS 2016b. Recreational Fisheries Statistics. NOAA Office of Science and Technology. Available at: http://www.st.nmfs.noaa.gov/st1/recreational/queries/

NOAA 2011. U.S. National Bycatch Report. NOAA Technical Memorandum NMFS-F/SPO-117C. First edition, Sept 16, 2011.

NOAA. 2016a. Commercial fisheries statistics, US foreign trade. NOAA Office of Science and Technology. Available at: http://www.st.nmfs.noaa.gov/commercial-fisheries/foreign-trade/

NOAA. 2016b. Species Information System Public Portal, NOAA Fisheries. Available at: https://www.st.nmfs.noaa.gov/sisPortal/sisPortalMain.jsp

NOAA 2016c. Status of fisheries: Stock status updates, June 2016 (1st quarter) update. NOAA Fisheries. Available at: http://www.nmfs.noaa.gov/sfa/fisheries_eco/status_of_fisheries/status_updates.html

NOAA SERO. 2016a. NOAA Southeast Regional Office, Annual catch limit monitoring. Available at: http://sero.nmfs.noaa.gov/sustainable_fisheries/acl_monitoring/

NOAA SERO. 2016b. NOAA Southeast Regional Office, Historical Gulf of Mexico Reef Fish Commercial Landings. Available at: http://sero.nmfs.noaa.gov/sustainable_fisheries/acl_monitoring/commercial_gulf/reef_fish_historical/index.html

NOAA SERO. 2016c. NOAA Southeast Regional Office, Historical South Atlantic Commercial Landings. Available at: http://sero.nmfs.noaa.gov/sustainable_fisheries/acl_monitoring/commercial_sa/historical/index.html

NOAA SERO 2015. 2015 South Atlantic Red Snapper Fishing Season. Southeast Regional Office, NOAA Fisheries. Available at: http://sero.nmfs.noaa.gov/sustainable_fisheries/s_atl/sg/2015/red_snapper/index.html

OOCRM (Office of Ocean and Coastal Resource Management). 2011. Snapshot of Gulf of Mexico MPAs. May 2011.

Patterson III, W.F., Ingram Jr., G.W., Shipp, R.L., & Cowan Jr., J.H. 2002. Indirect estimation of red snapper (Lutjanus campechanus) and gray triggerfish (Balistes capriscus) release mortality. 53rd Gulf and Caribbean Fisheries Institute, 53:526-536.

Personal communication. 2016. Erik Williams, NOAA Fisheries, Chief, Sustainable Fisheries Branch, SEFSC, Beaufort Lab.

Personal communication. 2016. Jeff Isely, Fisheries Scientist, NOAA SEFSC, Miami, FL.

Personal communication. 2016. Joseph Myers, data manager. The Atlantic Coastal Cooperative Statistics Program, Arlington, VA.

Porter R.D., Jylkka Z., and Swanson G. 2012. Enforcement and compliance trends under IFQ management in the Gulf of Mexico commercial reef fish fishery. Marine Policy 38:45-53.

Potts, J.C. & Brennan, K. 2001. Trends in catch data and estimated static SPR values for fifteen species of reef fish landed along the southeastern United States. Prepared for the SAFMC, February, 2001.

Robins, C.R. & Ray, G.C. 1986. A field guide to Atlantic coast fishes of North America. Houghton Mifflin Company, Boston, U.S.A. 354 p.

Rocha, L., McGovern, J.C., Craig, M.T., Choat, J.H., Ferreira, B., Bertoncini, A.A. & Craig, M. 2008. Mycteroperca phenax. The IUCN Red List of Threatened Species 2008: e.T132729A3434736. http://dx.doi.org/10.2305/IUCN.UK.2008.RLTS.T132729A3434736.en.

Rudershausen, P.J., Williams, E.H., Buckel, J.A., Potts, J.C. & Manooch III, C.S. 2008. Comparison of reef fish catch per unit effort and total mortality between the 1970s and 2005-2006 in Onslow Bay, North Carolina. Transactions of the American Fisheries Society, 137(5):1389-1405.

