Jonah and Atlantic rock crab

Cancer borealis, Cancer irroratus

United States: Northwest Atlantic

Pots

Report ID 667

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Seafood Watch Standard used in this assessment: Fisheries Standard v3

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About Seafood Watch

Monterey Bay Aquarium's Seafood Watch program evaluates the environmental sustainability of wild-caught and farmed seafood commonly found in the United States marketplace. Seafood Watch defines sustainable seafood as originating from sources, whether wild-caught or farmed, which can maintain or increase production in the long-term without jeopardizing the structure or function of affected ecosystems. The program's goals are to raise awareness of important ocean conservation issues and empower seafood consumers and businesses to make choices for healthy oceans.

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

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

- Seafood rated Best Choice comes from sources that operate in a manner that's consistent with our guiding principles. The seafood is caught or farmed in ways that cause little or no harm to other wildlife or the environment.

- Seafood rated Good Alternative comes from sources that align with most of our guiding principles. However, one issue needs substantial improvement, or there's significant uncertainty about the impacts on wildlife or the environment.

- Seafood rated Avoid comes from sources that don't align with our guiding principles. The seafood is caught or farmed in ways that have a high risk of causing harm to wildlife or the environment. There's a critical conservation concern or many issues need substantial improvement.

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

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

Guiding Principles

Seafood Watch defines sustainable seafood as originating from sources, whether fished[1] or farmed, that can maintain or increase production in the long term without jeopardizing the structure or function of affected ecosystems.

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

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

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

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

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

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

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

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

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

Summary

This report provides recommendations for Jonah crab (*Cancer borealis*) and Atlantic rock crab (*Cancer irroratus*) caught in the United States in the Northwest Atlantic. Both species are primarily harvested using fixed gear (vented traps), with a minor portion coming from trawls as by-catch (not assessed here).

Fisheries for Jonah crab and Atlantic rock crab, part of mixed crustacean fisheries, have recently expanded from by-catch within the lobster fishery to directed fisheries, primarily in southern New England. Historically, Jonah and Atlantic rock crabs had been considered nuisance species in the lobster fishery and were often discarded, used as bait, or sold to help cover fuel and operational costs. There are no biological reference points or reference points for fishing mortality for either *Cancer* species, and each is considered moderately vulnerable. Because of the uncertainty regarding abundance and fishing mortality, impacts on each species are considered a moderate conservation concern.

Traps used in commercial crab fisheries are highly selective; however, data are lacking on the nature and quantity of by-catch. Finfishes and benthic invertebrates are taxa likely to interact significantly with pot/trap gear. There is little information on discards and mortality for the crab fisheries, but overall mortality rates are considered low compared to other fisheries. The Jonah and rock crab fisheries are considered Category II fisheries by the National Marine Fisheries Service due to occasional incidental death or serious injury of humpback whale (Gulf of Maine stock) and fin whale (Western North Atlantic stock), while the lobster fishery from which crabs are landed as by-catch is a Category I fishery due to interactions with the critically endangered North Atlantic right whale. Of greatest concern are the interactions between the fishery and North Atlantic right whale, which drive the low rating for impacts on other species.

The Jonah crab fishery is regulated through an Interstate Fishery Management Plan (developed in 2015, implemented in June 2016, with addenda in 2017 and 2018) that includes harvest restrictions (including the prohibition on retaining egg-bearing females, minimum size limits, and daily and trip limits) and allowance for adaptive management. Management of the Jonah and Atlantic rock crab fisheries is considered moderately effective in all states. By-catch management and mitigation measures are ineffective due to the potential impact of the fishery on the critically endangered North Atlantic right whale, where serious injuries and mortality due to entanglement in fishing gear continue to exceed the potential biological removal (PBR) for this species.

Jonah and Atlantic rock crabs are almost exclusively fished with trap gear, and it is generally accepted that traps have a moderate to low impact on benthic habitats. At this time, there are no extensive measures in place to manage the ecosystem and trophic impacts of the fisheries. Impacts on the habitat and ecosystem are considered a moderate concern because more research is required to understand ecosystem dynamics.

Final Seafood Recommendations

SPECIES | FISHERY	CRITERION 1 TARGET SPECIES	CRITERION 2 OTHER SPECIES	CRITERION 3 MANAGEMENT	CRITERION 4 HABITAT	OVERALL RECOMMENDATION
Atlantic rock crab | Northwest Atlantic | Pots | United States | New York | Non-FMP	2.644	1.000	1.000	3.000	**Avoid (1.678)**
Atlantic rock crab | Northwest Atlantic | Pots | United States | Maine | Massachusetts | New Hampshire | Non-FMP	2.644	1.000	1.000	3.000	**Avoid (1.678)**
Atlantic rock crab | Northwest Atlantic | Pots | United States | Maryland | Connecticut | New Jersey | Rhode Island | Non-FMP	2.644	1.000	1.000	3.000	**Avoid (1.678)**
Jonah crab | Northwest Atlantic | Pots | United States | New York	2.644	1.000	1.000	3.000	**Avoid (1.678)**
Jonah crab | Northwest Atlantic | Pots | United States | Maine | Massachusetts | New Hampshire	2.644	1.000	1.000	3.000	**Avoid (1.678)**
Jonah crab | Northwest Atlantic | Pots | United States | Maryland | Connecticut | New Jersey | Rhode Island	2.644	1.000	1.000	3.000	**Avoid (1.678)**

Summary

Jonah crab and Atlantic rock crab from all regions in the United States Northwest Atlantic are rated an Avoid because of the risk posed by these fisheries to North Atlantic right whale and the ineffectiveness of management measures to mitigate this risk.

Scoring Guide

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

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

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

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

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

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

Introduction

Scope of the analysis and ensuing recommendation

This report provides recommendations for Jonah crab (*Cancer borealis*) and Atlantic rock crab (*Cancer irroratus*) caught by traps or pots using vertical lines in the United States in the Northwest Atlantic. There are small volumes of crab landed from trawl gears and "ropeless" or "on-demand" pots and traps, which are not assessed in this report.

Species Overview

Jonah crab and Atlantic rock crab have historically been considered nuisance by-catch in the American lobster fishery (Krouse 1980)(Reardon 2006). Since the mid-1990s, as a result of an increase in crab abundance coupled with an increase in market demand, Jonah and rock crabs have emerged as growing directed fisheries (NOAA 2013). In recent years, due partly to the decrease in abundance of southern New England American lobster and an increase in price for Dungeness crab, the Jonah crab fishery has grown dramatically, with landings increasing by 650% compared to those in the early 2000s (ASFMC 2019).

Jonah crab and Atlantic rock crab are native to the North Atlantic coast of North America. There is limited information regarding their biology, abundance, and distribution. Though physically similar, the two species differ in size and preferred habitats (Reardon 2006). Jonah crab is larger than Atlantic rock crab and more commonly found at depths from nearshore to 300 m and up to 800 m {Robichaud & Frail 2006}. Atlantic rock crab is smaller and distributed in shallower inshore waters ranging from 6 to 456 m {Stehlik et al. 1991}, most commonly at depths of less than 20 m (Krouse 1980)(Robichaud et al. 2000).

Jonah crab is managed from Maine through North Carolina by state and federal management through the Atlantic States Marine Fisheries Commission (ASMFC) (NMFS 2018). The ASMFC has an Interstate Fishery Management Plan (IFMP) in place for Jonah crab (Atlantic coast from Maine through Virginia), while the rock crab fishery has limited management (ASFMC 2015). The IFMP for Jonah crab aims to protect and maintain broodstock abundance through required permits, reporting, trip limits, gear requirements, minimum size limits, and prohibition on landing egg-bearing females. In November 2019, NOAA Fisheries approved management measures for the Jonah crab fishery in federal waters based on the Atlantic States Marine Fisheries Commission recommendations (84 Federal Register 56).

