Cobia

*Rachycentron canadum*

©Diane Rome Peebles

United States: Atlantic and Gulf of Mexico

**Drift gillnets, Set longlines, Handlines and hand-operated pole-and-lines**

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*Seafood Watch Consulting Researcher*

**Disclaimer**

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Seafood Watch Standard used in this assessment: Standard for Fisheries vF2
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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 Report. Each report 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.” The detailed evaluation methodology is available upon request. In producing the Seafood Reports, 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 Seafood Reports 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 Reports in any way they find useful. For more information about Seafood Watch® and Seafood Reports, please contact the Seafood Watch® program at Monterey Bay Aquarium by calling 1-877-229-9990.
Guiding Principles

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

Based on this principle, Seafood Watch had developed four sustainability criteria for evaluating wildcatch fisheries for consumers and businesses. These criteria are:

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

Each criterion includes:

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

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

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

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

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

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1 “Fish” is used throughout this document to refer to finfish, shellfish and other invertebrates
Summary

This report focuses on the cobia (*Rachycentron canadum*) fisheries in the US Southeastern Atlantic region and the US Gulf of Mexico. Cobia is not a targeted species but is retained bycatch in a number of coastal and pelagic fisheries. Along the east coast of the United States cobia are landed primarily with handline gears and with bottom (sink) gillnets. In the Gulf of Mexico handline gears are also the predominant source of cobia landings, followed by bottom longlines.

Cobia have a near global distribution and are found in tropical, subtropical and warm temperate waters. During their first few years of life cobia grow quickly and reach sexual maturity by 3 years of age; they breed prolifically, spawning repeatedly during a 5- to 6-month breeding season. Accordingly, cobia are considered to only moderately vulnerable to fishing pressure. There are two stocks of cobia identified in US Waters, one in the Atlantic and one in the Gulf of Mexico. The most recent stock assessment in 2013 demonstrated that US cobia stocks are neither overfished, nor undergoing overfishing.

In the US South Atlantic handline fishery, the main species are not particularly susceptible to fishing pressure and/or are well managed stocks. The species landed in the sink gillnet fishery are also relatively healthy, well managed stocks. In contrast, many of the main species landed in the Gulf of Mexico handline fishery are from depleted stocks and the reef fish bottom longline fishery has historically had high rates of loggerhead turtle bycatch. Recent management measures have been enacted to minimize turtle interaction with bottom longline gear and preliminary estimates of sea turtle takes suggest that these actions have appreciably reduced sea turtle interaction in the Gulf reef fish fishery.

In the United States cobia is managed under the Fishery Management Plan (FMP) for Coastal and Migratory Pelagic Resources (Mackerels) (1983), managed jointly by the South Atlantic Fishery Management Council (SAFMC) and the Gulf of Mexico Fishery Management Council (GMFMC). The management strategy in place is appropriate to maintain the integrity of both Atlantic and Gulf cobia stocks. Cobia stocks have been assessed via SEDAR, which provides rigorous and independent assessment that takes in to consideration both scientific advice and stakeholder concerns. Enforcement of fishery regulations is carried out jointly by a number of state and federal agencies, including state departments of wildlife and/or fisheries resources, the US Coast Guard and NOAA. SAFMC and GMFMC each also have law enforcement panels to make recommendations on enforcement strategies. Bycatch management for all fisheries is appropriate and the gillnet and bottom longline fisheries have some observer coverage, albeit at relatively low rates.

All the gear types assessed in this report generally have no to low impacts on the sea floor. Although for those gears that make contact with the bottom (bottom longline, sink gillnet) there are no mitigation measures in place. Despite the frequent capture of sharks in both the Atlantic sink gillnet and Gulf of Mexico bottom longline fisheries there have been no attempts to use an ecosystem approach to managing the catch.
**Final Seafood Recommendations**

<table>
<thead>
<tr>
<th>SPECIES/FISHERY</th>
<th>CRITERION 1: IMPACTS ON THE SPECIES</th>
<th>CRITERION 2: IMPACTS ON OTHER SPECIES</th>
<th>CRITERION 3: MANAGEMENT EFFECTIVENESS</th>
<th>CRITERION 4: HABITAT AND ECOSYSTEM</th>
<th>OVERALL RECOMMENDATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cobia</td>
<td>Green (5.00)</td>
<td>Yellow (2.64)</td>
<td>Green (3.46)</td>
<td>Green (3.87)</td>
<td>Best Choice (3.65)</td>
</tr>
<tr>
<td>United States of America Atlantic, Drift gillnets, United States of America</td>
<td>Green (5.00)</td>
<td>Yellow (2.64)</td>
<td>Green (4.00)</td>
<td>Green (3.87)</td>
<td>Best Choice (3.78)</td>
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<tr>
<td>Cobia</td>
<td>Green (3.83)</td>
<td>Yellow (2.71)</td>
<td>Yellow (3.00)</td>
<td>Green (3.87)</td>
<td>Best Choice (3.31)</td>
</tr>
<tr>
<td>United States of America Gulf of Mexico, Handlines and hand-operated pole-and-lines, United States of America</td>
<td>Green (3.83)</td>
<td>Red (1.00)</td>
<td>Yellow (3.00)</td>
<td>Green (3.24)</td>
<td>Good Alternative (2.47)</td>
</tr>
<tr>
<td>Cobia</td>
<td>Green (3.83)</td>
<td>Yellow (2.71)</td>
<td>Yellow (3.00)</td>
<td>Green (3.87)</td>
<td>Best Choice (3.31)</td>
</tr>
<tr>
<td>United States of America Gulf of Mexico, Set longlines, United States of America</td>
<td>Green (3.83)</td>
<td>Red (1.00)</td>
<td>Yellow (3.00)</td>
<td>Green (3.24)</td>
<td>Good Alternative (2.47)</td>
</tr>
</tbody>
</table>

**Summary**

Cobia landed in handline fisheries and from the US Atlantic bottom (sink) gillnet fishery are ranked as Best Choice. Cobia from the Gulf of Mexico reef fish bottom longline fisheries are ranked as a Good Alternative.

**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 Concern\(^2\), and no more than one Red Criterion, and no Critical scores
- **Avoid/Red** = Final Score ≤2.2, or either Harvest Strategy (Factor 3.1) or Bycatch Management Strategy (Factor 3.2) is Very High Concern or two or more Red Criteria, or one or more Critical scores.

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\(^2\) 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 focuses on the cobia (*Rachycentron canadum*) fisheries in the US Southeastern Atlantic region and the US Gulf of Mexico. Cobia is not a targeted species but is retained bycatch in a number of coastal and pelagic fisheries. Along the east coast of the United States cobia are landed primarily with handline gears and with gillnets. In the Gulf of Mexico handline gears are also the predominant source of cobia landings, followed by bottom longlines. This report has assessed cobia caught using handlines in the Atlantic and the Gulf of Mexico, the reef fish longline fishery in the Gulf of Mexico, and the strike gillnet fishery for coastal pelagics in the Atlantic.

Species Overview

Cobia is a widely distributed pelagic fish, found in tropical, subtropical and warm temperate waters worldwide, with the exception of the eastern Pacific (Williams 2001). Cobia is the only member of its genus and the only member of the family Rachycentridae (Shaffer and Nakamura 1989).

![Geographic distribution of cobia](www.aquamaps.org)

Off the Atlantic coast of North America, cobia range from Massachusetts south to the Florida Keys and throughout the Gulf of Mexico (Williams 2001) (Figure 1). Shaffer and Nakamua (Shaffer and Nakamura 1989) reported that cobia have been captured in waters ranging from 16.8-32.0°C. Cobia do not form large aggregation and often travel alone or in small groupings, feeding on fishes, squid, crabs and other benthic invertebrates (Shaffer and Nakamura 1989)(Froese and Pauly 2012).

Cobia are prolific breeders, spawning from April-September in the Gulf of Mexico and April-August in the Atlantic, although in the South Atlantic individual sub-populations are thought to spawn over shorter periods (30-45 days) (Brown-Peterson et al. 2000)(Franks and Brown-Peterson 2002)(L. Lefebvre pers comm.). Females are capable of spawning every 5-days, whereas males cobia are capable of spawning year round (Brown-Peterson et al. 2000). Mean batch fecundity estimates range from 377,000-1,980,500 eggs (Brown-Peterson et al. 2000).

In the United States cobia is managed under the Fishery Management Plan (FMP) for Coastal and Migratory Pelagic Resources (Mackerels) (GMFMC/SAFMC 1983), managed jointly by the South Atlantic Fishery
Management Council (SAFMC) and the Gulf of Mexico Fishery Management Council (GMFMC). In 2011, the FMP was amended to designate separate cobia management groups for the Atlantic and Gulf of Mexico EEZs. The Atlantic/Gulf group boundary is located at the state boundary of Florida (FL) and Georgia (GA) (Figure 2). The Atlantic stock is managed by the SAFMC and includes all fish caught north of the FL/GA state line and northward along the east coast of the US to New York, overlapping the management area of the Mid-Atlantic Fishery Management Council (MAFMC); the MAFMC participates as a voting member on the SAFMC’s mackerel committee (GMFMC/SAFMC 2011). Cobia caught south of the FL/GA boundary, around the Florida peninsula to Texas are considered to belong to the Gulf of Mexico stock (SEDAR 2013b). Oversight of fish stocks correlates with the GMFMC and SAFMC management areas, irrespective of cobia group boundaries.

Figure 2 Figure 2. SAFMC and GMFMC management boundaries. The red line at the Florida/Georgia border denotes the delineation of Atlantic (north of the line) and Gulf of Mexico (south of the line) cobia groups (from SEDAR 2013b).

In all US waters, cobia must be 33” (83.8 cm) FL and must be landed with head and fins attached. There is a bag limit of 2 cobia per person, per day and drift gillnets are prohibited. For the 2013 fishing season the annual commercial catch limit for cobia is in Atlantic EEZ is 125,712 lbs (57.2 mt). In the Gulf of Mexico there is an annual stock catch limit of 1,460,000 lbs (622.2mt), which encompasses both recreational and commercial landings (NMFS 2012a).

Production Statistics

In 2012, 13,371 mt of cobia were landed worldwide (FAO 2014). Major fishing nations include Malaysia, Brazil, Iran, Philippines and Pakistan (FAO 2014), although cobia is captured throughout its range. In 2011 commercial fishers in the United States landed 85.5 mt of cobia from the Atlantic and 37.5 mt from the Gulf of Mexico (NMFS 2013b).
In the United States, cobia are targeted by recreational fishers and are incidentally captured by commercial operators targeting other coastal pelagic species, using a variety of fishing gears (NMFS 2013b). The majority of cobia landed in the US are caught by the recreational sector, with commercial landings averaging 13% of the recreational take (NMFS 2009c). In the Atlantic and the Gulf of Mexico commercial fisheries the vast majority of cobia are landed using handlines or other hook and line gears (82% and 83%, respectively (NMFS 2013b); Figure 4). The bulk of these captures occurred in Florida (83.6%, both coasts), with North Carolina (7.3%), Virginia (3.2%), Louisiana (3.0%), South Carolina (1.6%), Alabama (<1%), Maryland (<1%), Texas (<1%), Rhode Island (<1%), New Jersey (<1%) and New York (<1%) reporting nominal landings. Historically more cobia have been landed in the Gulf of Mexico, when compared to the Atlantic, however in recent years the Atlantic catch has eclipsed the Gulf catch (Figure 5).

Figure 3

Figure 4. Cobia landings by gear in the Atlantic (a.) and Gulf of Mexico (b.). Handlines includes rod and reel and troll gears. In the Atlantic, the Other category includes: Unspecified gears, haul seines, otter trawl, weirs, pound nets, traps, longlines, spear, dredge, diving outfits and combined gears. In the Gulf of Mexico the Other category includes: Unspecified gears, spear, diving outfits and combined gears (NMFS 2013).
Importance to the US/North American market.

The US imported 435mt of cobia in 2012 and 640mt in 2013, mainly from Columbia and Panama. The US exported 37mt of cobia in 2012, mainly to South Korea, and exported 29mt in 2013 all of which went to Canada. There is no record of foreign trade prior to 2012. It should be noted that these imports and exports will include farmed cobia, particularly from Panama where production reached 500mt in 2012.

Common and market names.

Cobia is also known as crabeater, sergeantfish, black salmon, ling, cabio, cubby yew and lemonfish.

Primary product forms

Cobia is most commonly available as fillets and whole, head-on, gutted.
Assessment

This section assesses the sustainability of the fishery(s) relative to the Seafood Watch Criteria for Fisheries, available at http://www.seafoodwatch.org.

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

<table>
<thead>
<tr>
<th>COBIA</th>
<th>Region</th>
<th>Method</th>
<th>Inherent Vulnerability</th>
<th>Abundance</th>
<th>Fishing Mortality</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>United States of America/Atlantic Drift gillnets</td>
<td>United States of America</td>
<td>2.00: Medium</td>
<td>5.00: Very Low Concern</td>
<td>5.00: Very Low Concern</td>
<td>Green (5.00)</td>
</tr>
<tr>
<td></td>
<td>United States of America/Atlantic Handlines and hand-operated pole-and-lines</td>
<td>United States of America</td>
<td>2.00: Medium</td>
<td>5.00: Very Low Concern</td>
<td>5.00: Very Low Concern</td>
<td>Green (5.00)</td>
</tr>
<tr>
<td></td>
<td>United States of America/Gulf of Mexico Handlines and hand-operated pole-and-lines</td>
<td>United States of America</td>
<td>2.00: Medium</td>
<td>4.00: Low Concern</td>
<td>3.67: Low Concern</td>
<td>Green (3.83)</td>
</tr>
<tr>
<td></td>
<td>United States of America/Gulf of Mexico Set longlines</td>
<td>United States of America</td>
<td>2.00: Medium</td>
<td>4.00: Low Concern</td>
<td>3.67: Low Concern</td>
<td>Green (3.83)</td>
</tr>
</tbody>
</table>

Criterion 1 Assessment

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 it 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 (< 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.

**COBIA**

**Factor 1.1 - Inherent Vulnerability**
Cobia has a Fishbase score of 44 of 100 and is determined to be of medium inherent vulnerability (Froese and Pauly 2011).

**Justification:**

Cobia grow very quickly during their first few years of life (SEDAR 2013a). Females and males are sexually dimorphic, with females typically growing faster, living longer and attaining larger sizes than males (Franks and Brown-Patterson 2002). Fishery captures are significantly skewed toward females, with a male: female sex ratio of 1:1.4 (SEDAR 2013a). Gulf of Mexico cobia tend to be larger than Atlantic cobia, while Atlantic cobia tend to live longer than Gulf fish (Franks and Brown-Patterson 2002) (Table 1). The majority of male cobia reach sexual maturity by age 2, although the smallest reported mature male had not yet reached one year of age and was 36.5 cm FL (Brown-Peterson et al. 2001). Females mature at older ages and larger size, with most females mature by 3 years of age, with the smallest mature female reported as 70.0 cm FL, in its second year (Brown-Peterson et al. 2001).