Russell, B., Pollard, D., Carpenter, K.E. & Vega-Cendejas, M. 2014. Pagrus pagrus. The IUCN Red List of Threatened Species 2014: e.T15873A788483. http://dx.doi.org/10.2305/IUCN.UK.2014-3.RLTS.T15873A788483.en.

SAFMC. 2009. Regulations for deepwater marine protected areas in the south Atlantic.

SAFMC 2011. Amendment 24 to the Fishery Management Plan for the Snapper-Grouper Fishery of the South Atlantic Region with Environmental Assessment, Initial Regulatory Flexibility Act Analysis, Regulatory Impact Review, and Social Impact Assessment/Fishery Impact Statement. Available at: http://safmc.net/Library/pdf/SGAmend24.pdf

SAFMC. 2013. Update to Re-define Minimum Stock Size Threshold (MSST) in Amendment 24. Available at: http://www.safmc.net/sites/default/files/meetings/pdf/SSC/SSC-102013/A10_Council%20ConclusionMSSTAm24.pdf

SAFMC. 2014. Amendment 29 to the fishery management plan for the snapper grouper fishery of the south Atlantic region. October 14, 2014. 206 pp.

SAFMC 2015. South Atlantic snapper grouper complex commercial regulations. Updated January 7, 2015. South Atlantic Fisheries Management Council.

SAFMC. 2007. Snapper grouper amendment 14: Including a final environmental impact statement, biological assessment, initial regulatory flexibility analysis, regulatory impact review, and social impact assessment/fishery impact statement. July, 2007.

Saul, S. 2006. Estimated gray triggerfish (Balistes capriscus) commercial landings and price information for the Gulf of Mexico fishery. Preliminary draft, SEDAR 9-DW-13.

Sauls B. and Ayala O. 2012. Circle hook requirements in the Gulf of Mexico: Application in recreational fisheries and effectiveness for conservation of reef fishes. Bulletin of Marine Science, 88(3):667-679.

Scott-Denton, E. and Williams. Jo A. 2013. Observer coverage of the 2010-2011 Gulf of Mexico reef fish fishery. National Marine Fisheries Service. May, 2013.

Scott-Denton E., Cryer P.F., Gocke J.P., Harrelson M.R., Kinsella D.L., Pulver J.R., Smith R.C., Williams J.A. 2011. Descriptions of the U.S. Gulf of Mexico reef fish bottom longline and vertical line fisheries based on observer data. Marine Fisheries Review, 73: 1-26.

SEDAR. 2002. Red porgy fecundity data. Data workshop paper. SEDAR1-DW3. Available at: http://sedarweb.org/sedar-1-data-workshop

SEDAR. 2006. Southeast Data, Assessment, and Review, Stock Assessment Report 1 of SEDAR 9: Gulf of Mexico Gray Triggerfish. 2006. 195 pp.

SEDAR 2008. Stock Assessment Report, South Atlantic Greater Amberjack. Southeast Data, Assessment, and Review 15, South Atlantic Fishery Management Council, NOAA Fisheries. Available at: http://sedarweb.org/sedar-15-stock-assessment-report-south-atlantic-greater-amberjack

SEDAR 2009. Stock Assessment of Red Grouper in the Gulf of Mexico, Southeast Data, Assessment, and Review 12 Update Assessment. Southeast Fisheries Science Center, NOAA Fisheries. Available at: http://sedarweb.org/2009-update-sedar-12-gulf-mexico-red-grouper

SEDAR 2010a. Southeast Data, Assessment, and Review 19, Stock Assessment Report for South Atlantic Red Grouper. Southeast Fisheries Science Center, NOAA Fisheries. Available at: http://sedarweb.org/sedar-19-final-stock-assessment-report-south-atlantic-red-grouper

SEDAR. 2011a. Southeast Data, Assessment, and Review, SEDAR 9 update stock assessment report, Gulf of Mexico gray triggerfish. December, 2011. 270 pp.

