



# Monterey Bay Aquarium Seafood Watch

## Flatfish

*Pseudopleuronectes americanus, Paralichthys dentatus, Glyptocephalus cynoglossus, Limanda ferruginea, Hippoglossoides platessoides, Hippoglossus hippoglossus*



### **United States: Northwest Atlantic** **Bottom trawls, Set gillnets (anchored)**

*Report ID 1000*

September 6, 2022

Seafood Watch Standard used in this assessment: Fisheries Standard v3

#### **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.

## Table of Contents

Table of Contents	2
About Seafood Watch	3
Guiding Principles	4
Summary	5
Final Seafood Recommendations	7
Introduction	10
Criterion 1: Impacts on the species under assessment	12
Criterion 1 Summary	12
Criterion 1 Assessments	14
Criterion 2: Impacts on Other Species	47
Criterion 2 Summary	48
Criterion 2 Assessment	54
Criterion 3: Management Effectiveness	130
Criterion 3 Summary	130
Criterion 3 Assessment	131
Criterion 4: Impacts on the Habitat and Ecosystem	148
Criterion 4 Summary	148
Criterion 4 Assessment	148
Acknowledgements	153
References	154
Appendix A: Report Review and Update	166

## **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](http://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](http://www.SeafoodWatch.org).

## **Guiding Principles**

Seafood Watch defines sustainable seafood as originating from sources, whether fished<sup>1</sup> 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.

---

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

## **Summary**

The following Seafood Watch report provides recommendations for Atlantic flatfish caught in the Northwest Atlantic by U.S. fishing vessels. The six species dwell in similar habitats, have similar natural ranges, and are caught in mixed fisheries using a variety of methods, including bottom trawls and sink gillnets, that will be covered by this report. The fisheries that capture flatfish in the Northwest Atlantic are managed by the New England Fisheries Management Council (NEFMC) under the Multispecies Fishery Management Plan, the Mid-Atlantic Fishery Management Council, and the Atlantic States Marine Fisheries Commission.

There are three stocks of blackback and yellowtail flounder: Georges Bank, Gulf of Maine, and Mid-Atlantic. Yellowtail flounder is considered overfished in all three areas, while blackback is overfished only in the Mid-Atlantic. The status of blackback in the Gulf of Maine is unknown, and in Georges Bank is not considered overfished. Witch flounder and halibut are overfished in New England, plaice is not considered overfished, and summer flounder is 78% of the target biomass and not considered overfished in either the New England or Mid-Atlantic stocks.

Multiple species are caught as by-catch in the U.S. flatfish fisheries. The lowest scoring species for both the Georges Bank and the Gulf of Maine bottom trawl fisheries are long-finned pilot whale, due to its high inherent vulnerability, and Atlantic cod, due to its overfished and overfishing status. For the set gillnet fishery in the Gulf of Maine, Atlantic cod, fin whale, and North Atlantic right whale were the lowest scoring; both whale species are critically endangered. For the mid-Atlantic bottom trawl fishery, the lowest scoring species was the loggerhead turtle. These species limit the scoring for Criterion 2.

The NEFMC manages groundfish fisheries through a collective Fishery Management Plan (FMP) that covers 20 stocks from 13 species. Grouping species together allows the NEFMC to manage these mixed fisheries more effectively than if individual species FMPs were used. Because of the historical exploitation that the stocks have been exposed to, a number of stocks are depleted or in a state of rebuilding. NEFMC's current management system should improve the rate of recovery of stocks. There is a considerable effort to collect data in these fisheries through logbooks and observer coverage; the data (along with fishery-independent data) guide stock assessments. NEFMC takes into account the scientific information provided by stock assessments on the majority of occasions; however, in some instances, total allowable catches (TACs) have been set too high in response to social and economic needs. A number of regulations are in place that require fisheries managers to reduce the impacts of fishing activities on nontarget populations. The Atlantic Large Whale Take Reduction Plan has failed to reduce the impact of fisheries on North Atlantic right whale and is cause for concern. Reporting of by-catch creates an incentive for reduction efforts while providing data for scientific research and stock assessments. The observer program provides considerable data to aid in stock assessments of target and by-catch species, although gaps in monitoring may still be a concern.

The Mid-Atlantic Fishery Management Council manages summer flounder under the Summer Flounder, Scup, and Black Sea Bass fishery management plan. The management range for summer flounder extends from the United States–Canadian border to the southern border of North Carolina. Because these stocks are transboundary between state waters as well as migrating in and out of state and federal waters, both the Atlantic States Marine Fisheries Commission and the National Marine Fisheries Service

help in managing them. Similar to the NEFMC, fisheries under this management plan include a number of measures to regulate these species and work toward sustainability under the Magnuson–Stevens Fisheries Management Act.

The majority of the groundfish fishery takes place in water less than 100 m deep over sand and mud-silt habitats; gravel habitats affected by the fishery occur in waters 20 to 40 m deep. Habitat impacts are a moderate conservation concern for bottom trawl fisheries, a low conservation concern for bottom gillnet and bottom longline fisheries, and a very low concern for handline fisheries. There is a minimal level of mitigation measures in place in the form of a number of permanently closed areas to protect essential fish habitat from bottom trawls, and in other temporary and permanent closures that offer some protection from all gears (but these are not designated specifically for habitat protection and may not protect the most vulnerable habitats). Ecosystem-based management is currently being developed for the groundfish fishery in the Northwest Atlantic and this process is expected to take a minimum of 5 years. Management of the ecosystem in this region is a moderate conservation concern.

## Final Seafood Recommendations

SPECIES   FISHERY	CRITERION 1 TARGET SPECIES	CRITERION 2 OTHER SPECIES	CRITERION 3 MANAGEMENT	CRITERION 4 HABITAT	OVERALL RECOMMENDATION
American plaice   Northwest Atlantic   Bottom trawls   United States   New England	4.284	1.000	3.000	2.449	<b>Good Alternative (2.369)</b>
Atlantic halibut   Northwest Atlantic   Bottom trawls   United States   New England	1.732	1.000	3.000	2.449	<b>Avoid (1.889)</b>
Blackback   Gulf of Maine Stock   Northwest Atlantic   Bottom trawls   United States   New England	3.413	1.000	3.000	2.449	<b>Good Alternative (2.238)</b>
Blackback   Georges Bank Stock   Northwest Atlantic   Bottom trawls   United States   New England	3.413	1.000	3.000	2.449	<b>Good Alternative (2.238)</b>
Blackback   Southern New England / Mid-Atlantic Stock   Northwest Atlantic   Bottom trawls   United States   Mid Atlantic	1.732	1.000	3.000	2.449	<b>Avoid (1.889)</b>
Blackback   Southern New England / Mid-Atlantic Stock   Northwest Atlantic   Bottom trawls   United States	1.732	1.000	3.000	2.449	<b>Avoid (1.889)</b>
Blackback   Gulf of Maine Stock   Northwest Atlantic   Set gillnets   United States   New England	3.413	1.000	1.000	3.000	<b>Avoid (1.789)</b>
Summer flounder   Northwest Atlantic   Bottom trawls   United States   New England	4.284	1.000	3.000	2.449	<b>Good Alternative (2.369)</b>
Summer flounder   Northwest Atlantic   Bottom trawls   United States   Mid Atlantic	4.284	1.000	3.000	2.449	<b>Good Alternative (2.369)</b>
Witch flounder   Northwest Atlantic   Bottom trawls   United States   New England	1.732	1.000	3.000	2.449	<b>Avoid (1.889)</b>
Witch flounder   Northwest Atlantic   Bottom trawls   United States   Mid Atlantic	1.732	1.000	3.000	2.449	<b>Avoid (1.889)</b>
Yellowtail flounder   Southern New England / Mid-Atlantic Stock   Northwest Atlantic   Bottom trawls   United States   Mid Atlantic	1.000	1.732	3.000	2.449	<b>Avoid (1.889)</b>
Yellowtail flounder   Southern New England / Mid-Atlantic Stock   Northwest Atlantic   Bottom trawls   United States	1.000	1.000	3.000	2.449	<b>Avoid (1.646)</b>
Yellowtail flounder   Georges Bank Stock   Northwest Atlantic   Bottom trawls   United States   New England	1.000	1.000	3.000	2.449	<b>Avoid (1.646)</b>

Yellowtail flounder   Cape Cod / Gulf of Maine Stock   Northwest Atlantic   Bottom trawls   United States   New England	1.000	1.000	3.000	2.449	<b>Avoid (1.646)</b>
Yellowtail flounder   Cape Cod / Gulf of Maine Stock   Northwest Atlantic   Set gillnets   United States   New England	1.000	1.000	1.000	3.000	<b>Avoid (1.316)</b>

## Summary

Mid-Atlantic bottom trawl fisheries for summer flounder are rated a Good Alternative because stocks are healthy and management is effective, but there are by-catch concerns. Mid-Atlantic fisheries for witch flounder and blackback are rated an Avoid, due to concerns surrounding stock health and by-catch. In the New England bottom trawl fisheries, American plaice, summer flounder, blackback in the Gulf of Maine, and blackback in Georges Bank are all rated a Good Alternative, due to by-catch concerns combined with healthy stock status and moderately effective management. Also in the New England bottom trawl fishery, Atlantic halibut, witch flounder, and yellowtail flounder are rated an Avoid, due to by-catch and concerns with stock health. Blackback and yellowtail flounder in the Southern New England/Mid-Atlantic bottom trawl fisheries are rated an Avoid for these same reasons. Cape Cod/Gulf of Maine gillnet-caught yellowtail and Gulf of Maine gillnet-caught blackback are rated an Avoid, due to by-catch concerns and a failure of the ALWTRP to reduce the impact of fisheries on the critically endangered North Atlantic right whale.



## 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<sup>2</sup>, and no more than one Red Criterion, and no Critical scores

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

---

<sup>2</sup> 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 provides recommendations for the primary flatfish species landed and sold in the U.S. market. The scope of this analysis and ensuing recommendation includes American plaice (*Hippoglossoides platessoides*), Atlantic halibut (*Hippoglossus hippoglossus*), summer flounder (*Paralichthys dentatus*), blackback (*Pseudopleuronectes americanus*), witch flounder (*Glyptocephalus cynoglossus*), and yellowtail flounder (*Limanda ferruginea*). All species are caught by the U.S. commercial fleet using bottom trawls. Blackback and yellowtail flounder are also caught with gillnets by the U.S. commercial fleet in the Gulf of Maine.

## **Species Overview**

Flatfishes are a monophyletic group that comprises 14 families, 134 genera, and about 678 species worldwide (Nelson 2006). Individuals in this order (Pleuronectiformes) generally lay flat, with skull development in the larval stage causing the migration of one eye around the head and distinct pigmentation between sides (bottom-facing side white, upward-facing side pigmented for camouflage). Most commercially important flatfishes in the Atlantic are from the family Pleuronectidae (right-eye flounders), which comprises 23 genera and about 60 species, including witch, winter, and yellowtail flounder, American plaice, and Atlantic halibut (Nelson 2006). Other important families include Paralichthyidae (left-eyed sand flounders, including summer flounder) and Scophthalmidae (turbot) (Collette and Klein-MacPhee 2002)(Nelson 2006).

Northwest Atlantic flatfish fisheries in U.S. federal waters (3 to 200 nm offshore) are managed under Fishery Management Plans (FMPs) by the National Marine Fisheries Service (NMFS) and its advisory bodies, the New England Fishery Management Council (NEFMC) and Mid-Atlantic Fishery Management Council (MAFMC). The summer flounder fishery is managed under the MAFMC's Summer Flounder, Scup, and Black Sea Bass FMP. Federal fisheries for all other commercially important Atlantic flatfishes are regulated under the NEFMC's Northeast Multispecies Groundfish FMP, which covers the catch of 13 species and 20 stocks along the U.S. Atlantic coast. This FMP has been amended and adjusted multiple times; most recently, a final rule was determined to set catch limits for 2018 to 2020, adjust fisheries allocations, and revise accountability measures on 1 May 2018 (NEFMC 2018a).

## **Production Statistics**

In 2016, U.S. vessels landed approximately 46,914 mt of flatfish at U.S. ports (NMFS 2018a). Of the overall total, the species that are relevant to this report made up 6,827 mt, primarily summer flounder (3,530.3 mt), blackback (1,161.5 mt), Atlantic plaice (1,029.3 mt), yellowtail (564.8 mt), and witch flounder (397.5 mt). The majority of the U.S. market is dominated by Pacific flatfishes, specifically arrowtooth flounder (28,146.1 mt) and Pacific halibut (*Hippoglossus stenolepis*) (11,285.9 mt) (NMFS 2018a).

## **Importance to the US/North American market.**

The U.S. imported a total of 35,242,069 kg of flatfish products worth \$268,810,094 in 2017 and exported a total of 117,935,792 kg valued at \$207,804,311 (not including a small amount of flatfish products that were imported and immediately re-exported). The two largest sources of imports, by

weight, were China and Canada. The four largest consumers of U.S. flatfish exports in 2017 by weight were China, South Korea, Japan, and Mexico; by value, they were China, South Korea, Japan, and Canada (NMFS 2018c).

**Common and market names.**

American plaice is also known as dab {O'Brien 2006}. Summer flounder, also known as fluke or northern fluke, is often marketed simply as flounder or fluke; however, several other species, including southern flounder, smalleye flounder, and European flounder, are also marketed as fluke (NMFS 2018b). Blackback is also referred to or marketed as flounder, sole, lemon sole, Georges Bank flounder, and winter flounder (NMFS 2018b). Witch flounder is marketed as gray sole or Craig fluke {Monroe et al. 2015}. Yellowtail flounder, sometimes referred to as rusty dab or sand dab, is often sold simply as flounder (NMFS 2018b). When used for sushi or sashimi, Atlantic flatfishes are commonly sold as hirame.

**Primary product forms**

Flatfishes may be marketed as fresh or frozen fillets, blocks, whole, or value-added (e.g., breaded).

## Assessment

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

AMERICAN PLAICE			
REGION / METHOD	ABUNDANCE	FISHING MORTALITY	SCORE
Northwest Atlantic   Bottom trawls   United States   New England	3.670: Low Concern	5.000: Low Concern	Green (4.284)

ATLANTIC HALIBUT			
REGION / METHOD	ABUNDANCE	FISHING MORTALITY	SCORE
Northwest Atlantic   Bottom trawls   United States   New England	1.000: High Concern	3.000: Moderate Concern	Red (1.732)

**BLACKBACK**

REGION / METHOD	ABUNDANCE	FISHING MORTALITY	SCORE
Gulf of Maine Stock   Northwest Atlantic   Bottom trawls   United States   New England	2.330: Moderate Concern	5.000: Low Concern	Green (3.413)
Georges Bank Stock   Northwest Atlantic   Bottom trawls   United States   New England	2.330: Moderate Concern	5.000: Low Concern	Green (3.413)
Southern New England / Mid-Atlantic Stock   Northwest Atlantic   Bottom trawls   United States   Mid Atlantic	1.000: High Concern	3.000: Moderate Concern	Red (1.732)
Southern New England / Mid-Atlantic Stock   Northwest Atlantic   Bottom trawls   United States	1.000: High Concern	3.000: Moderate Concern	Red (1.732)
Gulf of Maine Stock   Northwest Atlantic   Set gillnets   United States   New England	2.330: Moderate Concern	5.000: Low Concern	Green (3.413)

**SUMMER FLOUNDER**

REGION / METHOD	ABUNDANCE	FISHING MORTALITY	SCORE
Northwest Atlantic   Bottom trawls   United States   New England	3.670: Low Concern	5.000: Low Concern	Green (4.284)
Northwest Atlantic   Bottom trawls   United States   Mid Atlantic	3.670: Low Concern	5.000: Low Concern	Green (4.284)

**WITCH FLOUNDER**

REGION / METHOD	ABUNDANCE	FISHING MORTALITY	SCORE
Northwest Atlantic   Bottom trawls   United States   New England	1.000: High Concern	3.000: Moderate Concern	Red (1.732)
Northwest Atlantic   Bottom trawls   United States   Mid Atlantic	1.000: High Concern	3.000: Moderate Concern	Red (1.732)

YELLOWTAIL FLOUNDER			
REGION / METHOD	ABUNDANCE	FISHING MORTALITY	SCORE
Southern New England / Mid-Atlantic Stock   Northwest Atlantic   Bottom trawls   United States   Mid Atlantic	1.000: High Concern	1.000: High Concern	Red (1.000)
Southern New England / Mid-Atlantic Stock   Northwest Atlantic   Bottom trawls   United States	1.000: High Concern	1.000: High Concern	Red (1.000)
Georges Bank Stock   Northwest Atlantic   Bottom trawls   United States   New England	1.000: High Concern	1.000: High Concern	Red (1.000)
Cape Cod / Gulf of Maine Stock   Northwest Atlantic   Bottom trawls   United States   New England	1.000: High Concern	1.000: High Concern	Red (1.000)
Cape Cod / Gulf of Maine Stock   Northwest Atlantic   Set gillnets   United States   New England	1.000: High Concern	1.000: High Concern	Red (1.000)

## 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.*

# **American plaice**

## **Factor 1.1 - Abundance**

### **Northwest Atlantic | Bottom trawls | United States | New England**

#### **Low Concern**

Based on the 2017 American plaice stock assessment, spawning stock biomass (SSB) in 2016 was estimated to be 13,351 mt, which is 99% of the biomass target for this stock ( $SSB_{MSY}$  proxy = 13,503; see Figure 1) {Terceiro 2017}. According to the NMFS first quarter 2018 update, Georges Bank American plaice is not overfished and in year 4 of a 10-year rebuilding plan (NMFS 2018c). Because the stock is not overfished, and abundance is more than 75% above the biomass target, abundance is considered a low concern.

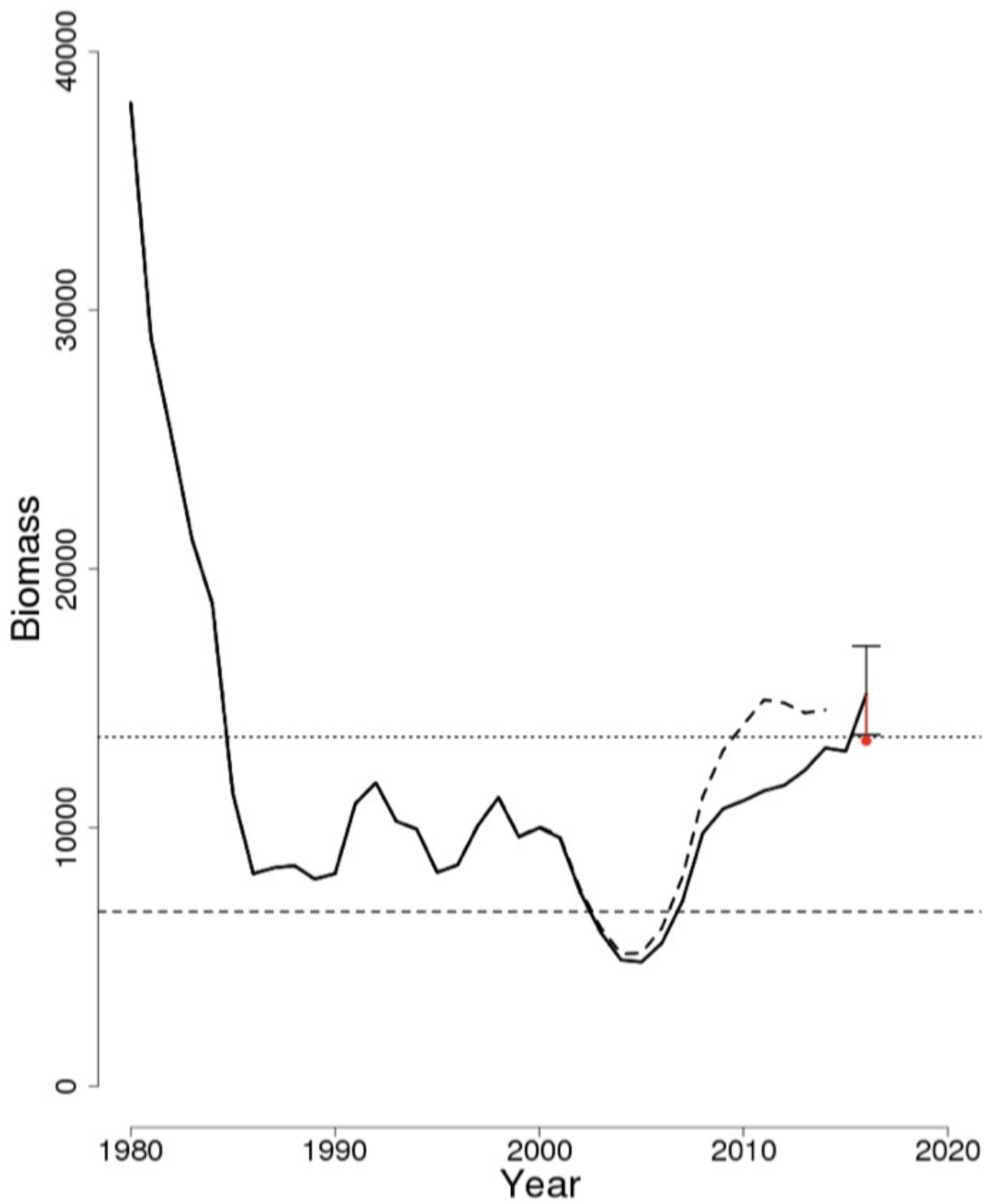


Figure 1: Trends in SSB of Gulf of Maine–Georges Bank American plaice between 1980 and 2016 from the current (solid line) and previous (dashed line) assessment and the corresponding  $SSB_{THRESHOLD}$  ( $1/2 SSB_{MSY}$  proxy; horizontal dashed line) as well as  $SSB_{TARGET}$  ( $SSB_{MSY}$  proxy; horizontal dotted line) based on the 2017 assessment (Terceiro 2017).



## **Factor 1.2 - Fishing Mortality**

### **Northwest Atlantic | Bottom trawls | United States | New England**

#### **Low Concern**

Based on the 2017 American plaice stock assessment, the 2016 fully selected fishing mortality was estimated to be 0.111, which is 51% of the overfishing threshold proxy ( $F_{MSY}$  proxy = 0.216; see Figure 2) {Terceiro 2017}. Therefore, the stock is not undergoing overfishing and fishing mortality is considered a low concern.

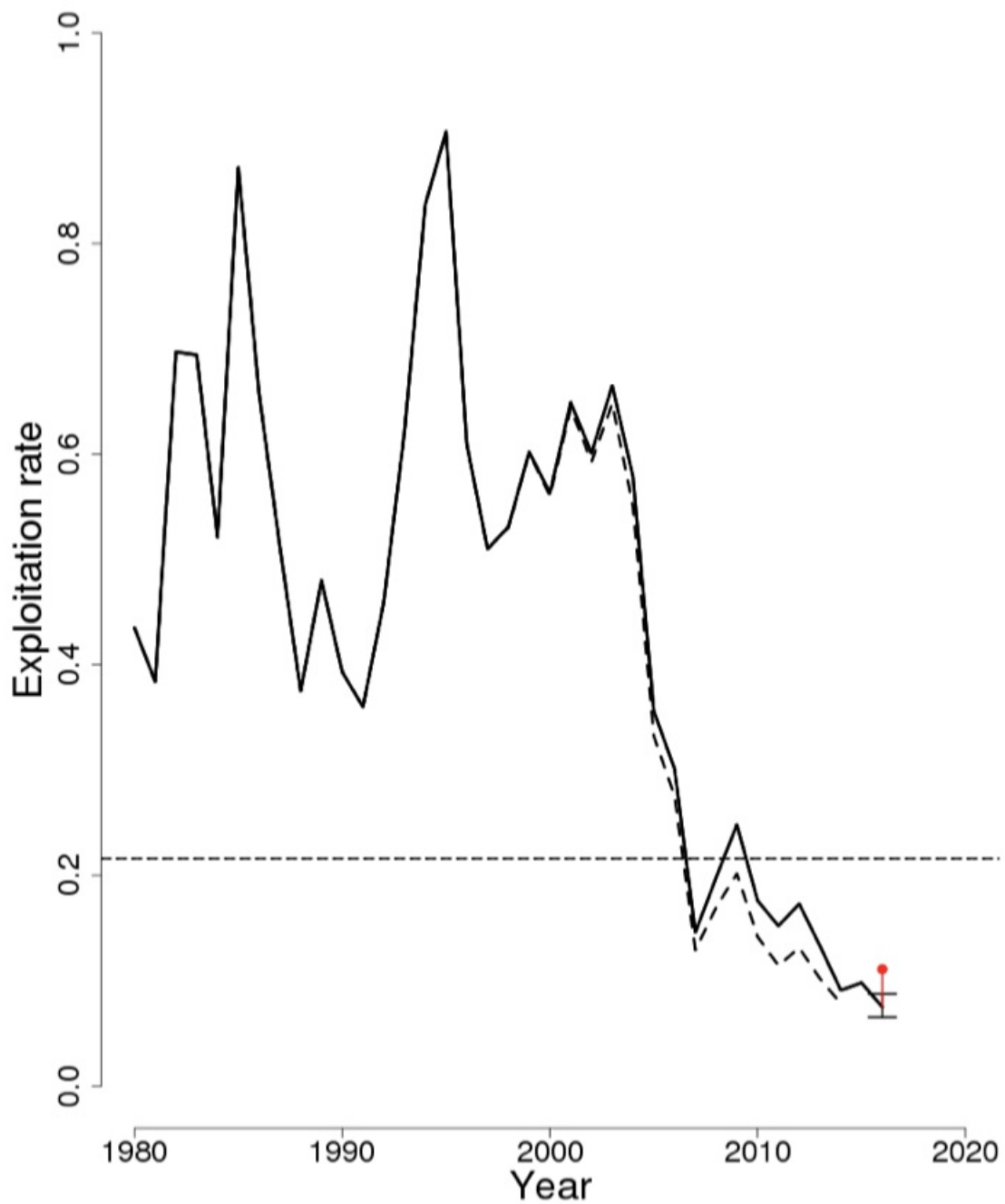


Figure 2: Trends in the fully selected fishing mortality ( $F_{FULL}$ ) of Gulf of Maine–Georges Bank American plaice between 1980 and 2016 from the current (solid line) and previous (dashed line) assessment and the corresponding  $F_{THRESHOLD}$  ( $F_{MSY}$  proxy = 0.216; horizontal dashed line) (Terceiro 2017).

# **Atlantic halibut**

## **Factor 1.1 - Abundance**

### **Northwest Atlantic | Bottom trawls | United States | New England**

#### **High Concern**

Based on the 2015 Atlantic halibut stock assessment, spawning stock biomass (SSB) in 2014 was estimated to be 96,464 mt, which is 199% of the biomass target ( $SSB_{MSY}$  proxy = 48,509; see Figure 3) (NEFSC 2015a). But, the assessment indicated that the model used was highly uncertain due to the high sensitivity to initial biomass, and that the survey data used were “noisy” due to the low number of animals caught in the surveys (NEFSC 2015a). Therefore, stock status for this species cannot be determined based on the current assessment and is unknown (NEFSC 2015a). According to the NMFS first quarter 2018 update, Atlantic halibut is overfished and in year 14 of a 52-year rebuilding plan (NMFS 2018c). This factor is considered a high concern, because Atlantic halibut is also listed as a species of concern under the Endangered Species Act (ESA) (NMFS 2017a).

#### **Justification:**

Catch has been very low for at least 100 years relative to landings reported early in the time series, despite a strong market and high value relative to other groundfish {NEFSC 2015}. The low catch throughout the century implies that the Atlantic halibut stock is very likely depleted relative to its unfished condition and is therefore likely to be overfished, even if its current biomass is unknown {NEFSC 2015}.

NMFS fourth quarter 2017 update stock determinations are from the GARMIII benchmark assessment and the 2012 updated assessment, which concluded that the stock was overfished but overfishing was not occurring; information available in the updated assessment indicates that stock size has not substantially increased. Hence, it was concluded that the stock is still overfished, and the overfishing status is unknown.

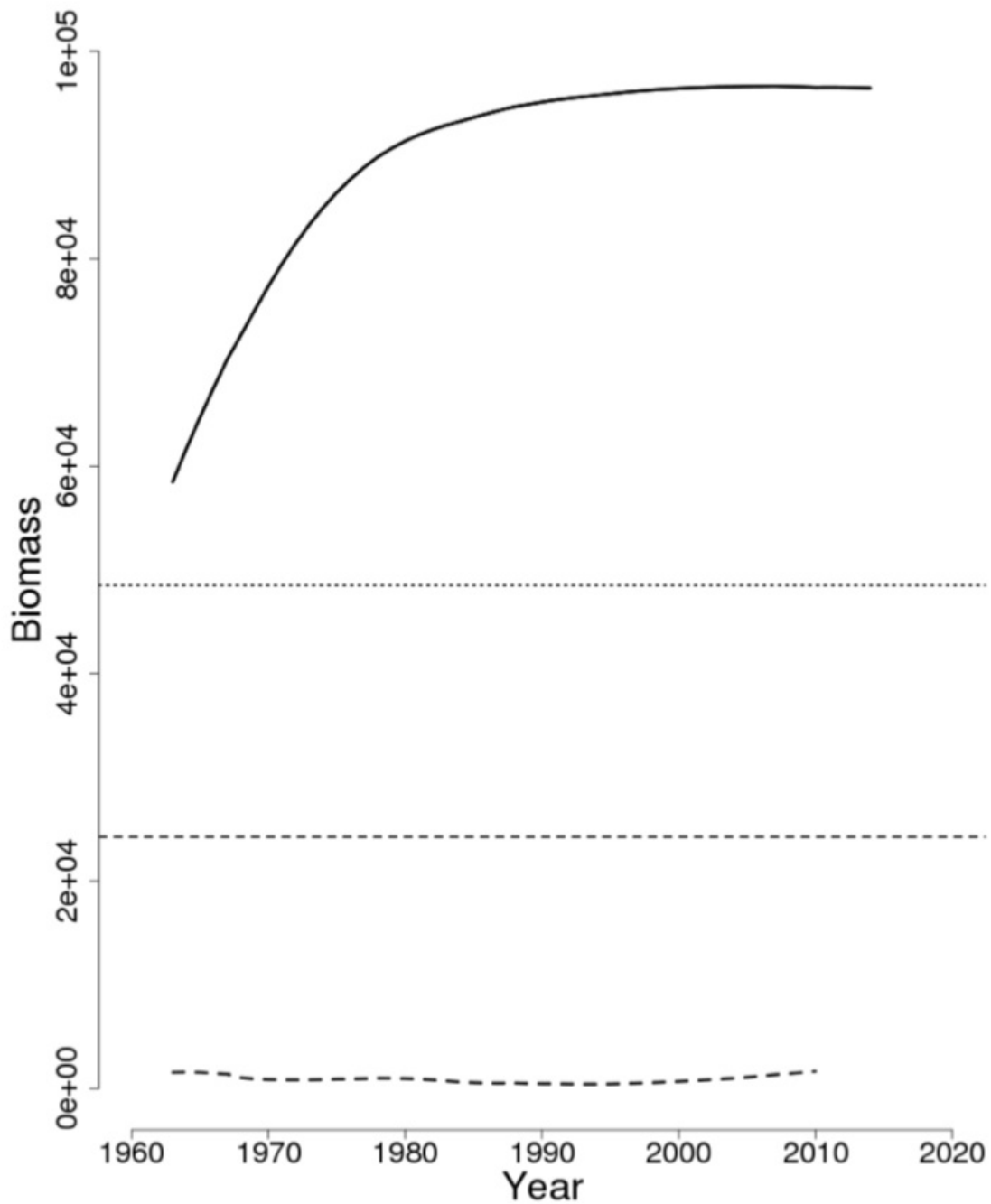


Figure 3: Estimated trends in the biomass of Atlantic halibut between 1963 and 2014 from the current (solid line) and previous (dashed line) assessment and the corresponding  $B_{THRESHOLD} = 1/2 B_{MSY}$  proxy (horizontal dashed line) as well as  $B_{TARGET}$  ( $B_{MSY}$  proxy; horizontal dotted line) based on the 2015 assessment {NEFSC 2015}.

## **Factor 1.2 - Fishing Mortality**

### **Northwest Atlantic | Bottom trawls | United States | New England**

#### **Moderate Concern**

Based on the 2015 Atlantic halibut stock assessment, the 2014 fully selected fishing mortality was estimated to be 0.001, which is 1% of the overfishing threshold proxy ( $F_{MSY}$  proxy = 0.073; see Figure 4) (NEFSC 2015a). According to the NMFS first quarter 2018 update, Atlantic halibut is not undergoing overfishing (NMFS 2018c). Because there is no 2017/2018 stock assessment update to support the NMFS FSSI listing, the Atlantic halibut stock is likely severely depleted, and the model used in the 2015 stock assessment has been deemed unreliable, so this factor is scored a moderate concern.

#### **Justification:**

NMFS fourth quarter 2017 update stock determinations are from the GARMIII benchmark assessment and the 2012 updated assessment, which concluded that the stock was overfished but overfishing was not occurring; information available in the updated assessment indicates that stock size has not substantially increased. Hence, it was concluded that the stock is still overfished, and the overfishing status is unknown.

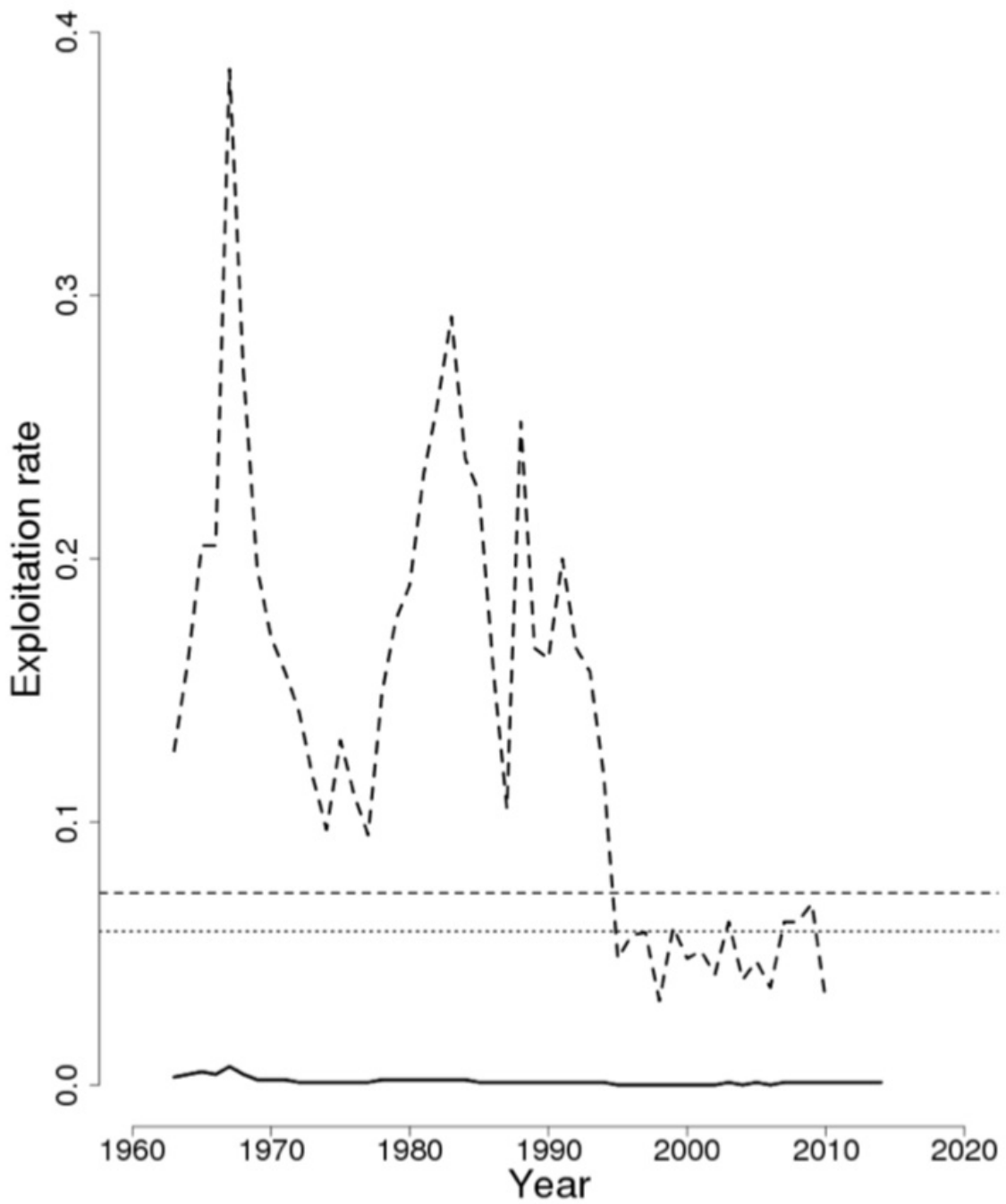


Figure 4: Estimated trends in the fully selected fishing mortality ( $F_{FULL}$ ) of Atlantic halibut between 1963 and 2014 from the current (solid line) and previous (dashed line) assessment and the corresponding  $F_{THRESHOLD}$  (0.073; horizontal dashed line) as well as  $F_{TARGET}$  ( $0.8 \times F_{MSY}$  proxy; dotted line) based on the 2015 assessment {NEFSC 2015}.

# **Blackback**

## **Factor 1.1 - Abundance**

### **Georges Bank Stock | Northwest Atlantic | Bottom trawls | United States | New England**

#### **Moderate Concern**

Based on the 2017 Georges Bank blackback/winter flounder stock assessment, spawning stock biomass (SSB) in 2016 was estimated to be 3,946 mt, which is 52% of the biomass target for an overfished stock ( $SSB_{MSY} = 7,600$  with a threshold of 50% of  $SSB_{MSY}$ ; see Figure 5) {Hendrickson 2017}. According to the NMFS first quarter 2018 update, Georges Bank blackback/winter flounder is not overfished and is in year 8 of a 7-year rebuilding plan (NMFS 2018c). Because the stock is not overfished, and biomass is less than 75% of the target biomass, abundance is scored a moderate concern.

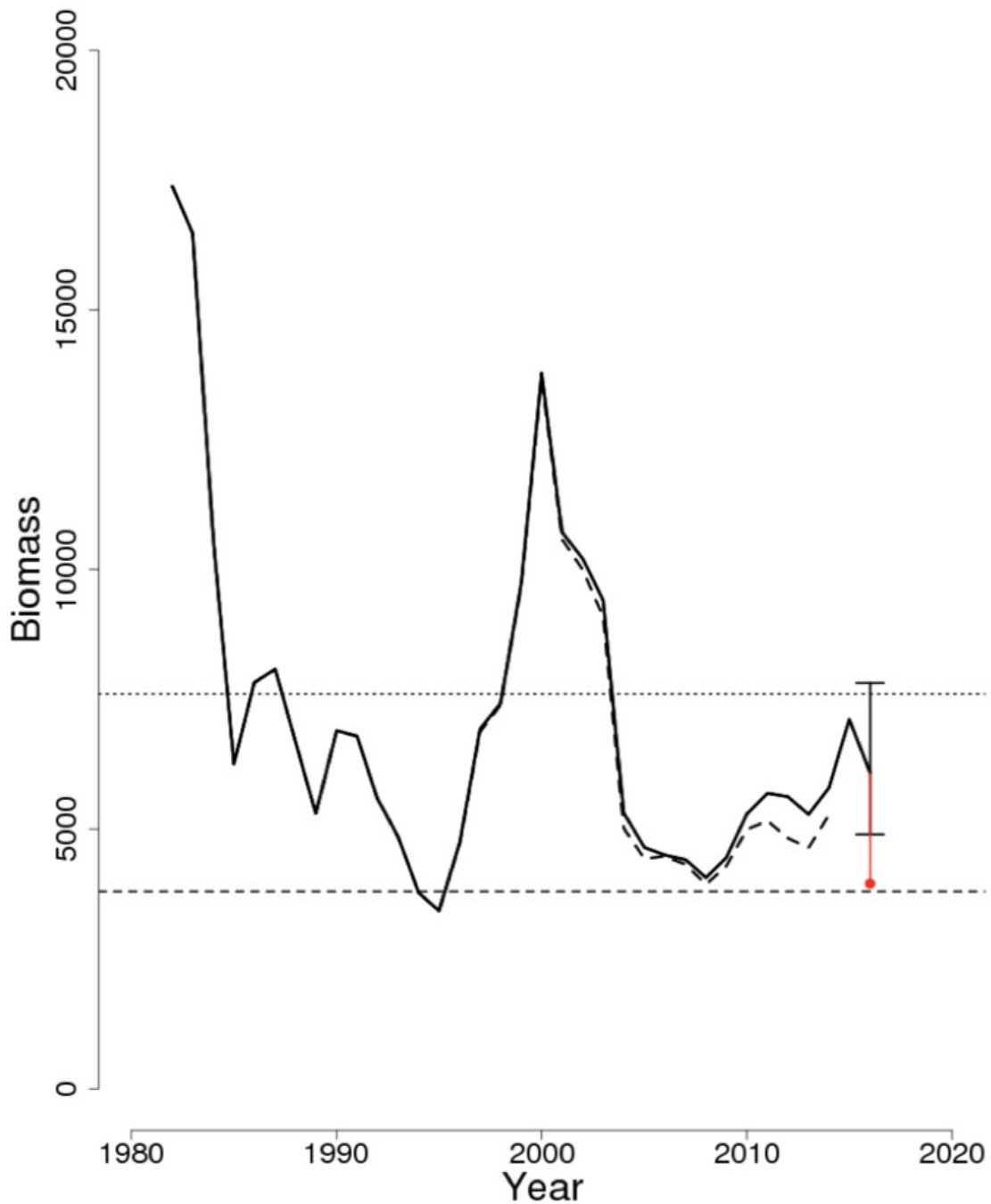


Figure 5: Trends in spawning stock biomass (mt) of Georges Bank blackback/winter flounder between 1982 and 2016 from the current (solid line) and previous (dashed line) assessments and the corresponding  $SSB_{THRESHOLD}$  ( $1/2 SSB_{MSY}$ ; horizontal dashed line) as well as  $SSB_{TARGET}$  ( $SSB_{MSY}$ ; horizontal dotted line) based on the 2017 assessment. The 90% normal confidence interval is shown for 2016 {Hendrickson 2017}.



**Gulf of Maine Stock | Northwest Atlantic | Bottom trawls | United States | New England**

**Gulf of Maine Stock | Northwest Atlantic | Set gillnets | United States | New England**

**Moderate Concern**

Based on the 2020 Gulf of Maine blackback/winter flounder stock assessment update, biomass (30+ cm mt) in 2019 was estimated to be 2,862 mt (Figure 6), and biomass status is unknown (NOAA 2020c). Biomass is estimated from survey area-swept for non-overlapping strata from three different fall trawl surveys: Maine New Hampshire (MENH), Massachusetts Division of Marine Fisheries (MDMF), and Northeast Fisheries Science Center (NEFSC), using an updated survey gear catchability (q) estimate of 0.87 (on the wing spread) from the sweep study (Miller et al. 2017)(Nitschke 2017), but biomass-based reference points cannot be determined from this method. According to the NMFS first quarter 2022 update, Gulf of Maine blackback/winter flounder overfishing status is also unknown (NMFS 2022).

A productivity-susceptibility analysis (PSA) was calculated to determine the inherent vulnerability of blackback, because biomass relative to a reference point is unknown. The PSA score = 2.84 (see detailed scoring of each PSA attribute in Justification), and blackback is deemed to have medium vulnerability. Because of the medium vulnerability of blackback, Seafood Watch considers abundance a moderate concern.

**Justification:**

Productivity-Susceptibility Analysis:

*Scoring Guidelines*

1. Productivity score (P) = average of the productivity attribute scores (p1, p2, p3, p4 (finfish only), p5 (finfish only), p6, p7, and p8 (invertebrates only))

2. Susceptibility score (S) = product of the susceptibility attribute scores (s1, s2, s3, s4), rescaled as follows:  $S = [(S1 \times S2 \times S3 \times S4) - 1 \div 40] + 1$ .

