



Monterey Bay Aquarium Seafood Watch

Wreckfish

Polyprion americanus



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

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Seafood Watch Standard used in this assessment: Fisheries Standard v4

Disclaimer

All Seafood Watch fishery assessments are reviewed for accuracy by external experts in ecology, fisheries science, and aquaculture. Scientific review does not constitute an endorsement of the Seafood Watch program or its ratings on the part of the reviewing scientists. Seafood Watch is solely responsible for the conclusions reached in this assessment.

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About Seafood Watch

Monterey Bay Aquarium's Seafood Watch program evaluates the environmental 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. 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.

Seafood Watch's science-based ratings are available at www.SeafoodWatch.org. Each rating is supported by a Seafood Watch assessment, in which the fishery or aquaculture operation is evaluated using the Seafood Watch standard.

Seafood Watch standards are built on our guiding principles, which outline the necessary environmental sustainability elements for fisheries and aquaculture operations. The guiding principles differ across standards, reflecting the different impacts of fisheries and aquaculture.

- Seafood rated Best Choice comes from sources that operate in a manner that's consistent with our guiding principles. The seafood is caught or farmed in ways that cause little or no harm to other wildlife or the environment.
- Seafood rated Good Alternative comes from sources that align with most of our guiding principles. However, one issue needs substantial improvement, or there's significant uncertainty about the impacts on wildlife or the environment.
- Seafood rated Avoid comes from sources that don't align with our guiding principles. The seafood is caught or farmed in ways that have a high risk of causing harm to wildlife or the environment. There's a critical conservation concern or many issues need substantial improvement.

Each assessment follows an eight-step process, which prioritizes rigor, impartiality, transparency and accessibility. They are conducted by Seafood Watch scientists, in collaboration with scientific, government, industry and conservation experts and are open for public comment prior to publication. Conditions in wild capture fisheries and aquaculture operations can change over time; as such assessments and ratings are updated regularly to reflect current practice.

More information on Seafood Watch guiding principles, standards, assessments and ratings are available at www.SeafoodWatch.org.

Guiding Principles

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

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

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

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

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

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

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

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

Avoid/Red: Take a pass on these for now; they're caught or farmed in ways that harm other marine life or the environment.

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

Summary

This report covers wreckfish caught with vertical hook-and-line gear off the U.S. Atlantic coast. The U.S. wreckfish fishery expanded rapidly during the first years of exploitation, starting in 1987. It was during these years that landings increased every year until more strict management regulations were implemented, including limited entry, a total allowable catch (TAC), gear restrictions, and individual transferable quotas (ITQs). These regulations resulted in a decrease in the number of participants, more stable catch amounts, and a significantly reduced fleet size.

In general, the hook-and-line gear used in the wreckfish fishery has minimal bycatch and habitat impacts, so impacts on nontarget species are of moderate concern. Management for this species is overseen by the South Atlantic Fishery Management Council (SAFMC), which in general has been proactive and responsible to maintain stocks through the implemented regulations stated above. The hook-and-line fishery in the South Atlantic U.S. is rated a Best Choice.

Final Seafood Recommendations

SPECIES FISHERY	C 1 TARGET SPECIES	C 2 OTHER SPECIES	C 3 MANAGEMENT	C 4 HABITAT	OVERALL	VOLUME (MT) YEAR
Wreckfish Western Central Atlantic Vertical lines United States	3.413	2.644	4.000	4.000	Best Choice (3.466)	Unknown

Summary

Wreckfish (*Polyprion americanus*) is a large, long-lived species living in deep water around the world's temperate oceans, although the population under review is found off the U.S. Atlantic coast (Blake Plateau, off South Carolina and Georgia).

The Green rating for the wreckfish fishery in the U.S. reflects the management approach, which in general has been proactive and responsible in maintaining wreckfish stocks. Overall, this fishery has a low risk of bycatch and has minimal impacts on the environment; however, there is some uncertainty around wreckfish abundance and the impacts on bycatch species because of a lack of recent data, which drives the scores of moderate concern in Criterion 1 and Criterion 2.