Production Statistics

The United States and Canada are the sole producers of Jonah and Atlantic rock crabs because both species occur in the Northwest Atlantic from Labrador to Florida. Neither species is commercially farmed. In 2016, the combined value of all U.S. Jonah crab landings was $12.3 million, while that of Atlantic rock crab was $869,142 (NMFS 2019a). Landings of Jonah crab have been increasing steadily since 2004 (2,000 mt [4.5 million lb]), reaching a peak in 2014 (8,000 mt [17.4 million lb]) and remaining high in recent years (2016: 7,000 mt [16 million lb]), with Massachusetts and Rhode Island as the major producers (Figure 1). Landings of Atlantic rock crab have fluctuated, with Maine as the major producer (Figure 2). There is some uncertainty and inconsistency in reporting among the individual states (Reardon 2006). The two species are also commonly confused because fishers and dealers refer to both as "rock crab" while the scientific literature and landings program refer to *C. irroratus* exclusively as "rock crab" (Reardon 2006) (pers.

comm., Taylor 2014) (pers. comm., Wilson 2014). Virginia has not commercially landed Atlantic rock crab since 1999 (NMFS 2019a).

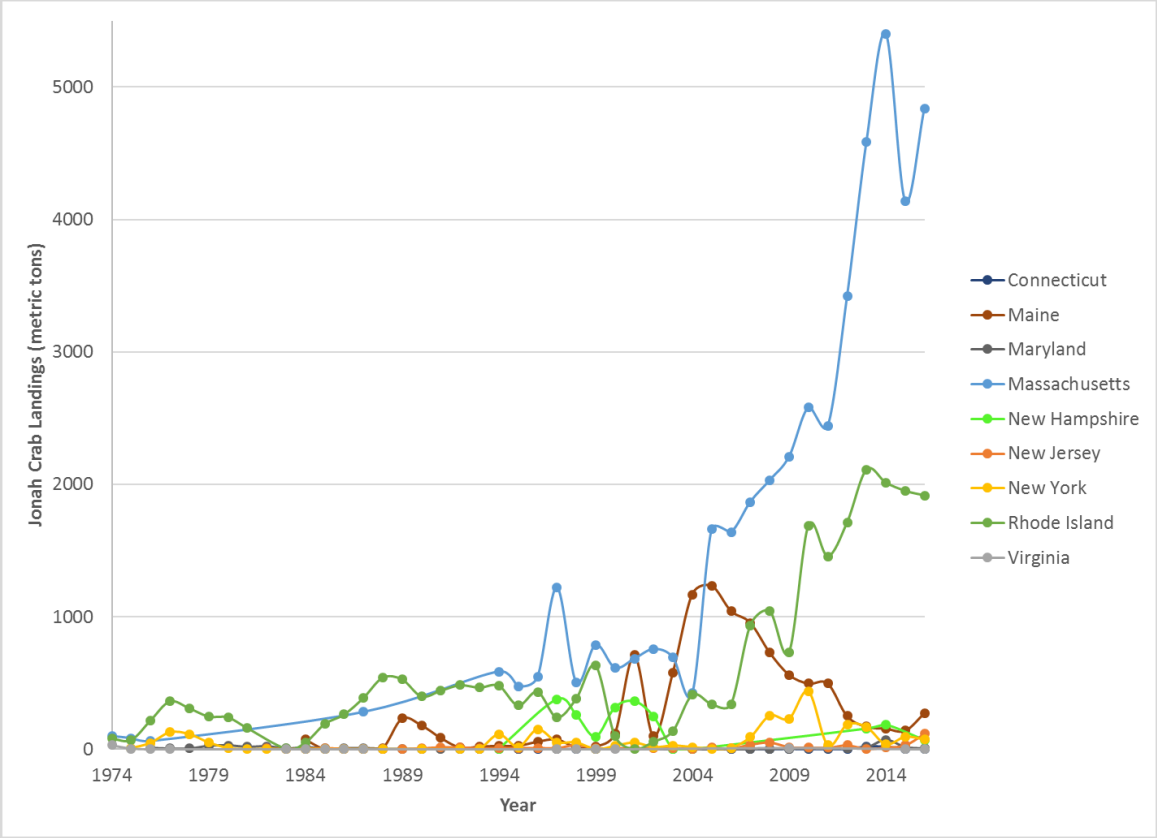


Figure 1: U.S. Jonah crab landings. Data source: (NMFS 2019a).

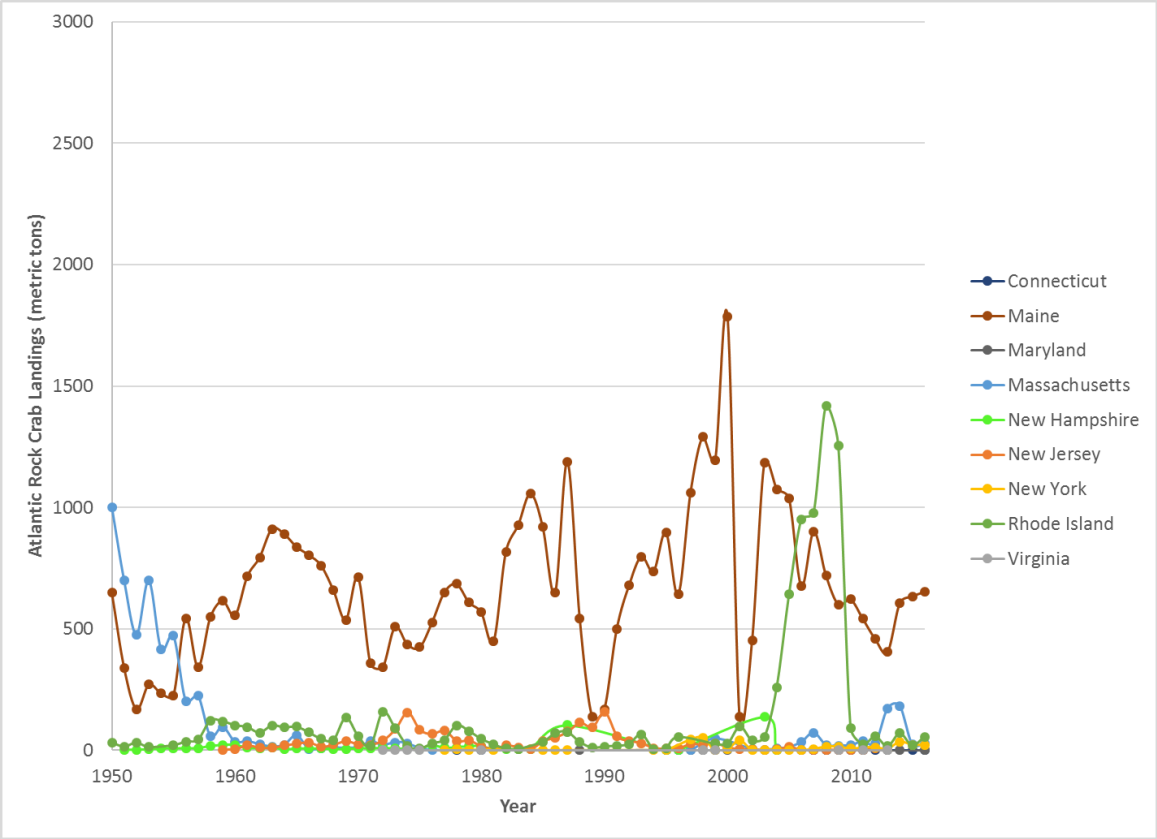


Figure 2: U.S. Atlantic rock crab landings. Data source: (NMFS 2019a).

Importance to the US/North American market.

Specific information is not available for Jonah crab or Atlantic rock crab imports/exports.

Common and market names.

Jonah crab:
Common Name: Jonah crab
Acceptable Market Name: Crab, Jonah

Atlantic Rock Crab
Common Name: Atlantic rock crab
Acceptable Market Name: Crab, rock
Vernacular Name: Sand crab

Primary product forms

Primary product forms for Jonah crab include live, fresh, and frozen (whole cooked, meat [also pasteurized], whole claw and arm, cocktail claws and snap-n-eat claws). Primary product forms for Atlantic rock crab are fresh or frozen cooked picked meat.