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Sex</th>
<th>Atlantic</th>
<th>Gulf of Mexico</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum length</td>
<td>Male</td>
<td>136.0 cm FL</td>
<td>145.0 cm FL</td>
<td>Smith 1995</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>142.0 cm FL</td>
<td>163.1 cm FL</td>
<td>Franks and Brown-Patterson 2002</td>
</tr>
<tr>
<td>Maximum weight (TW)</td>
<td>Male</td>
<td>32.0 kg</td>
<td>30.8 kg</td>
<td>Thompson et al. 1992</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>34.9 kg</td>
<td>62.2 kg</td>
<td>Franks et al. 1999</td>
</tr>
<tr>
<td>Maximum age (size)</td>
<td>Male</td>
<td>14 yrs (136.0 cm FL)</td>
<td>9 yrs (139.0 cm FL)</td>
<td>Franks and Brown-Patterson 2002</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>13 yrs (142.0 cm FL)</td>
<td>11 yrs (165.1 cm FL)</td>
<td>Franks and Brown-Patterson 2002</td>
</tr>
</tbody>
</table>

Figure 5

Table 1. Life-history parameters for cobia.

**Factor 1.2 - Abundance**

A recent assessment (SEDAR 2013b) found cobia spawning stock biomass (SSB) in the South Atlantic region of the US to be above the level at maximum sustainable yield, $SSB_{2011}/SSB_{MSY}=1.29$. This stock is not currently in an overfished state.
Low Concern

The most recent assessment of Gulf of Mexico cobia (SEDAR 2013a) concluded that biomass was above the level at which recruitment is impaired (SSB$_{2011}$/ MSST =1.72; MSST = Minimum Stock Size Threshold). However, there was some disagreement amongst the independent reviewers, as to the appropriateness of some of the population model assumptions and parameters. There were no population or fishing mortality estimates endorsed in the final SEDAR assessment report. The GMFMC (Gulf of Mexico Fishery Management Council) assembled a SSC (Science and Statistics Committee) Review Panel to address independent reviewer critiques and concluded that the data and application of initial model were sound and affirmed the original SEDAR (Southeast Data, Assessment and Review) findings; this stock is not currently in an overfished state (GMFMC 2013). Due to the uncertainty surrounding the abundance estimates relative to management reference points Seafood Watch considers this stock to be of low conservation concern.

Factor 1.3 - Fishing Mortality

Very Low Concern

In the most recent stock assessment SEDAR found the current level of fishery exploitation in the US South Atlantic is below the management reference point, $F_{2011}/F_{MSY} = 0.423$; overfishing is not occurring (SEDAR 2013d).

Low Concern

Gulf of Mexico cobia were recently assessed by SEDAR (SEDAR 2013a). This report concluded that current fishing mortality was below the maximum fishing mortality threshold (MFMT), $F_{2011}/MFMT = 0.82$. However, there was some disagreement amongst the independent reviewers, as to the appropriateness of some of the population model assumptions and parameters, accordingly there were no population or fishing mortality estimates endorsed in the final SEDAR assessment report. The GMFMC assembled a SSC Review Panel to address the independent reviewer critiques and concluded that the data and application of initial model were sound and affirmed the original SEDAR findings; overfishing is not currently occurring (GMFMC 2013). Due to the uncertainty regarding the reference points, Seafood Watch considers fishing mortality on Gulf of Mexico cobia to be a low conservation concern.
**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**

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

<table>
<thead>
<tr>
<th>Species</th>
<th>Inherent Vulnerability</th>
<th>Abundance</th>
<th>Fishing Mortality</th>
<th>Subscore</th>
</tr>
</thead>
<tbody>
<tr>
<td>Atlantic bumper</td>
<td>3.00:Low</td>
<td>3.00:Moderate Concern</td>
<td>2.33:Moderate Concern</td>
<td>Yellow (2.64)</td>
</tr>
<tr>
<td>Blue runner</td>
<td>3.00:Low</td>
<td>3.00:Moderate Concern</td>
<td>2.33:Moderate Concern</td>
<td>Yellow (2.64)</td>
</tr>
<tr>
<td>Spot</td>
<td>3.00:Low</td>
<td>3.00:Moderate Concern</td>
<td>2.33:Moderate Concern</td>
<td>Yellow (2.64)</td>
</tr>
<tr>
<td>Atlantic croaker</td>
<td>3.00:Low</td>
<td>4.00:Low Concern</td>
<td>3.67:Low Concern</td>
<td>Green (3.83)</td>
</tr>
<tr>
<td>Bluefish</td>
<td>1.00:High</td>
<td>4.00:Low Concern</td>
<td>5.00:Very Low Concern</td>
<td>Green (4.47)</td>
</tr>
<tr>
<td>Spanish mackerel</td>
<td>2.00:Medium</td>
<td>5.00:Very Low Concern</td>
<td>5.00:Very Low Concern</td>
<td>Green (5.00)</td>
</tr>
<tr>
<td>Species</td>
<td>Inherent Vulnerability</td>
<td>Abundance</td>
<td>Fishing Mortality</td>
<td>Subscore</td>
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<td>------------------------</td>
<td>-------------------------</td>
<td>-----------------------</td>
<td>----------</td>
</tr>
<tr>
<td>Dolphinfish</td>
<td>2.00:Medium</td>
<td>3.00:Moderate Concern</td>
<td>2.33:Moderate Concern</td>
<td>Yellow (2.64)</td>
</tr>
<tr>
<td>Yellowfin tuna</td>
<td>2.00:Medium</td>
<td>2.00:High Concern</td>
<td>5.00:Very Low Concern</td>
<td>Yellow (3.16)</td>
</tr>
<tr>
<td>Swordfish</td>
<td>1.00:High</td>
<td>5.00:Very Low Concern</td>
<td>5.00:Very Low Concern</td>
<td>Green (5.00)</td>
</tr>
</tbody>
</table>

**COBIA - UNITED STATES OF AMERICA/GULF OF MEXICO - HANDLINES AND HAND-OPERATED POLE-AND-LINES - UNITED STATES OF AMERICA**

Subscore: 2.71  Discard Rate: 1.00  C2 Rate: 2.71

<table>
<thead>
<tr>
<th>Species</th>
<th>Inherent Vulnerability</th>
<th>Abundance</th>
<th>Fishing Mortality</th>
<th>Subscore</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gag</td>
<td>1.00:High</td>
<td>2.00:High Concern</td>
<td>3.67:Low Concern</td>
<td>Yellow (2.71)</td>
</tr>
<tr>
<td>Red snapper</td>
<td>2.00:Medium</td>
<td>2.00:High Concern</td>
<td>3.67:Low Concern</td>
<td>Yellow (2.71)</td>
</tr>
<tr>
<td>Greater amberjack</td>
<td>2.00:Medium</td>
<td>3.00:Moderate Concern</td>
<td>3.67:Low Concern</td>
<td>Green (3.32)</td>
</tr>
<tr>
<td>King mackerel</td>
<td>1.00:High</td>
<td>5.00:Very Low Concern</td>
<td>2.33:Moderate Concern</td>
<td>Green (3.41)</td>
</tr>
<tr>
<td>Red grouper</td>
<td>1.00:High</td>
<td>4.00:Low Concern</td>
<td>3.67:Low Concern</td>
<td>Green (3.83)</td>
</tr>
</tbody>
</table>

**COBIA - UNITED STATES OF AMERICA/GULF OF MEXICO - SET LONGINES - UNITED STATES OF AMERICA**

Subscore: 1.00  Discard Rate: 1.00  C2 Rate: 1.00

<table>
<thead>
<tr>
<th>Species</th>
<th>Inherent Vulnerability</th>
<th>Abundance</th>
<th>Fishing Mortality</th>
<th>Subscore</th>
</tr>
</thead>
<tbody>
<tr>
<td>Warsaw grouper</td>
<td>1.00:High</td>
<td>1.00:Very High Concern</td>
<td>1.00:High Concern</td>
<td>Red (1.00)</td>
</tr>
<tr>
<td>Blacknose shark</td>
<td>1.00:High</td>
<td>2.00:High Concern</td>
<td>1.00:High Concern</td>
<td>Red (1.41)</td>
</tr>
<tr>
<td>Loggerhead turtle</td>
<td>1.00:High</td>
<td>1.00:Very High Concern</td>
<td>2.33:Moderate Concern</td>
<td>Red (1.53)</td>
</tr>
<tr>
<td>Speckled hind</td>
<td>1.00:High</td>
<td>1.00:Very High Concern</td>
<td>2.33:Moderate Concern</td>
<td>Red (1.53)</td>
</tr>
<tr>
<td>Smooth dogfish</td>
<td>1.00:High</td>
<td>2.00:High Concern</td>
<td>2.33:Moderate Concern</td>
<td>Red (2.16)</td>
</tr>
</tbody>
</table>
Cobia are not specifically targeted in commercial fisheries and are landed in fisheries where they are caught incidentally. As a result, the species caught alongside cobia can vary greatly dependent on the fishery. The species considered in this report are those that are known to be regularly caught alongside cobia in the various fisheries, or those that are caught less frequently but are considered stocks of concern as they are depleted, endangered or threatened, for example Loggerhead turtles. In order to determine which species to include in this assessment, bycatch information from the National Bycatch Report and data from NMFS (National Marine Fisheries Service) were considered.

**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)

**ATLANTIC BUMPER**

**Factor 2.1 - Inherent Vulnerability**

<table>
<thead>
<tr>
<th>Species</th>
<th>Factor 2.1 Score</th>
<th>Factor 2.2 Score</th>
<th>Factor 2.3 Score</th>
<th>Coloring</th>
</tr>
</thead>
<tbody>
<tr>
<td>Giant snake eel</td>
<td>1.00:High</td>
<td>2.00:High Concern</td>
<td>2.33:Moderate Concern</td>
<td>Red (2.16)</td>
</tr>
<tr>
<td>Snowy grouper</td>
<td>1.00:High</td>
<td>2.00:High Concern</td>
<td>2.33:Moderate Concern</td>
<td>Red (2.16)</td>
</tr>
<tr>
<td>Blueline tilefish</td>
<td>2.00:Medium</td>
<td>3.00:Moderate Concern</td>
<td>2.33:Moderate Concern</td>
<td>Yellow (2.64)</td>
</tr>
<tr>
<td>Yellowedge grouper</td>
<td>1.00:High</td>
<td>3.00:Moderate Concern</td>
<td>2.33:Moderate Concern</td>
<td>Yellow (2.64)</td>
</tr>
<tr>
<td>Gag</td>
<td>1.00:High</td>
<td>2.00:High Concern</td>
<td>3.67:Low Concern</td>
<td>Yellow (2.71)</td>
</tr>
<tr>
<td>Red grouper</td>
<td>1.00:High</td>
<td>4.00:Low Concern</td>
<td>3.67:Low Concern</td>
<td>Green (3.83)</td>
</tr>
<tr>
<td>Atlantic sharpnose shark</td>
<td>2.00:Medium</td>
<td>5.00:Very Low Concern</td>
<td>3.67:Low Concern</td>
<td>Green (4.28)</td>
</tr>
<tr>
<td>Blue tilefish</td>
<td>2.00:Medium</td>
<td>5.00:Very Low Concern</td>
<td>5.00:Very Low Concern</td>
<td>Green (5.00)</td>
</tr>
</tbody>
</table>
Low

Atlantic bumper has a Fishbase score of 29 of 100 and is determined to be of low inherent vulnerability (Froese and Pauly 2011).

**Factor 2.2 - Abundance**

**UNITED STATES OF AMERICA/ATLANTIC, DRIFT GILLNETS, UNITED STATES OF AMERICA**

**Moderate Concern**

There is no information available on the current abundance of Atlantic Bumper relative to reference points in the western central Atlantic region. As Atlantic bumper have a medium vulnerability to fishing, stock status is considered to be of moderate conservation concern.

**Factor 2.3 - Fishing Mortality**

**UNITED STATES OF AMERICA/ATLANTIC, DRIFT GILLNETS, UNITED STATES OF AMERICA**

**Moderate Concern**

There is no information available on Atlantic bumper fishing mortality. This species is moderately susceptible to sink gillnet fishing gear (as defined by the Seafood Watch criteria) (Seafood Watch 2012) and, accordingly, fishery mortality is determined to be of moderate concern.

**Factor 2.4 - Discard Rate**

**UNITED STATES OF AMERICA/ATLANTIC, DRIFT GILLNETS, UNITED STATES OF AMERICA**

< 20%

Passerotti et al. (2010) studied the catch and bycatch from the sink gillnet fishery off the southeast US. The results present a pooled sample of sink gillnet catch, including trips targeting misc. sharks, Spanish mackerel, king mackerel, Southern kingfish, Atlantic croaker, bluefish, weakfish, blacknose shark and finetooth shark. According to these data the overall discard rate for this gear was 6.6%. Soak and haul times were relatively short, with the entire fishing process (set to haul) lasting a mean of 1.09 hrs (3.56 S.D.).

**BLUE RUNNER**

**Factor 2.1 - Inherent Vulnerability**

**UNITED STATES OF AMERICA/ATLANTIC, DRIFT GILLNETS, UNITED STATES OF AMERICA**

Low

Blue runner has a Fishbase score of 34 of 100 and is determined to be of low inherent vulnerability (Froese and Pauly 2011).

**Factor 2.2 - Abundance**

**UNITED STATES OF AMERICA/ATLANTIC, DRIFT GILLNETS, UNITED STATES OF AMERICA**

**Moderate Concern**
There is no information available on the current abundance of blue runner in the western central Atlantic region.

**Factor 2.3 - Fishing Mortality**

**UNITED STATES OF AMERICA/ATLANTIC, DRIFT GILLNETS, UNITED STATES OF AMERICA**

**Moderate Concern**

There are no estimates available for blue runner fishing mortality. Only 10% of the blue runner captured in the U.S. Atlantic in 2011 was landed with gillnet gears (NMFS 2013b) so the contribution of the sink gillnet fishery to overall blue runner mortality is likely minor. However as overall mortality is unknown and Blue runner is moderately susceptible to sink gillnet gear (Seafood Watch 2012), fishing mortality is considered a moderate conservation concern.

**Factor 2.4 - Discard Rate**

**UNITED STATES OF AMERICA/ATLANTIC, DRIFT GILLNETS, UNITED STATES OF AMERICA**

**< 20%**

Passerotti et al. (2010) studied the catch and bycatch from the sink gillnet fishery off the southeast US. The results present a pooled sample of sink gillnet catch, including trips targeting misc. sharks, Spanish mackerel, king mackerel, Southern kingfish, Atlantic croaker, bluefish, weakfish, blacknose shark and finetooth shark. According to these data the overall discard rate for this gear was 6.6%. Soak and haul times were relatively short, with the entire fishing process (set to haul) lasting a mean of 1.09 hrs (3.56 S.D.).

**SPOT**

**Factor 2.1 - Inherent Vulnerability**

**UNITED STATES OF AMERICA/ATLANTIC, DRIFT GILLNETS, UNITED STATES OF AMERICA**

**Low**

Spot has a Fishbase score of 29 out of 100 and is determined to be of low inherent vulnerability (Froese and Pauly 2011).