3. Vulnerability score (V) = the Euclidean distance of P and S using the following formula:  $V = \sqrt{P^2 + S^2}$

<b>Productivity Attribute</b>	<b>Relevant Information</b>	<b>Risk (1 = low risk, 2 = medium risk, 3 = high risk)</b>
Average age at maturity	1.9–3.5 (Froese and Pauly 2018)	1
Average maximum age	14 years (Lux 1973)	2
Fecundity	200,000–1,400,100 (Buckley et al. 1991)	1
Average maximum size	64 cm (Froese and Pauly 2018)	1
Average size at maturity	27.4 cm (Buckley et al. 1991)	1
Reproductive strategy	Demersal {Scotten et al. 1973}	2
Habitat quality	Moderately altered (default)	2
Productivity Score = 1.625		

<b>Susceptibility Attribute</b>	<b>Relevant Information</b>	<b>Risk (1 = low risk, 2 = medium risk, 3 = high risk)</b>
Areal overlap	>30% overlap (default)	3
Vertical overlap	High overlap with demersal fishing gears	3
Selectivity of fishery	Species is targeted and is not likely to escape gear, but conditions under "high risk" do not apply	2
Post-capture mortality	Retained species (default)	3
Susceptibility Score = 2.325		
Vulnerability Score = 2.84		

PSA score for blackback in GoM bottom trawl fisheries is calculated as follows:

$$\text{Vulnerability (V)} = \sqrt{P^2 + S^2}$$

$$V = \sqrt{(1.625^2 + 2.325^2)}$$

$$V = 2.84$$

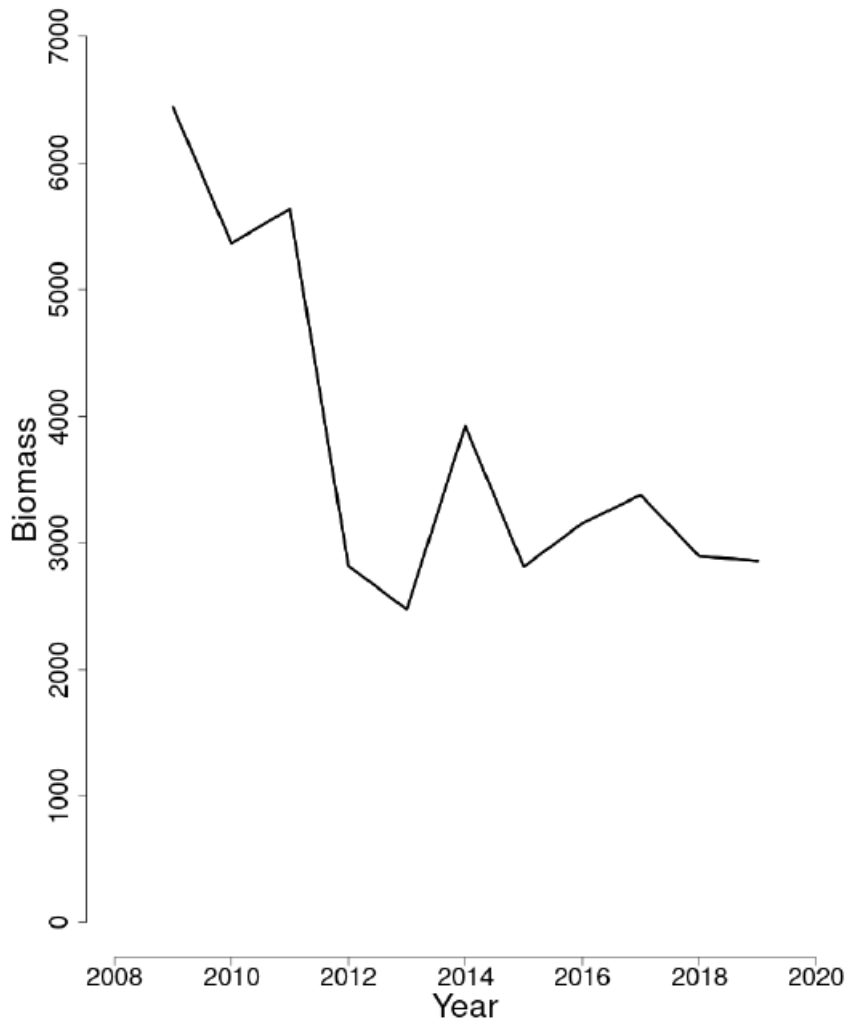


Figure 6: Trends in 30+ cm area-swept biomass of Gulf of Maine winter flounder between 2009 and 2019 from the current assessment based on the fall (MENH, MDMF, NEFSC) surveys. From (NOAA 2020c).

**Southern New England / Mid-Atlantic Stock | Northwest Atlantic | Bottom trawls | United States | Mid Atlantic**

**Southern New England / Mid-Atlantic Stock | Northwest Atlantic | Bottom trawls | United States**

**High Concern**

The 2017 Southern New England/Mid-Atlantic blackback/winter flounder stock assessment spawning stock biomass (SSB) for 2016 was 4,360 mt, which was 18% of the biomass target of 24,687 mt, as well as 36% of the biomass threshold of an overfished stock ( $SSB_{THRESHOLD} = 12,343.5$  mt; see Figure 7) (NEFSC 2017f). Because this stock is overfished, this factor is considered a high concern.

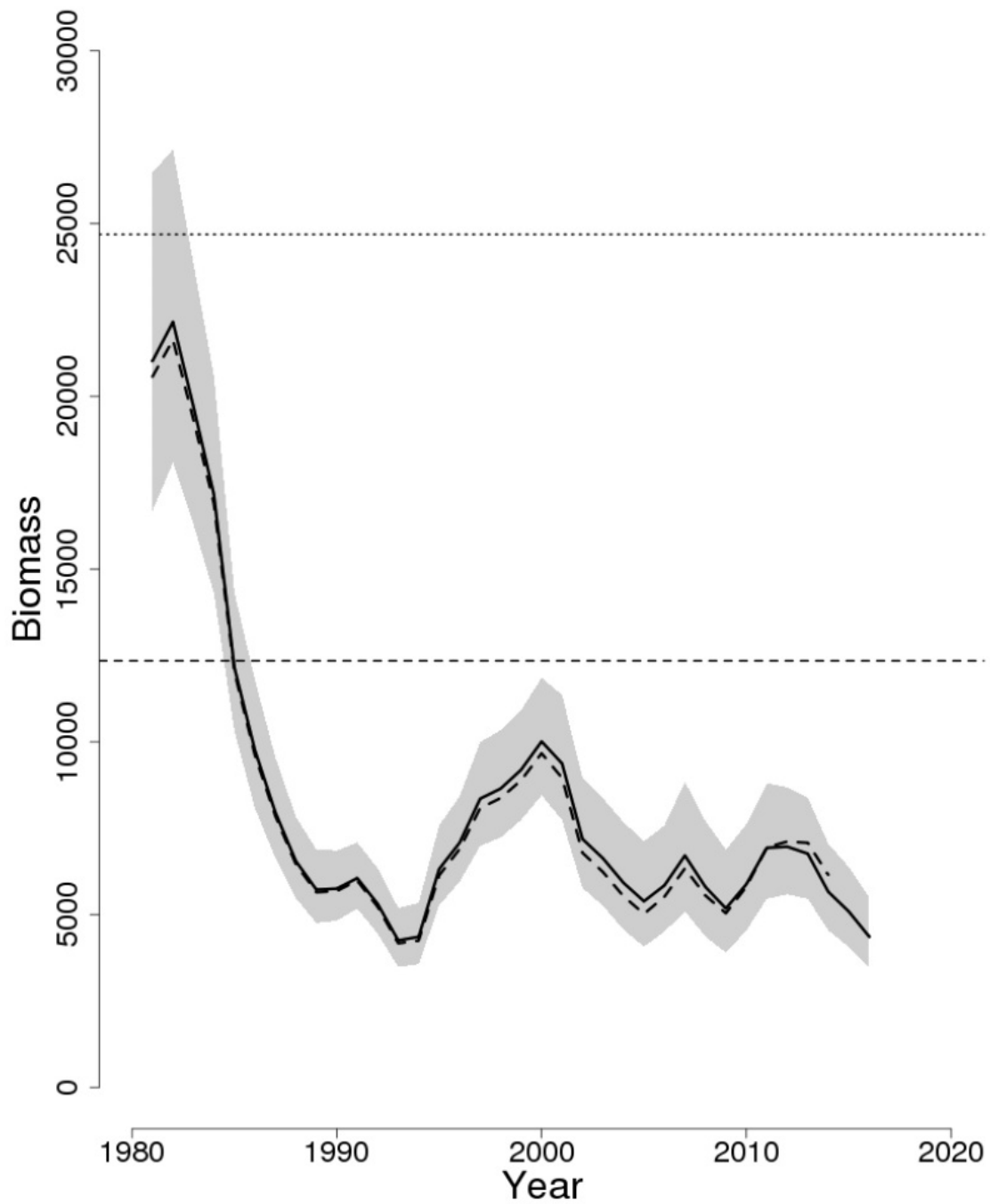


Figure 7: Trends in spawning stock biomass of Southern New England Mid-Atlantic blackback/winter flounder between 1981 and 2016 from the current (solid line) and previous (dashed line) assessment and the corresponding  $SSB_{THRESHOLD}$  ( $1/2 SSB_{MSY}$  proxy; horizontal dashed line) as well as  $SSB_{TARGET}$  ( $SSB_{MSY}$  proxy; horizontal dotted line) based on the 2017 assessment. The approximate 90% lognormal confidence intervals are shown (NEFSC 2017).

## **Factor 1.2 - Fishing Mortality**

### **Georges Bank Stock | Northwest Atlantic | Bottom trawls | United States | New England**

#### **Low Concern**

Based on the 2017 Georges Bank blackback/winter flounder stock assessment, the 2016 fully selected fishing mortality (F) was estimated to be 0.117, which is 22% of the overfishing threshold ( $F_{MSY} = 0.522$ ; see Figure 8) {Hendrickson 2017}. According to the NMFS first quarter 2018 update, Georges Bank blackback/winter flounder is in year 8 of a 7-year rebuilding plan (NMFS 2018c). Because blackback/winter flounder is not undergoing overfishing, fishing mortality is scored a low concern.

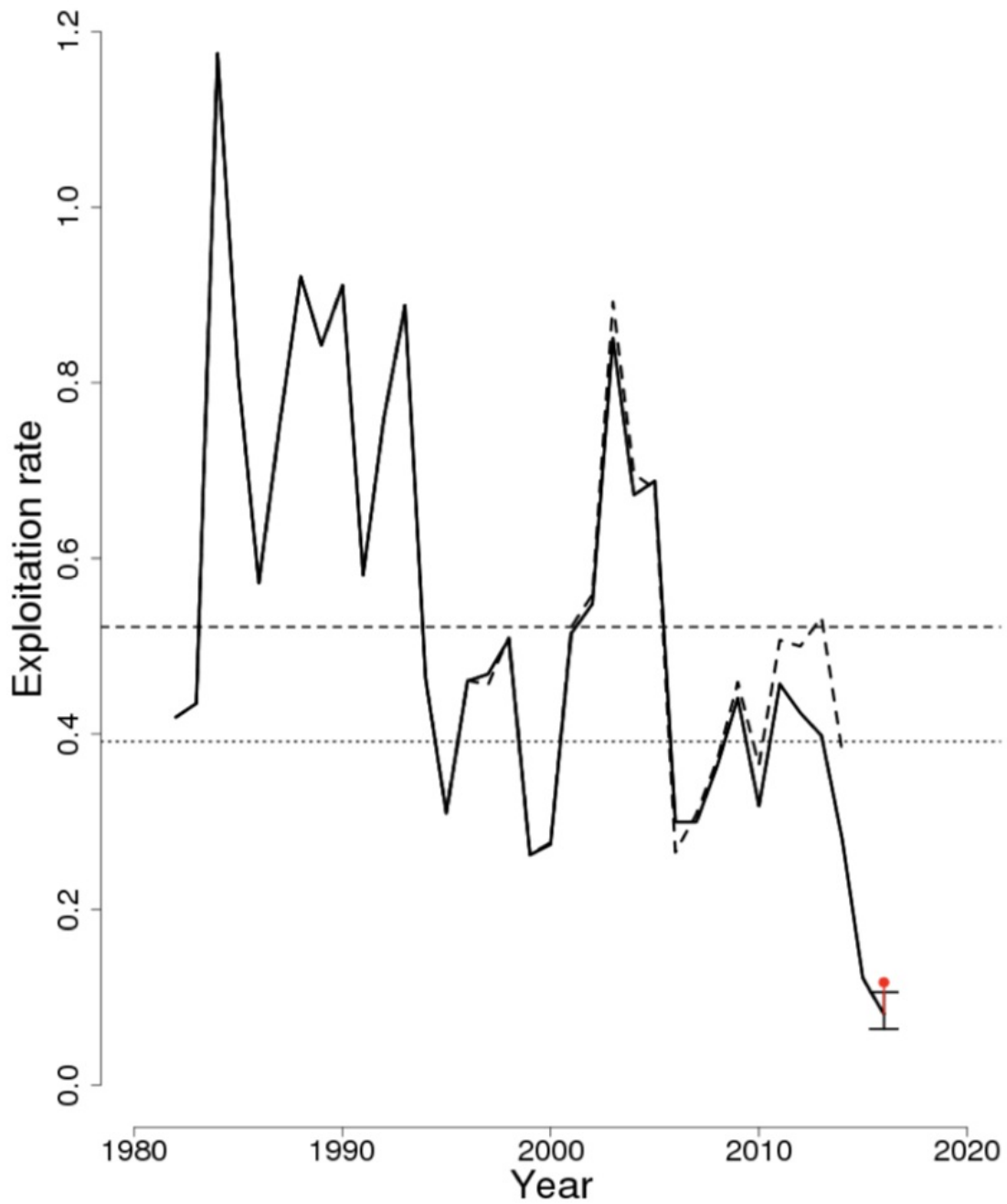


Figure 8: Trends in fully selected fishing mortality ( $F_{FULL}$ ) of Georges Bank Winter Flounder between 1982 and 2016 from the current (solid line) and previous (dashed line) assessments and the corresponding  $F_{THRESHOLD}$  ( $F_{MSY} = 0.522$ ; horizontal dashed line) as well as  $F_{TARGET}$  (75% of  $F_{MSY} = 0.392$ ; horizontal dotted line). The 90% normal confidence interval is shown for 2016 {Hendrickson 2017}.

**Low Concern**

Based on the 2020 Gulf of Maine blackback/winter flounder stock assessment update, the 2019 30+ cm exploitation rate was estimated to be 0.052, which is 23% of the overfishing exploitation threshold proxy ( $E_{MSY}$  proxy = 0.23; see Figure 9) (NOAA 2020c). Therefore, fishing mortality is scored a low concern.

**Justification:**

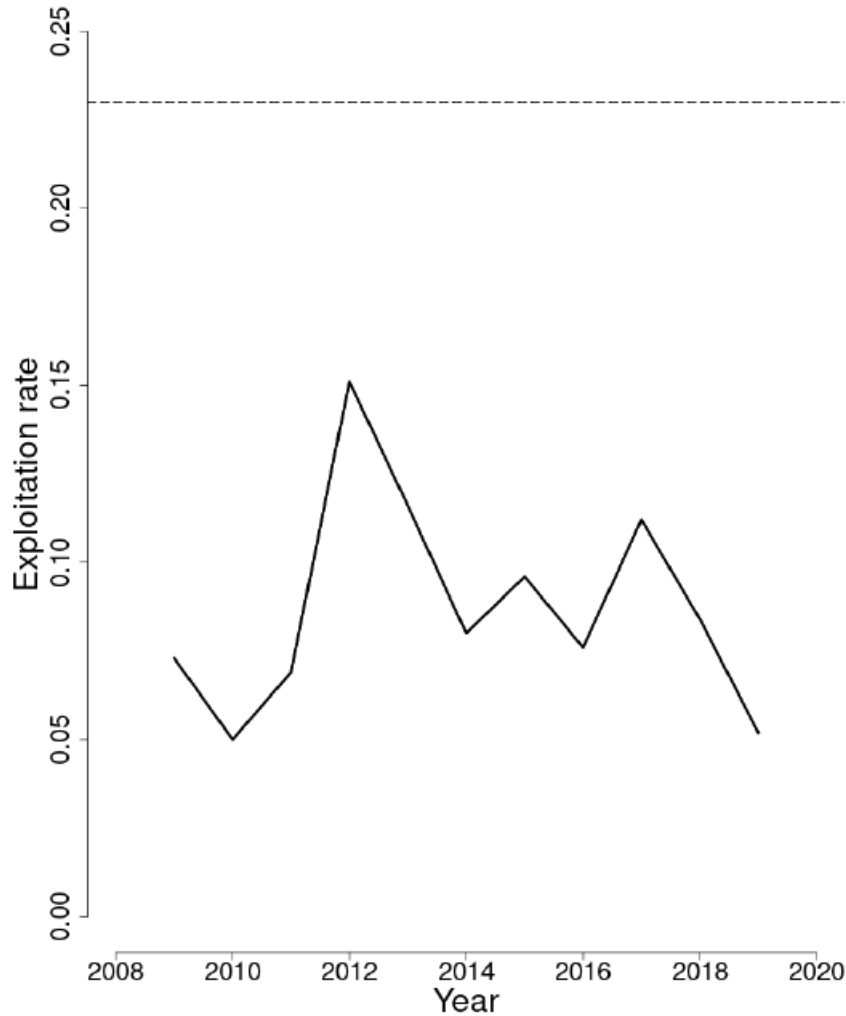


Figure 9: Trends in the exploitation rates ( $E_{FULL}$ ) of Gulf of Maine winter flounder between 2009 and 2019 from the current assessment and the corresponding  $F_{THRESHOLD}$  ( $E_{MSY}$  proxy = 0.23; horizontal dashed line). From (NOAA 2020c).

**Southern New England / Mid-Atlantic Stock | Northwest Atlantic | Bottom trawls | United States  
| Mid Atlantic**

**Southern New England / Mid-Atlantic Stock | Northwest Atlantic | Bottom trawls | United States**

**Moderate Concern**

The 2017 Southern New England/Mid-Atlantic blackback/winter flounder stock assessment indicated that the 2016 fully selected fishing mortality ( $F_{FULL}$ ) on fully selected ages 4 and 5 was 0.21, which was 62% of the overfishing threshold ( $F_{MSY} = 0.34$ ; see Figure 10) (NEFSC 2017f). The SNE/MA blackback stock shows an overall declining trend in SSB over the time series (1981 to 2016), with current estimates near the time series low (NEFSC 2017f).

The stock was in a 10-year rebuilding plan, but did not meet its rebuilding target in 2014, partly because of low recruitment {NEFSC 2015}. In 2014, NOAA Fisheries partly implemented Framework Adjustment 50 to revise the rebuilding end date to 2023. It is possible that, although fishing mortality is below MSY, it may be above the level that will allow recovery under current environmental conditions. The stock remains vulnerable to heavy fishing pressure and habitat degradation, and it has low genetic variability that hinders its recovery {NEFSC 2015}. But, estimates of fishing mortality have remained steady since 2012, and recruitment has been increasing since an all-time low in 2013 and is currently above the 10-year average (and the highest since 2008) (NEFSC 2017f). Because overfishing is not occurring, but recovery of the stock has not yet been achieved, we consider fishing mortality a moderate concern.



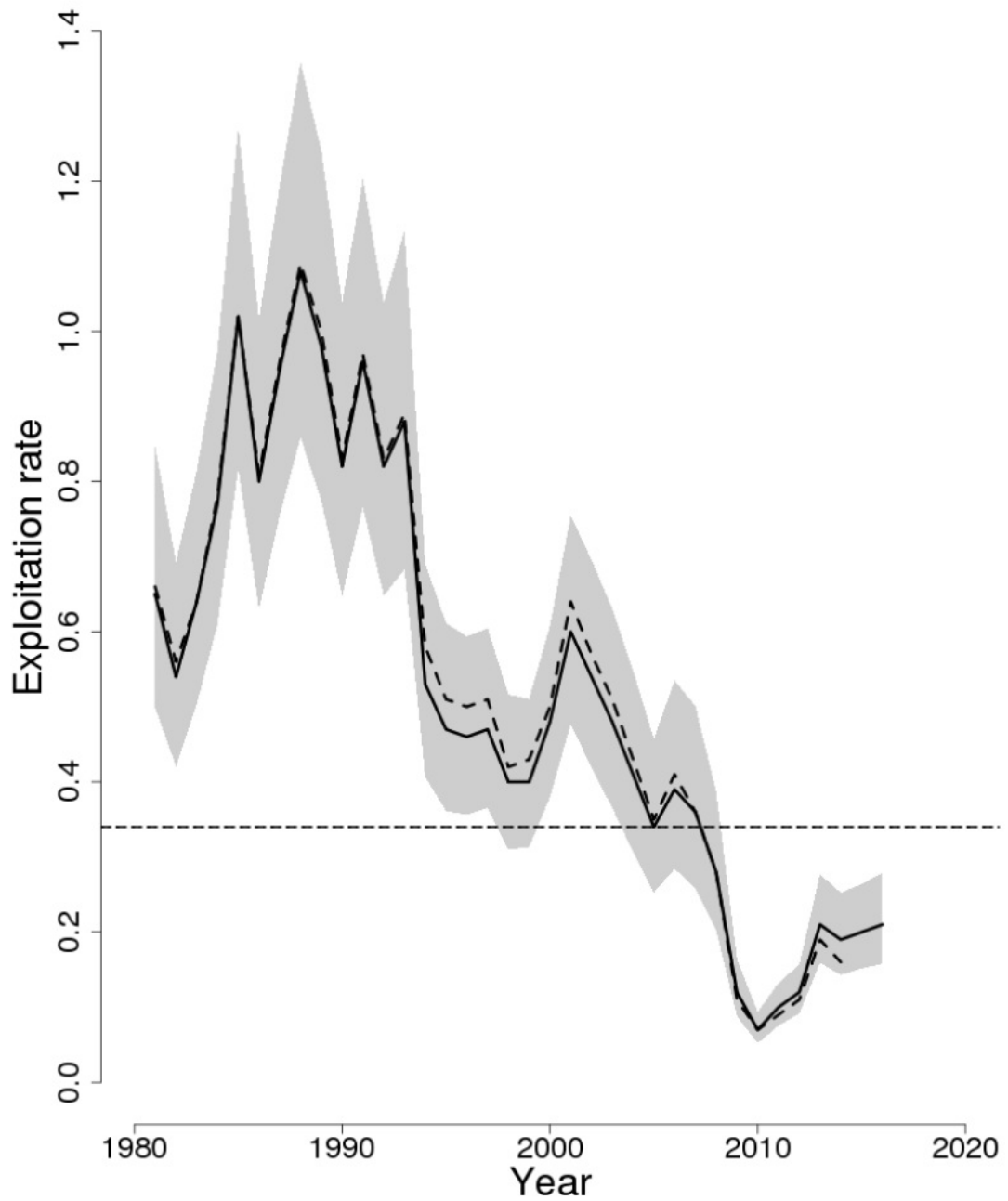


Figure 10: Trends in the fully selected fishing mortality ( $F_{FULL}$ ) of Southern New England Mid-Atlantic blackback/winter flounder between 1981 and 2016 from the current (solid line) and previous (dashed line) assessment and the corresponding  $F_{THRESHOLD}$  ( $F_{MSY} = 0.34$ ; horizontal dashed line) based on the 2017 assessment. The approximate 90% lognormal confidence intervals are shown (NEFSC 2017).

## **Summer flounder**

### **Factor 1.1 - Abundance**

**Northwest Atlantic | Bottom trawls | United States | New England**

**Northwest Atlantic | Bottom trawls | United States | Mid Atlantic**

#### **Low Concern**

Summer flounder has been rated as "Least Concern" by the International Union for the Conservation of Nature (IUCN), and the second quarter 2021 update from the National Marine Fisheries Service notes that this stock is not overfished or nearing an overfished state {NMFS 2021}. SSB was estimated to be 44,552 mt in 2017, 78% of the 2018 SAW-66  $SSB_{MSY}$  target proxy =  $SSB_{35\%}$  = 57,159 mt, and 56% above the 2018 SAW-66  $\frac{1}{2} SSB_{MSY}$  threshold proxy =  $\frac{1}{2} SSB_{35\%}$  = 28,580 mt (NOAA 2019). The stock was rebuilt in 2010 (GARFO 2017), and is not considered overfished (NOAA 2019). Because the stock is not considered overfished and is at a level greater than 75% of  $SSB_{MSY}$ , abundance is scored a low concern.

### **Factor 1.2 - Fishing Mortality**

**Northwest Atlantic | Bottom trawls | United States | New England**

**Northwest Atlantic | Bottom trawls | United States | Mid Atlantic**

#### **Low Concern**

The most recently updated assessment of summer flounder in the mid-Atlantic Ocean states that the fishing mortality rate has increased and was 0.334 in 2017, 75% of the 2018 SAW-66  $F_{MSY}$  proxy =  $F_{35\%}$  = 0.448 (NOAA 2019). Because overfishing of summer flounder is not occurring, we have awarded a score of low concern.

# **Witch flounder**

## **Factor 1.1 - Abundance**

**Northwest Atlantic | Bottom trawls | United States | New England**

**Northwest Atlantic | Bottom trawls | United States | Mid Atlantic**

### **High Concern**

Based on the 2017 witch flounder stock assessment, the exploitable biomass in 2016 was estimated to be 14,563 mt (see Figure 11) (Wigley 2017b). The stock status is considered to be overfished, and stock condition remains poor (Wigley 2017b). According to the NMFS first quarter 2018 update, witch flounder is overfished and in year 8 of a 7-year rebuilding plan (NMFS 2018c). Although there is no biomass reference point defined, the stock is in poor condition and considered to be overfished; therefore, abundance is scored a high concern.

### **Justification:**

Exploitable biomass is defined as the arithmetic average of the 2016 NEFSC spring and 2015 NEFSC fall surveys population biomass estimates and converted to exploitable biomass using 0.9, based on examination of survey and fishery selectivity patterns (Wigley 2017b).

The overfished and overfishing occurring NMFS stock status determinations for witch flounder are based on the 2016 assessment. There are no biomass or fishing mortality reference points in this stock assessment; however, stock condition was and remains poor (Wigley 2017b).

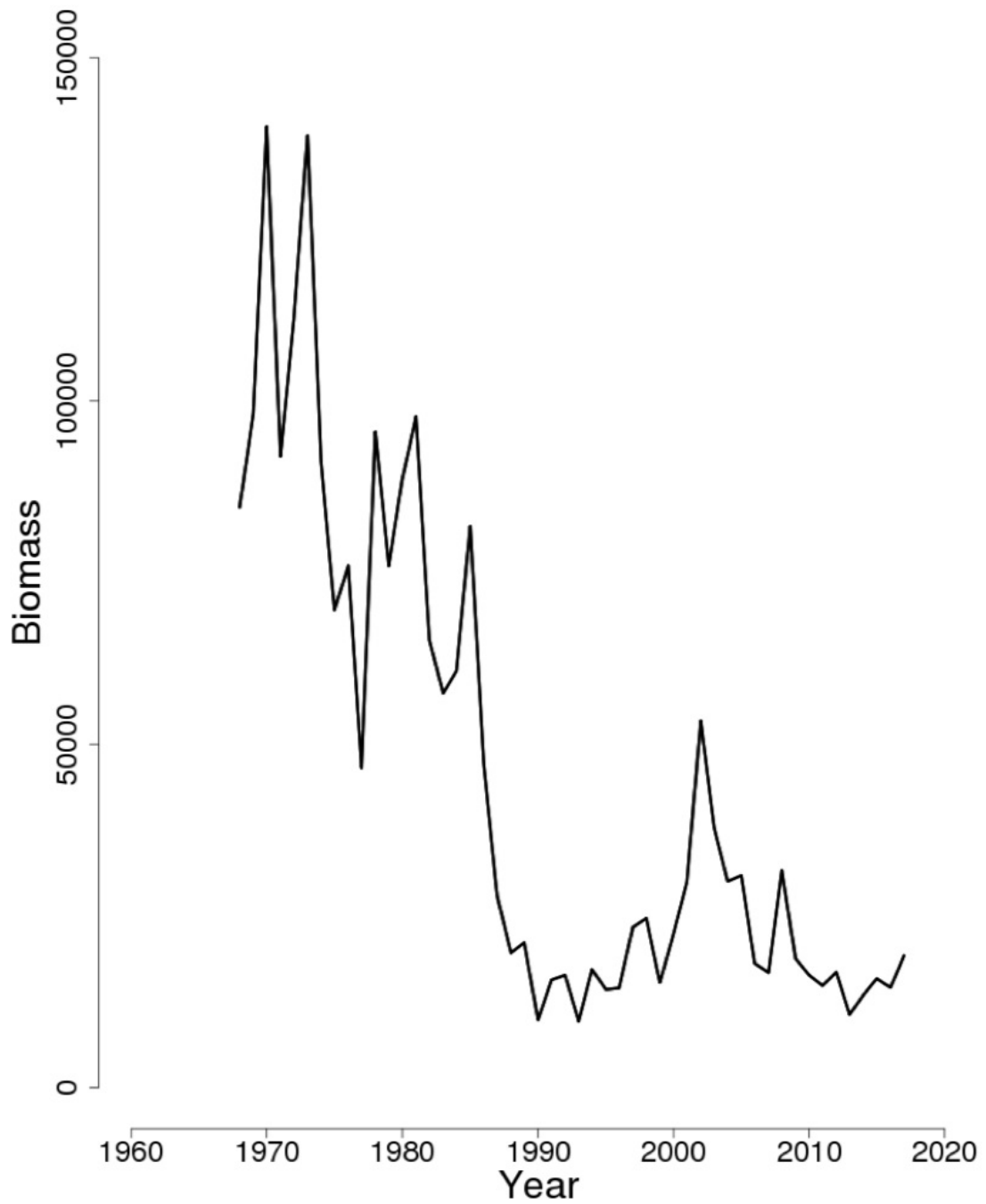


Figure 11: Trends in exploitable biomass (mt) of witch flounder between 1968 and 2017 from the current assessment (Wigley 2017b).

## **Factor 1.2 - Fishing Mortality**

**Northwest Atlantic | Bottom trawls | United States | New England**

**Northwest Atlantic | Bottom trawls | United States | Mid Atlantic**

### **Moderate Concern**

Based on the 2017 witch flounder stock assessment, the 2016 exploitation rate was estimated to be 0.035 (see Figure 12) (Wigley 2017b). Overfishing is unknown due to a lack of biological reference points associated with the empirical approach, but the stock condition remains poor (Wigley 2017b). Because it is unclear whether the stock is undergoing overfishing, fishing mortality is scored a moderate concern.

### **Justification:**

The exploitation rate is defined as the catch divided by the 2016 exploitable biomass (Wigley 2017b).

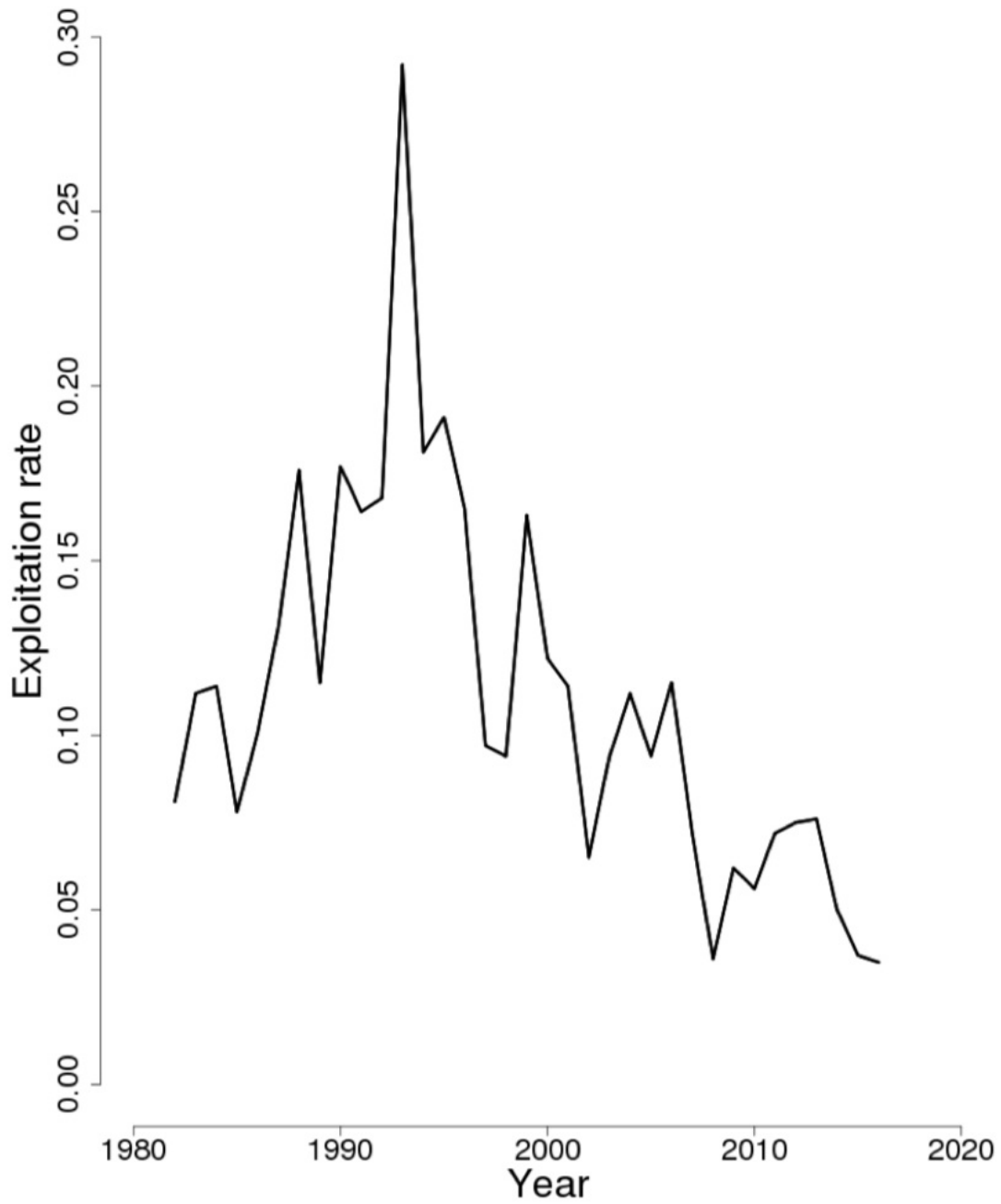


Figure 12: Trends in the exploitation rate (catch/exploitable biomass) of witch flounder between 1982 and 2016 from the current assessment (Wigley 2017b).

## **Yellowtail flounder**

### **Factor 1.1 - Abundance**

**Cape Cod / Gulf of Maine Stock | Northwest Atlantic | Bottom trawls | United States | New England**

**Cape Cod / Gulf of Maine Stock | Northwest Atlantic | Set gillnets | United States | New England**

#### **High Concern**

Based on the 2017 Cape Cod–Gulf of Maine yellowtail flounder stock assessment, spawning stock biomass (SSB) in 2016 was estimated to be 1,191 mt, which is 26% of the biomass target ( $SSB_{MSY}$  proxy = 4,640; see Figure 13) (Alade 2017). According to the NMFS fourth quarter 2017 update, Cape Cod–Gulf of Maine yellowtail flounder is overfished and in year 14 of a 19-year rebuilding plan {NMFS 2017}. Because the stock is overfished, abundance is scored a high concern.

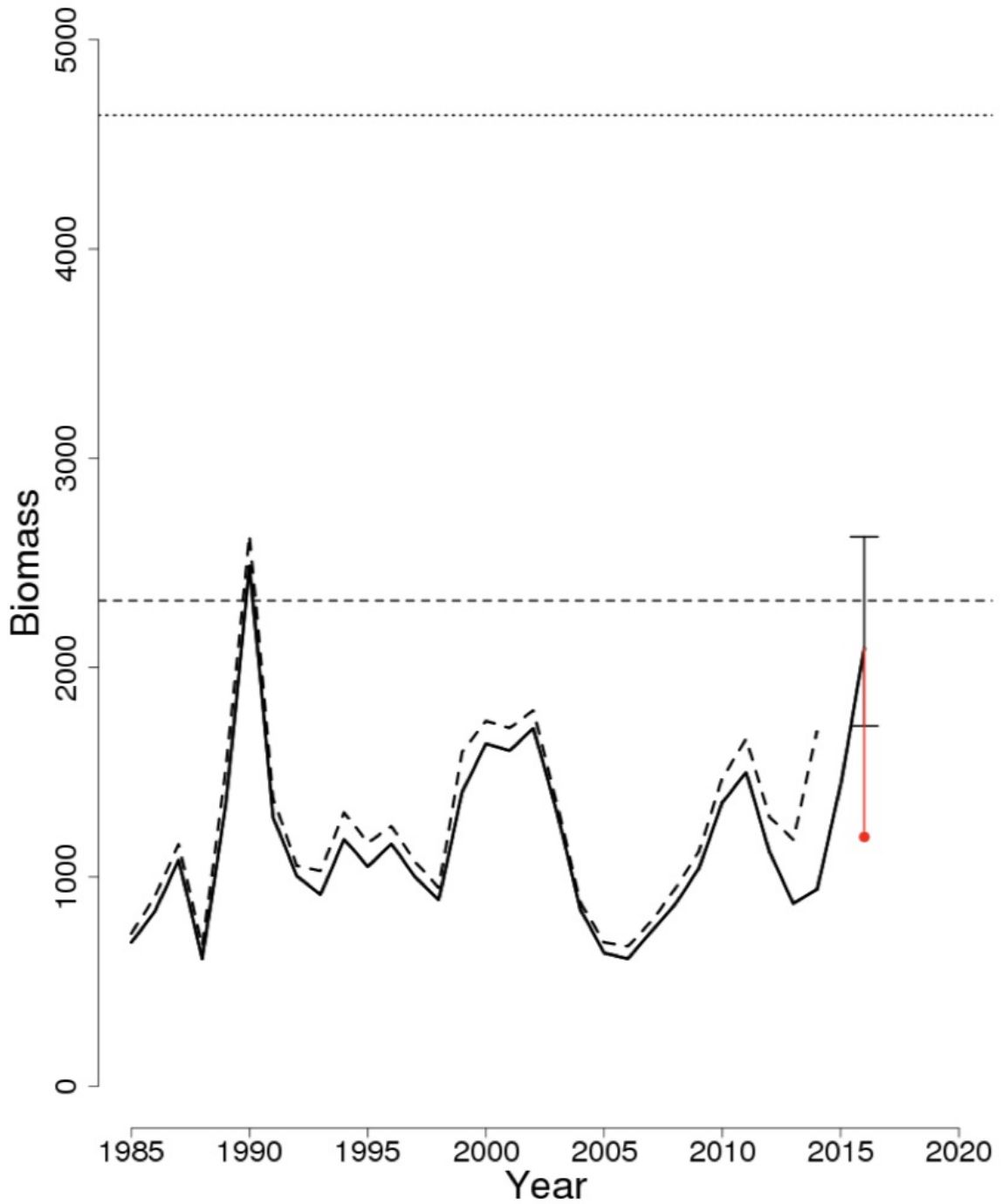


Figure 13: Trends in spawning stock biomass of Cape Cod–Gulf of Maine yellowtail flounder between 1985 and 2016 from the current (solid line) and previous (dashed line) assessment and the corresponding  $SSB_{THRESHOLD}$  ( $1/2 SSB_{MSY}$  proxy; horizontal dashed line) as well as  $SSB_{TARGET}$  ( $SSB_{MSY}$  proxy; horizontal dotted line) based on the 2017 assessment. The 90% bootstrap probability intervals are shown (Alade 2017).



**Georges Bank Stock | Northwest Atlantic | Bottom trawls | United States | New England**

**High Concern**

The most recent biomass estimate for Georges Bank yellowtail flounder is 2,077 mt, based on the 2019 NMFS fall bottom trawl survey and the 2020 DFO spring survey (the 2020 NMFS spring bottom trawl survey was not conducted due to the COVID-19 pandemic) (TRAC 2020). There is no biological reference point available for the biomass of Georges Bank yellowtail flounder; however, the current biomass reflects a 97% decrease in survey abundance since 2010 (TRAC 2020). According to the NMFS second quarter 2021 update, Georges Bank yellowtail flounder is overfished and in year 15 of a 26-year rebuilding plan {NMFS 2021}. Because the stock is considered overfished, abundance is scored a high concern.

**Southern New England / Mid-Atlantic Stock | Northwest Atlantic | Bottom trawls | United States | Mid Atlantic**

**Southern New England / Mid-Atlantic Stock | Northwest Atlantic | Bottom trawls | United States**

**High Concern**

Based on the 2017 New England/Mid-Atlantic yellowtail flounder stock assessment, spawning stock biomass (SSB) in 2016 was estimated at 152 mt, which is 8% of the biomass target ( $SSB_{MSY}$  proxy = 1,987 mt; see Figure 14) (NEFSC 2017e). Because the stock is overfished, this factor is deemed a high concern.

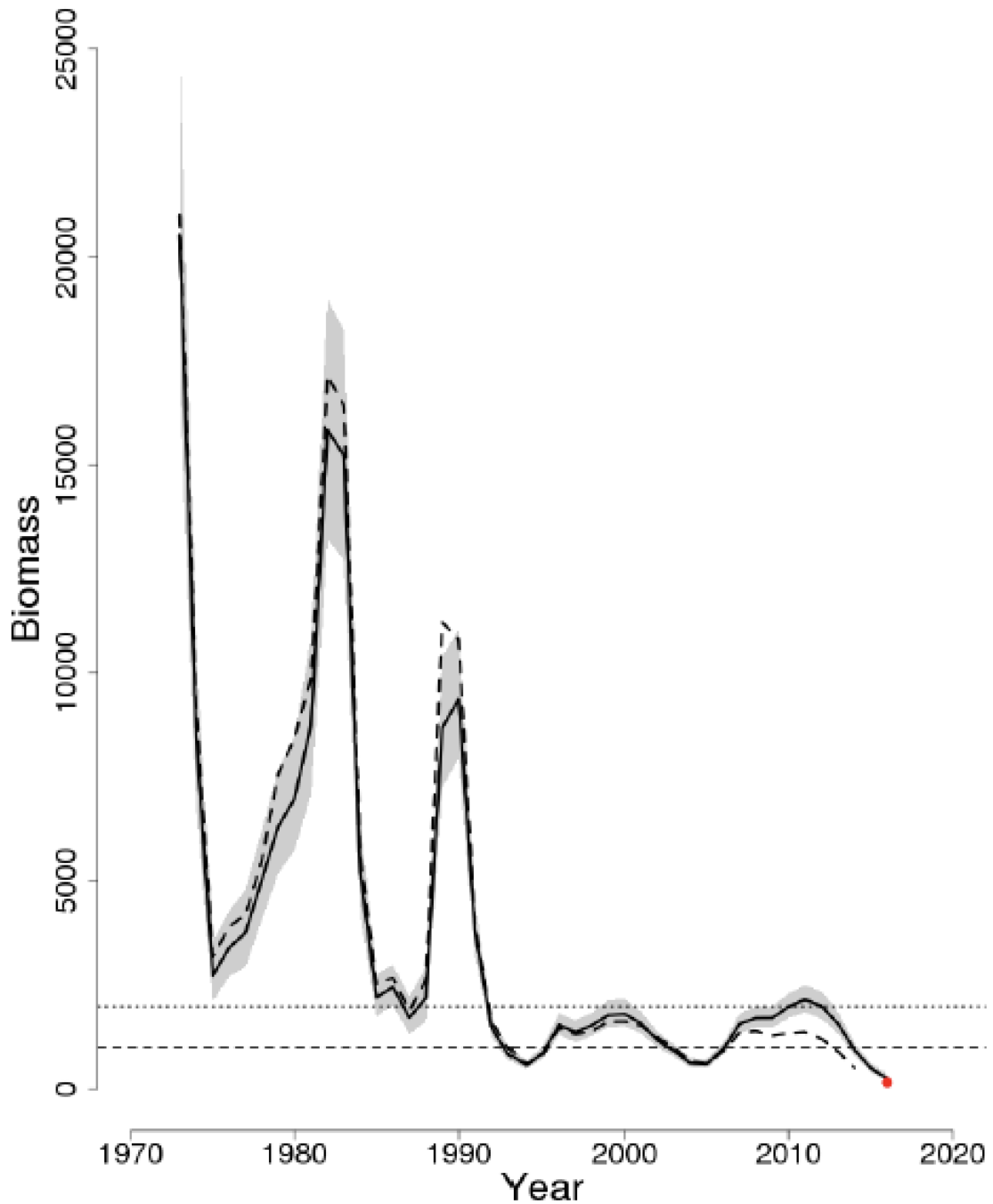


Figure 14: Trends in spawning stock biomass of Southern New England/Mid-Atlantic yellowtail flounder between 1973 and 2016 from the current (solid line) and previous (dashed line) assessment and the corresponding  $SSB_{THRESHOLD}$  (1/2  $SSB_{MSY}$  proxy; horizontal dashed line) as well as  $SSB_{TARGET}$  ( $SSB_{MSY}$  proxy; horizontal dotted line) based on the 2017 assessment. Biomass was adjusted for a retrospective pattern (shown in red). The approximate 90% lognormal confidence intervals are shown (NEFSC 2017).

**Factor 1.2 - Fishing Mortality**

**Cape Cod / Gulf of Maine Stock | Northwest Atlantic | Bottom trawls | United States | New England**

**Cape Cod / Gulf of Maine Stock | Northwest Atlantic | Set gillnets | United States | New England**

**High Concern**

Based on the 2017 Cape Cod–Gulf of Maine yellowtail flounder stock assessment, the 2016 fully selected fishing mortality was estimated to be 0.314, which is 115% of the overfishing threshold proxy ( $F_{MSY}$  proxy = 0.273; see Figure 15) (Alade 2017). The stock is undergoing overfishing, so fishing mortality is scored a high concern.