Scoring Guide

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

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

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

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

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

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

Introduction

Scope of the analysis and ensuing recommendation

This report covers ratings for wreckfish (*Polyprion americanus*) that is caught using vertical hook-and-line gear off the U.S. Atlantic coast.

Species Overview

Wreckfish (*Polyprion americanus*; Bloch and Schneider, 1801) is a deepwater marine fish (Roberts 1989) that inhabits continental slopes, oceanic islands, and seamounts at depths of 50 to 1,000 meters (m) {Sedberry et al. 2001}{Perez and Klippel 2003}. Wreckfish is a long-lived, slow-growing species found throughout the Atlantic Ocean and in some areas of the Indian and Pacific Oceans.

In the United States, the wreckfish fishery occurs mostly between 100 and 125 miles southeast of Charleston, off the coasts of South Carolina and Georgia. The Blake Plateau is located within this region, and is an area that provides a complex bottom feature with great topographic relief {Sedberry et al. 2001}(Goldman and Sedberry 2010). The Plateau is considered an important habitat and spawning ground for wreckfish (Goldman and Sedberry 2010). Wreckfish lurks in caves and comes out to feed during the day. Previous assessments have considered the Blake Plateau stock as separate from the rest of the eastern North Atlantic; however, genetic evidence suggests that the North Atlantic wreckfish constitute one stock that migrates across the North Atlantic (Sedberry et al. 1996)(Vaughan et al. 2001).

The South Atlantic Fishery Management Council (SAFMC) is the body that recommends commercial and recreational management measures for the wreckfish fishery to the National Marine Fisheries Service (NMFS). Wreckfish is managed under the SAFMC's Snapper Grouper Fishery Management Plan (FMP), with tools including an individual transferable quota (ITQ) system for the commercial fishery, allowable biological catch (ABC) and annual catch limits (ACLs), a spawning season closure, a recreational season, and gear specifications.

Production Statistics

The U.S. Atlantic wreckfish fishery began in 1987 off the coasts of Georgia and South Carolina. Landings went from 13 metric tons (mt) in the first fishing season to more than 900 mt by 1990 {Sedberry et al. 2001}. To promote a sustainable fishery, management regulations were put in place. In 1990, a total allowable catch (TAC) was set at 907 mt. The TAC was caught within the first 4 months of implementation (Gauvin et al. 1994). A program of individual transferable quotas (ITQ) was established in 1992 and, by 1995, the levels of production dropped substantially, with reported landings around 292 mt {Reiss, Ray and Quigley 2009}.

Wreckfish landings decreased from 519 mt during the 1993–94 season to a little more than 95 mt during the 1998–99 season (Table 1). Fishing effort and the number of vessels were reduced from 91 permitted vessels in 1991 to 14 in 1997 (Vaughan et al. 2001). By 2001, fewer than four vessels reported wreckfish landings, which totaled around 200,000 lbs—only 8% of the TAC (GAO 2002).

Table 1: Annual wreckfish landings in mt, 1987–2017. Landings for 2001–02 through 2008–09 were

confidential because there were fewer than three vessels that fished wreckfish and/or fewer than three dealers that purchased wreckfish during those years. Data from (Rademeyer and Butterworth 2014)(SAFMC 2019).

Year/Season	Landings (mt)	Year/Season	Landings (mt)
1987	12.701	2002–03	Confidential
1988	206.824	2003–04	Confidential
1989	1,680.54	2004–05	Confidential
1990	957.885	2005–06	Confidential
1991–92	873.658	2006–07	Confidential
1992–93	576.315	2007–08	Confidential
1993–94	519.243	2008–09	Confidential
1994–95	545.793	2009–2010	98.533
1995–96	292.563	2010–11	120.778
1996–97	108.017	2011–12	144.609
1997–98	113.264	2012–13	96.933
1998–99	95.618	2013–14	98.222
1999–2000	95.481	2014–15	86.472
2000–01	76.246	2015–16	162.876
2001–02	Confidential	2016–17	170.557

Importance to the US/North American market.

