



Monterey Bay Aquarium Seafood Watch

Blue and Blueline tilefish

Lopholatilus chamaeleonticeps, Caulolatilus microps



© Duane Raver

U.S./Gulf of Mexico, Western Central Atlantic, Northwest Atlantic
Set longlines, Handlines and hand-operated pole-and-lines

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Seafood Watch Standard used in this assessment: Fisheries Standard v2

Disclaimer

Seafood Watch strives to have all Seafood Reports reviewed for accuracy and completeness by external scientists with expertise in ecology, fisheries science and aquaculture. Scientific review, however, does not constitute an endorsement of the Seafood Watch program or its recommendations on the part of the reviewing scientists. Seafood Watch is solely responsible for the conclusions reached in this report.

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About Seafood Watch

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

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

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

Guiding Principles

Seafood Watch defines sustainable seafood as originating from sources, whether fished¹ or farmed that can maintain or increase production in the long-term without jeopardizing the structure or function of affected ecosystems.

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

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

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

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

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

Best Choice/Green: Buy first; they're well managed and caught or farmed responsibly.

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

Avoid/Red: Take a pass on these for now; they're overfished, lack strong management or are caught or farmed 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 Seafood Watch report addresses blue/golden tilefish (*Lopholatilus chamaeleonticeps*) fished in the U.S. Mid-Atlantic, South Atlantic, and Gulf of Mexico and blueline tilefish (*Caulolatilus microps*) in the U.S. South Atlantic and Gulf of Mexico. Blue tilefish is referred to as "golden tilefish" throughout this report. Both species are commercially fished with bottom longlines in all areas while handlines are used for both species in the South Atlantic and for blueline tilefish in the Gulf of Mexico. Golden tilefish caught in the Mid-Atlantic and South Atlantic rank as "best choice" for all gears. The Gulf of Mexico golden tilefish fishery ranks as "good alternative" due to bycatch issues. All blueline tilefish fisheries rank as "good alternative" due to bycatch issues.

Both golden and blueline tilefish have medium inherent vulnerabilities based on their life history characters. The abundance of golden tilefish in the Atlantic is of low concern because the stock is not overfished; however, current fishing levels are fluctuating around recommended levels in the South Atlantic, which is of moderate concern. Abundance of Golden tilefish in the Gulf of Mexico is unknown, but fishing mortality is below sustainable levels. Blueline tilefish on the other hand lacks a stock assessment in Gulf of Mexico, but catches are below target levels, which results in a moderate concern for abundance and low concern for fishing mortality. The blueline tilefish stock assessment for the South Atlantic shows that the abundance is above target and limit reference points and the fishing mortality is below target levels, which results in a low concern score for both abundance and fishing mortality.

The main species for each fishery were determined based on the percent that each species represented of the total fishery's catch. The data to determine main species for the South Atlantic and the Gulf of Mexico are from small sets of observer data of the tilefish fisheries in these areas and include at risk species that are managed with the tilefish species or are endangered. Data for the Mid-Atlantic are from catch disposition from 2003-2012 from Maine through Virginia Dusky smoothhound, red snapper, snowy grouper, southern hake, and yellowedge grouper composed more than five percent of the total fishery catch for those fisheries they were included in. Loggerhead turtles are threatened on the ESA while speckled hind, and warsaw grouper are critically endangered according to the IUCN. Speckled hind and Warsaw grouper are not included in golden tilefish fisheries based on habitat differences, but are included in the Gulf of Mexico blueline tilefish fisheries based on distribution overlap. Warsaw grouper and speckled hind are not included in the South Atlantic blueline tilefish fishery based on low overlap of distribution; most of the blueline catch occurs north of Cape Hatteras, while Warsaw grouper and speckled hind primarily occur south of Cape Hatteras. Red grouper was greater than five percent of the total fishery catch in the Gulf of Mexico, however it is the main target of shallow water longlines while both golden and blueline tilefish are targets of deep water longlines and therefore not included in this report. The Seafood Watch report on grouper has a more extensive list of bycatch species because fishing occurs in both shallow and deep waters. Bottom longline and handline fisheries in the Mid-Atlantic, South Atlantic, and Gulf of Mexico are category 3 fisheries under the Marine Mammal Protection Act (MMPA) (remote likelihood of/no known interactions) according to the List of Fisheries compiled to determine the level of interactions between the fishery and marine mammals. In the Mid-Atlantic there are no major bycatch species so the longline fishery for golden tilefish receives a score of 5.0. In the South Atlantic golden tilefish fishery very little bycatch occurs, only southern hake, which has little biological information available about it. In the South Atlantic blueline tilefish fisheries the lowest scoring bycatch species is snowy grouper. The Gulf of Mexico handline and longline fishery for blueline tilefish have Warsaw grouper, snowy grouper, and speckled hind as the red-scoring species; loggerhead turtle is the lowest scoring species in the longline fishery. The golden tilefish Gulf of Mexico longline fishery has loggerhead turtle as the lowest scoring species based on its listing on the Endangered Species Act.

Golden tilefish fished in the Mid-Atlantic is excellently managed and have no significant bycatch. Golden and blueline tilefish fished in the Gulf of Mexico is well-managed with moderate bycatch species management. These scores are driven by the lack of stock assessment for blueline tilefish and the unknown and critically endangered status of some of the bycatch species. The management of both golden and blueline in the South Atlantic is well-managed, but the bycatch species are moderate. These scores are driven by the lack of monitoring of bycatch species.

Both handline and longline fisheries over soft sediments have low or very low impact on the substrate. Most fisheries have moderate mitigation of the impacts on the habitat based on depth and area restrictions. The Mid-Atlantic bottom longline and

the Gulf of Mexico handline fisheries only have minimal mitigation because the fishing is not actively being reduced. The ecosystem-based fishery management is of moderate concern for all the fisheries because both golden and blueline tilefish are exceptional species since they modify habitat and ecosystem-based fishery management plans are being developed or exist, but do not substantially protect the tilefish species.

Final Seafood Recommendations

SPECIES FISHERY	CRITERION 1 TARGET SPECIES	CRITERION 2 OTHER SPECIES	CRITERION 3 MANAGEMENT	CRITERION 4 HABITAT	OVERALL RECOMMENDATION
Blue tilefish Southern Atlantic Coast Stock Western Central Atlantic Handlines and hand-operated pole-and-lines United States SAFMC	3.053	3.318	3.464	4.243	Best Choice (3.493)
Blue tilefish Gulf of Mexico Stock Set longlines United States GMFMC	2.644	1.820	3.000	3.742	Good Alternative (2.711)
Blue tilefish Mid-Atlantic Coast Stock Northwest Atlantic Set longlines United States MAFMC	4.472	5.000	5.000	3.122	Best Choice (4.322)
Blue tilefish Southern Atlantic Coast Stock Western Central Atlantic Set longlines United States SAFMC	3.053	3.152	3.464	3.742	Best Choice (3.342)
Blueline tilefish Gulf of Mexico Stock Handlines and hand-operated pole-and-lines United States GMFMC	2.644	2.051	3.000	4.123	Good Alternative (2.862)
Blueline tilefish Southern Atlantic Coast Stock Western Central Atlantic Handlines and hand-operated pole-and-lines United States SAFMC	3.831	1.343	3.464	4.243	Good Alternative (2.949)
Blueline tilefish Gulf of Mexico Stock Set longlines United States GMFMC	2.644	1.820	3.000	3.742	Good Alternative (2.711)
Blueline tilefish Southern Atlantic Coast Stock Western Central Atlantic Set longlines United States SAFMC	3.831	1.343	3.464	3.742	Good Alternative (2.858)

Summary

Blue tilefish caught in the Mid-Atlantic and South Atlantic rank as "best choice" for all gears, while the Gulf of Mexico blue tilefish fishery ranks as "good alternative" due to bycatch issues. All blueline tilefish fisheries rank as "good alternative" due to bycatch issues.

Scoring Guide

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

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

Best Choice/Green = Final Score >3.2, and no Red Criteria, and no Critical scores

Good Alternative/Yellow = Final score >2.2-3.2, and neither Harvest Strategy (Factor 3.1) nor Bycatch Management Strategy (Factor 3.2) are Very High Concern², and no more than one Red Criterion, and no Critical scores

Avoid/Red = Final Score \leq 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 addresses blue/golden tilefish (*Lopholatilus chamaeleonticeps*) fished in the U.S. Mid-Atlantic, South Atlantic, and Gulf of Mexico and blueline tilefish (*Caulolatilus microps*) in the U.S. South Atlantic and Gulf of Mexico. Both species are commercially fished with bottom longlines in all areas while handlines are used for both species in the South Atlantic and for blueline tilefish in the Gulf of Mexico. We use “golden tilefish” throughout this report as a synonym for blue tilefish.

Species Overview

Golden tilefish (*Lopholatilus chamaeleonticeps*) are found in the western Atlantic from Nova Scotia, Canada through Florida, into the Gulf of Mexico and the northern coast of South America (Dooley 1978). Golden tilefish are a deepwater species most common in waters 9-14°C over steep slopes with clay, mud, and sand substrates at depths of 80 to 440 m (Dooley 1978) (Nitschke 2006). In the Mid-Atlantic females attain 110 cm total length (TL) and 46 years of age, while males attain 112 cm TL and 39 years of age (Nitschke 2006). Sexual maturity is attained between 5 and 7 years (Grimes et al. 1988). In both the South Atlantic and the Gulf of Mexico the oldest individual was 40 years old (SEDAR 2011a)(SEDAR 2011c). Age at sexual maturity was estimated at age 3 in the South Atlantic and age 2 in the Gulf of Mexico (SEDAR 2011a)(SEDAR 2011c).

Golden tilefish are managed by three agencies: the Mid-Atlantic Fishery Management Council (MAFMC) from the northern extent of the U.S. range to North Carolina, the South Atlantic Fishery Management Council (SAFMC) from North Carolina to the southern tip of Florida, and the Gulf of Mexico Fishery Management Council (GMFMC) from the southern tip of Florida to the western extent of the U.S. range in the Gulf of Mexico. In the Mid-Atlantic a Fishery Management Plan (FMP) was implemented for tilefish in 2001 where the catch never exceeded the annual catch limit (ACL) since implementation and management switched to an Individual Fishing Quota (IFQ) program starting in 2009 (MAFMC 2013). In the South Atlantic golden tilefish are managed with an ACL, which has been exceeded every year since 2006 (SERO 2014a), but has since fluctuated around sustainable levels {Sedar 2021}. Here, golden tilefish are included in the snapper grouper FMP which was implemented in 1983 (SEDAR 2011c). In the Gulf of Mexico a FMP was implemented in 1984 for reef fishes with a switch to an IFQ system for golden tilefish in 2010 (SEDAR 2011a)(GMFMC 2013d).

Blueline tilefish (*Caulolatilus microps*) are found from Virginia through the Gulf of Mexico and are frequently found in the same habitat as deepwater grouper and snapper (50-200 m)(Dooley 1978). Blueline tilefish attain 90 cm fork length and 43 years of age (SEDAR 2013c). Fifty percent maturity occurs at 3 years of age for females in the South Atlantic (SEDAR 2013c). Biology of blueline tilefish in the Gulf of Mexico is not well studied.

Blueline tilefish are managed by the SAFMC from North Carolina to the southern tip of Florida and the GMFMC from the southern tip of Florida to the western extent of the U.S. range in the Gulf of Mexico. In the South Atlantic blueline tilefish are managed in the deepwater complex with an ACL (SERO 2014a). The deepwater complex includes yellowedge grouper (*Epinephelus niveatus*), blueline tilefish, silk snapper (*Lutjanus vivanus*), misty grouper (*Epinephelus mystacinus*), queen snapper (*Etelis oculatus*), sand tilefish (*Malacanthus plumieri*), black snapper (*Lutjanus griseus*), and blackfin snapper (*Lutjanus buccanella*)(SERO 2014a). Blueline tilefish are included in the snapper grouper FMP which was implemented in 1983 (SEDAR 2011c). In the Gulf of Mexico, blueline tilefish were added to the reef fish FMP in 1990 (SEDAR 2011a). Blueline tilefish were recorded in commercial catch starting in 1992, prior to this they were combined with blue tilefish landings (SEDAR 2011a). In 2010 an IFQ system was implemented where blueline tilefish are managed only with other tilefish species (GMFMC 2013d).

Production Statistics

Mid-Atlantic fisheries land the most golden tilefish of any region, followed by the South Atlantic and the Gulf of Mexico.

Species	Area	2020 Landings	2019 Landings (lbs)	2018 Landings (lbs)	Reference

Golden Tilefish	Mid-Atlantic	1,383,811 lbs	1,523,243 lbs	1,565,615 lbs	(NOAA 2021b)
	South Atlantic	344,255 lbs gw	367,817 lbs gw	301,999 lbs gw	(NOAA 2021a)
Blueline Tilefish	South Atlantic	116,563 lbs ww	95,904 lbs ww	93,051 lbs ww	(NOAA 2021a)
Tilefish complex	Gulf of Mexico	384,844 lbs gw	422,926 lbs gw	386,138 lbs gw	(NOAA 2021a)

Landings in lbs for golden and blueline tilefish in the Mid-Atlantic, South Atlantic and Gulf of Mexico from 2018-2020. ww = whole weight, gw = gutted weight, lw = live weight. The GOM tilefish complex includes golden, goldface, blueline, anchor and blackline tilefish.

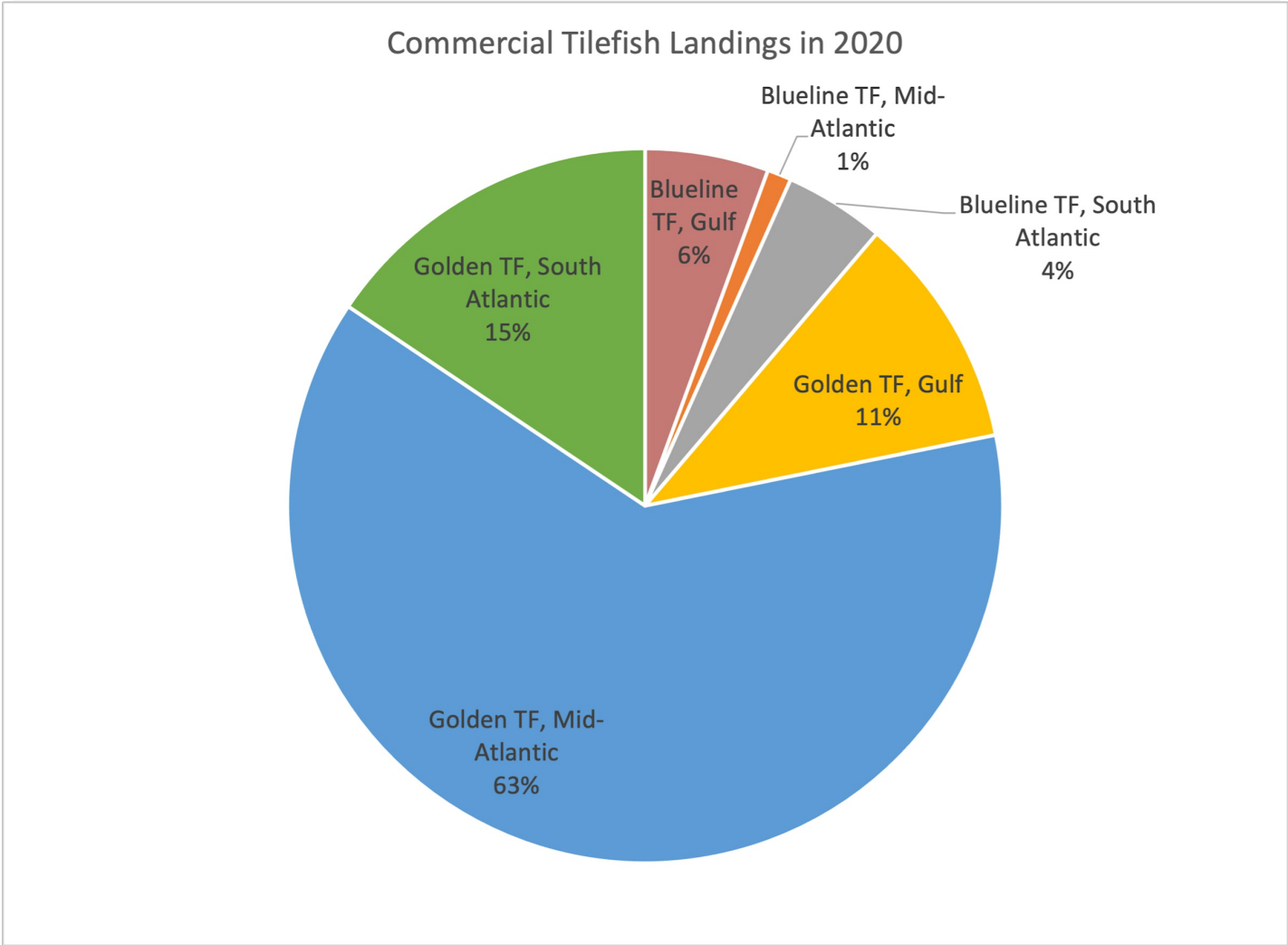


Figure 1: Commercial landings of golden and blueline tilefish in all U.S. waters in 2020. Total combined landings = ~2.21 million lbs

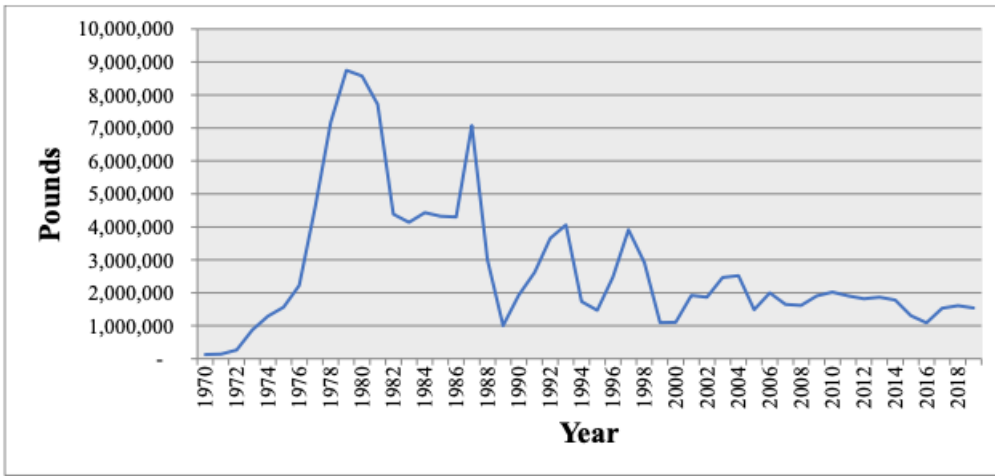


Figure 2: Commercial golden tilefish landings in the Mid-Atlantic (live weight) from Maine-Virginia, 1970- 2019 (calendar year). Source: 1970-1993 Tilefish FMP; 1994-2018 NMFS unpublished dealer data (MAFMC 2020)

Golden tilefish landings in the Mid-Atlantic have declined since the peaks of the late 1970s to the late 1980s. From 2015-2019, 97.3% of commercial landings of golden tilefish in the Mid-Atlantic were caught with longlines, 2% with bottom trawls, and <1% with remaining gears (MAFMC 2020).

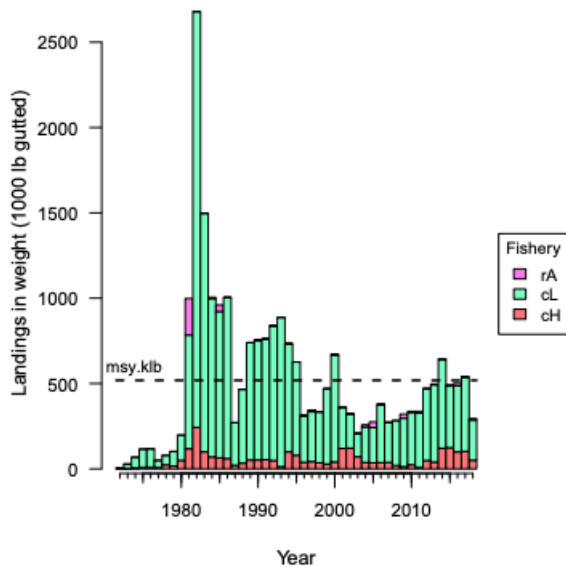


Figure 3: Commercial golden tilefish landings in the South Atlantic. Estimated landings in absolute weight by fleet from the catch-at-age model. rA = recreational landings, cL = commercial longline landings, and cH = commercial handline landings (SEDAR 2021).

Golden tilefish landings in the South Atlantic have fluctuated since the mid-1990s and recently dropped to below sustainable levels. The commercial longline fleet accounts for the majority of golden tilefish landings in the South Atlantic.

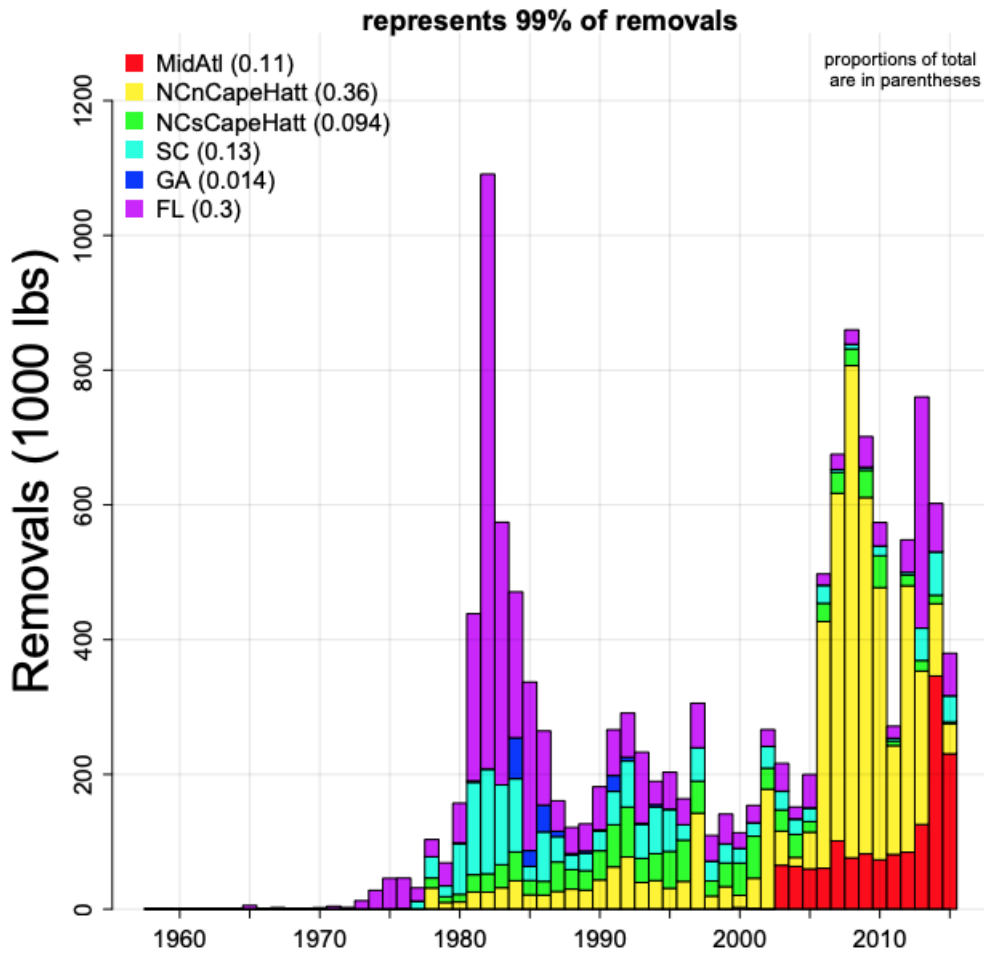


Figure 4: Total removals of blueline tilefish. Atlantic removals by aggregated area, from the GMFMC/SAFMC boundary (near Key West) north through the Mid-Atlantic. Removals include commercial and recreational landings and dead discards, which were provided at the data workshop in different spatial groupings, often finer than what is shown here. They are aggregated here into the smallest common areas that most (99%) of the removals could be aggregated into. The proportion of total removals for all years combined, from each area, is presented in the legend in parentheses next to the name of the area

Blueline tilefish removals (landings and discards) have generally declined in recent years. A larger proportion of removals has been from the Mid-Atlantic region in recent years. Over the entire time series, the commercial fishery has accounted for 72% of removals, but there has been a large increase in recreational landings since the mid-2000s (SEDAR 2017).