Assessment

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

Criterion 1: Impacts on the species under assessment

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

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

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

Guiding principles

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

Criterion 1 Summary

ATLANTIC ROCK CRAB			
REGION / METHOD	**ABUNDANCE**	**FISHING MORTALITY**	**SCORE**
Northwest Atlantic | Pots | United States | New York | Non-FMP	2.330: Moderate Concern	3.000: Moderate Concern	Yellow (2.644)
Northwest Atlantic | Pots | United States | Maine | Massachusetts | New Hampshire | Non-FMP	2.330: Moderate Concern	3.000: Moderate Concern	Yellow (2.644)
Northwest Atlantic | Pots | United States | Maryland | Connecticut | New Jersey | Rhode Island | Non-FMP	2.330: Moderate Concern	3.000: Moderate Concern	Yellow (2.644)

JONAH CRAB			
REGION / METHOD	**ABUNDANCE**	**FISHING MORTALITY**	**SCORE**
Northwest Atlantic | Pots | United States | New York	2.330: Moderate Concern	3.000: Moderate Concern	Yellow (2.644)
Northwest Atlantic | Pots | United States | Maine | Massachusetts | New Hampshire	2.330: Moderate Concern	3.000: Moderate Concern	Yellow (2.644)
Northwest Atlantic | Pots | United States | Maryland | Connecticut | New Jersey | Rhode Island	2.330: Moderate Concern	3.000: Moderate Concern	Yellow (2.644)

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.*

Atlantic rock crab

Factor 1.1 - Abundance

Northwest Atlantic | Pots | United States | New York | Non-FMP
Northwest Atlantic | Pots | United States | Maine | Massachusetts | New Hampshire | Non-FMP
Northwest Atlantic | Pots | United States | Maryland | Connecticut | New Jersey | Rhode Island | Non-FMP

Moderate Concern

There are no biological reference points or stock assessments for Atlantic rock crab. There is no reliable estimate for abundance and thus no evidence that the stock is either above or below a sustainable level. Because abundance in relation to reference points and conservation goals is unknown and the species has a medium vulnerability (PSA = 2.68, see table below), stock status is rated a moderate concern.

Justification:

To date, there have been no federal stock assessments conducted for Atlantic rock crab. Little is known about Atlantic rock crab populations but it has been noted that abundance varies cyclically, with periods of high abundance followed by periods of quite low abundance (Bannister et al. 2013). There is a high level of uncertainty associated with the use of landings data to estimate abundance, because they can be affected by environmental changes, market forces, and changes in fishing effort and pattern (Reardon 2006). Also, crab landings are not always publicly reported by species due to uncertainties with species identification. This will have likely improved with the recent implementation of the Jonah crab FMP, which requires more detailed reporting practices for Jonah crab (ASMFC 2015b). There are a number of fishery-independent surveys conducted by the different states that collect data on commercially important invertebrates (e.g., lobster, *Cancer* crab); however, little data is collected specifically for Atlantic rock crab (ASFMC 2018).

Atlantic rock crab has medium vulnerability (PSA score = 2.68).

Productivity Attribute	Relevant Information	Score
Average age at maturity	1–4 years	1
Average maximum age	8 years	1
Fecundity	125,000 to 500,000 eggs	1
Reproductive strategy	Egg brooder	2
Trophic level	2.5	1
Density dependence	Unknown	2

References for productivity table: (Bigford 1979)(Steneck et al. 2004)

Susceptibility	Relevant Information	Score
Areal overlap	>30% of the species concentration is fished, considering all fisheries	3
Vertical overlap	High degree of overlap between fishing depths and depth range of species	3
Selectivity of fishery	Species is targeted and/or by-catch but FMP requires escape gaps	2

Post-capture mortality	Retained species	3

Factor 1.2 - Fishing Mortality

Northwest Atlantic | Pots | United States | New York | Non-FMP
Northwest Atlantic | Pots | United States | Maine | Massachusetts | New Hampshire | Non-FMP
Northwest Atlantic | Pots | United States | Maryland | Connecticut | New Jersey | Rhode Island | Non-FMP

Moderate Concern
There are no known estimates for fishing mortality for Atlantic rock crab. Landings data are available (see Figure 2 in Introduction); however, there is a high degree of uncertainty associated with these data due to environmental changes, market forces, changes in fishing effort and pattern, and uncertainties with species identification (Reardon 2006). Because fishing mortality relative to reference points is unknown, it is considered a moderate concern.

Jonah crab

Factor 1.1 - Abundance

Northwest Atlantic | Pots | United States | New York
Northwest Atlantic | Pots | United States | Maine | Massachusetts | New Hampshire
Northwest Atlantic | Pots | United States | Maryland | Connecticut | New Jersey | Rhode Island

Moderate Concern
No range-wide stock assessments or biological reference points exist for Jonah crab, although the Atlantic States Marine Fisheries Commission considers them a priority for the future (ASMFC 2015b). Because of a lack of reference points and the stock's moderate inherent vulnerability (PSA = 2.68, see table below), abundance is rated a moderate concern.

Justification:
Jonah crab has historically been landed as a by-catch species in the lobster fishery; but in recent years, the species has become more popular in the market and is currently a targeted species, particularly in Southern New England. Landings data are available but significant uncertainty is associated with them and their suitability as a proxy for abundance, because landings have historically been underreported and can be affected by a range of factors, including environmental changes, market forces, and changes in fishing effort and pattern (ASMFC 2015b). A number of fishery-independent surveys are conducted by different states that collect data on Jonah crab. Indicators of stock health from these surveys vary: some suggest increases in abundance over the last couple of decades while others indicate declines (ASFMC 2018). There does not appear to be a comprehensive review of these surveys to provide an overall view of stock performance, further supporting the conclusion that stock health relative to a sustainable level is unknown.

This species has a moderate vulnerability (PSA = 2.68).

Productivity	Relevant Information	Score
Average age at maturity	<5 years*	1
Average maximum age	6–8 years*	2
Fecundity	1 million	1
Reproductive strategy	Egg brooder	2
Trophic level	2.5	1

* Best available estimate—based on Dungeness crab life history

References for productivity table: (Cobb et al. 1997)(CDFW 2013)(Steneck et al. 2004)(ASFMC 2015)

Susceptibility	Relevant Information	Score
Areal overlap	>30% of the species concentration is fished, considering all fisheries	3
Vertical overlap	High degree of overlap between fishing depths and depth range of species	3
Selectivity of fishery	Species is targeted and/or by-catch but FMP requires escape gaps	2
Post-capture mortality	Unknown	3

Factor 1.2 - Fishing Mortality

Northwest Atlantic | Pots | United States | New York
Northwest Atlantic | Pots | United States | Maine | Massachusetts | New Hampshire
Northwest Atlantic | Pots | United States | Maryland | Connecticut | New Jersey | Rhode Island

Moderate Concern

There are no recent fishing mortality estimates, and no current definition of overfishing exists for Jonah crab. Landings have increased due to the increased value of Jonah crab in the marketplace {ASMFC 2015} (see Figure 1 in Introduction) and redirection of effort toward directed Jonah crab harvest by lobster fishers in southern New England. In the 1990s, landings in New England fluctuated between 2 and 3 million lb (˜900–1,400 mt), rose to over 7 million lb (3,175 mt) in 2005, and reached over 20 million lbs (9,147 mt) in 2018 (NMFS 2022). Because reference points are unavailable, fishing mortality is considered a moderate concern.

Criterion 2: Impacts on Other Species

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

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

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

Guiding principles

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

Criterion 2 Summary

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.

ATLANTIC ROCK CRAB			
REGION / METHOD	**SUB SCORE**	**DISCARD RATE/LANDINGS**	**SCORE**
Northwest Atlantic | Pots | United States | New York | Non-FMP	1.000	1.000: < 100%	Red (1.000)
Northwest Atlantic | Pots | United States | Maine | Massachusetts | New Hampshire | Non-FMP	1.000	1.000: < 100%	Red (1.000)
Northwest Atlantic | Pots | United States | Maryland | Connecticut | New Jersey | Rhode Island | Non-FMP	1.000	1.000: < 100%	Red (1.000)

JONAH CRAB			
REGION / METHOD	**SUB SCORE**	**DISCARD RATE/LANDINGS**	**SCORE**
Northwest Atlantic | Pots | United States | New York	1.000	1.000: < 100%	Red (1.000)
Northwest Atlantic | Pots | United States | Maine | Massachusetts | New Hampshire	1.000	1.000: < 100%	Red (1.000)
Northwest Atlantic | Pots | United States | Maryland | Connecticut | New Jersey | Rhode Island	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 | POTS | UNITED STATES | MAINE | MASSACHUSETTS | NEW HAMPSHIRE			
SUB SCORE: 1.000	DISCARD RATE: 1.000	**SCORE: 1.000**	
SPECIES	**ABUNDANCE**	**FISHING MORTALITY**	**SCORE**
North Atlantic right whale	1.000: High Concern	1.000: High Concern	Red (1.000)
Fin whale	1.000: High Concern	5.000: Low Concern	Yellow (2.236)
Humpback whale	2.330: Moderate Concern	3.000: Moderate Concern	Yellow (2.644)
Jonah crab	2.330: Moderate Concern	3.000: Moderate Concern	Yellow (2.644)
Benthic inverts	2.330: Moderate Concern	5.000: Low Concern	Green (3.413)
Finfish	2.330: Moderate Concern	5.000: Low Concern	Green (3.413)
Little skate	3.670: Low Concern	5.000: Low Concern	Green (4.284)
Winter 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)