The wreckfish fishery is based mostly out of Charleston, South Carolina. Wreckfish is purchased by fish houses and sold to restaurants or directly to consumers; in some cases, product is shipped to dealers around the United States. U.S. fishers commercially sell their wreckfish catches only into the domestic market. There are no reports of imports of wreckfish to the U.S.

Common and market names.

Wreckfish is sometimes also called “sea bass” (Food and Drug Administration website).

Primary product forms

Wreckfish is sold fresh or frozen (GAO 2002).

Assessment

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

Criterion 1: Impacts on the species under assessment

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

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

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

Guiding principles

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

Criterion 1 Summary

WRECKFISH			
REGION / METHOD	ABUNDANCE	FISHING MORTALITY	SCORE
Western Central Atlantic Vertical lines United States	2.330: Moderate Concern	5.000: Low Concern	Green (3.413)

The abundance of wreckfish is of moderate concern because of the lack of a recent stock assessment, while the fishing mortality of wreckfish is of low concern, so a Green rating is awarded.

Criterion 1 Assessments

SCORING GUIDELINES

Factor 1.1 - Abundance

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

- *5 (Very Low Concern) — Strong evidence exists that the population is above an appropriate target abundance level (given the species' ecological role), or near virgin biomass.*
- *3.67 (Low Concern) — Population may be below target abundance level, but is at least 75% of*

the target level, OR data-limited assessments suggest population is healthy and species is not highly vulnerable.

- *2.33 (Moderate Concern) — Population is not overfished but may be below 75% of the target abundance level, OR abundance is unknown and the species is not highly vulnerable.*
- *1 (High Concern) — Population is considered overfished/depleted, a species of concern, threatened or endangered, OR abundance is unknown and species is highly vulnerable.*

Factor 1.2 - Fishing Mortality

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

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

Wreckfish

Factor 1.1 - Abundance

Western Central Atlantic | Vertical lines | United States

Moderate Concern

The most recent wreckfish population assessment was started in 2012, using a Statistical Catch at Age (SCAA) methodology (Rademeyer and Butterworth 2014). This model used similar fishery-dependent data as the previous assessment by Vaughan et al. (historical landings, annual length-frequency distributions, and annual or seasonal age-length keys that were obtained through logbook data for participating vessels) (Vaughan et al. 2001). The assessment concluded that the U.S. South Atlantic wreckfish stock is not overfished and is not undergoing overfishing, and present levels of biomass are above the spawning stock biomass (which is the amount of spawning stock biomass needed to produce the maximum sustainable yield, SSB_{MSY}) (NMFS 2015b)(SAFMC 2015). Previous assessments have considered the Blake Plateau stock as separate from the rest of the eastern North Atlantic stock; however, genetic evidence suggests that the North Atlantic wreckfish constitute one stock that migrates across the North Atlantic (Sedberry et al. 1996)(Vaughan et al. 2001).

During the peer-review process, the Scientific and Statistical Committee (SSC) of the SAFMC recommended that (because of data limitations) the new stock assessment should be considered as a data-limited method, but the assessment is robust, the model is consistent with standard practices, and it is appropriate for the available data (SAFMC 2015). But, this assessment was conducted using data from more than 10 years ago and cannot be considered a reliable reflection of the current stock status. The National Marine Fisheries Service considers the stock to be “not overfished”; therefore, the wreckfish abundance warrants a score of moderate concern.

Factor 1.2 - Fishing Mortality

Western Central Atlantic | Vertical lines | United States

Low Concern

The most recent SCAA assessment for wreckfish states that, based on the available information and using combinations of four different values of natural mortality (M) and three steepness (H) values, the U.S. Atlantic wreckfish is not experiencing overfishing (NMFS 2015a)(Rademeyer and Butterworth 2014).

The model used fishery-dependent data to calculate catch per unit effort (CPUE), which is assumed to be proportional to the population size. But, it is thought that CPUE may not accurately reflect changes in abundance, because the relationship between these two parameters is often disproportional and nonlinear (Erisman et al. 2011). According to the authors, the wreckfish fishery could be experiencing a case of hyperstability, possibly leading to an underestimate of fishing mortality (Erisman et al. 2011).