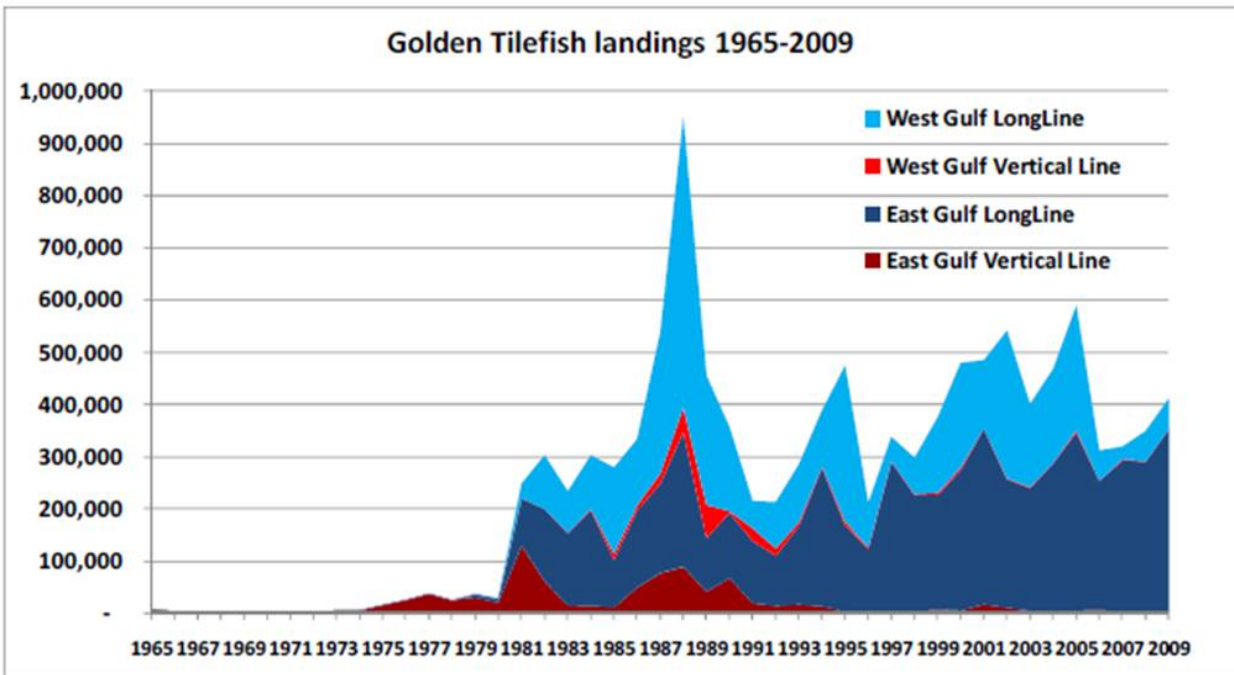


Figure 4. Golden tilefish landings in the Gulf of Mexico by gear and area from 1965-2009.

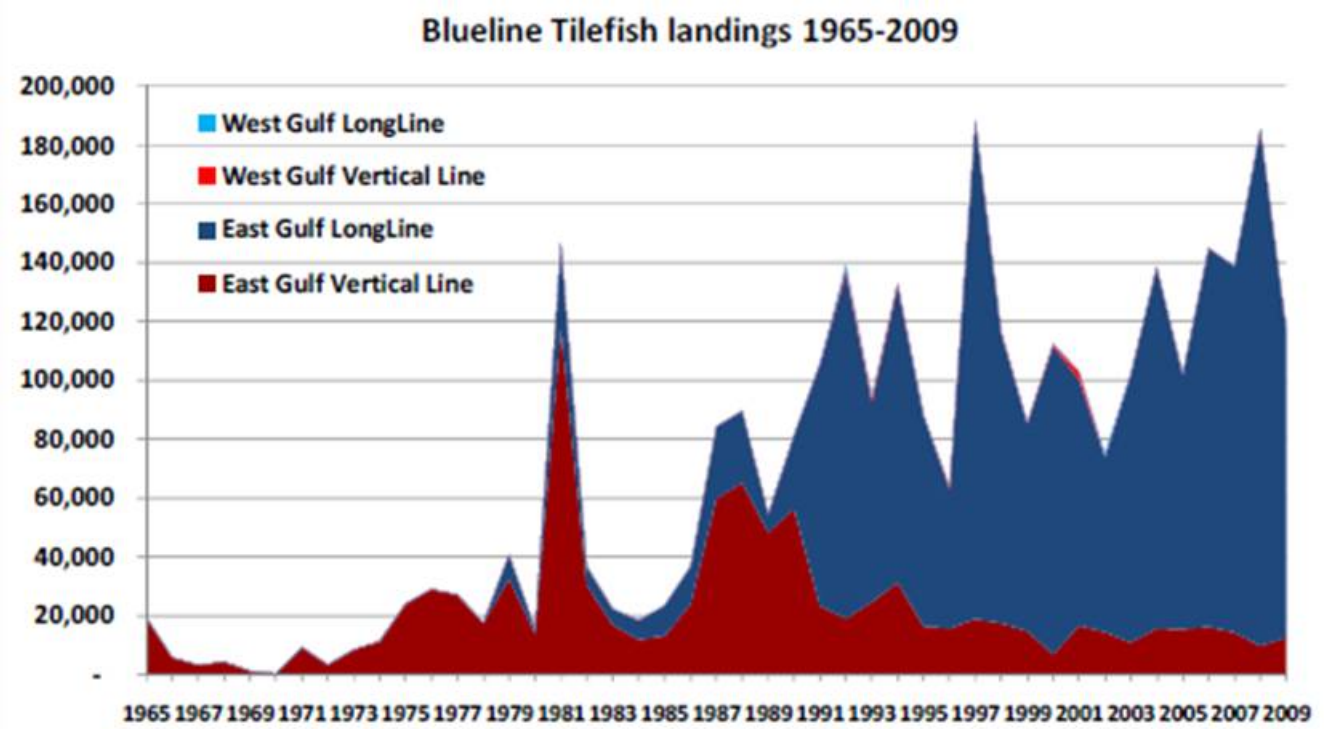


Figure 5. Blueline tilefish landings in the Gulf of Mexico by gear and area from 1965-2009.

There is no recent stock assessment report for tilefish in the Gulf of Mexico. Recent landings of the tilefish complex in this region are similar to levels show above (~384,000 - 422,000 lbs per year).

Importance to the US/North American market.

There are neither import data nor export data included in the National Marine Fisheries (NMFS) foreign trade database for these species. In 2019, nearly 2.3 million pounds of golden tilefish were caught by U.S. commercial fishers, with a value of \$8.1 million (NOAA 2020). Most of the commercial harvest was landed in New York, New Jersey and Florida. The same year, commercial landings of blueline tilefish totalled 216,000 pounds and were valued at \$635,000. Both species are important in

recreational fisheries, with recreational harvests in 2019 totaling 700,000 lbs and 159,000 lbs of golden tilefish and blueline tilefish, respectively (NOAA 2020).

Common and market names.

The two most common names for *Lopholatilus chamaeleonticeps* are the golden tilefish and tilefish. Other common names include blue tilefish, golden bass, golden snapper, great northern tilefish, and rainbow tilefish (Fishwatch 2014).

Caulolatilus microps is most often referred to as blueline tilefish. An alternate common name is gray tilefish (SAFMC 2014a).

Primary product forms

Golden and blueline tilefish are available fresh or frozen.

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. The inherent vulnerability to fishing rating influences how abundance is scored, when abundance is unknown.

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

BLUE TILEFISH				
REGION / METHOD	INHERENT VULNERABILITY	ABUNDANCE	FISHING MORTALITY	SCORE
Southern Atlantic Coast Stock Western Central Atlantic Handlines and hand-operated pole-and-lines United States SAFMC	2.000: Medium	4.000: Low Concern	2.330: Moderate Concern	Yellow (3.053)
Gulf of Mexico Stock Set longlines United States GMFMC	2.000: Medium	3.000: Moderate Concern	2.330: Moderate Concern	Yellow (2.644)
Mid-Atlantic Coast Stock Northwest Atlantic Set longlines United States MAFMC	2.000: Medium	4.000: Low Concern	5.000: Very Low Concern	Green (4.472)
Southern Atlantic Coast Stock Western Central Atlantic Set longlines United States SAFMC	2.000: Medium	4.000: Low Concern	2.330: Moderate Concern	Yellow (3.053)

BLUELINE TILEFISH				
REGION / METHOD	INHERENT VULNERABILITY	ABUNDANCE	FISHING MORTALITY	SCORE
Gulf of Mexico Stock Handlines and hand-operated pole-and-lines United States GMFMC	2.000: Medium	3.000: Moderate Concern	2.330: Moderate Concern	Yellow (2.644)
Southern Atlantic Coast Stock Western Central Atlantic Handlines and hand-operated pole-and-lines United States SAFMC	2.000: Medium	4.000: Low Concern	3.670: Low Concern	Green (3.831)
Gulf of Mexico Stock Set longlines United States GMFMC	2.000: Medium	3.000: Moderate Concern	2.330: Moderate Concern	Yellow (2.644)
Southern Atlantic Coast Stock Western Central Atlantic Set longlines United States SAFMC	2.000: Medium	4.000: Low Concern	3.670: Low Concern	Green (3.831)

Golden tilefish are divided into three stock management groups: Mid-Atlantic, South Atlantic, and Gulf of Mexico. The Mid-Atlantic stock—which includes tilefish from Maine to the Virginia-North Carolina (VA/NC) border—was last assessed in 2016 (Nitschke 2017) and updated in 2021 (Nitschke 2021). The South Atlantic stock was assessed in 2021; this stock is managed from the VA/NC border south to the boundary between the SAMFC and GMFMC jurisdictions (SEDAR 2021). The Gulf of Mexico stock is managed by the GMFMC within the all Gulf waters out to 200 miles from the state boundary line (SEDAR 2011a); this stock has not been assessed since 2011 and current stock status is unknown.

Although genetic work in the 2017 stock assessment (SEDAR 50) suggests that blueline tilefish are a genetically homogenous population along the entire Atlantic coast, SEDAR 50 was unable to suggest appropriately levels of catch off different parts of the coast, and Atlantic blueline tilefish was split into two stocks: north and south of Cape Hatteras (SEDAR 2017). The South Atlantic Fishery Management council manages blueline tilefish south of Cape Hatteras (SOH), while the Mid-Atlantic Fishery Management Council manages blueline tilefish north of Cape Hatteras (NOH). The third stock of blueline tilefish inhabits the Gulf of Mexico (GOM) and is managed by the Gulf of Mexico Fishery Management Council. Only the SOH and GOM stocks are assessed in this report, as the majority of landings originate from South Atlantic and Gulf fisheries. The SOH stock was last assessed in 2017, while the GOM stock has not been assessed since 2011.

In the Gulf of Mexico, golden, blueline, and goldface tilefish are managed as a species complex. Since the start of the IFQ program in 2010, golden tilefish accounted for 70-90% of the landings from the tilefish complex, while blueline and goldface tilefish accounted for 9-30% and <1-7%, respectively (SERO 2020). The total allowable catch for the tilefish complex was originally set based on the average landings during 1996-2000 (440,000 lbs) and was increased to 582,000 lbs under the Generic ACL amendment (SERO 2020). The current TAC is set with a 4% buffer around the ACL (ACL = 608,000 lbs); the overfishing limit (OFL) is 747,000 lbs (GMFMC 2011b). It's worth noting that discards do not count against the TAC {Pulver & Stephen 2019}, but discards are considered in stock assessments (SEDAR 2017)(SEDAR 2011a).

Criterion 1 Assessments

SCORING GUIDELINES

Factor 1.1 - - Inherent Vulnerability

- *Low*—The FishBase vulnerability score for species is 0-35, OR species exhibits life history characteristics that make it resilient to fishing, (e.g., early maturing).
- *Medium*—The FishBase vulnerability score for species is 36-55, OR species exhibits life history characteristics that make it neither particularly vulnerable nor resilient to fishing, (e.g., moderate age at sexual maturity (5-15 years), moderate maximum age (10-25 years), moderate maximum size, and middle of food chain).
- *High*—The FishBase vulnerability score for species is 56-100, OR species exhibits life history characteristics that make

is particularly vulnerable to fishing, (e.g., long-lived (>25 years), late maturing (>15 years), low reproduction rate, large body size, and top-predator). Note: The FishBase vulnerability scores is an index of the inherent vulnerability of marine fishes to fishing based on life history parameters: maximum length, age at first maturity, longevity, growth rate, natural mortality rate, fecundity, spatial behaviors (e.g., schooling, aggregating for breeding, or consistently returning to the same sites for feeding or reproduction) and geographic range.

Factor 1.2 - Abundance

- *5 (Very Low Concern)—Strong evidence exists that the population is above target abundance level (e.g., biomass at maximum sustainable yield, BMSY) or near virgin biomass.*
- *4 (Low Concern)—Population may be below target abundance level, but it is considered not overfished*
- *3 (Moderate Concern) —Abundance level is unknown and the species has a low or medium inherent vulnerability to fishing.*
- *2 (High Concern)—Population is overfished, depleted, or a species of concern, OR abundance is unknown and the species has a high inherent vulnerability to fishing.*
- *1 (Very High Concern)—Population is listed as threatened or endangered.*

Factor 1.3 - Fishing Mortality

- *5 (Very Low Concern)—Highly likely that fishing mortality is below a sustainable level (e.g., below fishing mortality at maximum sustainable yield, FMSY), OR fishery does not target species and its contribution to the mortality of species is negligible ($\leq 5\%$ of a sustainable level of fishing mortality).*
- *3.67 (Low Concern)—Probable (>50%) chance that fishing mortality is at or below a sustainable level, but some uncertainty exists, OR fishery does not target species and does not adversely affect species, but its contribution to mortality is not negligible, OR fishing mortality is unknown, but the population is healthy and the species has a low susceptibility to the fishery (low chance of being caught).*
- *2.33 (Moderate Concern)—Fishing mortality is fluctuating around sustainable levels, OR fishing mortality is unknown and species has a moderate-high susceptibility to the fishery and, if species is depleted, reasonable management is in place.*
- *1 (High Concern)—Overfishing is occurring, but management is in place to curtail overfishing, OR fishing mortality is unknown, species is depleted, and no management is in place.*
- *0 (Critical)—Overfishing is known to be occurring and no reasonable management is in place to curtail overfishing.*

Blue tilefish

Factor 1.1 - Inherent Vulnerability

Mid-Atlantic Coast Stock | Northwest Atlantic | Set longlines | United States | MAFMC

Medium

The inherent vulnerability of golden tilefish, *Lopholatilus chamaelonticeps*, was assessed based on seven productivity attributes (Table 4). Golden tilefish in the Mid-Atlantic have slightly different age and growth parameters than those in the Gulf of Mexico and South Atlantic. Golden tilefish scored an average of 1.833 which corresponds to a moderate inherent vulnerability.

Justification:

Productivity attribute	Golden Tilefish Mid-Atlantic	Score	Source
Average age at maturity	5-7 yrs	2	Grimes et al. 1988
Average maximum age	46 yrs	1	Nitschke 2006
Fecundity	average 2.3 million eggs/yr	N/A	Grimes et al. 1988
Average size at maturity	48-66 cm TL	2	Grimes et al. 1988
Average maximum size	112 cm TL	2	Nitschke 2006
Reproductive strategy	Broadcast spawner	3	Grimes et al. 1988
Trophic level	3.5 ± 0.4 SE	1	Froese and Pauly 2014
Average score		1.8333	

Figure 5: Table 4. Productivity attributes of golden tilefish in the Mid-Atlantic.

The www.fishbase.org vulnerability score was 60 out of 100 (Froese and Pauly 2014). This represents high inherent vulnerability, however the life history attributes do not support this score, therefore a moderate score is used.

Southern Atlantic Coast Stock | Western Central Atlantic | Handlines and hand-operated pole-and-lines | United States | SAFMC

Gulf of Mexico Stock | Set longlines | United States | GMFMC

Southern Atlantic Coast Stock | Western Central Atlantic | Set longlines | United States | SAFMC

Medium

The inherent vulnerability of golden tilefish, *Lopholatilus chamaeleonticeps*, was assessed based on seven productivity attributes (Table 3). Golden tilefish in the Gulf of Mexico and the South Atlantic have slightly different age and growth parameters than those in the Mid-Atlantic (SEDAR 2011a). Using the average age of maturity presented in the 2011 stock assessment (2-3 years), golden tilefish scored an average of 2.000 which corresponds to a moderate inherent vulnerability. Using the more conservative age of maturity of 6 years results in an average score of 1.833, which is still moderate inherent vulnerability, as calculated in the PSA for golden tilefish in the Mid-Atlantic.

Justification:

Productivity attribute	Golden Tilefish South Atlantic and Gulf of Mexico	Score	Source
Average age at maturity	2-3 yrs	3	SEDAR 2011a/c
Average maximum age	40 yrs	1	SEDAR 2011a/c
Fecundity	average 2.3 million eggs/yr	N/A	Grimes et al. 1988
Average size at maturity	48-66 cm TL	2	Grimes et al. 1988
Average maximum size	112 cm TL	2	Nitschke 2006
Reproductive strategy	Broadcast spawner	3	Grimes et al. 1988
Trophic level	3.5 ± 0.4 SE	1	Froese and Pauly 2014
Average score		2	

Figure 6: Table 3. Productivity attributes of golden tilefish in the South Atlantic and Gulf of Mexico.

The www.fishbase.org vulnerability score was 60 out of 100 (Froese and Pauly 2014). This represents high inherent vulnerability, however the life history attributes do not support this score, therefore a moderate score is used. The stock assessment notes that the earliest age of spawning for GOM golden tilefish is 6 years and that there may not be adequate resolution in the logistic maturity function (SEDAR 2011a). The review panel noted that "since spawning females were not detected until age 6 yet 50% maturity at age is predicted at age 2, there may be an overestimate of the reproductive contribution of the youngest mature fish relative to older ages if an SSB approach is used (SEDAR 2011a). Nonetheless, the inherent vulnerability under the PSA remains medium under the more conservative average age of maturity.

Factor 1.2 - Abundance

Gulf of Mexico Stock | Set longlines | United States | GMFMC

Moderate Concern

NOAA lists the stock status of the Gulf of Mexico tilefish complex—which includes golden tilefish—as not overfished, but the assessment has not yet been formally implemented in the fishery management plan (NMFS 2021b). The status is based on the 2011 stock assessment. Seafood Watch considers the stock status to be unknown because the assessment is outdated (published in 2011 and based on data through 2009). For context, the results of the 2011 stock assessment is presented in the Justification section below.

The IUCN has assessed this species Endangered due to a 66% decline in spawning stock biomass in the Gulf of Mexico over the last three generations (Aiken et al. 2015). However, this rating is also based on the 2011 stock assessment, so the data underlying the IUCN assessment is likewise dated.

The current status of golden tilefish in the Gulf of Mexico is unknown and the species is not highly vulnerable. Therefore, we award a “moderate” concern score.

Justification:

Golden tilefish in the Gulf of Mexico was not considered overfished in a 2011 assessment (SEDAR 2011a). Reference points were calculated with two methods to represent between-model-uncertainty (SEDAR 2011a). Both SSB_{2009} estimates were above target ($SSB_{SPR30\%}$) and limit ($MSST, (1-M)*SSB_{SPR30\%}$) reference values (see details in table below). The SSB_{2009} was also above the $SSB_{SPR40\%}$ (more conservative target reference point than $SSB_{SPR30\%}$) for the two methods (SEDAR 2011a). $SSB_{SPR30\%}$ is the default target reference point for the Gulf of Mexico Reef Fish FMP (SEDAR 2011a). However, the major concern in the assessment is poor data quality; for example, the indices of abundance conflict with signals from the landings data and the AP recommended that expert opinion and knowledge of the fishery be taken into account for management advice (SEDAR 2011a).

Mid-Atlantic Coast Stock | Northwest Atlantic | Set longlines | United States | MAFMC

Low Concern

According to the 2014 age-structured assessment model (ASAP) which incorporates length and age data, the stock of golden tilefish in the Mid-Atlantic is not overfished and above the target reference point (SAW 2014). The assessment was updated through 2016 with fishery-dependent data (landings, size data, and CPUE indices) (Nitschke 2017) and again in 2020 as reported in the Management Track Assessment report (Nitschke 2021). The estimated SSB was 10,562 mt in 2020, which is 96% of the updated target reference point (SSB_{MSY} proxy = $SSB_{40\%}$, 10,995 mt) and much greater than the limit reference point ($0.5*SSB_{40\%}$, 5,498 mt) (Nitschke 2021). The previous stock assessment from 2009 also agrees that the stock is not overfished and the abundance is above the target reference point (SAW 2009). NMFS considers golden tilefish in the Mid-Atlantic as not overfished in the 2021 2nd Quarter Update Summary of Stock Statuses (NMFS 2021b). We award a “low” concern score because abundance is above the limit reference point, but below the target reference point.

Justification:

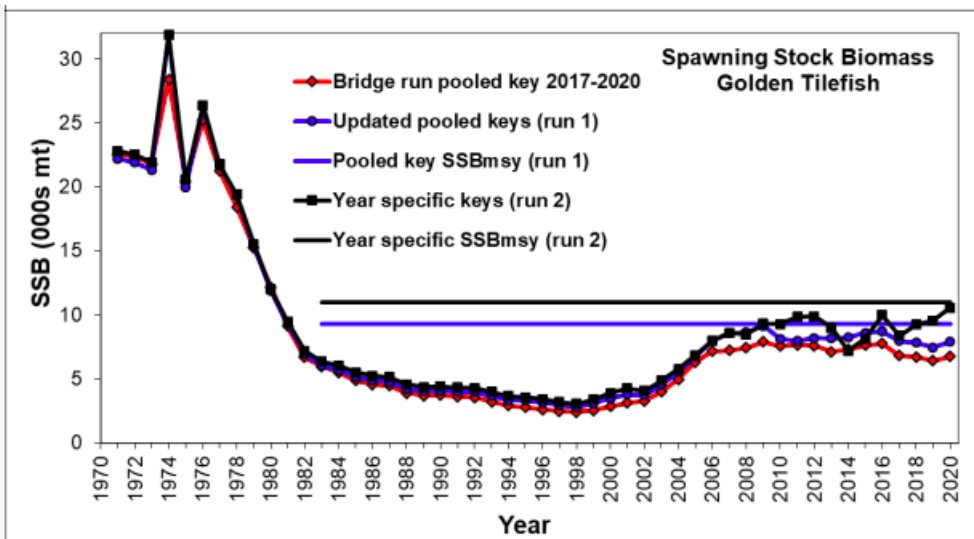


Figure 7: Spawning stock biomass (SSB) of golden tilefish in the Mid-Atlantic from 1970-2020. SSB comparison of the 2017 operational assessment model bridge ASAP model, updated pooled age key run (run 1) and the final update run 2 using the updated pooled-age-key and year specific keys for years where age data is available. The updated pooled key run 1 and final year specific key run 2 estimated SSB_{MSY} during the second selectivity block are also shown for comparison (Nitschke 2021).