NORTHWEST ATLANTIC | POTS | UNITED STATES | MAINE | MASSACHUSETTS | NEW HAMPSHIRE | NON-FMP			
SUB SCORE: 1.000	DISCARD RATE: 1.000	**SCORE: 1.000**	
SPECIES	**ABUNDANCE**	**FISHING MORTALITY**	**SCORE**
North Atlantic right whale	1.000: High Concern	1.000: High Concern	Red (1.000)
Fin whale	1.000: High Concern	5.000: Low Concern	Yellow (2.236)
Atlantic rock crab	2.330: Moderate Concern	3.000: Moderate Concern	Yellow (2.644)
Humpback whale	2.330: Moderate Concern	3.000: Moderate Concern	Yellow (2.644)
Benthic inverts	2.330: Moderate Concern	5.000: Low Concern	Green (3.413)
Finfish	2.330: Moderate Concern	5.000: Low Concern	Green (3.413)
Little skate	3.670: Low Concern	5.000: Low Concern	Green (4.284)
Winter 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)

NORTHWEST ATLANTIC | POTS | UNITED STATES | MARYLAND | CONNECTICUT | NEW JERSEY | RHODE ISLAND

SUB SCORE: 1.000 | DISCARD RATE: 1.000 | **SCORE: 1.000**

SPECIES	ABUNDANCE	FISHING MORTALITY	SCORE
North Atlantic right whale	1.000: High Concern	1.000: High Concern	Red (1.000)
American lobster	1.000: High Concern	3.000: Moderate Concern	Red (1.732)
Fin whale	1.000: High Concern	5.000: Low Concern	Yellow (2.236)
Humpback whale	2.330: Moderate Concern	3.000: Moderate Concern	Yellow (2.644)
Jonah crab	2.330: Moderate Concern	3.000: Moderate Concern	Yellow (2.644)
Benthic inverts	2.330: Moderate Concern	5.000: Low Concern	Green (3.413)
Finfish	2.330: Moderate Concern	5.000: Low Concern	Green (3.413)
Little skate	3.670: Low Concern	5.000: Low Concern	Green (4.284)
Winter skate	3.670: Low Concern	5.000: Low Concern	Green (4.284)

NORTHWEST ATLANTIC | POTS | UNITED STATES | MARYLAND | CONNECTICUT | NEW JERSEY | RHODE ISLAND | NON-FMP

SUB SCORE: 1.000 | DISCARD RATE: 1.000 | **SCORE: 1.000**

SPECIES	ABUNDANCE	FISHING MORTALITY	SCORE
North Atlantic right whale	1.000: High Concern	1.000: High Concern	Red (1.000)
American lobster	1.000: High Concern	3.000: Moderate Concern	Red (1.732)
Fin whale	1.000: High Concern	5.000: Low Concern	Yellow (2.236)
Atlantic rock crab	2.330: Moderate Concern	3.000: Moderate Concern	Yellow (2.644)
Humpback whale	2.330: Moderate Concern	3.000: Moderate Concern	Yellow (2.644)
Benthic inverts	2.330: Moderate Concern	5.000: Low Concern	Green (3.413)
Finfish	2.330: Moderate Concern	5.000: Low Concern	Green (3.413)
Little skate	3.670: Low Concern	5.000: Low Concern	Green (4.284)
Winter skate	3.670: Low Concern	5.000: Low Concern	Green (4.284)

NORTHWEST ATLANTIC | POTS | UNITED STATES | NEW YORK			
SUB SCORE: 1.000	DISCARD RATE: 1.000	**SCORE: 1.000**	
SPECIES	**ABUNDANCE**	**FISHING MORTALITY**	**SCORE**
North Atlantic right whale	1.000: High Concern	1.000: High Concern	Red (1.000)
American lobster	1.000: High Concern	3.000: Moderate Concern	Red (1.732)
Fin whale	1.000: High Concern	5.000: Low Concern	Yellow (2.236)
Humpback whale	2.330: Moderate Concern	3.000: Moderate Concern	Yellow (2.644)
Jonah crab	2.330: Moderate Concern	3.000: Moderate Concern	Yellow (2.644)
Benthic inverts	2.330: Moderate Concern	5.000: Low Concern	Green (3.413)
Finfish	2.330: Moderate Concern	5.000: Low Concern	Green (3.413)
Little skate	3.670: Low Concern	5.000: Low Concern	Green (4.284)
Winter skate	3.670: Low Concern	5.000: Low Concern	Green (4.284)

NORTHWEST ATLANTIC | POTS | UNITED STATES | NEW YORK | NON-FMP			
SUB SCORE: 1.000	DISCARD RATE: 1.000	**SCORE: 1.000**	
SPECIES	**ABUNDANCE**	**FISHING MORTALITY**	**SCORE**
North Atlantic right whale	1.000: High Concern	1.000: High Concern	Red (1.000)
American lobster	1.000: High Concern	3.000: Moderate Concern	Red (1.732)
Fin whale	1.000: High Concern	5.000: Low Concern	Yellow (2.236)
Atlantic rock crab	2.330: Moderate Concern	3.000: Moderate Concern	Yellow (2.644)
Humpback whale	2.330: Moderate Concern	3.000: Moderate Concern	Yellow (2.644)
Benthic inverts	2.330: Moderate Concern	5.000: Low Concern	Green (3.413)
Finfish	2.330: Moderate Concern	5.000: Low Concern	Green (3.413)
Little skate	3.670: Low Concern	5.000: Low Concern	Green (4.284)
Winter skate	3.670: Low Concern	5.000: Low Concern	Green (4.284)

Data are lacking regarding by-catch composition in the Jonah crab and Atlantic rock crab fisheries. There is no observer coverage in these fisheries. Traps used in the commercial crab fishery are considered highly selective, so by-catch is thought to be low. The unknown by-catch matrix was used to identify finfishes and benthic invertebrates as taxa likely to interact significantly with the pot/trap gear. American lobster is included because there is overlap with American lobster fisheries, and the Jonah and Atlantic rock crab traps are deployed in American lobster habitat.

The Jonah crab and Atlantic rock crab fisheries are part of the Atlantic Mixed Species Trap/Pot Fishery, so they are classified as Category II under the Marine Mammal Protection Act, driven by occasional incidental death or serious injury of humpback whale (Gulf of Maine stock) and fin whale (Western North Atlantic stock) (NMFS 2018b). This classification is based on analogy with other fisheries using similar gear in the same region. There are concerns regarding entanglement of the North Atlantic right whale in the Northeast/Mid-Atlantic, typically with pot/trap gear. As a precaution, Seafood Watch considers interactions with North Atlantic right whale in all trap fisheries in the region. The score for Criterion 2 is driven by interactions between the fisheries and the endangered North Atlantic right whale.

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 | Pots | United States | Maine | Massachusetts | New Hampshire
Northwest Atlantic | Pots | United States | Maine | Massachusetts | New Hampshire | Non-FMP

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) (Figure 3) (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).