SEDAR 2011b. Linton, B., Cass-Calay, S.L., Porch, C.E. An Alternative SSASPM Stock Assessment of Gulf of Mexico Vermilion Snapper that Incorporates the Recent Decline in Shrimp Effort. Southeast Data, Assessment, and Review 09 Update Assessment, Southeast Fishery Science Center, NOAA Fisheries. Available at: http://sedarweb.org/2011-update-sedar-09-gulf-mexico-vermilion-snapper

SEDAR. 2012a. Southeast Data, Assessment, and Review, SEDAR Update Assessment: Stock assessment of red porgy off the southeastern United States. November 5, 2012. 144 pp.

SEDAR 2012b. Stock Assessment of Vermilion Snapper off the Southeastern United States. SEDAR 17 Update Assessment. Southeast Fisheries Science Center, NOAA Fisheries. Available at: http://sedarweb.org/2012-update-sedar-17-south-atlantic-vermilion-snapper

SEDAR 2013. SEDAR 31 – Gulf of Mexico Red Snapper Stock Assessment Report. SEDAR, North Charleston SC. 1103 pp. Available at: http://sedarweb.org/sedar-31-stock-assessment-report-gulf- mexico-red-snapper

SEDAR 2014a. SEDAR 33 – Gulf of Mexico Gag Stock Assessment Report. SEDAR, North Charleston SC. 609 pp. Available at: http://sedarweb.org/sedar-33-stock-assessment-report-gulf-mexico-gag- grouper

SEDAR 2014b. Stock Assessment of Gag off the Southeastern United States. Southeast Data, Assessment, and Review 10 Update Assessment, Southeast Fisheries Science Center, NOAA Fisheries. Available at: http://sedarweb.org/2014-update-sedar-10-south-atlantic-gag-grouper

SEDAR 2014c. Cooper, W., Collins, A., O'Hop, J., Addis, D. Southeast Data, Assessment, and Review 37, 2013 Stock Assessment Report for Hogfish in the South Atlantic and Gulf of Mexico. Fish and Wildlife Research Institute, Florida Fish and Wildlife Conservation Commission. Available at: http://sedarweb.org/sedar-37-final-stock-assessment-report-southeastern-us-hogfish

SEDAR. 2015a. Southeast Data, Assessment, and Review, Stock Assessment Report of SEDAR 9: Gulf of Mexico gray triggerfish. Assessment Report 1. 193 pp.

SEDAR 2015b. Gulf of Mexico Red Grouper Assessment Process Report. Southeast Data, Assessment, and Review 42 (draft). Southeast Fisheries Science Center, NOAA Fisheries. Available at: http://sedarweb.org/sedar-42-assessment-report

SEDAR 2015c. Cass-Calay S.L., Porch C.E., Goethel D.R., Smith M.W., Matter V., McCarthy K.J. Stock Assessment of Red Snapper in the Gulf of Mexico 1872 - 2013 - with Provisional 2014 Landings. Southeast Data, Assessment, and Review 31 Update Report, NOAA Fisheries. Available at: http://sedarweb.org/2014-update-sedar-31-gulf-mexico-red-snapper

SEDAR. 2016a. Southeast Data, Assessment, and Review, Stock Assessment Report of SEDAR 43: South Atlantic gray triggerfish. April 2016. 428 pp.

SEDAR. 2016b. Southeast Data, Assessment, and Review, Stock Assessment Report of SEDAR 41: South Atlantic red snapper. April 2016. 660 pp.

SEDAR 2016c. Southeast Data, Assessment, and Review, Stock Assessment Report of SEDAR 45: Gulf of Mexico vermilion snapper. April 2016. 188 pp.

Shertzer, K.W. & Williams, E.H. 2008. Fish assemblages and indicator species: reef fishes off the southeastern United States. Fishery Bulletin, 106:257-269.