The 2017 updated stock assessment uses revised reference points after it was determined that the use of likelihood constants in the SARC 58 ASAP model resulted in biases that can result in lower biomass and recruitment estimates; the likelihood constants were turned off in the 2017 update, which shifted abundance trends higher and fishing mortality lower (Nitschke 2017). The reference points were revised once again in 2020. A comparison of previous and updated reference points are shown in the table below.

Blue tilefish reference points from the 2014 SARC 58 ASAP model stock assessment, 2017 assessment update, and the 2021 Management Track Assessment

Abundance Reference Points						Status (2016)
<i>Previous (2014) Biomass TRP</i>	<i>Previous (2014) Biomass LRP</i>	<i>Updated (2017) Biomass TRP</i>	<i>Updated (2017) Biomass LRP</i>	<i>Updated (2020) Biomass TRP</i>	<i>Updated (2020) Biomass LRP</i>	<i>SSB₂₀₂₀</i>
$SSB_{MSY} = SSB_{25\%} = 5,153$ mt	$0.5 * SSB_{25\%} = 2,577$ mt	$SSB_{MSY} = SSB_{38\%} = 9,492$ mt	$0.5 * SSB_{38\%} = 4,746$ mt	$SSB_{MSY} = SSB_{40\%} = 10,995$ mt	$0.5 * SSB_{40\%} = 5,498$ mt	10,562 mt
Fishing Mortality Reference Points						
<i>Previous (2014) F_{MSY} proxy</i>	<i>Updated (2017) F_{MSY} proxy</i>	<i>Updated (2020) F_{MSY} proxy</i>	-			<i>F₂₀₂₀</i>
$F_{MSY} = F_{25\%} = 0.37$	$F_{MSY} = F_{38\%} = 0.31$	$F_{MSY} = F_{40\%} = 0.261$	-			0.160

Southern Atlantic Coast Stock | Western Central Atlantic | Handlines and hand-operated pole-and-lines | United States | SAFMC

Southern Atlantic Coast Stock | Western Central Atlantic | Set longlines | United States | SAFMC

Low Concern

An updated stock assessment report for South Atlantic golden tilefish was published in 2016, with data through 2014; the report is an update to the SEDAR-25 benchmark assessment. An operational assessment was published in 2021 and followed previous assessments by using the Beaufort Assessment Model. Spawning stock biomass (SSB) in 2018 was estimated to be greater than the minimum stock size threshold ($MSST = 75\%SSB_{MSY}$; $SSB_{2018} / MSST = 1.29$) but below the target reference value ($SSB_{2018} / SSB_{MSY} = 0.97$) (SEDAR 2021). Golden tilefish off the U.S. Southeast Atlantic are not overfished, abundance is above limit levels, but below target levels. Therefore, we award a "low concern" score, rather than a score "very low" concern.

Justification:

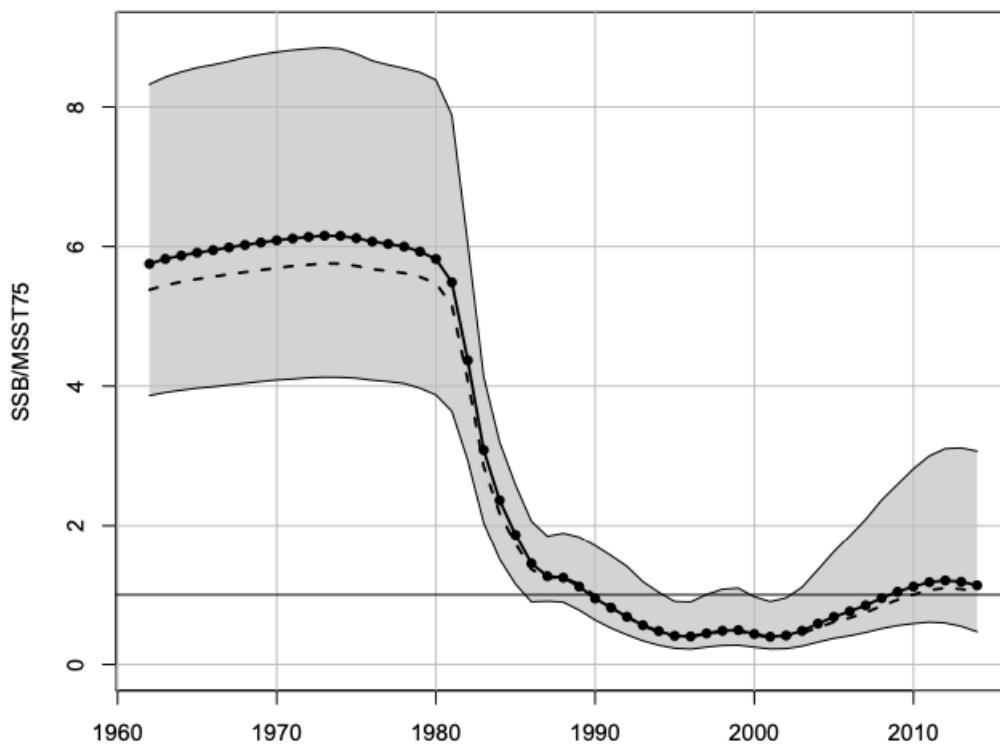


Figure 8: Stock status of golden tilefish in the South Atlantic, SSB relative to MSST. Solid line indicates estimates from the base run of the Beaufort Assessment Model and gray bands indicate 5th and 95th percentiles. Adopted from SEDAR 2016a.

Factor 1.3 - Fishing Mortality

Gulf of Mexico Stock | Set longlines | United States | GMFMC

Moderate Concern

There is no recent stock assessment for golden tilefish in the Gulf of Mexico. NOAA currently considers the GOM

Tilefishes Complex not subject to overfishing, based on 2019 catch data (NOAA 2020). The total allowable catch (TAC) for the tilefish complex was initially set at 440,000 lbs, based on the average annual harvest from 1996-2000 (NOAA 2017b). The TAC has since been increased and is currently 582,000 lbs (SERO 2020). The total average annual landings of the complex from 2010-2020 was 422,900 lbs, or 72.7% of the TAC. Even taking into account estimated discards (see below), the total catch is still likely below the TAC for the tilefish complex. However, there is no recent stock assessment for this species and the TAC is based on multiple species within a species complex. Landings data provides relative proportion of landings by tilefish species, but how these levels relate to relative biomass is unknown. Fishing mortality is scored as “moderate” concern because there is uncertainty in the sustainability of current fishing levels relative to current abundance levels.

Justification:

Although discards are considered in the 2011 stock assessment, discards are not counted against the total quota or individual allocations {Pulver & Stephen 2019}. Discarding can be influenced by multiple factors--market condition (i.e. high-grading due to price differentials between different size fish) is considered a dominant factor for tilefish (ibid). There is no minimum size limit for tilefish and a mandatory retention ban may be needed to reduce discarding of small fish (ibid).

Discard estimates from the Reef Fish Observer Program from 2010-2017 for each species in the tilefish complex are 18.3% (golden tilefish), 44.7% (blueline tilefish) and 60.8% (goldface tilefish) {Pulver & Stephen 2019}. These estimates should be interpreted with caution due to uncertainty in the representativeness of the observer data (SEDAR 2017). There were 8,999 blueline tilefish and 2,725 golden tilefish individual fish discarded between 2010-2017, according to the Supplemental Discard Logbook data reported to the SEFSC (ibid). High-grading is the likely reason for discarding tilefish species {Pulver & Stephen 2019} and research has show that this behavior is likely underreported in many fisheries (Batsleer et al. 2015). Discard mortality is assumed to be 100% for golden tilefish (SEDAR 2011a) and 95% for blueline tilefish (SEDAR 2017).

Using this average weight and the number of reported fish discarded, it's estimated that a *total* of 14,170 lbs and 46,795 lbs of golden and blueline tilefish, respectively, were discarded between 2010-2017, which is considerably less than the estimated average annual discards of these species using the observed discard rate. Using the average reported landings of tilefish from 2010-2020 (SERO 2020) and the observed discard and retention rates from Pulver & Stephen (2019), the total annual estimated catch of the tilefish complex is 560,145 lbs, which is still below the TAC. However, this estimate is based on uncertainty in the observer data.

Species	Average Landings/yr (2010-2020)	Observed Retention Rate	Observed Discard Rate	Estimated Discards	Estimated Average Catch/yr (Average landings/Observed retention rate)
Golden tilefish	353,703 lbs	81.7%	18.3%	79,226 lbs	432,930 lbs
Blueline tilefish	66,388 lbs	55.4%	44.7%	53,663 lbs	120,051 lbs
Goldface tilefish	2,809 lbs	39.2%	60.8%	4,356 lbs	7,165 lbs
Tilefish complex total	422,900 lbs			137,245 lbs	560,145 lbs

Additional information from the 2011 Gulf of Mexico tilefish assessment:

"Gulf of Mexico tilefish is a data poor species, and suffers many of the problems that make assessments of data poor species so difficult. Data quality is the primary problem with this assessment. This can be seen specifically in the effect of the age composition data on the estimation of recruitment. Unless the recruitment SD parameter is used to constrain the model, current biomass estimates will often exceed virgin levels. The age composition data are not the only problematic data source in this assessment. The indices of abundance, particularly in the east, appear to track abundance trends that conflict with signals from the landings data. For these reasons, the Assessment Panel has recommended that management advice not be based solely on this assessment, but should take into account other information like expert opinion and knowledge of the tilefish fishery."(SEDAR 2011a)

Very Low Concern

According to the 2020 Management Track Assessment, golden tilefish in the Mid-Atlantic is not experiencing overfishing (Nitschke 2021). This assessment updates the 2017 operational assessment with landings, catch at length distributions, catch at age and mean weights at age. The F_{MSY} proxy of 0.261 (equal to $F_{40\%}$) is based on the average fishing mortality during 2002-2012 and the updated $MSY_{40\%} = 935$ mt is slightly less than the the operational assessment ($MSY_{38\%} = 957$ mt). Estimated fishing mortality in 2020 was 0.160, which is less than the F_{MSY} proxy. The NMFS Summary of Stock Statuses states that this stock is not experiencing overfishing (NMFS 2021). Because fishing mortality is below sustainable levels (i.e. overfishing is not occurring), we award a “very low” concern score.

Justification:

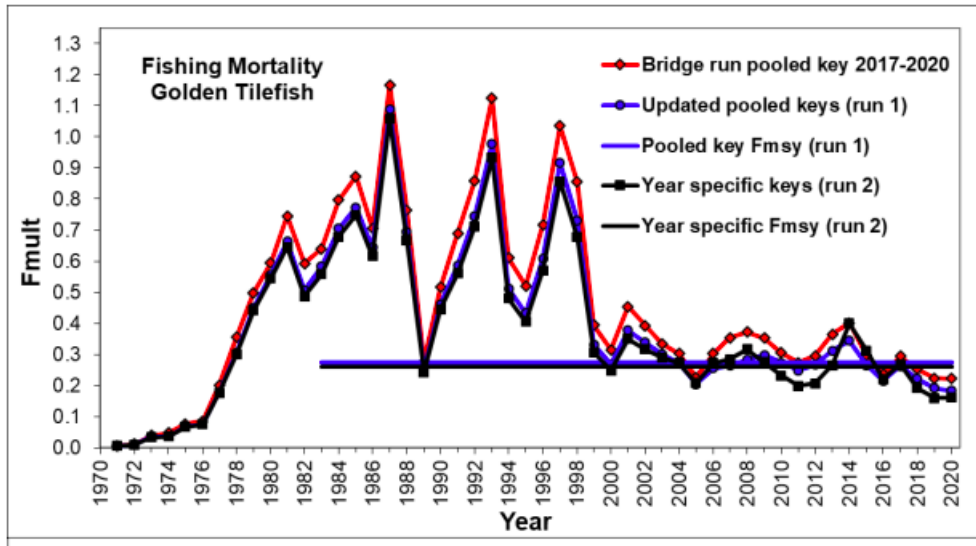


Figure 9: Fishing mortality of golden tilefish in the Mid-Atlantic from 1970-2020. F_{MULT} comparison of the 2017 operational assessment model bridge ASAP model, updated pooled age key run (run 1) and the final update run 2 using the updated pooled-age-key and year specific keys for years where age data is available. The updated pooled key run 1 and final year specific key run 2 estimated F_{MSY} during the second selectivity block are also shown for comparison (Nitschke 2021).

Rationale on how reference points were set, taken from the summary report of the 2021 Management Track Assessment (Nitschke 2021):

“The F_{MSY} proxy was updated using the new average of the fishing mortality during 2002-2012 (a period when the stock was rebuilding under constant quota = 905 mt or metric ton), providing an updated F_{MSY} proxy of 0.261 (equal to $F_{40\%}$), compared to the 2017 operational assessment value of 0.310 (equal to $F_{38\%}$). The SSB_{MSY} and MSY proxies were also updated using the same procedures as in the SARC 58 assessment. The updated SSB target = $SSB_{MSY} = SSB_{40\%} = 10,995$ mt (compared to the 2017 operational assessment $SSB_{38\%} = 9,492$ mt) and the updated SSB threshold = one-half $SSB_{40\%} = 5,498$ mt (compared to the 2017 operational assessment one-half $SSB_{38\%} = 4,746$ mt). The updated $MSY_{40\%} = 935$ mt (compared to the 2017 operational assessment $MSY_{38\%} = 957$ mt).”

Rationale on how reference points were set, taken from the summary report of the 2017 stock assessment (Nitschke 2017):

“Golden Tilefish are estimated to live about 40 years, and this information along with the SARC 58 likelihood profiles of the ASAP model indicated that a value for instantaneous natural mortality (M) of 0.15 was appropriate (NEFSC 2014). The long lifespan and relatively low M would suggest that a fishing mortality rate BRP of $F_{40\%}$ or higher $\%MSP$ would be appropriate. Under a management regime using a constant landings quota of 905 mt from 2002-2012, with actual

landings close to the quota each year, the stock increased to 8,388 mt in 2012. SARC 58 (NEFSC 2014)"

Southern Atlantic Coast Stock | Western Central Atlantic | Handlines and hand-operated pole-and-lines | United States | SAFMC

Southern Atlantic Coast Stock | Western Central Atlantic | Set longlines | United States | SAFMC

Moderate Concern

A stock assessment update with the Beaufort assessment model (BAM) was performed for golden tilefish in 2021. The exploitation status ($F_{\text{current}}/F_{\text{MSY}}$) was estimated at 0.864, where F_{current} is the geometric mean of F from 2016 to 2018 (SEDAR 2021). However, the assessment revealed some quantitative uncertainties. 25% of the model runs show that the stock is undergoing overfishing ($F_{\text{current}}/F_{\text{MSY}} > 1.869$) and only 48.8% of the model runs agreed with the fishing status result of the base model (ibid). There was a similar level of uncertainty in the previous assessment, which showed that 66% of the model runs are in qualitative agreement that overfishing was occurring (SEDAR 2016a). NMFS listed tilefish as undergoing overfishing in the 1st Quarter Stock Status Update for 2021 (NMFS 2021), but changed the status in the 2nd Quarter Update as no longer undergoing overfishing (NMFS 2021b). Since there is not a probable (>50% chance) that fishing mortality is below a sustainable level, and F is fluctuating around F_{MSY} , a moderate concern score is awarded.

Justification:

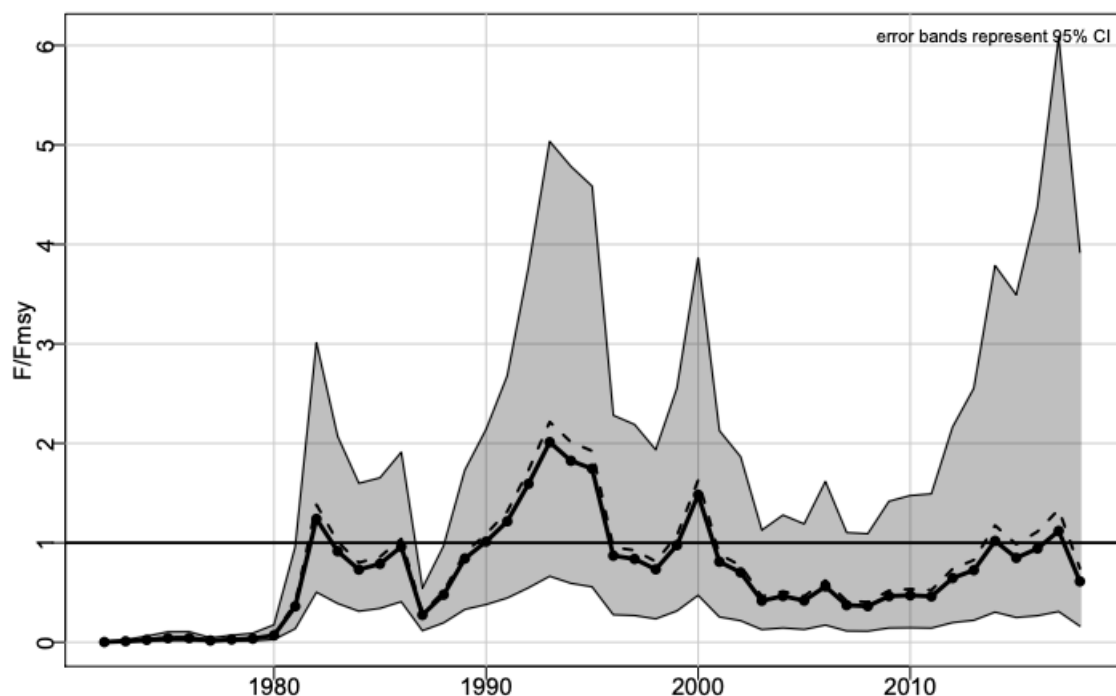


Figure 10: Estimated time series of F relative to benchmarks: F relative to F_{MSY} . Shaded region represents 95% confidence bands from the MCBE runs ($n = 4050$) (SEDAR 2021).

Blueline tilefish

Factor 1.1 - Inherent Vulnerability

Gulf of Mexico Stock | Handlines and hand-operated pole-and-lines | United States | GMFMC
Southern Atlantic Coast Stock | Western Central Atlantic | Handlines and hand-operated pole-and-lines | United States | SAFMC
Gulf of Mexico Stock | Set longlines | United States | GMFMC
Southern Atlantic Coast Stock | Western Central Atlantic | Set longlines | United States | SAFMC

Medium

The inherent vulnerability of blueline tilefish, *Caulolatilus microps*, was assessed based on seven productivity attributes (Table 2). Blueline tilefish scored an average of 2.333 which corresponds to a moderate inherent vulnerability.

Justification:

Productivity attribute	Blueline Tilefish	Score	Source
Average age at maturity	3 yrs	3	SEDAR 2013c
Average maximum age	43 yrs	1	SEDAR 2013c
Fecundity	2.2 - 13 million eggs/yr	N/A	SEDAR 2013c
Average size at maturity	33.8 - 38.7 cm TL (females)	3	SEDAR 2013c
Average maximum size	90 cm TL	3	SEDAR 2013c
Reproductive strategy	Broadcast spawner	3	SEDAR 2013c
Trophic level	3.8 ± 0.6 SE	1	Froese and Pauly 2014
Average score		2.3333	

Figure 11: Table 2. Productivity attributes of blueline tilefish.

The www.fishbase.org vulnerability score was 58 out of 100 (Froese and Pauly 2014). This represents high inherent vulnerability, however the life history attributes do not support this score, therefore a moderate score is used.

Factor 1.2 - Abundance

Moderate Concern

There has been no stock assessment for blueline tilefish in the Gulf of Mexico and its overfished status is unknown. Its stock was discussed in the 2011 golden tilefish assessment, but it was determined that adequate data were unavailable for an assessment of blueline tilefish (SEDAR 2011a). The ASPIC model was run for GOM blueline tilefish at SEDAR 50, but the model fit poorly and was not used to determine stock status, though the population is assumed to be stable {SEDAR 50}. Annual catch per unit effort (CPUE) was provided from 1993-2009 (blueline tilefish were not reported in commercial landings prior to 1992), but CPUE values had high uncertainty and no trend in CPUE was detected over time (SEDAR 2011a). This could be because there is no trend in CPUE or that the trend cannot be detected from the available data. The uncertainty of CPUE is driven in part by low sample sizes (SEDAR 2011a). NOAA lists the stock status of the Gulf of Mexico tilefish complex—which includes blueline tilefish—an unknown (NOAA 2020).

Since the stock status is unknown and blueline tilefish are not highly vulnerable, we award a “moderate” concern score.

Low Concern

Blueline tilefish were assessed with an Age-aggregated Production Model (ASPIC) (SEDAR 2017). Previous stock assessment methods (e.g. Beaufort Assessment Model) were not appropriate for SEDAR 50 because the available age data were unreliable (ibid). Current stock status for blueline tilefish south of Cape Hatteras is estimated to above target and limit reference values as $B_{2015}/MSST = 1.41$ and $B_{2015}/B_{MSY} = 1.06$, which indicates that the stock is not overfished (ibid). The 2015 biomass estimate was 1,549 thousand pounds, while the B_{MSY} was estimated at 1,466 thousand pounds (ibid). There is considerable uncertainty with the stock assessment, but 95% of the bootstrap runs show that the stock is not overfished (ibid). Therefore, we award a “low concern” score.