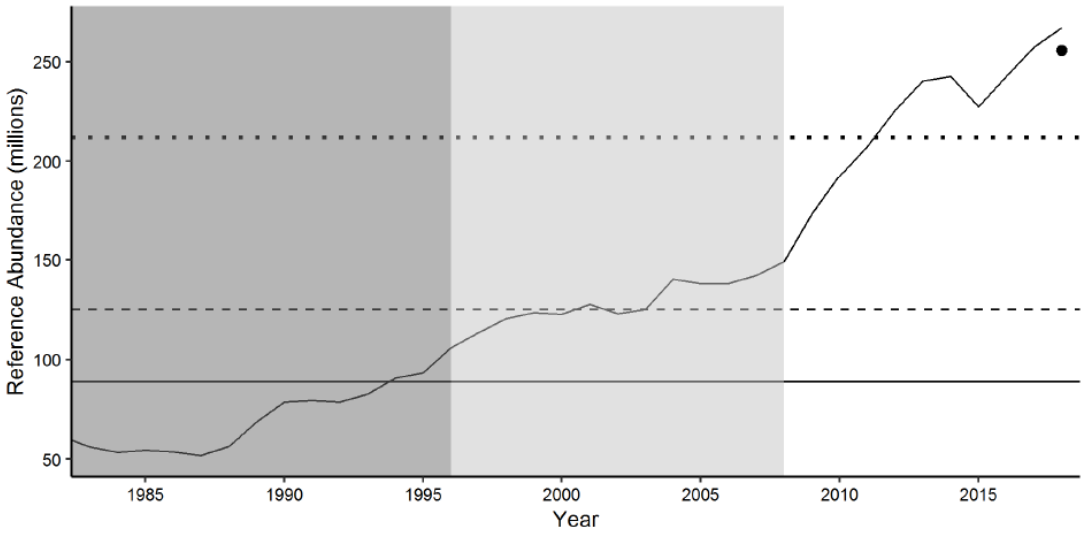


Figure 3: Gulf of Maine and Georges Bank lobster stock reference abundance compared to the fishery/industry target (dotted black line), abundance limit (dashed black line), and abundance threshold (solid black line) reference points based on detected low (dark grey period), moderate (light grey period),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

Northwest Atlantic | Pots | United States | Maryland | Connecticut | New Jersey |Rhode Island
Northwest Atlantic | Pots | United States | New York
Northwest Atlantic | Pots | United States | New York | Non-FMP
Northwest Atlantic | Pots | United States | Maryland | Connecticut | New Jersey |Rhode Island | Non-FMP

High Concern

The Southern New England (SNE) lobster stock is depleted, with the 3-year average abundance for 2016–2018 (7 million lobsters) below the abundance threshold (20 million lobsters) (Figure 4) (ASMFC 2020a). Beginning in 1997, the SNE stock suffered severe population declines, due partly to shell disease and changing environmental conditions (Phillips 2013). The stock is at an all-time low, and recruitment indices indicate that recruitment failure is preventing the stock from rebuilding (ASMFC 2020a). There is a contraction of the stock, which is now being seen in the offshore component in conjunction with the contraction of the inshore component (ASMFC 2020a). Environmental conditions remain unfavorable and disease indices are high (ASMFC 2020a). Because the SNE stock is in a depleted state, it is scored a high concern.

Justification:

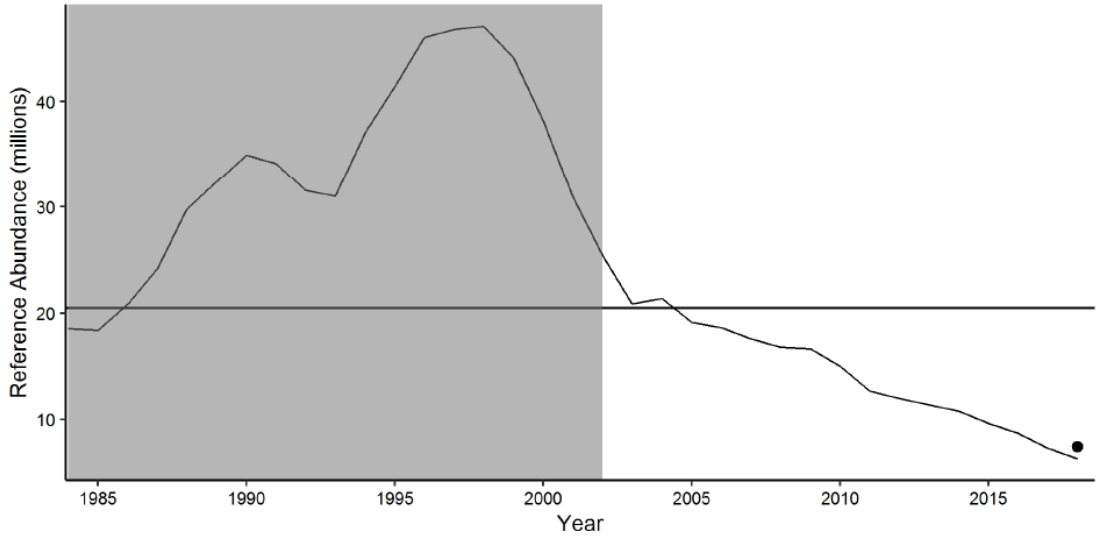


Figure 4: Southern New England lobster stock reference abundance relative to the abundance threshold (solid black line) reference point based on detected high (grey period) and low (white period) abundance regimes. The circle denotes the terminal 3-year (2016–2018) average reference abundance (ASMFC 2020a).

Factor 2.2 - Fishing Mortality

Northwest Atlantic | Pots | United States | Maine | Massachusetts | New Hampshire
Northwest Atlantic | Pots | United States | Maine | Massachusetts | New Hampshire | Non-FMP

Low Concern

Based on the average effective exploitation rate for 2016–2018, the GOM/GBK 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 5).

Justification:

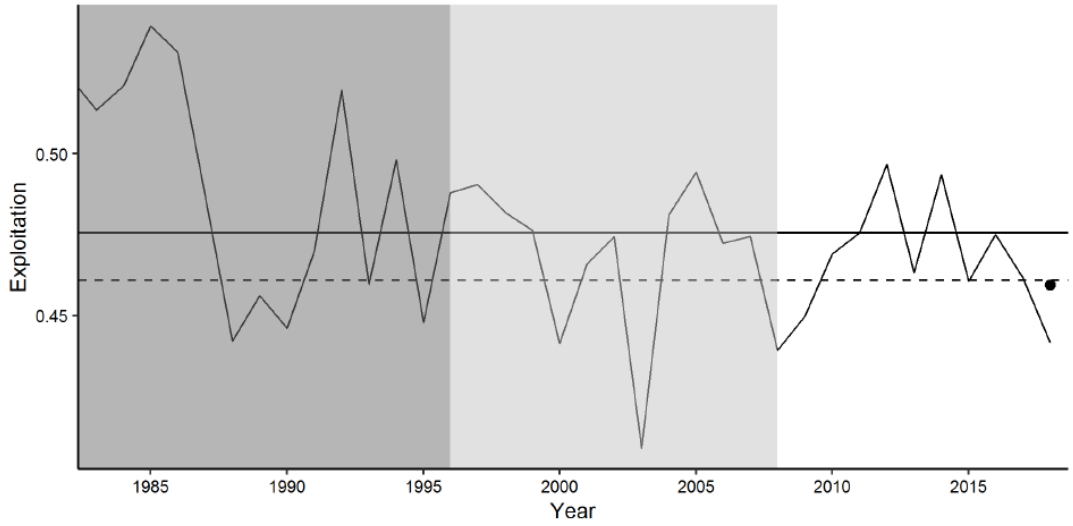


Figure 5: Gulf of Maine and Georges Bank lobster stock exploitation relative to the current target (dashed black line) and threshold (solid black line) reference points. Shaded periods are detected low (dark grey period), moderate (light grey period), and high (white period) abundance regimes. The circle represents the terminal 3-year (2016–2018) average exploitation (ASMFC 2020a).

Northwest Atlantic | Pots | United States | Maryland | Connecticut | New Jersey | Rhode Island
Northwest Atlantic | Pots | United States | New York
Northwest Atlantic | Pots | United States | New York | Non-FMP
Northwest Atlantic | Pots | United States | Maryland | Connecticut | New Jersey | Rhode Island | Non-FMP

Moderate Concern

Managers do not consider the Southern New England lobster stock to be experiencing overfishing. The 3-year average exploitation for 2016–2018 (0.2742) is below the exploitation threshold (0.2895) (Figure 6). But, it exceeds the target exploitation reference point (0.2569) and is not considered favorable (ASMFC 2020a). Exploitation has fluctuated between the threshold and target reference points during the last decade (ASMFC 2020a). Because overfishing is not occurring but exceeds the target exploitation reference, a score of moderate concern is given.