Simmons C.M. & Szedlmayer, S.T. 2011. Recruitment of age-0 gray triggerfish to benthic structured habitat in the northern Gulf of Mexico, Transactions of the American Fisheries Society, 140(1):14-20.

Simmons, C.M. & Szedlmayer, S.T. 2012. Territoriality, reproductive behavior, and parental care in gray triggerfish, Balistes capriscus, from the northern Gulf of Mexico. Bulletin of Marine Science, 88(2):197-209

Smith-Vaniz, W.F., Pina Amargos, F., Brown, J., Curtis, M. & Williams, J.T. 2015. Seriola dumerili. The IUCN Red List of Threatened Species 2015: e.T198643A16644002. http://dx.doi.org/10.2305/IUCN.UK.2015-4.RLTS.T198643A16644002.en.

Stebbins S., Trumble R.J., and Turris B. 2009. Monitoring the Gulf of Mexico commercial reef fish fishery: a review and discussion. Report by MRAG/PFMI and AMRL. April 2009.

Stephen, J.A. & Harris, P.J. 2010. Commercial catch composition with discard and immediate release mortality proportions off the southeastern coast of the United States. Fisheries Research, 103:18-24.

TIP (Trip Interviewer Program) Data. 2016. Query provided on all species caught with gray triggerfish, commercial. Data provided on February 4, 2016. NOAA Fisheries.

Vose, F.E. & Nelson, W.G. 1994. Gray triggerfish (Balistes capriscus Gmelin) feeding from artificial and natural substrate in shallow Atlantic waters of Florida. Bulletin of Marine Science, 55(2-3):1316- 1323.

Wilson J.A. & Diaz G.A. 2012. An overview of circle hook use and management measures in United States marine fisheries. Bulletin of Marine Science 88:771-788.

Appendix A: Extra By Catch Species

GREATER AMBERJACK

Factor 2.1 - Abundance

UNITED STATES / WESTERN CENTRAL ATLANTIC, DIVER, UNITED STATES

Low Concern

The International Union for the Conservation of Nature (IUCN) considers greater amberjack to be a species of "Least Concern" (Smith-Vaniz et al. 2015). Greater amberjack along the Southeast Atlantic Coast is managed by the South Atlantic Fishery Management Council under the Snapper-Grouper Fishery. The most recent stock assessment evaluated greater amberjack in the Southeast Atlantic as not overfished as of 2006, with the spawning stock biomass near the target level of biomass at maximum sustainable yield, and well above the limit reference point of minimum sustainable stock size (B/BMSY = 1.10, B/MSST = 1.46) (SEDAR 2008). Southeast Atlantic greater amberjack has not been assessed or further analyzed since 2008, so the last stock assessment (SEDAR 2008) continues to be the best available scientific information (pers. comm., Erik Williams, 2016). Due to the abundance of Southeast Atlantic greater amberjack in 2006 but the lack of a recent stock assessment, we have awarded "low" concern for abundance.

Factor 2.2 - Fishing Mortality

UNITED STATES / WESTERN CENTRAL ATLANTIC, DIVER, UNITED STATES

Low Concern

NOAA Fisheries lists greater amberjack along the Southeast Atlantic Coast as not subject to overfishing (NOAA 2016c). In the most recent stock assessment, fishing mortality was estimated to be 53% of the target level of fishing at maximum sustainable yield (F/FMSY = 0.53) (SEDAR 2008), and fishing mortality had consistently declined over the years 1999–2006. Greater amberjack is commonly targeted by commercial and recreational fishers using vertical lines, and by divers using spears. Landings for the Southeast Atlantic in 2014 were 615,986 lbs for the commercial fishery and 709,290 lbs for the recreational fishery, with the majority of landings from the east coast of Florida ((NMFS 2016a) and(NMFS 2016b)).