Justification:

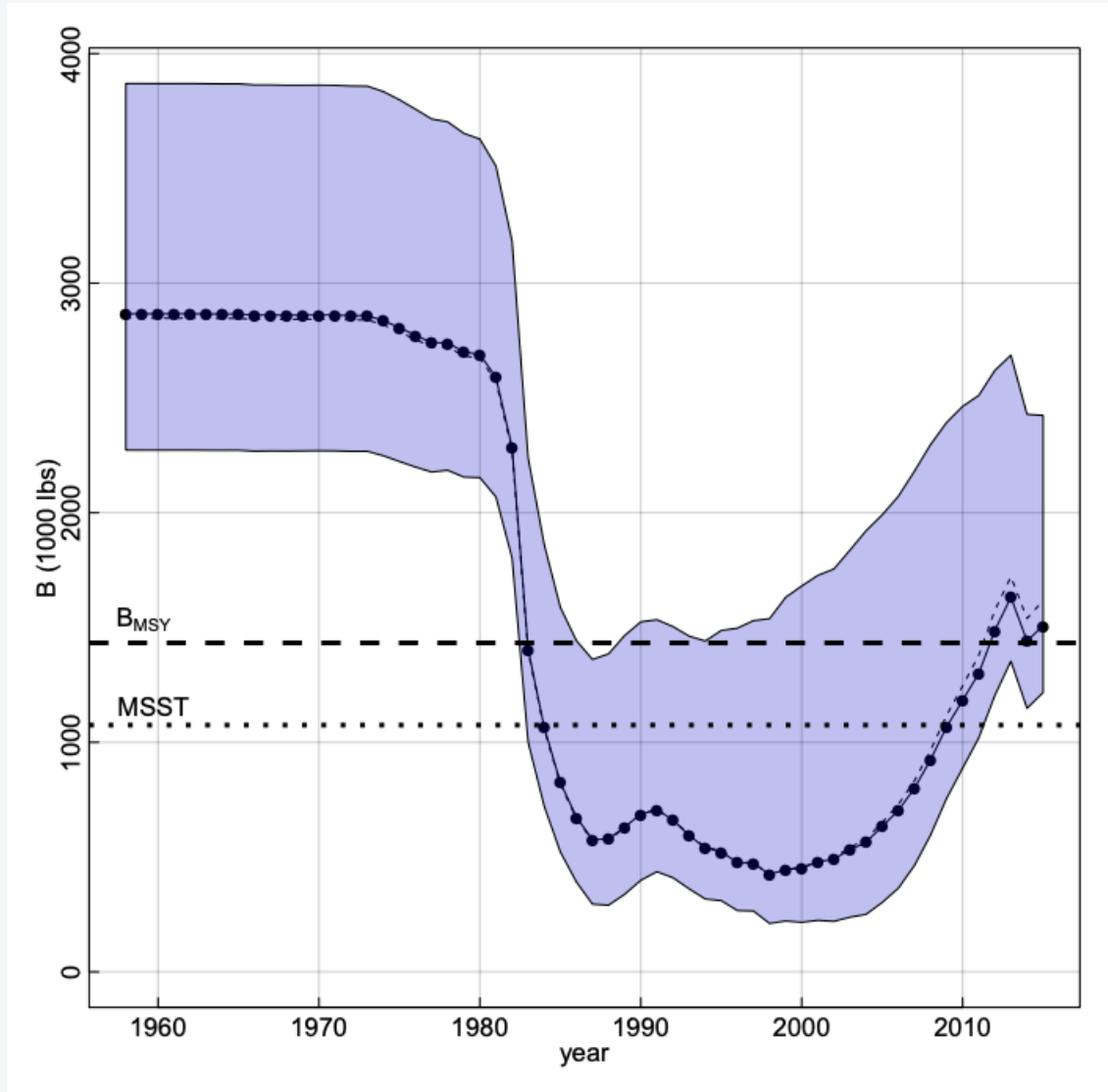


Figure 12: Estimated biomass series (B) from the ASPIC RW Reference model for the South Atlantic. Solid line indicates estimated B series. The jagged dashed line represents the median B and blue error bands indicate 5 th and 95th percentiles of the bootstrap trials. Horizontal dashed and dotted lines indicate BMSY and MSST (SEDAR 50)

Moderate Concern

There has been no stock assessment for blueline tilefish in the Gulf of Mexico. Commercial landings are available from 1992-2020 (blueline tilefish were not reported in commercial landings prior to 1992), and back calculated from golden tilefish landings for 1965-1991 based on proportions of golden and blueline landings from 1992-1996 (SEDAR 2011a) (SERO 2020). Blueline tilefish is managed within the GOM Tilefish Complex under a single TAC; NOAA currently considers this complex not subject to overfishing, based on 2019 catch data (NOAA 2020). The total allowable catch for the tilefish complex was originally set based on the average landings during 1996-2000 (440,000 lbs), was increased to 582,000 lbs under the Generic ACL amendment (SERO 2020). The total allowable catch for the tilefish complex is currently 582,000 lbs (SERO 2020). The total average annual landings of the complex from 2010-2020 was 422,900 lbs, or 72.7% of the TAC. Even taking into account estimated discards (see below), the total catch is still likely below the TAC for the tilefish complex. However, no formal stock assessment has ever been conducted for blueline tilefish and the sustainability of fishing levels on this stock is unknown, justifying a fishing mortality score of “moderate” concern.

Justification:

Although discards are considered in the 2011 stock assessment, discards are not counted against the total quota or individual allocations {Pulver & Stephen 2019}. Discarding can be influenced by multiple factors--market condition (i.e. high-grading due to price differentials between different size fish) is considered a dominant factor for tilefish (ibid). There is no minimum size limit for tilefish and a mandatory retention ban may be needed to reduce discarding of small fish (ibid).

Discard estimates from the Reef Fish Observer Program from 2010-2017 for each species in the tilefish complex are 18.3% (golden tilefish), 44.7% (blueline tilefish) and 60.8% (goldface tilefish) {Pulver & Stephen 2019}. These estimates should be interpreted with caution due to uncertainty in the representativeness of the observer data (SEDAR 2017). There were 8,999 blueline tilefish and 2,725 golden tilefish individual fish discarded between 2010-2017, according to the Supplemental Discard Logbook data reported to the SEFSC (ibid). High-grading is the likely reason for discarding tilefish species {Pulver & Stephen 2019} and research has show that this behavior is likely underreported in many fisheries (Batsleer et al. 2015). Discard mortality is assumed to be 100% for golden tilefish (SEDAR 2011a) and 95% for blueline tilefish (SEDAR 2017).

Using this average weight and the number of reported fish discarded, it's estimated that a *total* of 14,170 lbs and 46,795 lbs of golden and blueline tilefish, respectively, were discarded between 2010-2017, which is considerably less than the estimated average annual discards of these species using the observed discard rate. Using the average reported landings of tilefish from 2010-2020 (SERO 2020) and the observed discard and retention rates from Pulver & Stephen (2019), the total annual estimated catch of the tilefish complex is 560,145 lbs, which is still below the TAC. However, this estimate is based on uncertainty in the observer data.

Species	Average Landings/yr (2010-2020)	Observed Retention Rate	Observed Discard Rate	Estimated Discards	Estimated Average Catch/yr (Average landings/Observed retention rate)
Golden tilefish	353,703 lbs	81.7%	18.3%	79,226 lbs	432,930 lbs
Blueline tilefish	66,388 lbs	55.4%	44.7%	53,663 lbs	120,051 lbs
Goldface tilefish	2,809 lbs	39.2%	60.8%	4,356 lbs	7,165 lbs
Tilefish complex total	422,900 lbs			137,245 lbs	560,145 lbs

Low Concern

Although fishing mortality was historically above sustainable levels (from 1981 - 2003), F has been below F_{MSY} every year since 2003--with the exception of 2013. The most recent estimate of fishing mortality ($F_{2013-2015}$) was 0.134, which was less than fishing mortality at maximum sustainable yield (F_{MSY} ; 0.146), which indicates that overfishing is not occurring (SEDAR 2017). Although the stock assessment suggests that overfishing is not occurring, there is a high level of uncertainty, and almost 50% of bootstrap runs resulted in estimates of $F_{current}/F_{MSY} > 1.0$ (ibid). Blueline tilefish in the South Atlantic is listed as not undergoing overfishing in the NMFS's 1st Quarter Stock Status update (NMFS 2021). It is probable that fishing mortality is at or below a sustainable level, but there is some uncertainty. Therefore, a "low concern" rather than a "very low concern" score is given.

Justification:

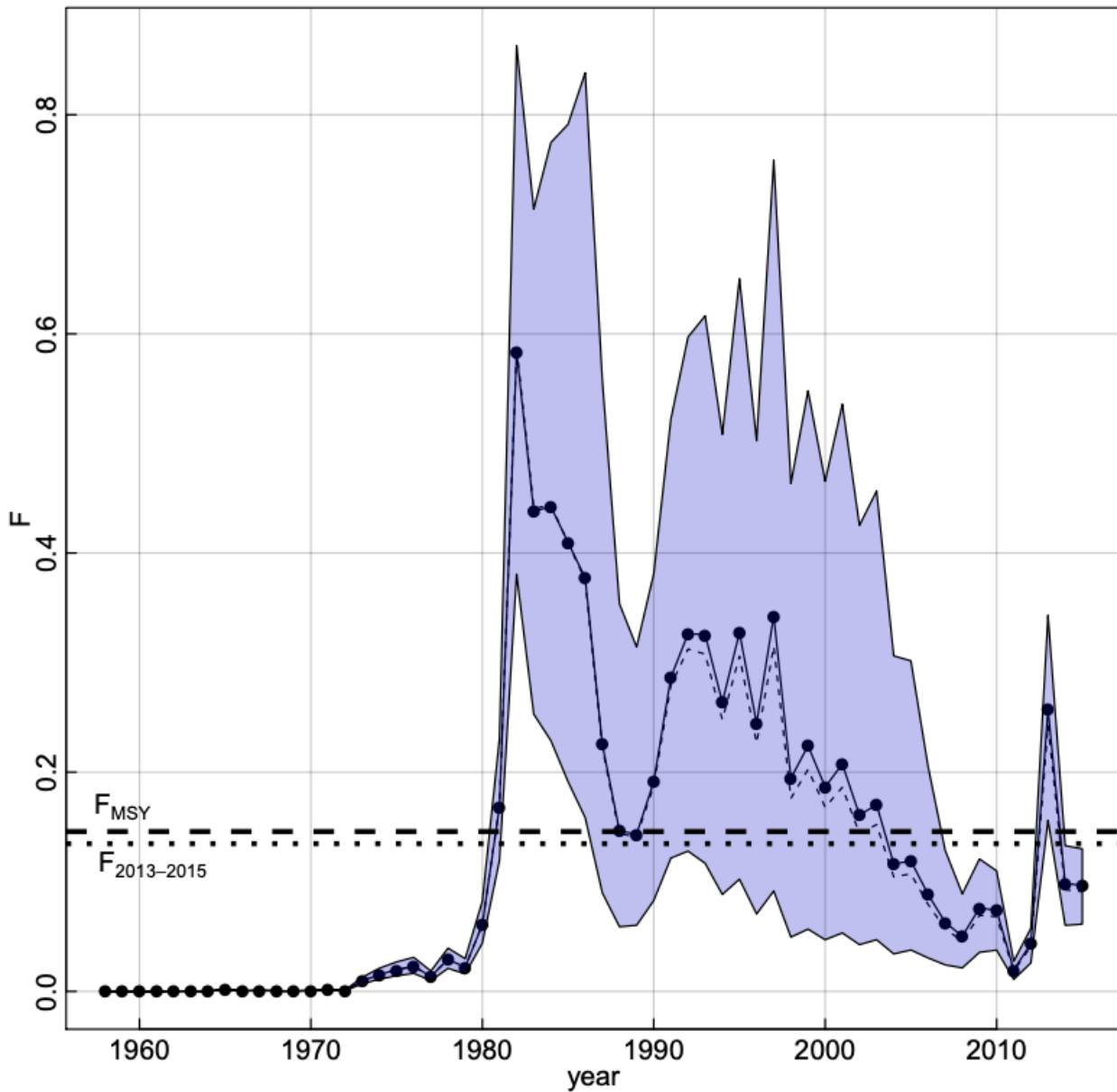


Figure 13: Estimated fishing mortality series (F) combining Runs 55 and 56) from ASPIC for the So. Atl. Solid line indicates average F series for handline and longline models. The jagged dashed line represents the median F and blue error bands indicate 5 th and 95th percentiles of the combined bootstrap trials. Horizontal dashed and dotted lines indicate average F_{MSY} and $F_{2013-2015}$ ($F_{current}$; geometric mean F from 2013-2015) for handline and longline models (SEDAR 50).

Criterion 2: Impacts on Other Species

All main retained and bycatch species in the fishery are evaluated in the same way as the species under assessment were evaluated in Criterion 1. 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.

To determine the final Criterion 2 score, the score for the lowest scoring retained/bycatch species is multiplied by the discard rate score (ranges from 0-1), which evaluates the amount of non-retained catch (discards) and bait use relative to the retained catch. 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 Critical

Criterion 2 Summary

Criterion 2 score(s) overview

This table(s) provides an overview of the Criterion 2 subscore, discards+bait modifier, and final Criterion 2 score for each fishery. A separate table is provided for each species/stock that we want an overall rating for.

BLUE TILEFISH			
REGION / METHOD	SUB SCORE	DISCARDS+BAIT / LANDINGS	SCORE
Southern Atlantic Coast Stock Western Central Atlantic Handlines and hand-operated pole-and-lines United States SAFMC	3.318	1.000: < 20%	Green (3.318)
Gulf of Mexico Stock Set longlines United States GMFMC	1.916	0.950: 20-40%	Red (1.820)
Mid-Atlantic Coast Stock Northwest Atlantic Set longlines United States MAFMC	5.000	1.000: < 20%	Green (5.000)
Southern Atlantic Coast Stock Western Central Atlantic Set longlines United States SAFMC	3.318	0.950: 20-40%	Green (3.152)

BLUELINE TILEFISH			
REGION / METHOD	SUB SCORE	DISCARDS+BAIT / LANDINGS	SCORE
Gulf of Mexico Stock Handlines and hand-operated pole-and-lines United States GMFMC	2.159	0.950: 20-40%	Red (2.051)
Southern Atlantic Coast Stock Western Central Atlantic Handlines and hand-operated pole-and-lines United States SAFMC	1.414	0.950: 20-40%	Red (1.343)
Gulf of Mexico Stock Set longlines United States GMFMC	1.916	0.950: 20-40%	Red (1.820)
Southern Atlantic Coast Stock Western Central Atlantic Set longlines United States SAFMC	1.414	0.950: 20-40%	Red (1.343)

Criterion 2 main assessed species/stocks table(s)

This table(s) provides a list of all species/stocks included in this assessment for each 'fishery' (as defined by a region/method combination). The text following this table(s) provides an explanation of the reasons the listed species were selected for inclusion in the assessment.

GULF OF MEXICO HANDLINES AND HAND-OPERATED POLE-AND-LINES UNITED STATES GMFMC				
SUB SCORE: 2.159		DISCARD RATE: 0.950		SCORE: 2.051
SPECIES	INHERENT VULNERABILITY	ABUNDANCE	FISHING MORTALITY	SCORE
Snowy grouper	1.000: High	2.000: High Concern	2.330: Moderate Concern	Red (2.159)
Speckled hind	1.000: High	2.000: High Concern	2.330: Moderate Concern	Red (2.159)
Warsaw grouper	1.000: High	2.000: High Concern	2.330: Moderate Concern	Red (2.159)
Blueline tilefish	2.000: Medium	3.000: Moderate Concern	2.330: Moderate Concern	Yellow (2.644)
Yellowedge grouper	1.000: High	2.000: High Concern	3.670: Low Concern	Yellow (2.709)
Red snapper	2.000: Medium	4.000: Low Concern	3.670: Low Concern	Green (3.831)
Smooth dogfish	1.000: High	4.000: Low Concern	3.670: Low Concern	Green (3.831)

GULF OF MEXICO SET LONGLINES UNITED STATES GMFMC				
SUB SCORE: 1.916		DISCARD RATE: 0.950		SCORE: 1.820
SPECIES	INHERENT VULNERABILITY	ABUNDANCE	FISHING MORTALITY	SCORE
Loggerhead turtle	1.000: High	1.000: Very High Concern	3.670: Low Concern	Red (1.916)
Snowy grouper	1.000: High	2.000: High Concern	2.330: Moderate Concern	Red (2.159)
Speckled hind	1.000: High	2.000: High Concern	2.330: Moderate Concern	Red (2.159)
Warsaw grouper	1.000: High	2.000: High Concern	2.330: Moderate Concern	Red (2.159)
Blueline tilefish	2.000: Medium	3.000: Moderate Concern	2.330: Moderate Concern	Yellow (2.644)
Yellowedge grouper	1.000: High	2.000: High Concern	3.670: Low Concern	Yellow (2.709)
Red snapper	2.000: Medium	4.000: Low Concern	3.670: Low Concern	Green (3.831)
Smooth dogfish	1.000: High	4.000: Low Concern	3.670: Low Concern	Green (3.831)

GULF OF MEXICO SET LONGLINES UNITED STATES GMFMC				
SUB SCORE: 1.916		DISCARD RATE: 0.950		SCORE: 1.820
SPECIES	INHERENT VULNERABILITY	ABUNDANCE	FISHING MORTALITY	SCORE
Loggerhead turtle	1.000: High	1.000: Very High Concern	3.670: Low Concern	Red (1.916)
Blue tilefish	2.000: Medium	3.000: Moderate Concern	2.330: Moderate Concern	Yellow (2.644)
Southern hake	3.000: Low	3.000: Moderate Concern	3.670: Low Concern	Green (3.318)

NORTHWEST ATLANTIC SET LONGLINES UNITED STATES MAFMC				
SUB SCORE: 5.000		DISCARD RATE: 1.000		SCORE: 5.000
SPECIES	INHERENT VULNERABILITY	ABUNDANCE	FISHING MORTALITY	SCORE
Blue tilefish	2.000: Medium	4.000: Low Concern	5.000: Very Low Concern	Green (4.472)

WESTERN CENTRAL ATLANTIC HANDLINES AND HAND-OPERATED POLE-AND-LINES UNITED STATES SAFMC				
SUB SCORE: 1.414		DISCARD RATE: 0.950		SCORE: 1.343
SPECIES	INHERENT VULNERABILITY	ABUNDANCE	FISHING MORTALITY	SCORE
Snowy grouper	1.000: High	2.000: High Concern	1.000: High Concern	Red (1.414)
Yellowedge grouper	1.000: High	2.000: High Concern	2.330: Moderate Concern	Red (2.159)
Blueline tilefish	2.000: Medium	4.000: Low Concern	3.670: Low Concern	Green (3.831)

WESTERN CENTRAL ATLANTIC HANDLINES AND HAND-OPERATED POLE-AND-LINES UNITED STATES SAFMC				
SUB SCORE: 3.318		DISCARD RATE: 1.000		SCORE: 3.318
SPECIES	INHERENT VULNERABILITY	ABUNDANCE	FISHING MORTALITY	SCORE
Blue tilefish	2.000: Medium	4.000: Low Concern	2.330: Moderate Concern	Yellow (3.053)
Southern hake	3.000: Low	3.000: Moderate Concern	3.670: Low Concern	Green (3.318)

WESTERN CENTRAL ATLANTIC SET LONGLINES UNITED STATES SAFMC				
SUB SCORE: 1.414		DISCARD RATE: 0.950		SCORE: 1.343
SPECIES	INHERENT VULNERABILITY	ABUNDANCE	FISHING MORTALITY	SCORE
Snowy grouper	1.000: High	2.000: High Concern	1.000: High Concern	Red (1.414)
Yellowedge grouper	1.000: High	2.000: High Concern	2.330: Moderate Concern	Red (2.159)
Blueline tilefish	2.000: Medium	4.000: Low Concern	3.670: Low Concern	Green (3.831)

WESTERN CENTRAL ATLANTIC SET LONGLINES UNITED STATES SAFMC				
SUB SCORE: 3.318		DISCARD RATE: 0.950		SCORE: 3.152
SPECIES	INHERENT VULNERABILITY	ABUNDANCE	FISHING MORTALITY	SCORE
Blue tilefish	2.000: Medium	4.000: Low Concern	2.330: Moderate Concern	Yellow (3.053)
Southern hake	3.000: Low	3.000: Moderate Concern	3.670: Low Concern	Green (3.318)

Both tilefish species in this report are managed in the Gulf of Mexico within the Tilefish Complex under the Reef Fish FMP, but catch composition in these fisheries varies by gear and target species. More specifically, golden tilefish in the Gulf of Mexico are primarily landed with longlines on golden tilefish directed trips, while blueline tilefish are landed with handlines and longlines on trips targeting deepwater grouper species. Therefore, species caught alongside golden tilefish differ from those caught alongside blueline tilefish. In the South Atlantic, blueline tilefish are targeted with longline and handline gear and the fishery incidentally catches snowy grouper and yellowedge grouper. The golden tilefish directed fisheries in the Mid-Atlantic and South Atlantic have minimal bycatch, and southern hake is the only main species (South Atlantic only).

The main species for each fishery were determined based on the percent that each species represented of the total fishery's catch. The data to determine main species for the South Atlantic and the Gulf of Mexico are from small sets of observer data from the tilefish fisheries in these areas and include at risk species that are managed with the tilefish species or are endangered. Data for the Mid-Atlantic are from catch disposition from 2003-2012 from Maine through Virginia.

Red snapper, snowy grouper, southern hake, and yellowedge grouper composed more than five percent of the total fishery catch for those fisheries they were included in. Under the ESA, loggerhead turtles are "threatened" and speckled hind is 'special concern'; Warsaw grouper are "near threatened" according to the IUCN Redlist. Speckled hind and Warsaw grouper are not included in golden tilefish fisheries based on habitat differences, but are included in the Gulf of Mexico blueline tilefish fisheries based on distribution overlap. Warsaw grouper and speckled hind are not included in the South Atlantic blueline tilefish fishery based on low overlap of distribution; most of the blueline catch occurs north of Cape Hatteras (pers comm M. Errigo, SAFMC), while Warsaw grouper and speckled hind primarily occur south of Cape Hatteras (see Farmer and Karnauskas 2013). Red grouper was greater than five percent of the total fishery catch in the Gulf of Mexico, however it is the main target of shallow water longlines while both golden and blueline tilefish are targets of deep water longlines and therefore not included in this report. The Seafood Watch report on grouper has a more extensive list of bycatch species because fishing occurs in both shallow and deep waters. Bottom longline and handline fisheries in the Mid-Atlantic, Southeast Atlantic, and Gulf of Mexico are category 3 fisheries under the Marine Mammal Protection Act (MMPA) (remote likelihood of/no known interactions) according to the List of Fisheries compiled to determine the level of interactions between the fishery and marine mammals. In the Mid-Atlantic there are no major bycatch species so the longline fishery for golden tilefish receives a score of 5.0. In the South Atlantic golden tilefish fishery very little bycatch occurs, only southern hake, which has little biological information available about it. In the South Atlantic blueline tilefish fisheries the lowest scoring bycatch species is the snowy grouper. Limiting species for the Gulf of Mexico handline and longline fishery for blueline tilefish are snowy grouper, speckled hind, and Warsaw grouper. Loggerhead sea turtles limit the score for the Gulf of Mexico longline fisheries.

Criterion 2 Assessment

SCORING GUIDELINES

Factor 2.1 - Inherent Vulnerability
(same as Factor 1.1 above)

Factor 2.2 - Abundance
(same as Factor 1.2 above)

Factor 2.3 - Fishing Mortality
(same as Factor 1.3 above)

Loggerhead turtle

Factor 2.1 - Inherent Vulnerability

Northwest Atlantic DPS Stock | Gulf of Mexico | Set longlines | United States | GMFMC

High

The loggerhead sea turtle, *Caretta caretta*, has high inherent vulnerability based on its high longevity, late maturation, and low reproductive rates. Additionally they are listed as Threatened under the US Endangered Species Act.

Factor 2.2 - Abundance

Northwest Atlantic DPS Stock | Gulf of Mexico | Set longlines | United States | GMFMC

Very High Concern

Loggerhead turtles are listed globally Vulnerable by the IUCN; the status of the Atlantic population is Least Concern (Casale and Tucker 2017) The U.S. Endangered Species Act (ESA) breaks loggerhead turtles into nine distinct population segments (DPS); the Northwest Atlantic Ocean DPS is listed as ESA Threatened (NMFS 2013c)(FR 2020). A recent study determined the relative risk of the Northwest Atlantic loggerhead turtle population (which includes turtles in the Gulf of Mexico) to be lower than other sea turtle populations (Wallace et al. 2013); however due to their Threatened status Seafood Watch considers abundance of loggerhead turtles to be a "very high" concern.

Factor 2.3 - Fishing Mortality

Northwest Atlantic DPS Stock | Gulf of Mexico | Set longlines | United States | GMFMC

Low Concern

Bottom longline gear is known to adversely affect sea turtles via hooking, entanglement, trailing line, and forced submergence. Captured sea turtles can be released alive or may be found dead upon retrieval of the gear as a result of forced submergence (NMFS 2009b). According to a 2009 National Marine Fisheries Service (NMFS) report, loggerhead turtle take in the Gulf of Mexico bottom longline reef fishery exceeded the number authorized by a 2005 NMFS Biological Opinion (BO) issued under the ESA (85 loggerheads over 3 yrs). The fishery took an estimated 714 loggerheads between July 2006 and December 2008 (the 95 % Confidence Interval was 296.9 – 1,720.5) (Table 5) (NMFS 2009a). The 2009 BO provides an estimate of 519 takes with 314 of those as mortalities (NMFS 2009b). These takes occurred despite the 2006 management measures to reduce sea turtle take established through Amendment 18A of the Gulf of Mexico Reef Fishery Management Plan (FMP) (established due to the 2005 BO) which required reef fishery vessels to have sea turtle release gear and instructions for how to use it onboard (NMFS 2011).