Justification:

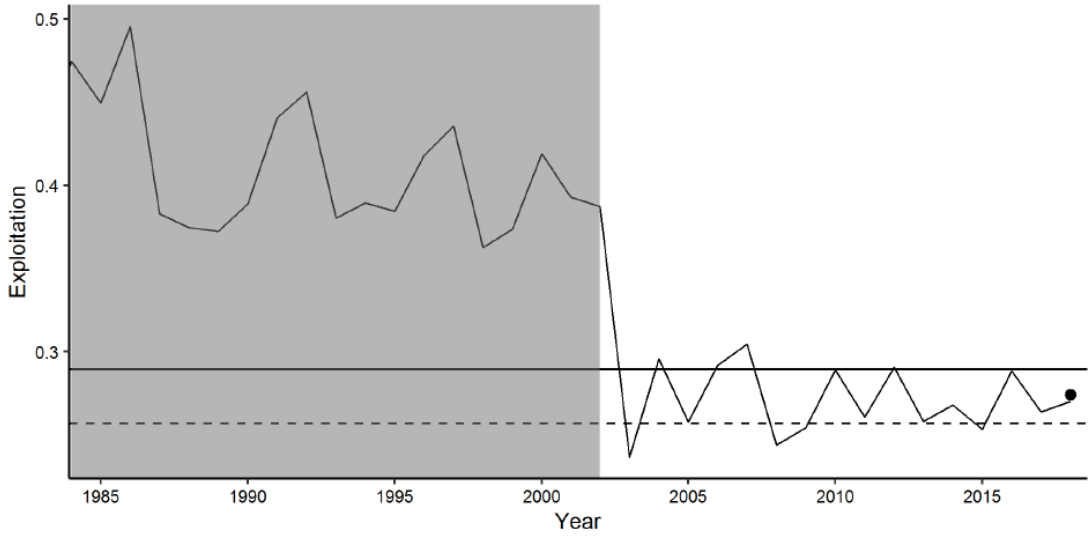


Figure 6: Southern New England lobster stock exploitation relative to the current target (dashed black line) and threshold (solid black line) reference points. Shaded periods are detected high (grey period) and low (white period) abundance regimes. The circle is the terminal 3-year (2016–2018) average exploitation (ASMFC 2020a).

Benthic inverts

Factor 2.1 - Abundance

Northwest Atlantic | Pots | United States | Maine | Massachusetts | New Hampshire | Non-FMP
Northwest Atlantic | Pots | United States | Maryland | Connecticut | New Jersey | Rhode Island | Non-FMP
Northwest Atlantic | Pots | United States | New York | Non-FMP
Northwest Atlantic | Pots | United States | New York
Northwest Atlantic | Pots | United States | Maryland | Connecticut | New Jersey | Rhode Island
Northwest Atlantic | Pots | United States | Maine | Massachusetts | New Hampshire

Moderate Concern
Abundance of unidentified benthic invertebrates is scored a moderate concern following scoring guidelines for pot fisheries provided by the Seafood Watch Unknown Bycatch Matrix.

Factor 2.2 - Fishing Mortality

Northwest Atlantic | Pots | United States | Maine | Massachusetts | New Hampshire | Non-FMP
Northwest Atlantic | Pots | United States | Maryland | Connecticut | New Jersey | Rhode Island | Non-FMP
Northwest Atlantic | Pots | United States | New York | Non-FMP

Northwest Atlantic | Pots | United States | New York
Northwest Atlantic | Pots | United States | Maryland | Connecticut | New Jersey | Rhode Island
Northwest Atlantic | Pots | United States | Maine | Massachusetts | New Hampshire

Low Concern
Fishing mortality of unidentified benthic invertebrates is scored a low concern following the scoring guidelines for pot fisheries provided by the Seafood Watch Unknown By-catch Matrix.

Fin whale

Factor 2.1 - Abundance

Northwest Atlantic | Pots | United States | Maine | Massachusetts | New Hampshire
Northwest Atlantic | Pots | United States | Maryland | Connecticut | New Jersey | Rhode Island
Northwest Atlantic | Pots | United States | New York
Northwest Atlantic | Pots | United States | New York | Non-FMP
Northwest Atlantic | Pots | United States | Maine | Massachusetts | New Hampshire | Non-FMP
Northwest Atlantic | Pots | United States | Maryland | Connecticut | New Jersey | Rhode Island | Non-FMP

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 | Pots | United States | Maine | Massachusetts | New Hampshire
Northwest Atlantic | Pots | United States | Maryland | Connecticut | New Jersey | Rhode Island
Northwest Atlantic | Pots | United States | New York
Northwest Atlantic | Pots | United States | New York | Non-FMP
Northwest Atlantic | Pots | United States | Maine | Massachusetts | New Hampshire |

Non-FMP
Northwest Atlantic | Pots | United States | Maryland | Connecticut | New Jersey | Rhode Island | Non-FMP

Low Concern
The total annual estimated average fishery-related mortality or serious injury (SIM) to the western North Atlantic fin whale stock from 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. waters, 0.95 unknown but first reported in U.S. waters, and 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). Because the PBR is not exceeded, and the pot/trap fishery contributes SIMs that are less than 50% of PBR, a score of low concern is given.

Finfish

Factor 2.1 - Abundance

Northwest Atlantic | Pots | United States | Maine | Massachusetts | New Hampshire | Non-FMP
Northwest Atlantic | Pots | United States | New York | Non-FMP
Northwest Atlantic | Pots | United States | Maryland | Connecticut | New Jersey | Rhode Island | Non-FMP
Northwest Atlantic | Pots | United States | New York
Northwest Atlantic | Pots | United States | Maryland | Connecticut | New Jersey | Rhode Island
Northwest Atlantic | Pots | United States | Maine | Massachusetts | New Hampshire

Moderate Concern
Abundance of unknown finfishes is scored a moderate concern following the scoring guidelines for pot fisheries provided by the Seafood Watch Unknown By-catch Matrix.

Factor 2.2 - Fishing Mortality

Northwest Atlantic | Pots | United States | Maine | Massachusetts | New Hampshire | Non-FMP
Northwest Atlantic | Pots | United States | New York | Non-FMP
Northwest Atlantic | Pots | United States | Maryland | Connecticut | New Jersey | Rhode Island | Non-FMP
Northwest Atlantic | Pots | United States | New York
Northwest Atlantic | Pots | United States | Maryland | Connecticut | New Jersey | Rhode Island
Northwest Atlantic | Pots | United States | Maine | Massachusetts | New Hampshire

Low Concern

Fishing mortality for finfishes is scored a low concern following the scoring guidelines for pot fisheries provided by the Seafood Watch Unknown By-catch Matrix.

Humpback whale

Factor 2.1 - Abundance

Northwest Atlantic | Pots | United States | Maryland | Connecticut | New Jersey | Rhode Island
Northwest Atlantic | Pots | United States | Maine | Massachusetts | New Hampshire
Northwest Atlantic | Pots | United States | New York
Northwest Atlantic | Pots | United States | New York | Non-FMP
Northwest Atlantic | Pots | United States | Maine | Massachusetts | New Hampshire | Non-FMP
Northwest Atlantic | Pots | United States | Maryland | Connecticut | New Jersey | Rhode Island | Non-FMP

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 | Pots | United States | Maryland | Connecticut | New Jersey | Rhode Island
Northwest Atlantic | Pots | United States | Maine | Massachusetts | New Hampshire
Northwest Atlantic | Pots | United States | New York
Northwest Atlantic | Pots | United States | New York | Non-FMP
Northwest Atlantic | Pots | United States | Maine | Massachusetts | New Hampshire | Non-FMP
Northwest Atlantic | Pots | United States | Maryland | Connecticut | New Jersey | Rhode Island | Non-FMP

Moderate Concern

From 2013 to 2017, the average annual rate of human-caused mortality and serious injury (SIM) 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, but it is likely that these are due to vessel strikes (NOAA 2021). It is estimated that 48–65% of the Gulf of Maine humpback whale stock have experienced a previous entanglement, based on scarring {Robbins & Mattila 2001}.

The majority of entanglements are not identifiable to a specific fishery, so the proportion of entanglement due to the Jonah and Atlantic rock crab fishery is unclear. The annual rate of mortality and serious injury during 2013–2017 from unidentified U.S. pot and trap interactions was 2.5 (11.4% of PBR) and from unidentified pot and trap interactions first seen in U.S. waters but unassigned to country was 0.75 (3.4% of PBR); while the rate of SIM not attributable to gear type was 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% was 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 pot and trap 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 pot and trap fisheries, fishing mortality is considered a moderate concern.