**Factor 2.2 - Abundance**

**UNITED STATES OF AMERICA/ATLANTIC, DRIFT GILLNETS, UNITED STATES OF AMERICA**

**Moderate Concern**

There is no information available on the status of spot stocks in the Atlantic. Therefore, stock status is deemed to be of moderate conservation concern.

**Factor 2.3 - Fishing Mortality**

**UNITED STATES OF AMERICA/ATLANTIC, DRIFT GILLNETS, UNITED STATES OF AMERICA**

**Moderate Concern**

There is no information available on spot fishing mortality. Spot is of moderate to high susceptibility to gillnet
Factor 2.4 - Discard Rate

UNITED STATES OF AMERICA/ATLANTIC, DRIFT GILLNETS, UNITED STATES OF AMERICA

< 20%

Passerotti et al. (2010) studied the catch and bycatch from the sink gillnet fishery off the southeast US. The results present a pooled sample of sink gillnet catch, including trips targeting misc. sharks, Spanish mackerel, king mackerel, Southern kingfish, Atlantic croaker, bluefish, weakfish, blacknose shark and finetooth shark. According to these data the overall discard rate for this gear was 6.6%. Soak and haul times were relatively short, with the entire fishing process (set to haul) lasting a mean of 1.09 hrs (3.56 S.D.).

DOLPHINFISH

Factor 2.1 - Inherent Vulnerability

UNITED STATES OF AMERICA/ATLANTIC, HANDLINES AND HAND-OPERATED POLE-AND-LINES, UNITED STATES OF AMERICA

Medium

Mahi mahi has been given a Fishbase score of 39 out of 100 (Froese and Pauly 2011) and is considered to be of moderate inherent vulnerability.

Factor 2.2 - Abundance

UNITED STATES OF AMERICA/ATLANTIC, HANDLINES AND HAND-OPERATED POLE-AND-LINES, UNITED STATES OF AMERICA

Moderate Concern

There is little data available on the US mahi mahi stocks (NMFS 2009c). A stock assessment based on data for the Western Atlantic and Gulf of Mexico mahi mahi from 1986-1997 found $B_{1998}/B_{MSY}=1.56$ (Prager 2000). This assessment showed tremendous variation in abundance from year to year. While it is possible that mahi mahi populations naturally fluctuate widely in accordance with climatic variables (Lasso and Zapata 1999, FAO 2011), absent additional corroboration, these data should be interpreted with caution (Prager 2000). Given this and the age of the stock assessment, stock status is considered unknown and to be of moderate concern.

Factor 2.3 - Fishing Mortality

UNITED STATES OF AMERICA/ATLANTIC, HANDLINES AND HAND-OPERATED POLE-AND-LINES, UNITED STATES OF AMERICA

Moderate Concern

There is very little data available on the US mahi mahi fishing mortality (NMFS 2009c). The Western Atlantic and Gulf of Mexico mahi mahi stocks were assessed by Prager (2000), who found fishing mortality to be below the target reference point ($F_{1997}/F_{MSY}=0.51$), although there is significant uncertainty around this estimate (Prager 2000), and the assessment is now out of date. Fishing mortality is therefore considered unknown and...
of moderate conservation concern.

**Factor 2.4 - Discard Rate**

<table>
<thead>
<tr>
<th>UNITED STATES OF AMERICA/ATLANTIC, HANDLINES AND HAND-OPERATED POLE-AND-LINES, UNITED STATES OF AMERICA</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>&lt; 20%</strong></td>
</tr>
<tr>
<td>Handline fisheries generally have low discard rates, with fishers able to land and release undesired species quickly and with low mortality (Kelleher 2005).</td>
</tr>
</tbody>
</table>

**GAG**

**Factor 2.1 - Inherent Vulnerability**

<table>
<thead>
<tr>
<th>UNITED STATES OF AMERICA/GULF OF MEXICO, HANDLINES AND HAND-OPERATED POLE-AND-LINES, UNITED STATES OF AMERICA</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>High</strong></td>
</tr>
<tr>
<td>Gag grouper has a Fishbase score of 68 out of 100 and is determined to be of high inherent vulnerability (Froese and Pauly 2011).</td>
</tr>
</tbody>
</table>

**Factor 2.2 - Abundance**

<table>
<thead>
<tr>
<th>UNITED STATES OF AMERICA/GULF OF MEXICO, HANDLINES AND HAND-OPERATED POLE-AND-LINES, UNITED STATES OF AMERICA</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>High Concern</strong></td>
</tr>
<tr>
<td>Results from the 2014 stock assessment (SEDAR 33) suggest that gag in the Gulf of Mexico remains overfished in relation to SSB_{30%}, although SSB is marginally above SSB_{MSY} (SSB_{Current}/MSST = 0.50 for the preferred model and 2.05 for the alternative model) (see Figure 9) (SEDAR 2014a). This is an increase from the 2009 assessment suggesting that the rebuilding plan implemented in 2012, combined with strong year classes in 2006 and 2007 have resulted in an increase in SSB since 2009. We note that the stock assessment model takes the effects of recreational and commercial fishing into account. Due to gag's overfished status in the Gulf of Mexico, stock status scores as &quot;high concern&quot;.</td>
</tr>
</tbody>
</table>

**Factor 2.3 - Fishing Mortality**

<table>
<thead>
<tr>
<th>UNITED STATES OF AMERICA/GULF OF MEXICO, HANDLINES AND HAND-OPERATED POLE-AND-LINES, UNITED STATES OF AMERICA</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Low Concern</strong></td>
</tr>
<tr>
<td>In the Gulf of Mexico, recreational fishing is responsible for the majority of gag fishing mortality (GMFMC 2011c). According to NMFS 2014 1st Quarter Status of US Fisheries report, gag grouper in the Gulf of Mexico is experiencing overfishing (NMFS 2013d), and has since the 2009 update stock assessment which indicated a fishing mortality ratio, ( F_{Current}/MFMT ) (( F_{MSY} ) proxy) of 2.47 (SEDAR 2012b).</td>
</tr>
</tbody>
</table>
However, according to the 2014 SEDAR assessment (completed prior to the release of 2014 1st Quarter status update), the Gulf of Mexico gag stock is no longer experiencing overfishing (see Figure 10), with a $F_{\text{CURRENT}}/MFMT$ (2010-2012) of 0.77 for the preferred population model and a $F_{\text{CURRENT}}/MFMT$ of 0.32 for the alternative model (SEDAR 2014a). This change in status is attributed to the rebuilding plan’s lowered gag quotas (begun in 2009) and the commercial and recreational IFQ system (begun in 2010). Due to information in new stock assessment that indicates an end to overfishing, fishing mortality scores as "low concern".

**Factor 2.4 - Discard Rate**

**UNITED STATES OF AMERICA/GULF OF MEXICO, HANDLINES AND HAND-OPERATED POLE-AND-LINES, UNITED STATES OF AMERICA**

< 20%

Handline fisheries generally have low discard rates, with fishers able to land and release undesired species quickly and with low mortality (Kelleher 2005).

**UNITED STATES OF AMERICA/GULF OF MEXICO, SET LONGLINES, UNITED STATES OF AMERICA**

< 20%

According to Scott-Denton et al. (2011) in the Gulf of Mexico reef fish bottom longline fishery 12% of the total catch was discarded dead, 4% was discarded in unknown condition and 3% were used for bait, for total discards of 19%.

**WARSAW GROPPER**

**Factor 2.1 - Inherent Vulnerability**

**UNITED STATES OF AMERICA/GULF OF MEXICO, SET LONGLINES, UNITED STATES OF AMERICA**

High

The fishbase inherent vulnerability score for Warsaw grouper is 68 (Froese & Pauly 2013), corresponding to a SFW score of "high" inherent vulnerability.

**Factor 2.2 - Abundance**

**UNITED STATES OF AMERICA/GULF OF MEXICO, SET LONGLINES, UNITED STATES OF AMERICA**

Very High Concern

Warsaw grouper has been listed by IUCN as "Critically Endangered" since 2006 (IUCN 2013). 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".

Warsaw grouper’s overfished status in the Gulf of Mexico is unknown because no stock assessments have been conducted (NMFS 2013d).
Due to its IUCN status and its unknown overfished status, Warsaw grouper’s stock status in the Gulf of Mexico scores as "very high concern".

**Factor 2.3 - Fishing Mortality**

**HIGH CONCERN**

NMFS listed Warsaw grouper’s overfishing status in the Gulf of Mexico as unknown, the stock has not been assessed (NMFS 2013d).

Starting in 2010, Warsaw grouper in the Gulf of Mexico has been managed under the deep water grouper IFQ program. Due to flexibility measures built into the IFQ program, Warsaw grouper (and speckled hind) can be landed under the shallow water grouper IFQ once a fisherman’s deep water IFQ allocation has been reached (GMFMC 2013b). In 2010, Warsaw grouper landings represented 9.8% of all deep water grouper landed (59.4% of the total 2010 deep water grouper quota was met), and in 2011, it represented 5.8% of all deep water grouper landed (76.3% of the total deep water grouper quota was met) (GMFMC 2013c)(NMFS 2013b). We note that of the deepwater groupers, Warsaw grouper is in least demand (GMFMC 2012b) so is likely not as highly targeted as other species.

According to the Federal Register notice rejecting ESA listing for this species, management actions have significantly reduced landings for Warsaw grouper in the Gulf of Mexico (Federal Register 2010) In the IFQ program's first year (2010), landings for this species reached a low point, and have increased in subsequent years (2010: 28.6 MT, 2011: 33.7 MT 2012: 47.5 MT)(NMFS 2013b). Although fishing effort is managed, we rate fishing mortality for Warsaw grouper as "high concern" because this species is listed as "critically endangered" by IUCN, fishing mortality is unknown and it is unknown if management to curtail overfishing is effective.

**Factor 2.4 - Discard Rate**

**< 20%**

According to Scott-Denton et al. (2011) in the Gulf of Mexico reef fish bottom longline fishery 12% of the total catch was discarded dead, 4% was discarded in unknown condition and 3% were used for bait, for total discards of 19%.

**RED SNAPPER**

**Factor 2.1 - Inherent Vulnerability**

**Medium**

Red snapper has a Fishbase score of 55 out of 100 and is therefore deemed to be of moderate inherent vulnerability (Froese and Pauly 2011).

**Factor 2.2 - Abundance**
**High Concern**
Gulf of Mexico red snapper stocks are depleted, with $B/B_{MSY}=0.18$. This stock is considered overfished (NMFS 2012b).

**Factor 2.3 - Fishing Mortality**

**Low Concern**
Fishing mortality of red snapper in the Gulf of Mexico is not exceeding threshold values with $F/MFMT=0.56$ (SEDAR 2013c); overfishing is not occurring (NMFS 2012b).

**Factor 2.4 - Discard Rate**

< 20%
Handline fisheries generally have low discard rates, with fishers able to land and release undesired species quickly and with low mortality (Kelleher 2005).
**Criterion 3: Management Effectiveness**

Management is separated into management of retained species (harvest strategy) and management of non-retained 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 or either the Harvest Strategy (Factor 3.1) or Bycatch Management Strategy (Factor 3.2) is Very High Concern = 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**

<table>
<thead>
<tr>
<th>Region / Method</th>
<th>Harvest Strategy</th>
<th>Bycatch Strategy</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>United States of America / Atlantic / Drift gillnets / United States of America</td>
<td>3.00</td>
<td>4.00</td>
<td>Green (3.46)</td>
</tr>
<tr>
<td>United States of America / Atlantic / Handlines and hand-operated pole-and-lines / United States of America</td>
<td>4.00</td>
<td>0.00</td>
<td>Green (4.00)</td>
</tr>
<tr>
<td>United States of America / Gulf of Mexico / Set longlines / United States of America</td>
<td>3.00</td>
<td>3.00</td>
<td>Yellow (3.00)</td>
</tr>
<tr>
<td>United States of America / Gulf of Mexico / Handlines and hand-operated pole-and-lines / United States of America</td>
<td>3.00</td>
<td>0.00</td>
<td>Yellow (3.00)</td>
</tr>
</tbody>
</table>

**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.

Factor 3.1 Summary

<table>
<thead>
<tr>
<th>Region / Method</th>
<th>Strategy</th>
<th>Recovery</th>
<th>Research</th>
<th>Advice</th>
<th>Enforce</th>
<th>Track</th>
<th>Inclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>United States of America / Atlantic / Drift gillnets / United States of America</td>
<td>Highly Effective</td>
<td>Moderately Effective</td>
<td>Moderately Effective</td>
<td>Highly Effective</td>
<td>Highly Effective</td>
<td>Highly Effective</td>
<td>Highly Effective</td>
</tr>
<tr>
<td>United States of America / Atlantic / Handlines and hand-operated pole-and-lines / United States of America</td>
<td>Highly Effective</td>
<td>N/A</td>
<td>Moderately Effective</td>
<td>Highly Effective</td>
<td>Highly Effective</td>
<td>Highly Effective</td>
<td>Highly Effective</td>
</tr>
<tr>
<td>United States of America / Gulf of Mexico / Set longlines / United States of America</td>
<td>Moderately Effective</td>
<td>Moderately Effective</td>
<td>Moderately Effective</td>
<td>Highly Effective</td>
<td>Moderately Effective</td>
<td>Highly Effective</td>
<td>Highly Effective</td>
</tr>
<tr>
<td>United States of America / Gulf of Mexico / Handlines and hand-operated pole-and-lines / United States of America</td>
<td>Highly Effective</td>
<td>Moderately Effective</td>
<td>Moderately Effective</td>
<td>Highly Effective</td>
<td>Highly Effective</td>
<td>Highly Effective</td>
<td>Highly Effective</td>
</tr>
</tbody>
</table>

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.

UNITED STATES OF AMERICA / ATLANTIC, DRIFT GILLNETS, UNITED STATES OF AMERICA
UNITED STATES OF AMERICA / ATLANTIC, HANDLINES AND HAND-OPERATED POLE-AND-LINES, UNITED STATES OF AMERICA

Highly Effective

South Atlantic cobia stocks are managed by SAFMC and are assessed by the Southeast Data Assessment and Review (SEDAR) process. SEDAR is a joint effort by the Caribbean, South Atlantic and Gulf of Mexico Fishery Management Councils, NOAA and the Atlantic and Gulf States Marine Fishery Commissions. This species is included in the Coastal Migratory Pelagic Fishery Management Plan (1983), which is amended regularly to adjust for changes in stock parameters, fishing effort and management goals. The goals for cobia management set forth in the FMP and the SEDAR assessment (SEDAR 2013b) are appropriate to the species and ongoing monitoring suggests that these management guidelines are being implemented successfully. Management measures include daily bag limits, fishery quotas, a 33” minimum landing size, and the use of...
accountability measures when quotas are exceeded. Regional quotas for cobia are being considered under the FMP.