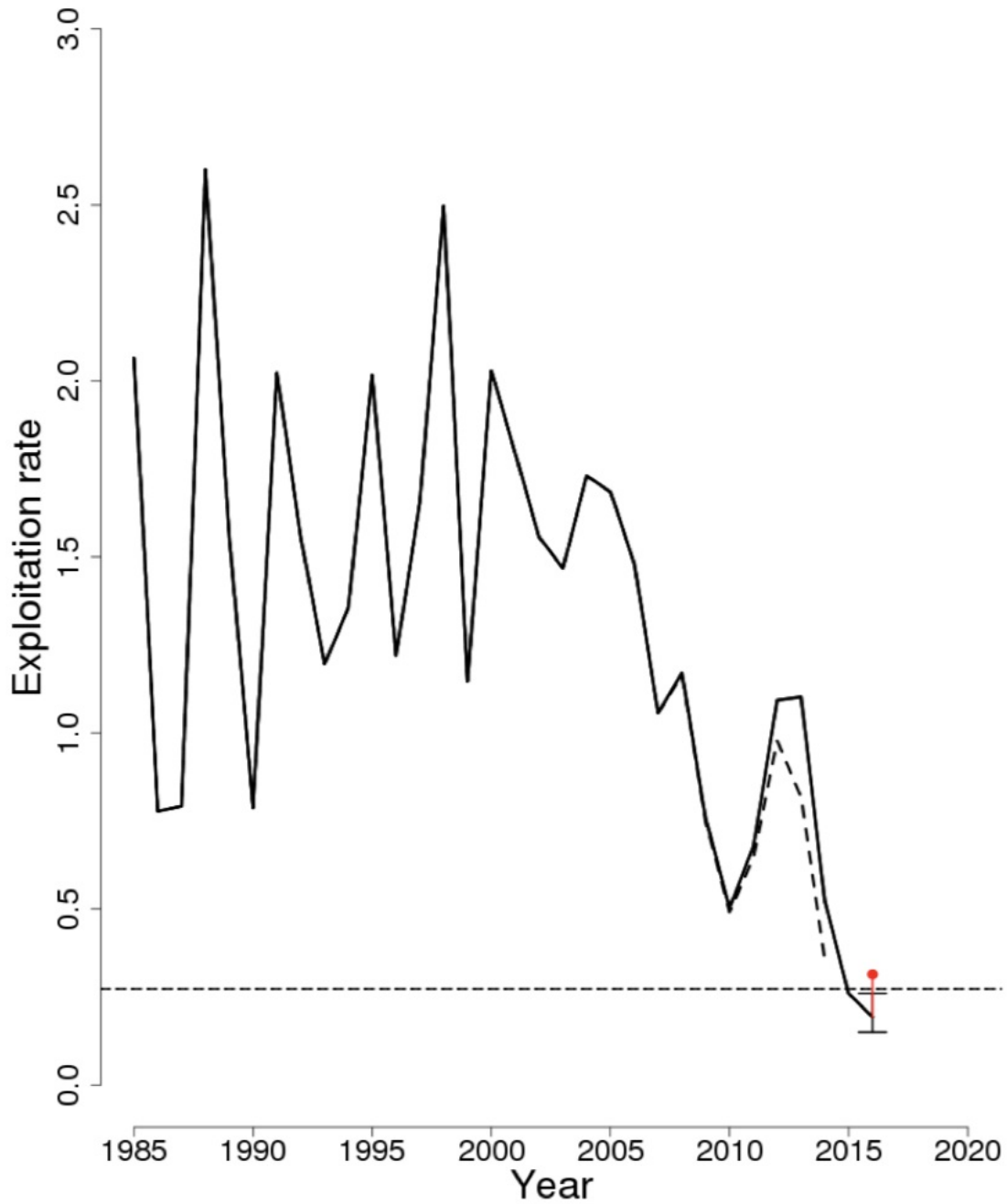


Figure 15: Trends in the fully selected fishing mortality ( $F_{FULL}$ ) of Cape Cod–Gulf of Maine yellowtail flounder between 1985 and 2016 from the current (solid line) and previous (dashed line) assessment and the corresponding  $F_{THRESHOLD}$  ( $F_{MSY}$  proxy = 0.273; horizontal dashed line). The 90% bootstrap probability intervals are shown (Alade 2017).

## **Georges Bank Stock | Northwest Atlantic | Bottom trawls | United States | New England**

### **High Concern**

The Transboundary Management Guidance Committee (TMGC) has implemented a strategy that seeks to minimize the risk of exceeding the fishing mortality reference,  $F_{REF} = 0.25$  (TRAC 2020). Currently, there is no assessment model, and as a result, current fishing mortality cannot be determined. The current catch is low relative to the estimated biomass from surveys, resulting in a low relative  $F$ ; fishing is not believed to be a major contributor to current stock status (TRAC 2020). But, total catches are uncertain because some elements are poorly understood (e.g., research catch is not included, and fisher behavior has been found to change on observed trips). This uncertainty makes it difficult to estimate fishing mortality and total mortality (TRAC 2020).

According to the NMFS second quarter 2021 update, Georges Bank yellowtail flounder is undergoing overfishing and in year 15 of a 26-year rebuilding plan {NMFS 2021}. Because there is significant uncertainty regarding the impact of fishing on Georges Bank yellowtail flounder and NMFS considers overfishing to be occurring, a score of high concern is given.

## **Southern New England / Mid-Atlantic Stock | Northwest Atlantic | Bottom trawls | United States | Mid Atlantic**

## **Southern New England / Mid-Atlantic Stock | Northwest Atlantic | Bottom trawls | United States**

### **High Concern**

Based on the 2017 New England/Mid-Atlantic yellowtail flounder stock assessment, the 2016 fully selected fishing mortality was estimated to be 1.14, which was 329% of the overfishing threshold proxy ( $F_{MSY}$  proxy = 0.347; see Figure 16) (NEFSC 2017e). This stock is experiencing overfishing and is no longer considered rebuilt. Therefore, this factor is considered a high concern.

### **Justification:**

An  $F_{40\%}$  proxy was used for the overfishing threshold and was based on long-term stochastic projections (NEFSC 2017e).

Both the 2015 operational assessment and the 2017 update assessment of SNE/MA yellowtail flounder indicated that the overfishing status of the stock was, in part, due to very low recruitment of young fish, which are contributing little to the overall adult biomass {NEFSC 2015}{NEFSC 2017e). Continued weak recruitment of SNE/MA yellowtail flounder suggests that the stock is in a new productivity regime {NEFSC 2015}, which, if it continues, will impede stock recovery {NEFSC 2015}. Poor recruitment further suggests that the causes for overfishing may not necessarily be due to fishing pressure {NEFSC 2015}{NEFSC 2017e).

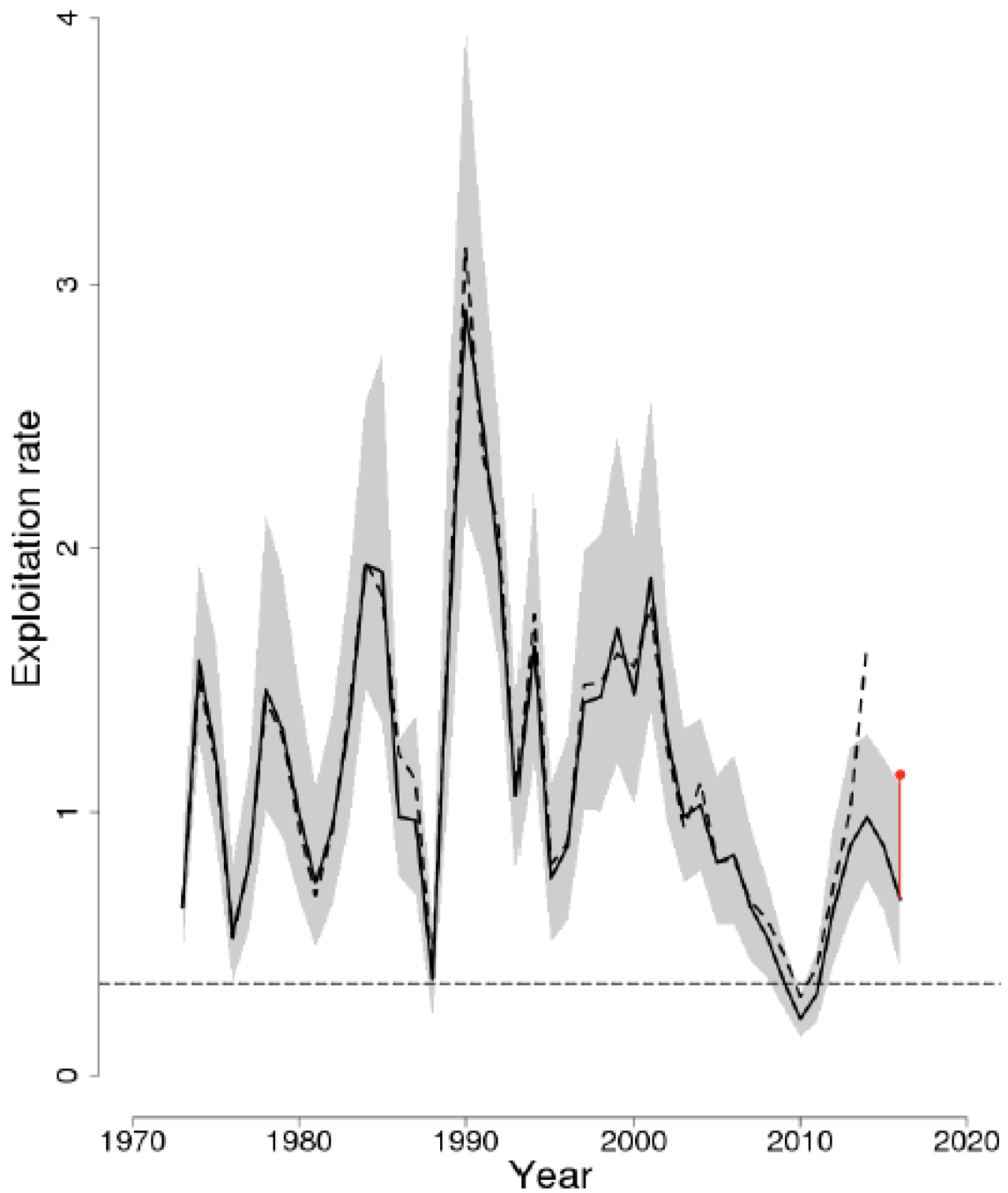


Figure 16: Trends in the fully selected fishing mortality ( $F_{FULL}$ ) of Southern New England/Mid-Atlantic yellowtail flounder between 1973 and 2016 from the current (solid line) and previous (dashed line) assessment and the corresponding  $F_{THRESHOLD}$  ( $F_{MSY}$  proxy = 0.347; horizontal dashed line).  $F_{FULL}$  was adjusted for a retrospective pattern and the adjustment is shown in red based on the 2017 assessment. The approximate 90% lognormal confidence intervals are shown (NEFSC 2017).

## **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.

AMERICAN PLAICE			
REGION / METHOD	SUB SCORE	DISCARD RATE/LANDINGS	SCORE
Northwest Atlantic   Bottom trawls   United States   New England	1.000	1.000: < 100%	Red (1.000)

ATLANTIC HALIBUT			
REGION / METHOD	SUB SCORE	DISCARD RATE/LANDINGS	SCORE
Northwest Atlantic   Bottom trawls   United States   New England	1.000	1.000: < 100%	Red (1.000)

BLACKBACK			
REGION / METHOD	SUB SCORE	DISCARD RATE/LANDINGS	SCORE
Gulf of Maine Stock   Northwest Atlantic   Bottom trawls   United States   New England	1.000	1.000: < 100%	Red (1.000)
Georges Bank Stock   Northwest Atlantic   Bottom trawls   United States   New England	1.000	1.000: < 100%	Red (1.000)
Southern New England / Mid-Atlantic Stock   Northwest Atlantic   Bottom trawls   United States   Mid Atlantic	1.000	1.000: < 100%	Red (1.000)
Southern New England / Mid-Atlantic Stock   Northwest Atlantic   Bottom trawls   United States	1.000	1.000: < 100%	Red (1.000)
Gulf of Maine Stock   Northwest Atlantic   Set gillnets   United States   New England	1.000	1.000: < 100%	Red (1.000)

SUMMER FLOUNDER			
REGION / METHOD	SUB SCORE	DISCARD RATE/LANDINGS	SCORE
Northwest Atlantic   Bottom trawls   United States   New England	1.000	1.000: < 100%	Red (1.000)
Northwest Atlantic   Bottom trawls   United States   Mid Atlantic	1.000	1.000: < 100%	Red (1.000)

WITCH FLOUNDER			
REGION / METHOD	SUB SCORE	DISCARD RATE/LANDINGS	SCORE
Northwest Atlantic   Bottom trawls   United States   New England	1.000	1.000: < 100%	Red (1.000)
Northwest Atlantic   Bottom trawls   United States   Mid Atlantic	1.000	1.000: < 100%	Red (1.000)



YELLOWTAIL FLOUNDER			
REGION / METHOD	SUB SCORE	DISCARD RATE/LANDINGS	SCORE
Southern New England / Mid-Atlantic Stock   Northwest Atlantic   Bottom trawls   United States   Mid Atlantic	1.732	1.000: < 100%	Red (1.732)
Southern New England / Mid-Atlantic Stock   Northwest Atlantic   Bottom trawls   United States	1.000	1.000: < 100%	Red (1.000)
Georges Bank Stock   Northwest Atlantic   Bottom trawls   United States   New England	1.000	1.000: < 100%	Red (1.000)
Cape Cod / Gulf of Maine Stock   Northwest Atlantic   Bottom trawls   United States   New England	1.000	1.000: < 100%	Red (1.000)
Cape Cod / Gulf of Maine Stock   Northwest Atlantic   Set gillnets   United States   New England	1.000	1.000: < 100%	Red (1.000)

**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.

NORTHWEST ATLANTIC | BOTTOM TRAWLS | UNITED STATES | MID ATLANTIC

SUB SCORE: 1.000		DISCARD RATE: 1.000		SCORE: 1.000
SPECIES	ABUNDANCE	FISHING MORTALITY	SCORE	
Yellowtail flounder	1.000: High Concern	1.000: High Concern	Red (1.000)	
Witch flounder	1.000: High Concern	3.000: Moderate Concern	Red (1.732)	
Blackback	1.000: High Concern	3.000: Moderate Concern	Red (1.732)	
Atlantic sturgeon	1.000: High Concern	3.000: Moderate Concern	Red (1.732)	
Loggerhead turtle	1.000: High Concern	5.000: Low Concern	Yellow (2.236)	
Thorny skate	1.000: High Concern	5.000: Low Concern	Yellow (2.236)	
Goosefish	3.670: Low Concern	3.000: Moderate Concern	Green (3.318)	
Longfin squid	3.670: Low Concern	3.000: Moderate Concern	Green (3.318)	
Bottlenose dolphin	2.330: Moderate Concern	5.000: Low Concern	Green (3.413)	
Atlantic white-sided dolphin	2.330: Moderate Concern	5.000: Low Concern	Green (3.413)	
Risso's dolphin	2.330: Moderate Concern	5.000: Low Concern	Green (3.413)	
Short-beaked common dolphin	2.330: Moderate Concern	5.000: Low Concern	Green (3.413)	
Spiny dogfish	2.330: Moderate Concern	5.000: Low Concern	Green (3.413)	
Clearnose skate	3.670: Low Concern	5.000: Low Concern	Green (4.284)	
Little skate	3.670: Low Concern	5.000: Low Concern	Green (4.284)	
Summer flounder	3.670: Low Concern	5.000: Low Concern	Green (4.284)	
Windowpane flounder	3.670: Low Concern	5.000: Low Concern	Green (4.284)	
Barndoor skate	3.670: Low Concern	5.000: Low Concern	Green (4.284)	
Scup	5.000: Very Low Concern	5.000: Low Concern	Green (5.000)	

NORTHWEST ATLANTIC | BOTTOM TRAWLS | UNITED STATES | NEW ENGLAND

SUB SCORE: 1.000		DISCARD RATE: 1.000		SCORE: 1.000
SPECIES	ABUNDANCE	FISHING MORTALITY	SCORE	
Yellowtail flounder	1.000: High Concern	1.000: High Concern	Red (1.000)	
Atlantic cod	1.000: High Concern	1.000: High Concern	Red (1.000)	
Atlantic cod	1.000: High Concern	1.000: High Concern	Red (1.000)	
Yellowtail flounder	1.000: High Concern	1.000: High Concern	Red (1.000)	
Yellowtail flounder	1.000: High Concern	1.000: High Concern	Red (1.000)	
Blackback	1.000: High Concern	3.000: Moderate Concern	Red (1.732)	

Witch flounder	1.000: High Concern	3.000: Moderate Concern	Red (1.732)
Atlantic halibut	1.000: High Concern	3.000: Moderate Concern	Red (1.732)
Windowpane flounder	1.000: High Concern	5.000: Low Concern	Yellow (2.236)
Sooty shearwater	1.000: High Concern	5.000: Low Concern	Yellow (2.236)
Thorny skate	1.000: High Concern	5.000: Low Concern	Yellow (2.236)
Goosefish	3.670: Low Concern	3.000: Moderate Concern	Green (3.318)
Blackback	2.330: Moderate Concern	5.000: Low Concern	Green (3.413)
Atlantic white-sided dolphin	2.330: Moderate Concern	5.000: Low Concern	Green (3.413)
Bottlenose dolphin	2.330: Moderate Concern	5.000: Low Concern	Green (3.413)
Spiny dogfish	2.330: Moderate Concern	5.000: Low Concern	Green (3.413)
Greater shearwater	2.330: Moderate Concern	5.000: Low Concern	Green (3.413)
Long-finned pilot whale	2.330: Moderate Concern	5.000: Low Concern	Green (3.413)
Short-beaked common dolphin	2.330: Moderate Concern	5.000: Low Concern	Green (3.413)
Blackback	2.330: Moderate Concern	5.000: Low Concern	Green (3.413)
Windowpane flounder	3.670: Low Concern	5.000: Low Concern	Green (4.284)
American plaice	3.670: Low Concern	5.000: Low Concern	Green (4.284)
Little skate	3.670: Low Concern	5.000: Low Concern	Green (4.284)
Clearnose skate	3.670: Low Concern	5.000: Low Concern	Green (4.284)
Barndoor skate	3.670: Low Concern	5.000: Low Concern	Green (4.284)
Summer flounder	3.670: Low Concern	5.000: Low Concern	Green (4.284)
Haddock	5.000: Very Low Concern	5.000: Low Concern	Green (5.000)
Haddock	5.000: Very Low Concern	5.000: Low Concern	Green (5.000)

NORTHWEST ATLANTIC | SET GILLNETS | UNITED STATES | NEW ENGLAND

SUB SCORE: 1.000

DISCARD RATE: 1.000

SCORE: 1.000

SPECIES	ABUNDANCE	FISHING MORTALITY	SCORE
Yellowtail flounder	1.000: High Concern	1.000: High Concern	Red (1.000)
Atlantic cod	1.000: High Concern	1.000: High Concern	Red (1.000)
Atlantic cod	1.000: High Concern	1.000: High Concern	Red (1.000)
North Atlantic right whale	1.000: High Concern	1.000: High Concern	Red (1.000)
Atlantic halibut	1.000: High Concern	3.000: Moderate Concern	Red (1.732)
Atlantic sturgeon	1.000: High Concern	3.000: Moderate Concern	Red (1.732)
Hooded seal	1.000: High Concern	3.000: Moderate Concern	Red (1.732)
Fin whale	1.000: High Concern	5.000: Low Concern	Yellow (2.236)
Thorny skate	1.000: High Concern	5.000: Low Concern	Yellow (2.236)
Gray seal	2.330: Moderate Concern	3.000: Moderate Concern	Yellow (2.644)
Humpback whale	2.330: Moderate Concern	3.000: Moderate Concern	Yellow (2.644)
Goosefish	3.670: Low Concern	3.000: Moderate Concern	Green (3.318)
Spiny dogfish	2.330: Moderate Concern	5.000: Low Concern	Green (3.413)
Risso's dolphin	2.330: Moderate Concern	5.000: Low Concern	Green (3.413)
Minke whale	2.330: Moderate Concern	5.000: Low Concern	Green (3.413)
Long-finned pilot whale	2.330: Moderate Concern	5.000: Low Concern	Green (3.413)
Harbor porpoise	2.330: Moderate Concern	5.000: Low Concern	Green (3.413)
Harbor seal	2.330: Moderate Concern	5.000: Low Concern	Green (3.413)
Blackback	2.330: Moderate Concern	5.000: Low Concern	Green (3.413)
Atlantic white-sided dolphin	2.330: Moderate Concern	5.000: Low Concern	Green (3.413)
Clearnose skate	3.670: Low Concern	5.000: Low Concern	Green (4.284)
Barndoor skate	3.670: Low Concern	5.000: Low Concern	Green (4.284)
Smooth skate	3.670: Low Concern	5.000: Low Concern	Green (4.284)
Little skate	3.670: Low Concern	5.000: Low Concern	Green (4.284)
American lobster	5.000: Very Low Concern	5.000: Low Concern	Green (5.000)

Criterion 2 species that composed >5% of the total catch from the U.S. flatfish fisheries were determined using NOAA's Northeast Fisheries Observer Program (NEFOP) observer data from 2016 (pers. comm., G. Shield 18 Sept. 2018). Species that are Endangered, Threatened, or Protected (ETP), where catch occurs regularly and may significantly contribute to the conservation concern, were included as well.

The lowest scoring species for both the Georges Bank and the Gulf of Maine bottom trawl fisheries are long-finned pilot whale, due to its high inherent vulnerability, and Atlantic cod, due to its overfished and overfishing status. For the set gillnet fishery in the Gulf of Maine, Atlantic cod, fin whale, and North Atlantic right whale were the lowest scoring; both whale species are "Critically Endangered." For the Mid-Atlantic bottom trawl fishery, the lowest scoring species was loggerhead turtle. These species limit the scoring for Criterion 2.

## 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

# American lobster

## Factor 2.1 - Abundance

### Northwest Atlantic | Set gillnets | United States | New England

#### Very Low Concern

The Gulf of Maine and Georges Bank (GOM/GBK) stock is considered healthy, because the 3-year average abundance for 2016–2018 (256 million lobsters) was greater than the abundance threshold (89 million lobsters) and the abundance limit (125 million lobsters) (ASMFC 2020a). The stock is currently at a historically high abundance and is scored a very low concern.

#### Justification:

In a 2015 stock assessment (ASMFC 2015a), it was determined that there was sufficient mixing between the GOM and GBK lobster stocks to combine them into a single stock unit (ASMFC 2015a). Analysis of the data from the NMFS Northeast Fisheries Science Center trawl survey suggested that small, immature females from the GBK stock were recruiting into the Gulf of Maine and migrating between the two areas when they reached a larger size (ASMFC 2015a).

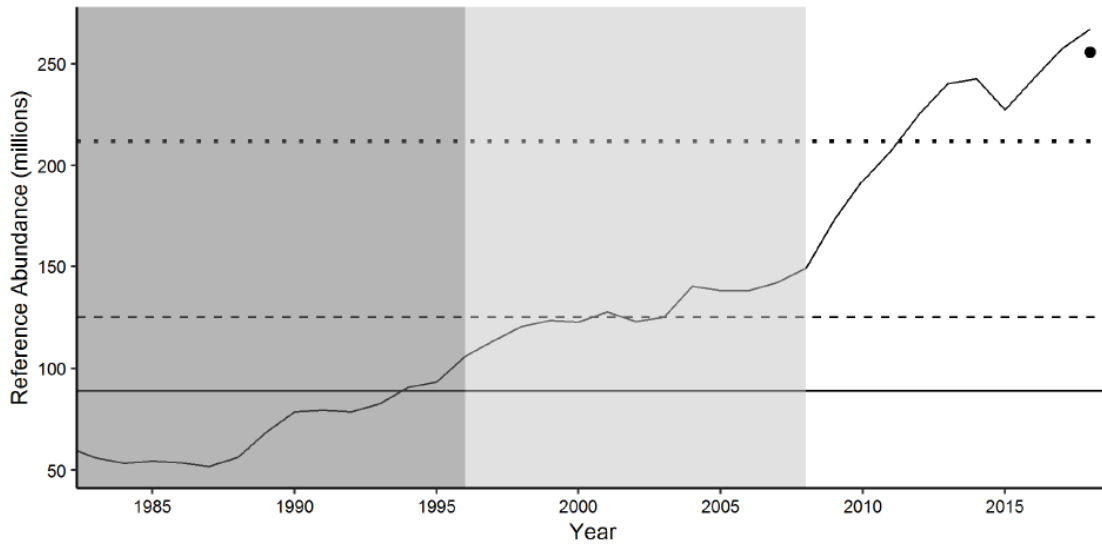


Figure 17: Gulf of Maine and Georges Bank lobster stock reference abundance compared to the fishery/industry target (dotted black line), abundance limit (dashed black line), and abundance threshold (solid black line) reference points based on detected low (dark grey period), moderate (light grey period), and high (white period) abundance regimes. The circle represents the terminal 3-year (2016–2018) average reference abundance (ASMFC 2020a).

## Factor 2.2 - Fishing Mortality

### Northwest Atlantic | Set gillnets | United States | New England

#### Low Concern

Based on the average effective exploitation rate for 2016–2018, the GOMGBK stock is not experiencing overfishing. The current rate of effective exploitation (2016–2018) of 0.459 is below both the exploitation threshold (0.475) and the exploitation target (0.461) (ASMFC 2020a). Over the last decade, the 3-year average effective exploitation has fluctuated around the exploitation threshold; however, it has been at or below the threshold since 2014 and has been below the target since 2017 (see Figure 18).

#### Justification:

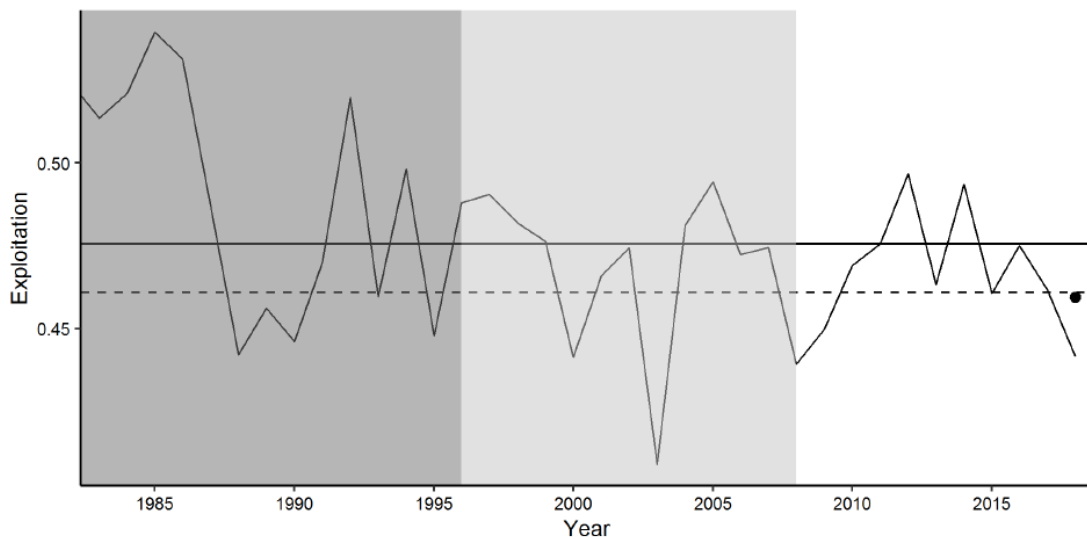


Figure 18: Gulf of Maine and Georges Bank lobster stock exploitation relative to the current target (dashed black line) and threshold (solid black line) reference points. Shaded periods are detected low (dark grey period), moderate (light grey period), and high (white period) abundance regimes. The circle represents the terminal 3-year (2016–2018) average exploitation (ASMFC 2020a).



## **Atlantic cod**

### **Factor 2.1 - Abundance**

**Georges Bank Stock | Northwest Atlantic | Bottom trawls | United States | New England**

**Georges Bank Stock | Northwest Atlantic | Set gillnets | United States | New England**

#### **High Concern**

Based on the 2017 Georges Bank Atlantic cod stock assessment, stock status cannot be quantitatively determined due to a lack of biological reference points associated with the "Plan B smooth" approach {Legault 2017a}. But, it is considered to be overfished due to poor stock condition {Legault 2017a}. The survey biomass in 2017 (the arithmetic average of the 2017 NEFSC spring and 2016 NEFSC fall surveys smoothed using a loess) was estimated to be 7.237 kg/tow (see Figure 19) {Legault 2017a}. According to the NMFS third quarter 2018 update, Georges Bank Atlantic cod is overfished and in year 15 of a 23-year rebuilding plan (NMFS 2018e). Because the stock is considered overfished, abundance is scored a high concern.

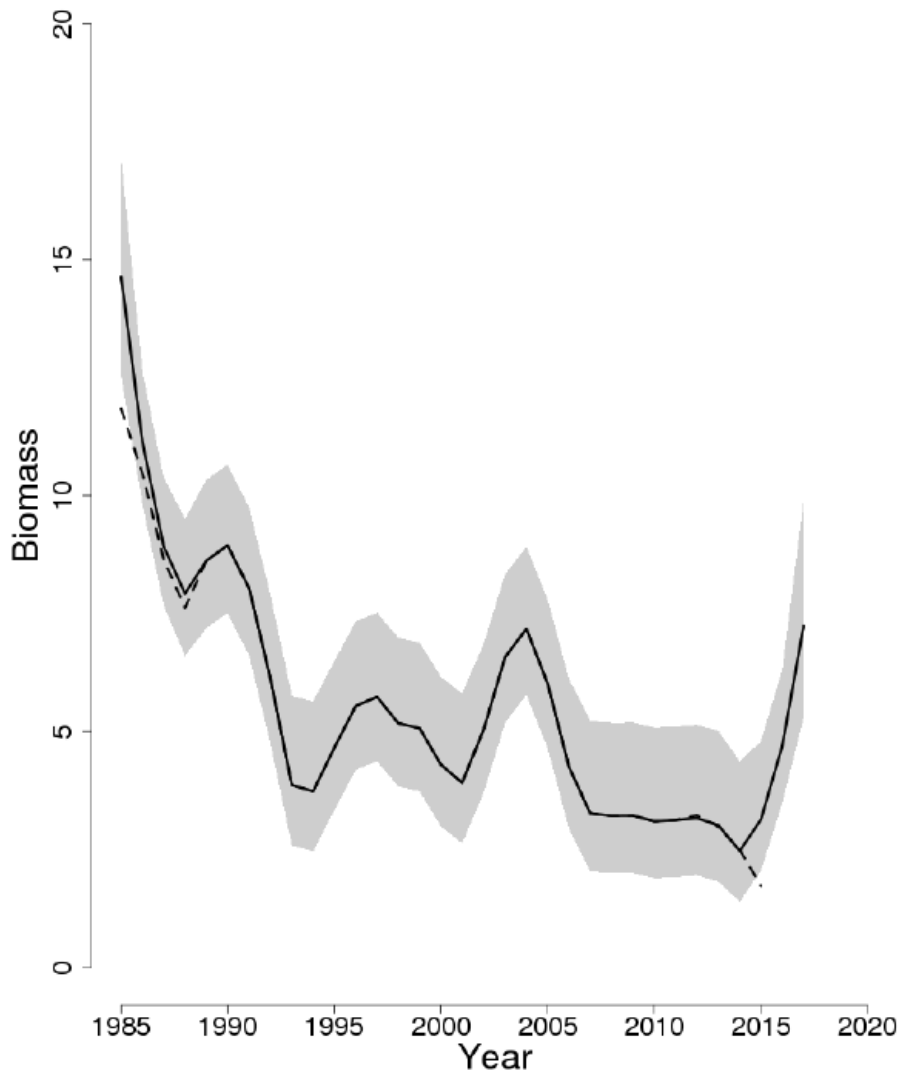


Figure 19: Trends in smoothed survey biomass (kg/tow) of Georges Bank Atlantic cod between 1985 and 2017 from the current (solid line) and previous (dashed line) assessment based on the 2017 assessment. The approximate 90% lognormal confidence intervals are shown {Legault 2017}.

NMFS fourth quarter 2017 update stock status determinations are a holdover according to NOAA's policy, where the agency decided after the 2015 assessment that the Georges Bank Atlantic cod stock status would remain as overfishing occurring and overfished, based on an earlier benchmark assessment (the SAW55 benchmark assessment in 2011) {O'Brien 2015}.

**Gulf of Maine Stock | Northwest Atlantic | Bottom trawls | United States | New England**  
**Gulf of Maine Stock | Northwest Atlantic | Set gillnets | United States | New England**

**High Concern**

Based on the 2017 Gulf of Maine Atlantic cod stock assessment, spawning stock biomass (SSB) in 2016 was estimated to be 3,046 mt under the  $M = 0.2$  model and 3,262 mt under the M-ramp model scenario, which is 8% and 5%, respectively, of the biomass target,  $SSB_{MSY}$  proxy (40,604 mt and 59,714 mt) (see Figure 20) (Palmer 2017a). According to the NMFS first quarter 2018 update, Gulf of Maine Atlantic cod is overfished and in year 4 of a 10-year rebuilding plan (NMFS 2018c). Because the stock is overfished, abundance is considered a high concern.

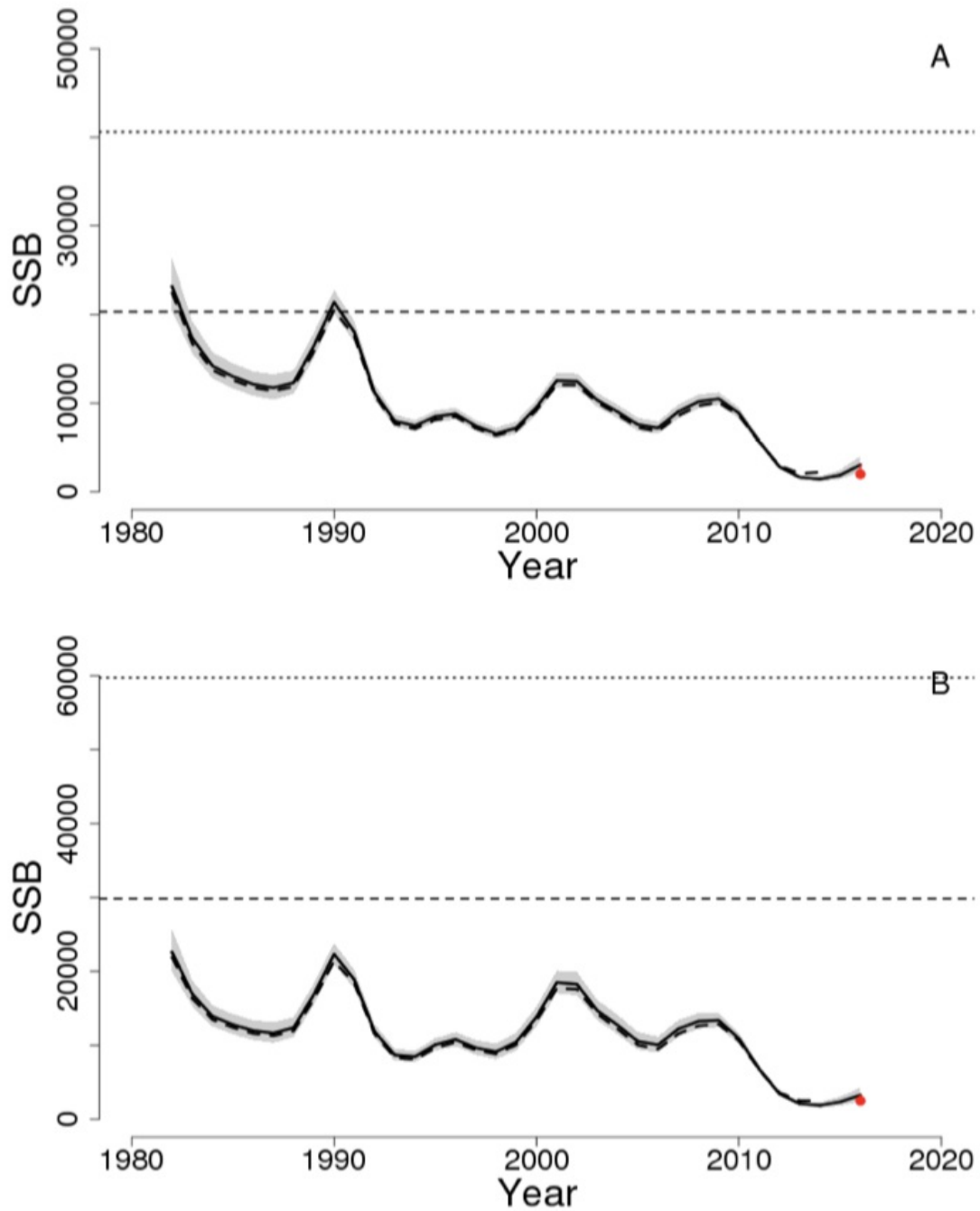


Figure 20: Estimated trends in the spawning stock biomass (SSB) of Gulf of Maine Atlantic cod between 1982 and 2016 from the current (solid line) and previous (dashed line) assessment and the corresponding  $SSB_{THRESHOLD}$  ( $1/2 SSB_{MSY}$ ; horizontal dashed line) as well as  $SSB_{TARGET}$  ( $SSB_{MSY}$ ; horizontal dotted line) based on the 2017  $M = 0.2$  (A) and M-ramp (B) assessment models {Palmer 2017}.

## Factor 2.2 - Fishing Mortality

**Georges Bank Stock | Northwest Atlantic | Bottom trawls | United States | New England**

**Georges Bank Stock | Northwest Atlantic | Set gillnets | United States | New England**

### High Concern

Based on the 2017 Georges Bank Atlantic cod stock assessment, the 2016 relative exploitation rate (2016 catch divided by 2016 smoothed survey biomass) was estimated to be 0.174 (see Figure 21) {Legault 2017a}. But, the recommended fishing level is unknown. According to the NMFS third quarter 2018 update, Georges Bank Atlantic cod is undergoing overfishing and in year 15 of a 23-year rebuilding plan, where the management action is focusing on reducing mortality (NMFS 2018e). Because of these issues, fishing mortality is scored a high concern.

### Justification:

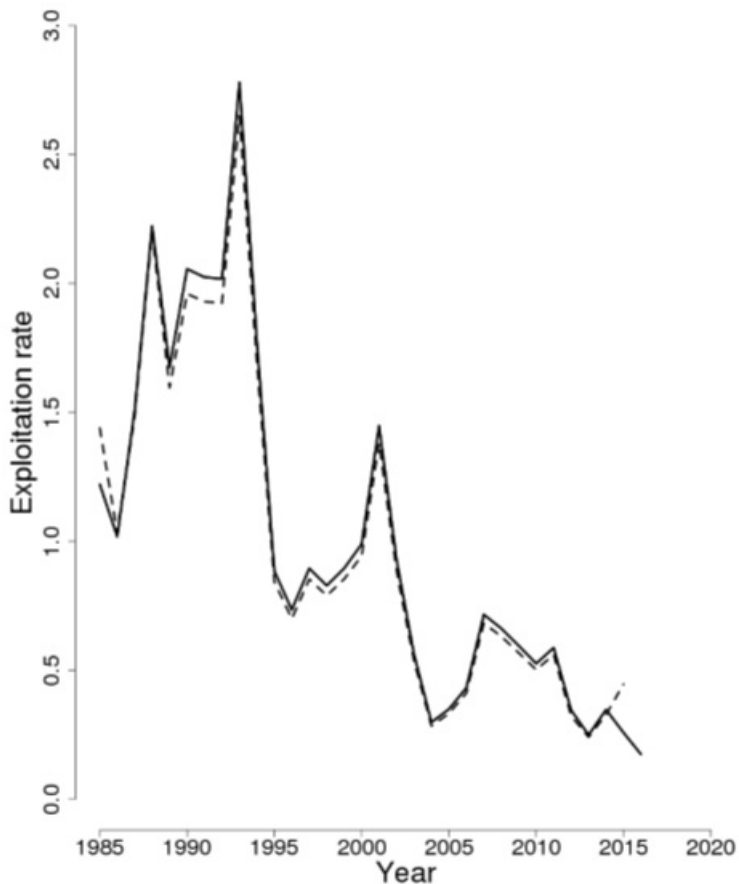


Figure 21: Trends in the relative exploitation rate (catch/smoothed survey) of Georges Bank Atlantic cod between 1985 and 2017 from the current (solid line) and previous (dashed line) assessment, based on the 2017 assessment {Legault 2017}.

NMFS second quarter 2018 update stock status determinations are a holdover according to NOAA's policy, where the agency decided after the 2015 assessment that the Georges Bank Atlantic cod stock status would remain as overfishing occurring and overfished, based on an earlier benchmark assessment (the SAW-55 benchmark assessment in 2011) {O'Brien 2015}.

**Gulf of Maine Stock | Northwest Atlantic | Bottom trawls | United States | New England**

**Gulf of Maine Stock | Northwest Atlantic | Set gillnets | United States | New England**

**High Concern**

Based on the 2017 Gulf of Maine Atlantic cod stock assessment, the 2016 fully selected fishing mortality was estimated to be 0.228 and 0.237, which is 131% and 134% of the  $F_{MSY}$  proxy ( $F_{40\%}$ ; 0.174 and 0.177) under the  $M = 0.2$  model and the M-ramp model scenarios, respectively (see Figure 22) (Palmer 2017a). Because the stock is undergoing overfishing, fishing mortality is considered a high concern.

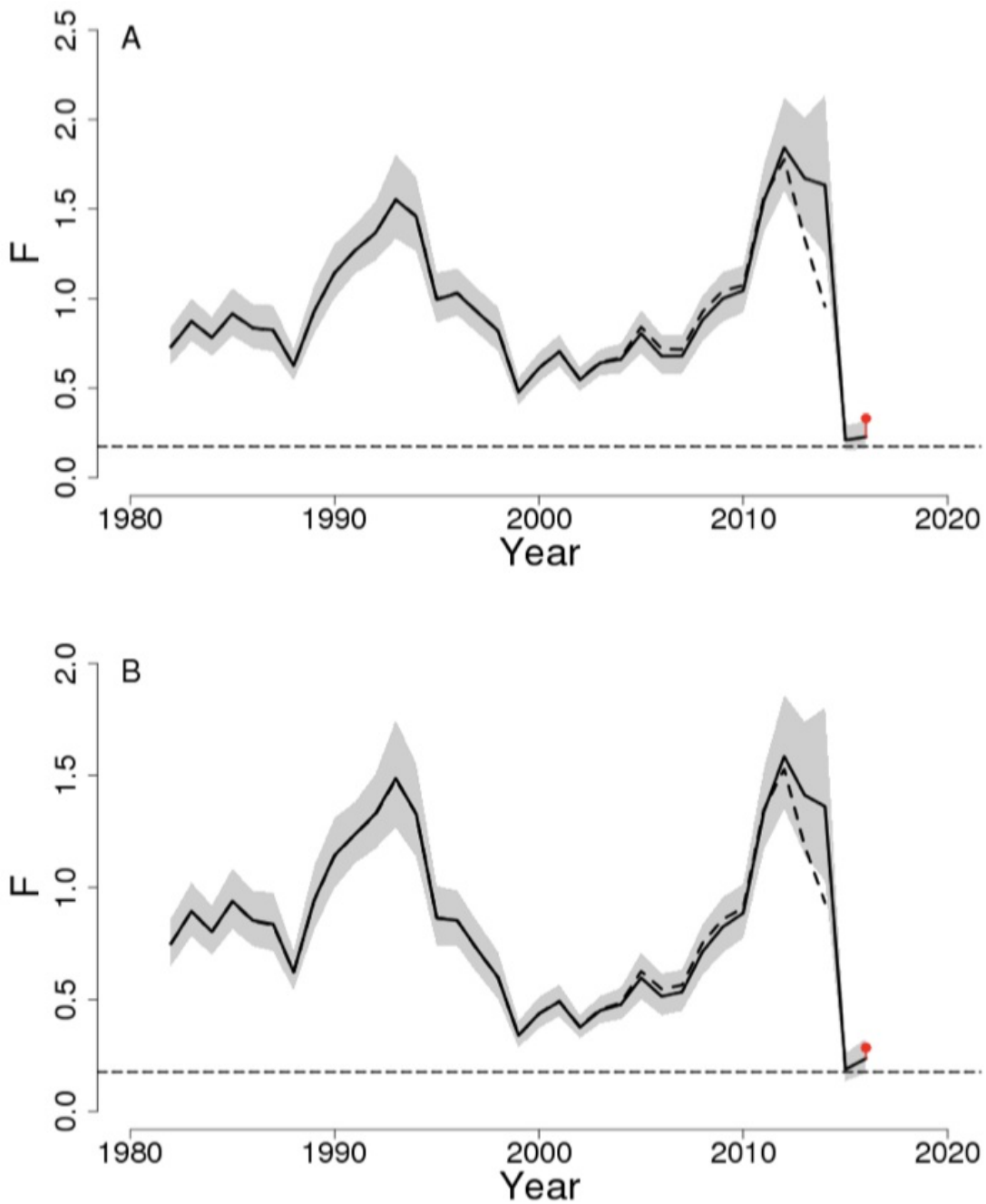


Figure 22: Estimated trends in the fully selected fishing mortality ( $F$ ) of Gulf of Maine Atlantic cod between 1982 and 2016 from the current (solid line) and previous (dashed line) assessment and the corresponding  $F_{\text{THRESHOLD}}$  (0.174 ( $M = 0.2$ ), 0.177 ( $M$ -ramp); dashed line) based on the 2017  $M = 0.2$  (A) and  $M$ -ramp (B) assessment models. The 90% lognormal confidence intervals are shown {Palmer 2017}.