Due to the excessive take, NMFS formulated a new Biological Opinion in 2009 (NMFS 2009b), and to reduce take to an acceptable level from the status quo (see table for anticipated future takes), NMFS instituted management strategies via Amendment 31 to the Gulf of Mexico Reef Fishery FMP in April 2010. This amendment includes several measures aimed at reducing turtle hooking and entanglements, including a prohibition on bottom longline gears within the 35-fathom contour in the Gulf of Mexico (east of Cape San Blas, FL), a reduction in vessels holding reef fish permits via an endorsement program for those vessels landing at least 40,000lbs (18.1 mt) of reef fish per annum and a limit of 1,000 hooks onboard reef fish longline vessels, with a maximum of 750 hooks rigged for fishing at any time (75 FR 21512). Preliminary data suggest that these actions have successfully reduced sea turtle takes in the Reef Fish fishery. For 2009, before the amendment 31 restrictions were fully implemented, an estimated 48.5 loggerhead turtles were taken in the Reef Fish bottom longline fishery (95% CI 22.5-104.4) (NMFS 2010). Total interaction estimates for 2011 and 2012 are not publically available but are anticipated to be lower still. (J. Lee, pers comm). Additionally, the majority of sea turtle interactions have occurred in less than 210 ft of water (NMFS 2009a), while golden tilefish is fished in waters greater than 250 ft (Nitschke 2006). Due to effective bycatch management in the long line reef fish fishery specifically aimed at reducing loggerhead sea turtle take and to the low overlap between the tilefish fishery and loggerhead sea turtle habitat, fishing mortality for loggerheads is scored as "low" concern.

Justification:

	Status Quo	2009	2010	2011 and Beyond
Total Captures	519	295.8	228.4	207.6
Lethal Captures	314	179	138	126

Figure 14: Table 5. Status quo and anticipated annual loggerhead sea turtle captures on reef fish bottom longlines in the Gulf of Mexico under the proposed action in the 2009 NMFS Biological Opinion.

Red snapper

Factor 2.1 - Inherent Vulnerability

Gulf of Mexico Stock | Handlines and hand-operated pole-and-lines | United States | GMFMC
Gulf of Mexico Stock | Set longlines | United States | GMFMC

Medium

Red snapper, *Lutjanus campechanus*, has a vulnerability score of 55 out of 100 (Froese and Pauly 2014). This corresponds to a moderate inherent vulnerability.

Factor 2.2 - Abundance

Low Concern

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

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

Even though SSB is well below virgin levels, the 2018 stock assessment deems that GOM red snapper is no longer overfished, the SSB is well above the LRP, but below the TRP and abundance is considered "low" concern.

Justification:

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

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

The biggest uncertainty in the 2018 stock assessment is still the poor understanding of the stock-recruit relationship (SEDAR 2018a). This has meant that MSY is incalculable. The stock-recruit function relationship is poorly defined because of the unpredictable recruitment and a lack of data. Proxies have been created to replace MSY. The SPR of SPR26% has been selected as the optimal proxy. However, SPR26% does not include recruitment into the calculation and, therefore, does not aim to determine the maximum yield for economic gain. An SPR at 26% has been considered as too low a percentage for such a long-lived species (SEDAR 2013a). Other proxies of varying SPR including FSPR22%, FSPR24%, FSPR30% and FSPRmax or FSPR20% have been suggested. When FSPR30% was considered, it was suggested that FSPR26% would be the optimum proxy for MSY.

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

Factor 2.3 - Fishing Mortality

Gulf of Mexico Stock | Handlines and hand-operated pole-and-lines | United States | GMFMC
Gulf of Mexico Stock | Set longlines | United States | GMFMC

Low Concern

(NOAA 2017) According to the 2018 stock assessment, $F_{\text{current}}/\text{MFMT} = 0.823$ (SEDAR 2018a), where MFMT is the maximum fishing mortality threshold (defined as $F_{\text{SPR}26\%}$); therefore, overfishing is not occurring. Fishing mortality is fluctuating around sustainable proxy levels, and has decreased since previous stock assessments. There is concern that the 2017 landings (which have not been included in the 2018 stock assessment) may change the outcome of the overfishing status due to quota overages (of 50%) in the private sector (NOAA 2017). According to the 1st Quarter Stock Status Update for 2021, red snapper in the Gulf of Mexico is not currently experiencing overfishing (NMFS 2021). Therefore, a "low" concern score is awarded.

Justification:

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

Other sources of mortality originate mainly from recreational fishery, discards (in both the commercial and recreational fisheries) and when snapper are caught as bycatch in the shrimp trawl fishery. In three out of the past five years, the recreational fishery has exceeded its quota .

Smooth dogfish

Factor 2.1 - Inherent Vulnerability

Gulf of Mexico | Handlines and hand-operated pole-and-lines | United States | GMFMC

Gulf of Mexico | Set longlines | United States | GMFMC

High

Dusky smoothhound, *Mustelus canis*, has a vulnerability score of 87 out of 100 (Froese and Pauly 2014). This corresponds to a high inherent vulnerability.

Factor 2.2 - Abundance

Gulf of Mexico | Handlines and hand-operated pole-and-lines | United States | GMFMC

Gulf of Mexico | Set longlines | United States | GMFMC

Low Concern

A peer reviewed stock assessment of the Gulf of Mexico "smoothhound complex," which covers three species including smooth dogfish, was conducted through the SEDAR process with data through 2012 (SEDAR 2015c). MSY-based reference points have been defined for the complex (SEDAR 2015c). The preferred model run and all sensitivity runs were in agreement that recent (2012) abundance exceeded the biomass target by more than 65%, indicating the stock is not overfished. Short-term projections assuming constant harvest at 2012 level resulted in stock growth, while constant harvest at MSY levels resulted in stock declines, as would be expected for a stock above B_{MSY} . IUCN lists smooth dogfish as Near Threatened due to increased commercial importance in the US mid Atlantic region (Conrath 2009). However, the 2015 stock assessment cites genetic differences between Atlantic and Gulf of Mexico populations, indicating separate stocks (SEDAR 2015c). A recent stock assessment indicating abundance greater than a biomass target generally qualifies for an abundance score of "very low" concern, but assessment of the species within a stock complex requires modification of the score to "low" concern to account for uncertainties.

Factor 2.3 - Fishing Mortality

Gulf of Mexico | Handlines and hand-operated pole-and-lines | United States | GMFMC

Gulf of Mexico | Set longlines | United States | GMFMC

Low Concern

Fishing mortality estimates from the 2015 stock assessment indicate the smoothhound complex is not experiencing overfishing (SEDAR 2015c). The preferred model run and nearly all sensitivity runs estimated a fishing mortality ratio of $F_{2012}/F_{MSY} = 0.20$ or less (SEDAR 2015c). Projections assuming annual harvest continues at 2012 levels indicate that there is less than 10% probability that fishing mortality would exceed F_{MSY} levels (SEDAR 2015c). For these reasons, smooth dogfish in the Gulf of Mexico receive a fishing mortality score of "low" concern

Snowy grouper

Factor 2.1 - Inherent Vulnerability

Gulf of Mexico | Handlines and hand-operated pole-and-lines | United States | GMFMC
Southern Atlantic Coast Stock | Western Central Atlantic | Handlines and hand-operated pole-and-lines | United States | SAFMC
Gulf of Mexico | Set longlines | United States | GMFMC
Southern Atlantic Coast Stock | Western Central Atlantic | Set longlines | United States | SAFMC

High

Snowy grouper, *Hyporthodus niveatus*, has a vulnerability score of 64 out of 100 (Froese and Pauly 2014). This corresponds to a high inherent vulnerability.

Factor 2.2 - Abundance

Gulf of Mexico | Handlines and hand-operated pole-and-lines | United States | GMFMC
Gulf of Mexico | Set longlines | United States | GMFMC

High Concern

A stock assessment for snowy grouper in the Gulf of Mexico was conducted using data limited methods with data through 2014, and peer reviewed through the SEDAR process (SEDAR 2016b). Only one of three candidate models met the performance criteria (e.g., model convergence) for all the methods evaluated. This model, which uses a short time series of data (2010 to 2014), indicated the biomass in recent years was below threshold levels and fishing mortality exceeded a sustainable level; however, the time series was considered too short to provide reliable management advice (SEDAR 2016b). A similar model run with a longer time series of data (1990 to 2014) provided similar results for stock status, but did not meet all the performance criteria (SEDAR 2016b). Furthermore, no index of abundance is available for this species due to recent changes in the fishery distribution (SEDAR 2016b). Snowy grouper is listed as "Vulnerable" by IUCN (Bertoncini et al. 2018). The combination of high vulnerability and a lack of data to evaluate stock status of snowy grouper in the Gulf of Mexico leads to an abundance score of "high" concern

Southern Atlantic Coast Stock | Western Central Atlantic | Handlines and hand-operated pole-and-lines | United States | SAFMC
Southern Atlantic Coast Stock | Western Central Atlantic | Set longlines | United States | SAFMC

High Concern

Snowy grouper in the U.S. Southeast Atlantic is overfished with a biomass status estimate ($SSB_{2018}/SSB_{MSY} = 0.36$ and $SSB_{2018}/SSB_{MST} = 0.48$) (SEDAR 2020). It is in year 15 of a 34 year rebuilding plan (NMFS 2021). Additionally, snowy grouper is listed as 'vulnerable' by IUCN (Thierry et al. 2008) therefore the abundance is of "high" concern.

Factor 2.3 - Fishing Mortality

Gulf of Mexico | Handlines and hand-operated pole-and-lines | United States | GMFMC
Gulf of Mexico | Set longlines | United States | GMFMC

Moderate Concern

Observer data of shark and reef fish bottom longlines in the Gulf of Mexico in 2012, snowy grouper was more than 5% of catch when targeting deep water reef fish (which includes blueline tilefish)(Gulak et al. 2013). Snowy grouper comprised 1 to 5% of the catch of deep reef fish, reef fish, and grouper/snapper/tilefish mix from 2007 through 2010 {Hale et al. 2008}{Hale et al. 2009}{Hale et al. 2010}{Hale et al. 2011}. Based on the generally unknown status of snowy grouper in the Gulf of Mexico, the fishing mortality is of "moderate" concern.

Southern Atlantic Coast Stock | Western Central Atlantic | Handlines and hand-operated pole-and-lines | United States | SAFMC
Southern Atlantic Coast Stock | Western Central Atlantic | Set longlines | United States | SAFMC

High Concern

According to the 2020 stock assessment update (SEDAR 36) snowy grouper in the U.S. Southeast Atlantic has experienced overfishing throughout much of the assessment period (SEDAR 2020). While there was uncertainty in the results of this assessment, the stock is currently undergoing overfishing, with $F_{2016-2018}/F_{MSY} = 1.24$ (ibid). However, only 55% of the model runs agreed with the base run that the stock is undergoing overfishing (ibid).

According to the latest stock status update for snowy grouper in the southeast Atlantic, the stock is undergoing overfishing (NMFS 2021b) and the latest stock assessment suggests that it is probable that overfishing is occurring. Fishing mortality is considered above sustainable levels and a "high" concern score is given.

Justification:

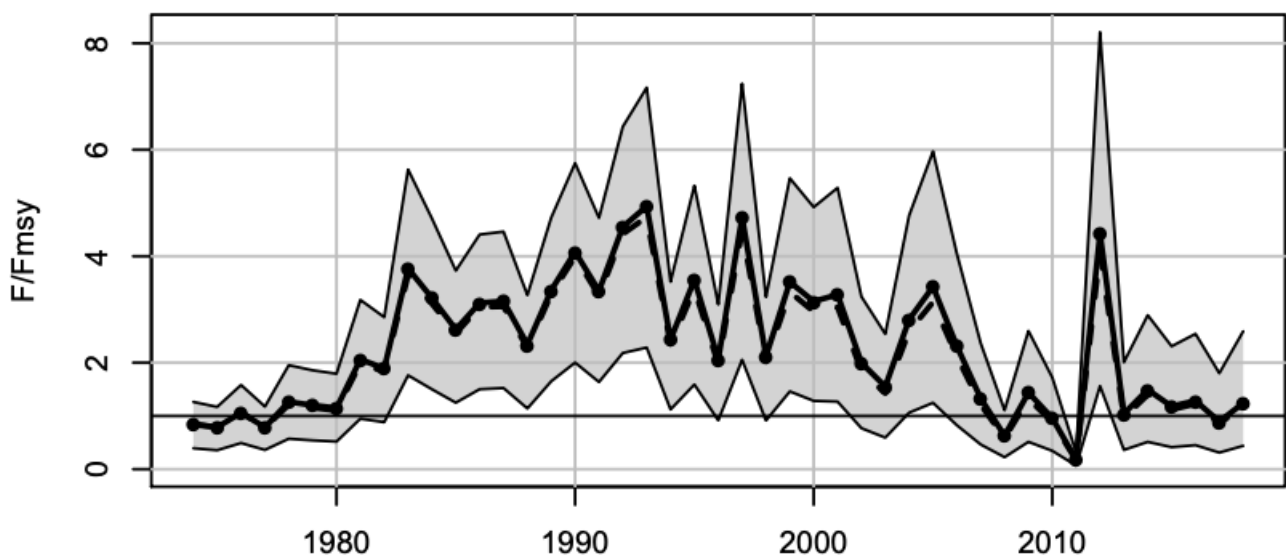


Figure 15: Estimated time series relative to benchmarks with F relative to F_{MSY} . Solid line indicates estimates from base run of the Beaufort Assessment Model; dashed lines represent median values which are indistinguishable from the base run in the upper 2 panels; gray error bands indicate 5th and 95th percentiles of the MCB trials (SEDAR 2020).

Southern hake

Factor 2.1 - Inherent Vulnerability

Western Central Atlantic | Handlines and hand-operated pole-and-lines | United States | SAFMC

Gulf of Mexico | Set longlines | United States | GMFMC

Western Central Atlantic | Set longlines | United States | SAFMC

Low

Southern hake, *Urophycis floridana*, has a vulnerability score of 34 out of 100 (Froese and Pauly 2014). This corresponds to a low inherent vulnerability.

Factor 2.2 - Abundance

Western Central Atlantic | Handlines and hand-operated pole-and-lines | United States | SAFMC

Gulf of Mexico | Set longlines | United States | GMFMC

Western Central Atlantic | Set longlines | United States | SAFMC

Moderate Concern

Southern hake lacks a stock assessment in either the Southeast Atlantic or the Gulf of Mexico. It also is assessed by the IUCN Red List of Threatened Species as a species of Least Concern because it has a wide distribution, is common and locally abundant, and has no known major threats (Espinosa-Perez 2015). As a result of its unknown abundance and low inherent vulnerability, southern hake are of moderate conservation concern.

Factor 2.3 - Fishing Mortality

Gulf of Mexico | Set longlines | United States | GMFMC

Low Concern

Southern hake lacks a stock assessment in the Gulf of Mexico. In 2012 observers of bottom longline fisheries targeting golden tilefish recorded 160 Phycid hake (which includes southern hake) in 33 hauls (Gulak et al. 2013). It is unknown what percentage this represents of total hauls. This was 6.5% of the total observed catch (and second most frequent catch) whereas the target species, golden tilefish, was 81.8% of the total observed catch (Gulak et al. 2013). Southern hake is a small component of a very specialized fishery, therefore despite its unknown fishing mortality it scores as low conservation concern.

Western Central Atlantic | Handlines and hand-operated pole-and-lines | United States | SAFMC Western Central Atlantic | Set longlines | United States | SAFMC

Low Concern

Southern hake lacks a stock assessment in the Southeast Atlantic. The most recent observer coverage of bottom longlines targeting golden tilefish in the Southeast Atlantic was from 2005-2007 (Hale et al. 2007a)(Hale et al. 2007b). In all years southern hake was the second most frequent catch (behind golden tilefish) at 7.2% in 2005-2006 and 2.1% in 2007 (Hale et al. 2007a)(Hale et al. 2007b). This compares to golden tilefish which comprised 90.7% in 2005-2006 and 94.8% in 2007 (Hale et al. 2007a)(Hale et al. 2007b). Southern hake is a small component of a very specialized fishery, therefore despite its unknown fishing mortality it scores as low conservation concern.

Speckled hind

Factor 2.1 - Inherent Vulnerability

Gulf of Mexico | Handlines and hand-operated pole-and-lines | United States | GMFMC

Gulf of Mexico | Set longlines | United States | GMFMC

High

Speckled hind, *Epinephelus drummondhayi*, has a vulnerability score of 60 out of 100 (Froese and Pauly 2014). This corresponds to a high inherent vulnerability.

Factor 2.2 - Abundance

Gulf of Mexico | Handlines and hand-operated pole-and-lines | United States | GMFMC

Gulf of Mexico | Set longlines | United States | GMFMC

High Concern

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

Speckled hind have also been identified as a "species of concern" under the US Endangered Species Act, indicating there is concern regarding its status but insufficient data to inform a formal determination (NMFS 2017a). The IUCN status for this species was Critically Endangered in 2013, but has more recently been changed to Least Concern (Gulf of Mexico) and Data Deficient (Global) (Carpenter et al. 2015).

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

Justification:

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

Factor 2.3 - Fishing Mortality

Gulf of Mexico | Handlines and hand-operated pole-and-lines | United States | GMFMC

Gulf of Mexico | Set longlines | United States | GMFMC

Moderate Concern

No explicit fishing mortality reference points are defined for Gulf of Mexico speckled hind, but the data-limited model conducted during SEDAR 49 indicates that there is only a 33.1% probability that overfishing is not occurring (SEDAR 2016b). However, according to observer data speckled hind was caught in small numbers when targeting deep reef fish (n=64 in 2010 and n=129 in 2012) which targets blueline tilefish (Hale et al. 2011){Hale et al. 2013}. During 2010 and 2012, 161 and 100 deep reef fish longline hauls were observed respectively (Hale et al. 2011){Hale et al. 2013}. Speckled hind was also observed in shallow reef fish catches (n=105 in 2010 and n=83 in 2012) from 383 and 427 longline hauls observed in 2010 and 2012, but this fishery does not catch either species of tilefish (Hale et al. 2011) {Hale et al. 2013}. As a result of the low occurrence in tilefish fisheries the fishing mortality of speckled hind in the Gulf of Mexico is of moderate conservation concern.

Warsaw grouper

Factor 2.1 - Inherent Vulnerability

Gulf of Mexico | Handlines and hand-operated pole-and-lines | United States | GMFMC

Gulf of Mexico | Set longlines | United States | GMFMC

High

Warsaw grouper, *Epinephelus nigritus*, has a vulnerability score of 68 out of 100 (Froese and Pauly 2014). This corresponds to a high inherent vulnerability.

Factor 2.2 - Abundance

Gulf of Mexico | Handlines and hand-operated pole-and-lines | United States | GMFMC

Gulf of Mexico | Set longlines | United States | GMFMC

High Concern

Warsaw grouper has been managed as part of the GMFMC Reef Fish complex since inception of the FMP (GMFMC 1981), but a formal stock assessment has never been conducted for this species. Warsaw grouper has been listed by IUCN as Near Threatened (Aguilar-Perera et al. 2018). Warsaw grouper has been on the candidate list for Endangered Species Act Listing since 1999 {Federal Register 1999} and NMFS placed it on the "Species of Concern" list in 2004 due to potential population decline and threats from fishing and bycatch (Federal Register 2004). In 2010, a petition to list Warsaw grouper under ESA was denied (Federal Register 2010) with the rationale that "warsaw grouper has always been too uncommonly captured in fisheries for data on landings or weight of fish landed to be a reliable indicator of population status and trends". Additionally, warsaw grouper is highly vulnerable to fishing pressure, as scored in C2.1.

These factors, in combination with the lack of a current stock assessment, warrant an abundance score of "high" concern for Gulf of Mexico Warsaw grouper.

Factor 2.3 - Fishing Mortality

Gulf of Mexico | Handlines and hand-operated pole-and-lines | United States | GMFMC

Gulf of Mexico | Set longlines | United States | GMFMC

Moderate Concern

Reported commercial landings for Warsaw grouper in the Gulf of Mexico increased during the 1990s and reached a recent peak of more than 200,000 lb (all gears combined) in the early 2000s (NMFS Fishery Statistics Division 2019). Since then, reported landings generally declined, and have been below 100,000 lb in 7 of the last 10 years (NMFS Fisheries Statistics Division 2019). Warsaw grouper are a member of the "deep water grouper" management complex in the Gulf of Mexico, and included in the deepwater grouper IFQ category (NMFS 2018), so harvest is limited by shares and allocation. NMFS characterizes the complex as not experiencing overfishing (NMFS 2021). However, no formal stock assessment has ever been conducted for this stock, and no information could be found regarding fishing mortality for Warsaw grouper in the Gulf of Mexico. Fishing mortality is unknown and the population is depleted, but effective management is in place (see below); therefore, we award a "moderate" concern score.

Justification:

For data poor species like warsaw grouper, management implementation is hampered due to data deficiencies. Stock status is not known, but control rules are in place to establish harvest limits that minimize overfishing. Grouper species complexes were developed in the Generic ACL/AM Amendment for the purpose of developing multispecies ACLs (GMFMC 2011b). The IFQ program was implemented to minimize overcapacity in order to achieve and maintain optimum yield in the fishery (GMFMC 2008) .

Yellowedge grouper

Factor 2.1 - Inherent Vulnerability

Gulf of Mexico Stock | Handlines and hand-operated pole-and-lines | United States | GMFMC
Western Central Atlantic | Handlines and hand-operated pole-and-lines | United States | SAFMC
Gulf of Mexico Stock | Set longlines | United States | GMFMC
Western Central Atlantic | Set longlines | United States | SAFMC

High

Yellowedge grouper, *Hyporthodus flavolimbatus*, has a vulnerability score of 66 out of 100 (Froese and Pauly 2014). This corresponds to a high inherent vulnerability.

Factor 2.2 - Abundance

Gulf of Mexico Stock | Handlines and hand-operated pole-and-lines | United States | GMFMC **Gulf of Mexico Stock | Set longlines | United States | GMFMC**

High Concern

Stock assessments for Gulf of Mexico yellowedge grouper were carried out in 2002 (determined inconclusive) and in 2011. The 2011 assessment (based on commercial and recreational impacts to the stock) concluded that the stock was not overfished. According to the stock assessment, the most realistic range estimate for B/BMSY (using a Spawning Potential Ratio (SPR) of 30% as a proxy for Maximum Sustainable Yield (MSY) and based on spawning stock biomass in 2009 relative to the minimum stock size threshold) was 0.96 to 1.36 (SEDAR 2011b).

There were high degrees of uncertainty among the numerous model outputs in the stock assessment, with results indicating that the stock could be close to overfished (SEDAR 2011b). For the preferred outcome (which resulted in the stock not being overfished), the stock assessment modelled biomass with the less conservative SPR30% as a proxy for MSY rather than the more conservative SPR40%. Choosing SPR40% would have led to an "overfished" determination. Due to the very high vulnerability of this species to fishing mortality, SPR40% may have been a more appropriate MSY proxy. Independent reviews of the stock assessment discussed the choice of SPR percentage as a management decision, such that setting SPR at the more conservative 40% assumes a lower biological risk that the stock will be overfished (Medley 2011).

Yellowedge grouper is listed as Vulnerable by IUCN on the global level (Padovani-Ferreira et al. 2018), but Least Concern in the Gulf of Mexico (Claro et al. 2015). However, Gulf of Mexico rating is also based on the 2011 stock assessment, so the data underlying the IUCN assessment is likewise dated.

Seafood Watch considers the stock status to be unknown because the assessment is outdated (published in 2011 and based on data through 2009). Overfishing a major threat to this species and recent shifts to greater fishing depths in red grouper longline fishery could lead to increased fishing pressure on yellowedge grouper (Padovani-Ferreira et al. 2018). The current status of golden tilefish in the Gulf of Mexico is unknown and the species is highly vulnerable. Therefore, we award a "high" concern score.