There are TACs for each migratory group of King mackerel managed under the FMP, a minimum size limit of 24” has been implemented and there are bag limits which vary by region and gear (SAFMC 2014a). Spanish mackerel landed in federal waters must be at least 12” (30.5 cm) FL and must be landed with heads and fins intact. There are also seasonal and and gear restrictions that are also in place (SAFMC 2014b).

The management measures set forth in the Coastal Pelagics FMP have been highly effective at maintaining healthy populations of target species within the appropriate fisheries, and have been scored as such.

UNITED STATES OF AMERICA / GULF OF MEXICO, SET LONGLINES, UNITED STATES OF AMERICA

*Moderately Effective*

Gulf of Mexico cobia stocks are managed by GMFMC and are assessed by the Southeast Data Assessment and Review (SEDAR) process. SEDAR is a joint effort by the Caribbean, South Atlantic and Gulf of Mexico Fishery Management Councils, NOAA and the Atlantic and Gulf States Marine Fishery Commissions. This species is included in the Coastal Migratory Pelagic Fishery Management Plan (1983), however the Gulf of Mexico reef fish longline fishery is managed under the Reef Fish FMP, therefore the following is an assessment of the Reef Fish FMP management system.

The GMFMC has conducted scientifically based stock assessments and continually amended the Reef Fish Fishery Management Plan (FMP) (instituted in 1984) to end overfishing of the most commercially important species, namely the shallow water groupers: gag (which has been overfished on and off since the 1970's and is currently overfished) and red grouper (which has rebuilt and is no longer overfished or experiencing overfishing). Management measures instituted by amendments have included rebuilding programs, annual catch limits allocated between commercial and recreational fisheries, gear restrictions, minimum size limits on shallow water grouper species (for example red grouper's minimum size limit is set at 20”, the Lso of maturity) (there are no minimum size limits for deep water grouper species due to the high likelihood of lethal barotrauma during capture) (see Table 2), areal closures to protect spawning sites and most recently an IFQ system with a strict reporting program. A concise summary of each amendment made to the FMP is given in a 2012 GMFMC document (GMFMC 2012b).

Protected areas are part of the GMFMC's management strategy (see Figure 15 for a map of MPAs in the Gulf). The GMFMC designated Essential Fish Habitat (EFH) in 2005, including 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) (70 FR 76216 )

Problematic for rebuilding and maintaining grouper stocks is the infrequency of quantitative stock assessments, namely for the deep water groupers, the lack of information on regulatory discards of these species (and other bycatch) and the lack of accountability in the recreational fishery. The infrequent stock assessment of the deep water groupers is due partly to a lack of sufficient data, likely caused by low population size (pers comm R. Ellis - check to see if he is okay with pers comm attribution). Due to these challenges, this criterion is scored as moderately effective.

While management measures introduced to protect cobia stocks have ensured that a healthy stocks are maintained, there has been less success with maintaining and recovering reef fish populations targeted in the longline fishery, therefore the management strategy is considered to be moderately effective.
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.

UNITED STATES OF AMERICA / GULF OF MEXICO, HANDLINES AND HAND-OPERATED POLE-AND-LINES, UNITED STATES OF AMERICA

Highly Effective

Gulf of Mexico cobia stocks are managed by GMFMC under the Coastal Migratory Pelagic Fishery Management Plan (1983) (FMP), and are assessed by the Southeast Data Assessment and Review (SEDAR) process. SEDAR is a joint effort by the Caribbean, South Atlantic and Gulf of Mexico Fishery Management Councils, NOAA and the Atlantic and Gulf States Marine Fishery Commissions.

The FMP is amended regularly to adjust for changes in stock parameters, fishing effort and management goals. Current management measures include spatial closures, seasonal closures, trip limits (two cobia per vessel per day), and a minimum landing size of 33" FL (fork length), which is considered to be above the size that cobia reach maturity (although there is some uncertainty)(SEDAR 2013a). The goals for cobia management set forth in the FMP and the SEDAR assessment (SEDAR 2013a) are appropriate to the species and ongoing monitoring suggests that these management guidelines are being implemented successfully.

UNITED STATES OF AMERICA / ATLANTIC, DRIFT GILLNETS, UNITED STATES OF AMERICA

UNITED STATES OF AMERICA / GULF OF MEXICO, SET LONGLINES, UNITED STATES OF AMERICA

Moderately Effective

Rebuilding plans are in place (or have been completed successfully) for the most commercially valuable grouper species, namely gag and red grouper. This criterion scores as moderate effective because vulnerable deep water groupers, namely warsaw (listed as critically endangered by IUCN), and snowy groupers (listed as vulnerable by IUCN), are unassessed and have "unknown" overfished and overfishing statuses (NMFS 2013d) so are not eligible for rebuilding plans (even if it is widely held that warsaw grouper is depleted throughout its range).

UNITED STATES OF AMERICA / ATLANTIC, HANDLINES AND HAND-OPERATED POLE-AND-LINES, UNITED STATES OF AMERICA

N/A

No stocks of concern are caught and retained in this fishery.

UNITED STATES OF AMERICA / GULF OF MEXICO, HANDLINES AND HAND-OPERATED POLE-AND-LINES, UNITED STATES OF AMERICA

Moderately Effective

The Gulf of Mexico handline fishery regularly lands gag groupers, greater amberjacks and red snappers which are all considered overfished. The majority of greater amberjack and red snapper catch in the Gulf of Mexico occurs with handlines or other small hook and line gear (NMFS 2013) whereas gag grouper are landed
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.

<table>
<thead>
<tr>
<th>Country/Region</th>
<th>Fishery Type</th>
<th>Scientific Research and Monitoring</th>
</tr>
</thead>
<tbody>
<tr>
<td>United States of America / Atlantic, Drift Gillnets</td>
<td>Moderately Effective</td>
<td>South Atlantic cobia stocks are managed by SAFMC and are assessed by the Southeast Data Assessment and Review (SEDAR) process. SEDAR is a joint effort by the Caribbean, South Atlantic and Gulf of Mexico Fishery Management Councils, NOAA and the Atlantic and Gulf States Marine Fishery Commissions. The assessment process includes three workshops: 1. Data Workshop (reviewing fisheries, monitoring and biological data), 2. Assessment Workshop (developing population models and parameter estimates) and 3. A review of data and assessment workshop products by independent experts. Fishery data used by SEDAR in the stock assessment report were derived entirely from fishery-dependent sources, as appropriate fishery-independent data were not available. Furthermore, there is some indication that there are multiple distinct sub-populations in the South Atlantic region (Lefebrve 2013); additional scientific research on this species is needed. The scientific research and monitoring component of this fishery is therefore considered moderately effective.</td>
</tr>
<tr>
<td>United States of America / Gulf of Mexico, Set Longlines</td>
<td>Moderately Effective</td>
<td>Gulf of Mexico cobia stocks are managed by GMFMC and are assessed by the Southeast Data Assessment and Review (SEDAR) process. SEDAR is a joint effort by the Caribbean, South Atlantic and Gulf of Mexico Fishery Management Councils, NOAA and the Atlantic and Gulf States Marine Fishery Commissions. The assessment process includes three workshops: 1. Data Workshop (reviewing fisheries, monitoring and biological data), 2. Assessment Workshop (developing population models and parameter estimates) and 3. A review of data and assessment workshop products by independent experts. Data for the Gulf of Mexico cobia assessment were collected from two sources. Fishery dependent data were collected from Texas Parks and Wildlife Departments sport boat angling surveys, which were used to generate CPUE trends for cobia in near- and off-shore waters. Fishery-independent data were derived from a SEAMAP groundfish survey, which uses a biannual trawl surveys to collect information about the distribution and abundance of demersal fishes in the Gulf of Mexico. However, cobia were caught in such low numbers that the abundance indices for cobia generated from the SEAMAP data were not recommended for use in the SEDAR assessment (SEDAR 2013a). Due to the uncertainty in the fishery-independent data, scientific research and monitoring for the Gulf of Mexico cobia fisheries are determined to be moderately effective.</td>
</tr>
</tbody>
</table>
Stock assessments are carried out with greater frequencies and with more rigor for the more commercially valuable grouper species; gag had 4 yrs between the last assessment and the current one (2009 to 2013), red grouper will have 5 years between the last assessment and the future one (2009 to 2014), black grouper will have 5 years between the last assessment and the future one (2009 to 2014), yellowedge grouper has only been assessed twice (2002 and 2010), snowy and Warsaw groupers have never been assessed (SEDAR 2013d). Gag, red grouper, black grouper and yellowedge grouper assessments have used fishery dependent and independent data.

UNITED STATES OF AMERICA / GULF OF MEXICO, HANDLINES AND HAND-OPERATED POLE-AND-LINES, UNITED STATES OF AMERICA

**Moderately Effective**

Gulf of Mexico cobia stocks are managed by GMFMC and are assessed by the Southeast Data Assessment and Review (SEDAR) process. SEDAR is a joint effort by the Caribbean, South Atlantic and Gulf of Mexico Fishery Management Councils, NOAA and the Atlantic and Gulf States Marine Fishery Commissions. The assessment process includes three workshops: 1. Data Workshop (reviewing fisheries, monitoring and biological data), 2. Assessment Workshop (developing population models and parameter estimates) and 3. A review of data and assessment workshop products by independent experts.

Data for the Gulf of Mexico cobia assessment were collected from two sources. Fishery dependent data were collected from Texas Parks and Wildlife Departments sport boat angling surveys, which were used to generate CPUE trends for cobia in near- and off-shore waters. Fishery-independent data were derived from a SEAMAP groundfish survey, which uses a biannual trawl surveys to collect information about the distribution and abundance of demersal fishes in the Gulf of Mexico. However, cobia were caught in such low numbers that the abundance indices for cobia generated from the SEAMAP data were not recommended for use in the SEDAR assessment (SEDAR 2013a). Due to the uncertainty in the fishery-independent data, scientific research and monitoring for the Gulf of Mexico cobia fisheries are determined to be moderately effective.

**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.*

UNITED STATES OF AMERICA / ATLANTIC, DRIFT GILLNETS, UNITED STATES OF AMERICA

UNITED STATES OF AMERICA / ATLANTIC, HANDLINES AND HAND-OPERATED POLE-AND-LINES, UNITED STATES OF AMERICA

**Highly Effective**

The current assessment is the first time South Atlantic cobia has been assessed via the SEDAR process (SEDAR 2013b). One previous assessment of South Atlantic cobia was completed in 1994 (Thompson 1994), and concluded that this stock was neither overfished nor undergoing overfishing and made no management recommendations. A quota for cobia landings was first introduced in 2011. The quota for commercial landings (125,712 lbs) remains unchanged for the current cobia season (NOAA 2014). Total allowable biological catch (ABC) was determined by the SAFMC SSC and was calculated as the mean + (1.5 *s.d.) for the most recent 10 years of landings (1,571,399 lbs). Ninety-two percent of ABC is allocated to the recreational fishing sector, with 8% reserved for commercial fishers. Since the quota has been implemented, South Atlantic commercial fisheries have not yet reached the annual catch limit (NOAA 2014). Management adherence to scientific advice is determined to be highly effective.
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.

UNITED STATES OF AMERICA / GULF OF MEXICO, SET LONGLINES, UNITED STATES OF AMERICA

Highly Effective

GMFMC follows scientific advice set out by their Scientific and Statistical Committee (SSC), particularly for commercially important, overfished species (GMFMC 2011c).

UNITED STATES OF AMERICA / GULF OF MEXICO, HANDLINES AND HAND-OPERATED POLE-AND-LINES, UNITED STATES OF AMERICA

Highly Effective

The current assessment is the first time Gulf of Mexico cobia has been assessed via the SEDAR process (SEDAR 2013a). One previous assessment of Gulf cobia was completed in 2001 (Williams 2001) and was unable to determine stock status. Amendment 18 (effective Jan 30, 2012) to the GMFMC Costal Pelagics FMP set a single stock ACL for Gulf cobia as 1,460,000 lbs, or 100% of the SSC determined ABC (GMFMC 2011). This amendment also set an annual catch target of 1,310,000 lbs, which has not been reached since the amendment was enacted. Management adherence to scientific advice is determined to be highly effective.

UNITED STATES OF AMERICA / ATLANTIC, DRIFT GILLNETS, UNITED STATES OF AMERICA

Highly Effective

The SAFMC has no law enforcement authority and thus works closely with a number of state and federal agencies to ensure that fishers comply with fisheries regulations including state departments of wildlife and/or fisheries resources, the US Coast Guard and NOAA. Additionally, SAFMC has convened a Law Enforcement Advisory Panel to make recommendations on enforcement strategies (SAFMC 2012b) and publishes quarterly reports on law enforcement activities conducted in the Atlantic EEZ.

UNITED STATES OF AMERICA / GULF OF MEXICO, SET LONGLINES, UNITED STATES OF AMERICA

Moderately Effective

Since 2006 commercial vessels fishing under the Gulf Reef Fish FMP are required to have satellite communication Vessel Monitoring Systems (VMS) (NMFS SERO 2007) Grouper species catch relative to their quotas are monitored in real time via the online IFQ reporting system which is maintained by the NMFS Southeast Regional Office (SERO) (NMFS SERO 2013). 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).

UNITED STATES OF AMERICA / GULF OF MEXICO, HANDLINES AND HAND-OPERATED POLE-AND-LINES, UNITED STATES OF AMERICA

Highly Effective
The GMFMC has no law enforcement authority and thus works closely with a number of state and federal agencies to ensure that fishers comply with fisheries regulations. GMFMC periodically convenes a Law Enforcement Advisory Panel to make recommendations on enforcement strategies. This panel includes members of the law enforcement community from each of the five Gulf states as well as representatives from the US Fish and Wildlife Service, US Coast Guard and NOAA (GMFMC 2012a). With recent changes in fishery quota allocations there has been a reduction in enforcement actions in recent years (Porter et al. 2013), although it is unclear as to whether the NOAA Office of Law Enforcement data accurately reflects overall fisher compliance with management guidelines (Porter et al. 2013).

**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.*

**UNITED STATES OF AMERICA / ATLANTIC, DRIFT GILLNETS, UNITED STATES OF AMERICA**

**UNITED STATES OF AMERICA / ATLANTIC, HANDLINES AND HAND-OPERATED POLE-AND-LINES, UNITED STATES OF AMERICA**

**Highly Effective**

This is the first time SEDAR has assessed Atlantic cobia (SEDAR 2013b). Cobia previously fell under the auspices of the Mackerel Stock Assessment Panel and the US Southeast Atlantic cobia stocks were assessed by Thompson (1994), who found a very low fishery mortality rate and concluded that these stocks were not overfished. No additional management measures were implemented; US Southeast Atlantic cobia stocks continue to be of low conservation concern.

**UNITED STATES OF AMERICA / GULF OF MEXICO, SET LONGLINES, UNITED STATES OF AMERICA**

**Moderately Effective**

The newest measures enacted by management, namely the new IFQ system, have not been in place long enough to result in the long-term maintenance of grouper stock abundance, given the long lived and slow reproductive rates of these species. However, the 2009 red grouper stock assessment indicated that the population has generally increased from 1986 levels, and while it decreased from the 2006 assessment levels, the stock is at 86% of its target and is above the overfished threshold (SEDAR 2009b).