Although an updated stock assessment as not been conducted since, recent 2020 catch data suggest that the stock is not subject to overfishing (FishWatch 2022). It is probable that fishing mortality from all sources is at a sustainable level, which warrants a score of low concern.

Criterion 2: Impacts on Other Species

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

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

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

Guiding principles

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

Criterion 2 Summary

Criterion 2 score(s) overview

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

WRECKFISH			
REGION / METHOD	SUB SCORE	DISCARD RATE/LANDINGS	SCORE
Western Central Atlantic Vertical lines United States	2.644	1.000: < 100%	Yellow (2.644)

Criterion 2 main assessed species/stocks table(s)

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

WESTERN CENTRAL ATLANTIC VERTICAL LINES UNITED STATES			
SUB SCORE: 2.644		DISCARD RATE: 1.000	SCORE: 2.644
SPECIES	ABUNDANCE	FISHING MORTALITY	SCORE
Finfish	2.330: Moderate Concern	3.000: Moderate Concern	Yellow (2.644)
Wreckfish	2.330: Moderate Concern	5.000: Low Concern	Green (3.413)

There is little information about the bycatch associated with the wreckfish fishery, although there are two finfish species that are primarily caught as bycatch: barrellfish and red bream. Experts suggest that the finfish species caught represent about 5% of total landings. Therefore, the impacts on other species warrant a Yellow rating.

Criterion 2 Assessment

SCORING GUIDELINES

Factor 2.1 - Abundance

(same as Factor 1.1 above)

Factor 2.2 - Fishing Mortality

(same as Factor 1.2 above)

Factor 2.3 - Modifying Factor: Discards and Bait Use

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

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

	Ratio of bait + discards/landings	Factor 2.3 score
<100%		1
>=100		0.75

Finfish

Factor 2.1 - Abundance

Western Central Atlantic | Vertical lines | United States

Moderate Concern

Hook-and-line gear is selective, so bycatch is generally considered to be low (FishWatch 2022). But, some finfish species are regularly caught, particularly those with life-history characteristics similar to those of wreckfish (slow growth, long life span, high maturity age) (Filer and Sedberry 2008)(Goldman and Sedberry 2010).

Barrelfish is regularly caught as bycatch in the wreckfish fishery, although there is no management strategy in place specifically for this species (Filer and Sedberry 2008)(Filer 2004). Red bream is also caught over Blake Plateau; these landings are not monitored currently because red bream is only caught in small numbers as bycatch in the wreckfish fishery, and red bream is considered to be at near-virgin biomass levels (Filer 2004)(Friess and Sedberry 2011). Both barrel fish and red bream are of "Least Concern" according to the International Union for the Conservation of Nature (IUCN). The volume of barrelfish caught as bycatch is thought to represent around 4% of total landings, whereas other species, including red bream, represent around 1% (NMFS 2015b). Because there is little to no stock information on these common bycatch species and they are noted as "Least Concern" status by the IUCN, their abundance warrants a score of moderate concern.

Factor 2.2 - Fishing Mortality

Western Central Atlantic | Vertical lines | United States

Moderate Concern

Barrelfish and red bream are the species most commonly caught as bycatch in the wreckfish fishery, among small numbers of other finfish (Filer 2004)(Filer and Sedberry 2008)(Friess and Sedberry 2011). Although the level of bycatch is considered to be low and the impacts on these finfish populations are thought to be minimal, the fishing mortality is relatively unknown (NMFS 2015b). Any discarded fish in this fishery would likely not survive due to the depths at which they are caught (SAFMC 2019). Therefore, fishing mortality warrants a score of moderate concern.

Factor 2.3 - Discard Rate/Landings

Western Central Atlantic | Vertical lines | United States

< 100%

Of commercial vessels in this fishery, 20% are randomly subsampled to report all discards, although underreporting is suspected and the limited number of vessels sometimes results in this information not being collected (NMFS 2011b). Fishers could harvest one of these species and

return co-occurring species to the water as “regulatory discards” (e.g., if the fish are under the size limit) or if undesirable; however, the discarded fish would likely not survive due to the depths at which these fish are caught (SAFMC 2019). Despite the limited information available on discards, they are thought to be low relative to total landings. Therefore, discards warrant a factor of 1.