Little skate

Factor 2.1 - Abundance

Northwest Atlantic | Pots | United States | Maryland | Connecticut | New Jersey | Rhode Island
Northwest Atlantic | Pots | United States | Maine | Massachusetts | New Hampshire
Northwest Atlantic | Pots | United States | New York
Northwest Atlantic | Pots | United States | Maryland | Connecticut | New Jersey | Rhode Island | Non-FMP
Northwest Atlantic | Pots | United States | Maine | Massachusetts | New Hampshire | Non-FMP
Northwest Atlantic | Pots | United States | New York | Non-FMP

Low Concern

For little skate, 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 7) (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.

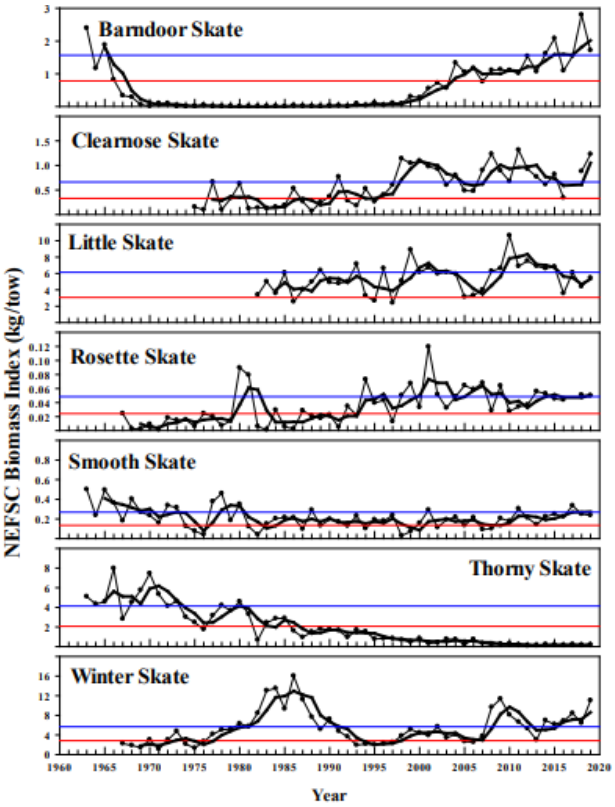


Figure 7: Northeast Fisheries Science Center survey biomass indices (kg/tow). Thin lines with symbols are annual indices, thick lines are 3-year moving averages, and the thin horizontal lines are the management biomass thresholds and targets. From (Sosebee 2020).

Factor 2.2 - Fishing Mortality

Northwest Atlantic | Pots | United States | Maryland | Connecticut | New Jersey | Rhode Island
Northwest Atlantic | Pots | United States | Maine | Massachusetts | New Hampshire
Northwest Atlantic | Pots | United States | New York
Northwest Atlantic | Pots | United States | Maryland | Connecticut | New Jersey | Rhode Island | Non-FMP

Northwest Atlantic | Pots | United States | Maine | Massachusetts | New Hampshire | Non-FMP
Northwest Atlantic | Pots | United States | New York | Non-FMP

Low Concern
For little skate, 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).

North Atlantic right whale

Factor 2.1 - Abundance

Northwest Atlantic | Pots | United States | Maine | Massachusetts | New Hampshire
Northwest Atlantic | Pots | United States | Maine | Massachusetts | New Hampshire | Non-FMP
Northwest Atlantic | Pots | United States | New York
Northwest Atlantic | Pots | United States | New York | Non-FMP
Northwest Atlantic | Pots | United States | Maryland | Connecticut | New Jersey | Rhode Island | Non-FMP
Northwest Atlantic | Pots | United States | Maryland | Connecticut | New Jersey | Rhode Island

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 | Pots | United States | Maine | Massachusetts | New Hampshire
Northwest Atlantic | Pots | United States | Maine | Massachusetts | New Hampshire | Non-FMP
Northwest Atlantic | Pots | United States | New York
Northwest Atlantic | Pots | United States | New York | Non-FMP
Northwest Atlantic | Pots | United States | Maryland | Connecticut | New Jersey | Rhode Island | Non-FMP
Northwest Atlantic | Pots | United States | Maryland | Connecticut | New Jersey | Rhode Island

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 Jonah and Atlantic rock crab 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).

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 the mitigation of whale entanglement have yet to be determined. Because of limited observation coverage, it is likely that the number of entanglements are 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 identifiable to gear (7.8% of entangled NARW carry gear) and only a small proportion (12%) of those are identifiable to a location {Knowlton et al. 2012}{Knowlton et al. 2019}{Kraus et al. 2019}. Fishery 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 recent study 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 of 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. Of all vertical lines fished in the U.S. Atlantic outside of the ALWTRP exempt areas, 95% are from the lobster and crab fishery (50 Federal Register 2020). 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 8).

The Jonah and rock crab fishery is classified as a Category II fishery by NOAA (NMFS 2018b). 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 Jonah and Atlantic rock crab fisheries 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 NARW 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 the highest abundance in the western Gulf of Maine {Record et al. 2019}.

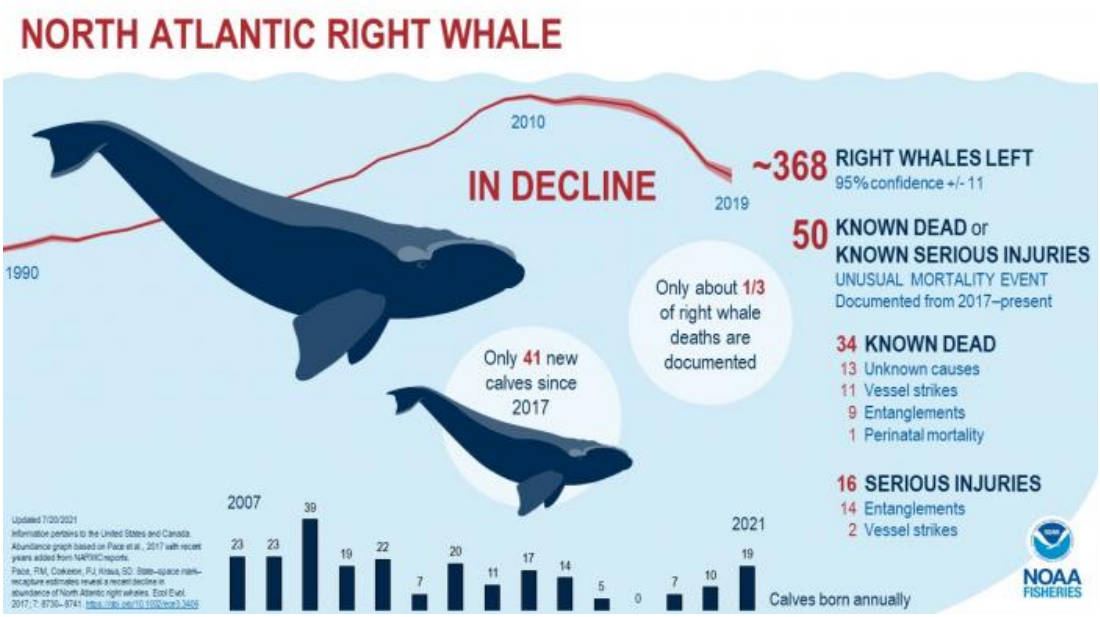


Figure 8: An infographic showing best estimates of current North Atlantic right whale population numbers and causes of death during the current Unusual Mortality Event, 2017 to present (NOAA 2021).