Commercial catches have remained around the established annual catch limits (ACL) (73%–105% between 2010 and 2016) (NOAA SERO 2016c). Due to the very low fishing mortality in 2006, and because catches have largely remained at or below the established ACLs, we have awarded "low" concern for fishing mortality.

Factor 2.3 - Discard Rate

UNITED STATES / WESTERN CENTRAL ATLANTIC, DIVER, UNITED STATES

< 100%

Discard mortality is low when diver-based methods are used (< 5%), with discards resulting from the unintended catch of undersized individual fish (Frisch et al. 2008).

RED PORGY

Factor 2.1 - Abundance

UNITED STATES / WESTERN CENTRAL ATLANTIC, HANDLINES, UNITED STATES

High Concern

The International Union for the Conservation of Nature (IUCN) considers red porgy to be a species of "Least Concern" globally (Russell et al. 2014). But a 2012 assessment of red porgy in the U.S. Southeast Atlantic determined that this population was overfished. The assessment estimated abundance at 61% of the threshold/limit abundance level, and at 47% of the target abundance level or the biomass at maximum sustainable yield (BMSY) (SEDAR 2012a). Red porgy is managed by the South Atlantic Fishery Management Council under the Snapper-Grouper Fishery, and is in year 16 of an 18-year rebuilding program (NOAA 2016c). There is a low probability (2%–18%) that the population will rebuild by the 2018 timeline (SEDAR 2012a). Due to this depleted status, red porgy abundance is a "high" concern.

UNITED STATES / GULF OF MEXICO, HANDLINES, UNITED STATES

Low Concern

The International Union for the Conservation of Nature (IUCN) considers red porgy to be a species of "Least Concern" (Russell et al. 2014). Red porgy in the Gulf of Mexico is not managed by the Gulf of Mexico Fishery Management Council under the Reef Fish Management Plan, and there are no formal stock assessments published for this species in the Gulf of Mexico. Based on the Productivity- Susceptibility Analysis (PSA), red porgy has a medium vulnerability (see details below) and abundance is therefore rated a "moderate" concern.

Justification:

The PSA score for red porgy = 2.73. For this reason, the species is deemed as having a "medium" vulnerability. Detailed scoring of each attribute is shown below.

Productivity Attribute	Relevant Information	Score (1 = low risk, 2 = medium risk, 3 = high risk)
Average age at maturity	Age 2 (Hood & Johnson 2000)	1
Average maximum age	17 years (Hood & Johnson 2000)	2
Fecundity	2,000,000 eggs/yr (SEDAR 2002)	1
Average maximum size	91 cm (Froese & Pauly 2016)	1
Average size at maturity (fish	23 cm (Hood & Johnson 2000)	1
Reproductive strategy	broadcast spawner	1
Trophic level	3.9 (Froese & Pauly 2016)	3
Density dependence	N/A	N/A

Susceptibility Attribute	Relevant Information	Score (1 = low risk, 2 = medium risk, 3 = high risk)
Areal overlap (Considers all fisheries)	Fished in nearly all of the species range (Russell et al. 2014)	3
Vertical overlap (Considers all fisheries)	Fished in nearly all of the vertical distribution by various fisheries (Russell et al. 2014)	3
Selectivity of fishery (Specific to fishery under assessment)	Targeted and important contribution to reef fish fishery (Russell et al. 2014) (SEDAR 2012a)	2
Post-capture mortality (Specific to fishery under assessment)	Red porgy is a retained species	3

Figure 5

Factor 2.2 - Fishing Mortality

UNITED STATES / WESTERN CENTRAL ATLANTIC, HANDLINES, UNITED STATES

Low Concern

Red porgy in the U.S. Southeast Atlantic is not experiencing overfishing. Fishing mortality over the years 2009–2011 was estimated to be 64% of the fishing mortality at maximum sustainable yield (FMSY) ((SEDAR 2012a) and (NOAA 2016c)). Red porgy is currently recovering from a depleted state, but rebuilding has slowed in recent years despite the low fishing mortality (SEDAR 2012a). Red porgy is commonly targeted by commercial fishers, headboats, and private recreational boats using vertical lines. Landings for the Southeast Atlantic in 2014 were 149,599 lbs by the commercial fishery and 35,269 lbs by the recreational fishery ((NMFS 2016a) and (NMFS 2016b)). Due to the current lack of overfishing, we awarded a "low" concern for fishing mortality.