Criterion 3: Management Effectiveness

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

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

The Criterion 3 rating is determined as follows:

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

Rating is Critical if Management Strategy and Implementation is Critical.

Guiding principle

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

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

Criterion 3 Summary

FISHERY	MANAGEMENT STRATEGY	BYCATCH STRATEGY	DATA COLLECTION AND ANALYSIS	ENFORCEMENT	INCLUSION	SCORE
Western Central Atlantic Vertical lines United States	Highly effective	Moderately Effective	Moderately Effective	Moderately Effective	Highly effective	Green (4.000)

The overall management strategy of wreckfish and the inclusion of stakeholders in the management process are highly effective, while the bycatch strategy, approach to data collection and analysis, and

enforcement of regulations are moderately effective. Therefore, the management effectiveness of this fishery warrants a Green rating.

The fishery management plan (FMP) for snapper-grouper was first implemented in 1983 (<http://safmc.net/resource-library/snapper-grouper>). Amendment 3 (1991) established a management program for wreckfish that defined an optimal yield (OY) and overfishing limits. Amendment 4 (1992) prohibited the use of fish traps and bottom longlines in the wreckfish fishery {SAFMC 1992} to limit impacts on other species and on the habitat.

Criterion 3 Assessment

SCORING GUIDELINES

Factor 3.1 - Management Strategy and Implementation

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

Factor 3.2 - Bycatch Strategy

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

Factor 3.3 - Scientific Research and Monitoring

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

Factor 3.4 - Enforcement of Management Regulations

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

Factor 3.5 - Stakeholder Inclusion

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

Factor 3.1 - Management Strategy And Implementation

Western Central Atlantic | Vertical lines | United States

Highly effective

The wreckfish fishery is included in the Snapper-Grouper Fishery Management Plan (FMP) and managed by the South Atlantic Fishery Management Council (SAFMC). The primary management strategies implemented include a closed season during spawning, gear restrictions, an annual catch limit (ACL), and individual transferable quotas (ITQ) (Filer 2004)(FishWatch 2022).

Of the annual catch limit, 5% is also allocated to recreational fishers, who are allowed to fish in July and August and are limited with a bag limit (FishWatch 2022)(SAFMC 2022a). The management strategy for wreckfish has resulted in a small, sustained fishery with a modest market and price. A larger marine protected area (MPA) in the region was also considered, but it was turned down due to the ongoing success of the existing management approach (Sedberry 2022). Management of wreckfish is being implemented successfully, so this factor is scored highly effective.

Justification:

A fixed seasonal closure from January 15 through April 15 each year is in effect to protect wreckfish during peak spawning (SAFMC 2019). Allowable gear includes vertical hook-and-line using hydraulic reels, with additional requirements for dehooking tools, hook specifications, and descending devices onboard (SAFMC 2022a). The annual catch limits (ACL) through 2021 were developed under the Regulatory Amendment 22 to the SAFMC management plan, and the 2020–21 ACL was determined to be approximately 176.5 mt. This ACL was to remain in place for future years until otherwise modified (SAFMC 2019).

Under the ITQ program, the management entity sets a total allowable catch limit annually, based on stock assessments and other indicators of biological productivity, and allocates coupons or quotas (portions of this catch) to eligible vessels and fishers. These quota holders may then fish their quota or lease, sell, or transfer it, according to program rules (GAO 2002). Programs such as this have proved to be successful in achieving conservation goals, stabilizing fisheries, and improving safety (GAO 2002). The SAFMC is required by the Magnuson-Stevens Fishery Conservation and Management Act to review the Wreckfish ITQ program every 5 to 7 years. The most recent review, completed in 2019, concluded that it is likely that the ITQ program has been and is continuing to achieve its overall goal (SAFMC 2019).