Western Central Atlantic | Handlines and hand-operated pole-and-lines | United States | SAFMC **Western Central Atlantic | Set longlines | United States | SAFMC**

High Concern

The last stock assessment for yellowedge grouper in the U.S. Southeast Atlantic took place in 2004 (SEDAR 2004) and therefore is out of date. There are no plans to conduct further stock assessments of yellowedge grouper in the Southeast Atlantic (SEDAR 2014). The NMFS Summary of Stock Statuses lists the overfished status of the deepwater snapper-grouper complex as unknown (NMFS 2021). Also, yellowedge grouper is listed as vulnerable by IUCN Redlist (Padovani-Ferreira et al. 2018). Due to the IUCN listing and high inherent vulnerability, yellowedge grouper in the U.S. Southeast Atlantic has a high conservation concern.

Factor 2.3 - Fishing Mortality

Gulf of Mexico Stock | Handlines and hand-operated pole-and-lines | United States | GMFMC **Gulf of Mexico Stock | Set longlines | United States | GMFMC**

Low Concern

Stock assessments for Gulf of Mexico yellowedge grouper were carried out in 2002 (determined inconclusive) and in 2011. The 2011 assessment (based on commercial and recreational impacts to the stock), concluded that the stock was not experiencing overfishing. According to the stock assessment, the most realistic range estimate for F/FMSY (using a Spawning Potential Ratio (SPR) of 30% as a proxy for Maximum Sustainable Yield (MSY) based on the average fishing mortality between 2007 to 2009 relative to the maximum fishing mortality threshold) was 0.78 to 1.30. (SEDAR 2011b). However, there were high degrees of uncertainty among the numerous model outputs, with results indicating that the stock could be experiencing overfishing (SEDAR 2011b) and the stock assessment is based on data that is now more than 10 years old.

Commercial landings of yellowedge grouper averaged 781,800 lbs from 2010-2020 (NOAA 2021b); the average landings before the IFQ program started in 2010 was 792,055 lbs (NMFS 2018). This species is managed within the deep-water grouper (DWG) complex under a combined quota; the quota is currently 1.024 million lbs and has not been exceeded since it was introduced in 2010 (NMFS 2021c). Yellowedge grouper accounts for 70-81% of the DWG landings (ibid). According to the 1st Quarter Stock Status Update for 2021, yellowedge grouper is not currently experiencing overfishing (NMFS 2021).

Fishing mortality is scored as "low concern" because landings are consistently below the established quota and NOAA currently considers fishing levels to be sustainable.

Justification:

Two of the individual peer reviewers state that appropriate reference point levels are a function of manager risk tolerance (Medley 2011), while a third reviewer provides an argument that 20% SPR might be more appropriate for yellowedge grouper (Sparholt 2011). The GMFMC Generic Sustainable Fishery Act Amendment (GMFMC 1999a) provides justification for using reference points based on 30% SPR in the reef fish fishery. As such, the score for yellowedge grouper is based on a fishing mortality threshold of FSPR30%.

Western Central Atlantic | Handlines and hand-operated pole-and-lines | United States | SAFMC **Western Central Atlantic | Set longlines | United States | SAFMC**

Moderate Concern

The last stock assessment for yellowedge grouper in the U.S. Southeast Atlantic took place in 2004 (SEDAR 2004) and therefore is out of date. There are no plans to conduct further stock assessments of yellowedge grouper in the Southeast Atlantic (SEDAR 2014). The NMFS Summary of Stock Statuses lists the yellowedge grouper as not experiencing overfishing (NMFS 2014a). Yellowedge grouper fishing mortality in the Southeast Atlantic is considered of moderate conservation concern based on the unknown status of overfishing.

Factor 2.4 - Modifying Factor: Discards and Bait Use

Gulf of Mexico Stock | Handlines and hand-operated pole-and-lines | United States | GMFMC

20-40%

The discards to landings ratio is 40%. This ratio is based on observer count data covering 7,391 handline sets from August 2006 to November 2009 in the whole Gulf of Mexico reef fish fishery {Scott-Denton et al. 2011}.

Gulf of Mexico Stock | Set longlines | United States | GMFMC

20-40%

In 2012, 33 hauls were observed for golden tilefish targeted in the Gulf of Mexico {Gulak 2013}. These fished between 311 and 442 m in depth and golden tilefish was the most frequently caught species (81.8% of the catch)(Gulak et al. 2013). In this small sample the discards to landings ratio was 16.9%. As for blueline tilefish in the Gulf of Mexico, they are not currently observed separately from the deepwater reef fish fishery. In 2012, 100 hauls were observed for deepwater reef fish which caught blueline tilefish most frequently (26.8% of the catch)(Gulak et al. 2013). The discards to landings ratio of this fishery was 55.0% in 2012. Potential bycatch species for either tilefish fishery may include other deep water snapper/grouper species, but discards are likely few since discard mortality is likely 100% (SAFMC 2010) (SEDAR 2011a)(Gulak et al. 2013). The small sample size of observed hauls for these fisheries make it difficult to assess the discard to landings ratio, but with the available information a ratio between 20-40% is used to be conservative for the golden tilefish and a smaller ratio than the deepwater reef fish fishery because both species are managed by an IFQ and the deepwater reef fish fishery is not a target fishery for blueline tilefish.

Mid-Atlantic Coast Stock | Northwest Atlantic | Set longlines | United States | MAFMC

< 20%

In the Mid-Atlantic out of 1,124 bottom longline trips targeting golden tilefish from 2003-2012 the discards to total landings was 12,649 lbs discards to 16,207,469 lbs total which is less than 1% (MAFMC 2013). Spiny dogfish (*Squalus acanthias*) was discarded the most often (11,500 lbs discarded)(MAFMC 2013). The bottom longline fishery in the Mid-Atlantic targeting golden tilefish has a discards to total landings ratio less than 1%.

Southern Atlantic Coast Stock | Western Central Atlantic | Handlines and hand-operated pole-and-lines | United States | SAFMC

20-40%

The discards to landings ratio is 24%. This ratio is based on observer count data from 59 vertical line snapper-grouper fishery trips over 316 days covering the region extending from southern North Carolina to northern Florida (Helies and Jamison 2013). This observer coverage is very low and the percent that is directed tilefish fishing is unknown. Actual discards of blueline tilefish in the South Atlantic are 1% (SEDAR 2011c)(SEDAR 2013c). Without better data, the discards to landings ratio is between 20 and 40%.

Southern Atlantic Coast Stock | Western Central Atlantic | Handlines and hand-operated pole-and-lines | United States | SAFMC

< 20%

Discards of golden tilefish in the South Atlantic are less than 1% (could not be calculated)(SEDAR 2011c). In the South Atlantic southern hake is the only other species that compose greater than 5% of the total catch. It comprises 6.4% of the total catch (Gulak et al. 2013). Therefore even if it is 100% discarded (with 1% golden tilefish discards) the discard to landings ratio would still only be 7.3%. The discards to landings ratio for golden tilefish in the South Atlantic is less than 20%.

Southern Atlantic Coast Stock | Western Central Atlantic | Set longlines | United States | SAFMC

20-40%

There is no recent observer data for bottom longlines targeting golden tilefish or blueline tilefish in the Southeast Atlantic. Therefore data from the Gulf of Mexico is used as a proxy. In 2012, 33 hauls were observed for golden tilefish targeted in the Gulf of Mexico {Gulak 2013}. These fished between 311 and 442 m in depth and golden tilefish was the most frequently caught species (81.8% of the catch)(Gulak et al. 2013). In this small sample the discards to landings ratio was 16.9%. As for blueline tilefish in the Gulf of Mexico, they are not currently observed separately from the deepwater reef fish fishery. In 2012, 100 hauls were observed for deepwater reef fish which caught blueline tilefish most frequently (26.8% of the catch)(Gulak et al. 2013). The discards to landings ratio of this fishery was 55.0% in 2012. Potential bycatch species for either tilefish fishery may include other deep water snapper/grouper species, but discards are likely few since discard mortality is likely 100% (SAFMC 2010)(SEDAR 2011a)(Gulak et al. 2013). The small sample size of observed hauls for these fisheries make it difficult to assess the discard to landings ratio, but with the available information a ratio between 20-40% is used to be conservative for the golden tilefish and a smaller ratio than the deepwater reef fish fishery. Discards in the South Atlantic are 1% for blueline tilefish specifically and less than that (could not be calculated) for golden tilefish specifically (SEDAR 2011c)(SEDAR 2013c). Without more data the discards to landing ratio for golden and blueline tilefish is estimated to be 20-40%.

Criterion 3: Management Effectiveness

Management is separated into management of retained species (harvest strategy) and management of nonretained species (bycatch strategy). The final score for this criterion is the geometric mean of the two scores.

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 either or both of Harvest Strategy (Factor 3.1) and Bycatch Management Strategy (Factor 3.2) ratings are Critical

Criterion 3 Summary

FISHERY	HARVEST STRATEGY	BYCATCH MANAGEMENT STRATEGY	SCORE
Gulf of Mexico Handlines and hand-operated pole-and-lines United States GMFMC	3.000	3.000	Yellow (3.000)
Gulf of Mexico Set longlines United States GMFMC	3.000	3.000	Yellow (3.000)
Gulf of Mexico Set longlines United States GMFMC	3.000	3.000	Yellow (3.000)
Northwest Atlantic Set longlines United States MAFMC	5.000	-1.000	Green (5.000)
Western Central Atlantic Handlines and hand-operated pole-and-lines United States SAFMC	4.000	3.000	Green (3.464)
Western Central Atlantic Handlines and hand-operated pole-and-lines United States SAFMC	4.000	3.000	Green (3.464)
Western Central Atlantic Set longlines United States SAFMC	4.000	3.000	Green (3.464)
Western Central Atlantic Set longlines United States SAFMC	4.000	3.000	Green (3.464)

Factor 3.1 Summary

FISHERY	STRATEGY	RECOVERY	RESEARCH	ADVICE	ENFORCE	TRACK	INCLUSION
Gulf of Mexico Handlines and hand-operated pole-and-lines United States GMFMC	Moderately Effective	N/A	Moderately Effective	Highly effective	Moderately Effective	Moderately Effective	Highly effective
Gulf of Mexico Set longlines United States GMFMC	Moderately Effective	N/A	Moderately Effective	Highly effective	Moderately Effective	Moderately Effective	Highly effective
Gulf of Mexico Set longlines United States GMFMC	Moderately Effective	N/A	Moderately Effective	Highly effective	Moderately Effective	Moderately Effective	Highly effective
Northwest Atlantic Set longlines United States MAFMC	Highly effective	Highly effective	Highly effective	Highly effective	Highly effective	Highly effective	Highly effective
Western Central Atlantic Handlines and hand-operated pole-and-lines United States SAFMC	Highly effective	Highly effective	Moderately Effective	Highly effective	Moderately Effective	Moderately Effective	Highly effective

Western Central Atlantic Handlines and hand-operated pole-and-lines United States SAFMC	Highly effective	Highly effective	Highly effective	Highly effective	Moderately Effective	Highly effective	Highly effective
Western Central Atlantic Set longlines United States SAFMC	Highly effective	Highly effective	Moderately Effective	Highly effective	Moderately Effective	Moderately Effective	Highly effective
Western Central Atlantic Set longlines United States SAFMC	Highly effective	Highly effective	Highly effective	Highly effective	Moderately Effective	Highly effective	Highly effective

Factor 3.2 Summary

FISHERY	ALL SPECIES RETAINED?	CRITICAL?	STRATEGY	RESEARCH	ADVICE	ENFORCE
Gulf of Mexico Handlines and hand-operated pole-and-lines United States GMFMC	No	No	Moderately Effective	Moderately Effective	Highly effective	Moderately Effective
Gulf of Mexico Set longlines United States GMFMC	No	No	Moderately Effective	Moderately Effective	Highly effective	Moderately Effective
Gulf of Mexico Set longlines United States GMFMC	No	No	Moderately Effective	Moderately Effective	Highly effective	Moderately Effective
Northwest Atlantic Set longlines United States MAFMC	Yes	No				
Western Central Atlantic Handlines and hand-operated pole-and-lines United States SAFMC	No	No	Moderately Effective	Moderately Effective	Highly effective	Moderately Effective
Western Central Atlantic Handlines and hand-operated pole-and-lines United States SAFMC	No	No	Moderately Effective	Moderately Effective	Highly effective	Moderately Effective
Western Central Atlantic Set longlines United States SAFMC	No	No	Moderately Effective	Moderately Effective	Highly effective	Moderately Effective
Western Central Atlantic Set longlines United States SAFMC	No	No	Moderately Effective	Moderately Effective	Highly effective	Moderately Effective

Golden tilefish fished in the Mid-Atlantic is excellently managed and have no significant bycatch. Golden and blueline tilefish fished in the Gulf of Mexico is well-managed with moderate bycatch species management. These scores are driven by the lack of stock assessment for blueline tilefish and the unknown and IUCN statuses of concern for some of the bycatch species. The South Atlantic fisheries are the worst scoring as far as management goes. The management of both golden and blueline in the South Atlantic is well-managed, but the bycatch species are moderate. These scores are driven by the lack of monitoring of bycatch species.

Criterion 3 Assessment

SCORING GUIDELINES

Factor 3.1 - Harvest Strategy

Seven subfactors are evaluated: Management Strategy, Recovery of Species of Concern, Scientific Research/Monitoring, Following of Scientific Advice, Enforcement of Regulations, Management Track Record, and Inclusion of Stakeholders. Each is rated as 'ineffective,' 'moderately effective,' or 'highly effective.'

- 5 (Very Low Concern)—Rated as 'highly effective' for all seven subfactors considered
- 4 (Low Concern)—Management Strategy and Recovery of Species of Concern rated 'highly effective' and all other

subfactors rated at least 'moderately effective.'

- *3 (Moderate Concern)—All subfactors rated at least 'moderately effective.'*
- *2 (High Concern)—At minimum, meets standards for 'moderately effective' for Management Strategy and Recovery of Species of Concern, but at least one other subfactor rated 'ineffective.'*
- *1 (Very High Concern)—Management exists, but Management Strategy and/or Recovery of Species of Concern rated 'ineffective.'*
- *0 (Critical)—No management exists when there is a clear need for management (i.e., fishery catches threatened, endangered, or high concern species), OR there is a high level of Illegal, unregulated, and unreported fishing occurring.*

Subfactor 3.1.1 – 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? To achieve a highly effective rating, there must be appropriate management goals, and evidence that the measures in place have been successful at maintaining/rebuilding species.

Subfactor 3.1.2 – Recovery of Species of Concern

Considerations: When needed, are recovery strategies/management measures in place to rebuild overfished/threatened/ endangered species or to limit fishery's impact on these species and what is their likelihood of success? To achieve a rating of Highly Effective, rebuilding strategies that have a high likelihood of success in an appropriate timeframe must be in place when needed, as well as measures to minimize mortality for any overfished/threatened/endangered species.

Subfactor 3.1.3 – Scientific Research and Monitoring

Considerations: How much and what types of data are collected to evaluate the health of the population and the fishery's impact on the species? To achieve a Highly Effective rating, population assessments must be conducted regularly and they must be robust enough to reliably determine the population status.

Subfactor 3.1.4 – Management Record of Following Scientific Advice

Considerations: How often (always, sometimes, rarely) do managers of the fishery follow scientific recommendations/advice (e.g. do they set catch limits at recommended levels)? A Highly Effective rating is given if managers nearly always follow scientific advice.

Subfactor 3.1.5 – 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.

Subfactor 3.1.6 – Management Track Record

Considerations: Does management have a history of successfully maintaining populations at sustainable levels or a history of failing to maintain populations at sustainable levels? A Highly Effective rating is given if measures enacted by management have been shown to result in the long-term maintenance of species overtime.

Subfactor 3.1.7 – 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 and includes stakeholder input.

Factor 3.2 - Bycatch Strategy

Four subfactors are evaluated: Management Strategy and Implementation, Scientific Research and Monitoring, Record of Following Scientific Advice, and Enforcement of Regulations. Each is rated as 'ineffective,' 'moderately effective,' or 'highly effective.' Unless reason exists to rate Scientific Research and Monitoring, Record of Following Scientific Advice, and

Enforcement of Regulations differently, these rating are the same as in 3.1.

- 5 (Very Low Concern)—Rated as 'highly effective' for all four subfactors considered
- 4 (Low Concern)—Management Strategy rated 'highly effective' and all other subfactors rated at least 'moderately effective.'
- 3 (Moderate Concern)—All subfactors rated at least 'moderately effective.'
- 2 (High Concern)—At minimum, meets standards for 'moderately effective' for Management Strategy but some other factors rated 'ineffective.'
- 1 (Very High Concern)—Management exists, but Management Strategy rated 'ineffective.'
- 0 (Critical)—No bycatch management even when overfished, depleted, endangered or threatened species are known to be regular components of bycatch and are substantially impacted by the fishery

Subfactor 3.2.2 – Management Strategy and Implementation

Considerations: What type of management strategy/measures are in place to reduce the impacts of the fishery on bycatch species and how successful are these management measures? To achieve a Highly Effective rating, the primary bycatch species must be known and there must be clear goals and measures in place to minimize the impacts on bycatch species (e.g., catch limits, use of proven mitigation measures, etc.)

Subfactor 3.2.3 – Scientific Research and Monitoring

Considerations: Is bycatch in the fishery recorded/documented and is there adequate monitoring of bycatch to measure fishery's impact on bycatch species? To achieve a Highly Effective rating, assessments must be conducted to determine the impact of the fishery on species of concern, and an adequate bycatch data collection program must be in place to ensure bycatch management goals are being met

Subfactor 3.2.4 – Management Record of Following Scientific Advice

Considerations: How often (always, sometimes, rarely) do managers of the fishery follow scientific recommendations/advice (e.g., do they set catch limits at recommended levels)? A Highly Effective rating is given if managers nearly always follow scientific advice.

Subfactor 3.2.5 – Enforcement of Management Regulations

Considerations: Is there a monitoring/enforcement system in place to ensure fishermen follow management regulations and what is the level of fishermen's compliance with regulations? To achieve a Highly Effective rating, there must be consistent enforcement of regulations and verification of compliance.

Factor - Critical?

Western Central Atlantic | Handlines and hand-operated pole-and-lines | United States | SAFMC
Gulf of Mexico | Set longlines | United States | GMFMC
Northwest Atlantic | Set longlines | United States | MAFMC
Western Central Atlantic | Set longlines | United States | SAFMC
Gulf of Mexico | Handlines and hand-operated pole-and-lines | United States | GMFMC

No

Factor 3.1.1 - Mgmt Strategy / Implement

Moderately Effective

A FMP was implemented in 1984 for reef fishes in the Gulf of Mexico, blueline tilefish was added in 1990 (SEDAR 2011a). Amendment 29 to the FMP created an IFQ system which was implemented in 2010 (GMFMC 2013d). This approach sought to reduce derby style fishing and fishery closures due to overages (SEDAR 2011a). The IFQ system has five share categories with distinct shares and allocations (GMFMC 2013d). Blueline tilefish is in a category with other tilefish (golden tilefish and goldface tilefish) meaning that a vessel must have an allocation in the tilefishes category to land any species of tilefish (GMFMC 2013d). Many vessels have allocations in multiple categories, but the separate allocations between categories make landings of different species dependent on the allocation each vessel has (GMFMC 2013d). For this reason red snapper, snowy grouper, speckled hind, Warsaw grouper, and yellowedge grouper are addressed in Criterion 3.2. There is no size limit for blueline tilefish and quotas were not established until 2004 (SEDAR 2011a). Quotas for the tilefish category were 440,000 lbs in 2011 then raised to 582,000 lbs in 2012 (GMFMC 2013d). Blueline tilefish typically account for made up about 9-30% of the tilefish category catch (SERO 2020).

The tilefish fishery is managed with a TAC that includes a buffer to account for uncertainty. However, this TAC is based on historical landings and not on the biology of the target species (Lombardi-Carlson 2012). The TAC is set at 100% of the average catch from 1999-2004; Seafood Watch recommends that TACs be based on 75% of the average catch if the stock is believed to be healthy. Blueline tilefish have not been assessed in the Gulf of Mexico and there is no current estimate of abundance, which makes it difficult to assess the effectiveness of the current TAC. There are some management measures in place but there is insufficient evidence to suggest that the measures are highly effective. Therefore, management strategy is scored as "moderately effective."

Moderately Effective

A Fishery Management Plan (FMP) was implemented in 1984 for reef fishes in the Gulf of Mexico, golden tilefish was included in the original FMP (SEDAR 2011a). Amendment 29 to the FMP created an IFQ system which was implemented in 2010 (GMFMC 2013d). This approach sought to reduce derby style fishing and fishery closures due to overages (SEDAR 2011a). The IFQ system has five share categories with distinct shares and allocations (GMFMC 2013d). Golden tilefish is in a category with other tilefish (blueline tilefish and goldface tilefish) meaning that a vessel must have an allocation in the tilefishes category to land any species of tilefish (GMFMC 2013d). There is no size limit for golden tilefish and quotas were not established until 2004 (SEDAR 2011a). The first stock assessment was conducted in 2011 for golden tilefish (SEDAR 2011a). Quotas for the tilefish category were 440,000 lbs in 2011 then raised to 582,000 lbs in 2012 (GMFMC 2013d). Golden tilefish typically account for 70-90% of the tilefish category catch (SERO 2020).

The unique life history traits of this species (e.g. high site fidelity, long-lived, slow growing) make tilefish highly susceptible to overfishing, and it's complex breeding and reproductive strategy is not well understood (Lombardi-Carlson 2012). A recent analysis of fish spawning aggregations (FSAs) in the U.S. Gulf of Mexico evaluated whether management measures protect species during their spawning season (Heyman et al. 2019). Although this species is not known to form FSAs, management measures nonetheless fail to protect tilefish during the spawning season. Management of tilefish had one of the worst scores of the 28 species evaluated in the study; blueline tilefish was not assessed. A scoring rubric ranked management measures on a scale of 1-4, where levels of management to protect species from fishing during their spawning season were 1 (high), 2 (medium), 3 (low) and 4 (no management). The scoring rubric is further described in the Justification section below. The mean score for overall level of management of tilefish in federal and state waters was 4 (i.e. no management).

The tilefish fishery is managed with a TAC that includes a buffer to account for uncertainty. However, this TAC is based on historical landings and not on the biology of the target species (Lombardi-Carlson 2012). The TAC is set at 100% of the average catch from 1999-2004; Seafood Watch recommends that TACs be based on 75% of the average catch if the stock is believed to be healthy. The last stock assessment was conducted in 2011 and there is no current estimate of abundance, which makes it difficult to assess the effectiveness of the current TAC. There are some management measures in place but there is insufficient evidence to suggest that the measures are highly effective. Therefore, management strategy is scored as "moderately effective."

Justification:

Management Type	Measure of management	Scoring Rubric			
Catch and Effort Limits	Number of regulations	5	4	1-3	0
Gear Limitations	Number of legal gear types	0-1	3-5	6-8	9+
Seasonal Restrictions	Catch restrictions during spawning	Full spawning season closure	Seasonal closure during peak spawning	Seasonal closure not during spawning	No seasonal closures
Site Closures	Spatial closure of spawning sites	Site closed all year	Site closed part of the year	Restricted gear in designated sites	No site closures
Level of Management (score)		High (1)	Medium (2)	Low (3)	None (4)

Figure 16: Rubric for the scaled levels of management used in Table 5. Scores range between 1 (high), 2 (medium), 3 (low), to 4 (no management). Table from (Heyman et al. 2019).

Management status of Tilefish (*Lopholatilus chamaeleonticeps*) in federal and state waters. Values in state columns are calculated as the average from each of the five U.S. Gulf of Mexico states. Adapted from (Heyman et al. 2019).