UNITED STATES / GULF OF MEXICO, HANDLINES, UNITED STATES

Moderate Concern

In one study, 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 & 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 276,298 lbs by the commercial fishery and 426,494 lbs by the recreational fishery ((NMFS 2016a) and (NMFS 2016b)). Because of the lack of stock assessments or fishing mortality estimates, we awarded a "moderate" concern score for red porgy fishing mortality.

Factor 2.3 - Discard Rate

UNITED STATES / WESTERN CENTRAL ATLANTIC, HANDLINES, UNITED STATES

< 100%

Commercial discards in the snapper-grouper fishery in the U.S. Southeast Atlantic are moderate. The total discards/landings ratio for the fishery was 23.2% between 2007 and 2011 (GSAFFI 2013). A large proportion (36% to 98%, depending on the species) of the most commonly discarded species in the fishery (red snapper, scamp, red porgy, and vermilion snapper) is undersized discards (GSAFFI 2008). Discard/landings ratios of some commonly discarded species in a pilot observer program in the commercial fishery were: vermilion snapper, 17%; red snapper, 45%; and red grouper, 250% (GSAFFI 2010).

UNITED STATES / GULF OF MEXICO, HANDLINES, UNITED STATES

< 100%

The total discards/landings ratio for the U.S. Gulf of Mexico reef fish fishery was 33.8% between 2006 and 2009 (Scott-Denton et al. 2011) and nearly identical from data collected in 2010–2011 (33.3%) (Scott-Denton & Williams 2013). Discard to landings ratios for four of the most commonly discarded species that are frequently caught with gray triggerfish are: red snapper, 24%; vermilion snapper, 5%; red grouper, 41%; and gag grouper, 40% (Scott-Denton et al. 2011).

RED GROUPER

Factor 2.1 - Abundance

UNITED STATES / WESTERN CENTRAL ATLANTIC, HANDLINES, UNITED STATES

Low Concern

The International Union for the Conservation of Nature (IUCN) considers red grouper to be a "Near Threatened" species (Garcia-Moliner & Eklund 2004). Red grouper in the Southeast Atlantic is managed by the South Atlantic Fishery Management Council under the Snapper-Grouper Fishery. The last stock assessment for red grouper in the Southeast Atlantic estimated abundance as of 2008 to be at 79% of the biomass at maximum sustainable yield (B2008/BMSY = 0.79) and at 92% of the minimum stock size threshold (B/MSST = 0.92) (SEDAR 2010a). Because abundance was estimated to be below the limit reference point, the assessment concluded that red grouper in the South Atlantic was overfished. Since then, the way that MSST is calculated was revised; based on the new MSST value (75% of BMSY), red grouper is no longer classified as overfished (SAFMC 2013). But red grouper abundance remains below the target level and the species is in year 4 of a 10-year rebuilding plan ((NOAA 2016c) and (SAFMC 2011)).

Because red grouper is no longer considered overfished but abundance is below the target level, abundance is rated "low" concern.