**UNITED STATES OF AMERICA / GULF OF MEXICO, HANDLINES AND HAND-OPERATED POLE-AND-LINES, UNITED STATES OF AMERICA**

**Highly Effective**

This is the first year SEDAR has assessed cobia (SEDAR 2013a)(SEDAR 2013b). Cobia previously fell under the auspices of the Mackerel Stock Assessment Panel and Gulf of Mexico stocks have most recently been assessed by Williams (Williams 2001), who concluded that cobia biomass had increased in recent years, but was unable to make a determination of stock status, thus there is no prior stock assessment on which to base an examination of management effectiveness. Size and bag limits have been in place for many years (since 1985 and 1990, respectively (NMFS 1983)), but no additional management actions have been taken.

**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.

UNITED STATES OF AMERICA / ATLANTIC, DRIFT GILNETS, UNITED STATES OF AMERICA
UNITED STATES OF AMERICA / ATLANTIC, HANDLINES AND HAND-OPERATED POLE-AND-LINES, UNITED STATES OF AMERICA
UNITED STATES OF AMERICA / GULF OF MEXICO, HANDLINES AND HAND-OPERATED POLE-AND-LINES, UNITED STATES OF AMERICA

Highly Effective

The SEDAR assessment process includes participants from state and federal agencies, non governmental organizations, management council members and fishery industry representatives at all workshop activities. According to SEDAR (2013a): "SEDAR emphasizes constituent and stakeholder participation in assessment development, transparency in the assessment process and a rigorous and independent scientific review of completed stock assessments."

UNITED STATES OF AMERICA / GULF OF MEXICO, SET LONGLINES, UNITED STATES OF AMERICA

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 2011d).

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). Stakeholder 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 2013b). Select stakeholders are also involved in the Southeast Data, Assessment, and Review (SEDAR) process.

Factor 3.2 - Bycatch Strategy

SCORING GUIDELINES

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.).

UNITED STATES OF AMERICA / ATLANTIC, DRIFT GILLNETS, UNITED STATES OF AMERICA

Highly Effective

Atlantic gillnet fishers are subject to a number of restrictions. Throughout the year there are seasonal and area closures that affect all gillnet fishers (Figure 6). Many of these restrictions are in place to reduce or mitigate bycatch of sensitive or protected species, including marine mammals, sea turtles and the endangered smalltooth sawfish (*Pristis pectinata*). All gillnet vessels owners and operators must possess US federal Protected Species Safe Handling, Release and Identification Workshop certificates and the Atlantic Large Whale Take Reduction Plan stipulates that gillnet gear must be marked, vessels must carry observers and utilize vessel monitoring systems when fishing with gillnets in non-closure areas. Additionally, vessels cannot carry gillnets exceeding 2.5 km in length and one end of the net must be attached to the vessel, except during net checks. Nets must be checked every two hours to monitor catch of protected resources. In the event that a turtle, marine mammal or smalltooth sawfish becomes entangled fishers must immediately disentangle and release the animal and move a distance of 1 nm before resuming fishing activities.

Justification:
UNITED STATES OF AMERICA / GULF OF MEXICO, SET LONGLINES, UNITED STATES OF AMERICA

Moderately Effective

Due to excessive bycatch or “take” of federally listed, endangered loggerhead sea turtles (over 800 over a 30 month period) (NMFS 2009a) in the bottom longline component of the Gulf of Mexico reef fishery, the GMFMC instituted large changes to the fishery, via interim measures in 2009 and permanent measures in 2010 which reduced the longline fleet by almost 80%, seasonally banned the use of longline gear across a large portion of the gulf, restricted the number of hooks allowed on board longline vessels and continued monitoring the fishery for incidental sea turtle takes (NMFS 2009b). No recent data is available on the loggerhead sea turtle take by Gulf reef fish longliners, but it seems likely that this take is reduced given the post 2009-2010 reductions in longline effort.

According to limited observer data recorded between 2006 and 2009, discarded bycatch (including regulatory discards) made up 26% of the individual fish captured by vertical line and 51% of the individual fish captured by longline (Scott-Denton et al. 2011). The majority of discarded fish (>80%) (Scott-Denton et al. 2011) are regulatory discards of undersized groupers and snappers and also include regulation sized fish when IFQs (including multi-species IFQs) are reached. The majority of discarded fish are released alive: of those 35% released from the vertical line fishery and 42% from the longline fishery had signs of barotrauma (Scott-Denton et al. 2011). Several management measures are in place to reduce regulatory and incidental bycatch of targeted grouper species, including flexibility measures in the Gulf grouper IFQ program to allow landings across categories (NMFS 2013e), reductions in size limits of some species (GMFMC 2011e) and mandatory...
use of circle hooks, dehooking devices, and venting tools (NMFS 2008). Circle hooks have been shown to reduce gut hookings in target as well as non-target species; gut hooking is more likely to result in bleeding than jaw hooking (Bacheler & Buckel 2004).

Overall the management strategy and implementation for bycatch species is moderately effective.

**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.*

**UNITED STATES OF AMERICA / ATLANTIC, DRIFT GILLNETS, UNITED STATES OF AMERICA**

**Moderately Effective**

As cobia are not targeted, but are retained bycatch in several fisheries which makes it difficult to ascertain precisely which US Southeast Atlantic fisheries are responsible for the bulk of cobia landings. The purview of the southeast gillnet observer program includes the teleost sink gillnet fishery. In 2012, there were observers present in 100% of target shark strike (runaround) gillnet trips, 38% of shark drift gillnet trips and only 5% of shark/teleost sink gillnet trips. While coverage is low for this fishery, it may be adequate, given main catch stock status and vulnerability to fishing pressure. However, due to uncertainty in cobia population structure in the South Atlantic, further research is necessary to determine the effects of cobia fisheries on these stocks.

Scientific research and monitoring in the Atlantic is therefore considered to be moderately effective.

**UNITED STATES OF AMERICA / GULF OF MEXICO, SET LONGLINES, UNITED STATES OF AMERICA**

**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 (NMFS 2014b). Target coverage for this fishery is 2% (NMFS 2013f), so observer coverage is above the target. SEFSC 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, this criterion scores as "moderately effective" because the high discard rate and the discard of highly vulnerable species in this fishery warrant increased observer coverage and because logbook data on discards is suspect.

**Justification:**

Number of sea days observed, the total sea days fished and the percent observer coverage in the reef fish fishery in the Gulf of Mexico. SBLOP (Shark Bottom Long Line Observer Program), RFOP (Reef Fish Observer Program)(NMFS 2014b).

**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.

UNITED STATES OF AMERICA / ATLANTIC, DRIFT GILLNETS, UNITED STATES OF AMERICA

Highly Effective
In the US Atlantic bottom gillnet fishery there are few species of ecological or conservation concern landed routinely. Accordingly, management adherence to scientific advice, for bycatch species, is considered to be highly effective.

UNITED STATES OF AMERICA / GULF OF MEXICO, SET LONGLINES, UNITED STATES OF AMERICA

Highly Effective
In 2009, after observer data indicated that the longline component of the Gulf of Mexico reef fishery exceeded the number of incidental takes of endangered loggerhead sea turtles allowed by the 2005 Biological Opinion under the Endangered Species Act, NMFS acted swiftly to reduce turtle bycatch by enacting several measures restricting the use of longline gear in the region (NMFS 2009b), effectively shifting the commercial reef fishery to vertical gear.

In 2008, in order to reduce mortality of discarded fish, NMFS followed scientific advice and required all commercial and recreational fishers targeting reef fish to possess and use unhooking and venting tools and circle hooks (NMFS 2008).

Although observer coverage is low, scientific advice related to bycatch has been followed for the Gulf Reef Fish Fishery, so this Scientific Advice is scored as "highly effective".

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.

UNITED STATES OF AMERICA / ATLANTIC, DRIFT GILLNETS, UNITED STATES OF AMERICA

Highly Effective
The SAFMC has no law enforcement authority and thus works closely with a number of state and federal agencies to ensure that fishers comply with fisheries regulations including state departments of wildlife and/or fisheries resources, the US Coast Guard and NOAA. Additionally, SAFMC has convened a Law Enforcement Advisory Panel to make recommendations on enforcement strategies (SAFMC 2012b) and publishes quarterly reports on law enforcement activities conducted in the Atlantic EEZ.

UNITED STATES OF AMERICA / GULF OF MEXICO, SET LONGLINES, UNITED STATES OF AMERICA

Moderately Effective
Since 2006 commercial vessels fishing under the Gulf Reef Fish FMP are required to have satellite communication Vessel Monitoring Systems (VMS) (NMFS SERO 2007). Grouper species catch relative to their quotas are monitored in real time via the online IFQ reporting system which is maintained by the NMFS
Southeast Regional Office (SERO) (NMFS SERO 2013). 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).
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

<table>
<thead>
<tr>
<th>Region / Method</th>
<th>Gear Type and Substrate</th>
<th>Mitigation of Gear Impacts</th>
<th>EBFM</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>United States of America / Atlantic / Drift gillnets / United States of America</td>
<td>5.00: None</td>
<td>0.00: Not Applicable</td>
<td>3.00: Moderate Concern</td>
<td>Green (3.87)</td>
</tr>
<tr>
<td>United States of America / Atlantic / Handlines and hand-operated pole-and-lines / United States of America</td>
<td>5.00: None</td>
<td>0.00: Not Applicable</td>
<td>3.00: Moderate Concern</td>
<td>Green (3.87)</td>
</tr>
<tr>
<td>United States of America / Gulf of Mexico / Set longlines / United States of America</td>
<td>3.00: Low Concern</td>
<td>0.50: Moderate Mitigation</td>
<td>3.00: Moderate Concern</td>
<td>Green (3.24)</td>
</tr>
<tr>
<td>United States of America / Gulf of Mexico / Handlines and hand-operated pole-and-lines / United States of America</td>
<td>5.00: None</td>
<td>0.00: Not Applicable</td>
<td>3.00: Moderate Concern</td>
<td>Green (3.87)</td>
</tr>
</tbody>
</table>

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**

| UNITED STATES OF AMERICA / ATLANTIC, DRIFT GILLNETS, UNITED STATES OF AMERICA |
| None |
| Strike gillnets used to target pelagic species such as cobia, Spanish and king mackerel do not contact the seabed. |

| UNITED STATES OF AMERICA / ATLANTIC, HANDLINES AND HAND-OPERATED POLE-AND-LINES, UNITED STATES OF AMERICA |
| None |
**Factor 4.2 - Mitigation of Gear Impacts**

**UNITED STATES OF AMERICA / GULF OF MEXICO, SET LONGLINES, UNITED STATES OF AMERICA**

*Low Concern*

Bottom longlines contact the bottom substrate via sink weights and drifting hooks. While bottom longlines are generally considered to have minimal impact on the benthic environment (Morato and Pham 2013), sessile invertebrates do become snagged on hooks during gear haul (see (Parker and Bowden 2009)). The impact of bottom longline gear on the substrate is considered to be of low concern.

**UNITED STATES OF AMERICA / GULF OF MEXICO, HANDLINES AND HAND-OPERATED POLE-AND-LINES, UNITED STATES OF AMERICA**

*None*

**Factor 4.2 - Mitigation of Gear Impacts**

**UNITED STATES OF AMERICA / ATLANTIC, DRIFT GILLNETS, UNITED STATES OF AMERICA**

*Not Applicable*

**UNITED STATES OF AMERICA / ATLANTIC, HANDLINES AND HAND-OPERATED POLE-AND-LINES, UNITED STATES OF AMERICA**

*Not Applicable*

**UNITED STATES OF AMERICA / GULF OF MEXICO, SET LONGLINES, UNITED STATES OF AMERICA**

*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 79%, 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 (70 FR 76216) 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)

**UNITED STATES OF AMERICA / GULF OF MEXICO, HANDLINES AND HAND-OPERATED POLE-AND-LINES, UNITED STATES OF AMERICA**

*Not Applicable*

**Factor 4.3 - Ecosystem-Based Fisheries Management**

**UNITED STATES OF AMERICA / ATLANTIC, DRIFT GILLNETS, UNITED STATES OF AMERICA**

*Not Applicable*
### Moderate Concern

While there are no implicit considerations made for ecosystem health in the Atlantic gillnet fishery, the gillnet gear used to catch cobia has relatively low impact and does not routinely catch species of exceptional importance. There are no current efforts to account for the role of cobia within the ecosystem. Therefore the management of the ecosystem within the fisheries from which cobia are landed are considered a moderate conservation concern.

#### UNITED STATES OF AMERICA / ATLANTIC, HANDLINES AND HAND-OPERATED POLE-AND-LINES, UNITED STATES OF AMERICA

#### Moderate Concern

Handline fisheries are relatively selective allowing non-target species to be released alive, and there is minimal impact with the seabed. There are however no current efforts to account for the role of cobia within the ecosystem. Therefore the management of the ecosystem within the fisheries from which cobia are landed are considered a moderate conservation concern.

#### UNITED STATES OF AMERICA / GULF OF MEXICO, HANDLINES AND HAND-OPERATED POLE-AND-LINES, UNITED STATES OF AMERICA

#### Moderate Concern

The reef fish longline fishery, from which a number of number will be landed, is managed under the Reef Fish FMP which takes the ecosystem role of some reef fish into account. As a result essential fish habitat (EFH) has been protected through the FMP. There are however no management measures in place relating to cobia in the coastal pelagic species FMP to account for the ecosystem role of cobia or other target species such as Spanish and king mackerel. Seafood Watch therefore considers management of the ecosystem to be of moderate conservation concern.
Acknowledgements

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.

Many thanks to D. Klemm and J. Lee for information about bycatch and R. Rincone for keeping me up to speed with the progress of the cobia assessment process. L. Lefebvre kindly reviewed an earlier draft of this report. Seafood Watch would like to thank the consulting researcher and author of this report, Jen Hunter, as well as Lyndsey Lefebvre of the National Oceanic and Atmospheric Administration Southwest Fisheries Science Center for graciously reviewing this report for scientific accuracy. Additional thanks to R. Rincone, D. Klemm and J. Lee for information about bycatch.
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Appendix A: Extra By Catch Species

ATLANTIC CROAKER

Factor 2.1 - Inherent Vulnerability

United States of America/Atlantic, Drift Gillnets, United States of America

Low

Atlantic croaker has a Fishbase score of 34 of 100 and is determined to be of low inherent vulnerability (Froese and Pauly 2011).

Factor 2.2 - Abundance

United States of America/Atlantic, Drift Gillnets, United States of America

Low Concern

Atlantic croaker is currently managed as a single stock from New Jersey to Florida by the Atlantic States Marine Fisheries Commission (ASMFC)(ASMFC 2010). In 2010, the biological reference points were redefined and SSB_{MSY} was estimated at 26,268 mt, and the biomass threshold was estimated at 19,700 mt. The 2010 croaker SSB was estimated at 39,728 mt, well above the threshold biomass and SSB_{MSY}, indicating that the croaker stock is not overfished. However, there is significant uncertainty in the assessment, particularly regarding the amount of croaker caught in the Mid-Atlantic scrap fisheries, where fish are unsorted and sold together as bait (ASMFC 2010).