# **Atlantic halibut**

## **Factor 2.1 - Abundance**

### **Northwest Atlantic | Set gillnets | United States | New England**

#### **High Concern**

Based on the 2015 Atlantic halibut stock assessment, spawning stock biomass (SSB) in 2014 was estimated to be 96,464 mt, which is 199% of the biomass target ( $SSB_{MSY}$  proxy = 48,509; see Figure 3) (NEFSC 2015a). But, the assessment indicated that the model used was highly uncertain due to the high sensitivity to initial biomass, and that the survey data used were “noisy” due to the low number of animals caught in the surveys (NEFSC 2015a). Therefore, stock status for this species cannot be determined based on the current assessment and is unknown (NEFSC 2015a). According to the NMFS first quarter 2018 update, Atlantic halibut is overfished and in year 14 of a 52-year rebuilding plan (NMFS 2018c). This factor is considered a high concern, because Atlantic halibut is also listed as a species of concern under the Endangered Species Act (ESA) (NMFS 2017a).

#### **Justification:**

Catch has been very low for at least 100 years relative to landings reported early in the time series, despite a strong market and high value relative to other groundfish {NEFSC 2015}. The low catch throughout the century implies that the Atlantic halibut stock is very likely depleted relative to its unfished condition and is therefore likely to be overfished, even if its current biomass is unknown {NEFSC 2015}.

NMFS fourth quarter 2017 update stock determinations are from the GARMIII benchmark assessment and the 2012 updated assessment, which concluded that the stock was overfished but overfishing was not occurring; information available in the updated assessment indicates that stock size has not substantially increased. Hence, it was concluded that the stock is still overfished, and the overfishing status is unknown.



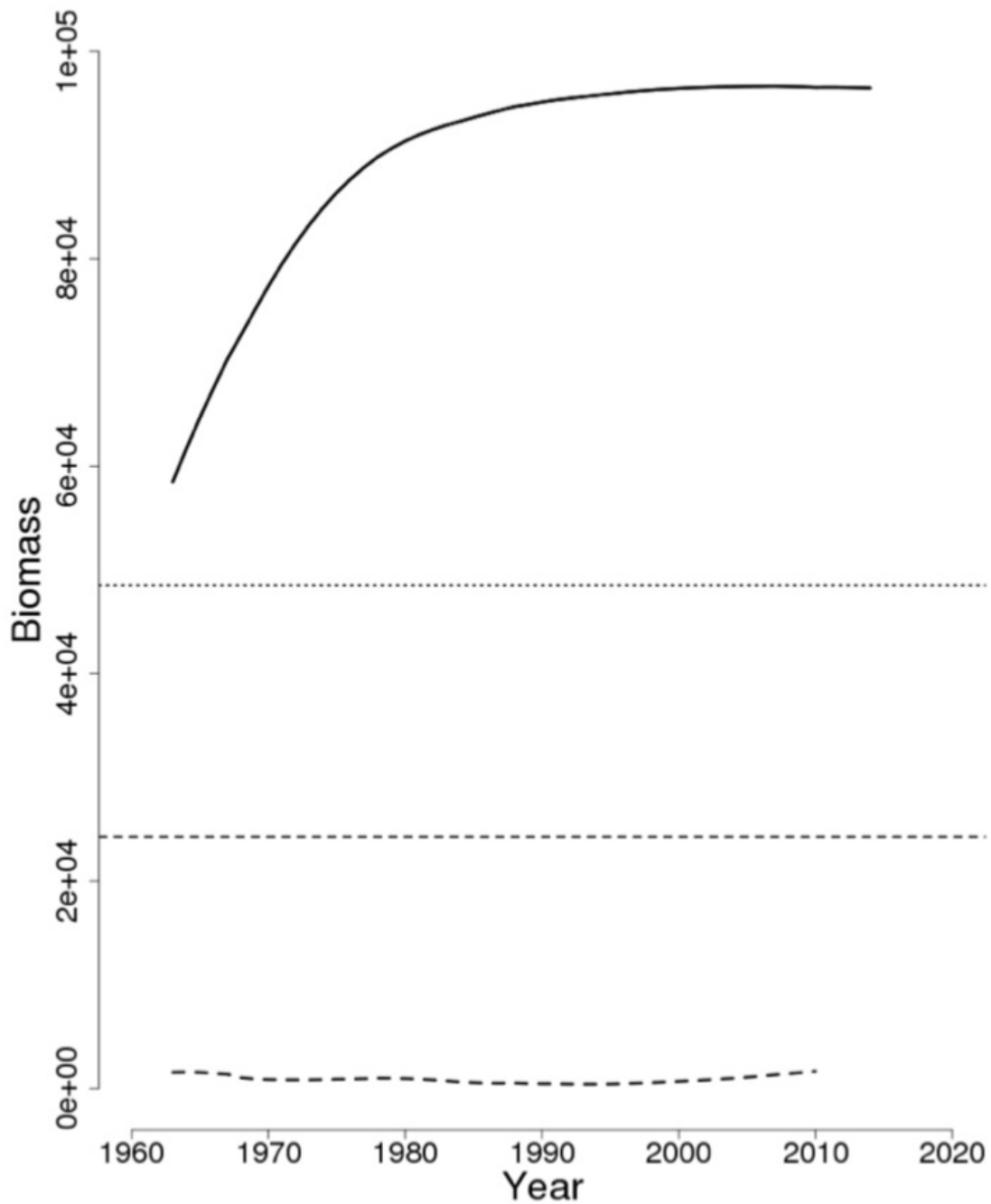


Figure 3: Estimated trends in the biomass of Atlantic halibut between 1963 and 2014 from the current (solid line) and previous (dashed line) assessment and the corresponding  $B_{THRESHOLD} = 1/2 B_{MSY}$  proxy (horizontal dashed line) as well as  $B_{TARGET}$  ( $B_{MSY}$  proxy; horizontal dotted line) based on the 2015 assessment {NEFSC 2015}.

## Factor 2.2 - Fishing Mortality

### Northwest Atlantic | Set gillnets | United States | New England

#### **Moderate Concern**

Based on the 2015 Atlantic halibut stock assessment, the 2014 fully selected fishing mortality was estimated to be 0.001, which is 1% of the overfishing threshold proxy ( $F_{MSY}$  proxy = 0.073; see Figure 4) (NEFSC 2015a). According to the NMFS first quarter 2018 update, Atlantic halibut is not undergoing overfishing (NMFS 2018c). Because there is no 2017/2018 stock assessment update to support the NMFS FSSI listing, the Atlantic halibut stock is likely severely depleted, and the model used in the 2015 stock assessment has been deemed unreliable, so this factor is scored a moderate concern.

#### **Justification:**

NMFS fourth quarter 2017 update stock determinations are from the GARMIII benchmark assessment and the 2012 updated assessment, which concluded that the stock was overfished but overfishing was not occurring; information available in the updated assessment indicates that stock size has not substantially increased. Hence, it was concluded that the stock is still overfished, and the overfishing status is unknown.

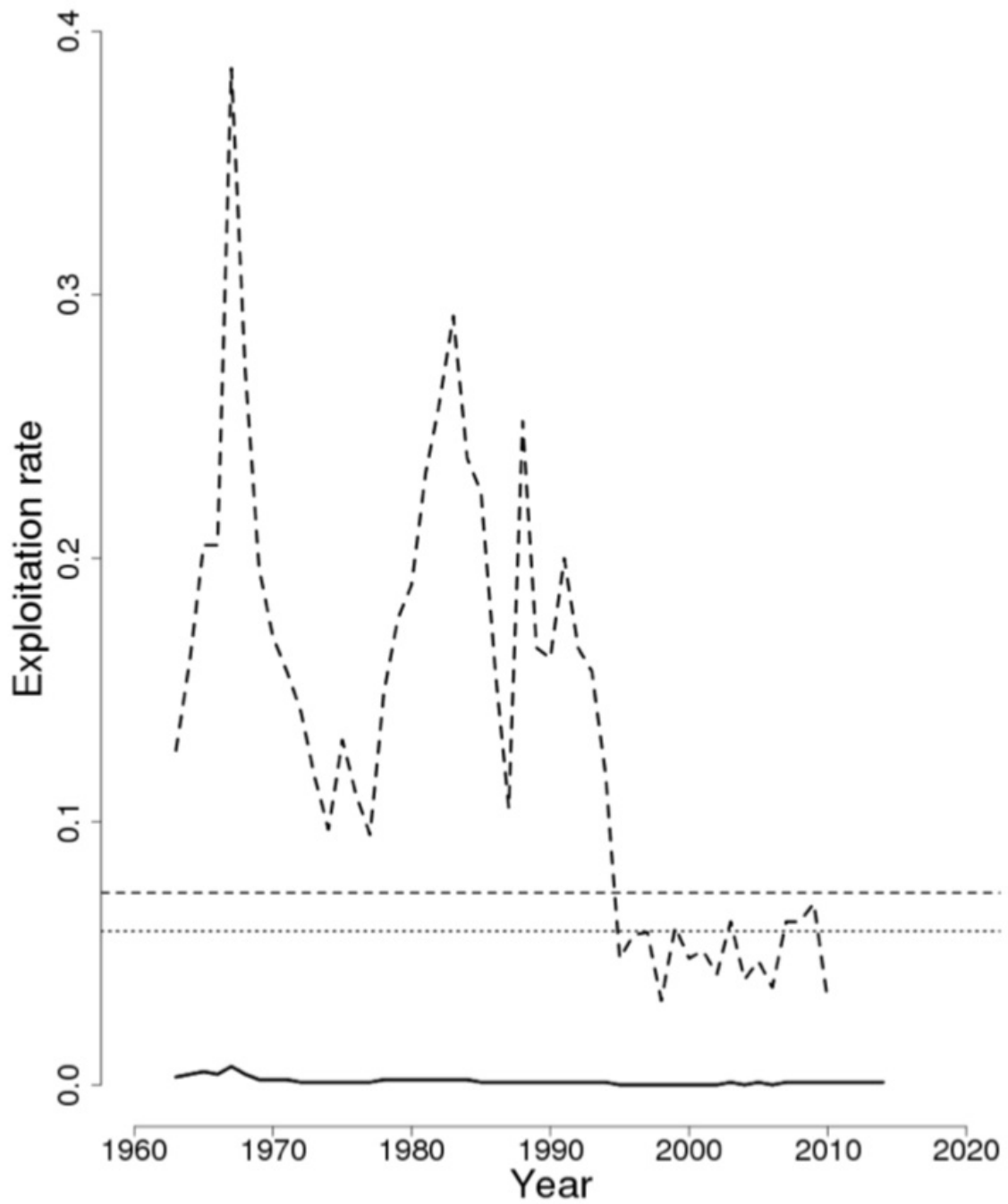


Figure 4: Estimated trends in the fully selected fishing mortality ( $F_{FULL}$ ) of Atlantic halibut between 1963 and 2014 from the current (solid line) and previous (dashed line) assessment and the corresponding  $F_{THRESHOLD}$  (0.073; horizontal dashed line) as well as  $F_{TARGET}$  ( $0.8 \times F_{MSY}$  proxy; dotted line) based on the 2015 assessment {NEFSC 2015}.

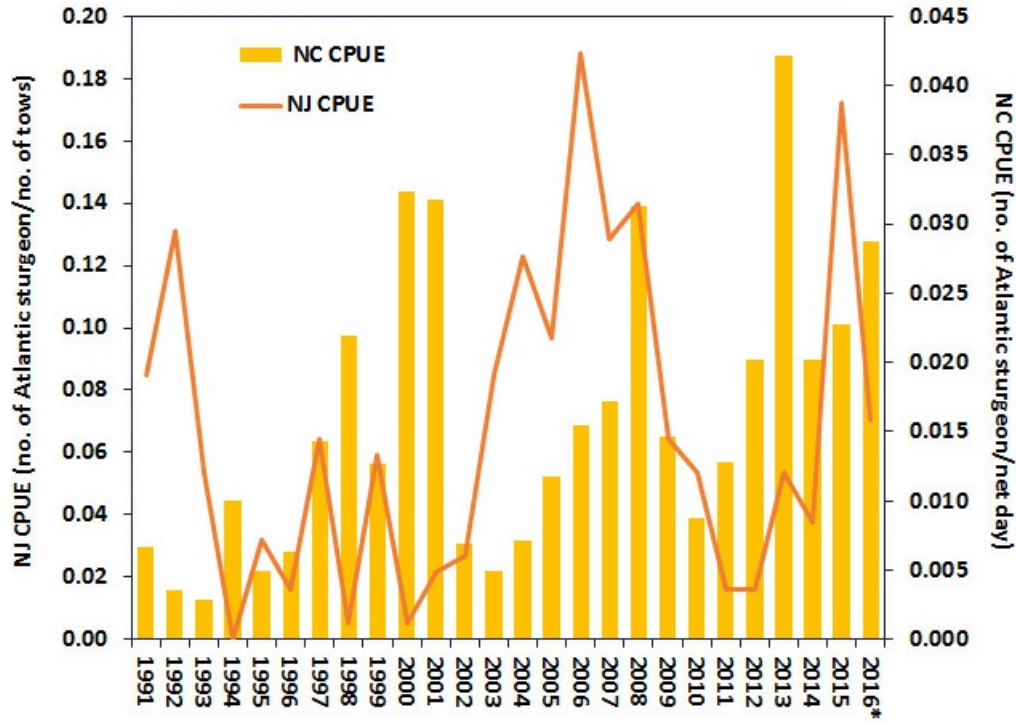
# **Atlantic sturgeon**

## **Factor 2.1 - Abundance**

**Northwest Atlantic | Bottom trawls | United States | Mid Atlantic  
Northwest Atlantic | Set gillnets | United States | New England**

### **High Concern**

All U.S. populations of Atlantic sturgeon are listed as “Endangered” or “Threatened” by the Endangered Species Act (ESA) (NMFS 2012a). U.S. populations of Atlantic sturgeon are divided into five distinct population segments (DPS) for management purposes (NOAA Fisheries 2012b). The Gulf of Maine DPS is currently listed as “Threatened” by the ESA, while the four DPS south of Cape Cod are currently listed as “Endangered” (NOAA Fisheries 2012b). Little is known about stock status: reliable data are difficult to collect because many river systems have few fish and are difficult to sample (ASFMC 2017). Although accurate stock assessments are difficult to conduct, some states conduct long-term monitoring of Atlantic sturgeon via fishery-independent surveys (see Figure 23) (ASFMC 2017). The figure comprises data from NJ and NC surveys that provide an example of local conditions, with both surveys indicating an increase in the number of sturgeon in these areas (ASFMC 2017). Because all populations of Atlantic sturgeon are threatened or endangered, Seafood Watch deems this factor a high concern.



\* 2016 data is preliminary

Figure 23: Atlantic sturgeon fishery-independent catch per unit effort in New Jersey’s coastal waters and North Carolina’s Albemarle Sound {NJDEP 2016}{NCDMF 2016}.

## Factor 2.2 - Fishing Mortality

**Northwest Atlantic | Bottom trawls | United States | Mid Atlantic**

**Northwest Atlantic | Set gillnets | United States | New England**

### Moderate Concern

The most recent stock assessment for Atlantic sturgeon predicted overall take for both bottom trawl gear and gillnets. From 2000 to 2015, total by-catch from bottom trawls ranged from 624 to 1,518 fish, with an average of 4% recorded as dead (ASMFC 2017b). Total by-catch from sink and drift gill nets ranged from 253 to 2,715 fish, with an average of 30% resulting in annual dead discards. Little change in dead discard numbers has been noted since 2000 (ASMFC 2017b). Statistical uncertainty surrounds these estimates regarding whether or not they exceed the determined threshold for total mortality (ASMFC 2017b); therefore, a score of moderate concern was awarded.

# **Atlantic white-sided dolphin**

## **Factor 2.1 - Abundance**

**Northwest Atlantic | Bottom trawls | United States | Mid Atlantic  
Northwest Atlantic | Bottom trawls | United States | New England  
Northwest Atlantic | Set gillnets | United States | New England**

### **Moderate Concern**

According to the most current marine mammal stock assessment report, the best estimate of abundance for the North Atlantic white-sided dolphin stock was 93,233 (CV = 0.71), with a minimum population size of 54,443 (Hayes et al. 2020). The status of this population relative to the optimum sustainable population (OSP) in the U.S. Atlantic EEZ is unknown, and a trend analysis has not been conducted for this species (Hayes et al. 2020). The International Union for the Conservation of Nature (IUCN) considers this species as "Least Concern" (Hammond et al. 2008a), and because status and trend analysis are unknown, abundance is considered a moderate concern.

## **Factor 2.2 - Fishing Mortality**

**Northwest Atlantic | Bottom trawls | United States | Mid Atlantic**

### **Low Concern**

The total annual estimated average fishery-related mortality or serious injury to the western North Atlantic white-sided dolphin stock during 2013 to 2017 was 26 (CV = 0.20), with a potential biological removal (PBR) of 544 (Hayes et al. 2020). The Mid-Atlantic bottom trawl is a minor contributor, accounting for 7% (1.9/26 individuals) of the total by-catch across all fisheries, with the Northeast bottom trawl fishery accounting for 81% (21/26 individuals), and the Northeast sink gillnet fishery accounting for 11% (2.8/26 individuals) (Hayes et al. 2020). Because mortality or serious injury is only 5% of the PBR, and the Mid-Atlantic bottom trawl fishery takes less than 50% of the PBR, fishing mortality is considered a low concern.

**Northwest Atlantic | Bottom trawls | United States | New England**

### **Low Concern**

The total annual estimated average fishery-related mortality or serious injury to the western North Atlantic white-sided dolphin stock during 2013 to 2017 was 26 individuals (CV = 0.20), with a potential biological removal (PBR) of 544 (Hayes et al. 2020). The Northeast bottom trawl is by far the primary contributor, accounting for 81% (21/26 individuals) of the total by-catch across all fisheries, with the Northeast sink gillnet fishery accounting for 11% (2.8/26 individuals) (Hayes et al. 2020). Because PBR is not exceeded, and the bottom trawl fishery takes less than 50% of the PBR, fishing mortality is considered a low concern.

## **Northwest Atlantic | Set gillnets | United States | New England**

### **Low Concern**

The total annual estimated average fishery-related mortality or serious injury to the western North Atlantic white-sided dolphin stock during 2013 to 2017 was 26 (CV = 0.20), with a potential biological removal (PBR) of 544 (Hayes et al. 2020). The Northeast bottom trawl is by far the primary contributor, accounting for 81% (21/26 individuals) of the total by-catch across all fisheries, with the Northeast sink gillnet fishery accounting for 11% (2.8/26 individuals) (Hayes et al. 2020). Because mortality or serious injury is only 5% of the PBR, and the sink gillnet fishery takes less than 50% of the PBR, fishing mortality is considered a low concern.

## **Barndoor skate**

### **Factor 2.1 - Abundance**

**Northwest Atlantic | Bottom trawls | United States | New England  
Mid Atlantic Stock | Northwest Atlantic | Bottom trawls | United States  
Northwest Atlantic | Set gillnets | United States | New England**

#### **Low Concern**

For barndoor skate, the 2017 to 2019 NEFSC autumn average survey biomass index of 2.02 kg/tow is above the biomass threshold reference point (0.78 kg/tow) and 102% above the  $B_{MSY}$  proxy (1.57 kg/tow; see Figure 24) (Sosebee 2020). Because the stock is not overfished, but there is uncertainty associated with using the survey index as a proxy for abundance, a score of low concern is given (rather than a score of very low concern).

#### **Justification:**

For barndoor skate, the  $B_{MSY}$  proxy is defined as the average of 1963 to 1966 autumn survey biomass indices, because the survey did not catch barndoor skate for a protracted period (Sosebee 2020).



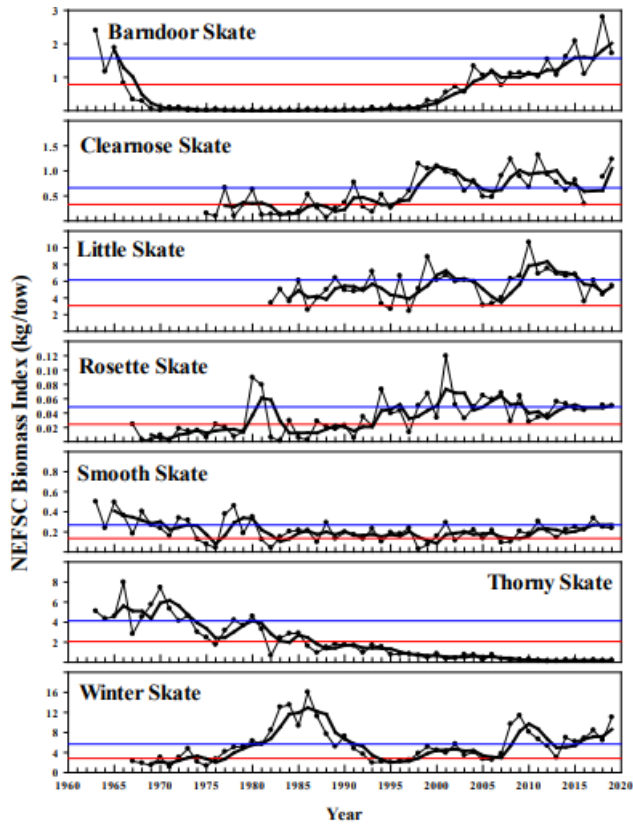


Figure 24: Northeast Fisheries Science Center survey biomass indices (kg/tow). Thin lines with symbols are annual indices, thick lines are 3-year moving averages, and the thin horizontal lines are the management biomass thresholds and targets. From (Sosebee 2020).

## Factor 2.2 - Fishing Mortality

**Northwest Atlantic | Bottom trawls | United States | New England  
 Mid Atlantic Stock | Northwest Atlantic | Bottom trawls | United States  
 Northwest Atlantic | Set gillnets | United States | New England**

### Low Concern

The 2017 to 2019 average index is above the 2016 to 2018 index by 11.4% (Sosebee 2020). Because the stock is not undergoing overfishing, fishing mortality is considered a low concern.

### Justification:

The fishing mortality reference points are based on changes in the 3-year survey biomass indices. If there is a decline in the 3-year moving average of the survey biomass index that is greater than the average CV of the survey time series, then fishing mortality is assumed to be greater than  $F_{MSY}$ , and overfishing is occurring for that skate species (Sosebee 2020).

# **Bottlenose dolphin**

## **Factor 2.1 - Abundance**

**Northwest Atlantic | Bottom trawls | United States | Mid Atlantic  
Northwest Atlantic | Bottom trawls | United States | New England**

### **Moderate Concern**

The best available estimate for the offshore stock of common bottlenose dolphin in the western North Atlantic is 62,851 (CV = 0.23), with a minimum population size of 51,914 (Hayes et al. 2020). This estimate is from surveys covering waters from central Florida to the lower Bay of Fundy in 2011 and 2016. The status of this stock relative to the optimum sustainable population (OSP) in the U.S. Atlantic EEZ is unknown, as are population trends (Hayes et al. 2020). The International Union for the Conservation of Nature (IUCN) considers this species as "Least Concern" (Hammond et al. 2012), and because status and trend analyses are unknown, abundance is considered a moderate concern.

## **Factor 2.2 - Fishing Mortality**

**Northwest Atlantic | Bottom trawls | United States | Mid Atlantic  
Northwest Atlantic | Bottom trawls | United States | New England**

### **Low Concern**

The total annual estimated mean fishery-related mortality or serious injury to the western North Atlantic offshore bottlenose dolphin stock during 2013 to 2017 was 28, with a potential biological removal (PBR) of 519 (Hayes et al. 2020). In addition to observed takes, there was a self-reported take in the unobserved mid-Atlantic tuna hook and line fishery during 2010 {Hayes et al. 2017}, but total take is still estimated to be well below PBR, even taking this into account. The Northeast bottom gillnet fishery accounted for 25% (7/28 individuals) of the total by-catch across all fisheries (Hayes et al. 2020). Because PBR is not exceeded, and the sink gillnet fishery accounts for less than 50% of the PBR, fishing mortality is considered a low concern.

## **Clearnose skate**

### **Factor 2.1 - Abundance**

**Northwest Atlantic | Bottom trawls | United States | Mid Atlantic  
Northwest Atlantic | Bottom trawls | United States | New England  
Northwest Atlantic | Set gillnets | United States | New England**

#### **Low Concern**

For clearnose skate, the 2017 to 2019 NEFSC autumn average biomass index of 1.05 kg/tow is above the biomass threshold reference point (0.33 kg/tow) and the  $B_{MSY}$  proxy (0.66 kg/tow; see Figure 25) (Sosebee 2020). Because the stock is not overfished, but there is uncertainty in using a survey index as a proxy for biomass relative to MSY, abundance is scored a low concern (rather than very low concern).

#### **Justification:**

For clearnose skate, the  $B_{MSY}$  proxy is defined as the 75th percentile of the appropriate survey biomass index time series for that species (Sosebee 2020).

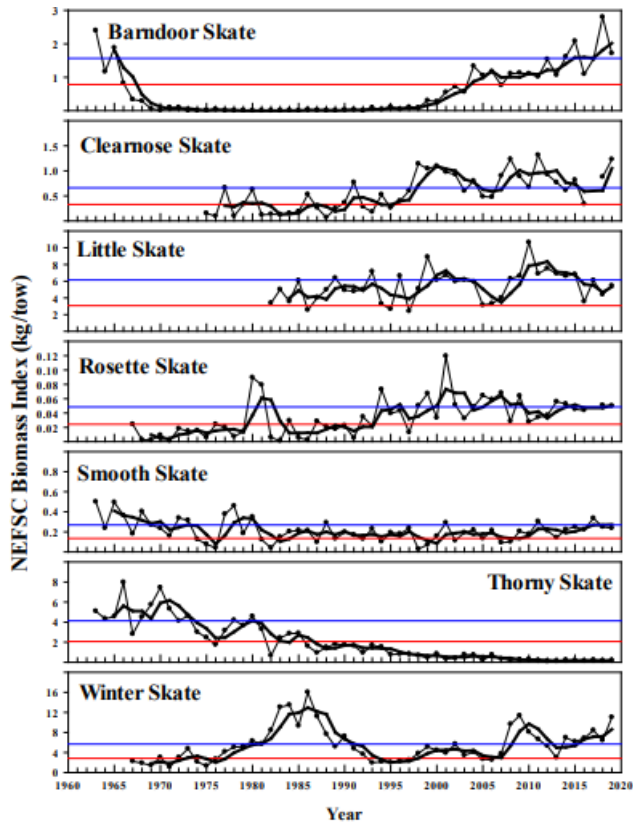


Figure 25: Northeast Fisheries Science Center survey biomass indices (kg/tow). Thin lines with symbols are annual indices, thick lines are 3-year moving averages, and the thin horizontal lines are the management biomass thresholds and targets. From (Sosebee 2020).

## Factor 2.2 - Fishing Mortality

**Northwest Atlantic | Bottom trawls | United States | Mid Atlantic  
Northwest Atlantic | Bottom trawls | United States | New England  
Northwest Atlantic | Set gillnets | United States | New England**

### Low Concern

For clearnose skate, the 2017 to 2019 index is above the 2016 to 2018 index by 73.1% (Sosebee 2020). Because the stock is not undergoing overfishing, fishing mortality is scored a low concern.

### Justification:

The fishing mortality reference points are based on changes in the 3-year survey biomass indices. If there is a decline in the 3-year moving average of the survey biomass index that is greater than the average CV of the survey time series, then fishing mortality is assumed to be greater than  $F_{MSY}$ , and overfishing is occurring for that skate species (Sosebee 2020).

# **Fin whale**

## **Factor 2.1 - Abundance**

### **Northwest Atlantic | Set gillnets | United States | New England**

#### **High Concern**

The best abundance estimate available for the western North Atlantic fin whale stock is 6,802, with a minimum population size of 5,573 (Hayes et al. 2021). This is the estimate derived from the sum of the 2016 NOAA shipboard and aerial surveys and the 2016 Canadian Northwest Atlantic International Sightings Survey (NAISS) (Hayes et al. 2021). The surveys do not overlap, so the estimates from the two surveys were combined (Hayes et al. 2021), extending the range of the survey from Newfoundland to Florida and resulting in a significant increase in the population estimate relative to the 2011 NOAA survey (Hayes et al. 2021). The status of this stock relative to the optimum sustainable population (OSP) in the U.S. Atlantic EEZ is unknown, as are population trends (Hayes et al. 2021). The International Union for the Conservation of Nature (IUCN) Red List classifies fin whale as "Vulnerable" to extinction, the Endangered Species Act (ESA) lists it as "Endangered" (Cooke 2018b)(USFWS 2017), and it is listed on CITES Appendix I (NOAA 2017a) and as MMPA "Depleted" throughout its range (NOAA 2017b). Because of the IUCN, ESA, and MMPA listings, abundance is considered a high concern.

## **Factor 2.2 - Fishing Mortality**

### **Northwest Atlantic | Set gillnets | United States | New England**

#### **Low Concern**

The total annual estimated average fishery-related mortality or serious injury (SIM) to the western North Atlantic fin whale stock during 2014 to 2018 was 1.55, with a potential biological removal (PBR) of 11 (Hayes et al. 2021). This value includes incidental fishery interaction records, 0.95 (0 U.S./0.95 unknown but first reported in U.S. waters/0.6 Canadian waters); and records of vessel collisions, 0.8 (all U.S.; (Hayes et al. 2021)). But, the total level of human-caused mortality and serious injury is unknown, because NMFS records represent coverage of only a portion of the area surveyed for the population estimate for the stock (Hayes et al. 2021). The total U.S. fishery-related mortality and serious injury for this stock derived from the available records is likely biased low (Hayes et al. 2021).

According to the List of Fisheries, the Northeast sink gillnet fishery is a Category I fishery, because previous estimates suggested that fishery-specific annual mortality and serious injury to fin whale was greater than or equal to 50% of the PBR {LOF 2017b}. In addition, fin whale is a strategic stock because it is listed as "Endangered" under the Endangered Species Act (ESA). Because the PBR is not exceeded, and the gillnet fishery contributes SIMs that are less than 50% of PBR, a score of low concern is given.

# Goosefish

## **Factor 2.1 - Abundance**

**Mid Atlantic Stock | Northwest Atlantic | Bottom trawls | United States  
Northwest Atlantic | Bottom trawls | United States | New England  
Northwest Atlantic | Set gillnets | United States | New England**

### **Low Concern**

According to the most recent operational assessment in 2016, which used survey indices to estimate abundance and biomass, there was a lack of current biological reference points that would allow for stock status determination (Richards 2016)(NMFS 2017a). The 2016 assessment does not include an update to the SAW 50 SCALE model used previously (in 2013) because the method for aging goosefish failed a validation test completed in 2016, thus invalidating the growth model (Richards 2016)(NMFS 2017a). In the 2016 assessment, survey indices were used as proxies for stock abundance, and relative exploitation rates were used as proxies for trends in fishing mortality rates, but neither of these quantities has been used as a basis for proxies for biological reference points (Richards 2016)(NMFS 2017a).

Therefore, the most current abundance estimates are from 2013, which determined that both the northern and southern stock biomass are above targets (NEFSC 2013). But, because it appears that neither the 2013 stock assessment result nor the 2016 stock assessment result is appropriate for determining whether abundance is at a sustainable level, a productivity-susceptibility analysis (PSA) was calculated.

Goosefish has medium inherent vulnerability according to the productivity-susceptibility analysis (PSA = 2.91; see detailed scoring below); and because there are two positive data-limited indicators (NEFSC survey indices are either stable or increasing, landings have decreased substantially, and the size structure is reasonably stable), abundance is scored a low concern.

### **Justification:**

Productivity-Susceptibility Analysis:

#### *Scoring Guidelines*

1. *Productivity score (P) = average of the productivity attribute scores (p1, p2, p3, p4 (finfish only), p5 (finfish only), p6, p7, and p8 (invertebrates only))*

2. *Susceptibility score (S) = product of the susceptibility attribute scores (s1, s2, s3, s4), rescaled as follows:  $S = [(S1 \times S2 \times S3 \times S4) - 1/40] + 1$ .*

3. *Vulnerability score (V) = the Euclidean distance of P and S using the following formula:  $V = \sqrt{P^2 + S^2}$*

$$\text{Vulnerability (V)} = \sqrt{P^2 + S^2}$$

$$V = \sqrt{1.75^2 + 2.325^2}$$

V = 2.91 (medium vulnerability)

<b>Productivity Attribute</b>	<b>Relevant Information</b>	<b>Score (1 = low risk, 2 = medium risk, 3 = high risk)</b>	<b>Reference(s)</b>
Average age at maturity	4.5 years	1	(Steimle et al. 1999)
Average maximum age	10 years	2	(Steimle et al. 1999)
Fecundity	300,000 to 2,780,000 eggs/year	1	(Steimle et al. 1999)
Average maximum size (fish only)	100 cm	2	(Steimle et al. 1999)
Average size at maturity (fish only)	55 cm	2	(Steimle et al. 1999)
Reproductive strategy	Broadcast spawner	1	(Froese and Pauly 2018)
Trophic level	4.4	3	(Choi et al. 2008)
Density dependence (invertebrates only)	-	-	
Habitat quality	Moderately altered	2	SFW default value
<b>Total Productivity (average)</b>		<b>1.75</b>	

<b>Susceptibility attribute</b>	<b>Relevant information</b>	<b>Score (1 = low risk, 2 = medium risk, 3 = high risk)</b>	<b>Reference(s)</b>
Areal overlap (considers all fisheries)	The northern goosefish stock is concentrated in the GoM and Georges Bank cod, haddock, and pollock fishing areas.	3	(Richards 2013)
Vertical overlap (considers all fisheries)	Usual depth range of inshore to 900 m; groundfish fishery operates between 10 and 200 m.	3	(Richards 2013)
Selectivity of fishery (specific to fishery under assessment)	Goosefish is incidentally encountered and is not likely to escape the gear, but conditions under "high risk" do not apply.	2	SFW default
Post-capture mortality (specific to fishery under assessment)	Unknown	3	SFW default
<b>Total Susceptibility (multiplicative)</b>		<b>2.325</b>	

## **Factor 2.2 - Fishing Mortality**

**Mid Atlantic Stock | Northwest Atlantic | Bottom trawls | United States**

**Northwest Atlantic | Bottom trawls | United States | New England**

**Northwest Atlantic | Set gillnets | United States | New England**

### **Moderate Concern**

The 50th SAW Assessment Summary Report estimates fishing mortality at  $F = 0.10$  per year in the NMA and  $F = 0.07$  per year in the SMA;  $F$  is below  $F_{\text{THRESHOLD}}$ , which is currently set equal to  $F_{\text{MAX}}$  ( $F = 0.44$  for NMA and  $F = 0.37$  for SMA) (NEFSC 2013). Nevertheless, there is high uncertainty surrounding these estimates, especially because the SCALE model from the 2013 operational assessment has since been rejected due to  $F$  BRPs (biological reference points) being considered inappropriate for this species (Richards 2016). And, although the most current assessment in 2016 used relative exploitation rates as proxies to estimate trends in fishing mortality rates, these have not been used as proxies for fishing mortality BRPs (Richards 2016). Because there is uncertainty surrounding these estimates, fishing mortality is considered a moderate concern.

### **Justification:**

The relative exploitation rates cannot be compared with reference points at this stage, but they do indicate, particularly in the north, a clear decrease in recent years.



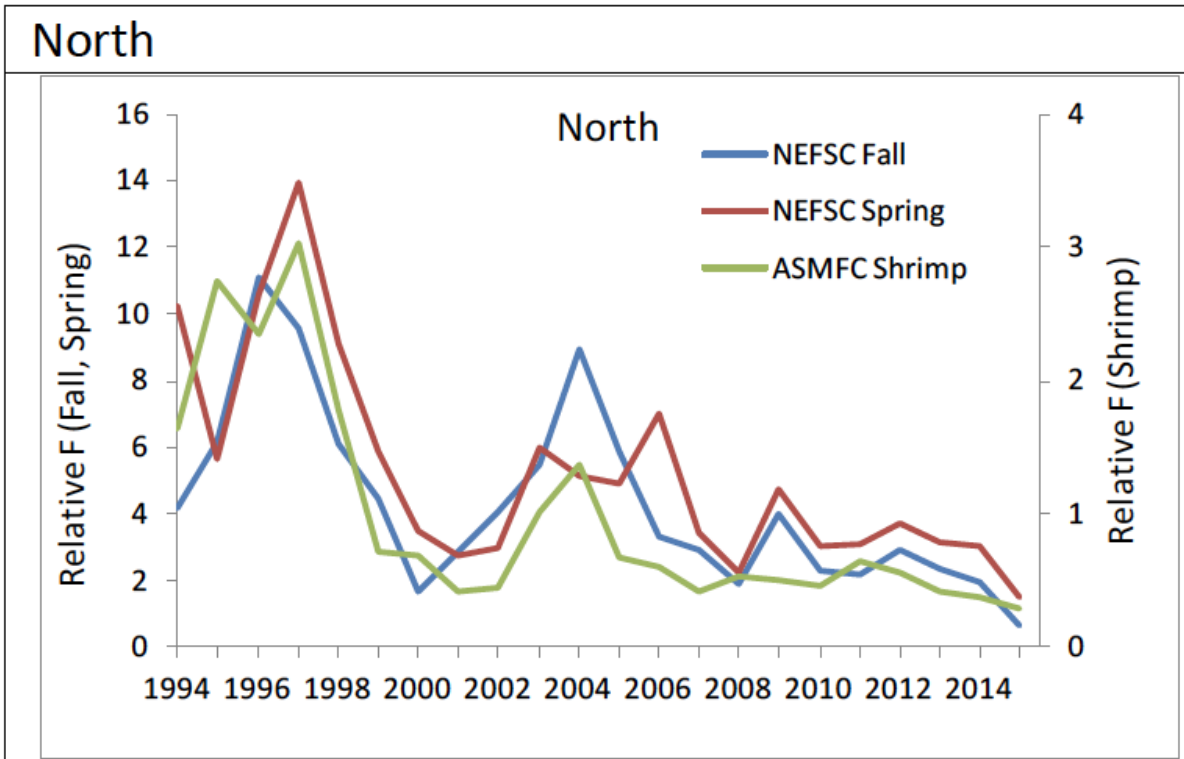


Figure 26: Relative exploitation rates (total catch in numbers/total abundance index) of goosfish in the northern management area (Richards 2016).

## South

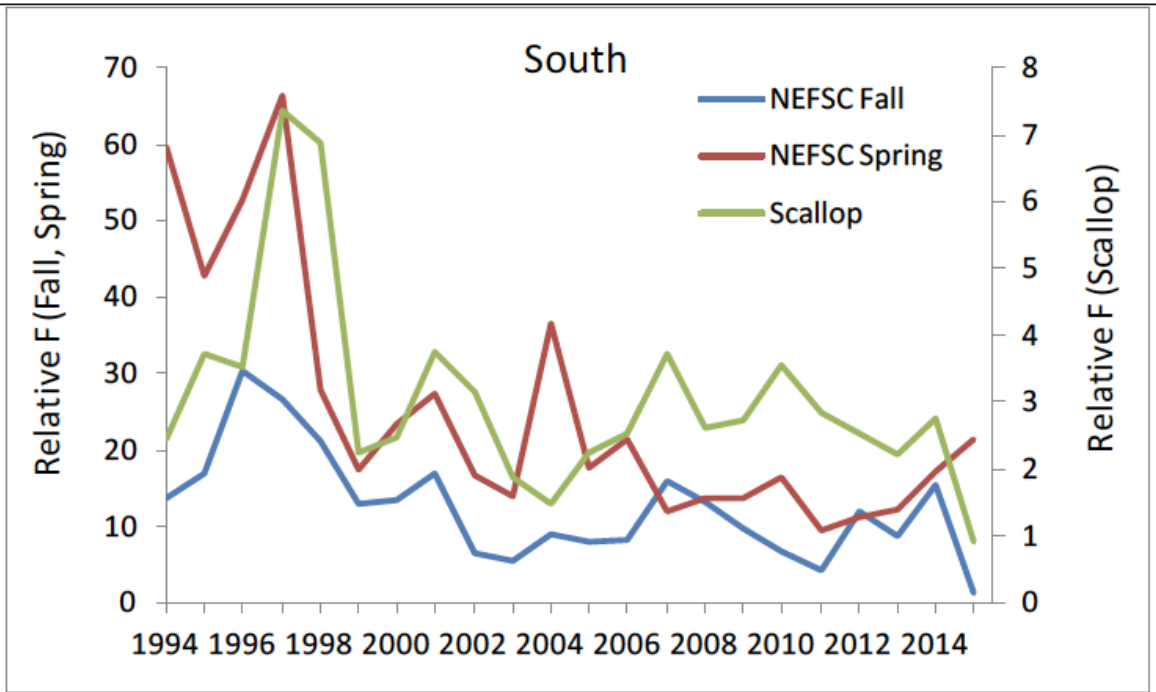


Figure 27: Relative exploitation rates (total catch in numbers/total abundance index) of goosefish in the southern management areas (Richards 2016).

# **Gray seal**

## **Factor 2.1 - Abundance**

### **Northwest Atlantic | Set gillnets | United States | New England**

#### **Moderate Concern**

There is a single population of gray seal in the Northwest Atlantic, found in both the United States and Canada. The size of the population is estimated separately for each country, and mainly reflects the size of the breeding population in each country (Hayes et al. 2021). Based on the 2016 estimate of 27,131 individuals in the U.S. portion of the population, the minimum population estimate is 23,153 (Hayes et al. 2021). Gray seal has recovered from persecution in previous years and is listed as "Least Concern" by the International Union for the Conservation of Nature (IUCN) (Bowen 2016). Based on the IUCN listing, a score of moderate concern is given.

## **Factor 2.2 - Fishing Mortality**

### **Northwest Atlantic | Set gillnets | United States | New England**

#### **Moderate Concern**

The average annual estimated human-caused mortality and serious injury to gray seal during 2014 to 2018 was 4,729 per year, with a potential biological removal (PBR) of 1,389 (Hayes et al. 2021). The U.S. observed fishery accounted for 20% (946/4,729) of the average annual estimated human-caused mortality and serious injury; the sink gillnet fishery accounted for 95% of that percentage (896/946; (Hayes et al. 2021)). The most significant impact on this population comes from the cull of nuisance seals in Canadian waters (average of 3,737 per year from 2014 to 2018) (Hayes et al. 2021). Because PBR is exceeded (mostly due to culling nuisance seals in Canada) and the bottom gillnet fishery is a major contributor, but increasing abundance trends suggest that the population is not being depleted due to this mortality and the total U.S. impacts are below PBR, this factor is considered a moderate concern.

## **Greater shearwater**

### **Factor 2.1 - Abundance**

#### **Northwest Atlantic | Bottom trawls | United States | New England**

##### **Moderate Concern**

The greater shearwater is no longer considered a species of concern by the United States Fish and Wildlife Service and is rated as "Least Concern" by the International Union for the Conservation of Nature (IUCN); however, it is a protected species under the Migratory Bird Treaty Act (USFWS 2018) {IUCN 2017b}. Abundance relative to a sustainable level is unknown for greater shearwater and, based on the IUCN listing, abundance is scored a moderate concern.

### **Factor 2.2 - Fishing Mortality**

#### **Northwest Atlantic | Bottom trawls | United States | New England**

##### **Low Concern**

Fishing mortality of greater shearwater is unknown in the Northwest Atlantic, so the Seafood Watch Unknown By-catch Matrix (UBM) was used to determine a score for the bottom trawl fishery. Seabirds in the Northwest Atlantic caught via bottom trawl receive a score of 4 with the UBM, allowing a score of low concern to be awarded.

# **Haddock**

## **Factor 2.1 - Abundance**

### **Georges Bank Stock | Northwest Atlantic | Bottom trawls | United States | New England**

#### **Very Low Concern**

Based on the 2017 Georges Bank haddock stock assessment, spawning stock biomass (SSB) in 2016 was estimated to be 290,324 mt, which is 278% of the biomass target ( $SSB_{MSY}$  proxy = 104,312; see Figure 28) (Brooks 2017). Because the stock is not overfished and SSB is above the biomass target, abundance is scored a very low concern.

#### **Justification:**

A retrospective adjustment was made for both the determination of stock status and projections of catch in 2018, which changed the 2016 SSB from 549,938 to 290,324 (Brooks 2017).