UNITED STATES / GULF OF MEXICO, HANDLINES, UNITED STATES

Low Concern

The International Union for the Conservation of Nature (IUCN) considers red grouper to be a "Near Threatened" species (Garcia-Moliner & Eklund 2004). Red grouper in the Gulf of Mexico is managed by the Gulf of Mexico Fishery Management Council under the Reef Fish Management Plan. After a previous overfished status, the Gulf of Mexico red grouper stock was declared rebuilt in 2007 (FishWatch 2016). Formal stock assessments ((SEDAR 2009) and (SEDAR 2015b)) list this stock as not overfished, with abundance well above the target level of biomass at maximum sustainable yield and increasing from 2009 to 2013 (B/BMSY proxy = 1.28 in 2009; B/BMSY proxy = 1.83 in 2013). But the assessment review panel notes that there is some uncertainty around the abundance estimate, and there is debate regarding the appropriate reference points (SEDAR 2015b). Also, this species is vulnerable to toxic red tide events, which could reduce biomass ((FishWatch 2016) and (SEDAR 2009)). Based on the recovery from the previous overfished status combined with uncertainty in the recent stock assessment, abundance is rated as a "low" concern.

Factor 2.2 - Fishing Mortality

UNITED STATES / WESTERN CENTRAL ATLANTIC, HANDLINES, UNITED STATES

Low Concern

Red grouper in the U.S. Southeast Atlantic was experiencing overfishing in 2008, with fishing mortality well above the target level at maximum sustainable yield (F/FMSY = 1.46) (SEDAR 2010a). But the overfishing concerns were addressed with the establishment of a rebuilding plan and revised annual catch limits for red grouper in 2012. NOAA Fisheries currently lists red grouper in the Southeast Atlantic as not subject to overfishing (NOAA 2016c), although there is no recent assessment report to back up this classification. Red grouper is commonly targeted by commercial fishers using vertical lines and longlines, and by headboat and private recreational fishers using vertical lines. Landings for the Southeast Atlantic in 2014 were 71,576 lbs by the commercial fishery and 29,437 lbs by the recreational fishery ((NMFS 2016a) and (NMFS 2016b)). In a recent peer-reviewed report on grouper fisheries, Seafood Watch rated fishing mortality for this stock as "low"

concern because of the current lack of overfishing (Seafood Watch 2014).

UNITED STATES / GULF OF MEXICO, HANDLINES, UNITED STATES

Low Concern

Red grouper in the Gulf of Mexico is not experiencing overfishing ((SEDAR 2015b) and (NOAA 2016c)). Red grouper is commonly targeted by commercial fishers using vertical lines and longlines, and by headboat and private recreational fishers using vertical lines. Landings for the Gulf of Mexico in 2014 were 6,545,646 lbs by the commercial fishery and 426,494 lbs by the recreational fishery ((NMFS 2016a) and (NMFS 2016b)).

Fishing mortality was estimated to be below the fishing mortality at maximum sustainable yield in both recent stock assessments (F/FMSY = 0.778 in 2008; F/FMSY = 0.76 in 2013) ((SEDAR 2009) and (SEDAR 2015b)). Red grouper fishing mortality is a "low" concern.

Factor 2.3 - Discard Rate

UNITED STATES / WESTERN CENTRAL ATLANTIC, HANDLINES, UNITED STATES

< 100%

Commercial discards in the snapper-grouper fishery in the U.S. Southeast Atlantic are moderate. The total discards/landings ratio for the fishery was 23.2% between 2007 and 2011 (GSAFFI 2013). A large proportion (36% to 98%, depending on the species) of the most commonly discarded species in the fishery (red snapper, scamp, red porgy, and vermilion snapper) is undersized discards (GSAFFI 2008). Discard/landings ratios of some commonly discarded species in a pilot observer program in the commercial fishery were: vermilion snapper, 17%; red snapper, 45%; and red grouper, 250% (GSAFFI 2010).

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< 100%

The total discards/landings ratio for the U.S. Gulf of Mexico reef fish fishery was 33.8% between 2006 and 2009 (Scott-Denton et al. 2011) and nearly identical from data collected in 2010–2011 (33.3%) (Scott-Denton & Williams 2013). Discard to landings ratios for four of the most commonly discarded species that are frequently caught with gray triggerfish are: red snapper, 24%; vermilion snapper, 5%; red grouper, 41%; and gag grouper, 40% (Scott-Denton et al. 2011).