Due to these unknowns, the biological reference points alone were deemed to be too uncertain to be used to determine stock status in the 2010 assessment. Therefore, the assessment used the ratio of SSB/SSB_{MSY} as a proxy for biomass; it was determined that the croaker stock was not overfished and overfishing is not occurring. Based on the best available information it appears that croaker biomass has been steadily increasing and is therefore a low conservation concern.

Factor 2.3 - Fishing Mortality

United States of America/Atlantic, Drift Gillnets, United States of America

Low Concern

The recent Atlantic croaker stock assessment report (SEDAR 2010) concluded that current fishing mortality (F_{2008}=0.22) was less than both target (F_{MSY}= 0.455) and threshold (0.75F_{MSY}= 0.341) values, therefore overfishing is not occurring (SEDAR 2010). There is however some uncertainty in fishing mortality due to unknown landings for scrap fisheries and bycatch in shrimp fisheries (ASMFC 2010). Fishing mortality is determined to be of low concern.

Factor 2.4 - Discard Rate

United States of America/Atlantic, Drift Gillnets, United States of America

< 20%

Passerotti et al. (2010) studied the catch and bycatch from the sink gillnet fishery off the southeast US. The results present a pooled sample of sink gillnet catch, including trips targeting misc. sharks, Spanish mackerel,
king mackerel, Southern kingfish, Atlantic croaker, bluefish, weakfish, blacknose shark and finetooth shark. According to these data the overall discard rate for this gear was 6.6%. Soak and haul times were relatively short, with the entire fishing process (set to haul) lasting a mean of 1.09 hrs (3.56 S.D.).

**BLUEFISH**

**Factor 2.1 - Inherent Vulnerability**

<table>
<thead>
<tr>
<th>UNITED STATES OF AMERICA/ATLANTIC, DRIFT GILLNETS, UNITED STATES OF AMERICA</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>High</strong></td>
</tr>
<tr>
<td>Bluefish has a Fishbase score of 59 of 100 and is determined to be of high inherent vulnerability (Froese and Pauly 2011).</td>
</tr>
</tbody>
</table>

**Factor 2.2 - Abundance**

<table>
<thead>
<tr>
<th>UNITED STATES OF AMERICA/ATLANTIC, DRIFT GILLNETS, UNITED STATES OF AMERICA</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Low Concern</strong></td>
</tr>
<tr>
<td>The Atlantic bluefish stock has recently rebuilt after decades of overharvest (NOAA 2012, SAW 2005). The most recent stock assessment (Wood 2013) estimated biomass to be 132,890 mt of fish, or 90% B_{MSY} (Wood 2013); this stock is not in an overfished state. As biomass remains slightly below that expected to produce maximum sustainable yield Seafood Watch considers it to be of low conservation concern.</td>
</tr>
</tbody>
</table>

**Factor 2.3 - Fishing Mortality**

<table>
<thead>
<tr>
<th>UNITED STATES OF AMERICA/ATLANTIC, DRIFT GILLNETS, UNITED STATES OF AMERICA</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Very Low Concern</strong></td>
</tr>
<tr>
<td>A stock assessment for Atlantic bluefish was most recently conducted by Wood (2013). The fishery mortality rate was estimated as F_{2011}=0.114, with F_{2011}/F_{MSY}=0.6. The Atlantic bluefish stock is not undergoing overfishing (Wood 2013).</td>
</tr>
</tbody>
</table>

**Factor 2.4 - Discard Rate**

<table>
<thead>
<tr>
<th>UNITED STATES OF AMERICA/ATLANTIC, DRIFT GILLNETS, UNITED STATES OF AMERICA</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>&lt; 20%</strong></td>
</tr>
<tr>
<td>Passerotti et al. (2010) studied the catch and bycatch from the sink gillnet fishery off the southeast US. The results present a pooled sample of sink gillnet catch, including trips targeting misc. sharks, Spanish mackerel, king mackerel, Southern kingfish, Atlantic croaker, bluefish, weakfish, blacknose shark and finetooth shark. According to these data the overall discard rate for this gear was 6.6%. Soak and haul times were relatively short, with the entire fishing process (set to haul) lasting a mean of 1.09 hrs (3.56 S.D.).</td>
</tr>
</tbody>
</table>

**SWORDFISH**

**Factor 2.1 - Inherent Vulnerability**
### Factor 2.1 - Inherent Vulnerability

**UNITED STATES OF AMERICA/ATLANTIC, HANDLINES AND HAND-OPERATED POLE-AND-LINES, UNITED STATES OF AMERICA**

**High**

Swordfish has a Fishbase score of 72 out of 100 and is therefore considered to be of high inherent vulnerability (Froese and Pauly 2011).

### Factor 2.2 - Abundance

**UNITED STATES OF AMERICA/ATLANTIC, HANDLINES AND HAND-OPERATED POLE-AND-LINES, UNITED STATES OF AMERICA**

**Very Low Concern**

Despite severe overfishing in the 1990’s the North Atlantic swordfish stocks have rebuilt significantly. Due in large part to a comprehensive international management plan, the most recent stock assessment (ICCAT 2009) found that North Atlantic swordfish stocks are not currently in an overfished state ($B_{2009}/B_{MSY} = 1.05$).

### Factor 2.3 - Fishing Mortality

**UNITED STATES OF AMERICA/ATLANTIC, HANDLINES AND HAND-OPERATED POLE-AND-LINES, UNITED STATES OF AMERICA**

**Very Low Concern**

Fishing mortality for north Atlantic swordfish is $F_{2008}/F_{MSY}=0.76$, indicating that overfishing is not occurring (ICCAT 2009).

### Factor 2.4 - Discard Rate

**UNITED STATES OF AMERICA/ATLANTIC, HANDLINES AND HAND-OPERATED POLE-AND-LINES, UNITED STATES OF AMERICA**

**< 20%**

Handline fisheries generally have low discard rates, with fishers able to land and release undesired species quickly and with low mortality (Kelleher 2005).

### SPANISH MACKEREL

### Factor 2.1 - Inherent Vulnerability

**UNITED STATES OF AMERICA/ATLANTIC, DRIFT GILLNETS, UNITED STATES OF AMERICA**

**Medium**

Spanish mackerel has a Fishbase score of 39 out of 100 and is determined to be of moderate inherent vulnerability (Froese and Pauly 2011).

### Factor 2.2 - Abundance

**UNITED STATES OF AMERICA/ATLANTIC, DRIFT GILLNETS, UNITED STATES OF AMERICA**
**Very Low Concern**

A stock assessment was conducted in 2012 (SEDAR 2012) and concluded that $SSB_{2011}/MSST=2.29$. The South Atlantic Spanish mackerel stock is not currently in an overfished state.

### Factor 2.3 - Fishing Mortality

**UNITED STATES OF AMERICA/ATLANTIC, DRIFT GILLNETS, UNITED STATES OF AMERICA**

**Very Low Concern**

In the most recent stock assessment report (SEDAR 2012) fishing mortality for the Atlantic Spanish mackerel stock was determined to be $F_{2011}/F_{MSY}=0.521$, overfishing is not occurring.

### Factor 2.4 - Discard Rate

**UNITED STATES OF AMERICA/ATLANTIC, DRIFT GILLNETS, UNITED STATES OF AMERICA**

< 20%

Passerotti et al. (2010) studied the catch and bycatch from the sink gillnet fishery off the southeast US. The results present a pooled sample of sink gillnet catch, including trips targeting misc. sharks, Spanish mackerel, king mackerel, Southern kingfish, Atlantic croaker, bluefish, weakfish, blacknose shark and finetooth shark. According to these data the overall discard rate for this gear was 6.6%. Soak and haul times were relatively short, with the entire fishing process (set to haul) lasting a mean of 1.09 hrs (3.56 S.D.).

**YELLOWFIN TUNA**

### Factor 2.1 - Inherent Vulnerability

**UNITED STATES OF AMERICA/ATLANTIC, HANDLINES AND HAND-OPERATED POLE-AND-LINES, UNITED STATES OF AMERICA**

**Medium**

Yellowfin tuna has been given a Fishbase score of 46 out of 100 (Froese and Pauly 2012) and is determined to be of medium inherent vulnerability.

### Factor 2.2 - Abundance

**UNITED STATES OF AMERICA/ATLANTIC, HANDLINES AND HAND-OPERATED POLE-AND-LINES, UNITED STATES OF AMERICA**

**High Concern**

A stock assessment for Atlantic yellowfin was conducted by ICCAT in 2011. This analysis found that for the most recent year (2010) the Atlantic yellowfin stocks were estimated to be overfished as biomass was below the management target ($B_{2010}/B_{MSY}=0.85$; ICCAT 2011). Although, there is some uncertainty around this estimate. The state of Atlantic yellowfin tuna stocks was assessed using both production and age-structured population models and while the age structured models indicate a decrease in stock biomass, the production models indicate an increase in stock biomass. When the uncertainty in the point estimates for all models was taken into account however, ICCAT concluded that these stocks are most likely 15% below target value (ICCAT 2011).
### Factor 2.3 - Fishing Mortality

**UNITED STATES OF AMERICA/ATLANTIC, HANDLINES AND HAND-OPERATED POLE-AND-LINES, UNITED STATES OF AMERICA**

**Very Low Concern**

Despite the decades long decrease in yellowfin abundance, overfishing is not currently occurring, with $F_{2011}/F_{MSY}=0.87$ (ICCAT 2011). ICCAT (2011) recommends that stock exploitation remain at or below current harvest levels (11,000 mt) in order to facilitate species recovery in the coming years. Longliners and purse seine fishers are responsible for the vast majority of yellowfin landings in the Atlantic EEZ. Handline fishers catch comparably few yellowfin and hence the mortality attributable to this fishery is not a substantial contributor to the mortality of the stock (NMFS 2008).

### Factor 2.4 - Discard Rate

**UNITED STATES OF AMERICA/ATLANTIC, HANDLINES AND HAND-OPERATED POLE-AND-LINES, UNITED STATES OF AMERICA**

**< 20%**

Handline fisheries generally have low discard rates, with fishers able to land and release undesired species quickly and with low mortality (Kelleher 2005).

### ATLANTIC SHARPNOSE SHARK

#### Factor 2.1 - Inherent Vulnerability

**UNITED STATES OF AMERICA/GULF OF MEXICO, SET LONGLINES, UNITED STATES OF AMERICA**

**Medium**

Inherent Vulnerability is 48/100 therefore sharpnose shark are considered to have medium vulnerability (Froese & Pauly 2013)

#### Factor 2.2 - Abundance

**UNITED STATES OF AMERICA/GULF OF MEXICO, SET LONGLINES, UNITED STATES OF AMERICA**

**Very Low Concern**

According to the 2013 stock assessment, Atlantic sharpnose shark is not overfished. The stock assessment uses a Biomass proxy of Spawning Stock Fecundity (SSF) and estimated $SSF_{2011}/SSF_{MSY}$ as ranging from 1.01 to 2.88 (SEDAR 2013e). The assessment reports an 85-99% probability that the stock is not overfished (SEDAR 2013e).

#### Factor 2.3 - Fishing Mortality

**UNITED STATES OF AMERICA/GULF OF MEXICO, SET LONGLINES, UNITED STATES OF AMERICA**

**Low Concern**

According to the 2013 stock assessment it is not clear if the Atlantic sharpnose shark stock (across the US Atlantic, Gulf of Mexico and Caribbean region) is experiencing overfishing with current fishing mortality ($F_{2011}$)
compared to fishing mortality at Maximum Sustainable Yield ($F_{MSY}$) ranging from $F_{2011}/F_{MSY}=0.03$ to 0.57 (SEDAR 2013e). The probability of overfishing not occurring in 2011 was >50% in three cases and ranged between 54 and 67% (SEDAR 2013e), justifying the fishing mortality score of "low concern".

Bycatch is a significant source of mortality to Atlantic sharpnose shark, but the species is not overfished and is likely not experiencing overfishing (so current bycatch mortality of this species is considered acceptable). Between July 2006 and December 2009, reef fish observers covering 1,503 longline sets recorded 2,142 individuals caught (20 were kept) on reef fish longline gear in this region (Scott-Denton et al. 2011). According to the 2013 Update to the US National Bycatch report an estimated 25,910.76 individuals were caught in the Gulf of Mexico Reef Fish Bottom Longline fishery (NMFS 2013g). The report does not cite what data they based this estimate on. This estimate constitutes 40% of the total bycatch of Atlantic sharpnose shark across the Southeast region (spanning the Gulf of Mexico and South Atlantic) (NMFS 2013g).

**Factor 2.4 - Discard Rate**

| UNITED STATES OF AMERICA/GULF OF MEXICO, SET LONGLINES, UNITED STATES OF AMERICA |
| < 20% |

According to Scott-Denton et al. (2011) in the Gulf of Mexico reef fish bottom longline fishery 12% of the total catch was discarded dead, 4% was discarded in unknown condition and 3% were used for bait, for total discards of 19%.

**BLACKNOSE SHARK**

**Factor 2.1 - Inherent Vulnerability**

| UNITED STATES OF AMERICA/GULF OF MEXICO, SET LONGLINES, UNITED STATES OF AMERICA |
| High |

The inherent vulnerability score for blacknose shark on Fishbase is 70/100 (Froese & Pauly 2013), therefore Seafood Watch considers it to be highly vulnerable to fishing pressure.

**Factor 2.2 - Abundance**

| UNITED STATES OF AMERICA/GULF OF MEXICO, SET LONGLINES, UNITED STATES OF AMERICA |
| High Concern |

NMFS lists the overfished status of blacknose shark in the Gulf of Mexico as unknown (NMFS 2013d). The 2011 stock assessment for this region provided biomass reference points based on Spawning Stock Fecundity ($SSF_{2005}/SSF_{MSY} = 0.48$) and described the population as overfished (SEDAR 2011d). This species is listed as near threatened by IUCN (Morgan et al 2009). Seafood Watch considers stock status of blacknose shark to be a high conservation concern.

**Factor 2.3 - Fishing Mortality**

| UNITED STATES OF AMERICA/GULF OF MEXICO, SET LONGLINES, UNITED STATES OF AMERICA |
| High Concern |
According to the NMFS, the overfishing status for blacknose shark in the Gulf of Mexico is unknown (NMFS 2013d), however the 2011 stock assessment describes this population as experiencing overfishing with F/FMSY as 3.43 (SEDAR 2011d). Based on limited observer data on selected longline trips (n = 1,503 sets) between 2006 and 2009, 816 blacknose sharks were caught (with 6 kept) in the Gulf of Mexico (Scott-Denton et al. 2011). The 2013 Update to the US National Bycatch Report estimated that 31,885.77 individuals (coefficient of variation (CV) = 2.97) were caught as bycatch in the Gulf of Mexico reef fish bottom longline fishery (NMFS 2013g), which constitutes 80% of the bycatch mortality of this species across the South Atlantic region (including the South Atlantic and Gulf of Mexico). The report does not cite the data source used to generate these estimates. Seafood Watch considers the impact of the longline fishery on blacknose shark to be a high conservation concern.