Factor 3.2 - Bycatch Strategy

Western Central Atlantic | Vertical lines | United States

Moderately Effective

According to the Bycatch Practicability Analysis (BPA) included in Regulatory Amendment 22 to

the Snapper-Grouper FMP, little information is available on bycatch for the commercial wreckfish fishery, but barrelfish and red bream are described as the most abundant co-occurring species caught (Goldman and Sedberry 2010). Other species are caught and it is unknown if they are retained. The fishery has a low level of bycatch, although it presents “fairly” high landings of barrelfish; along with other species, these volumes represent around 4% and 1% of the total landings, respectively (NMFS 2015b).

The slow growth, long life span, and high maturity age of these common bycatch species are similar to those of wreckfish, so the management strategies in place for wreckfish (which have proved to be successful) are thought to also benefit these species. But, there is no specific strategy in place for barrelfish or red bream (Filer and Sedberry 2008).

A series of amendments to the Snapper-Grouper FMP have been made in order to minimize bycatch, following scientific advice. For example, in the Snapper-Grouper fishery, trawl gears were prohibited in 1989, and fish traps and entanglement nets were prohibited in 1992. Also, SAFMC follows scientific advice as set out by its Science and Statistical Committee (SSC). Therefore, the bycatch strategy warrants a score of moderately effective.

Factor 3.3 - Scientific Data Collection and Analysis

Western Central Atlantic | Vertical lines | United States

Moderately Effective

Traditional fish sampling gear may lead to difficulties in collecting data in this deep reef habitat (Sedberry 2001a). In 2014, the most recent stock assessment, which was based on the statistical catch at age (SCAA) method, was conducted by a third party and was accepted through a series of workshops in coordination with the SAFMC (NMFS 2015b).

The effects of management actions are, and will continue to be, monitored through collection of landings data by NMFS, stock assessments and stock assessment updates, life history studies, economic and social analyses, and other scientific observations (SAFMC 2015). For fisheries in the Snapper-Grouper Fishery Management Plan (FMP), NMFS SEFSC collects logbook information on landed catch from 100% of commercial vessels, including, but not limited to, pounds and numbers of wreckfish landed, area fished, and depth of fishing (NMFS 2011a)(NMFS 2011b). They also record incidental landings of other species, gear, fishing time, fishing location, and fishing depth data for each trip (SAFMC 2019).

There is no regular analysis of bycatch data for the wreckfish fishery and there is currently no observer program covering this fishery, thus leading to concerns about the accuracy of logbook data in collecting bycatch information (NMFS 2015a). In recent years, discard data have been collected using a supplemental form that is sent to a 20% stratified random sample of the active permit holders in the snapper grouper fishery (NMFS 2015a). Therefore, this factor is scored moderately effective.

Factor 3.4 - Enforcement of and Compliance with Management Regulations

Western Central Atlantic | Vertical lines | United States

Moderately Effective

The wreckfish fishery is managed with an individual transferrable quota (ITQ) system, and monitoring of catch is conducted through fish coupons, dockside sampling, and logbooks. Coupons are provided so that commercial fishers can land, trade, and sell fish, so an overage of the quota is unlikely (NMFS 2015a).

Since 2001, all commercial vessels with Snapper-Grouper Fishery Management Plan (FMP) permits are required to complete a separate form that describes those fish discarded at sea, including disposition, estimated weight, the number of fish, and the reason for discard. But, underreporting is suspected in this self-reporting program, and compliance is difficult to estimate because vessels can submit a report of “no discards.” Because of the small fraction of wreckfish permits within the Snapper-Grouper FMP and the limited number of vessels operating in the wreckfish fishery, this detailed information is infrequently collected for these trips (NMFS 2011b). Enforcement and monitoring of compliance are in place to ensure that the management goals of this fishery are met, but some aspects are uncertain, so a score of moderately effective is awarded.