SCAMP

Factor 2.1 - Abundance

UNITED STATES / GULF OF MEXICO, HANDLINES, UNITED STATES

Moderate Concern

The International Union for the Conservation of Nature (IUCN) considers scamp to be a species of "Least Concern" (Rocha et al. 2008). Scamp in the Gulf of Mexico is managed by the Gulf of Mexico Fishery Management Council under the Shallow Water Grouper Complex. There is no formal stock assessment for this species. The stock status of Gulf of Mexico scamp is listed as unknown by NOAA Fisheries (NOAA 2016c). The Productivity-Susceptibility Analysis indicates that this species has a medium inherent vulnerability (see detailed scoring below). We have therefore ranked Gulf of Mexico scamp abundance as "moderate" concern.

Justification:

The PSA score for scamp = 2.89. For this reason, the species is deemed to have a “medium” vulnerability. Detailed scoring of each attribute is shown below.

Productivity Attribute	Relevant Information	Score (1 = low risk, 2 = medium risk, 3 = high risk)
Average age at maturity	Age 1.3 (Rocha et al. 2008)	1
Average maximum age	Age 30 (Harris et al. 2002) (Rocha et al. 2008)	3
Fecundity	6,000,000 (median) (Harris et al. 2002)	1
Average maximum size (fish only)	107 cm (Rocha et al. 2008)	2
Average size at maturity (fish only)	35 cm (Harris et al. 2002)	1
Reproductive strategy	broadcast spawner (Harris et al. 2002)	1
Trophic level	4.5 (Froese & Pauly 2016)	3
Density dependence (invertebrates only)	N/A	N/A

Susceptibility Attribute	Relevant Information	Score (1 = low risk, 2 = medium risk, 3 = high risk)
Areal overlap (Considers all fisheries)	Heavily fished throughout much of its range (Rocha et al. 2008)	3
Vertical overlap (Considers all fisheries)	Likely to be fished by multiple gears over its depth range (Rocha et al. 2008)	3
Selectivity of fishery (Specific to fishery under assessment)	Not main targeted species in the fishery (Rocha et al. 2008)	2
Post-capture mortality (Specific to fishery under assessment)	Scamp is a retained species	3

Figure 6

Factor 2.2 - Fishing Mortality

UNITED STATES / GULF OF MEXICO, HANDLINES, UNITED STATES

Moderate Concern

Fishing mortality for scamp (which is landed in the category of shallow-water groupers) in the Gulf of Mexico is listed as unknown (NOAA 2016c), and there is no formal stock assessment for this species. Scamp is commonly targeted by commercial fishers using vertical lines or longlines, and by headboats and private recreational fishers using vertical lines. Landings of scamp for the Gulf of Mexico were 191,736 lbs in the commercial fishery and 71,853 lbs in the recreational fishery in 2014 ((NMFS 2016a) and (NMFS 2016b)). Due to the lack of a stock assessment and unknown fishing mortality, we have rated the fishing mortality as a "moderate" concern.

Factor 2.3 - Discard Rate

UNITED STATES / GULF OF MEXICO, HANDLINES, UNITED STATES

< 100%

The total discards/landings ratio for the U.S. Gulf of Mexico reef fish fishery was 33.8% between 2006 and 2009 (Scott-Denton et al. 2011) and nearly identical from data collected in 2010–2011 (33.3%) (Scott-Denton & Williams 2013). Discard to landings ratios for four of the most commonly discarded species that are frequently caught with gray triggerfish are: red snapper, 24%; vermilion snapper, 5%; red grouper, 41%; and gag grouper, 40% (Scott-Denton et al. 2011).

Appendix B: Review Schedule

Upcoming or recently completed assessments for the Gulf of Mexico: Gag - March 2017
Red grouper - 2015
Red snapper - Summer 2018 Scamp - 2018
Vermilion snapper - March 2016

Upcoming or recently completed assessments for the Southeast Atlantic: Gag - 2014
Red grouper - February 2017