**Factor 2.4 - Discard Rate**

**UNITED STATES OF AMERICA/GULF OF MEXICO, SET LONGLINES, UNITED STATES OF AMERICA**

< 20%

According to Scott-Denton et al. (2011) in the Gulf of Mexico reef fish bottom longline fishery 12% of the total catch was discarded dead, 4% was discarded in unknown condition and 3% were used for bait, for total discards of 19%.

**BLUENAME TILEFISH**

**Factor 2.1 - Inherent Vulnerability**

**UNITED STATES OF AMERICA/GULF OF MEXICO, SET LONGLINES, UNITED STATES OF AMERICA**

**Medium**

The inherent vulnerability of blueine tilefish, Caulolatilus microps, was assessed based on seven productivity attributes (Table 3). Blueline tilefish scored an average of 2.333 which corresponds to a moderate inherent vulnerability.

**Justification:**

The www.fishbase.org vulnerability score was 58 out of 100 (Froese & Pauly 2013). This represents high inherent vulnerability, however the life history attributes do not support this score, therefore a moderate score is used.

<table>
<thead>
<tr>
<th>Productivity Attribute</th>
<th>Blueine Tilefish</th>
<th>Score</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average age at maturity</td>
<td>3 yrs</td>
<td>3</td>
<td>SEDAR 2013f</td>
</tr>
<tr>
<td>Average maximum age</td>
<td>43 yrs</td>
<td>1</td>
<td>SEDAR 2013f</td>
</tr>
<tr>
<td>Fecundity</td>
<td>2.2 – 13 million eggs/yr</td>
<td>N/A</td>
<td>SEDAR 2013f</td>
</tr>
<tr>
<td>Average size at maturity</td>
<td>33.8 – 38.7 cm TL (females)</td>
<td>3</td>
<td>SEDAR 2013f</td>
</tr>
<tr>
<td>Average maximum size</td>
<td>90 cm TL</td>
<td>3</td>
<td>SEDAR 2013f</td>
</tr>
<tr>
<td>Reproductive strategy</td>
<td>Broadcast spawner</td>
<td>3</td>
<td>SEDAR 2013f</td>
</tr>
<tr>
<td>Trophic level</td>
<td>2.3 ± 0.66E</td>
<td>1</td>
<td>Froese &amp; Pauly 2013</td>
</tr>
<tr>
<td>Average Score</td>
<td>2.3333</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 7 Table 3. Inherent Vulnerability characteristics of blueine tilefish.

**Factor 2.2 - Abundance**

**UNITED STATES OF AMERICA/GULF OF MEXICO, SET LONGLINES, UNITED STATES OF AMERICA**

**Moderate Concern**
There has been no stock assessment for blueline tilefish in the Gulf of Mexico and its overfished status is unknown. However, its stock was discussed in the golden tilefish assessment (it was determined that adequate data was unavailable for an assessment of this species), and annual CPUE was provided through 2009. No trend in CPUE values was detected over time (SEDAR 2011c).

### Factor 2.3 - Fishing Mortality

**UNITED STATES OF AMERICA/GULF OF MEXICO, SET LONGLINES, UNITED STATES OF AMERICA**

**Moderate Concern**

There has been no stock assessment for blueline tilefish in the Gulf of Mexico and it is unknown whether this species is experiencing overfishing. However, its stock was discussed in the golden tilefish assessment, as these two species comprise the majority of landings for the Gulf tilefish quota (IFQ). Blueline tilefish catch (largely caught by longline) has fluctuated, but generally increased over time (SEDAR 2011c). A deepwater species, blueline tilefish is a major bycatch species of the yellowedge grouper fishery, with fisherman reporting 3,000 lbs. of blueline tilefish caught for every 10,000 lbs. of yellowedge grouper caught (SEDAR 2011c). Between July 2006 and December 2009, reef fish observers covering 1,503 longline sets recorded 3591 blueline tilefish as caught (1767 were kept) (Scott-Denton et al. 2011). According to limited logbook data, for the 13 longline trips reporting discards between 2002-2009, a total of 3498 blueline tilefish were discarded (SEDAR 2011c). Discarded blueline tilefish are assumed to have 100% mortality (SEDAR 2011c).

### Factor 2.4 - Discard Rate

**UNITED STATES OF AMERICA/GULF OF MEXICO, SET LONGLINES, UNITED STATES OF AMERICA**

< 20%

According to Scott-Denton et al. (2011) in the Gulf of Mexico reef fish bottom longline fishery 12% of the total catch was discarded dead, 4% was discarded in unknown condition and 3% were used for bait, for total discards of 19%.

### SMOOTH DOGFISH

### Factor 2.1 - Inherent Vulnerability

**UNITED STATES OF AMERICA/GULF OF MEXICO, SET LONGLINES, UNITED STATES OF AMERICA**

**High**

The Fishbase inherent vulnerability score for dusky smoothhound is 87/100 (Froese & Pauly 2013), therefore Seafood Watch considers this species to be highly vulnerable to fishing pressure.

### Factor 2.2 - Abundance

**UNITED STATES OF AMERICA/GULF OF MEXICO, SET LONGLINES, UNITED STATES OF AMERICA**

**High Concern**

There is no stock assessment for smooth dogfish so its overfished status is unknown. However there is a benchmark assessment scheduled for 2014 (SEDAR 2013d) This species is listed as "near threatened" by IUCN (Conrath 2005)
**Factor 2.3 - Fishing Mortality**

**UNITED STATES OF AMERICA/GULF OF MEXICO, SET LONGLINES, UNITED STATES OF AMERICA**

**Moderate Concern**

There is no stock assessment for smooth dogfish so it is unknown whether it is experiencing overfishing. A benchmark assessment is scheduled for 2014 (SEDAR 2013d) Based on observer data from 1,503 reef fish long line sets in the Gulf of Mexico between July 2006 and December 2009, 1284 smooth dogfish were caught (only 1 was kept), 96% of those caught were classified as "normal", rather than "stressed" (Scott-Denton et al. 2011). Bycatch mortality studies are not available for this species. Due to moderate management aimed at reducing bycatch species, SFW rates this sub-criterion as moderate concern. Relevant management practices include mandatory use of circle hooks, dehooking devices, and venting tools (NMFS 2008).

**Factor 2.4 - Discard Rate**

**UNITED STATES OF AMERICA/GULF OF MEXICO, SET LONGLINES, UNITED STATES OF AMERICA**

< 20%

According to Scott-Denton et al. (2011) in the Gulf of Mexico reef fish bottom longline fishery 12% of the total catch was discarded dead, 4% was discarded in unknown condition and 3% were used for bait, for total discards of 19%.

**GIANT SNAKE EEL**

**Factor 2.1 - Inherent Vulnerability**

**UNITED STATES OF AMERICA/GULF OF MEXICO, SET LONGLINES, UNITED STATES OF AMERICA**

**High**

The Fishbase inherent vulnerability score for the giant snake eel is 74/100 (Froese & Pauly 2013), therefore Seafood Watch considers this species to be highly vulnerable to fishing pressure.

**Factor 2.2 - Abundance**

**UNITED STATES OF AMERICA/GULF OF MEXICO, SET LONGLINES, UNITED STATES OF AMERICA**

**High Concern**

There is no stock assessment for giant/king snake eel in the Gulf of Mexico (nor is a future assessment scheduled) so the overfished status of this species is unknown. As vulnerability of this species is high, Seafood Watch considers stock status to be a high conservation concern.

**Factor 2.3 - Fishing Mortality**

**UNITED STATES OF AMERICA/GULF OF MEXICO, SET LONGLINES, UNITED STATES OF AMERICA**

**Moderate Concern**

There is no stock assessment for giant/king snake eel in the Gulf of Mexico (nor is a future assessment scheduled) so it is unknown if this species is experiencing overfishing. Based on observer data from 1,503 reef fish long line sets in the Gulf of Mexico between July 2006 and December 2009, 1573 giant/king snake
eels were caught (only 2 were kept), and 88% of those caught were classified as "normal" rather than "stressed" (Scott-Denton et al. 2011). Due to moderate management aimed at reducing bycatch species, we rate this sub-criterion as moderate concern. Relevant management practices include mandatory use of circle hooks, dehooking devices, and venting tools (NMFS 2008).

**Factor 2.4 - Discard Rate**

**UNITED STATES OF AMERICA/GULF OF MEXICO, SET LONGLINES, UNITED STATES OF AMERICA**

< 20%

According to Scott-Denton et al. (2011) in the Gulf of Mexico reef fish bottom longline fishery 12% of the total catch was discarded dead, 4% was discarded in unknown condition and 3% were used for bait, for total discards of 19%.

**BLUE TILEFISH**

**Factor 2.1 - Inherent Vulnerability**

**UNITED STATES OF AMERICA/GULF OF MEXICO, SET LONGLINES, UNITED STATES OF AMERICA**

Medium

The inherent vulnerability of golden tilefish, Lopholatilus chamaelonticeps, was assessed based on seven productivity attributes (Table 4). Golden tilefish scored an average of 2.0 which corresponds to a moderate inherent vulnerability.

**Justification:**

The www.fishbase.org vulnerability score was 60 out of 100 (Froese & Pauly 2013). This represents high inherent vulnerability, however the life history attributes do not support this score, therefore a moderate score is used.

<table>
<thead>
<tr>
<th>Productivity Attribute</th>
<th>Blue Tilefish</th>
<th>Score</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average age at maturity</td>
<td>2-3 yrs</td>
<td>3</td>
<td>SEDAR 2011/c/e</td>
</tr>
<tr>
<td>Average maximum age</td>
<td>40 yrs</td>
<td>1</td>
<td>SEDAR 2011/c/e</td>
</tr>
<tr>
<td>Fecondity</td>
<td>Average 2.3 million eggs/yr</td>
<td>N/A</td>
<td>Grimes et al 1988</td>
</tr>
<tr>
<td>Average size at maturity</td>
<td>48 - 66cm TL (females)</td>
<td>2</td>
<td>Grimes et al 1988</td>
</tr>
<tr>
<td>Average maximum size</td>
<td>122cm TL</td>
<td>2</td>
<td>Nitschke 2006</td>
</tr>
<tr>
<td>Reproductive strategy</td>
<td>Broadcast spawner</td>
<td>3</td>
<td>Grimes et al 1988</td>
</tr>
<tr>
<td>Trophic level</td>
<td>3.5 ± 0.4SE</td>
<td>1</td>
<td>Froese &amp; Pauly 2013</td>
</tr>
<tr>
<td>Average Score</td>
<td></td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

Figure 8 Table 4. Inherent Vulnerability characteristics for golden tilefish.

**Factor 2.2 - Abundance**

**UNITED STATES OF AMERICA/GULF OF MEXICO, SET LONGLINES, UNITED STATES OF AMERICA**

Very Low Concern

In the Gulf of Mexico, tilefish/golden tilefish is not overfished (B/BMSY proxy: SSBcurrent/MSST ranges from 2.26 to 2.30) (SEDAR 2011c)

**Factor 2.3 - Fishing Mortality**
**Very Low Concern**

In the Gulf of Mexico, tilefish/golden tilefish is not experiencing overfishing, with a $\frac{F_{current}}{F_{MSY}}$ (F/F$\text{MSY}$ proxy) of 0.49-0.78 (SEDAR 2011c). Golden tilefish landings peaked in the late 1980s and have fluctuated ever since (SEDAR 2011c). Based on reef fish observer data on commercial longline vessels covering 1503 sets between July 2006 and December 2009, 2199 golden tilefish were caught (2130 were kept) (Scott-Denton et al. 2011). Limited commercial logbook data from 11 longline trips reporting discards between 2002 and 2009 reported 3509 golden tilefish discarded (SEDAR 2011c). Discarded golden tilefish are assumed to have 100% mortality (SEDAR 2011c).

### Factor 2.4 - Discard Rate

According to Scott-Denton et al. (2011) in the Gulf of Mexico reef fish bottom longline fishery 12% of the total catch was discarded dead, 4% was discarded in unknown condition and 3% were used for bait, for total discards of 19%.

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**GREATER AMBERJACK**

### Factor 2.1 - Inherent Vulnerability

Greater amberjack has a Fishbase score of 54 out of 100 and is therefore determined to be of moderate inherent vulnerability (Froese and Pauly 2011).

### Factor 2.2 - Abundance

According to the results of 2014 stock assessment, greater amberjack in the Gulf of Mexico is slightly overfished, although the review panel did not agree on an overfished status for this stock due to concerns over the assessment models used (SEDAR 2014c). Estimates from all three stock assessment models for 2012 greater amberjack biomass relative to its biomass at Maximum Sustainable Yield (B2012/BMSY) (1.140, 1.039 and 0.906) do not exceed the Minimum Stock Size Threshold (MSST) of 75% BMSY (i.e., do not indicate that the stock is overfished) (SEDAR 2014c). Stock status is scored as moderate concern due to concerns about the stock assessment raised by the review panel and due uncertainties in the underlying data on discards used in the stock assessment (SEDAR 2014c).

Greater amberjack in its 12th year of a 10 year rebuilding plan in the Gulf of Mexico (NMFS 2014).

### Factor 2.3 - Fishing Mortality
Low Concern

According to the results of 2014 stock assessment, greater amberjack in the Gulf of Mexico is not likely experiencing overfishing, although the review panel did not agree on an overfishing status for this stock due to concerns over the assessment models used (SEDARe 2014c). The 2014 assessment found that fishing mortality has steadily decreased over the last several years. Estimates of current fishing mortality relative to fishing mortality at Maximum Sustainable Yield (F/FMSY) range from 0.45-0.55, indicating that the stock is not likely experiencing overfishing (SEDARe 2014c).

Reef fish observers on vertical line trips covering 1116 sea days/7391 sets from July 2006 to December 2009, recorded 613 greater amberjack caught (171 kept) (Scott-Denton et al. 2011).

Due to uncertainty over the overfishing status in the 2014 stock assessment, greater amberjack's fishing mortality scores as "low concern" rather than "very low concern".

Factor 2.4 - Discard Rate

< 20%

Handline fisheries generally have low discard rates, with fishers able to land and release undesired species quickly and with low mortality (Kelleher 2005).

Loggerhead Turtle

Factor 2.1 - Inherent Vulnerability

High

Loggerhead sea turtles have high inherent vulnerability. This species reaches sexual maturity at 20-30 year of age and experiences high hatchling and juvenile mortality (Abreu-Grobois and Plotkin 2008)(IUCN 2011).

Factor 2.2 - Abundance

Very High Concern

Loggerhead sea turtles in the Gulf of Mexico are currently ranked as Endangered by the International Union for the Conservation of Nature (IUCN) (IUCN 2011) and are considered Threatened by the US Endangered Species Act. Populations of all sea turtles are imperiled worldwide (IUCN 2011). A number of factors have contributed to decline of these species including conflict with fisheries, pollution, nesting habitat loss, and hunting. Sea turtle eggs have historically been an important resource for coastal communities around the world and the unregulated harvest of eggs has been credited with the decline of several species (IUCN 2011). 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 endangered status Seafood Watch considers abundance of loggerhead turtles to be a very high conservation concern.