Factor 3.5 - Stakeholder Inclusion

Western Central Atlantic | Vertical lines | United States

Highly effective

The South Atlantic Fisheries Management Council (SAFMC) provides an open management process, as emphasized in the Snapper-Grouper Fishery Management Plan Goals of developing mechanisms to engage and collaborate with stakeholders on research and data collection, increased awareness and engagement with a diverse audience, and transparent, flexible decision-making (SAFMC 2022b). The meetings of the SAFMC are open to the public, and public statements are taken before major decisions. Before the adoption of harvest specifications, the proposed specifications are published in the Federal Register, followed by a public review and comment period of no less than 15 days (NMFS 2015b).

The SAFMC also takes advice from its advisory panel (which comprises representatives from commercial fishing companies, subsistence fishers, processors, observers, and environmental organizations) about trends in fisheries, environmental concerns relating to fishery ecosystems, and management impacts on fishers and fishing communities (Rademeyer and Butterworth 2014). The management process is transparent and includes stakeholder input, warranting a score of highly effective.

Criterion 4: Impacts on the Habitat and Ecosystem

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

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

Guiding principles

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

Rating cannot be Critical for Criterion 4.

Criterion 4 Summary

FISHERY	FISHING GEAR ON THE SUBSTRATE	MITIGATION OF GEAR IMPACTS	ECOSYSTEM-BASED FISHERIES MGMT	FORAGE SPECIES?	SCORE
Western Central Atlantic Vertical lines United States	Score: 4	Score: 0	Low Concern		Green (4.000)

Managers have worked to incorporate ecosystem-based fisheries management methods for this species and have limited this fishery to a selective fishing gear—vertical hook-and-line—which has minimal impacts on the habitat and ecosystem. Therefore, the impacts on the habitat and ecosystem warrant a Green rating.

Criterion 4 Assessment

SCORING GUIDELINES

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

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

- *5 - Fishing gear does not contact the bottom*

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

Factor 4.2 - Modifying Factor: Mitigation of Gear Impacts

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

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

Factor 4.3 - Ecosystem-Based Fisheries Management

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

- 5 — Policies that have been shown to be effective are in place to protect species' ecological roles and ecosystem functioning (e.g. catch limits that ensure species' abundance is maintained at sufficient levels to provide food to predators) and effective spatial management is used to protect spawning and foraging areas, and prevent localized depletion. Or it has been scientifically demonstrated that fishing practices do not have negative ecological effects.
- 4 — Policies are in place to protect species' ecological roles and ecosystem functioning but have not proven to be effective and at least some spatial management is used.

- *3 — Policies are not in place to protect species' ecological roles and ecosystem functioning but detrimental food web impacts are not likely or policies in place may not be sufficient to protect species' ecological roles and ecosystem functioning.*
- *2 — Policies are not in place to protect species' ecological roles and ecosystem functioning and the likelihood of detrimental food impacts are likely (e.g. trophic cascades, alternate stable states, etc.), but conclusive scientific evidence is not available for this fishery.*
- *1 — Scientifically demonstrated trophic cascades, alternate stable states or other detrimental food web impact are resulting from this fishery.*

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

Western Central Atlantic | Vertical lines | United States

Score: 4

Adult wreckfish are associated with steep, rocky bottoms and deep reefs, and are primarily caught using vertical hook-and-line gear, including hand line and bandit gear (SAFMC 2022a). Fishers attach heavy weights and multiple circle hooks baited with squid to a 1/8-inch cable and fish just above the substrate (FishWatch 2022). This fishing method has minimal impact on the substrate, so it warrants a score of 4.

Factor 4.2 - Modifying Factor: Mitigation of Gear Impacts

Western Central Atlantic | Vertical lines | United States

Score: 0

Vertical hook-and-line gear has minimal interactions with the substrate and does not require substantial mitigation. Therefore, a score of 0 is awarded.

Factor 4.3 - Ecosystem-based Fisheries Management

Western Central Atlantic | Vertical lines | United States

Low Concern

The wreckfish is included in the Snapper-Grouper Fishery Management Plan (FMP) that is developed by the South Atlantic Fisheries Management Council (SAFMC). The SAFMC is working toward an ecosystem-based approach, which is reflected in the plan's combination of key strategies including a total allowable catch (TAC) limit, individual fishing quota (ITQ) program, restrictions on fishing gear, and closures during spawning season (Filer 2004)(Sedberry 2022).