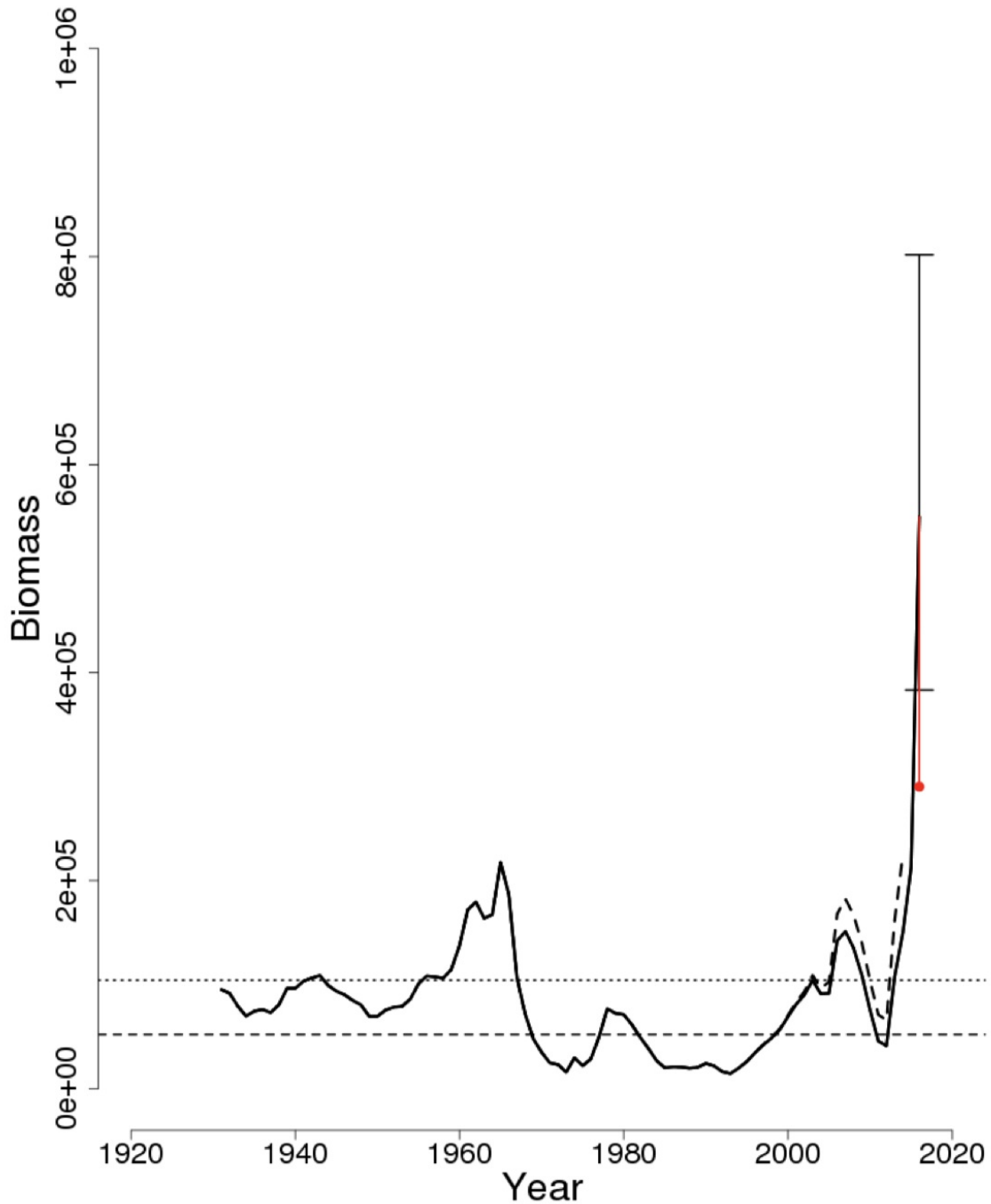


Figure 28: Trends in spawning stock biomass of Georges Bank haddock between 1931 and 2016 from the current (solid line) and previous (dashed line) assessment and the corresponding  $SSB_{THRESHOLD}$  ( $1/2 SSB_{MSY}$  proxy; horizontal dashed line) as well as  $SSB_{TARGET}$  ( $SSB_{MSY}$  proxy; horizontal dotted line) based on the 2015 assessment (Brooks 2017).

## **Gulf of Maine Stock | Northwest Atlantic | Bottom trawls | United States | New England**

### **Very Low Concern**

Based on the 2017 Gulf of Maine haddock stock assessment, spawning stock biomass (SSB) in 2016 was estimated to be 47,821 mt, which is 706% of the biomass target ( $SSB_{MSY}$  proxy = 6,769; see Figure 29) (Palmer 2017b). Because the stock is not overfished and SSB is above the biomass target, abundance is scored a very low concern.

### **Justification:**

The  $M = 0.2$  model has a major retrospective pattern (7-year Mohn's rho SSB = 0.53,  $F = -0.31$ ) and the M-ramp model has a minor retrospective pattern (7-year Mohn's rho SSB = 0.30,  $F = -0.17$ ) (Palmer 2017b). But, following the recommendations of the SARC 55 and 2014 assessment review panels, no retrospective adjustments were made to the terminal model results or in the base catch projections (NEFSC 2013a)(Palmer 2014)(Palmer 2017b). The 2015 assessment review panel (NEFSC 2015b) supported this decision, noting that an adjustment using the 7-year average may not be appropriate.

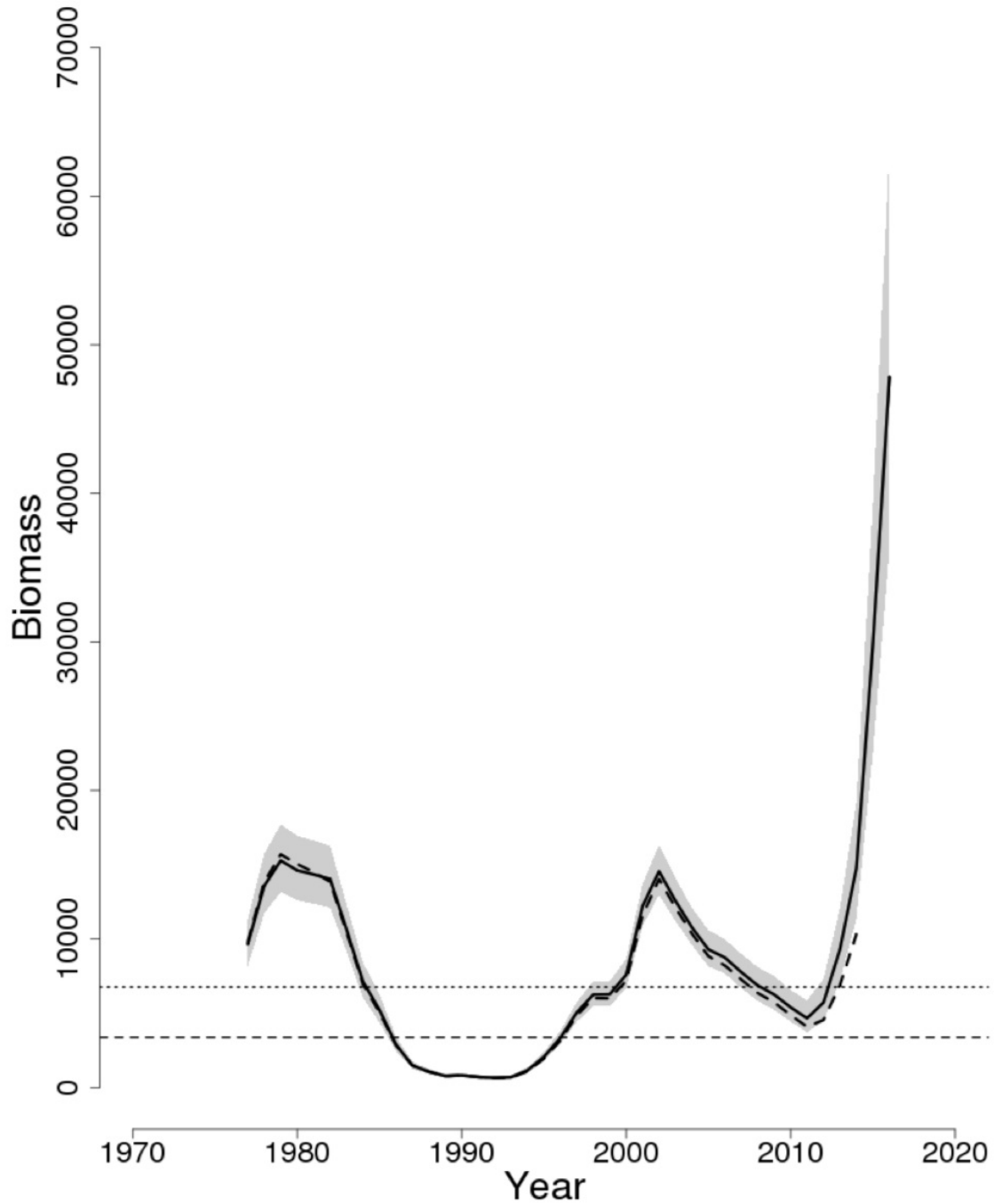


Figure 29: Trends in spawning stock biomass (SSB) of Gulf of Maine haddock between 1977 and 2016 from the current (solid line) and previous (dashed line) assessment and the corresponding  $SSB_{THRESHOLD}$  ( $1/2 SSB_{MSY}$  proxy; horizontal dashed line) as well as  $SSB_{TARGET}$  ( $SSB_{MSY}$  proxy; horizontal dotted line) based on the 2017 assessment. The approximate 90% lognormal confidence intervals are shown (Palmer 2017b).



## **Factor 2.2 - Fishing Mortality**

### **Georges Bank Stock | Northwest Atlantic | Bottom trawls | United States | New England**

#### **Low Concern**

Based on the 2017 Georges Bank haddock stock assessment, the 2016 numbers-weighted average fishing mortality on ages 5 to 7 was estimated to be 0.309, which is 88% of the overfishing threshold proxy ( $F_{MSY}$  proxy = 0.353; see Figure 30) (Brooks 2017). Because the stock is not undergoing overfishing, fishing mortality is scored a low concern.

#### **Justification:**

The  $F_{MSY}$  proxy is expressed as a numbers-weighted average  $F$  on ages 5 to 7 for comparability with the VPA estimated  $F$ . The retrospective adjustment changed the 2016  $F_{5-7}$  from 0.113 to 0.309 (Brooks 2017).

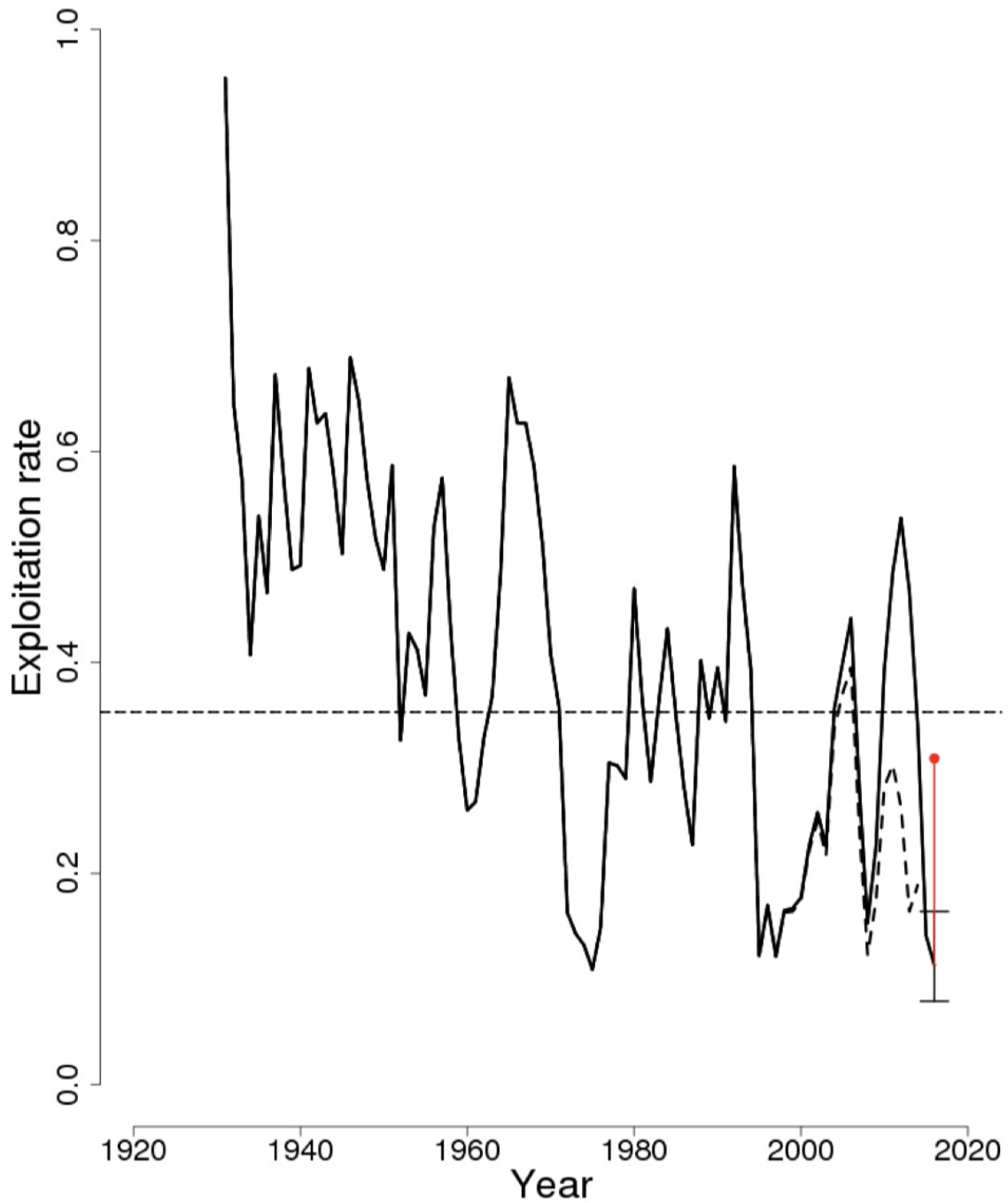


Figure 30: Trends in the numbers weighted fishing mortality ( $F_{5-7}$ ) of Georges Bank haddock between 1931 and 2016 from the current (solid line) and previous (dashed line) assessment and the corresponding  $F_{\text{THRESHOLD}}$  ( $F_{\text{MSY}}$  proxy = 0.353; horizontal dashed line) based on the 2015 assessment (Brooks 2017).

## **Gulf of Maine Stock | Northwest Atlantic | Bottom trawls | United States | New England**

### **Low Concern**

Based on the 2017 Gulf of Maine haddock stock assessment, the 2016 fully selected fishing mortality was estimated to be 0.137, which is 30% of the overfishing threshold proxy ( $F_{MSY}$  proxy =  $F_{40\%}$  = 0.455; see Figure 31) (Palmer 2017b). Because the stock is not undergoing overfishing, fishing mortality is scored a low concern.

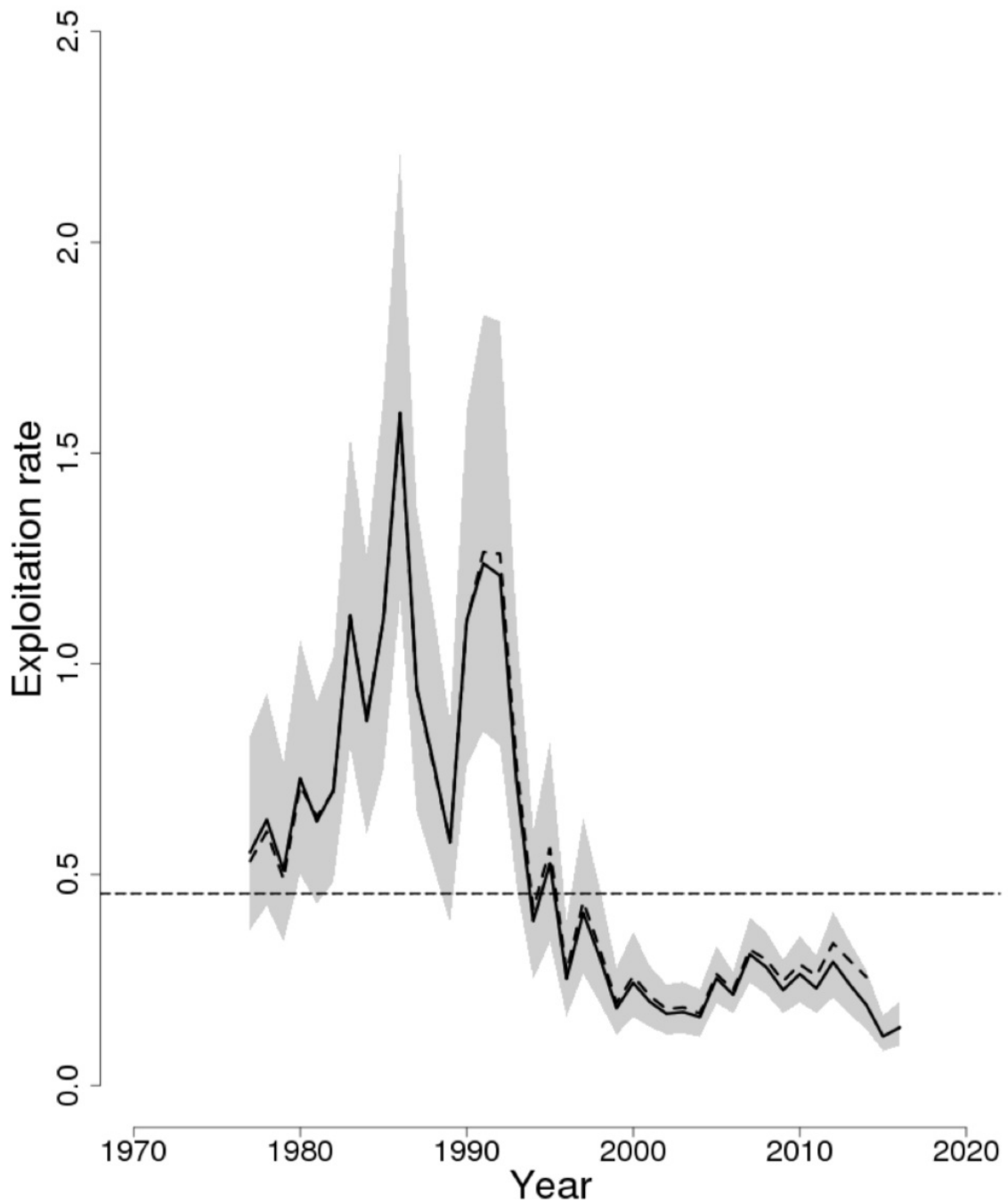


Figure 31: Trends in the fully selected fishing mortality (F) of Gulf of Maine haddock between 1977 and 2016 from the current (solid line) and previous (dashed line) assessment and the corresponding  $F_{\text{THRESHOLD}}$  ( $F_{\text{MSY proxy}} = 0.455$ ; horizontal dashed line) from the 2017 assessment model. The approximate 90% lognormal confidence intervals are shown (Palmer 2017b).

# **Harbor porpoise**

## **Factor 2.1 - Abundance**

### **Northwest Atlantic | Set gillnets | United States | New England**

#### **Moderate Concern**

The best current abundance estimate of the Gulf of Maine/Bay of Fundy harbor porpoise stock is 95,543 individuals (CV = 0.31), with a minimum population size of 74,034, which is from a 2016 U.S. shipboard and aerial survey combined with a DFO aerial survey of the Bay of Fundy and Scotian Shelf {Hayes et al. 2021}. But, the surveyed area may not have covered the entire area of the stock's habitat at the appropriate time of the year, and the current abundance estimate did not account for availability bias due to the submergence of animals. Without a correction for availability bias, the abundance estimate is expected to be biased low {Hayes et al. 2021}. The status of this population relative to the optimum sustainable population (OSP) in the U.S. Atlantic EEZ is unknown, and a trend analysis has not been conducted for this species {Hayes et al. 2021}. The International Union for the Conservation of Nature (IUCN) considers this species as "Least Concern" (Hammond et al. 2008b), and because status and trend analysis are unknown, abundance is considered a moderate concern.

## **Factor 2.2 - Fishing Mortality**

### **Northwest Atlantic | Set gillnets | United States | New England**

#### **Low Concern**

The total annual estimated average fishery-related mortality or serious injury to the harbor porpoise stock during 2014 to 2018 was 150 harbor porpoises (CV = 0.14) from U.S. fisheries, with a potential biological removal (PBR) of 851 (Hayes et al. 2021). The Northeast sink gillnet fishery is by far the primary contributor, accounting for 88% (132/150 individuals) of the total by-catch across all fisheries (Hayes et al. 2021). But, because total U.S. fisheries mortality or serious injury does not exceed PBR, and mortality or serious injury for the bottom gillnet fishery specifically is less than 50% of the PBR, fishing mortality is considered a low concern.

# **Harbor seal**

## **Factor 2.1 - Abundance**

### **Northwest Atlantic | Set gillnets | United States | New England**

#### **Moderate Concern**

The best current abundance estimate of the harbor seal stock is 75,834 (CV = 0.15), with a minimum population size of 66,884, which is from a 2012 survey {Waring et. al. 2015}(Hayes et al. 2021). The status of this population relative to the optimum sustainable population (OSP) in the U.S. Atlantic EEZ is unknown, and a trend analysis has not been conducted for this species (Waring et al. 2015)(Hayes et al. 2021). The International Union for the Conservation of Nature (IUCN) considers this species as "Least Concern" (Lowry 2016), and because status and trend analysis are unknown, abundance is considered a moderate concern.

## **Factor 2.2 - Fishing Mortality**

### **Northwest Atlantic | Set gillnets | United States | New England**

#### **Low Concern**

The total human-caused mortality or serious injury to the harbor seal stock during 2014 to 2018 was 365.2 (351 harbor seals per year from U.S. fisheries), with a potential biological removal (PBR) of 2,006 (Hayes et al. 2021). The Northeast sink gillnet fishery is by far the primary contributor, accounting for 91% (319/351 individuals) of the total by-catch across all fisheries (Hayes et al. 2021). Because PBR is not exceeded, and the sink gillnet fishery does not account for more than 50% of the PBR, fishing mortality is considered a low concern.

## **Hooded seal**

### **Factor 2.1 - Abundance**

#### **Northwest Atlantic | Set gillnets | United States | New England**

##### **High Concern**

The latest stock assessment of hooded seal in the western North Atlantic was conducted in 2007. This assessment produced a best population estimate abundance of 593,500 {Hayes et al. 2019}. An optimum sustainable population (OSP) was not derived; however, the population appeared to be increasing. Nevertheless, the International Union for the Conservation of Nature (IUCN) considers this species as "Vulnerable," with an unknown population trend (Kovacs 2016). Therefore, abundance is considered a high concern.

##### **Justification:**

Although the latest stock assessment for hooded seal in the western North Atlantic indicated that the population was likely increasing, there is good reason to believe that changing sea ice conditions will lead to declines in the future (Kovacs 2016). Assuming that the entire population will decline at 3.7% per year (which is the current West Ice rate of decline), the three-generation reduction would be 75%, which qualifies hooded seal for listing as "Endangered" under criterion A3c (Kovacs 2016). Even if the overall rate of decline were only 1% per year, the three-generation decline would be 32%, which would qualify hooded seal as "Vulnerable" (Kovacs 2016).

### **Factor 2.2 - Fishing Mortality**

#### **Northwest Atlantic | Set gillnets | United States | New England**

##### **Moderate Concern**

The total estimated human-caused annual mortality and serious injury to hooded seal from 2012 to 2016 is 1,680 {Hayes et al. 2019}. The estimated annual human-caused mortality in U.S. waters is 0.6 hooded seals (CV = 1.12) from the observed U.S. fisheries {Hayes et al. 2019}; the potential biological removal (PBR) is unknown. Therefore, less than 0.1% of the total estimated human-caused mortality is due to interactions with U.S. fishing gear. But, because hooded seal has an uncertain population trend, a stock status approaching endangered, and the fishing-related mortalities relative to the PBR are unknown, fishing mortality is considered a moderate concern.

##### **Justification:**

The total estimated human-caused annual mortality and serious injury derives from two components: 1) 1,679 from the 2012 to 2016 average catches of the Northwest Atlantic population of hooded seal by Canada and Greenland; and 2) 0.6 hooded seals (CV = 0.82) from the observed U.S. fisheries {Hayes et al. 2019}.

# **Humpback whale**

## **Factor 2.1 - Abundance**

### **Northwest Atlantic | Set gillnets | United States | New England**

#### **Moderate Concern**

The humpback whale population in the Gulf of Maine stock is estimated to be 1,396 individuals (Hayes et al. 2020). Population trends and the status of the stock relative to the optimum sustainable population (OSP) are unknown. NMFS conducted a global status review of humpback whale (Bettridge et al. 2015) and recently revised the Endangered Species Act (ESA) listing of the species (Federal Register 2016). The final rule indicated that, until the stock delineations are reviewed in light of the Distinct Population Segment (DPS) designations, NMFS would consider stocks that do not fully or partly coincide with a listed DPS as not depleted, for management purposes. Hence, the Gulf of Maine stock (part of the West Indies DPS) is considered not depleted because it does not coincide with any ESA-listed DPS (NOAA 2018b). Globally, humpback whale is considered "Least Concern" by the International Union for the Conservation of Nature (IUCN) {Cooke 2018}. Because humpback whale is not considered endangered or threatened in the Gulf of Maine and is classified as "Least Concern" by the IUCN, abundance is ranked a moderate concern.

## **Factor 2.2 - Fishing Mortality**

### **Northwest Atlantic | Set gillnets | United States | New England**

#### **Moderate Concern**

From 2013 to 2017, the average annual rate of human-caused mortality and serious injury for the Gulf of Maine humpback whale stock was 12.15 whales (7.75 for fishery interactions), which is considered negatively biased due to detection limitations (Hayes et al. 2020). Based on the inference of undetected mortality from annual population estimates, managers determined that it is likely that annual average mortality and serious injury exceeds the potential biological removal (PBR) (22 whales); however, this has yet to be formally determined, and the proportion by nationality or cause is unknown. There is an Unusual Mortality Event in effect (since January 2016) for Atlantic humpback whale due to coast-wide elevated mortality levels in the United States observed from strandings; however, it is likely that these are due to vessel strikes (NOAA 2021). It is estimated that 48–65% of the Gulf of Maine humpback stock have experienced a previous entanglement, based on scarring {Robbins & Mattila 2001}.

The majority of entanglements are not identifiable to fishery, so the proportion of entanglement due to the U.S. gillnet fisheries is unclear. Annual serious injury and mortality during 2013–2017 from unidentified U.S. gillnet interactions was 0.35 (1.6% of PBR), from unidentified gillnet interactions first seen in U.S. waters but unassigned to country was 0.75 (3.4% of PBR), while those not attributable to gear type were 0.75 (3.4% of PBR) in the United States, 3.2 (14.5% of PBR) for those first seen in the United States but unassigned to country, and 0.15 (0.7% of PBR) for those



first seen in Canada but unassigned to country (Hayes et al. 2020).

Of the mortalities documented from 1970 to 2009, 24.5% were attributed to entanglement, 0.8% were attributed to a combination of ship strikes and entanglement, and 57% were due to unknown causes {van der Hoop et al. 2013}. The majority of entanglements are not identifiable to fishery, so the proportion of entanglement due to gillnet fisheries is unclear. Data are lacking regarding fisheries' interactions with the other feeding groups in the Western Atlantic humpback whale population. Because known fisheries mortality does not exceed PBR, but with concern that total fishing mortality likely exceeds PBR and uncertainty in the proportion of contribution from the gillnet fisheries, fishing mortality is considered a moderate concern.

## **Little skate**

### **Factor 2.1 - Abundance**

**Northwest Atlantic | Bottom trawls | United States | New England**

**Northwest Atlantic | Bottom trawls | United States | Mid Atlantic**

**Northwest Atlantic | Set gillnets | United States | New England**

#### **Low Concern**

The 2017 to 2019 NEFSC spring average biomass index of 5.32 kg/tow is above the biomass threshold reference point (3.07 kg/tow), but below the  $B_{MSY}$  proxy (6.15 kg/tow; see Figure 32) (Sosebee 2020). Because the stock is not overfished, and biomass is greater than 75% of the biomass target, abundance is considered a low concern.

#### **Justification:**

For little skate, the  $B_{MSY}$  proxy is defined as the 75th percentile of the appropriate survey biomass index time series for that species.

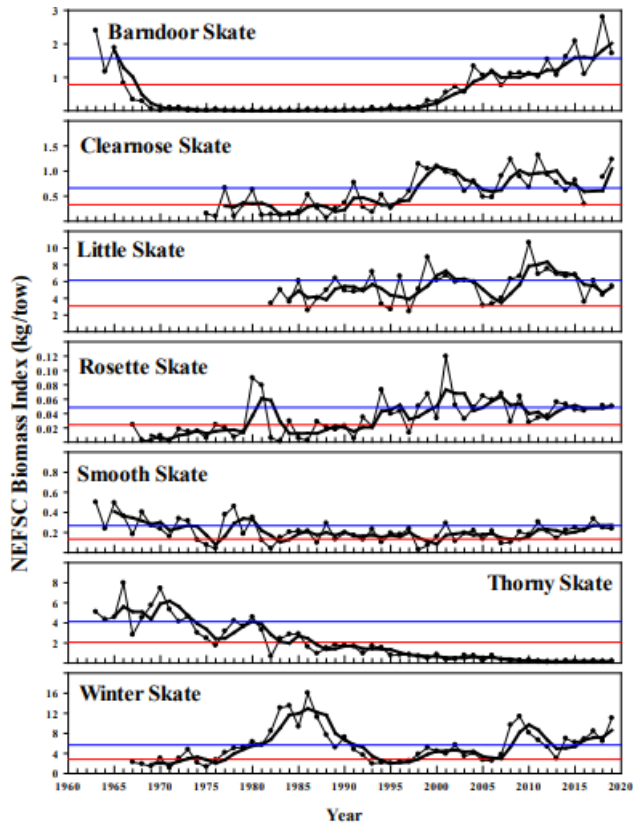


Figure 32: Northeast Fisheries Science Center survey biomass indices (kg/tow). Thin lines with symbols are annual indices, thick lines are 3-year moving averages, and the horizontal lines are the management biomass thresholds and targets. From (Sosebee 2020).

## Factor 2.2 - Fishing Mortality

**Northwest Atlantic | Bottom trawls | United States | New England**

**Northwest Atlantic | Bottom trawls | United States | Mid Atlantic**

**Northwest Atlantic | Set gillnets | United States | New England**

### Low Concern

The 2017 to 2019 average index is above the 2016 to 2018 average by 13.4% (Sosebee 2020). Because the stock is not undergoing overfishing, fishing mortality is considered a low concern.

### Justification:

The fishing mortality reference points are based on changes in the 3-year survey biomass indices. If there is a decline in the 3-year moving average of the survey biomass index that is greater than the average CV of the survey time series, then fishing mortality is assumed to be greater than  $F_{MSY}$ , and overfishing is occurring for that skate species (Sosebee 2020).

# **Loggerhead turtle**

## **Factor 2.1 - Abundance**

### **Mid Atlantic Stock | Northwest Atlantic | Bottom trawls | United States**

#### **High Concern**

Loggerhead turtle continues to be listed as "Threatened" in the Northwest Atlantic (NOAA Fisheries 2017). Therefore, based on conservation status, this factor is considered a high concern.

#### **Justification:**

Loggerhead turtle nesting numbers have declined in all but one of the nine major rookeries that likely contribute turtles to the population in the Northwest Atlantic, although the cause of the decline could be related to a number of factors, including recruitment failures in previous years, increased nesting of first-time females (which have fewer broods with fewer eggs), ship strikes, and fishing mortalities (TEWG 2009).

## **Factor 2.2 - Fishing Mortality**

### **Mid Atlantic Stock | Northwest Atlantic | Bottom trawls | United States**

#### **Low Concern**

Loggerhead turtle is known to interact with bottom trawl, gillnet, and pot/trap fisheries. The most recent Biological Opinion for the Atlantic flatfish fishery used information from (Murray 2020) and data from the Sea Turtle Disentanglement Network (STDN) to estimate that 954 loggerhead turtles will interact with non-shrimp bottom trawl fisheries in the U.S. Atlantic region over a 5-year period, resulting in 477 mortalities (NMFS 2021a). It is uncertain what the impact of fishing activities in the region are on the loggerhead turtle population; however, it is not anticipated that flatfish fisheries will appreciably affect the population, because the estimated number of mortalities is  $\approx 0.7\%$  of the population, based on an estimate of the adult population (38,334 from {Richards et al. 2011}) (NMFS 2021a). Because flatfish fisheries are not expected to negatively affect loggerhead turtle populations, a score of low concern is given.

## **Longfin squid**

### **Factor 2.1 - Abundance**

#### **Northwest Atlantic | Bottom trawls | United States | Mid Atlantic**

##### **Low Concern**

According to the most recent updated stock assessment for longfin squid, the stock is not overfished, with an average annual biomass of 73,762 during 2015 to 2016 {Hendrickson 2017b}. This was above the threshold  $B_{MSY}$  proxy of 21,203 mt and the target  $B_{MSY}$  proxy of 42,205 mt {Hendrickson 2017b}. Because squid is a highly fluctuating species and it is difficult to determine definitive reference points, but annual biomass was above both determined proxies, a score of low concern was awarded.

### **Factor 2.2 - Fishing Mortality**

#### **Northwest Atlantic | Bottom trawls | United States | Mid Atlantic**

##### **Moderate Concern**

According to the Mid-Atlantic Fishery Management Council's 2018 Fishery Information Document, it is unknown whether or not longfin squid is experiencing overfishing (MAFMC 2018d). Because of this unknown status, a score of moderate concern is awarded.

# **Long-finned pilot whale**

## **Factor 2.1 - Abundance**

**Northwest Atlantic | Bottom trawls | United States | New England**

**Northwest Atlantic | Set gillnets | United States | New England**

### **Moderate Concern**

The best available estimate for long-finned pilot whale in the western North Atlantic is 39,215 (CV = 0.30), with a minimum population size of 30,627 (Hayes et al. 2020). This estimate is from the U.S. summer 2016 surveys combined with the DFO Canada summer 2016 survey, providing coverage from Virginia to Labrador (Hayes et al. 2020). The status of this stock relative to the optimum sustainable population (OSP) in the U.S. Atlantic EEZ is unknown, and there are insufficient data to determine population trends. The International Union for the Conservation of Nature (IUCN) considers this species as "Least Concern" {Minton et al. 2018}, so abundance is considered a moderate concern.

## **Factor 2.2 - Fishing Mortality**

**Northwest Atlantic | Bottom trawls | United States | New England**

### **Low Concern**

The total annual observed average fishery-related mortality or serious injury during 2013 to 2017 was 21 for long-finned pilot whale (CV = 0.15), with a potential biological removal (PBR) of 306 (Hayes et al. 2020). The Northeast bottom trawl fishery is the primary contributor, accounting for 71% (15/21 individuals) of the total by-catch across all fisheries (Hayes et al. 2020). Because the PBR is not exceeded, and the bottom trawl fishery accounts for less than 50% of the PBR, fishing mortality is considered a low concern.

**Northwest Atlantic | Set gillnets | United States | New England**

### **Low Concern**

The total annual observed average fishery-related mortality or serious injury during 2013 to 2017 was 21 for long-finned pilot whale (CV = 0.15), with a potential biological removal (PBR) of 306 (Hayes et al. 2020). The Northeast bottom trawl fishery is the primary contributor, accounting for 71% (15/21 individuals) of the total by-catch across all fisheries (Hayes et al. 2020). Because the PBR is not exceeded, and the sink gillnet fishery accounts for less than 10% of the PBR, fishing mortality is considered a low concern.

# **Minke whale**

## **Factor 2.1 - Abundance**

### **Northwest Atlantic | Set gillnets | United States | New England**

#### **Moderate Concern**

The Canadian East Coast minke whale stock size is estimated to be 21,968 individuals (17,022 minimum population estimate) (Hayes et al. 2021). The abundance estimate is uncertain because it utilizes an availability bias correction for which accuracy and precision are unknown. Abundance relative to reference points is uncertain. But, this species is classified by the International Union for the Conservation of Nature (IUCN) as "Least Concern" {Cooke 2018}, so abundance is rated a moderate concern.

## **Factor 2.2 - Fishing Mortality**

### **Northwest Atlantic | Set gillnets | United States | New England**

#### **Low Concern**

During 2014 to 2018, the average annual minimum detected human-caused mortality and serious injury was 10.55 minke whales per year, with a potential biological removal (PBR) of 170 (Hayes et al. 2021). The minimum detected average annual mortality and serious injury was 9.15 minke whales (3.15 United States, 2.85 Canada, 2.05 unassigned but first reported in the United States, and 0.9 unassigned but first reported in Canada), and in most cases where gear was recovered and identified, it was due to a sink gillnet fishery (Hayes et al. 2021). Because the PBR is not exceeded, and the sink gillnet fishery accounts for less than 50% of the PBR, fishing mortality is considered a low concern.

## **North Atlantic right whale**

### **Factor 2.1 - Abundance**

#### **Northwest Atlantic | Set gillnets | United States | New England**

##### **High Concern**

The western Atlantic stock of North Atlantic right whale is listed as “Endangered” under the Endangered Species Act (ESA), and it is considered “Critically Endangered” by the International Union for the Conservation of Nature (IUCN) (Cooke 2020) because it is “considered to be facing an extremely high risk of extinction in the wild” (IUCN 2012). Minimum abundance from the most recent stock assessment was estimated at 364 individuals (best estimate 368) (Hayes et al. 2022), while the best estimate of the population from the North Atlantic Whale Consortium was 336 individuals at the end of 2020 {Pettis et al. 2022}. There are fewer reproductive females producing fewer calves each year, with experts estimating that there are 88 or fewer reproductively active females remaining {Pettis et al. 2022}{NOAA 2022c}. The population has been declining since 2011 and calving rates have been low (2017–2019 calving rates averaged four per season, which is <33% of the previous annual average). But in 2020, calving increased (10 calves sighted; 1 involved in a vessel strike) (Pace et al. 2017){NOAA 2020b}. The cause of reduced productivity is unknown but several factors are likely contributing to the declining health of North Atlantic right whale, including climate-related shifts in prey distribution, anthropogenic noise, pollution, vessel strikes, and entanglement in fishing gear (Pace et al. 2017){NOAA 2019c}. Because the North Atlantic right whale is considered “Critically Endangered” by the IUCN, abundance is rated a high concern.

### **Factor 2.2 - Fishing Mortality**

#### **Northwest Atlantic | Set gillnets | United States | New England**

##### **High Concern**

The western Atlantic stock of the North Atlantic right whale (NARW) is considered a strategic stock because annual serious injury and mortality (SIM) (7.7 from all sources; 5.7 attributed to fisheries entanglement from 2015 to 2019) exceeds the potential biological removal (PBR) (0.7 whales) (Hayes et al. 2022). Due to a lack of information, it is often not possible to assign entanglements to a specific fishery. Documented entanglements from 2015 to 2019 involving pot/trap gear or unidentified gear are all attributed to unknown fisheries, of which the flatfish fishery may be a part. Annual SIMs attributed to entanglements in pot/trap gear in Canadian fisheries were 1.95 (279% of PBR), while none were attributed to pot/trap gear in United States fisheries. Serious injuries and mortalities first seen in the United States but not attributable to country were 2.65 (379% of PBR), and those first seen in Canada but not attributable to country were 1.05 (150% of PBR) (Hayes et al. 2022). In 2014, there was one SIM (0.2 average annual serious injuries and mortality, 29% of PBR) that was first seen in the U.S. but not attributable to country, and it was most likely caused by entanglement in netting gear {Sharp et al. 2019 Supplemental}{Sharp et al. 2019}.



Vessel strikes and entanglement (from pot/trap and anchored gillnet fisheries) are the two leading causes of mortality and serious injury to North Atlantic right whale, with entanglements increasing over the past decade (Moore 2019). Rope strengths have increased in recent decades (based on data from 1994 to 2010), leading to reduced escape success from entangling gear {Knowlton et al. 2016}. Sinking groundline (2009) and vertical line (2015) regulations have been implemented, resulting in gear configuration changes for which the effects on mitigation of whale entanglement have yet to be determined. Because of limited observation coverage, it is likely that the number of entanglements is severely underestimated {Kraus et al. 2019}. Based on mark-recapture studies through photo identification, <50% of entanglement-related mortality is estimated to be detected, with these same studies demonstrating that 59% of North Atlantic right whales have been entangled more than once (83% at least once), and new scars from entanglement are observed annually for at least 26% of the observed population {Knowlton et al. 2012}.

More than 90% of entanglements (based on 2010–2016 data and partial data for 2016/2017) are not linked to gear (7.8% of entangled NARW carry gear) and only 12% of those are linked to a location {Knowlton et al. 2012}{Knowlton et al. 2019}{Kraus et al. 2019}. Fisheries interactions with North Atlantic right whale have been documented with gillnet fisheries (15% of entanglements attributed to gillnets from 1984 to 2016) {Kraus et al. 2019}. An entanglement that results in gear remaining attached to the whale places an energetic strain that can compromise overall fitness and reproduction {van der Hoop et al. 2016}. Also, a new paper shows that whale lengths have been decreasing due to fishing gear entanglements and vessel strikes since 1981, possibly leading to reduced reproductive success and increased probability in the lethality of entanglements {Stewart et al. 2021}. Challenges in identifying the fishery involved in an entanglement occur due to ineffective gear marking (gear recovered from an entanglement does not carry a mark identifying the gear type, target species, and/or location) or the inability to recover gear from the entangled whale. A recent study estimated that, from 2010 to 2017, the carcass detection rate (how many whale deaths were identified) was 29% {Pace et al. 2021}. Pace et al. (2021) also concluded that, of the cryptic mortalities, the majority were likely caused by entanglement rather than blunt force trauma from vessel strikes.

An Unusual Mortality Event is in effect (since June 2017) for North Atlantic right whale, which includes 34 mortalities (21 in Canada and 13 in the United States, based on the location of stranding, not the location of mortality) through December 2021 (NOAA 2021). Mortalities are attributed to a combination of human interactions including vessel strikes and rope entanglement (final results are pending; however, preliminary investigations list 11 suspected as vessel strikes, 9 suspected as entanglement, 13 as pending or unknown causes, and 1 as perinatal mortality) (NOAA 2021) (see Figure 33 in Justification).

The Northeast sink gillnet is classified as a Category I fishery by NOAA (NMFS 2018c). Cumulative SIMs far exceed PBR and entanglements due to unknown fisheries are considered a significant contributor. Until there is more specific information available regarding which fisheries are responsible for the unattributed entanglements, Seafood Watch considers that all relevant fisheries that may overlap with NARW pose risks. Based on the available information and the significant risks to NARW, the sink gillnet fishery cannot be considered sustainable, and fishing mortality is scored a high concern.

**Justification:**

Distributional shifts in the abundance of North Atlantic right whale (NARW) across its range may lead to shifts in regional fisheries interactions and entanglement risks. Based on data from passive acoustic monitoring (2004–2014), North Atlantic right whale is highly mobile and has a continuous year-round presence across its geographic range {Davis et al. 2017}. In recent years (2010–2014), there has been a distributional shift, with presence increased in the Southern New England and mid-Atlantic regions and decreased in the Scotian Shelf and greater Gulf of Maine. Visual surveys in Canadian waters reported increased presence farther north in the Gulf of St. Lawrence, which may be related to increased fisheries interactions with North Atlantic right whale in Canada {Meyer-Gutbrod et al. 2018}. A recent study of individual whales identified in the Gulf of St. Lawrence found that there was a high return rate from year to year, indicating that this is an important feeding area for a specific group of NARW (Crowe et al. 2021). The study also found that, in 2019, a total of 137 individual NARW were estimated to have visited the Gulf of St. Lawrence (Crowe et al. 2021), which was 38% of the estimated 356 NARW alive at the end of 2019 (Pettis et al. 2021). Although this identifies the Gulf of St. Lawrence as an important foraging area for a significant proportion of the population, it does raise uncertainty regarding the location of the remaining individuals and the concern that they may be in areas that are offered less protection (Crowe et al. 2021).

In 2017, an Unusual Mortality Event for North Atlantic right whale was observed in the region (NOAA 2020). It is unclear if distributional shifts are due to environmental or anthropogenic effects; however, warming temperatures and shifting prey distributions are thought to play a part in the change {Meyer-Gutbrod et al. 2018}. The primary prey (*Calanus finmarchicus*) of the North Atlantic right whale currently remains in highest abundance in the western Gulf of Maine {Record et al. 2019}.

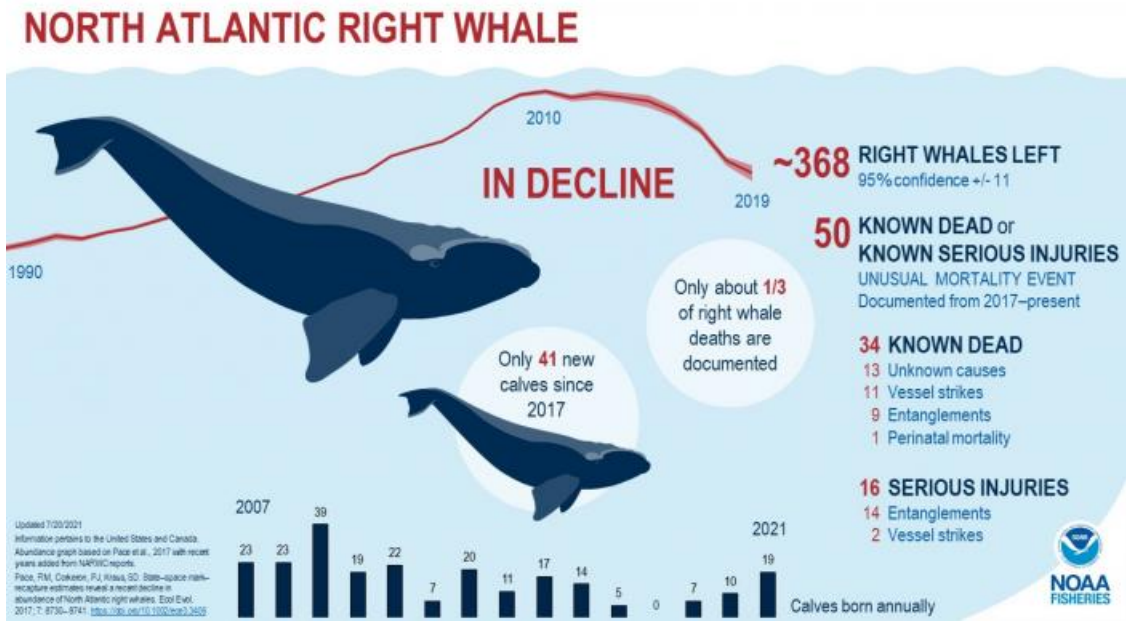


Figure 33: An infographic showing best estimates of current North Atlantic right whale population numbers and causes of death during the current Unusual Mortality Event, 2017 to present. (NOAA 2021)

# **Risso's dolphin**

## **Factor 2.1 - Abundance**

**Northwest Atlantic | Bottom trawls | United States | Mid Atlantic  
Northwest Atlantic | Set gillnets | United States | New England**

### **Moderate Concern**

The best abundance estimate for Risso's dolphin is the sum of the estimates from the 2016 surveys: 35,493 (CV = 0.19), with a minimum population estimate of 30,289 (Hayes et al. 2020). The status of this stock relative to the optimum sustainable population (OSP) in the U.S. Atlantic EEZ is unknown, and there are insufficient data to determine population trends (Hayes et al. 2020). The International Union for the Conservation of Nature (IUCN) considers this species as "Least Concern" (Taylor et al. 2012), and because status and trend analysis are unknown, abundance is considered a moderate concern.