**Factor 2.3 - Fishing Mortality**

**UNITED STATES OF AMERICA/GULF OF MEXICO, SET LONGLINES, UNITED STATES OF AMERICA**

**Moderate Concern**

Loggerheads are often caught via biting baited longline hooks (Largarcha et al. 2005). Unlike pelagic longline gear, bottom longlines do not allow hooked turtles to continue to surface to breathe, thus bottom longline hooked turtles likely have higher rates of mortality. A 2009 report by the Southeast Fisheries Science Center estimated that 862 (95% CI: 384-1934) loggerhead turtles were caught in the Gulf reef fish fishery from July 2006-2008 (SEFSC 2009). Of these approximately 410 turtles were released alive, 246 were released dead and 205 were released in unknown condition (SEFSC 2009).

In 2010 Amendment 31 to the Gulf of Mexico Reef Fish Fishery Management Plan was enacted to reduce turtle bycatch in the bottom longline fishery. 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 (NOAA 2011).

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). Total interaction estimates for 2011 and 2012 are not publically available but are anticipated to be lower still. (J. Lee, pers comm) (NMFS 2010).

Wallace et al (Wallace et al 2013) determined the longline fishery to be a low risk to loggerhead turtles relative to other fisheries in the Gulf of Mexico, however there is no indication that the current level of mortality is at a level that allows the recovery of the turtle population. Seafood Watch therefore considers the impact of the longline fishery on loggerhead turtles to be of moderate conservation concern.

**Factor 2.4 - Discard Rate**

**UNITED STATES OF AMERICA/GULF OF MEXICO, SET LONGLINES, UNITED STATES OF AMERICA**

< 20%

According to Scott-Denton et al. (2011) in the Gulf of Mexico reef fish bottom longline fishery 12% of the total catch was discarded dead, 4% was discarded in unknown condition and 3% were used for bait, for total discards of 19%.

**SNOWY GROUPER**

**Factor 2.1 - Inherent Vulnerability**

**UNITED STATES OF AMERICA/GULF OF MEXICO, SET LONGLINES, UNITED STATES OF AMERICA**

**High**

The fishbase inherent vulnerability score for snowy grouper is 64 (Froese & Pauly 2013), corresponding to a SFW score of "high" inherent vulnerability.
Factor 2.2 - Abundance

**UNITED STATES OF AMERICA/GULF OF MEXICO, SET LONGLINES, UNITED STATES OF AMERICA**

**High Concern**

Snowy grouper is listed as "Vulnerable" by IUCN (Thierry et al 2008).

According to NMFS, it is unknown if snowy grouper in the Gulf of Mexico are overfished or experiencing overfishing (NMFS 2013d). There has been no Gulf of Mexico stock assessment for this species.

Due to its IUCN status and its unknown overfished status, snowy grouper’s stock status scores as "high concern".

Factor 2.3 - Fishing Mortality

**UNITED STATES OF AMERICA/GULF OF MEXICO, SET LONGLINES, UNITED STATES OF AMERICA**

**Moderate Concern**

According to NMFS, it is unknown if snowy grouper in the Gulf of Mexico is overfished or experiencing overfishing (NMFS 2013d). There has been no Gulf of Mexico stock assessment for this species. Snowy grouper in the Gulf of Mexico are primarily fished using long lines and rod & reel. Of the 65.7 MT landed commercially in 2011, 38.2 MT were landed by long line and 14.1 MT were landed by rod and reel. Starting in 2010, snowy grouper in the Gulf of Mexico has been managed under the deep water grouper IFQ program. In 2010, snowy grouper landings represented 21.3% of all deep water grouper landed (59.4% of the total 2010 deep water grouper quota was met), and in 2011, it represented 18.6% of all deep water grouper landed (76.3% of the total deep water grouper quota was met) (GMFMC 2013c)(NMFS 2013b).

Due to its unknown overfishing status and unknown effects of management strategies and regulations on this species, snowy grouper's fishing mortality in the Gulf of Mexico scores as "moderate concern".

Factor 2.4 - Discard Rate

**UNITED STATES OF AMERICA/GULF OF MEXICO, SET LONGLINES, UNITED STATES OF AMERICA**

**< 20%**

According to Scott-Denton et al. (2011) in the Gulf of Mexico reef fish bottom longline fishery 12% of the total catch was discarded dead, 4% was discarded in unknown condition and 3% were used for bait, for total discards of 19%.

SPECKLED HIND

Factor 2.1 - Inherent Vulnerability

**UNITED STATES OF AMERICA/GULF OF MEXICO, SET LONGLINES, UNITED STATES OF AMERICA**

**High**

The Fishbase inherent vulnerability score for speckled hind is 60/100 (Froese & Pauly 2013), therefore Seafood Watch considers this species to be highly vulnerable to fishing pressure.
**Factor 2.2 - Abundance**

**UNITED STATES OF AMERICA/GULF OF MEXICO, SET LONGLINES, UNITED STATES OF AMERICA**

**Very High Concern**

There has been no stock assessment for speckled hind in the Gulf of Mexico, so it is unknown if this species is overfished in this region. Speckled hind is listed as "critically endangered" by IUCN (IUCN 2013), warranting a score of "very high concern" for this criterion.

**Factor 2.3 - Fishing Mortality**

**UNITED STATES OF AMERICA/GULF OF MEXICO, SET LONGLINES, UNITED STATES OF AMERICA**

**Moderate Concern**

There has been no stock assessment for speckled hind in the Gulf of Mexico, so it is unknown if this species is experiencing overfishing in this region. Fishing for speckled hind is regulated as part of the deep water grouper IFQ program. However, speckled hind can also be landed under the shallow water grouper IFQ category when a shareholder’s deep water grouper allocation has been used (GMFMC 2014). There are recreational fishing limits for speckled hind to limit fishing mortality of this species (one speckled hind is permitted per vessel as part of the four grouper bag limit) (GMFMC 2014).

Based on reef fish observer data on commercial longline vessels covering 1503 sets between July 2006 and December 2009, 492 speckled hind were caught (453 were kept) (Scott-Denton et al. 2011).

Fishing mortality for speckled hind in the Gulf of Mexico scores as "moderate concern" due to speckled hind's uncertain population status and the unknown effectiveness of existing fishing regulations for this species (commercial and recreational).

**Factor 2.4 - Discard Rate**

**UNITED STATES OF AMERICA/GULF OF MEXICO, SET LONGLINES, UNITED STATES OF AMERICA**

< 20%

According to Scott-Denton et al. (2011) in the Gulf of Mexico reef fish bottom longline fishery 12% of the total catch was discarded dead, 4% was discarded in unknown condition and 3% were used for bait, for total discards of 19%.

**YELLOWEDGE GROUPER**

**Factor 2.1 - Inherent Vulnerability**

**UNITED STATES OF AMERICA/GULF OF MEXICO, SET LONGLINES, UNITED STATES OF AMERICA**

**High**

Yellowedge grouper has a Fishbase score of 66 out of 100 and is determined to be of high inherent vulnerability (Froese and Pauly 2011).

**Factor 2.2 - Abundance**
**UNITED STATES OF AMERICA/GULF OF MEXICO, SET LONGLINES, UNITED STATES OF AMERICA**

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**Moderate Concern**

Yellowedge grouper is listed as "Vulnerable" by IUCN (Froese & Pauly 2013)(Ferreira & Peres 2008).

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 (Cook 2011)(Medley 2011)(Sparholt 2011).

The next stock assessment is tentatively scheduled for 2015 (SEDAR 2013d).

Yellowedge grouper's stock status in the Gulf of Mexico scores as "moderate concern" rather than "low" or "very low concern" because of uncertainties over the overfished status and the use of the less conservative SPR30% as an MSY proxy in the stock assessment.

**Factor 2.3 - Fishing Mortality**

**UNITED STATES OF AMERICA/GULF OF MEXICO, SET LONGLINES, UNITED STATES OF AMERICA**

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**Moderate 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). For the preferred outcome (which resulted in overfishing not occurring), the stock assessment modelled fishing mortality with both the less conservative SPR30% as a proxy for MSY rather than the more conservative SPR40%. Choosing SPR40% would have led to an "overfishing" determination. Due to the 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 for overfishing the stock (Cook 2011)(Medley 2011)(Sparholt 2011).
The next stock assessment is tentatively scheduled for 2015 (SEDAR 2013d).

Due to uncertainty in the F/FMSY estimation and the choice of SPR30% rather than SPR40% as an MSY proxy, fishing mortality scores as "moderate concern" rather than "low concern" or "very low concern". As of 2010, commercial (but not recreational) fishing mortality to the yellowedge grouper stock is managed under a multi-species deep water grouper IFQ program which currently also includes Warsaw, snowy and speckled hind (GMFMC 2012c). Recreational mortality to the yellowedge grouper stock is considered to be low (SEDAR 2011b).

**Factor 2.4 - Discard Rate**

<table>
<thead>
<tr>
<th>UNITED STATES OF AMERICA/GULF OF MEXICO, SET LONGLINES, UNITED STATES OF AMERICA</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 20%</td>
</tr>
</tbody>
</table>

According to Scott-Denton et al. (2011) in the Gulf of Mexico reef fish bottom longline fishery 12% of the total catch was discarded dead, 4% was discarded in unknown condition and 3% were used for bait, for total discards of 19%.

**KING MACKEREL**

**Factor 2.1 - Inherent Vulnerability**

<table>
<thead>
<tr>
<th>UNITED STATES OF AMERICA/GULF OF MEXICO, HANDLINES AND HAND-OPERATED POLE-AND-LINES, UNITED STATES OF AMERICA</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
</tr>
</tbody>
</table>

King mackerel has a Fishbase score of 69 out of 100 and is determined to be of high inherent vulnerability (Froese and Pauly 2011).

**Factor 2.2 - Abundance**

<table>
<thead>
<tr>
<th>UNITED STATES OF AMERICA/GULF OF MEXICO, HANDLINES AND HAND-OPERATED POLE-AND-LINES, UNITED STATES OF AMERICA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very Low Concern</td>
</tr>
</tbody>
</table>

SEDAR (2009) carried out an assessment of the Atlantic and Gulf of Mexico king mackerel stocks in 2008. This assessment found the biomass for the Atlantic stock to exceed the management reference point (SSB2006/MSST=1.50), hence this stock is not currently in an overfished state.

**Factor 2.3 - Fishing Mortality**

<table>
<thead>
<tr>
<th>UNITED STATES OF AMERICA/GULF OF MEXICO, HANDLINES AND HAND-OPERATED POLE-AND-LINES, UNITED STATES OF AMERICA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moderate Concern</td>
</tr>
</tbody>
</table>

Fishing mortality for king mackerel in the Gulf of Mexico was most recently assessed in 2009 (SEDAR 2009c). This assessment however does not include fishing mortality attributable to Mexican fishing fleets targeting
king mackerel in the Gulf of Mexico, accordingly there is some uncertainty as to the actual level of fishery exploitation experienced in the Gulf. US fishery mortality is below the management reference point, MFMT \( F_{30\%SPR} \), with \( F_{2006}/MFMT=0.83 \), however due to the uncertainty regarding total fishing mortality on the stock Seafood Watch considers this to be a moderate conservation concern.

**Factor 2.4 - Discard Rate**

| UNITED STATES OF AMERICA/GULF OF MEXICO, HANDLINES AND HAND-OPERATED POLE-AND-LINES, UNITED STATES OF AMERICA |
| < 20% |

Handline fisheries generally have low discard rates, with fishers able to land and release undesired species quickly and with low mortality (Kelleher 2005).

**RED GROPER**

**Factor 2.1 - Inherent Vulnerability**

| UNITED STATES OF AMERICA/GULF OF MEXICO, HANDLINES AND HAND-OPERATED POLE-AND-LINES, UNITED STATES OF AMERICA |
| UNITED STATES OF AMERICA/GULF OF MEXICO, SET LONGLINES, UNITED STATES OF AMERICA |
| High |

Red grouper has a Fishbase score of 63 out of 100 and is determined to be of high inherent vulnerability (Froese and Pauly 2011).

**Factor 2.2 - Abundance**

| UNITED STATES OF AMERICA/GULF OF MEXICO, HANDLINES AND HAND-OPERATED POLE-AND-LINES, UNITED STATES OF AMERICA |
| UNITED STATES OF AMERICA/GULF OF MEXICO, SET LONGLINES, UNITED STATES OF AMERICA |
| Low Concern |

Red grouper was assessed most recently by SEDAR (2009), which concluded that Gulf red grouper stocks are not in an overfished state \( (SSB_{2008}/MSST=1.28) \).

**Factor 2.3 - Fishing Mortality**

| UNITED STATES OF AMERICA/GULF OF MEXICO, HANDLINES AND HAND-OPERATED POLE-AND-LINES, UNITED STATES OF AMERICA |
| UNITED STATES OF AMERICA/GULF OF MEXICO, SET LONGLINES, UNITED STATES OF AMERICA |
| Low Concern |

The 2009 Gulf of Mexico red grouper update stock assessment (based on commercial and recreational fishing impacts to the stock) indicated that its stock had declined from 2005 levels, although the stock was neither overfished or undergoing overfishing. This decline was attributed to a 2005 episodic mortality event resulting in approximately 20% mortality, in addition to normal natural and fishing mortalities (GMFMC 2011b). According to the 2009 assessment, overfishing was not occurring \( (F_{\text{current}}/F_{\text{MSY}} = 0.80) \) (SEDAR 2009b). A benchmark Gulf of Mexico red grouper stock assessment is scheduled for 2014. According to the 2009
assessment, the breakdown of fishing mortality by gear type in 2008 was: commercial handline: 0.052, commercial long line: 0.097 and recreational: 0.033 (SEDAR 2009b).

For 2014 the Florida Fish and Wildlife Commission (FWC) eliminated seasonal closures for all shallow-water groupers (except for gag) in Florida Gulf state waters. The GMFMC likewise eliminated the closed season within 20-fathoms. Red grouper do not migrate to spawn like other species in this management group, so this action will likely result in increased fishing mortality from the recreational sector (pers comm R. Ellis). Due to uncertainties created by this new legislation, red grouper fishing mortality for the Gulf of Mexico scores as "low concern" rather than "very low concern".

Factor 2.4 - Discard Rate

| UNITED STATES OF AMERICA/GULF OF MEXICO, HANDLINES AND HAND-OPERATED POLE-AND-LINES, UNITED STATES OF AMERICA |
| < 20% |

Handline fisheries generally have low discard rates, with fishers able to land and release undesired species quickly and with low mortality (Kelleher 2005).

| UNITED STATES OF AMERICA/GULF OF MEXICO, SET LONGLINES, UNITED STATES OF AMERICA |
| < 20% |

According to Scott-Denton et al. (2011) in the Gulf of Mexico reef fish bottom longline fishery 12% of the total catch was discarded dead, 4% was discarded in unknown condition and 3% were used for bait, for total discards of 19%.