Federal Management Measures				State Management Measures				Overall Level of Management		
Catch and Effort	Gear	Seasonal	Site Closures	Catch and Effort	Gear	Seasonal	Site Closures	Federal (Mean)	State (Mean)	Overall (Mean)
4	4	4	3	4	3	4	4	4	4	4

Northwest Atlantic | Set longlines | United States | MAFMC

Highly effective

A FMP was implemented in 2001 for the Mid-Atlantic golden tilefish fishery which established a stock rebuilding strategy, total allowable landings (TAL), and a limited entry program (MAFMC 2013). Amendment One to the FMP established an IFQ program in 2009 (MAFMC 2013). This approach sought to reduce derby style fishing and fishery closures due to overages (MAFMC 2008). Stock assessments for golden tilefish have been conducted in 1992, 1999, 2005, 2009 and 2014 (SAW 2009)(SAW 2014). The 2009 and 2014 stock assessment determined that the Mid-Atlantic stock was not overfished and was not experiencing overfishing (SAW 2009)(SAW 2014). Fishing mortality has been below F_{MSY} since 1999 (MAFMC 2013). The MAFMC has several tilefish specific research goals for 2013-2017 including understanding recruitment, evaluating local population structure, and tilefishes' role as ecosystem engineers (MAFMC 2014a). Overall the management strategy and implementation for Mid-Atlantic golden tilefish is highly effective.

Western Central Atlantic | Handlines and hand-operated pole-and-lines | United States | SAFMC
Western Central Atlantic | Set longlines | United States | SAFMC

Highly effective

For longline, blueline tilefish are generally managed in the deepwater complex which is within the South Atlantic snapper grouper FMP which was implemented in 1983 (SAFMC 2014d). The deepwater complex includes yellowedge grouper (as well as six other species that are not caught in large numbers with blueline tilefish) (SAFMC 2014d). In 2012, the deepwater complex reached its Annual Catch Limit (ACL) on September 9th, but did not reach its ACL in 2013 (SERO 2014a). In 2014, blueline tilefish was temporarily separated from the deepwater complex into its own category and has reached its ACL as of June 23rd, 2014, and the rest of the deepwater complex reached the ACL on July 10th, 2014 (SERO 2014b). Snowy grouper, speckled hind, and Warsaw grouper are managed in the same FMP, but snowy grouper has a separate ACL (82,900 lbs) while speckled hind and Warsaw grouper are prohibited to be landed (SAFMC 2014a)(SERO 2014b). The snapper grouper fishery as a whole became a limited entry fishery in 1998; vessels landing more than 1000 lbs were allowed to keep their permit while all other vessels had a new 225 lb trip limit (SAFMC 2014d). Commercial quota for snowy grouper was established in 1994 and reduced to end overfishing in 2006 (SAFMC 2014d). Currently under development, Amendment 17 proposes spatial closures in the South Atlantic aimed at reducing bycatch mortality for Warsaw grouper and speckled hind (SAFMC 2010). There are no specifications pertaining to blueline tilefish fished by handline. There is no size or trip limit for blueline tilefish fished with either gear (SAFMC 2014a). Due to the continued modification to the snapper grouper FMP, the management strategy and implementation is considered highly effective.

Western Central Atlantic | Handlines and hand-operated pole-and-lines | United States | SAFMC
Western Central Atlantic | Set longlines | United States | SAFMC

Highly effective

Golden tilefish are managed in the South Atlantic snapper grouper FMP which was implemented in 1983 (SAFMC 2014d). Species included for blueline tilefish management strategy and implementation are not included for golden tilefish in the South Atlantic based on habitat differences. The current ACL for golden tilefish is 405,971 lbs for bottom longline (SERO 2014b). Golden tilefish fished by bottom longline was closed for the season on March 5th, 2014 (SERO 2014b). The bottom longline fishery in the South Atlantic has closed prior to the end of the season every year since 2006 (SERO 2014a). In 2011, 2012, and 2014 the fishery has closed before March 10th (SERO 2014a)(SERO 2014b). Golden tilefish may be fished via handline by fishermen without a longline endorsement until the annual catch limit (ACL) of 135,324 lbs gutted weight in 2014 is reached, which occurred on August 29th, 2014 (SAFMC 2014b)(SERO 2014b). A limited access permit is required and 4,000 lb gutted weight is the trip limit (SAFMC 2014b). There is no size limit for golden tilefish fished with either gear (SAFMC 2014b). In 2012, Amendment 18B established an endorsement program to limit participation in the golden tilefish fishery, specified gear allocation of 75% to bottom longline and 25% to hook and line, and limit vessels who do not qualify for the tilefish endorsement to 500 lbs gutted tilefish per trip (SAFMC 2012). Due to the frequent management updates, the management strategy and implementation is considered highly effective.

Factor 3.1.2 - Recovery of Stock Concerns

Gulf of Mexico | Handlines and hand-operated pole-and-lines | United States | GMFMC
Gulf of Mexico | Set longlines | United States | GMFMC

N/A

Overfished status of blueline tilefish in the Gulf of Mexico is unknown (NMFS 2021). Based on their current status, the recovery of stocks is scored as N/A.

Species included in Criteria 2 as main species (which are targeted species covered in the same FMP as blueline tilefish) are not included in this response because gears are set differently for tilefish as they are for those targeted species.

Gulf of Mexico | Set longlines | United States | GMFMC

N/A

Golden tilefish are not overfished in the Gulf of Mexico (NMFS 2021b), therefore the recovery of stocks is not applicable.

Northwest Atlantic | Set longlines | United States | MAFMC

Highly effective

Golden tilefish is not currently overfished (NMFS 2021b), but was overfished beginning in the 1980s (MAFMC 2013). The 2001 FMP implemented a constant harvest strategy (905 mt) for the stock to rebuild in 10 years (MAFMC 2001). By the 2005 assessment the abundance was increasing, but not recovered (MAFMC 2013). In 2009 an IFQ program took effect to better manage the golden tilefish (MAFMC 2013). Recent assessments deem the stock not overfished (MAFMC 2013)(MAFMC 2014c)(Nitschke 2017), therefore the recovery of stock is highly effective.

Western Central Atlantic | Handlines and hand-operated pole-and-lines | United States | SAFMC
Western Central Atlantic | Set longlines | United States | SAFMC

Highly effective

Blueline tilefish were considered overfished in the previous assessment (SEDAR 2013c), but is now above MSST and B_{MSY} (SEDAR 2017). Catch limits for blueline tilefish were separated from the Deepwater Complex in 2015 and emergency actions were put in place in 2016 to establish trip limits for recreational and commercial vessels (SEDAR 2017). Blueline tilefish is no longer overfished and this factor is scored "highly" effective.

Species included in Criteria 2 as main species (which are targeted species covered in the same FMP as blueline tilefish) are not included in this response because gears are set differently for tilefish as they are for those targeted species.

Western Central Atlantic | Handlines and hand-operated pole-and-lines | United States | SAFMC
Western Central Atlantic | Set longlines | United States | SAFMC

Highly effective

Golden tilefish are not overfished in the South Atlantic, but they were overfished from the 1990s to the early 2000s (SEDAR 2011c). There was no explicit stock recovery strategy implemented, but a big year class boosted the abundance to above overfished levels (SEDAR 2011c) and the stock remained above overfished levels according in 2020 (SEDAR 2021). Based on the current abundance levels the recovery of stocks is “highly” effective.

Factor 3.1.3 - Scientific Research / Monitoring

Gulf of Mexico | Handlines and hand-operated pole-and-lines | United States | GMFMC
Gulf of Mexico | Set longlines | United States | GMFMC

Moderately Effective

The first stock assessment for blueline tilefish in the Gulf of Mexico was conducted in 2011 (SEDAR 2011a). There was insufficient available data to create reference points for blueline tilefish, therefore it still has not formally been assessed (SEDAR 2011a). Fishery dependent and independent surveys were collected for blueline tilefish (SEDAR 2011a). The research of blueline tilefish in the Gulf of Mexico is considered moderately effective.

Gulf of Mexico | Set longlines | United States | GMFMC

Moderately Effective

The first stock assessment for golden tilefish in the Gulf of Mexico was conducted in 2011 (SEDAR 2011a). This assessment included catches, length and age compositions, abundance indices, and life history data (SEDAR 2011a). One commercial and one fishery independent survey were used in this assessment (SEDAR 2011a). It has been suggested that a deep water fishery independent surveys are important to further improve estimates of stock abundance (Lombardi-Carlson 2012); there have been surveys conducted in recent years to acquire baseline data on comparative abundances and species demographics of continental shelf demersal fishes (e.g. (Murawski et al. 2018)). However, this data has not resulted in an updated assessment of tilefish in the Gulf of Mexico. Since only one stock assessment has been conducted to date, the research of golden tilefish in the Gulf of Mexico is considered moderately effective.

Northwest Atlantic | Set longlines | United States | MAFMC

Highly effective

The last stock assessment for golden tilefish in the Mid-Atlantic was conducted in 2014 with previous assessments occurring in 2009, 2005, 1999, and first in 1992 (SAW 2014). There was some uncertainty about the stock status in the 2009 assessment, but the most recent assessment supports a rebuilt stock (SAW 2009)(SAW 2014). The 2014 assessment incorporated age and length data into an age-structured assessment model (ASAP) rather than the previously used surplus production model ASPIC (SAW 2014). The stock assessment relies on catch per unit effort (CPUE) data since no fishery independent surveys exist for this fishery (SAW 2014). Due to the frequent and robust stock assessments, the scientific research and monitoring are highly effective.

Western Central Atlantic | Handlines and hand-operated pole-and-lines | United States | SAFMC
Western Central Atlantic | Set longlines | United States | SAFMC

Moderately Effective

Blueline tilefish in the South Atlantic were first assessed in 2013 (SEDAR 2013c). Three fishery-dependent surveys were used for the catch-at-age model (SEDAR 2013c). With only one stock assessment the scientific research and monitoring are moderately effective.

Western Central Atlantic | Handlines and hand-operated pole-and-lines | United States | SAFMC
Western Central Atlantic | Set longlines | United States | SAFMC

Highly effective

Golden tilefish has had stock assessments completed in 1988, 1990, 1999, 2004, and 2011 and the data used has improved with each assessment (SEDAR 2011c). The data used include landings, age, length, abundance, and one fishery independent and one fishery dependent survey (SEDAR 2011c). The stock was assessed again in 2021 (SEDAR 2021). With up-to-date and robust stock assessments the scientific research and monitoring are highly effective.

Factor 3.1.4 - Scientific Advice

Gulf of Mexico | Set longlines | United States | GMFMC
Gulf of Mexico | Handlines and hand-operated pole-and-lines | United States | GMFMC

Highly effective

Gulf of Mexico Fishery Management Council (GMFMC) follows scientific advice as set out by their Science and Statistical Committee. The scientific advice is highly effective.

Northwest Atlantic | Set longlines | United States | MAFMC

Highly effective

Mid-Atlantic Fishery Management Council (MAFMC) follows scientific advice as set out by their Science and Statistical Committee. The scientific advice is highly effective.

Western Central Atlantic | Handlines and hand-operated pole-and-lines | United States | SAFMC
Western Central Atlantic | Set longlines | United States | SAFMC

Highly effective

South Atlantic Fishery Management Council (SAFMC) follows scientific advice as set out by their Science and Statistical Committee. The scientific advice is highly effective.

Factor 3.1.5 - Enforce

Gulf of Mexico | Set longlines | United States | GMFMC**Gulf of Mexico | Handlines and hand-operated pole-and-lines | United States | GMFMC****Moderately Effective**

Tilefish management in the Gulf of Mexico has recently switched to an IFQ system (implemented January 1, 2010) (GMFMC 2013d). Annual quotas are distributed among shareholders and are subject to change based on stock status changes (GMFMC 2013d). Any overages are deducted from that shareholder's allocation for the next year (GMFMC 2013d). This IFQ program was implemented to reduce overcapacity of the fishing fleet, increase harvesting efficiency, and eliminate derby fishing (GMFMC 2013d). A share cap exists for each IFQ category; for tilefishes no one shareholder may have more than 12.2% of the annual allocation (GMFMC 2013d). Vessels are monitored using a vessel monitoring system (VMS) while at sea (GMFMC 2013d). Vessels must provide a landing notification prior to returning to port and complete a landing transaction to offload (GMFMC 2013d). A recent study of enforcement under the IFQ program suggests that compliance has increased although levels of non-compliance remain substantial, and increased dockside enforcement is necessary (Porter et al. 2013). Overall the enforcement in the Gulf of Mexico is considered moderately effective.

Northwest Atlantic | Set longlines | United States | MAFMC**Highly effective**

Vessels commercially fishing for golden tilefish must submit a catch report by using the interactive voice response phone line system within 48 hours after returning to port and offloading (MAFMC 2008b). Vessel trip reports must be maintained on board the vessel and submitted to NMFS for all trips (MAFMC 2008b). These regulations were enacted after the golden tilefish switched to an IFQ system and are more stringent than before. If a vessel exceeds its IFQ allocation in a given year then the following year its IFQ allocation will be reduced by the overage of the previous year (MAFMC 2008b). From 2002 to 2012 the commercial landings of golden tilefish in the Mid-Atlantic have exceeded the total allowable landings (TAL) three times with a maximum overage of 0.652 million lbs on 1.995 million lbs TAL (MAFMC 2013). Two of these overages were due to the court decision of *Hadaja v. Evans* which postponed permitting and reporting requirements for the tilefish fishery during those years that had overages. The third overage was negligible. The rest of the years were under TAL, as much as 0.498 million lbs in 2005 (MAFMC 2013). As a result, the TAL overages were not caused by management problems therefore the enforcement is highly effective.

Western Central Atlantic | Handlines and hand-operated pole-and-lines | United States | SAFMC**Western Central Atlantic | Set longlines | United States | SAFMC****Moderately Effective**

The deepwater complex (which includes blueline tilefish) exceeded its ACL in 2012, but not in 2013 (SERO 2014a). In 2014, blueline tilefish was split into its own category (SERO 2014b). An amendment was proposed to institute a VMS in order to improve enforcement, but the SAFMC decided not to submit it for Secretarial review (SAFMC 2014d). Dealers are required to submit dealer purchase permits forms once every two weeks (SAFMC 2014c). Starting August 7, 2014 dealers must submit report once per week (including when no purchase is made)(SAFMC 2014c). Overall the enforcement for tilefishes in the South Atlantic is moderately effective.

Western Central Atlantic | Handlines and hand-operated pole-and-lines | United States | SAFMC
Western Central Atlantic | Set longlines | United States | SAFMC

Moderately Effective

Landings of golden tilefish in the South Atlantic exceeded the ACL from 2006 to 2011 (SERO 2014a). From 2010 to 2011 the ACL was decreased, but the ACL was still exceeded (SERO 2014a). The ACL was increased in 2012 by 258,476 lbs and has remained at this level through 2014 (SERO 2014a)(SERO 2014b). The ACL was not exceeded in 2012 and 2013 (SERO 2014a), but has been exceeded in 2014 (SERO 2014b). An amendment was proposed to institute a VMS in order to improve enforcement, but the SAFMC decided not to submit it for Secretarial review (SAFMC 2014d). Dealers are required to submit dealer purchase permits forms once every two weeks (SAFMC 2014c). Starting August 7, 2014 dealers must submit report once per week (including when no purchase is made)(SAFMC 2014c). Overall the enforcement for tilefishes in the South Atlantic is moderately effective.

Factor 3.1.6 - Track Record

Gulf of Mexico | Handlines and hand-operated pole-and-lines | United States | GMFMC
Gulf of Mexico | Set longlines | United States | GMFMC

Moderately Effective

The biomass trend for blueline tilefish in the Gulf of Mexico over time is unknown, therefore the track record is also unknown. A FMP was implemented in 1984 for reef fishes in the Gulf of Mexico, blueline tilefish was added in 1990 (SEDAR 2011a). There is no size limit for blueline tilefish and quotas were not established until 2004 (SEDAR 2011a). An IFQ system was put into place in 2010 to reduce derby-style fishing, but the change is too recent to see effects yet. Due to the unknown stock status of blueline tilefish, it has a moderately effective track record in the Gulf of Mexico.

Gulf of Mexico | Set longlines | United States | GMFMC

Moderately Effective

The stock biomass of golden tilefish in the Gulf of Mexico declined from the 1980s until 1990 and increased from 1996 to 2000 (SEDAR 2011a). Since 2000 the biomass has remained relatively constant (SEDAR 2011a). A FMP was implemented in 1984 for reef fishes in the Gulf of Mexico, golden tilefish was included in the original FMP {SEDAR 2011}. There is no size limit for golden tilefish and quotas were not established until 2004 (SEDAR 2011a). An IFQ system was put into place in 2010 to reduce derby-style fishing, but the change is too recent to see effects yet. Due to the increased then constant biomass of golden tilefish and that the change in management is too recent to see effects on the stock, this fishery has a moderately effective track record in the Gulf of Mexico.

Northwest Atlantic | Set longlines | United States | MAFMC

Highly effective

The stock biomass of golden tilefish in the Mid-Atlantic was below B_{MSY} from 1981 to 2008, but the stock biomass has been increasing steadily since 2000 and the population is not currently overfished (MAFMC 2013). The golden tilefish stock was first managed by a FMP introduced in 2011 (MAFMC 2013). The FMP introduced a stock rebuilding strategy and TALs to control fishing mortality (MAFMC 2013). An IFQ system was put into place in 2009 to reduce derby-style fishing, but the change is too recent to see effects yet (MAFMC 2008b). Due to the recovery of this population as a result of management measures, the track record is considered highly effective.

Western Central Atlantic | Handlines and hand-operated pole-and-lines | United States | SAFMC

Western Central Atlantic | Set longlines | United States | SAFMC

Moderately Effective

Blueline tilefish in the South Atlantic was below B_{MSY} from 1984 to 2004 and again for 2011 and 2012 (SEDAR 2013c). From 1998 through 2007 the stock biomass steadily increased, but then quickly decreased and dropped below B_{MSY} after 2010 (SEDAR 2013c). Blueline tilefish are included in the snapper grouper FMP which was implemented in 1983 (SEDAR 2011c). They are managed in the deepwater complex with an ACL (SERO 2014a). The fluctuating stock biomass of blueline tilefish results in a moderately effective track record for both species in the South Atlantic.

Western Central Atlantic | Handlines and hand-operated pole-and-lines | United States | SAFMC

Western Central Atlantic | Set longlines | United States | SAFMC

Highly effective

Golden tilefish in the South Atlantic was below B_{MSY} from 1990 to 2004, but the stock biomass has been increasing steadily since 2003 and is not currently overfished (SEDAR 2011c). South Atlantic golden tilefish are managed with an ACL, which has been exceeded every year since 2006 (SERO 2014a). They are included in the snapper grouper FMP which was implemented in 1983 (SEDAR 2011c). The high stock biomass results in a highly effective track record in the South Atlantic.

Factor 3.1.7 - Stakeholder Inclusion

Gulf of Mexico | Set longlines | United States | GMFMC

Gulf of Mexico | Handlines and hand-operated pole-and-lines | United States | GMFMC

Highly effective

The GMFMC developed a strategic communication plan in 2011 aimed at increasing stakeholder involvement through outreach and education strategies and to develop a system to evaluate the effectiveness of its communication tactics. (GMFMC 2011). The Gulf Council currently involves public stakeholders via public hearings on all proposed rule changes, at public testimonies, informal question and answer sessions, in person and via the web at Council meetings (where final actions are taken). Stakeholders can also provide public comment to NMFS and the Gulf Council before a rule is approved. Stakeholders also serve on Council advisory panels and committees (such as the Science and Statistical Committee). (GMFMC 2013a). Select stakeholders are also involved in the Southeast Data, Assessment, and Review (SEDAR) process.

Northwest Atlantic | Set longlines | United States | MAFMC

Highly effective

MAFMC meetings are open to the public except when dealing with personnel or litigation issues, and press releases summarizing the meeting are circulated to those on the mailing list (MAFMC 2008a). Public comments are encouraged and invited before (two weeks prior) and during each meeting (MAFMC 2008a). The public can also serve on advisory subpanels (MAFMC 2008a). Additionally, MAFMC's advisory panels develop annual Fishery Performance Reports that summarize fishermen's perspectives of the fishery that year that particularly help the process of setting quota's for data-poor stocks.

Western Central Atlantic | Handlines and hand-operated pole-and-lines | United States | SAFMC

Western Central Atlantic | Set longlines | United States | SAFMC

Highly effective

The SAFMC currently involves stakeholders via public hearings on all proposed rule changes and public testimonies at Council meetings (where final actions are taken), and in the SEDAR process. Stakeholders can also provide public comment to NMFS before a rule is approved. Stakeholders also serve on Council panels and committees (SAFMC 2013a).

Factor 3.2.1 - All Species Retained?

Northwest Atlantic | Set longlines | United States | MAFMC

Yes

In the Mid-Atlantic golden tilefish comprised 99.5% of the bottom longline catch targeting golden tilefish during 2003-2013 (MAFMC 2014c).

Western Central Atlantic | Handlines and hand-operated pole-and-lines | United States | SAFMC

Gulf of Mexico | Set longlines | United States | GMFMC

Western Central Atlantic | Set longlines | United States | SAFMC

Gulf of Mexico | Handlines and hand-operated pole-and-lines | United States | GMFMC

No

Factor 3.2.2 - Critical?

Western Central Atlantic | Handlines and hand-operated pole-and-lines | United States | SAFMC

Gulf of Mexico | Set longlines | United States | GMFMC

Northwest Atlantic | Set longlines | United States | MAFMC

Western Central Atlantic | Set longlines | United States | SAFMC

Gulf of Mexico | Handlines and hand-operated pole-and-lines | United States | GMFMC

No

Factor 3.2.3 - Mgmt Strategy / Implement

Moderately Effective

The blueline tilefish fishery in the Gulf of Mexico is managed by an IFQ system where any fish caught that is not a tilefish (blueline, golden or goldface) is either managed in a separate IFQ category (and subject to a different allocation) or is not managed in the IFQ and is regular bycatch. For loggerhead sea turtles in 2009 a Biological Opinion was released; it included several reasonable and prudent measures (RPMs) to minimize impacts on protected species (specifically sea turtles and smalltooth sawfish)(NMFS 2014c). These RPMs “require NMFS to: (1) avoid and minimize take through outreach and education; (2) minimize future gear impacts through research; and (3) monitor the frequency, magnitude, and impact of incidental take” (NMFS 2014c). A recently released report demonstrates that significant progress has been made on 6 terms and conditions from the 2009 biological opinion including training and education on the handling of sea turtles, fishery interactions with protected species, and improving observer coverage, bycatch reporting, and stock assessments (NMFS 2014c). Observer coverage began in 2005 for Gulf of Mexico fisheries (NMFS 2014c) and in 2008, 2010, and 2012, no protected species were caught during observer coverage of bottom longline gear targeting deepwater reef fish or tilefish in the Gulf of Mexico (Hale et al. 2009)(Hale et al. 2011)(Gulak et al. 2013). Five of the bycatch species listed in this report (red snapper, snowy grouper, speckled hind, Warsaw grouper, and yellowedge grouper) are managed under the reef fish FMP, are targeted species, and two have up-to-date stock assessments (SEDAR 2011b)(GMFMC 2013d)(SEDAR 2013a). These species are managed in a separate category of the IFQ or not in the IFQ (red snapper) and therefore are considered bycatch species of the blueline tilefish fishery since having a permit to fish for blueline tilefish does not allow fishing for these other species (GMFMC 2012)(GMFMC 2013d). Snowy grouper, speckled hind, and Warsaw grouper do not have stock assessments in the Gulf of Mexico. Snowy grouper has an unknown overfished status (NMFS 2014a), speckled hind and Warsaw grouper are critically endangered (Chuen and Huntsman 2006a)(Chuen and Huntsman 2006b). Dusky smoothhound does not have a stock assessment available for the Gulf of Mexico, but it is scheduled for a stock assessment in 2014 (SEDAR 2014).