## **Factor 2.2 - Fishing Mortality**

**Northwest Atlantic | Bottom trawls | United States | Mid Atlantic**

### **Low Concern**

The total annual estimated average fishery-related mortality or serious injury to the Risso's dolphin stock during 2013–2017 was 54.3 individuals (53.9 from fisheries), with a potential biological removal (PBR) of 303 (Hayes et al. 2020). The Mid-Atlantic bottom trawl fishery accounts for only 68.6% of the total U.S. fishery-related serious injury and mortality (37/53.9 individuals; {Hayes et al 2020}). Because PBR is not exceeded, and the bottom trawl fishery accounts for less than 50% of the PBR, fishing mortality is considered a low concern.

**Northwest Atlantic | Set gillnets | United States | New England**

### **Low Concern**

The total annual estimated average fishery-related mortality or serious injury to the Risso's dolphin stock from 2013 to 2017 was 54.3 individuals (53.9 from fisheries), with a potential biological removal (PBR) of 303 (Hayes et al. 2020). The Northeast sink gillnet fishery accounts for only 11% of the total U.S. fishery-related serious injury and mortality (5.8/53.9 individuals) (Hayes et al. 2020). Because PBR is not exceeded, and the sink gillnet fishery accounts for less than 50% of the PBR, fishing mortality is considered a low concern.

# **Scup**

## **Factor 2.1 - Abundance**

### **Northwest Atlantic | Bottom trawls | United States | Mid Atlantic**

#### **Very Low Concern**

The most recent stock assessment update has been conducted in 2019, with data from 2018 {NEFSC 2020}. Abundance data have been consistently collected over the years {NMFS & NEFSC 2017}. Because there is a recent stock assessment and update for scup that has been published by the Northeast Fisheries Science Center, and spawning stock biomass (SSB) has been well above the target reference threshold set for the scup fishery, abundance has been scored a very low concern.

#### **Justification:**

In 2018, the SSB was 186,578 mt, which was higher than the updated  $SSB_{MSY}$  or  $SSB_{40\%}$ , indicating that the stock is not overfished {NEFSC 2020}. The fishing mortality on the fully selected age 3 fish was 0.158 in 2018, which is lower than the updated biological reference point of  $F_{MSY}$  or  $F_{40\%}$ , indicating that the stock is not being overfished {NEFSC 2020}. The fishery is being well managed by NOAA Fisheries, the Mid-Atlantic Fishery Management Council, and the Atlantic States Marine Fisheries Commission. Nevertheless, the fishery needs to be closely watched in the future because SSB is projected to further decrease unless recruitment to the stock increases {NEFSC 2020}.

## **Factor 2.2 - Fishing Mortality**

### **Northwest Atlantic | Bottom trawls | United States | Mid Atlantic**

#### **Low Concern**

The fishing mortality on the fully selected age 3 fish was 0.158 in 2018, which is lower than the updated biological reference point of  $F_{MSY}$  or  $F_{40\%}$ , indicating that the stock is currently not being overfished {NEFSC 2020}. The fishery is being well managed by NOAA Fisheries, the Mid-Atlantic Fishery Management Council, and the Atlantic States Marine Fisheries Commission. Nevertheless, fishing mortality needs to be closely monitored in the future because SSB is projected to further decrease unless recruitment to the stock increases {NEFSC 2020}. Because there is currently a probable chance that the fishing mortality from all sources is below the biological target reference point of  $F_{MSY}$  or  $F_{40\%}$  that has been set specifically for the scup fishery, fishing mortality has been set a low concern.

#### **Justification:**

In the early 1990s, fishing pressure was high and the scup spawning stock biomass was low (Figure 4, {NMFS & NEFSC 2017}). Consequently, the stock was overfished and overfishing was occurring. Gradually, the fishing pressure on the stock was reduced from the mid-1990s to 2000 and beyond. The stock likely responded to the reduced fishing pressure due to management strategies put in

place between 2005 and 2009.

Per the 2018 assessment, fishing mortality on the fully selected age 3 fish was 0.158, which is lower than the updated biological reference point of  $F_{40\%}$ , which was set to 0.215, indicating that the stock is not being overfished (Figure 5, {NEFSC 2020}). But, managers must be cautious in the future to ensure that fishing pressure does not increase.

# **Short-beaked common dolphin**

## **Factor 2.1 - Abundance**

**Northwest Atlantic | Bottom trawls | United States | Mid Atlantic  
Northwest Atlantic | Bottom trawls | United States | New England**

### **Moderate Concern**

The current best abundance estimate for short-beaked common dolphin in the Northwest Atlantic is 172,947 (CV = 0.21), with a minimum population size of 145,216 (Hayes et al. 2021). This estimate is derived from 2016 shipboard and aerial surveys in the United States and Canada and covers most of the population's range. The status of common dolphin relative to the optimum sustainable population (OSP) in the U.S. Atlantic EEZ is unknown, and population trends have not been investigated (Hayes et al. 2021). The International Union for the Conservation of Nature (IUCN) considers this species as "Least Concern" {Braulik et al. 2021}, and because status and trend analysis are unknown, abundance is considered a moderate concern.

## **Factor 2.2 - Fishing Mortality**

**Northwest Atlantic | Bottom trawls | United States | Mid Atlantic  
Northwest Atlantic | Bottom trawls | United States | New England**

### **Low Concern**

The total annual estimated average fishery-related mortality or serious injury to the short-beaked common dolphin stock during 2014 to 2018 was 399 (CV = 0.10), with a potential biological removal (PBR) of 1,452 (Hayes et al. 2021). The Northeast bottom trawl fishery accounted for only 4.3% of the total U.S. fishery-related serious injury and mortality (17/399 individuals), whereas the Northeast sink gillnet fishery accounted for 24.6% (98/399 individuals) (Hayes et al. 2021). Because PBR is not exceeded, and neither the bottom trawl fishery nor the set gillnet fishery accounts for more than 50% of the PBR, fishing mortality is considered a low concern.

# Smooth skate

## Factor 2.1 - Abundance

### Northwest Atlantic | Set gillnets | United States | New England

#### Low Concern

For smooth skate, the 2017 to 2019 NEFSC autumn average biomass index of 0.27 kg/tow is above the biomass threshold reference point (0.134 kg/tow) and meets the  $B_{MSY}$  proxy (0.27 kg/tow; see Figure 34) (Sosebee 2020). Because the stock is not overfished and biomass meets the target biomass, but there is uncertainty in the use of survey indices, abundance is considered a low concern (rather than a very low concern).

#### Justification:

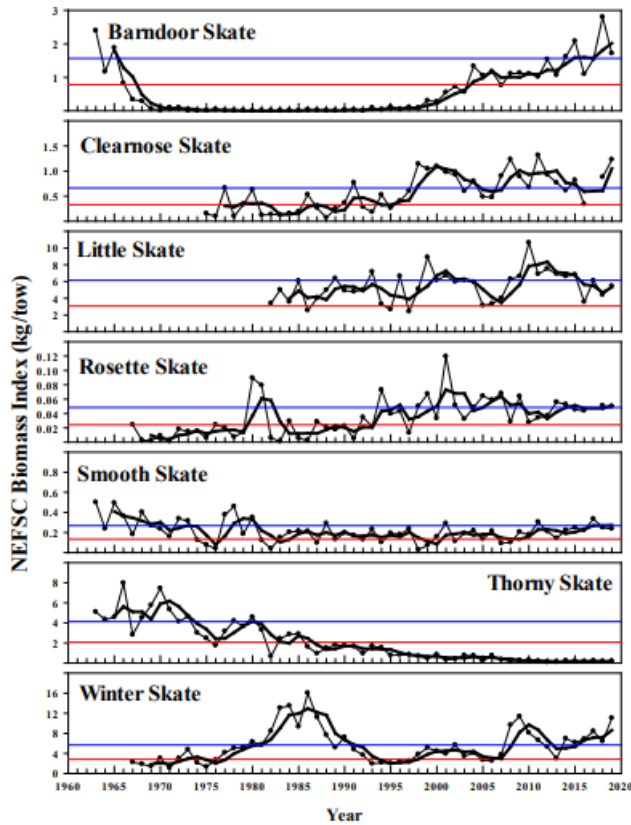


Figure 34: Northeast Fisheries Science Center survey biomass indices (kg/tow). Thin lines with symbols are annual indices, thick lines are 3-year moving averages, and the thin horizontal lines are the management biomass thresholds and targets. From (Sosebee 2020).



## **Factor 2.2 - Fishing Mortality**

### **Northwest Atlantic | Set gillnets | United States | New England**

#### **Low Concern**

For smooth skate, the 2017 to 2019 index is consistent with the 2016 to 2018 index (Sosebee 2020). Because the stock is not undergoing overfishing, fishing mortality is considered a low concern.

#### **Justification:**

The fishing mortality reference points are based on changes in survey biomass indices. If the 3-year moving average of the survey biomass index for a skate species declines by more than the average CV of the survey time series, then fishing mortality is assumed to be greater than  $F_{MSY}$  and overfishing is occurring for that skate species (Sosebee 2020).

## **Sooty shearwater**

### **Factor 2.1 - Abundance**

#### **Northwest Atlantic | Bottom trawls | United States | New England**

##### **High Concern**

The sooty shearwater is not listed as “Endangered” or “Threatened”; however, it is listed as “Near Threatened” by the International Union for the Conservation of Nature (IUCN) (Birdlife International 2019) and is a protected species under the Migratory Bird Treaty Act (USFWS 2018). Abundance relative to a sustainable level is unknown for greater shearwater and, based on the “Near Threatened” status, sooty shearwater scores a high concern for abundance.

### **Factor 2.2 - Fishing Mortality**

#### **Northwest Atlantic | Bottom trawls | United States | New England**

##### **Low Concern**

Fishing mortality of sooty shearwater is unknown in the Northwest Atlantic, so the Seafood Watch Unknown By-catch Matrix (UBM) was used to determine a score for the bottom trawl fishery. Seabirds in the Northwest Atlantic caught via bottom trawl receive a score of 4 with the UBM, allowing a score of low concern to be awarded.

## **Spiny dogfish**

### **Factor 2.1 - Abundance**

**Northwest Atlantic | Bottom trawls | United States | Mid Atlantic**  
**Northwest Atlantic | Bottom trawls | United States | New England**  
**Northwest Atlantic | Set gillnets | United States | New England**

#### **Moderate Concern**

The most recent estimate of spawning stock biomass (SSB) for spiny dogfish in the U.S. Atlantic is 106.8 kt, which is greater than the established limit reference point for the stock ( $SSB_{THRESHOLD} = 79.6$  kt) {Sosebee & Rago 2018}. But, SSB is less than 75% of the established target reference point ( $SSB_{TARGET} = 159.3$  kt), so abundance is scored a moderate concern.

### **Factor 2.2 - Fishing Mortality**

**Northwest Atlantic | Bottom trawls | United States | Mid Atlantic**  
**Northwest Atlantic | Bottom trawls | United States | New England**  
**Northwest Atlantic | Set gillnets | United States | New England**

#### **Low Concern**

The largest contributors to total fishing mortality of spiny dogfish are United States commercial fisheries, which landed 10,949 mt in 2017; recreational, Canadian, and foreign fleets landed 130 mt collectively in the same year {Sosebee & Rago 2018}. Fishing mortality in 2017 was estimated to be 0.202, which is lower than the established target reference point ( $F_{MSY} = 0.2439$ ), so fishing mortality is scored a low concern.

# Thorny skate

## Factor 2.1 - Abundance

**Northwest Atlantic | Bottom trawls | United States | Mid Atlantic  
Northwest Atlantic | Bottom trawls | United States | New England  
Northwest Atlantic | Set gillnets | United States | New England**

### High Concern

For thorny skate, the 2017 to 2019 NEFSC autumn average biomass index of 0.18 kg/tow is well below the biomass threshold reference point (2.06 kg/tow; see Figure 35) (Sosebee 2020). Because the stock is overfished, abundance is considered a high concern.

### Justification:

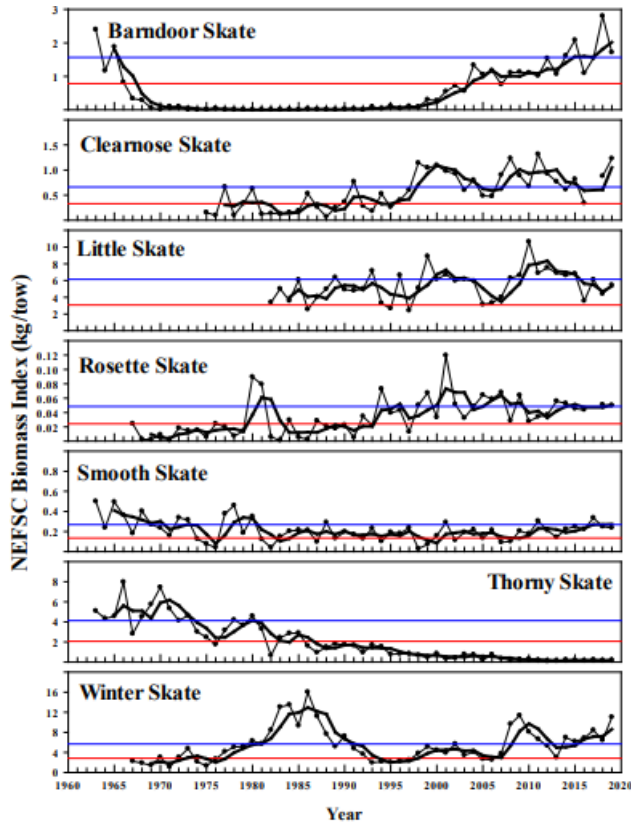


Figure 35: Northeast Fisheries Science Center survey biomass indices (kg/tow). Thin lines with symbols are annual indices, thick lines are 3-year moving averages, and the thin horizontal lines are the management biomass thresholds and targets. From (Sosebee 2020).

Thorny skate is a data-poor species, and bottom trawls are known to have poor catchability for the species (Walsh 1992). Recent efforts to enhance fisheries surveys in the Northwest Atlantic by using

benthic longline surveys on rough bottom show that the biomass of thorny skate may be higher than would have been expected from the trawl survey data (see Figure 36; presentation by Dave McElroy at NOAA’s National Marine Fisheries Service 2018).

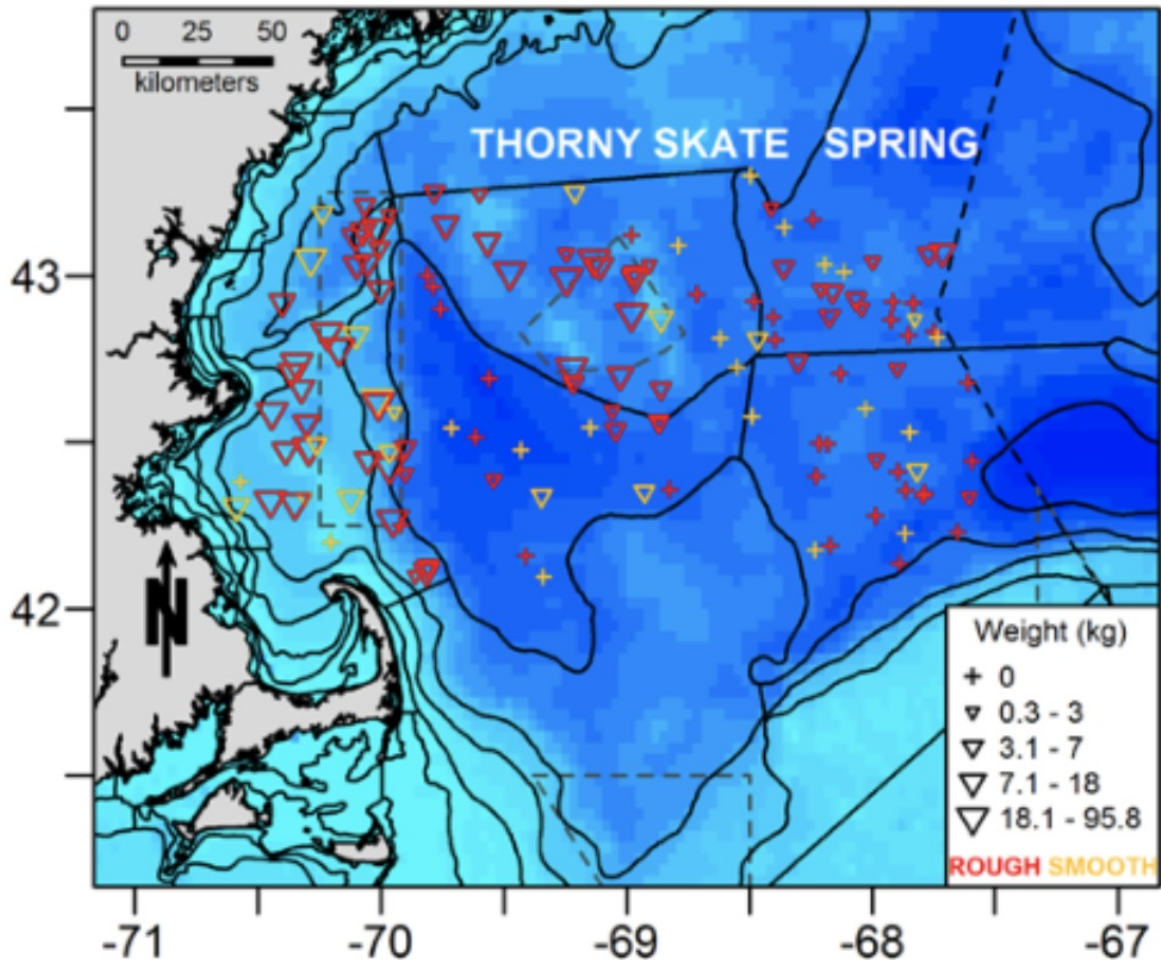


Figure 36: Benthic longline surveys of thorny skate on rough and smooth bottom in the Northwest Atlantic showing that the biomass of thorny skate may be higher than would have been expected from the trawl survey data. The red symbols represent survey efforts on rough bottom where the trawl survey does not reach. The yellow symbols represent survey efforts on smooth bottom where the trawl survey goes (presentation by Dave McElroy at NOAA’s National Marine Fisheries Service 2018).

**Factor 2.2 - Fishing Mortality**

**Northwest Atlantic | Bottom trawls | United States | Mid Atlantic  
 Northwest Atlantic | Bottom trawls | United States | New England  
 Northwest Atlantic | Set gillnets | United States | New England**

**Low Concern**

For thorny skate, the 2017 to 2019 index is higher than the 2016 to 2018 index by 11.4% (Sosebee

2020). Because the stock is not undergoing overfishing, fishing mortality is considered a low concern.

**Justification:**

The fishing mortality reference points are based on changes in survey biomass indices. If the 3-year moving average of the survey biomass index for a skate species declines by more than the average CV of the survey time series, then fishing mortality is assumed to be greater than  $F_{MSY}$  and overfishing is occurring for that skate species (Sosebee 2020).

# **Windowpane flounder**

## **Factor 2.1 - Abundance**

### **Gulf of Maine / Georges Bank Stock | Northwest Atlantic | Bottom trawls | United States | New England**

#### **High Concern**

Based on the 2017 northern windowpane flounder stock assessment, the mean NEFSC fall bottom trawl survey index from years 2014, 2015, and 2016 (a 3-year moving average is used as a biomass index, B) was 0.359 kg/tow, which is lower than the  $B_{\text{THRESHOLD}}$  of 1.030 kg/tow (see Figure 37) (NEFSC 2017g). According to the NMFS first quarter 2018 update, Gulf of Maine/Georges Bank windowpane flounder is overfished and in year 8 of a 7-year rebuilding plan {NMFS 2018}. Because the stock is overfished, abundance is deemed a high concern.

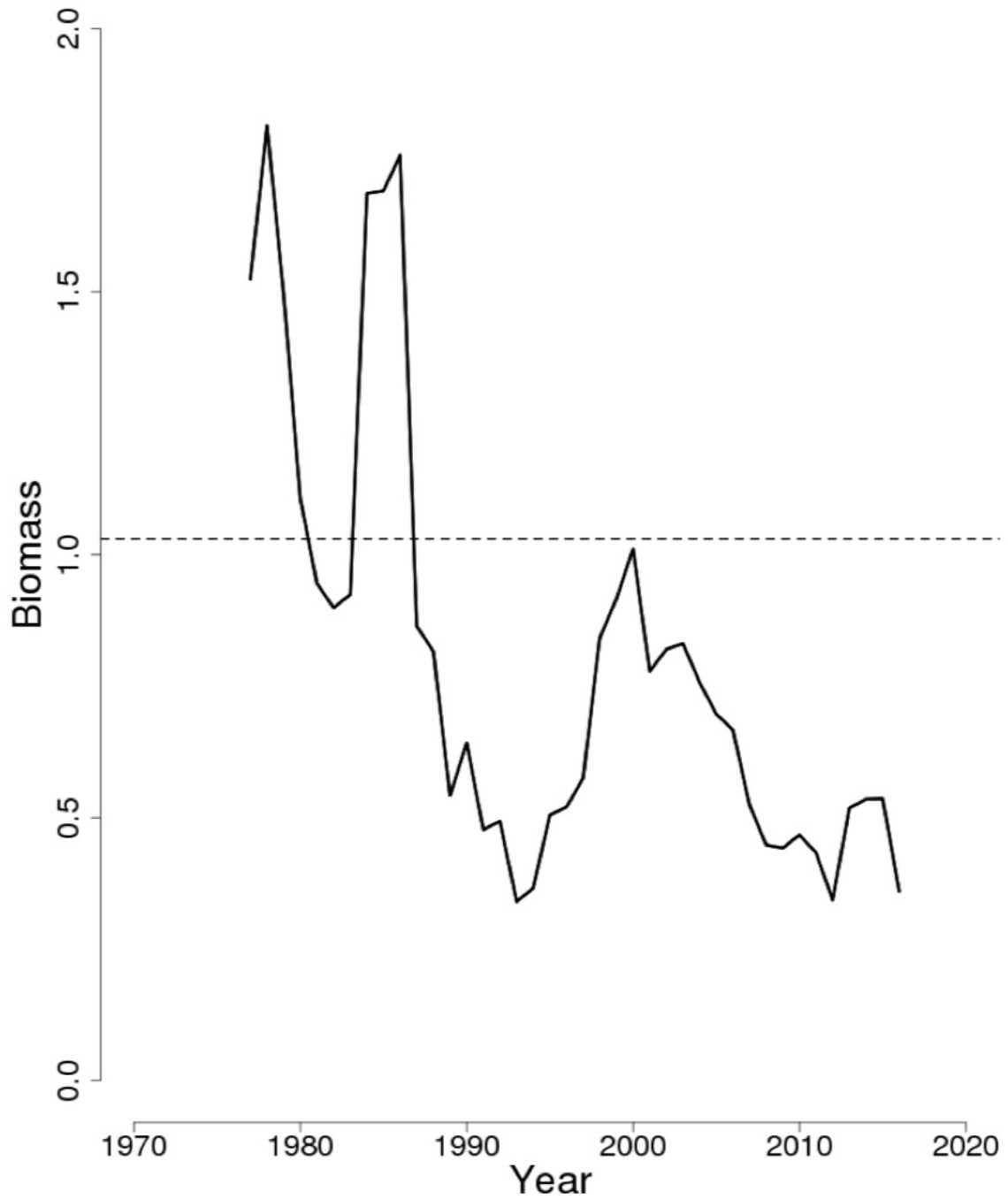


Figure 37: Trends in the biomass index (a 3-year moving average of the NEFSC fall bottom trawl survey index) of northern windowpane flounder from 1975 to 2016 from the current assessment, and the corresponding  $B_{\text{THRESHOLD}} = 1$ ,  $B_{\text{MSY proxy}} = 1.030$  kg/tow (horizontal dashed line) (NEFSC 2017g).



**Southern New England / Mid-Atlantic Stock | Northwest Atlantic | Bottom trawls | United States**

**Southern New England / Mid-Atlantic Stock | Northwest Atlantic | Bottom trawls | United States | Mid Atlantic**

**Low Concern**

Based on the 2017 southern windowpane flounder stock assessment, the mean NEFSC fall bottom trawl survey index from years 2014, 2015, and 2016 (a 3-year moving average is used as a biomass index, B) was 0.329 kg/tow, which is higher than the  $B_{\text{THRESHOLD}}$  of 0.126 kg/tow (see Figure 38) (NEFSC 2017h). Because the stock is not overfished, and biomass is more than 75% of the target biomass, abundance is considered a low concern.

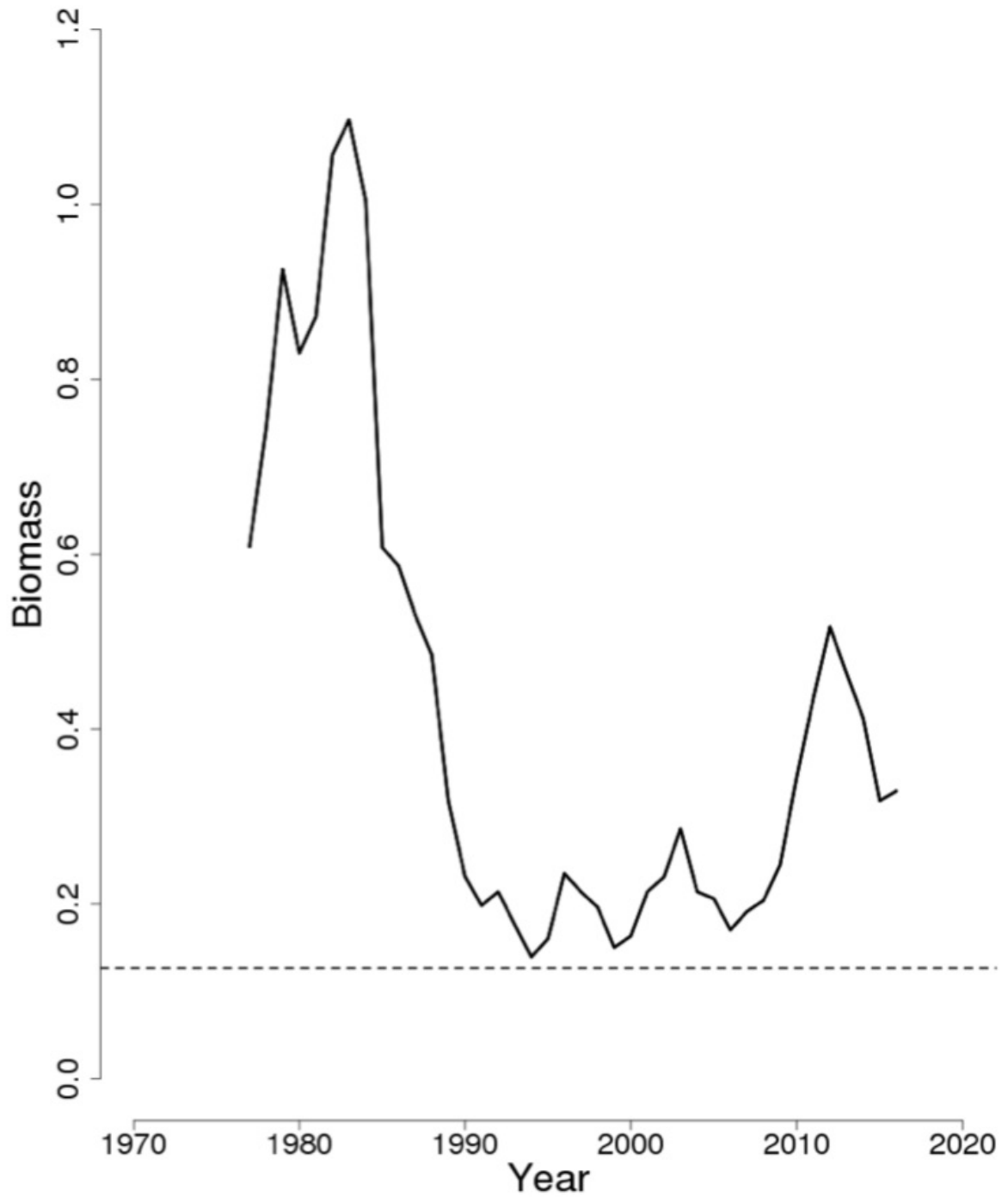


Figure 38: Trends in the biomass index (a 3-year moving average of the NEFSC fall bottom trawl survey index) of southern windowpane flounder from 1975 to 2016 from the current assessment, and the corresponding  $B_{\text{THRESHOLD}} = 1$ ,  $B_{\text{MSY proxy}} = 0.126$  kg/tow (horizontal dashed line) (NEFSC 2017h).

## **Factor 2.2 - Fishing Mortality**

### **Gulf of Maine / Georges Bank Stock | Northwest Atlantic | Bottom trawls | United States | New England**

#### **Low Concern**

Based on the 2017 northern windowpane flounder stock assessment, the 2016 relative fishing mortality was estimated to be 0.222 kt per kg/tow, which is lower than the  $F_{MSY}$  of 0.340 kt per kg/tow (see Figure 39) (NEFSC 2017g). According to the NMFS first quarter 2018 update, this stock is not yet rebuilt (in year 8 of a 7-year rebuilding plan) and biomass has decreased since 2015, but overfishing is not occurring {NMFS 2018}; therefore, fishing mortality is considered a low concern.

#### **Justification:**

As of October 2011, NMFS prohibits possession of any windowpane flounder (NOAA 2011b), so there is effectively no targeted fishery for northern windowpane flounder (NEFSC 2017g).

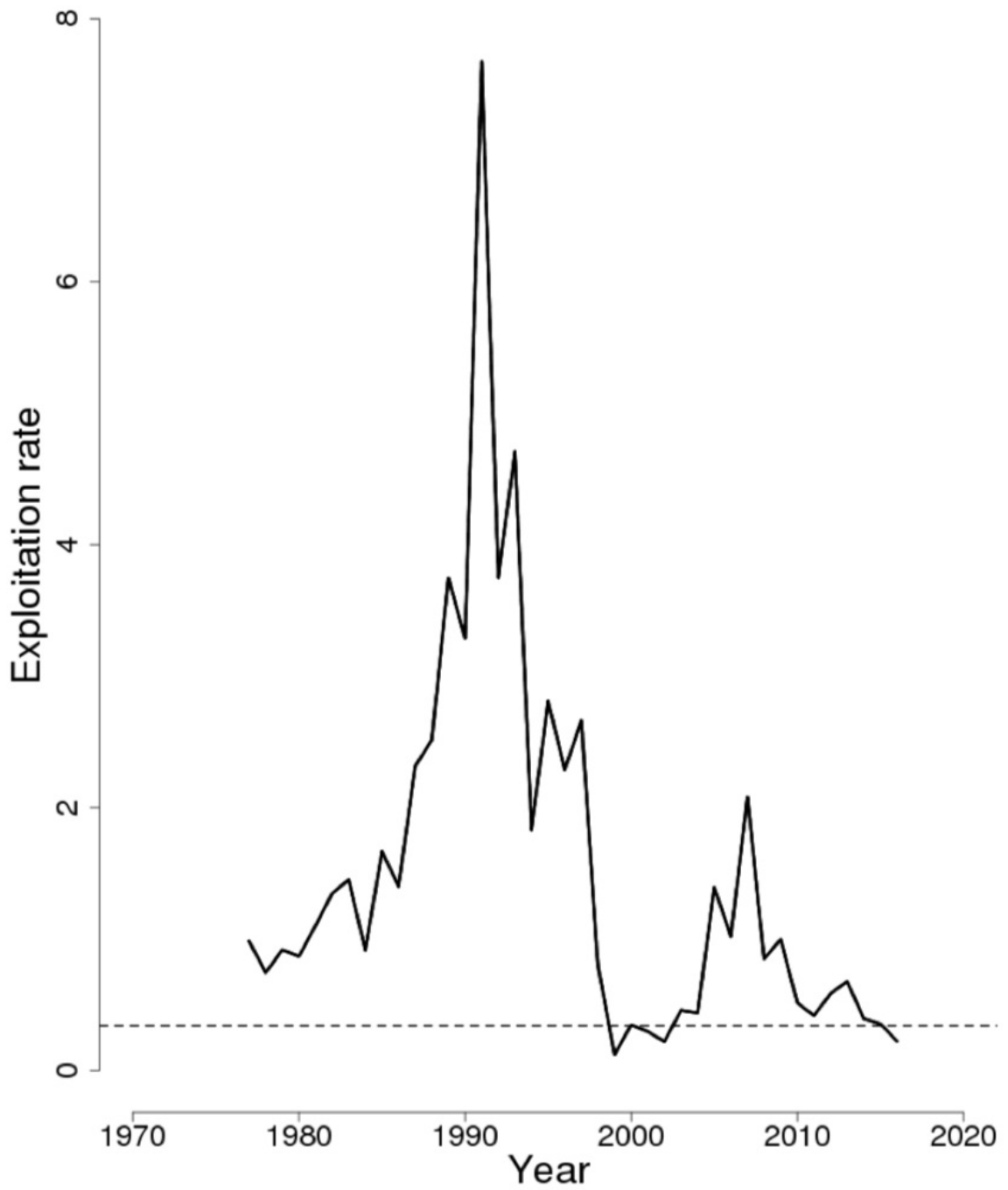


Figure 39: Trends in estimated relative fishing mortality of northern windowpane flounder from 1975 to 2016 from the current assessment, and the corresponding  $F_{MSY}$  proxy = 0.34 (horizontal dashed line) (NEFSC 2017g).

**Southern New England / Mid-Atlantic Stock | Northwest Atlantic | Bottom trawls | United States**

**Southern New England / Mid-Atlantic Stock | Northwest Atlantic | Bottom trawls | United States | Mid Atlantic**

**Low Concern**

Based on the 2017 southern windowpane flounder stock assessment, the 2016 relative fishing mortality was estimated to be 1.733 kt per kg/tow, which is lower than the  $F_{MSY}$  proxy of 1.918 kt per kg/tow (see Figure 40) (NEFSC 2017h). Because overfishing is not occurring, fishing mortality is considered a low concern.

**Justification:**

As of October 2011, NMFS prohibits possession of any windowpane flounder (NOAA 2011b), so there is effectively no targeted fishery for southern windowpane (NEFSC 2017h).

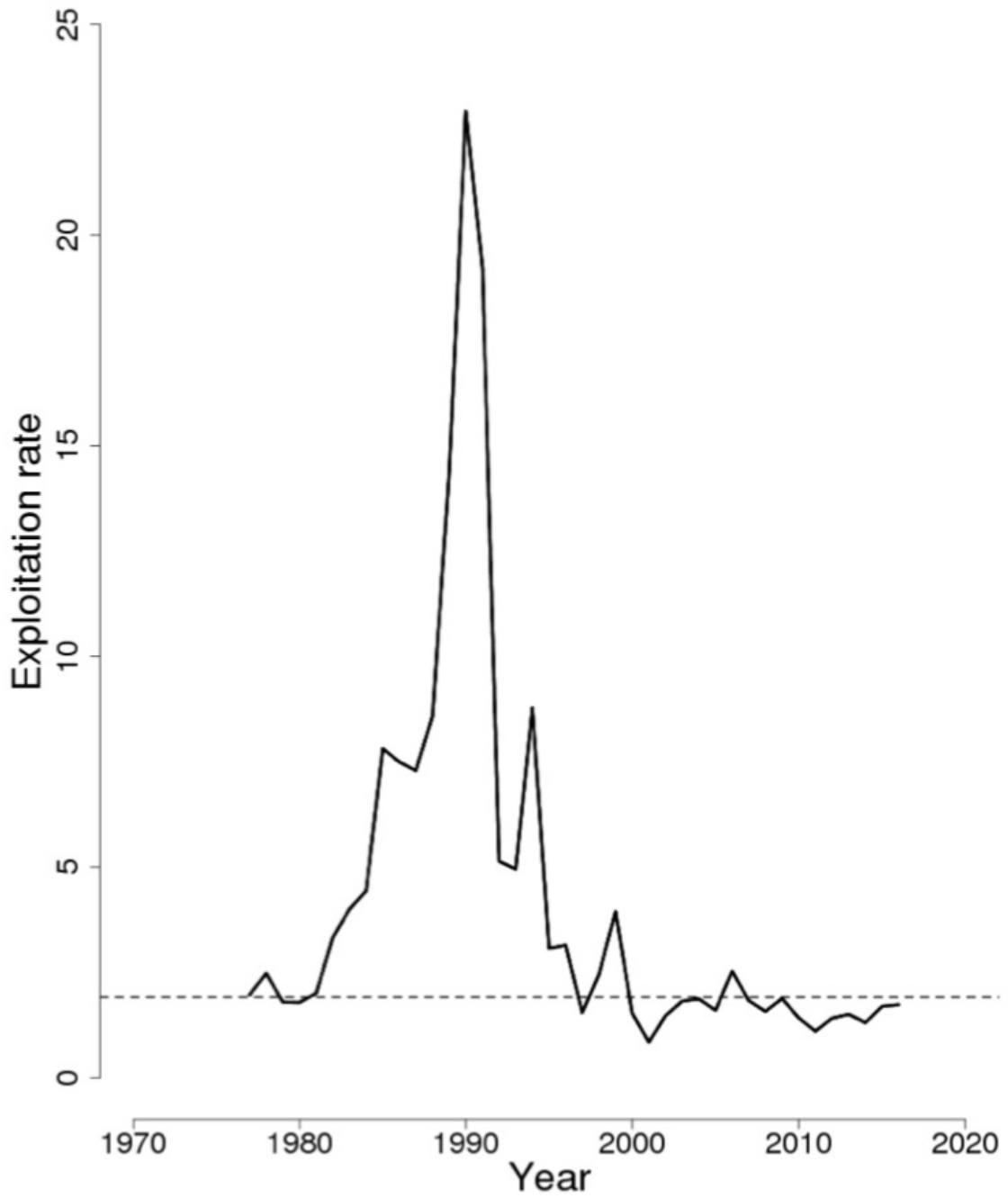


Figure 40: Trends in relative fishing mortality of southern windowpane flounder from 1975 to 2016 from the current assessment, and the corresponding  $F_{MSY}$  proxy = 1.918 (horizontal dashed line) (NEFSC 2017h).

### **Factor 2.3 - Discard Rate/Landings**

#### **Gulf of Maine Stock | Northwest Atlantic | Set gillnets | United States | New England Cape Cod / Gulf of Maine Stock | Northwest Atlantic | Set gillnets | United States | New England**

##### **< 100%**

A 2017 report estimated discards of 14 federally managed fish and invertebrate species groups during the July 2015 through June 2016 period {Wigley and Tholke 2017}. This report found that, in the NE large mesh gillnet fishery, a total of 35% of skate complex catch and 36% of spiny dogfish catch were discarded, mostly because there is no market for them {Wigley and Tholke 2017}. Of all 14 Standardized By-catch Reporting Methodology (SBRM) species groups combined, roughly 26% were discarded. In total (including non-SBRM species), 29% of caught species were discarded. These comprised dogfish (72%), non-SBRM species (17%), and other SBRM species (12%) {Wigley and Tholke 2017}. Because total discards in this fishery are less than 100%, a multiplying factor of 1 is given.

##### **Justification:**

Each year, the majority of fish and invertebrate by-catch by weight in the Greater Atlantic comprises three species: skate complex, spiny dogfish (*Squalus acanthias*), and sea scallop (*Placopecten magellanicus*), with skate complex having the highest by-catch estimates (NMFS 2016). Skate species are believed to have a higher post-release survival rate than other fish species.

#### **Northwest Atlantic | Bottom trawls | United States | New England Gulf of Maine Stock | Northwest Atlantic | Bottom trawls | United States | New England Georges Bank Stock | Northwest Atlantic | Bottom trawls | United States | New England Southern New England / Mid-Atlantic Stock | Northwest Atlantic | Bottom trawls | United States Cape Cod / Gulf of Maine Stock | Northwest Atlantic | Bottom trawls | United States | New England**

##### **< 100%**

A 2017 report estimated discards of 14 federally managed fish and invertebrate species groups during the July 2015 through June 2016 period {Wigley and Tholke 2017}. This report found that, in the NE large-mesh otter trawl fishery, a total of 76% of skate complex catch and 90% of spiny dogfish catch were discarded, mostly because there is no market for them {Wigley and Tholke 2017}. Of all 14 Standardized By-catch Reporting Methodology (SBRM) species groups combined, roughly 43% were discarded. In total (including non-SBRM species), 47% of landed species were discarded. These comprised species in the skate complex (67%), non-SBRM species (14%), dogfish (8%), large mesh groundfish (5%), goosfish/monkfish (3%), and small mesh groundfish (2%) {Wigley and Tholke 2017}. Because total discards in this fishery are less than 100%, a multiplying factor of 1 is given.

##### **Justification:**

Each year, the majority of fish and invertebrate by-catch by weight in the Greater Atlantic comprises

three species: skate complex, spiny dogfish (*Squalus acanthias*), and sea scallop (*Placopecten magellanicus*), with skate complex having the highest by-catch estimates (NMFS 2016). Skate species are believed to have a higher post-release survival rate than other fish species.

The data sets used include July 2015 through June 2016 data from the Northeast Fisheries Observer Program (NEFOP) database, the Vessel Trip Report (VTR) database, the Northeast Fisheries Science Center (NEFSC) commercial landings database, and the National Oceanic and Atmospheric Administration Marine Recreational Information Program (MRIP) database {Wigley and Tholke 2017}.

It is worth noting that, in recent years, fishers have been adopting more selective gears in an attempt to reduce by-catch of nontarget, low abundance species. Separator trawls and Ruhle trawls are designed to take advantage of the different behaviors of different species: catching species that tend to swim upward during capture, such as haddock, and allowing the release of species that tend to swim down, such as cod and flatfish.

**Southern New England / Mid-Atlantic Stock | Northwest Atlantic | Bottom trawls | United States | Mid Atlantic  
Northwest Atlantic | Bottom trawls | United States | Mid Atlantic**

**< 100%**

A 2017 report estimated discards of 14 federally managed fish and invertebrate species groups during the July 2015 through June 2016 period {Wigley and Tholke 2017}. This report found that, in the NE large-mesh otter trawl fishery, a total of 76% of skate complex catch and 90% of spiny dogfish catch were discarded, mostly because there is no market for them {Wigley and Tholke 2017}. Of all 14 Standardized By-catch Reporting Methodology (SBRM) species groups combined, roughly 43% were discarded. In total (including non-SBRM species), 47% of landed species were discarded. These comprised species in the skate complex (67%), non-SBRM species (14%), dogfish (8%), large mesh groundfish (5%), goosfish/monkfish (3%), and small mesh groundfish (2%) {Wigley and Tholke 2017}. Because total discards in this fishery are less than 100%, a multiplying factor of 1 is given.

**Justification:**

Each year, the majority of fish and invertebrate by-catch by weight in the Greater Atlantic comprises three species: skate complex, spiny dogfish (*Squalus acanthias*), and sea scallop (*Placopecten magellanicus*), with skate complex having the highest by-catch estimates (NMFS 2016). Skate species are believed to have a higher post-release survival rate than other fish species.

The data sets used include July 2015 through June 2016 data from the Northeast Fisheries Observer Program (NEFOP) database, the Vessel Trip Report (VTR) database, the Northeast Fisheries Science Center (NEFSC) commercial landings database, and the National Oceanic and Atmospheric Administration Marine Recreational Information Program (MRIP) database {Wigley and Tholke 2017}.

It is worth noting that, in recent years, fishers have been adopting more selective gears in an



attempt to reduce by-catch of nontarget, low abundance species. Separator trawls and Ruhle trawls are designed to take advantage of the different behaviors of different species: catching species that tend to swim upward during capture, such as haddock, and allowing the release of species that tend to swim down, such as cod and flatfish.

### **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	RESEARCH AND MONITORING	ENFORCEMENT	INCLUSION	SCORE
Northwest Atlantic   Bottom trawls   United States   Mid Atlantic	Moderately Effective	Moderately Effective	Moderately Effective	Highly effective	Highly effective	<b>Yellow (3.000)</b>
Northwest Atlantic   Bottom trawls   United States   New England	Moderately Effective	Moderately Effective	Moderately Effective	Moderately Effective	Highly effective	<b>Yellow (3.000)</b>
Northwest Atlantic   Set gillnets   United States   New England	Moderately Effective	Ineffective	N/A	N/A	N/A	<b>Red (1.000)</b>

## 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**

#### **Northwest Atlantic | Bottom trawls | United States | Mid Atlantic**

##### **Moderately Effective**

Summer flounder is managed under the Summer Flounder, Scup, and Black Sea Bass Fishery Management Plan (SFSCBSB FMP) under the Mid-Atlantic Fisheries Management Council (MAFMC). The MAFMC and the Atlantic States Marine Fisheries Commission (ASFMC) jointly develop

complementary fishery regulations for federal and state waters, respectively, and the National Marine Fisheries Service (NMFS) implements and enforces these regulations. The original summer flounder FMP was implemented in 1988 and a series of amendments and frameworks adjustments have ensued (MAFMC 2018a).