Wreckfish is considered to be a top species in the Charleston Bump community with no known predators; thus, its extraction creates a potential for trophic impacts on community composition and species diversity (Goldman and Sedberry 2010)(Koslow et al. 2000)(Barnette 2001). The management strategies put in place, including a TAC limit, ITW program, gear restrictions, and spawning season closures, are appropriate for this fishery and effectively protect the ecological role of the wreckfish. Therefore, this factor is scored a low concern.

Justification:

At a larger scale, the National Oceanographic and Atmospheric Administration (NOAA) has developed an ecosystem-based management strategy for the South Atlantic region that identifies its guiding principles as: (1) implement ecosystem-level planning; (2) advance our understanding of ecosystem processes; (3) prioritize vulnerabilities and risks of ecosystems; (4) explore and address trade-offs within an ecosystem; (5) incorporate ecosystem considerations into

management advice; and (6) maintain resilient ecosystems (NOAA 2019). A large marine protected area (MPA) has also been discussed in the region; however, the Charleston Bump has not been included in the discussions because of the success of the current management of wreckfish (Goldman and Sedberry 2010)(Sedberry 2022).

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

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Appendix A: Updates to the U.S. Wreckfish Report

Updates to the April 14, 2020 U.S. Wreckfish Report were made on June 7, 2023:

The overall rating for wreckfish caught by vertical hook-and-line gear off the U.S. Atlantic coast remains unchanged, but we have outlined the individual criterion updates below because this report was transitioned from the Seafood Watch Standard 2 to Standard 4.

Seafood Watch made the following updates:

- C1.1
 - Although the Green rating for Criterion 1 remained the same, the rating for abundance has been updated to moderate concern, because the population stock assessment used in the previous version of the report is now out of date and cannot be considered a reliable reflection of the current stock status.
- C1.2
 - Added new information pertaining to recent catch data (FishWatch 2022) and acknowledged that the past stock assessment is now out of date. The low concern rating remained the same.
- C2.1
 - Finfish species caught as bycatch were identified, and additional information regarding their population status was added, although the rating for abundance has remained the same (FishWatch 2022)(Friess and Sedberry 2011)(Filer 2004)(Filer and Sedberry 2008).
- C2.2
 - Additional information was added, and the rating for fishing mortality was updated to moderate concern because bycatch species were identified and there are uncertainties regarding their status (Filer 2004)(Filer and Sedberry 2008)(Friess and Sedberry 2011)(SAFMC 2019)(NMFS 2015b). This drove a downgrade in the Criterion 2 rating from Green to Yellow.
- C2.3
 - Additional information was added (NMFS 2011b)(SAFMC 2019), although the Discards score remained the same.
- C3
 - The Green rating for Criterion 3 remained the same, although the harvest strategy and bycatch strategy scores in the previous version were transitioned to Seafood Watch Standard 4 guidelines, and additional information was added. This resulted in highly effective scores for management strategy (GAO 2002)(SAFMC 2019)(SAFMC 2022a) and inclusion (SAFMC 2022b), and in moderately effective scores for bycatch strategy (Goldman and Sedberry 2010)(Filer and Sedberry 2008), data collection and analysis (NMFS 2011a)(NMFS 2011b)(SAFMC 2019), and enforcement (NMFS 2011b).
- C4.1
 - Additional information regarding fishing methods was added (FishWatch 2022)(SAFMC 2022a), although the score remained the same.
- C4.2
 - Because of the transition from Seafood Watch Standard 2 to Standard 4, the score for

mitigation of gear impacts decreased to 0 despite no change in information.

- C4.3
 - Additional information regarding the ecological role of wreckfish (Goldman and Sedberry 2010)(Koslow et al. 2000)(Barnette 2001) and management methods (Filer 2004)(Sedberry 2022)(NOAA 2019)(Goldman and Sedberry 2010) was added, although the score remained the same.