Vessels must use non-stainless steel hooks, have dehooking device onboard, can only fish 750 hooks at any time and must comply with guidelines for proper care and release of sea turtles (GMFMC 2013b). To fish east of Cape San Blas, Florida a bottom longline endorsement is required and the gear is prohibited inside 50 fathoms west of Cape San Blas (GMFMC 2013b). Off of Florida fishing is prohibited in the Flower Garden Banks National Marine Sanctuary, North and South Tortugas Ecological Reserve, Madison-Swanson Marine Reserve, Steamboat Lumps Marine Reserve, Middle Grounds, Pulley Ridge, McGrail Bank, and Stetson Bank (GMFMC 2013b). Overall the management strategy and implementation for bycatch species is moderately effective.

Gulf of Mexico | Set longlines | United States | GMFMC

Moderately Effective

For golden tilefish fished in the Gulf of Mexico loggerhead turtles and southern hake are bycatch, species included for blueline tilefish are not included here mainly due to habitat use differences and fishing for golden tilefish do not overlap (GMFMC 2005). In 2009 a Biological Opinion was released; it included several reasonable and prudent measures (RPMs) to minimize impacts on protected species (specifically sea turtles and smalltooth sawfish)(NMFS 2014c). These RPMs “require NMFS to: (1) avoid and minimize take through outreach and education; (2) minimize future gear impacts through research; and (3) monitor the frequency, magnitude, and impact of incidental take” (NMFS 2014c). A recently released report demonstrates that significant progress has been made on 6 terms and conditions from the 2009 biological opinion including training and education on the handling of sea turtles, fishery interactions with protected species, and improving observer coverage, bycatch reporting, and stock assessments (NMFS 2014c). Observer coverage began in 2005 for Gulf of Mexico fisheries (NMFS 2014c) and in 2012, no protected species were caught during observer coverage of bottom longline gear targeting deepwater reef fish or tilefish in the Gulf of Mexico (Gulak et al. 2013). Southern hake does not have a stock assessment available for the Gulf of Mexico. Vessels must use non-stainless steel hooks, have dehooking device onboard, can only fish 750 hooks at any time and must comply with guidelines for proper care and release of sea turtles (GMFMC 2013b). To fish east of Cape San Blas, Florida a bottom longline endorsement is required and the gear is prohibited inside 50 fathoms west of Cape San Blas (GMFMC 2013b). Off of Florida fishing is prohibited in the Flower Garden Banks National Marine Sanctuary, North and South Tortugas Ecological Reserve, Madison-Swanson Marine Reserve, Steamboat Lumps Marine Reserve, Middle Grounds, Pulley Ridge, McGrail Bank, and Stetson Bank (GMFMC 2013b). Overall the management strategy and implementation for bycatch species is moderately effective.

Western Central Atlantic | Handlines and hand-operated pole-and-lines | United States | SAFMC **Western Central Atlantic | Set longlines | United States | SAFMC**

Moderately Effective

In 1999, Amendment 9 ruled that vessels with bottom longline gear onboard were only allowed to possess snowy grouper, Warsaw grouper, yellowedge grouper, misty grouper, golden tilefish, blueline tilefish, and sand tilefish (SAFMC 2014d). This eliminates landings of other species. Fishing for snapper-grouper is illegal in the Oculina Experimental Closed Area for at least 10 years beginning in 2004 (SAFMC 2014d). In 2009, Amendment 14 established eight Marine Protected Areas (MPAs) where fishing or possession of any snapper-grouper species is illegal (SAFMC 2007). Amendment 15B established the Atlantic Coastal Cooperative Statistics Program (ACCSP) to monitor bycatch (SAFMC 2008). This program requires vessels to allow observers onboard, maintain logbooks, and potentially use video monitoring (SAFMC 2008). Currently under development, Amendment 17 proposes MPAs in the South Atlantic aimed at reducing bycatch mortality for Warsaw grouper and speckled hind (SAFMC 2010). Overall the management strategy and implementation for bycatch species is moderately effective.

Moderately Effective

In 1999, Amendment 9 ruled that vessels with bottom longline gear onboard were only allowed to possess snowy grouper, Warsaw grouper, yellowedge grouper, misty grouper, golden tilefish, blueline tilefish, and sand tilefish (SAFMC 2014d). This eliminates landings of other species. Fishing for snapper-grouper is illegal in the Oculina Experimental Closed Area for at least 10 years beginning in 2004 (SAFMC 2014d). In 2009, Amendment 14 established eight MPAs where fishing or possession of any snapper-grouper species is illegal (SAFMC 2007). Amendment 15B established the Atlantic Coastal Cooperative Statistics Program (ACCSP) to monitor bycatch (SAFMC 2008). This program requires vessels to allow observers onboard, maintain logbooks, and potentially use video monitoring (SAFMC 2008). Currently under development, Amendment 17 proposes MPAs in the South Atlantic aimed at reducing bycatch mortality for Warsaw grouper and speckled hind (SAFMC 2010). Southern hake does not have a stock assessment and have not been assessed by the IUCN Red List of Threatened Species. Overall the management strategy and implementation for bycatch species is moderately effective.

Factor 3.2.4 - Scientific Research / Monitoring

Gulf of Mexico | Set longlines | United States | GMFMC

Gulf of Mexico | Handlines and hand-operated pole-and-lines | United States | GMFMC

Moderately Effective

The Reef Fish Fishery in the Gulf of Mexico is monitored by two observer programs, the Reef Fishery Observer Program (RFOP) which monitors vertical line (handline) and bottom long line trips and the Shark Bottom Long Line Fishery Observer Program (SBLOP) which monitors bottom longline trips. Combining coverage from these programs, observer coverage is 5.3% for vertical line gears and 7.1% for bottom longline (Table 6)(NMFS 2014c). Target coverage for this fishery is 2% (NMFS 2013a), so observer coverage is above the target. However, observations of vertical line gears were primarily focused on red grouper and snapper (NMFS 2014c), not tilefish.

Southeast Fishery Science Center collects logbook information on landed catch from 100% of commercial vessels and 20% of them are randomly subsampled to report all discards. In addition, a form specific for those fish discarded was implemented in 2001, to obtain better information on fish not landed. Underreporting is suspected in this self reporting program, and compliance is difficult to estimate because vessels can submit a report of "no discards" (NMFS 2011).

Although observer coverage meets and exceeds its target, it is a low target and the logbook data on discards is suspect, therefore this criterion scores as moderately effective.

Justification:

Gear Type	SBLOP	RFOP	Industry	Percent Coverage
Bottom Longline	240	196	6133	7.1%
Vertical Line	N/A	1247.8	23349	5.3%
Total	240	1443.8	29482	5.7%

Figure 17: Table 6. Number of sea days observed, the total sea days fished and the percent coverage in the reef fish fishery in the Gulf of Mexico. SBLOP (Shark Bottom Long Line Observer Program), RFOP (Reef Fish Observer Program). Adapted from NMFS 2014c.

Western Central Atlantic | Handlines and hand-operated pole-and-lines | United States | SAFMC

Western Central Atlantic | Set longlines | United States | SAFMC

Moderately Effective

The last explicit observer coverage of tilefish in the Southeast Atlantic occurred in 2005-2006 and covered golden tilefish, but not blueline tilefish (Hale et al. 2007a). Eighteen hauls from four trips were observed (Hale et al. 2007a), but the level of observer coverage is unknown. There is no monitoring of handline fishing for tilefishes in the Southeast Atlantic. Stock assessments for both species were recently completed based mostly on fishery dependent surveys and one fishery independent survey. Data is collected for stock assessments but there is no observer coverage for either golden or blueline tilefish fisheries in the South Atlantic, so scientific research and monitoring is moderately effective.

Factor 3.2.5 - Scientific Advice

Gulf of Mexico | Set longlines | United States | GMFMC

Gulf of Mexico | Handlines and hand-operated pole-and-lines | United States | GMFMC

Highly effective

GMFMC follows scientific advice as set out by their Science and Statistical Committee. The scientific advice is highly effective.

Western Central Atlantic | Handlines and hand-operated pole-and-lines | United States | SAFMC

Western Central Atlantic | Set longlines | United States | SAFMC

Highly effective

SAFMC follows scientific advice as set out by their Science and Statistical Committee. The scientific advice is highly effective.

Factor 3.2.6 - Enforce

Gulf of Mexico | Set longlines | United States | GMFMC

Gulf of Mexico | Handlines and hand-operated pole-and-lines | United States | GMFMC

Moderately Effective

Enforcement for bycatch species is the same as for target species in the Gulf of Mexico. Please refer to 3.1.5-01 for details.

Western Central Atlantic | Handlines and hand-operated pole-and-lines | United States | SAFMC

Western Central Atlantic | Set longlines | United States | SAFMC

Moderately Effective

Under Amendment 30 to the Snapper Grouper FMP the SAFMC is proposing that all commercial vessels that fish for these species be equipped with satellite communication Vessel Monitoring Systems (VMS) in order to improve enforcement, increase scientific knowledge and promote better management, but it was not submitted for Secretarial review (SAFMC 2014d). In terms of enforcement, the council states that VMSs would be particularly useful to help enforce fishing area restrictions (SAFMC 2013b). Currently, quota enforcement relies on mandatory trip report forms reporting catch for all snapper, grouper, and tilefish vessels. Based on the current enforcement mechanisms, this criterion is scored as moderately 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 (plus the mitigation of gear impacts score) and the Ecosystem Based Fishery Management 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 cannot be Critical for Criterion 4.

Criterion 4 Summary

FISHERY	FISHING GEAR ON THE SUBSTRATE	MITIGATION OF GEAR IMPACTS	ECOSYSTEM-BASED FISHERIES MGMT	SCORE
Gulf of Mexico Stock Handlines and hand-operated pole-and-lines United States GMFMC	Very Low Concern	Minimal Mitigation	Low Concern	Green (4.123)
Gulf of Mexico Stock Set longlines United States GMFMC	Low Concern	Moderate Mitigation	Low Concern	Green (3.742)
Gulf of Mexico Stock Set longlines United States GMFMC	Low Concern	Moderate Mitigation	Low Concern	Green (3.742)
Mid-Atlantic Coast Stock Northwest Atlantic Set longlines United States MAFMC	Low Concern	Minimal Mitigation	Moderate Concern	Yellow (3.122)
Southern Atlantic Coast Stock Western Central Atlantic Handlines and hand-operated pole-and-lines United States SAFMC	Very Low Concern	Moderate Mitigation	Low Concern	Green (4.243)
Southern Atlantic Coast Stock Western Central Atlantic Handlines and hand-operated pole-and-lines United States SAFMC	Very Low Concern	Moderate Mitigation	Low Concern	Green (4.243)
Southern Atlantic Coast Stock Western Central Atlantic Set longlines United States SAFMC	Low Concern	Moderate Mitigation	Low Concern	Green (3.742)
Southern Atlantic Coast Stock Western Central Atlantic Set longlines United States SAFMC	Low Concern	Moderate Mitigation	Low Concern	Green (3.742)

Both handline and longline fisheries over soft sediments have low or very low impact on the substrate. Most fisheries have moderate mitigation of the impacts on the habitat based on depth and area restrictions. The Mid-Atlantic bottom longline and the Gulf of Mexico handline fisheries only have minimal mitigation because the fishing is not actively being reduced. The ecosystem-based fishery management is of moderate concern for all the fisheries because both golden and blueline tilefish are exceptional species since they modify habitat and ecosystem-based fishery management plans are being developed or exist, but do not substantially protect the tilefish species.

Criterion 4 Assessment

SCORING GUIDELINES

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

- 5 (None) - Fishing gear does not contact the bottom
- 4 (Very Low) - Vertical line gear
- 3 (Low)—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. Bottom seine on resilient mud/sand habitats. Midwater trawl that is known to contact bottom occasionally (
- 2 (Moderate)—Bottom dragging gears (dredge, trawl) fished on resilient mud/sand habitats. Gillnet, trap, or bottom longline fished on sensitive boulder or coral reef habitat. Bottom seine except on mud/sand
- 1 (High)—Hydraulic clam dredge. Dredge or trawl gear fished on moderately sensitive habitats (e.g., cobble or boulder)
- 0 (Very High)—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 - Mitigation of Gear Impacts

- +1 (Strong Mitigation)—Examples include large proportion of habitat protected from fishing (>50%) with gear, fishing intensity low/limited, gear specifically modified to reduce damage to seafloor and modifications shown to be effective at reducing damage, or an effective combination of 'moderate' mitigation measures.
- +0.5 (Moderate Mitigation)—20% of habitat protected from fishing with gear or other measures in place to limit fishing effort, fishing intensity, and spatial footprint of damage caused from fishing.
- +0.25 (Low Mitigation)—A few measures are in place (e.g., vulnerable habitats protected but other habitats not protected); there are some limits on fishing effort/intensity, but not actively being reduced
- 0 (No Mitigation)—No effective measures are in place to limit gear impacts on habitats

Factor 4.3 - Ecosystem-Based Fisheries Management

- 5 (Very Low Concern)—Substantial efforts have been made to protect species' ecological roles and ensure fishing practices do not have negative ecological effects (e.g., large proportion of fishery area is protected with marine reserves, and abundance is maintained at sufficient levels to provide food to predators)
- 4 (Low Concern)—Studies are underway to assess the ecological role of species and measures are in place to protect the ecological role of any species that plays an exceptionally large role in the ecosystem. Measures are in place to minimize potentially negative ecological effect if hatchery supplementation or fish aggregating devices (FADs) are used.
- 3 (Moderate Concern)—Fishery does not catch species that play an exceptionally large role in the ecosystem, or if it does, studies are underway to determine how to protect the ecological role of these species, OR negative ecological effects from hatchery supplementation or FADs are possible and management is not place to mitigate these impacts
- 2 (High Concern)—Fishery catches species that play an exceptionally large role in the ecosystem and no efforts are being made to incorporate their ecological role into management.
- 1 (Very High Concern)—Use of hatchery supplementation or fish aggregating devices (FADs) in the fishery is having serious negative ecological or genetic consequences, OR fishery has resulted in trophic cascades or other detrimental impacts to the food web.

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

Gulf of Mexico | Set longlines | United States | GMFMC

Northwest Atlantic | Set longlines | United States | MAFMC

Western Central Atlantic | Set longlines | United States | SAFMC

Low Concern

Bottom longlines do contact the substrate. Tilefishes closely associate with the benthos and are known to inhabit areas of medium to fine sand, silt, mud, and shell hash where they construct burrows (Able et al. 1993)(NMFS 1999)(SAFMC 2014a) therefore bottom longlines targeting tilefish have a low impact on the substrate.

Western Central Atlantic | Handlines and hand-operated pole-and-lines | United States | SAFMC

Gulf of Mexico | Handlines and hand-operated pole-and-lines | United States | GMFMC

Very Low Concern

Handlines are vertical lines that make minimal contact with the substrate therefore they have very low impact.

Factor 4.2 - Modifying Factor: Mitigation of Gear Impacts

Gulf of Mexico | Handlines and hand-operated pole-and-lines | United States | GMFMC

Minimal Mitigation

Fishing effort is monitored, but not actively being reduced. The use of handline gear is prohibited in four areas in the Gulf of Mexico (GMFMC 2013b). Overall the Gulf of Mexico handline fishery has minimal mitigation.

Gulf of Mexico | Set longlines | United States | GMFMC

Moderate Mitigation

Longline restrictions in the Gulf of Mexico region which mitigate potential gear impacts include: reductions in the number of reef fish longline vessels by approximately 80%, limits on the number of hooks which can be fished at once and restrictions to outside the 35-fathom depth contour from June - August via Amendment 31 in 2010 (aimed to mitigate loggerhead sea turtle bycatch, but also served to mitigate the effects of longline gear on the benthos) (75 FR 21512), prohibitions of longline gear in designated Essential Fish Habitat, Habitat Areas of Particular Concern (EFH-HAPC) via EFH Amendment 3 in 2005 (GMFMC 2005) and year-round restrictions to outside the 50-fathom depth contour west of Cape San Blas, Florida and the 20 fathom depth contour east of Cape San Blas via Amendment 1 in 1990 (GMFMC 1989). Year-round restrictions also occur for the Flower Garden Banks National Marine Sanctuary, North and South Tortugas Ecological Reserve, Madison-Swanson Marine Reserve, Steamboat Lumps Marine Reserve, Middle Grounds, Pulley Ridge, McGrail Bank, and Stetson Bank (GMFMC 2013b).

Northwest Atlantic | Set longlines | United States | MAFMC

Minimal Mitigation

Fishing effort is monitored, but not actively being reduced. The original FMP suggested restriction of bottom tending gear, but no restrictions were adopted (MAFMC 2001). In Amendment 1 to the FMP, gear restriction areas were created to exclude bottom trawl gear (MAFMC 2008b), but no restriction on longline gear use. Due to the lack of restrictions the Mid Atlantic tilefish fishery has minimal mitigation.

Western Central Atlantic | Handlines and hand-operated pole-and-lines | United States | SAFMC

Western Central Atlantic | Set longlines | United States | SAFMC

Moderate Mitigation

Longline restrictions in the South Atlantic region which mitigate potential gear impact include depth limitations (only allowed in depths 50 fathoms or more and only north of St. Lucie Inlet, Florida), vessel limits (vessels with longline gear onboard may only possess deepwater species), protected areas limits (longline gear cannot be used in the deep water Oculina Habitat Area of Particular Concern (HAPC) located approximately 15 nautical miles off the coast of Ft. Pierce, Florida), and a longline endorsement program for the golden tile fish sector of the snapper-grouper fishery which serves to restrict long line effort across the the snapper-grouper fishery in general (SAFMC 2013b). In addition, coral HAPCs are currently being expanded through Coral Amendment 8 to the Coral, Coral Reefs, and Live/Hardbottom Habitats FMP.

Factor 4.3 - Ecosystem-based Fisheries Management

Gulf of Mexico | Set longlines | United States | GMFMC

Gulf of Mexico | Handlines and hand-operated pole-and-lines | United States | GMFMC

Low Concern

Golden tilefish and blueline tilefish are considered exceptional species since they are important modifiers and creators of habitat by constructing burrows in the sediment that support an array of burrow associates such as decapod crustaceans {Able et al. 1982}{Able et al. 1993}. Amendment 3 to the Reef Fish FMP, the GMFMC designated 7 Habitat Areas of Particular Concern (HAPC) where either all fishing is prohibited (Tortugas, north and south), or certain gears, including longlines, are prohibited (McGrail Bank, Pulley Ridge, Stetson Bank, West and East Flower Garden Banks)(GMFMC 2005). Progress is being made towards an Integrated Ecosystem Assessment, which was first conceived in 2008 with an update in 2012 (Schirripa et al. 2012). Based on their micro-habitat forming capabilities and the progress on ecosystem management approach, the Ecosystem Based Fishery Management is of low conservation concern.

Northwest Atlantic | Set longlines | United States | MAFMC

Moderate Concern

Golden tilefish is an exceptional species since it does create and modify habitat by constructing burrows in the sediment that support an array of burrow associates such as decapod crustaceans {Able et al. 1982}{Able et al. 1993}. The MAFMC is developing an ecosystem approach to fisheries management guidance document (MAFMC 2014b). In 2011 the drafting of this document was approved with the goal of providing a "framework for considering policy choices and tradeoffs as they affect FMP species and the broader ecosystems" (MAFMC 2014b). Amendment 1 of the tilefish FMP proposed four gear restricted areas (Lydonia, Oceanographer, Veatch, and Norfolk), but these would only restrict bottom otter trawls, which are not the major gear used to catch tilefish (MAFMC 2008b). Based on their micro-habitat forming capabilities, the progress on ecosystem management approach, and the lack of protection of a substantial proportion of the fishery area, the ecosystem based fishery management is of moderate conservation concern.

Western Central Atlantic | Handlines and hand-operated pole-and-lines | United States | SAFMC

Western Central Atlantic | Set longlines | United States | SAFMC

Low Concern

Golden tilefish and blueline tilefish are considered exceptional species since they are important modifiers and creators of habitat by constructing burrows in the sediment that support an array of burrow associates such as decapod crustaceans {Able et al. 1982}{Able et al. 1993}. The SAFMC created a Fishery Ecosystem Plan (FEP) to more thoroughly characterize the South Atlantic Ecosystem (SAFMC 2009). The FEP has five parts that cover the background of ecosystem-based management, essential fish habitat descriptions, characterization of coastal communities, threats to the South Atlantic ecosystem, and future research needs (SAFMC 2009). Additionally there are eight Marine Protected Areas (MPAs) established in 2009 to protect a portion of the deep water snapper and grouper species, which include the tilefishes (SAFMC 2009). Based on their micro-habitat forming capabilities and the progress on ecosystem management approach, the Ecosystem Based Fishery Management is of low conservation concern.

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

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Appendix

Appendix A

Updates to the Tilefish Report :

Updates to the March 11, 2015 U.S. tilefish report were made on December 1, 2021:

Overall Recommendations for blue tilefish caught with all gears in all regions remained unchanged.

Overall Recommendations for blueline tilefish caught with handlines and longlines south of Cape Hatteras (U.S. South Atlantic) upgraded from Avoid to Good Alternative.

Updates Include:

Gulf of Mexico Longline and Handline Fisheries

C1.2 Golden tilefish downgraded from "very low" to "moderate" concern because the stock status is unknown and the species

is not highly vulnerable.

C1.3 Golden tilefish downgraded from "low" to "moderate" concern because the sustainability of current fishing levels is unknown.

C2.2 Red snapper abundance upgraded from "high" to "low" concern because the stock is no longer overfished (i.e. is above threshold levels), but abundance is still below target levels.

C2.2 Smooth dogfish abundance upgraded from "high" to "low" concern because a recent stock assessment suggests healthy stock levels.

C2.2 Warsaw grouper abundance upgraded from "very high" to "high" concern because the IUCN status changed from Critically Endangered to Near Threatened in the most recent assessment.

C2.3 Warsaw grouper fishing mortality upgraded from "high" to "moderate" concern because, although the population is depleted and fishing mortality is unknown, effective management is in place.

C2.2 Speckled hind abundance upgraded from "very high" to "high" concern because the species is no longer listed as Critically Endangered by the IUCN but a data-limited stock assessment suggests that it is overfished in the Gulf of Mexico.

C2.2 Yellowedge grouper abundance downgraded from "moderate" to "high" concern because Seafood Watch the stock status is unknown and the species is highly vulnerable.

C2.3 Yellowedge grouper fishing mortality upgraded from "moderate" to "low" concern because the stock is not currently undergoing overfishing, but there is some uncertainty.

C3.1.2 Management Strategy downgraded from "highly effective" to "moderately effective" because there are no recent measures (e.g. stock assessments) to assess the effectiveness of current management measures.

NW Atlantic Longline Fishery

C1.3 Golden tilefish upgraded from "low" to "very low" concern because the fishing mortality reference point is now more conservative ($F_{MSY\ proxy} = F_{38\%}$) than the previous value ($F_{MSY\ proxy} = F_{25\%}$) and current fishing levels are below this updated reference point.

South Atlantic Fisheries

C1.2 Golden tilefish downgraded from "very low" to "low" concern because a recent stock assessment update suggests that abundance is above limit levels, but below target levels.

C1.3 Golden tilefish downgraded from "very low" to "moderate" concern because fishing levels are fluctuating around F_{MSY} .

C1.2 Blueline tilefish upgraded from "high" to "low" concern because a recent stock assessment suggests that the stock is not overfished

C1.3 Blueline tilefish upgraded from "high" to "low" concern because a recent stock assessment suggests that the stock is no longer undergoing overfishing, but there is some uncertainty.

C1.3 Snowy grouper downgraded from "moderate" to "high" concern because the stock is experiencing overfishing.

C3.1.2 Blueline tilefish upgraded from "moderately" to "highly" effective because the stock is no longer overfished.