Current management under this FMP includes annual catch limits and allotment to both the commercial and recreational sectors, size limits for fish and mesh, permits to sell and purchase summer flounder, an existing moratorium on commercial fishery entry, and reporting requirements (NOAA 2018e). Aspects of the current FMP for summer flounder have been assessed multiple times, but have not been modified since 1993 (ASMFC 2018a). The MAFMC and ASMFC have prepared a document for public hearing that outlines an amendment regarding commercial issues that will tentatively be finalized December 2018 (ASMFC 2018a). Potential changes being discussed surround requalifying criteria for federal commercial moratorium permits, modifications to commercial quota allocations, the potential of adding commercial landings flexibility as part of an FMP framework issue, and revising FMP objectives that stakeholders believe may be outdated (MAFMC 2019)(ASMFC 2018a).

Spawning stock biomass (SSB) reached record lows in the late 1980s and early 1990s when the original fishery plan was implemented. The amount of summer flounder in this stock that are able to reproduce has grown dramatically since the implementation of the FMP; the stock was considered rebuilt in 2011, overfishing continued to occur over several years, but the stock was not relisted as overfished after 2011 (MAFMC 2018a). Measures are in place to manage the stock and there is evidence that the strategy is working, because the stock has been rebuilt, overfishing is not occurring, and the stock is no longer considered overfished.

Although measures in the Mid-Atlantic seem to be working successfully, species managed under the New England Multispecies Fishery Management Plan are caught and retained in this fishery as well, so the NE FMP is considered in scoring this criterion. Rebuilding targets for certain species have not yet been met in New England; there is potential underreporting of discarding in this region, and there is insufficient evidence that fishery management is being implemented successfully (see the New England bottom trawl Explanation in this factor for further details). Management strategy and implementation is scored collectively as moderately effective.

## **Northwest Atlantic | Bottom trawls | United States | New England**

### **Moderately Effective**

The New England fisheries for flatfish are managed by the NEFMC through the Northeast Multispecies Fishery Management Plan (NE Multispecies FMP), alongside nine other species of flatfish and groundfish. Originally enacted in 1985, the NE Multispecies FMP has been amended a number of times to improve the management of the relevant fisheries, including the introduction of gear restrictions (e.g., mesh size and number of nets/hooks), seasonal closures, spatial closures, minimum landing sizes, trip limits on pounds of fish landed, limited access (a restriction on the number of vessels able to work within the fishery), effort limits based on a days-at-sea (DAS) system, and most recently, a system based on transferable quotas set against a hard annual catch limit (ACL), which replaced the previous effort-based limitation of the DAS system in 2010.

In 2010, Amendment 16 to the NE Multispecies FMP greatly expanded catch share, or sector-based, management. The sectors function essentially as cooperatives because they are self-selecting and largely self-regulating (albeit within a framework designated and closely monitored by federal agencies). The sectors are exempt from many of the effort controls previously used to manage the fishery; instead, they adhere to an overall hard quota known as an annual catch limit (ACL), which is divided into annual catch entitlements (ACE) allocated to each sector. The shift to output management instead of effort management enables efficiency gains by allowing increased operational efficiency. Although it is optional to join the sectors, the majority of fishers have chosen to participate: sector vessels made 65% of all NE Multispecies landings in 2010, including 98% of groundfish and 54% of nongroundfish {Kitts et al. 2011}{Labaree 2012}{Federal Register 2012}. Under the Magnuson-Stevens Act, the ACL must be set less than or equal to the acceptable biological catch (ABC), to account for management uncertainty, and the ABC must be set less than or equal to the overfishing level (OFL), to account for any scientific uncertainty in the stock assessment (see Figure 41) (Federal Register 2009).

Fishing mortality targets are set for each stock independently, based on achieving maximum sustainable yield (MSY) in the long term. Therefore, for stocks that are overfished (and may also be subject to overfishing), the target fishing mortality is set at a level that will have a reasonable probability (>50%) of ensuring rebuilding of the stock within the timeline set within the relevant rebuilding program. But, if a sector were to approach the ACE for one of the target stocks, then the area inhabited by that stock is closed to all gears capable of catching that stock, resulting in a potential "under-harvest" of more abundant stocks. The sector system allows fishers to share, trade, or lease quota within a fishery, thus reducing the chance of overfishing depleted stocks, while targeting more abundant stocks; and if a sector is nearing its quota for a particular species, it may be possible to lease it from another sector.

There are a number of stocks of concern affected by the fisheries managed under the NE Multispecies FMP, and the management plan has had varying degrees of success in recovering these stocks. The most recent stock assessments have shown that a number of stocks of concern have not yet been rebuilt and that the targets set within the rebuilding programs have not been met (e.g., Georges Bank cod, Gulf of Maine cod, Gulf of Maine yellowtail flounder, Georges Bank yellowtail flounder, and witch flounder) {Palmer 2017a}{Legault 2017a}{Legault 2017b}{Alade 2017a}{Wigley 2017a}. But, there are a number of stocks that have rebuilt before the end of the rebuilding period (typically due to strong recruitment and good survival of abundant year-classes during periods of reduced exploitation). These stocks include Georges Bank haddock, Gulf of Maine haddock, Acadian redfish, and pollock {Brooks 2017}{Palmer 2017b}{Linton 2017a}{Linton 2017b}. Although there is concern that some of the stocks have yet to meet their rebuilding targets, other stocks have rebuilt within the specified timelines, and the current management system is likely to improve rebuilding of stocks, due to reduced levels of discarding (which was a result of Amendment 16).

There have been some concerns with the management strategy in the past, particularly with respect to depleted stocks. In addition, target total allowable catches (TACs) have been set too high because of errors in stock assessments (a retrospective pattern suggesting that the stock was in better shape than it was), and there has been a need for increased precaution. But the management system has

substantially changed under Amendment 16, which is expected to reduce the race to fish and to improve conservation outcomes. For example, discarding appears to have been reduced, and the fishery now relies on hard ACLs (which include discards) rather than target TACs—all of which helps reduce the likelihood of exceeding sustainable fishing mortality rates for targeted stocks. In addition, sectors have not exceeded their ACEs, whereas in the past it was possible for target TACs to be exceeded because the regulations were based on effort control (DAS) rather than output control {Kitts et al. 2011}{GARFO 2018b} (pers. comm., J. Cournane 13 July 2018). But, the Groundfish Plan Development Team’s preliminary analysis of observer data to explore potential discarding of legal-sized cod revealed evidence that suggests noncompliance may be occurring (NEFMC 2018a).

Summer flounder managed under the Summer Flounder, Scup, and Black Sea Bass Fishery Management Plan (SFSCBSB FMP) by the Mid-Atlantic Fisheries Management Council is also caught and retained in the New England bottom trawl fishery; therefore, this plan must be taken into consideration for scoring. There are no major concerns to consider from the management of this FMP. See the Mid-Atlantic bottom trawl explanation in this factor for further details.

ACLs/AMs based on scientific input are in place for more than 70% of the stocks in the New England FMP. Amendment 16 has led to improvements in constraining harvest to ACLs and to reduced discarding, resulting in sectors not exceeding their ACEs. But, the rebuilding targets for certain species have not yet been met, and there is potential underreporting of discarding.

Although measures in the Mid-Atlantic seem to be working successfully, the rebuilding targets for certain species have not yet been met in New England, and there is potential underreporting of discarding in this region; also, there is insufficient evidence that fishery management is being implemented successfully. Therefore, management strategy and implementation is scored collectively as moderately effective.

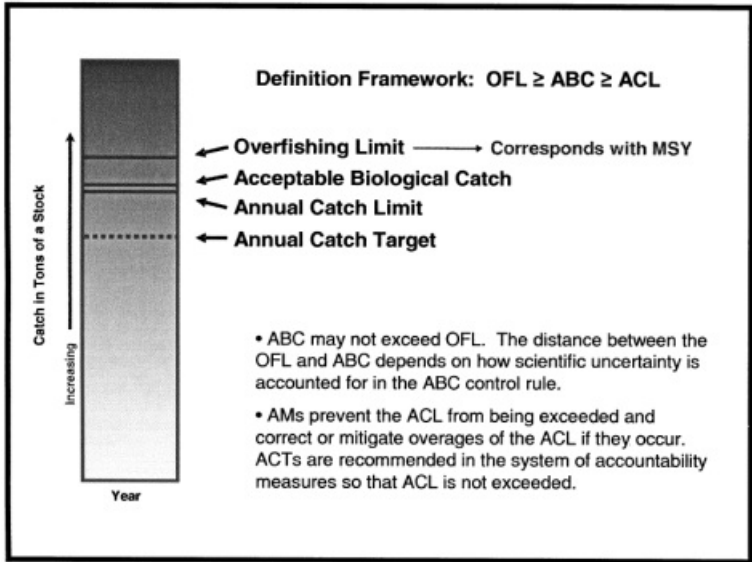


Figure 41: Relationship between the overfishing limit, acceptable biological catch, and the annual catch limit (from National Standard Guidelines, Federal Register 2009).

**Northwest Atlantic | Set gillnets | United States | New England**

**Moderately Effective**

The New England Fishery Management Council (NEFMC) administers the Northeast Multispecies Fishery Management Plan (NE Multispecies FMP), which specifies management plans for 13 groundfish species including yellowtail flounder, plaice, witch flounder, windowpane flounder, Atlantic halibut, and winter flounder {NEFMC 2018}.

The original management plan was published in 1985 and included major management measures to meet the requirements of the Magnuson-Stevens Act, such as commercial size limits, minimum mesh size regulations, extended closed areas for certain species, and gear marking requirements {NEFMC 2018}. Since then, multiple amendments and framework adjustments have been implemented. Amendment 13 was enacted to end overfishing and rebuild New England multispecies U.S. groundfish stocks through updated gear restrictions, modifications to vessel monitoring system (VMS) requirements, changes to days-at-sea baselines, outlining of new reporting requirements (including measures to protect essential fish habitat [EFH]), and revisions on trip limits, to name a few (Federal Register 2004).

In 2010, Amendment 16 to the FMP established acceptable biological catch (ABC) limits, annual catch limits (ALs), and accountability measures (AMs) for all stocks managed under this plan, in addition to adopting rebuilding programs for newly classified stocks that are subject to overfishing or determined as overfished, and revised management measures to end overfishing (Federal Register 2010). Most recently in 2015, Amendment 20 implemented standards for precision of by-catch estimation for all Northeast region fisheries (Federal Register 2015).

In January 2018, Framework 57 made further adjustments to the NE Multispecies FMP {Federal

Register 2018}. These adjustments included set catch limits for 2018 to 2020. The 2018 fishing year catch limits include Georges Bank yellowtail flounder (206 mt), Southern New England/Mid-Atlantic yellowtail flounder (66 mt), Cape Cod/Gulf of Maine yellowtail flounder (490 mt), American plaice (1,649 mt), witch flounder (948 mt), Gulf of Maine winter flounder (428 mt), Georges Bank winter flounder (787 mt), northern windowpane flounder (86 mt), southern windowpane flounder (457 mt), and Atlantic halibut (100 mt) (Federal Register 2018b). Other measures included in this framework adjusted allocations for several fisheries, such as shared United States/Canada quotas for Georges Bank yellowtail flounder, revisions to the common pool trimester total allowable catch (TAC) for several stocks, accountability measures for Atlantic halibut for vessels issued any federal permit and for southern windowpane flounder for nongroundfish trawl vessels, and other minor changes to groundfish management measures (Federal Register 2018b).

Many stocks under this management plan are undergoing rebuilding plans, several of which have exceeded the intended recovery goal and are not yet rebuilt (NMFS 2018d). Because management that is in place exceeds those for ineffective or critical scores and for the fishery's main primary targeted and retained species, measures that are expected to be effective are in place; however, there may be a need for increased precaution in some cases, so a score of moderately effective has been awarded.

### **Factor 3.2 - Bycatch Strategy**

#### **Northwest Atlantic | Bottom trawls | United States | Mid Atlantic**

##### **Moderately Effective**

The Magnuson-Stevens Act (MSA) requires fisheries management to prevent overfishing from occurring, and for depleted and overfished stocks to be rebuilt. Marine mammals are further protected under the Marine Mammal Protection Act (MMPA) of 1972, which requires the maintenance of marine mammal populations above their optimum sustainable level and the rebuilding of depleted populations. The Endangered Species Act of 1973 provides protection for species that are endangered or threatened with extinction, including fish, marine mammals, turtles, and seabirds. These three pieces of legislation provide a framework directed at ensuring that FMPs are designed and implemented in a way that prevents overfishing and allows recovery of stocks caught within a fishery, whether the stocks are targeted or caught incidentally.

The MSA requires that all management measures must minimize by-catch to the extent practicable, and minimize mortality of by-catch when by-catch is unavoidable (Magnuson-Stevens Fishery Conservation and Management Act 1976). To comply with the MSA requirement of including a standardized by-catch reporting methodology (SBRM) in all FMPs, and prompted by successful lawsuits by Oceana, the Conservation Law Foundation, and the Natural Resources Defense Council, the NEFMC and the Mid-Atlantic Fisheries Management Council jointly developed an omnibus amendment, corresponding to Amendment 15 to the NE multispecies FMP. The SBRM amendment is meant to "establish, maintain, and utilize biological sampling programs designed to minimize bias to the extent practicable, thus promoting accuracy while maintaining sufficiently high levels of precision" (Federal Register 2008). The original SBRM was considered inadequate and was vacated



by the courts in 2011. A revised SBRM Amendment was adopted by both the Mid-Atlantic and New England Councils in 2014, and approved by NMFS in March 2015; the final rule became effective in July 2015 (NEFMC 2015)(NEFSC 2018a). This action establishes standards of precision for by-catch estimation (selecting the combined ratio method using discard-to-kept pounds, using a coefficient of variation [CV] of 30%, deciphering the number of observed sea days [and trips] necessary to achieve a CV of 30% for each species, and conducting analyses to evaluate potential sources of bias in NEFOP data) for all Northeast Region fisheries; it serves to document the SBRM established for all fisheries managed through the two Councils (NEFMC 2015)(NEFSC 2018a).

To be approved to operate, sectors must submit a Pre-Vessel Trip Report to the National Oceanic and Atmospheric Administration (NOAA), to randomly assign observer coverage across the groundfish fleet and ensure monitoring of discards and protected species (GARFO 2018c). Currently, two types of observers are associated with the NE multispecies fishery: Northeast Fishery Observer Program (NEFOP) observers, which is a federally funded program, and at-sea monitors (ASM), which are funded by a third party and managed by the Northeast Fisheries Science Center's Fisheries Sampling Branch (NEFSC 2018b).

Title 50 CFR §223.206 requires the use of turtle excluder devices (TED) in certain areas and at certain times for the summer flounder fishery (NMFS 2014). These devices, though not 100% effective, do successfully reduce turtle by-catch rates {Murray 2008}.

Because there are by-catch reduction measures in place, but mitigation measures with respect to sea turtles and other endangered, threatened, or protected (ETP) species have not been fully successful, management strategy is scored moderately effective.

## **Northwest Atlantic | Bottom trawls | United States | New England**

### **Moderately Effective**

The Magnuson-Stevens Act (MSA) requires fisheries management to prevent overfishing from occurring, and for depleted and overfished stocks to be rebuilt. Marine mammals are further protected under the Marine Mammal Protection Act (MMPA) of 1972, which requires the maintenance of marine mammal populations above their optimum sustainable level and the rebuilding of depleted populations. The Endangered Species Act of 1973 provides protection for species that are endangered or threatened with extinction, including fish, marine mammals, turtles, and seabirds. These three pieces of legislation provide a framework directed at ensuring that FMPs are designed and implemented in a way that prevents overfishing and allows the recovery of stocks caught within a fishery, whether the stocks are targeted or caught incidentally.

The MSA requires that all management measures must minimize by-catch to the extent practicable, and minimize mortality of by-catch when by-catch is unavoidable (Magnuson-Stevens Fishery Conservation and Management Act 1976). To comply with the MSA requirement of including a standardized by-catch reporting methodology (SBRM) in all FMPs, and prompted by successful lawsuits by Oceana, the Conservation Law Foundation, and the Natural Resources Defense Council, the NEFMC and the Mid-Atlantic Fisheries Management Council jointly developed an omnibus amendment, corresponding to Amendment 15 to the NE multispecies FMP. The SBRM amendment is

meant to “establish, maintain, and utilize biological sampling programs designed to minimize bias to the extent practicable, thus promoting accuracy while maintaining sufficiently high levels of precision” (Federal Register 2008). The original SBRM was considered inadequate and was vacated by the courts in 2011. A revised SBRM Amendment was adopted by both the Mid-Atlantic and New England Councils in 2014, and approved by NMFS in March 2015; the final rule became effective in July 2015 (NEFMC 2015)(NEFSC 2018a). This action establishes standards of precision for by-catch estimation (selecting the combined ratio method using discard-to-kept pounds, using a coefficient of variation [CV] of 30%, deciphering the number of observed sea days [and trips] necessary to achieve a CV of 30% for each species, and conducting analyses to evaluate potential sources of bias in NEFOP data) for all Northeast Region fisheries; it also serves to document the SBRM established for all fisheries managed through the two Councils (NEFMC 2015)(NEFSC 2018a).

To be approved to operate, sectors must submit an operations plan to the regional administrator (NMFS) that details (among other things) how by-catch of regulated species and ocean pout will be avoided to prevent allowable catch entitlement overages. Currently, two types of observers are associated with the NE multispecies fishery: Northeast Fishery Observer Program (NEFOP) observers, which is a federally funded program, and at-sea monitors (ASM), which are funded by a third party and managed by the Northeast Fisheries Science Center’s Fisheries Sampling Branch {NEFSC 2018c}.

Amendment 23 to the NE multispecies FMP has been proposed to adjust the groundfish monitoring program in order to improve reliability and accountability (NEFMC 2017). The Council plans to explore alternatives to at-sea observers and may consider changes to any part of the monitoring and reporting system for groundfish (NEFMC 2017). At this point, there is adequate observer coverage (15%, which is the coverage requirement specified in the Standardized By-catch Reporting Methodology), and data collection and analysis are sufficient to ensure that goals are being met for both by-catch and retained species (NOAA 2018b).

In the bottom trawl fishery, large amounts of landed by-catch are being discarded (refer to Criterion 2.3), such as skate complex species, spiny dogfish, and certain large mesh groundfish, mostly because of their lack of market value {Wigley and Tholke 2017}. In addition, endangered, threatened, or protected (ETP) species (e.g., Atlantic halibut), marine mammals (such as Atlantic white-sided dolphin, gray seal, harp seal, harbor seal, harbor porpoise, long-finned pilot whale, minke whale, and short-beaked common dolphin), and overfished species (such as ocean pout, thorny skate, witch flounder, and yellowtail flounder) are being caught as by-catch.

A reduction in discarding is being actively addressed by both NMFS and fishery participants. The NMFS Saltonstall-Kennedy Grant Program (a program that funds projects that address the needs of fishing communities) sponsors gear research, including trawls such as the “Eliminator Trawl” and the Haddock Separator Trawl, both of which have been recognized for use in fisheries regulations (DeAlteris and Allen 2018). In addition, NMFS has sponsored projects designed to help fishers avoid areas with catches of prohibited or overfished species (DeAlteris and Allen 2018). Finally, there are stock rebuilding plans for certain overfished species that are part of the FMP, and fishing mortality is controlled and closely monitored in the stock rebuilding process. Nevertheless, management measures that are currently in place have not been entirely effective, as evidenced by the continuing

large amount of overfished and ETP by-catch.

Because there are by-catch reduction measures in place, but mitigation measures with respect to ETP species, marine mammals, and overfished species have not been fully successful, and there is potential underreporting of discarding (see Criterion 3.1), management strategy is scored moderately effective.

## **Northwest Atlantic | Set gillnets | United States | New England**

### **Ineffective**

The Magnuson-Stevens Act (MSA) requires fisheries management to prevent overfishing from occurring, and for depleted and overfished stocks to be rebuilt. Marine mammals are further protected under the Marine Mammal Protection Act (MMPA) of 1972, which requires the maintenance of marine mammal populations above their optimum sustainable level and the rebuilding of depleted populations. The Endangered Species Act of 1973 provides protection for species that are endangered or threatened with extinction, including fish, marine mammals, turtles, and seabirds. These three pieces of legislation provide a framework directed at ensuring that FMPs are designed and implemented in a way that prevents overfishing and allows recovery of stocks caught within a fishery, whether the stocks are targeted or caught incidentally.

The MSA requires that all management measures must minimize by-catch to the extent practicable, and minimize mortality of by-catch when by-catch is unavoidable (Magnuson-Stevens Fishery Conservation and Management Act 1976). To comply with the MSA requirement of including a standardized by-catch reporting methodology (SBRM) in all FMPs, and prompted by successful lawsuits by Oceana, the Conservation Law Foundation, and the Natural Resources Defense Council, the NEFMC and the Mid-Atlantic Fisheries Management Council jointly developed an omnibus amendment, corresponding to Amendment 15 to the NE multispecies FMP. The SBRM amendment is meant to “establish, maintain, and utilize biological sampling programs designed to minimize bias to the extent practicable, thus promoting accuracy while maintaining sufficiently high levels of precision” (Federal Register 2008). The original SBRM was considered inadequate and was vacated by the courts in 2011. A revised SBRM Amendment was adopted by both the Mid-Atlantic and New England Councils in 2014, and approved by NMFS in March 2015; the final rule became effective in July 2015 (NEFMC 2015)(NEFSC 2018a). This action establishes standards of precision for by-catch estimation (selecting the combined ratio method using discard-to-kept pounds, using a coefficient of variation [CV] of 30%, deciphering the number of observed sea days [and trips] necessary to achieve a CV of 30% for each species, and conducting analyses to evaluate potential sources of bias in NEFOP data) for all Northeast Region fisheries; furthermore, it serves to document the SBRM established for all fisheries managed through the two Councils (NEFMC 2015)(NEFSC 2018a).

To be approved to operate, sectors must submit a Pre-Vessel Trip Report to the National Oceanic and Atmospheric Administration (NOAA) to randomly assign observer coverage across the groundfish fleet and ensure monitoring of discards and protected species {NOAA 2013}. Currently, two types of observers are associated with the NE multispecies fishery: Northeast Fishery Observer Program (NEFOP) observers, which is a federally funded program, and at-sea monitors (ASM), which are funded by a third party and managed by the Northeast Fisheries Science Center’s

Fisheries Sampling Branch (NEFSC 2018b).

Amendment 23 to the NE multispecies FMP has been proposed to adjust the groundfish monitoring program in order to improve reliability and accountability (NEFMC 2017). The Council plans to explore alternatives to at-sea observers and may consider changes to any part of the monitoring and reporting system for groundfish (NEFMC 2017). At this point, there is adequate observer coverage (15%, which is the coverage requirement based on the standard specified in the Standardized By-catch Reporting Methodology), and data collection and analysis are sufficient to ensure that goals are being met for both by-catch and retained species (NOAA 2018f).

The Atlantic Large Whale Take Reduction Plan (ALWTRP) was developed under the MMPA in 1997 to reduce mortality and serious injury (SIM) to whales due to incidental take in U.S. commercial fisheries that interact with strategic stocks (NOAA 2012)(NOAA 2018c). To achieve this goal, several measures have been implemented, including requirements of sinking groundline, weak links, a vertical line rule, gear marking requirements, and area closures {Gouveia & Swails 2017}{NOAA 2018c}. But, the Take Reduction Plans (TRPs) in the northeastern U.S. have been regarded as the least successful of the U.S. TRPs at reducing marine mammal by-catch {McDonald et al. 2016}. To date, the ALWTRP has failed to meet its statutory goal of reducing SIM to a level below the potential biological removal (PBR), and to a level approaching zero (the Zero Mortality Rate Goal). Many management measures have been ineffective in reducing entanglement rates (based on data from 1999 to 2009, inclusive of entanglements attributed to unidentified fisheries) {Pace et al. 2014}, because annual SIMs due to entanglement continue to exceed PBR (NOAA 2019c). The impacts of introducing regulations such as the "sinking groundline rule" in 2009 and the "vertical line rule" (50 Federal Register 2014) in 2015 are not fully understood, due to limited data and analyses (the latest marine mammal stock assessments consider data from 2014 to 2018). But, for most entanglement interactions, gear is not recovered or is unidentifiable (77% of entanglements between 2000 and 2018) and, although the flatfish gillnet fishery has not been identified specifically in recent interactions, most interactions cannot be attributed to a specific fishery (NOAA 2019c). In 2014, a whale carcass was found south of Nantucket entangled in what was most likely gillnet gear {Sharp et al. 2019}{Sharp et al. 2019 Supplemental}.

A batched biological opinion published in May 2021 considers the impact of fisheries in U.S. federal waters on species listed under the Endangered Species Act (ESA) (NMFS 2021a). Although the biological opinion reached a determination that fisheries in U.S. federal waters will not jeopardize the continued existence of North Atlantic right whale, NOAA predicts that the Conservation Framework will take 9 years to reduce the impact of U.S. fisheries to below PBR (currently 0.8) (Table 1). NOAA's analysis indicates that the proposed management measures will fail to limit the impact of U.S. fisheries to below PBR within a reasonable time frame consistent with the Seafood Watch Fisheries Standard with respect to the Marine Mammal Protection Act. The impact of the Risk Reduction Rule is expected to reduce the impact of U.S. pot and trap fisheries from 4.57 SIMs per year to 2.56 SIMs, and 2.69 SIMs per year in federal waters, inclusive of gillnet interactions.

Table 1: Actions to be taken under the ALWTRP Conservation Framework. From 2021 Batched Biological Opinion (NMFS 2021a).

Phase	Year	Framework Action Description
	Annually	Provide updates, as appropriate, on the implementation of the Framework to the New England and Mid-Atlantic Fishery Management Councils, Atlantic States Marine Fisheries Commission, and ALWTRT.
1	2021	NMFS implements the MMPA ALWTRP rule-making focused on 60% reduction in right whale M/SI incidental to American lobster and Jonah crab trap/pot fisheries. In federal waters, this action reduces M/SIs, on average annually, to 2.69. Implementation for certain measures will begin in 2021; others will be phased over time.
2	2023	NMFS implements rule-making to reduce M/SI in federal gillnet and other pot/trap (i.e., other than lobster and Jonah crab fisheries included in Phase 1) fisheries by 60%, reducing M/SI, on average annually, to 2.61. The ALWTRT will convene in 2021 to recommend modifications to the ALWTRP to address risk in the remaining fixed gear fisheries. This phase will consider how any changes to the ALWTRP contribute to achieving the target reduction under this Framework.
Evaluation	2023–2024	NMFS evaluates any updated or new data on North Atlantic right whale population and threats to assess progress toward achieving the conservation goals of this Framework. At this time, we will also assess measures taken by Canada to address M/SI in Canadian waters.
3	2025	NMFS implements rule-making to further reduce M/SI by 60% in all federal fixed gear fisheries, reducing M/SI, on average annually, to 1.04.
Evaluation	2025–2026	NMFS evaluates measures implemented in 2025 action as well as new data on North Atlantic right whale population and threats to assess progress toward achieving the conservation goals of this Framework. Based on the results of this evaluation, NMFS will determine the degree to which additional measures are needed to ensure the fisheries are not appreciably reducing the likelihood of survival and recovery. As described above, if actions outside the federal fisheries reduce risk to right whales by 0.5 M/SI on average annually (one whale every 2 years), the M/SI reduction requirement in Phase 4 will be reduced from 87% to 39%. If M/SI from other sources is reduced by greater than one M/SI on average annually, we will evaluate whether further action in the federal fisheries is needed.
4	2030	In accordance with the goals identified in the 2025–2026 evaluation, NMFS implements regulations to further reduce M/SI (up to 87%) in fixed gear fisheries.

In July 2022, a District Court ruled that the 2021 Final Rule and 2021 Biological Opinion were invalid, in part due to the concerns noted above. Specifically, the court ruled that the Risk Reduction Rule and 2021 Biological Opinion violated requirements of the Endangered Species Act and Marine Mammal Protection Act on two accounts: 1) “through its failure to satisfy the required antecedent in section 101 (a)(5)(E) of the MMPA before issuing an ITS”; and 2) “the Final Rule did not attempt to meet the take-reduction measures that it was obligated to under the MMPA within the required timeline” {US District Court 2022}.

To address harbor porpoise mortality in the sink gillnet fisheries, NMFS updated its Harbor Porpoise Take Reduction Plan (HPTRP) to reduce mortality below the PBR threshold level. Measures implemented in New England include new areas with acoustic deterrent (“pinger”) requirements, as well as “consequence” closure areas that would seasonally close certain areas to gillnet fishing if the observed average by-catch rate exceeds the target by-catch rate for two consecutive management seasons. Acoustic deterrents, or “pingers,” are highly effective in reducing harbor porpoise by-catch in gillnets when used properly, with a controlled scientific study showing a 92% reduction in harbor porpoise by-catch {Kraus et al. 1997}. Area closures, if triggered and properly enforced, should be highly effective, too. The latest annual report to the Take Reduction Team shows no pinger violations during 2016 (this report will be updated in November 2018) {Provencher 2017}. The levels of harbor porpoise by-catch for both the bottom trawl and gillnet fisheries are now below 50% of the PBR level for the species (NOAA 2018b).

Ghost fishing impacts are a concern for gillnet gear, because it tends to have the highest risk of ghost fishing compared to other gears, such as traps/pots and trawls (GGGI 2018). Because of the

amount of fishing gear used in deepwater net fisheries, the length of the fleets, and the fact that nets are unattended for a majority of the time, it is highly likely that large quantities of nets are lost, and large quantities of by-catch are caught {Brown et al. 2005}. But, there is no information available from this fishery to indicate how ghost fishing has been effectively addressed.

There are by-catch reduction measures in place for certain species, harbor porpoise by-catch levels have been reduced below PBR, and there is an active take reduction team implementing measures in an effort to reduce large whale by-catch, but improvement is still needed. Current management measures to prevent by-catch are insufficient, given the potential impacts of the fishery on endangered North Atlantic right whale, and the planned framework to implement risk reduction measures is not anticipated to reduce the impact of U.S. fisheries to below PBR until 2030. Therefore, the by-catch strategy is rated ineffective.

**Justification:**

There is a need for improved cooperation between United States and Canadian agencies in addressing the impact of fisheries on North Atlantic right whale. Since 2010, there has been a shift in North Atlantic right whale distribution, with whales migrating to the Gulf of St. Lawrence during the summer months {Davis et al. 2017}. The number of entanglements involving Canadian fisheries, including snow crab fisheries, increased starting in 2016 (NOAA 2021); during the ongoing Unusual Mortality Event, 21 of the 34 known mortalities have been attributed to Canadian waters (NOAA 2021). Although U.S. and Canadian agencies have introduced measures aimed at reducing the impact of, and the risk posed by, commercial fisheries (and other human activities) on North Atlantic right whale, the effectiveness of these measures remains unproved, and the impact of these activities continues to exceed a sustainable level (Hayes et al. 2021). Cumulative impacts (average of 8.15 SIMs per year from 2014 to 2018), particularly on SIMs from unknown sources (5.1 SIMs), remain far above levels that would allow the population to recover (PBR = 0.8) (Hayes et al. 2021), and the Conservation Framework will allow continued impacts above PBR for the next 9 years. Cumulative impacts must be addressed through a comprehensive and coordinated management strategy, to account for the transboundary nature of North Atlantic right whales that migrate between U.S. and Canadian waters.

New scientific data indicate additional risks that have not been addressed in the Conservation Framework: specifically, risks related to entanglements that do not result in SIMs {Steward et al. 2021}, and range shifts due to climate change and the impact this has on food availability {Meyer-Gutbrod et al. 2021}. There is a growing body of evidence indicating that entanglements that do not result in SIMs can still have a negative impact on North Atlantic right whale populations as a result of decreased growth {Steward et al. 2021}, increased energy consumption {van der Hoop et al. 2017}, declining body condition {Pettis et al. 2017}, and reduced reproductive output {Fauquier et al. 2020}; as scientific understanding of these issues improves, there will likely be a need for improved management to ensure that negative effects of entanglements are avoided.

In addition to the federal management measures described above, the Massachusetts Division of Marine Fisheries has implemented a suite of measures to reduce the risk to North Atlantic right whale in Massachusetts state waters effective from May 1, 2021 (Massachusetts Register 2022). A seasonal closure has been implemented prohibiting the use of traps and gillnets within 53% of state

waters from February 1 to May 15 (with the possibility of opening after April 30, or extending beyond May 15, dependent on the presence of North Atlantic right whale in the area). All buoy lines in the trap fisheries are required to have a 1,700-lb breaking strength contrivance, and buoy lines shall be no thicker than 3/8" in diameter. Further to the federally required gear marking, MDMF requires all trap fisheries in state waters to include a 3-ft red mark within the surface system, and four 2-ft red marks along the buoy line (two within the top 50%, and two within the bottom 50% of the line) (MDMF 2022).

### **Factor 3.3 - Scientific Research And Monitoring**

#### **Northwest Atlantic | Bottom trawls | United States | Mid Atlantic**

##### **Moderately Effective**

There is a high level of scientific research and monitoring associated with the Northeast U.S. fisheries, including regular stock assessments and gear modification trials (NMFS 2011)(NEFSC 2017). Much of the scientific research and monitoring is carried out by the Northeast Fisheries Science Center (NEFSC), which provides the Mid-Atlantic Fisheries Management Council (MAFMC) with scientific advice, including stock assessments, to guide the management of the fishery. A number of independent and academic institutions also conduct research in the region, including testing gear modifications and conducting tagging experiments to monitor fish populations.

Stock assessments account for all sources of fishing mortality, including commercial and recreational landings and discards (NEFSC 2008)(NEFSC 2012)(NEFSC 2017), as well as environmental factors. Thus, there is a wealth of both fishery-dependent and fishery-independent data available to MAFMC and NMFS to ensure that the fishery is managed effectively. Although there have been some retrospective patterns in stock assessments, appropriate caution has been used in setting total allowable catches (TAC) such that these patterns have not resulted in overfished stocks in the Mid-Atlantic fishery.

The MAFMC approved a 5-year comprehensive research plan in 2015 to address research efforts, starting in 2016 to 2020 (MAFMC 2015). Measures included in this plan outline the importance placed on improvements to stock assessments, efforts supporting measures to reduce/eliminate discards, collection and incorporation of social and economic data into management decisions, improvements to electronic reporting, and evaluating current allocations to fishery sectors (MAFMC 2015).

Specific to summer flounder in the Mid-Atlantic bottom trawl fishery, fishery-dependent and -independent priorities have been established, including (but not limited to) annual sampling to collect and analyze age-length samples and catch per unit effort (CPUE) data, examination of mesh selectivity patterns, and comprehensive otolith collection (ASMFC 2013). For fishery-independent priorities, fecundity and continuation of fishery-independent surveys are included (ASMFC 2013). Priorities for modeling/quantitative research, as well as biological, life history, and habitat priorities, have also been established.

Because species managed under the New England multispecies fishery plan are caught and retained in the Mid-Atlantic bottom trawl fishery, scientific research and monitoring associated with these species must be considered in scoring as well. Some stock assessments have been inaccurate in the past, overestimating biomass and leading to too-high harvest rates (due to a retrospective pattern; see past and recent stock assessments) (NEFSC 2008)(NEFSC 2015b){NEFSC 2017a}. See the explanation for New England bottom trawl in this factor for further details. This factor is scored moderately effective.

## **Northwest Atlantic | Bottom trawls | United States | New England**

### **Moderately Effective**

There is a high level of scientific research and monitoring associated with the Northeast U.S. fisheries, including regular stock assessments and gear modification trials (NMFS 2011)(NEFSC 2017). Much of the scientific research and monitoring is carried out by the Northeast Fisheries Science Center (NEFSC), which provides the NEFMC with scientific advice, including stock assessments, to guide the management of the fishery. A number of independent and academic institutions also conduct research in the region, including testing gear modifications and conducting tagging experiments to monitor fish populations.

Stock assessments account for all sources of fishing mortality, including commercial and recreational landings and discards (NEFSC 2008)(NEFSC 2012)(NEFSC 2017), as well as environmental factors. Thus, there is a wealth of both fishery-dependent and fishery-independent data available to NEFMC and NMFS to ensure that the fishery is managed effectively. There are concerns about a continued retrospective pattern that overestimates biomass and underestimates fishing mortality in some stocks (for example, Georges Bank blackback flounder), and stock assessments are taking account of this pattern, which is thought to be caused partly by increased natural mortality rates (NEFSC 2017).

Amendment 23 to the NE multispecies FMP has been proposed to adjust the groundfish monitoring program, to improve reliability and accountability (NEFMC 2017). The Council plans to explore alternatives to at-sea observers, and may consider changes to any part of the monitoring and reporting system for groundfish (NEFMC 2017). At this point, there is adequate observer coverage (15%, which is the coverage requirement specified in the Standardized By-catch Reporting Methodology), and data collection and analysis are sufficient to ensure that goals are being met for both by-catch and retained species (NOAA 2018f){GARFO 2018}.

Summer flounder, which is managed by the Mid-Atlantic Fishery Management Council, is also caught and retained within this bottom trawl fishery. Scientific research and monitoring associated with this species is thought to be effective. See the Mid-Atlantic bottom trawl explanation in this factor for further details.

All the above data would be sufficient to meet a score of highly effective; however, because stock assessments have been inaccurate in the past, overestimating biomass and leading to too-high harvest rates (due to a retrospective pattern; see past and recent stock assessments) (NEFSC 2008) (NEFSC 2015b){NEFSC 2017a}, this factor is scored moderately effective.



## **Northwest Atlantic | Set gillnets | United States | New England**

### **N/A**

In cases where either Factor 3.1 or 3.2 scores ineffective, Factor 3.3 is not scored because the overall score for Criterion 3 is a very high concern (1), regardless of how a fishery performs against Factor 3.3.

## **Factor 3.4 - Enforcement Of Management Regulations**

### **Northwest Atlantic | Bottom trawls | United States | Mid Atlantic**

#### **Highly effective**

Enforcement of fishery legislation at sea is a cooperative operation between coastal states, the NOAA Office of Law Enforcement (OLE), and the United States Coast Guard. OLE efforts include meetings with industry representatives, dock visits and outreach, and patrolling efforts {NOAA 2018k}. NOAA deploys observers to report violations, collects and addresses issues via vessel monitoring systems (VMS), and reports incidents, by law {NOAA 2018k}. The U.S. Coast Guard conducts fishery patrols in the Mid-Atlantic for illegal fishing activities and does outreach and enforcement of the right whale speed zone rule (USCG 2018).

The Mid-Atlantic Fishery Management Council obtains information from observer data, a days-at-sea (DAS) database, and vessel trip reports (VTRs) (NOAA 2018j), in addition to dealer reports and Monitoring Committees (ECFR 2013). Vessel operators must fill monthly VTRs for every trip (GARFO 2018c). VTRs contain information for each trip taken, including catch, effort, gear characteristics, and spatial information (GARFO 2018c).

Accountability measures (AMs) permit management to take actions, such as decreasing catch limits for the following year if allowable catch is exceeded in any given year (ECFR 2013).

NOAA fisheries has set enforcement priorities for 2018 to 2022, outlining the needs for patrol outreach and investigation in an effort to deter and detect observer harassment, reporting and permitting compliance, by-catch management, incursions into closed or protected areas, and monitoring and enforcement of illegal sales and gear compliance, in addition to maintaining control over illegal, unreported, and unregulated (IUU) fishing and over seafood fraud (NOAA 2018i). There are no known issues with enforcement in this region; therefore, this factor is scored highly effective.

### **Northwest Atlantic | Bottom trawls | United States | New England**

#### **Moderately Effective**

A variety of enforcement measures are in place in the New England groundfish fishery. Enforcement of fishery legislation at sea is a cooperative operation between coastal states, the NOAA Office of Law Enforcement (OLE), and the United States Coast Guard. OLE officers conduct dockside inspections and inspect fish processing plants (per OLE webpage), and the Coast Guard inspects vessels at sea (NOAA 2018h)(NOAA 2018i). OLE enforces fisheries legislation, including minimum

landing sizes, retention of prohibited species, and gear restrictions. Violation of such management measures can result in criminal or civil actions as well as fines, loss of quota, or imprisonment for more serious cases.

All vessels fishing in the multispecies fishery are required to be fitted with a vessel monitoring system (VMS) (Federal Register 2006)(ECFR 2014), which allows fishery officers to remotely monitor the location of each vessel. VMS enable fishery managers not only to monitor where catches are being taken, but also to enforce spatial closures, of which there are a number in the Northwest Atlantic.

Under Amendment 16 of the Multispecies Fishery Management Plan, accountability measures (AMs) were established (Federal Register 2010). AMs are required to ensure accountability within the fishery and to prevent overfishing. Proactive AMs are designed to prevent allowable catch limits (ACLs) from being exceeded, whereas reactive AMs are designed to correct any overages if they occur (Federal Register 2012). AMs can result in a reduction or complete loss of quota for a sector that regularly or greatly exceeds its quota (Federal Register 2010). It is thought that loss of a community pool will encourage a greater level of self-management, thus improving compliance throughout the fishery.

The most recent AM was triggered due to overages in the 2016 fishing year. The end of year showed that three stocks had overages: Gulf of Maine cod, Georges Bank cod, and witch flounder; a combination of catch from both recreational and state commercial vessels contributed to cod overages, and catch from state commercial vessels contributed to witch flounder overages (GARFO 2018b). Framework 57 was implemented to reduce the new trimester quota (to account for these overages) starting on 1 May 2018 (GARFO 2018b).

NOAA fisheries has set enforcement priorities for 2018 to 2022, outlining the needs for patrol outreach and investigation in an effort to deter and detect observer harassment, reporting and permitting compliance, by-catch management, incursions into closed or protected areas, monitoring and enforcement of illegal sales, and gear compliance, in addition to maintaining control over illegal, unreported, and unregulated (IUU) fishing and over seafood fraud (NOAA 2018i).

But, there have been instances of significant overages that were undiscovered for substantial periods, indicating that gaps in monitoring may still be a concern (Federal Register 2018c), and NOAA OLE has been curtailed in the last decade. Thus, this factor is scored moderately effective.

#### **Northwest Atlantic | Set gillnets | United States | New England**

##### **N/A**

In cases where either Factor 3.1 or 3.2 scores ineffective, Factor 3.4 is not scored because the overall score for Criterion 3 is a very high concern (1), regardless of how a fishery performs against Factor 3.4.

## **Factor 3.5 - Stakeholder Inclusion**

### **Northwest Atlantic | Bottom trawls | United States | Mid Atlantic**

#### **Highly effective**

The Mid-Atlantic Fisheries Management Council, in tandem with the Atlantic States Marine Fisheries Commission (ASMFC), has a good track record of including stakeholders in the development of legislation, with oral and written comments being invited on each draft amendment or framework adjustment to the FMP (ECFR 2015)(MAFMC 2018b){ASMFC 2018}. Comprehensive information on fishery performance and management action is available on request, via open meetings, mailed/emailed notices, written copies of relevant documents, and a comprehensive website through which interested parties can obtain most documents associated with fishery management. Explanations are also provided for any action/lack of action associated with findings, and for relevant recommendations as a result of research, monitoring, evaluation, and review activity (MAFMC 2018c). The ASMFC considers needs and opportunities for enhancing stakeholder awareness with commission management plans and regulations {ASMFC 2018}. Therefore, this factor is scored highly effective.

### **Northwest Atlantic | Bottom trawls | United States | New England**

#### **Highly effective**

The New England Fisheries Management Council has a good track record of including stakeholders in the development of legislation, with oral and written comments invited on each draft amendment or framework adjustment to the FMP (DeAlteris and Allen 2018). Comprehensive information on the fishery's performance and management action is available on request, via open meetings, mailed/emailed notices, written copies of relevant documents, and a comprehensive website through which interested parties can obtain most documents associated with fishery management. Explanations are also provided for any action/lack of action associated with findings, and for relevant recommendations as a result of research, monitoring, evaluation, and review activity (DeAlteris and Allen 2018). The NEFMC also responds to each comment in the Federal Register documents, to show transparency of process (Federal Register 2010)(Federal Register 2012)(DeAlteris and Allen 2018). The management system incorporates, or is subject by law, to a transparent mechanism for resolving legal disputes, which is considered to be appropriate to the context of the fishery and effective in dealing with most issues (DeAlteris and Allen 2018). Therefore, this factor is scored highly effective.

### **Northwest Atlantic | Set gillnets | United States | New England**

#### **N/A**

In cases where either Factor 3.1 or 3.2 scores ineffective, Factor 3.5 is not scored because the overall score for Criterion 3 is a very high concern (1), regardless of how a fishery performs against Factor 3.5.

## 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	SCORE
Southern New England / Mid-Atlantic Stock   Northwest Atlantic   Bottom trawls   United States   Mid Atlantic	Score: 2	Score: 0	Moderate Concern	<b>Yellow (2.449)</b>
Northwest Atlantic   Bottom trawls   United States   New England	Score: 2	Score: 0	Moderate Concern	<b>Yellow (2.449)</b>
Gulf of Maine Stock   Northwest Atlantic   Set gillnets   United States   New England	Score: 3	Score: 0	Moderate Concern	<b>Yellow (3.000)</b>

### 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 - Impact of Fishing Gear on the Habitat/Substrate**

##### **Northwest Atlantic | Bottom trawls | United States | Mid Atlantic**

###### **Score: 2**

Flatfish are caught via bottom trawl gear in the Mid-Atlantic and typically live in sandy bottom habitats (NOAA 2018e). Seafood Watch criteria outline bottom trawl gear dragging over mud and sand to have an impact score of 2.

##### **Northwest Atlantic | Bottom trawls | United States | New England**

###### **Score: 2**

Flatfish otter trawls are used on smooth mud and sand bottoms to sweep the seafloor, causing flounder to swim up as they feel a disturbance and to be caught in the net {NEFMC 2018}. Seafood Watch criteria outline bottom trawl gear dragging over mud and sand to have an impact score of 2.

##### **Northwest Atlantic | Set gillnets | United States | New England**

###### **Score: 3**

Both yellowtail and witch flounder are caught via gillnet, but to a much lesser degree than by bottom trawl gear. Set gillnets over soft substrates are scored a 3 out of 5, based on Seafood Watch criteria.

#### **Factor 4.2 - Modifying Factor: Mitigation of Gear Impacts**

##### **Northwest Atlantic | Bottom trawls | United States | New England**

##### **Northwest Atlantic | Bottom trawls | United States | Mid Atlantic**

##### **Northwest Atlantic | Set gillnets | United States | New England**

###### **Score: 0**

Under the Magnuson-Stevens Act, fisheries management plans (FMPs) must identify essential fish habitat (EFH) in an effort to protect waters and substrates for spawning, breeding, feeding, growth, and maturity {16 U.S.C. § 1853(a)(7) and § 1802(10)}. A number of areas have been closed to trawling activity to protect EFH and other important areas. A number of permanent and temporary

spatial closures are in place in the Gulf of Maine (GoM) and Georges Bank. There are two groundfish closed areas (Western GoM Groundfish Closure and Cashes Ledge Groundfish Closure), eight applicable habitat management areas (HMAs), and two dedicated habitat research areas (Stellwagen DHRA and Georges Bank DHRA) in place to protect essential fish habitat (EFH) from the impacts of bottom trawling and set gillnets (NOAA 2018l)(GARFO 2018f). These areas are either closed year-round to all bottom-tending mobile gears, or closed to all fishing vessels, with certain exemptions (GARFO 2018f).

Certain areas are also closed to all fishing vessels, except for handline and pelagic longline gear, during certain months as a result of management efforts protecting cod. There are also four seasonal closures that apply to all fishing vessels, with HL and LL exemptions: 1) Closed Area 1 North Seasonal Closure (1,937 km<sup>2</sup>), closed from February 1 to April 15; 2) Winter Massachusetts Bay Spawning Protection Area (310 km<sup>2</sup>), closed from November 1 to January 31; 3) Spring Massachusetts Bay Spawning Protection Area (46 km<sup>2</sup>), closed from April 15–30; and 4) "Whaleback" GOM Cod Spawning Protection Area (114 km<sup>2</sup>), closed from April 1 to June 30 (GARFO 2018f).

Large areas have also been closed by the Mid-Atlantic Council to bottom-tending gear, with the intent to protect deep-sea corals. These measures freeze the current footprint of fishing effort and bottom-tending gear in many submarine canyons and deep-slope areas in the Mid-Atlantic {MAFMC 2016}.

Although an effort is made to protect EFH through FMPs, a substantial proportion (>20%) of all representative habitats are not protected from all bottom contact, so zero mitigation points are awarded to this factor.

### **Factor 4.3 - Ecosystem-based Fisheries Management**

#### **Northwest Atlantic | Bottom trawls | United States | Mid Atlantic**

##### **Moderate Concern**

The National Oceanic and Atmospheric Administration (NOAA) published an overarching policy focused on ecosystem-based fisheries management (EBFM) along with regional implementation plans (NOAA 2018m). The purpose of the policy outlines defining what EBFM is and the benefits of implementing it, as well as how EBFM relates to current Living Marine Resource management legal authorities and requirements; it creates a framework of principles to guide the implementation of EBFM, and offers an opportunity to build on past progress (NOAA 2018m). The Northeast Regional Implementation Plan identifies six guiding principles: 1) Implement ecosystem-level planning; 2) Advance our understanding of ecosystem processes; 3) Prioritize vulnerabilities and risks of ecosystems and their components; 4) Explore and address trade-offs within an ecosystem; 5) Incorporate ecosystem considerations into management advice; and 6) Maintain resilient ecosystems (NOAA 2018m).

The Mid-Atlantic Council has adopted an incremental approach through its ecosystem approach to fisheries management (EAFM) guidance document that sets policy to approach forage fish, climate, habitat, and species interactions (NOAA 2018m). In addition, the Greater Atlantic Regional Fisheries Office is working to develop regional guidance on national EBFM policies and management approaches for working with NOAA, the National Marine Fisheries Service (NMFS), and the Northeast Fisheries Science Center (NEFSC).

Because policies are in progress to address EBFM concerns but the approach is not fully implemented, and detrimental food web impacts are not likely, a score of moderate concern is awarded.

#### **Northwest Atlantic | Bottom trawls | United States | New England**

#### **Northwest Atlantic | Set gillnets | United States | New England**

##### **Moderate Concern**

The National Oceanic and Atmospheric Administration (NOAA) published an overarching policy focused on ecosystem-based fisheries management (EBFM) along with regional implementation plans (NOAA 2018m). The purpose of the policy outlines defining what EBFM is and the benefits of implementing it, as well as how EBFM relates to current Living Marine Resource management legal authorities and requirements; it creates a framework of principles to guide the implementation of EBFM, and offers an opportunity to build on past progress (NOAA 2018m). The Northeast Regional Implementation Plan identifies six guiding principles: 1) Implement ecosystem-level planning; 2) Advance our understanding of ecosystem processes; 3) Prioritize vulnerabilities and risks of ecosystems and their components; 4) Explore and address trade-offs within an ecosystem; 5) Incorporate ecosystem considerations into management advice; and 6) Maintain resilient ecosystems (NOAA 2018m).

The New England Fishery Management Council is considering a wholesale change to its approach, which will take time to implement those policies if pursued (NOAA 2018m). In addition, the Greater Atlantic Regional Fisheries Office is working to develop regional guidance on national EBFM policies and management approaches for working with NOAA, the National Marine Fisheries Service (NMFS), and the Northeast Fisheries Science Center (NEFSC).

Because policies are in progress to address EBFM concerns but have not been fully implemented, and detrimental food web impacts are not likely, a score of moderate concern is awarded.



## **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.*

*Seafood Watch would like to thank two anonymous reviewers for graciously reviewing this report for scientific accuracy.*

## **References**

50 Federal Register Part 229. 2014. Taking of Marine Mammals Incidental to Commercial Fishing Operations; Atlantic Large Whale Take Reduction Plan Regulations. Federal Register. Vol 79., No. 124. June 27, 2014.

Alade, L. 2017. Gulf of Maine Yellowtail Flounder. Operational Assessment of 19 Northeast Groundfish Stocks, Updated Through 2016. Northeast Fisheries Science Center Reference Document 17-17. Available at: [https://www.nefsc.noaa.gov/publications/crd/crd1717/cc\\_gom\\_yellowtail\\_flounder.pdf](https://www.nefsc.noaa.gov/publications/crd/crd1717/cc_gom_yellowtail_flounder.pdf).

ASMFC (Atlantic States Marine Fisheries Commission). 2015a. American Lobster Benchmark Stock Assessment and Peer Review Report. Atlantic States Marine Fisheries Commission, Woods Hole, MA. Available at: [http://www.asmfmc.org/uploads/file//55d61d73AmLobsterStockAssmt\\_PeerReviewReport\\_Aug2015\\_red2.pdf](http://www.asmfmc.org/uploads/file//55d61d73AmLobsterStockAssmt_PeerReviewReport_Aug2015_red2.pdf).

ASMFC 2017b. Atlantic Sturgeon Benchmark Stock Assessment and Peer Review Report. Atlantic States Marine Fisheries Commission. Available at: [http://www.asmfmc.org/uploads/file//59f8d5ebAtlSturgeonBenchmarkStockAssmt\\_PeerReviewReport\\_2017.pdf](http://www.asmfmc.org/uploads/file//59f8d5ebAtlSturgeonBenchmarkStockAssmt_PeerReviewReport_2017.pdf)

ASMFC 2020a. 2020 American Lobster Benchmark Stock Assessment and Peer Review Report. Atlantic States Marine Fisheries Commission.

ASMFC.2017. <http://www.asmfmc.org/species/atlantic-sturgeon>.

Atlantic States Marine Fishery Commission (ASMFC). 2013. Research Priorities and Recommendations to Support Interjurisdictional Fisheries Management. SUMMER FLOUNDER . Available at: [http://www.asmfmc.org/uploads/file/ResearchPriorities\\_SUMMERFLOUNDER\\_June2013.pdf](http://www.asmfmc.org/uploads/file/ResearchPriorities_SUMMERFLOUNDER_June2013.pdf).

Atlantic States Marine Fishery Commission (ASMFC). 2018a. SUMMER FLOUNDER COMMERCIAL ISSUES AMENDMENT. Public Hearing Document. Available at: [http://www.asmfmc.org/uploads/file/5b6ddf93SFlounderPHD\\_August2018.pdf](http://www.asmfmc.org/uploads/file/5b6ddf93SFlounderPHD_August2018.pdf)

Bettridge, S., C.S. Baker, J. Barlow, P.J. Clapham, M. Ford, D. Gouveia, et al. 2015. Status Review of the Humpback Whale (*Megaptera novaeangliae*) under the Endangered Species Act. NOAA Technical Memorandum NMFS. NOAA-TM-NMFS-SWFSC-540 U.S. Department of Commerce, National Oceanic and

Atmospheric Administration, National Marine Fisheries Service, Southwest Fisheries Science Center, California.

BirdLife International. 2019. *Ardenna grisea*. The IUCN Red List of Threatened Species 2019: e.T22698209A154440143. <https://dx.doi.org/10.2305/IUCN.UK.2019-3.RLTS.T22698209A154440143.en>. Accessed on 24 December 2021.

Bowen, D. 2016. *Halichoerus grypus* ssp. *grypus*. The IUCN Red List of Threatened Species 2016: e.T61382004A61382007

Brooks, L. 2017. Georges Bank Haddock. Operational Assessment of 19 Northeast Groundfish Stocks, Updated Through 2016. Northeast Fisheries Science Center Reference Document 17-17. Available at: [https://www.nefsc.noaa.gov/publications/crd/crd1717/georges\\_bank\\_haddock.pdf](https://www.nefsc.noaa.gov/publications/crd/crd1717/georges_bank_haddock.pdf).

Choi, Y.M., J.T. Yoo, J.H. Choi, K.H. Choi, J.K. Kim, Y.S. Kim, J.B. Kim. 2008. Ecosystem structure and trophic level to the oceanographic conditions around the waters of Jeju Island. *Journal of Environmental Biology*. 29:4, 419-25. Available at: <https://www.ncbi.nlm.nih.gov/pubmed/19195374>.

Cooke, J.G. 2018. *Balaenoptera physalus*. The IUCN Red List of Threatened Species 2018: e.T2478A50349982.

Cooke, J.G. 2020. *Eubalaena glacialis*. The IUCN Red List of Threatened Species 2020: e.T41712A162001243. <https://dx.doi.org/10.2305/IUCN.UK.2020-2.RLTS.T41712A162001243.en>

Crowe, L.M., Brown, M.W., Corkeron, P.J., Hamilton, P.K., Ramp, C., Ratelle, S., Vanderlaan, A.S.M., & Cole, T.V.N., 2021. In plane sight: a mark-recapture analysis of North Atlantic right whales in the Gulf of St. Lawrence. *Endangered Species Research*. Vol. 46:227-251 <https://doi.org/10.3354/esr01156>

DeAlteris, J., and Allen, R. 2018. MSC Sustainable Fisheries Certification: US Gulf of Maine and Georges Bank Haddock, Pollock and Redfish Trawl. On behalf of Acoura Marine. 293 pp. February 2018.

div5#\_top

Federal Register. 2004. Magnuson-Stevens Fishery Conservation and Management Act Provisions; Fisheries of the Northeastern United States; Northeast (NE) Multispecies Fishery; Amendment 13. Vol. 69, No. 81/Tuesday, April 27, 2004. Available at: <https://www.nefmc.org/library/amendment-13>

Federal Register. 2006. Magnuson-Stevens Fishery Conservation and Management Act Provisions; Vessel Monitoring Systems; Mobile Transmitter Unit and Enhanced Mobile Transmitter Unit Reimbursement Program 71 FR 41425 .

Federal Register. 2008. Magnuson-Stevens Fishery Conservation and Management Act Provisions; Fisheries of the Northeastern United States; Northeast Region Standardized Bycatch Reporting Methodology Omnibus Amendment. NOAA DC 73 FR 4736. <https://www.federalregister.gov/documents/2008/01/28/E8-1436/magnuson-stevens-fishery->

conservation-and-management-act-provisions-fisheries-of-the-northeastern

Federal Register. 2009. Magnuson-Stevens Act Provisions; Annual Catch Limits; National Standard Guidelines. 50 CFR Part 600.

Federal Register. 2010. Magnuson-Stevens Fishery Conservation and Management Act Provisions; Fisheries of the Northeastern United States; Northeast Multispecies Fishery; Amendment 16; Final Rule. 50 CFR Part 648.

Federal Register. 2012. Magnuson-Stevens Fishery Conservation and Management Act Provisions; Fisheries of the Northeastern United States; Northeast Multispecies Fishery; Framework Adjustment 47. 50 CFR Part 648

Federal Register. 2015. Magnuson-Stevens Fishery Conservation and Management Act Provisions; Fisheries of the Northeastern United States; Standardized Bycatch Reporting Methodology Omnibus Amendment. Vol. 80, No. 125/Tuesday, June 30, 2015. Available at:  
<https://www.greateratlantic.fisheries.noaa.gov/regs/2015/June/15sbrmomnibusamendmentfinal.pdf>

Federal Register. 2016. Endangered and Threatened Species; Identification of 14 Distinct Population Segments of the Humpback Whale (*Megaptera novaeangliae*) and Revision of Species-Wide Listing. 81 FR 62259. Pages 62259-62320 (62 pages). September 8. Available at:  
<https://www.federalregister.gov/documents/2016/09/08/2016-21276/endangered-and-threatened-species-identification-of-14-distinct-population-segments-of-the-humpback>.

Federal Register. 2018b. Magnuson-Stevens Fishery Conservation and Management Act Provisions; Fisheries of the Northeastern United States; Northeast Multispecies Fishery; Framework Adjustment 57. Vol. 83, No. 84/Tuesday, May 1, 2018. Available at: <https://www.nefmc.org/library/framework-57>

Federal Register. 2018c. Magnuson-Stevens Act Provisions; Fisheries of the Northeastern United States; Northeast Multispecies Fishery; 2018 Sector Operations Plans and Allocation of Northeast Multispecies Annual Catch Entitlements. Document Citation: 83 FR 34492, 50 CFR 648. Available at:  
<https://www.federalregister.gov/documents/2018/07/20/2018-15477/magnuson-stevens-act-provisions-fisheries-of-the-northeastern-united-states-northeast-multispecies>.

Froese, R., D. Pauly. Editors. 2018. FishBase. World Wide Web electronic publication. Available at: [www.fishbase.org](http://www.fishbase.org).

GARFO. 2018a. Northeast Multispecies (Groundfish) Fishing Year 2018 Regulations. Greater Atlantic Region Bulletin. May 1. Available at:  
<https://www.greateratlantic.fisheries.noaa.gov/nr/2018/April/18multifw572018recrulephl.pdf>

GARFO. 2018c. Fishing Vessel Trip Report (VTR) Reporting Instructions May 4. Available at:  
[https://www.greateratlantic.fisheries.noaa.gov/aps/evtr/vtr\\_inst.pdf](https://www.greateratlantic.fisheries.noaa.gov/aps/evtr/vtr_inst.pdf)

GARFO. 2018f. Northeast Multispecies Information Sheet Closed Area Regulations. NOAA. Available at:

<https://www.greateratlantic.fisheries.noaa.gov/regs/infodocs/multsclosedareas.pdf>

GGGI (Global Ghost Gear Initiative). 2018. Development of a Best Practice Framework for the Management of Fishing Gear. Part 2: Best Practice Framework for the Management of Fishing Gear. 46 pp.

Greater Atlantic Region Fisheries Office (GARFO). 2017a. Summer Flounder. Available at: <https://www.greateratlantic.fisheries.noaa.gov/sustainable/species/fluke/>.

Hammond, P.S., G> Bearzi, A. Bjørge, K.A. Forney, L. Karczmarski, T. Kasuya, W.F. Perrin, M.D. Scott, J.Y. Wang, R.S. Wells, B. Wilson. 2012. *Tursiops truncatus*. The IUCN Red List of Threatened Species 2012: e.T22563A17347397. <http://dx.doi.org/10.2305/IUCN.UK.2012.RLTS.T22563A17347397.en>. Downloaded on 25 March 2018. Available at: <http://www.iucnredlist.org/details/22563/0>.

Hammond, P.S., G. Bearzi, A. Bjørge, K. Forney, L. Karczmarski, T. Kasuya, W.F. Perrin, M.D. Scott J.Y. , Wang, R.S. Wells, B. Wilson. 2008a. *Lagenorhynchus acutus*. The IUCN Red List of Threatened Species 2008: e.T11141A3255721. <http://dx.doi.org/10.2305/IUCN.UK.2008.RLTS.T11141A3255721.en>. Downloaded on 25 March 2018. Available at: <http://www.iucnredlist.org/details/11141/0>.

Hammond, P.S., G. Bearzi, A. Bjørge, K. Forney, L. Karczmarski, T. Kasuya, W.F. Perrin, M.D. Scott, J.Y. Wang, R.S. Wells, B. Wilson. 2008b. *Phocoena phocoena*. The IUCN Red List of Threatened Species 2008: e.T17027A6734992. <http://dx.doi.org/10.2305/IUCN.UK.2008.RLTS.T17027A6734992.en>. Downloaded on 25 March 2018. Available at: <http://www.iucnredlist.org/search>.

Hayes, S.A., Josephson, E., Maze-Foley, K., & Rosel, P.E., 2020. US Atlantic and Gulf of Mexico Marine Mammal Stock Assessments - 2019. NOAA Technical Memorandum NMFS-NE-264.

Hayes, S.A., Josephson, E., Maze-Foley, K., Rosel, P.E. & Turek, J., 2021. US Atlantic and Gulf of Mexico Marine Mammal Stock Assessments 2020. US Department of Commerce. National Oceanic and Atmospheric Administration. National Marine Fisheries Service. Northeast Fisheries Science Center. Woods Hole, Massachusetts.

Hayes, S.A., Josephson, E., Maze-Foley, K., Rosel, P.E., & Wallace, J. Eds. 2022. U.S. Atlantic and Gulf of Mexico Marine Mammal Stock Assessments 2021. National Marine Fisheries Service.

IUCN. 2012. IUCN Red List Categories and Criteria: Version 3.1. Second edition. Gland, Switzerland and Cambridge, UK: IUCN. iv + 32pp.

Kovacs, K.M. 2016. *Cystophora cristata*. The IUCN Red List of Threatened Species 2016: e.T6204A45225150. <http://dx.doi.org/10.2305/IUCN.UK.2016-1.RLTS.T6204A45225150.en>. Downloaded on 26 March 2018. Available at: <http://www.iucnredlist.org/details/6204/0>.

L. J. Buckley, A. S. Smigielski, T. A. Halavik, E. M. Caldarone, B. R. Burns, G. C. Laurence. 1991. Winter flounder *Pseudopleuronectes americanus* reproductive success. II. Effects of spawning time and female size on size, composition and viability of eggs and larvae. Marine Ecology Progress Series 74, 125-135.

Lowry, L. 2016. *Phoca vitulina*. The IUCN Red List of Threatened Species 2016: e.T17013A45229114. <http://dx.doi.org/10.2305/IUCN.UK.2016-1.RLTS.T17013A45229114.en>. Downloaded on 26 March 2018. Available at: <http://www.iucnredlist.org/details/17013/0>.

Lux, F.E., 1973. Age and Growth of the Winter Flounder, *Pseudopleuronectes americanus*, on Georges Bank. *Fishery Bulletin*. Vo. 71:2 pp 505-512

MAFMC 2018a. Summer Flounder Fishery Information Document. Mid-Atlantic Fisheries Management Council Scientific and Statistical Committee. [https://static1.squarespace.com/static/511cdc7fe4b00307a2628ac6/t/5b2aa6801ae6cf54e7958f69/1529521794159/5\\_Fluxe+Fishery+Info+Doc+2018.pdf](https://static1.squarespace.com/static/511cdc7fe4b00307a2628ac6/t/5b2aa6801ae6cf54e7958f69/1529521794159/5_Fluxe+Fishery+Info+Doc+2018.pdf)

MAFMC 2018b. Public Comment. Available at: <http://www.mafmc.org/public-comment/>

MAFMC 2018c. Council Actions. Amendments and Frameworks Under Development. Available at: <http://www.mafmc.org/council-actions>

MAFMC 2019. March 2019 Council Meeting Summary. Available at: <https://s3-us-west-2.amazonaws.com/sfwart/comments/67146/2019-03%20Council%20Report.pdf>

MAFMC 2108d. 2018 Mackerel, Squid, Butterfish Fishery Information Document. Fishery Performance Reports and Information Documents. Mid-Atlantic Fishery Management Council. Available at: [https://static1.squarespace.com/static/511cdc7fe4b00307a2628ac6/t/5ace1f92575d1f2b3be8db51/1523457939344/MSB\\_APIInfo-2018.pdf](https://static1.squarespace.com/static/511cdc7fe4b00307a2628ac6/t/5ace1f92575d1f2b3be8db51/1523457939344/MSB_APIInfo-2018.pdf)

MAFMC. 2015. Comprehensive Five Year (2016-2020) Research Plan. Available at: [https://static1.squarespace.com/static/511cdc7fe4b00307a2628ac6/t/576ab61bf7e0abfcb30c4f1d/1466611228981/Five-Year-Research-Plan\\_2016-2020.pdf](https://static1.squarespace.com/static/511cdc7fe4b00307a2628ac6/t/576ab61bf7e0abfcb30c4f1d/1466611228981/Five-Year-Research-Plan_2016-2020.pdf)

Massachusetts Register 2022. 322 CMR 12.00: Protected Species. *Mass. Register* #1463 2/18/22.

MDMF 2022. Buoy Line Marking Rules for Trap Fisheries in 2022. The Commonwealth of Massachusetts Division of Marine Fisheries. Boston, MA.

Miller, T., D.E. Richardson, P. Politis, J. Blaylock 2017. Northeast Fisheries Science Center bottom trawl catch efficiency and biomass estimates for 2009- 2017 for 8 flatfish stocks included in the 2017 Northeast Groundfish Operational Assessments. Available at: <https://www.nefsc.noaa.gov/groundfish/operational-assessments-2017/docs/catch-efficiency-biomass-estimates-wp.pdf>.

Moore, M.J. 2019. How we can all stop killing whales: a proposal to avoid whale entanglement in fishing gear. *ICES Journal of Marine Science*, Volume 76(4): 781–786. <https://doi.org/10.1093/icesjms/fsy194>

Murray, K. T. 2020. Estimated magnitude of sea turtle interactions and mortality in U.S. bottom trawl

gear, 2014-2018. National Marine Fisheries Service, Woods Hole, Massachusetts, 2020. Northeast Fisheries Science Center Technical Memorandum No. NMFS-NE-260.

NEFMC. 2015. Standardized Bycatch Reporting Methodology: An Omnibus Amendment to the Fishery Management Plans of the New England and Mid-Atlantic Regional Fishery Management Councils. March 2015; 361 p. Available from:  
<http://www.greateratlantic.fisheries.noaa.gov/regs/2015/June/15SBRMOmnibusAmend.html>.

NEFMC. 2017. Scoping Document for Amendment 23 to the Northeast Multispecies Fishery Management Plan (Groundfish Monitoring Amendment). Available at: <https://www.nefmc.org/library/amendment-23>

NEFMC. 2018a, Magnuson-Stevens Fishery Conservation and Management Act Provisions; Fisheries of the Northeastern United States; Northeast Multispecies Fishery. Available at:  
<https://www.nefmc.org/management-plans/northeast-multispecies>

NEFMC. 2018a. Memorandum to Groundfish Committee: Additional Analyses for Amendment 23/Groundfish Monitoring. May 29. Available at: [https://s3.amazonaws.com/nefmc.org/180529-GF-PDT-memo-to-GF-CMTE-re-additional-analyses-for-A23\\_revised.pdf](https://s3.amazonaws.com/nefmc.org/180529-GF-PDT-memo-to-GF-CMTE-re-additional-analyses-for-A23_revised.pdf).

NEFSC (Northeast Fisheries Science Center). 2013. 2013 Monkfish Operational Assessment. Northeast Fisheries Science Center. Reference Document 13-23. August 2013. 116p.

NEFSC 2018b. Northeast Fisheries At-Sea Monitoring Program (ASM). Available at:  
[https://www.nefsc.noaa.gov/fsb/asm/ASM\\_Fact\\_Sheet.pdf](https://www.nefsc.noaa.gov/fsb/asm/ASM_Fact_Sheet.pdf)

NEFSC. 2008. Assessment of 19 Northeast Groundfish Stocks through 2007: Report of the 3rd Groundfish Assessment Review Meeting (GARM III). Northeast Fisheries Science Center, National Marine Fisheries Service, US Department of Commerce, Woods Hole, Massachusetts.

NEFSC. 2012. Assessment or data updates of 13 Northeast Groundfish Stocks through 2010. Northeast Fisheries Science Center Reference Document 12-06. 784pp.

NEFSC. 2013a. 55th Northeast Regional Stock Assessment Workshop (55th SAW) Assessment Summary Report. US Dept Commer, Northeast Fish Sci Cent Ref Doc. 13-11; 41 p. Available from: National Marine Fisheries Service, 166 Water Street, Woods Hole, MA 02543-1026.

NEFSC. 2015a. Operational Assessment of 20 Northeast Groundfish Stocks, Updated through 2014. US Dept Commer, Northeast Fish Sci Cent Ref Doc. 15-24; 251 p. Available from: National Marine Fisheries Service, 166 Water Street, Woods Hole, MA 02543-1026.

NEFSC. 2017. Operational Assessment of 19 Northeast Goundfish Stocks, Updated Through 2016. US Dept Commer, Northeast Fish Sci Cent Ref Doc. 17-17; 259 p. doi: 10.7289/V5/RD-NEFSC-17-17

NEFSC. 2017e. Southern New England-Mid Atlantic Yellow Tail Flounder, 2017 Assessment Update Report. US Dept Commer, Northeast Fisheries Science Center draft report. 9pp.

NEFSC. 2017f. Southern New England-Mid-Atlantic Winter Flounder, 2017 Assessment Update Report. US Dept Commer, Northeast Fish Sci Cent draft report.

NEFSC. 2017g. Northern windowpane flounder 2017 Assessment Update Report. U.S. Department of Commerce, National Oceanic and Atmospheric Administration National Marine Fisheries Service. August. 7pp.

NEFSC. 2017h. Southern windowpane flounder 2017 Assessment Update Report. U.S. Department of Commerce, National Oceanic and Atmospheric Administration National Marine Fisheries Service. August. 7pp.

NEFSC. 2018a. Standardized Bycatch Reporting Methodology and Sea Day Schedule. Available at: <https://www.nefsc.noaa.gov/fsb/SBRM/>.

Nelson, J. S. 2006. Fishes of the World, Fourth edition. John Wiley & Sons, Inc, Hoboken, New Jersey.

Nitschke, P. 2017. Gulf of Maine Winter Flounder. Operational Assessment of 19 Northeast Groundfish Stocks, Updated Through 2016. Northeast Fisheries Science Center Reference Document 17-17. Available at: [https://www.nefsc.noaa.gov/publications/crd/crd1717/gulf\\_of\\_maine\\_winter\\_flounder.pdf](https://www.nefsc.noaa.gov/publications/crd/crd1717/gulf_of_maine_winter_flounder.pdf).

NMFS (National Marine Fisheries Service). 2016. U.S. National Bycatch Report First Edition Update 2 [L. R. Benaka, D. Bullock, J. Davis, E. E. Seney, and H. Winarsoo, Editors]. U.S. Dep. Commer., 90 p. Available at: [https://www.st.nmfs.noaa.gov/Assets/Observer-Program/bycatch-report-update-2/NBR%20First%20Edition%20Update%202\\_Final.pdf](https://www.st.nmfs.noaa.gov/Assets/Observer-Program/bycatch-report-update-2/NBR%20First%20Edition%20Update%202_Final.pdf).

NMFS (National Marine Fisheries Service). 2017a. Proactive Conservation Program: Species of Concern. Species of Concern List: Atlantic Halibut. Available at: <http://www.nmfs.noaa.gov/pr/species/concern/>.

NMFS 2021a. Endangered Species Act Section 7 Consultation Biological Opinion: Authorization of the American Lobster, Atlantic Bluefish, Atlantic Deep-sea Red Crab, Mackerel/Squid/Butterfish, Monkfish, Northeast Multispecies, Northeast Skate Complex, Spiny Dogfish, Summer Flounder/Scup/Black Sea Bass, and Jonah Crab Fisheries. National Marine Fisheries Service, Greater Atlantic Regional Fisheries Office.

NMFS 2022. 1st Quarter 2022 Update: Summary of Stock Status for FSSI Stocks. Available at <https://www.fisheries.noaa.gov/national/population-assessments/fishery-stock-status-updates>

NMFS. 2011. U.S National Bycatch Report. National Marine Fisheries Service, U.S. Department of Commerce.

NMFS. 2012a. Atlantic Sturgeon (*Acipenser oxyrinchus oxyrinchus*). Available at: <http://www.nmfs.noaa.gov/pr/species/fish/atlanticsturgeon.htm>.

NMFS. 2014. 50 CFR 223.206 (d)(2). Gear Requirements for Trawlers. Available at: [http://sero.nmfs.noaa.gov/protected\\_resources/sea\\_turtle\\_protection\\_and\\_shrimp\\_fisheries/documents/](http://sero.nmfs.noaa.gov/protected_resources/sea_turtle_protection_and_shrimp_fisheries/documents/)



gear\_requirements\_for\_shrimp\_trawlers\_50\_cfr\_223206d2.pdf

NMFS. 2018a. Commercial Fisheries Statistics. NMFS Fisheries Statistics Division (ST1), NOAA. Accessed 2018. <https://www.st.nmfs.noaa.gov/commercial-fisheries/commercial-landings/annual-landings/index>

NMFS. 2018b. FishWatch: U.S. Seafood Facts. National Marine Fisheries Service. Accessed 2018. [www.nmfs.noaa.gov/fishwatch](http://www.nmfs.noaa.gov/fishwatch).

NMFS. 2018c. Fisheries Statistics. NMFS Fisheries Statistics Division, NOAA. Accessed 2018. <https://www.st.nmfs.noaa.gov/commercial-fisheries/foreign-trade/applications/annual-product-by-countryassociation>

NMFS. 2018d. Summary of Stock Status for FSSI stocks, 2nd quarter 2018 update. Available at: <https://www.fisheries.noaa.gov/national/population-assessments/fishery-stock-status-updates#2018-quarterly-updates>

NMFS. 2018e. Summary of Stock Status for FSSI stocks, 3rd quarter 2018 update. Available at: <https://www.fisheries.noaa.gov/national/population-assessments/fishery-stock-status-updates#2018-quarterly-updates>

NOAA (National Oceanic and Atmospheric Administration). 2017a. Convention on International Trade in Endangered Species of Wild Fauna and Flora. Available at: <https://www.fisheries.noaa.gov/national/international-affairs/convention-international-trade-endangered-species-wild-fauna-and>.

NOAA (National Oceanic and Atmospheric Administration). 2017b. Laws and Policies: Marine Mammal Protection Act. Available at: <https://www.fisheries.noaa.gov/topic/laws-policies#marine-mammal-protection-act>.

NOAA 2018e. Summer Flounder. FishWatch US Seafood Facts. Available at: <https://www.fisheries.noaa.gov/species/summer-flounder>

NOAA 2018I. The Omnibus Essential Fish Habitat Amendment; Changes to Year-Round and Seasonal Closure Areas. Bulletin. New England/Mid-Atlantic. <https://www.fisheries.noaa.gov/bulletin/omnibus-essential-fish-habitat-amendment-changes-year-round-and-seasonal-closure-areas>

NOAA 2019. 66th Northeast Regional Stock Assessment Workshop (66th SAW) Assessment Summary Report. A. SUMMER FLOUNDER ASSESSMENT SUMMARY FOR 2018. Available at: [https://s3-us-west-2.amazonaws.com/sfwart/comments/67140/3\\_SAW\\_SARC%20Assessment%20Summary%20Report.pdf](https://s3-us-west-2.amazonaws.com/sfwart/comments/67140/3_SAW_SARC%20Assessment%20Summary%20Report.pdf)

NOAA 2019. 66th Northeast Regional Stock Assessment Workshop (66th SAW) Assessment Summary Report. Available at: [https://s3-us-west-2.amazonaws.com/sfwart/comments/67140/3\\_SAW\\_SARC%20Assessment%20Summary%20Report.pdf](https://s3-us-west-2.amazonaws.com/sfwart/comments/67140/3_SAW_SARC%20Assessment%20Summary%20Report.pdf)

NOAA 2020c. Gulf of Maine winter flounder: 2020 Assessment Update Report. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Northeast Fisheries Science Center, Woods Hole, Massachusetts.

NOAA 2021. 2017-2021 North Atlantic Right Whale Unusual Mortality Event. Accessed 9th November 2021. Available at <https://www.fisheries.noaa.gov/national/marine-life-distress/2017-2021-north-atlantic-right-whale-unusual-mortality-event>.

NOAA 2022c. North Atlantic Right Whale Calving Season 2022. Available at: <https://www.fisheries.noaa.gov/national/endangered-species-conservation/north-atlantic-right-whale-calving-season-2022>

NOAA Fisheries. 2012b. Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*). Office of protected resources. Available at: <http://www.nmfs.noaa.gov/pr/species/fish/atlanticsturgeon.htm>.

NOAA Fisheries. 2017. Available at : <http://www.nmfs.noaa.gov/pr/species/turtles/loggerhead.html>

NOAA. 2011b. NE Multispecies Information Sheet - Landing/Possession Limits. National Oceanic and Atmospheric Administration.

NOAA. 2012. Atlantic Large Whale Take Reduction Plan (ALWTRP) Enforcement Update Draft. Available at: [http://www.nero.noaa.gov/whaletrp/trt/meetings/day1/Enforcement%20update%20ALWTRT\\_southeast.pdf](http://www.nero.noaa.gov/whaletrp/trt/meetings/day1/Enforcement%20update%20ALWTRT_southeast.pdf)

NOAA. 2018b. U.S. Atlantic and Gulf of Mexico Marine Mammal Stock Assessments - 2017. 349pp. Available at: <https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessment-reports-species-stock>

NOAA. 2018c. Proactive Conservation Program: Species of Concern. Accessed 2018: [https://www.greateratlantic.fisheries.noaa.gov/protected/pcp/soc/atlantic\\_halibut.html](https://www.greateratlantic.fisheries.noaa.gov/protected/pcp/soc/atlantic_halibut.html)

NOAA. 2018f. Summary of Analyses Conducted to Determine At-Sea Monitoring Requirement for Multispecies Sectors FY2018. 12 pp. Available at: [https://www.greateratlantic.fisheries.noaa.gov/ro/fso/reports/Sectors/ASM/FY2018\\_Multispecies\\_Sector\\_ASM\\_Requirements\\_Summary.pdf](https://www.greateratlantic.fisheries.noaa.gov/ro/fso/reports/Sectors/ASM/FY2018_Multispecies_Sector_ASM_Requirements_Summary.pdf).

NOAA. 2018h. NOAA Law Enforcement. Available at: <https://www.fisheries.noaa.gov/insight/noaa-law-enforcement>.

NOAA. 2018i. Enforcement Priorities Fiscal Years 2018-2022. NOAA Office of Law Enforcement. Available at: <https://www.fisheries.noaa.gov/resource/document/enforcement-priorities-fiscal-years-2018-2022>

NOAA. 2018j. Data Download. NOAA Fisheries. Greater Atlantic Region. Available at:

[https://www.greateratlantic.fisheries.noaa.gov/educational\\_resources/gis/data/index.html](https://www.greateratlantic.fisheries.noaa.gov/educational_resources/gis/data/index.html)

NOAA. 2018m. Ecosystem-Based Fishery Management Draft Implementation Plans. Available at: <https://www.fisheries.noaa.gov/national/ecosystems/ecosystem-based-fishery-management-draft-implementation-plans>

NOAA. 2019c. 2019 Draft U.S. Atlantic and Gulf of Mexico Draft Marine Mammal Stock Assessment. Available at: <https://www.fisheries.noaa.gov/national/marine-mammal-protection/draft-marine-mammal-stock-assessment-reports>

NOAA. 2020. Active and Closed Unusual Mortality Events. Available at: <https://www.fisheries.noaa.gov/national/marine-life-distress/active-and-closed-unusual-mortality-events>

NOAA. 2020b. New North Atlantic Right Whale Calves Born off Florida, Georgia, and South Carolina. February 12, 2020 Available at: <https://www.fisheries.noaa.gov/feature-story/new-north-atlantic-right-whale-calves-born-florida-georgia-and-south-carolina>

Northeast Fisheries Science Center (NEFSC). 2015b. Part A. Scup Benchmark Stock Assessment for 2015. 60th Northeast Regional Stock Assessment Workshop (60th SAW) Assessment Report. Northeast Fisheries Science Center Reference Document 15-08. Available at: <https://www.nefsc.noaa.gov/publications/crd/crd1508/>.

Pace III, R.M., Corkeron, P.J., Kraus, S.D. 2017. State space mark recapture estimates reveal a recent decline in abundance of North Atlantic right whales. *Ecol. Evol.* 7:8730–8741. <https://doi.org/10.1002/ece3.3406>

Palmer, M. 2017a. Gulf of Maine Atlantic Cod. Operational Assessment of 19 Northeast Groundfish Stocks, Updated Through 2016. Northeast Fisheries Science Center Reference Document 17-17. Available at: [https://www.nefsc.noaa.gov/publications/crd/crd1717/gulf\\_of\\_maine\\_cod.pdf](https://www.nefsc.noaa.gov/publications/crd/crd1717/gulf_of_maine_cod.pdf).

Palmer, M. 2017b. Gulf of Maine Haddock. Operational Assessment of 19 Northeast Groundfish Stocks, Updated Through 2016. Northeast Fisheries Science Center Reference Document 17-17. Available at: [https://www.nefsc.noaa.gov/publications/crd/crd1717/gulf\\_of\\_maine\\_haddock.pdf](https://www.nefsc.noaa.gov/publications/crd/crd1717/gulf_of_maine_haddock.pdf).

Palmer, M.C. 2014. 2014 Assessment update report of the Gulf of Maine Atlantic cod stock. US Dept Commer, Northeast Fish Sci Cent Ref Doc. 14-14; 119 p. Available from: National Marine Fisheries Service, 166 Water Street, Woods Hole, MA 02543-1026.

Pettis, H.M., Pace, R.M. III, Hamilton, P.K. 2021. North Atlantic Right Whale Consortium 2020 Annual Report Card. Report to the North Atlantic Right Whale Consortium.

Richards RA. 2016. 2016 Monkfish Operational Assessment. US Dept Commer, Northeast Fish Sci Cent Ref Doc. 16-09; 109 p. Available from: National Marine Fisheries Service, 166 Water Street, Woods Hole, MA 02543-1026.

Richards, A. 2013. Goosefish (*Lophius americanus*). Status of Fishery Resources off the Northeastern US NEFSC - Resource Evaluation and Assessment Division. Available at: <https://www.nefsc.noaa.gov/sos/spsyn/og/goose/>.

Sosebee, K. 2020. 2019 NE Skate Stock Status Update. Northeast Fisheries Science Center. 15pp.

Steimle, F. W., W. W. Morse, D. L. Johnson. 1999. Essential Fish Habitat Source Document: Goosefish, *Lophius americanus*, Life History and Habitat Characteristics. NOAA Technical Memorandum NMFS-NE-127. 31 pp. Available at: <https://www.nefsc.noaa.gov/publications/tm/tm127/tm127.pdf>.

Taylor, B.L., R. Baird, J. Barlow, S.M. Dawson, J.K.B. Ford, J.G. Mead, G. Notarbartolo di Sciara, P. Wade, R.L. Pitman. 2012. *Grampus griseus*. The IUCN Red List of Threatened Species 2012: e.T9461A17386190. <http://dx.doi.org/10.2305/IUCN.UK.2012.RLTS.T9461A17386190.en>. Downloaded on 26 March 2018. Available at: <http://www.iucnredlist.org/details/9461/0>.

Terceiro, M. 2017. Gulf of Maine - Georges Bank American Plaice. Operational Assessment of 19 Northeast Groundfish Stocks, Updated Through 2016. Northeast Fisheries Science Center Reference Document 17-17. Available at: [https://www.nefsc.noaa.gov/publications/crd/crd1717/gom\\_gb\\_american\\_plaice.pdf](https://www.nefsc.noaa.gov/publications/crd/crd1717/gom_gb_american_plaice.pdf).

TEWG (Turtle Expert Working Group). 2009. An assessment of the loggerhead turtle population in the western North Atlantic Ocean. NOAA Technical Memorandum NMFS-SEFSC-575. Available at: [http://www.sefsc.noaa.gov/turtles/TM\\_575\\_TEWG.pdf](http://www.sefsc.noaa.gov/turtles/TM_575_TEWG.pdf).

TRAC. 2020. Georges Bank Yellowtail Flounder. TRAC Status Report 2020/03.

USCG. 2018. FIFTH COAST GUARD DISTRICT ENFORCEMENT REPORT. Enforcement Branch. 01 April 2018 – 31 May 2018 v 2.0. Available at: <https://static1.squarespace.com/static/511cdc7fe4b00307a2628ac6/t/5b240808f950b7b369467c16/1529088009047/MAFMC+01APR18-31MAY18+v2.pdf>

USFWS 2018. Migratory Bird Treaty Act. Available at: <https://www.fws.gov/birds/management/managed-species/migratory-bird-treaty-act-protected-species.php>.

Walsh, S.J. 1992. Size-Dependent Selection at the Footgear of a Groundfish Survey Trawl. *North American Journal of Fisheries Management* 12:3, 625–633. Available at: <https://s3-us-west-2.amazonaws.com/sfwart/comments/61625/walsh%201992.pdf>.

Waring, G.T., R.A. DiGiovanni Jr, E. Josephson, S. Wood, J.R. Gilbert. 2015. 2012 population estimate for the harbor seal (*Phoca vitulina concolor*) in New England waters. NOAA Tech. Memo. NMFS NE-235. 15 pp. Waring, G.T., M.C. Rossman and F.W. Wenzel. 2015b. Serious injury determinations for small cetaceans and pinnipeds caught in commercial fisheries off the northeast U.S. coast, 2012. *Northeast Fish. Sci. Cent. Ref. Doc.* 15-12. 19 pp.

Wigley, S. 2017b. Witch Flounder. Operational Assessment of 19 Northeast Groundfish Stocks, Updated Through 2016. Northeast Fisheries Science Center Reference Document 17-17. Available at: [https://www.nefsc.noaa.gov/publications/crd/crd1717/witch\\_flounder.pdf](https://www.nefsc.noaa.gov/publications/crd/crd1717/witch_flounder.pdf).

## **Appendix A: Report Review and Update**

This report was reviewed and updated in September 2022 for any significant stock status or management updates to the fishery. Additional data and scientific information were found that significantly affected some of the ratings.

**The overall recommendation for blackback caught in the U.S. gillnet fishery was downgraded to Avoid. The overall recommendation for yellowtail flounder caught in the U.S. gillnet fishery remains an Avoid. The overall recommendations for all flatfish caught using bottom trawls are unchanged.**

The most recent Atlantic halibut stock status information was reviewed and included in the assessment. This resulted in a downgrade for Factor 1.2 from low concern to moderate concern.

The most recent stock status information was used to update answers for Factors 2.1 and 2.2 for North Atlantic right whale. This did not result in a change in the score for either factor.

Information on recent entanglements of North Atlantic right whale resulting in serious injury was considered with respect to the effectiveness of management measures implemented in U.S. gillnet fisheries for Atlantic flatfish to minimize the impact on this endangered marine mammal. The cumulative impact of fishing mortality, the potential for U.S. gillnet fisheries for flatfish to contribute to this excessive fishing mortality, and the failure of management measures to prevent entanglement leading to serious injury or mortality of North Atlantic right whale resulted in a score of ineffective (a downgrade from the previous moderately effective score).

Red criterion scores for Criteria 2 and 3 result in an overall rating of Avoid for blackback and yellowtail flounder caught using gillnets in the U.S. Atlantic.