Winter skate

Factor 2.1 - Abundance

Northwest Atlantic | Pots | United States | New York
Northwest Atlantic | Pots | United States | Maine | Massachusetts | New Hampshire
Northwest Atlantic | Pots | United States | Maine | Massachusetts | New Hampshire | Non-FMP
Northwest Atlantic | Pots | United States | Maryland | Connecticut | New Jersey | Rhode Island | Non-FMP
Northwest Atlantic | Pots | United States | New York | Non-FMP
Northwest Atlantic | Pots | United States | Maryland | Connecticut | New Jersey | Rhode Island

Low Concern

For winter skate, the 2017 to 2019 NEFSC autumn average biomass index of 8.61 kg/tow is above

the biomass threshold reference point (2.83 kg/tow) and above the B_{MSY} proxy (5.66 kg/tow; see Figure 9) (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:

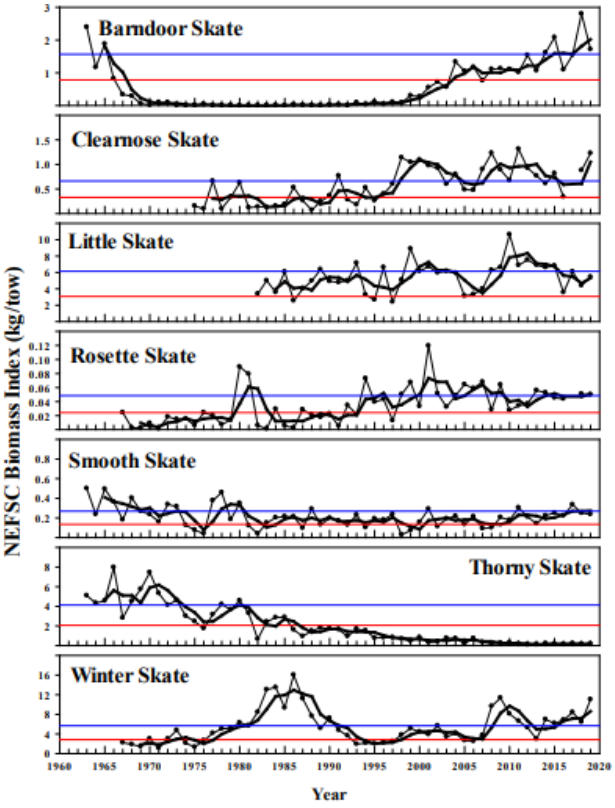


Figure 9: Northeast Fisheries Science Center survey biomass indices (kg/tow). Thin lines with symbols are annual indices, thick lines are 3-year moving averages, and the thin horizontal lines are the management biomass thresholds and targets. From (Sosebee 2020).

Factor 2.2 - Fishing Mortality

Northwest Atlantic | Pots | United States | New York
Northwest Atlantic | Pots | United States | Maine | Massachusetts | New Hampshire
Northwest Atlantic | Pots | United States | Maine | Massachusetts | New Hampshire | Non-FMP
Northwest Atlantic | Pots | United States | Maryland | Connecticut | New Jersey | Rhode Island | Non-FMP
Northwest Atlantic | Pots | United States | New York | Non-FMP
Northwest Atlantic | Pots | United States | Maryland | Connecticut | New Jersey | Rhode Island

Low Concern

For winter skate, the 2017 to 2019 average index is above the 2016 to 2018 index by 19.2% (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).

Factor 2.3 - Discard Rate/Landings

Northwest Atlantic | Pots | United States | New York | Non-FMP
Northwest Atlantic | Pots | United States | Maine | Massachusetts | New Hampshire | Non-FMP
Northwest Atlantic | Pots | United States | Maryland | Connecticut | New Jersey | Rhode Island | Non-FMP
Northwest Atlantic | Pots | United States | New York
Northwest Atlantic | Pots | United States | Maine | Massachusetts | New Hampshire
Northwest Atlantic | Pots | United States | Maryland | Connecticut | New Jersey | Rhode Island

< 100%

Mortality rates, based on preliminary data from laboratory studies, were 19% in control crab, 56% with one claw removed, and 74% when both claws were removed (Carloni et al. 2016). But the ratio of by-catch to landings has not been studied, so the dead discard amount is uncertain. The average discard rate for crustacean fisheries is estimated at 12.4% (Kelleher 2005).

Skates, from a directed skate bait fishery comprising 90% little skate and 10% juvenile winter skate, are one of the primary bait forms used in the Jonah and Atlantic rock crab fisheries (NMFS 2018). Processing by-products and frames/racks (typically from cod, haddock, and salmon) are also used to bait crab traps (pers. comm., Grossman 2014). Bait use relative to landings is estimated at 25–50%. Although more robust research is required, it is likely that dead discards plus bait use relative to total landings <100%.

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 | Pots | United States | Maine | Massachusetts | New Hampshire	Moderately Effective	Ineffective	N/A	N/A	N/A	**Red (1.000)**
Northwest Atlantic | Pots | United States | Maine | Massachusetts | New Hampshire | Non-FMP	Moderately Effective	Ineffective	N/A	N/A	N/A	**Red (1.000)**

Northwest Atlantic | Pots | United States | Maryland | Connecticut | New Jersey | Rhode Island	Moderately Effective	Ineffective	N/A	N/A	N/A	**Red (1.000)**
Northwest Atlantic | Pots | United States | Maryland | Connecticut | New Jersey | Rhode Island | Non-FMP	Moderately Effective	Ineffective	N/A	N/A	N/A	**Red (1.000)**
Northwest Atlantic | Pots | United States | New York	Ineffective	Ineffective	N/A	N/A	N/A	**Red (1.000)**
Northwest Atlantic | Pots | United States | New York | Non-FMP	Ineffective	Ineffective	N/A	N/A	N/A	**Red (1.000)**

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 manages follow scientific advice? To achieve a highly effective rating, there must be appropriately defined management goals, precautionary policies that are based on scientific advice, and evidence that the measures in place have been successful at maintaining/rebuilding species.

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 | Pots | United States | Maine | Massachusetts | New Hampshire | Non-FMP
Northwest Atlantic | Pots | United States | Maryland | Connecticut | New Jersey | Rhode Island | Non-FMP

Moderately Effective
Atlantic rock crab fishery management falls under the jurisdiction of state management agencies coordinated by the Atlantic States Marine Fisheries Commission (ASMFC). Currently, there are few management measures in place for Atlantic rock crab and there is no coordination among state management agencies.

Atlantic rock crab is typically landed as by-catch in the Jonah crab and lobster fisheries in the region, so any management measures pertaining to gear specifications are considered here. Of note is the use of escape vents. Although specific requirements vary from state to state, the escape vents that are used will allow a rock crab of <5 in. carapace width (CW) to leave the trap. Atlantic rock crab matures at 2.75–3 in. CW and reaches a maximum of 5.75 in. CW, suggesting that a large proportion of the spawning biomass will be able to escape traps set for Jonah crab or lobster.

Because there are measures in place in the fisheries that land Atlantic rock crab that are likely to provide meaningful protection to this species, management strategy and implementation is considered moderately effective.

Northwest Atlantic | Pots | United States | Maine | Massachusetts | New Hampshire
Northwest Atlantic | Pots | United States | Maryland | Connecticut | New Jersey | Rhode Island

Moderately Effective
An Interstate Fisheries Management Plan (IFMP) is in effect (established in 2015) for the Jonah crab fishery in state waters that includes harvest restrictions (including prohibition on retaining egg-bearing females, minimum size limits, and daily and trip limits for incidental harvest) and allowance for adaptive management (ASFMC 2015). Permits are required and limited to those already holding a lobster permit or with proof of participation in the fishery before June 2015. Addenda to the IFMP in recent years have implemented by-catch limits for non-trap and non-lobster trap gear, a coast-wide standard for claw harvest, and improved the spatial resolution of harvester reporting and the quality of data collected.

In November 2019, NOAA Fisheries approved management measures for the Jonah crab fishery in federal waters based on Atlantic States Marine Fisheries Commission recommendations (84 Federal Register 56). Actions include implementing a minimum size limit and protection for egg-bearing females, restricting harvest to those already holding a limited-access American lobster permit, and setting incidental catch limits.

There are no current population reference points available and measures have not been in place long enough to evaluate their success at achieving targeted goals, so management strategy and

implementation are rated moderately effective.

Northwest Atlantic | Pots | United States | New York | Non-FMP
Northwest Atlantic | Pots | United States | New York

Ineffective
An Interstate Fisheries Management Plan (IFMP) is in effect (established in 2015) for the Jonah crab fishery in state waters that includes harvest restrictions (including prohibition on retaining egg-bearing females, minimum size limits, and daily and trip limits for incidental harvest) and allowance for adaptive management (ASFMC 2015). Permits are required and limited to those already holding a lobster permit or with proof of participation in the fishery before June 2015. Addenda to the IFMP in recent years have implemented by-catch limits for non-trap and non-lobster trap gear, a coast-wide standard for claw harvest, and improved the spatial resolution of harvester reporting and the quality of data collected.

In November 2019, NOAA Fisheries approved management measures for the Jonah crab fishery in federal waters based on Atlantic States Marine Fisheries Commission recommendations (84 Federal Register 56). Actions include implementing a minimum size limit and protection for egg-bearing females, restricting harvest to those already holding a limited-access American lobster permit, and setting incidental catch limits.

Although New York is a member state of the Atlantic States Marine Fisheries Commission, to date it has not effectively implemented the requirements of the IFMP (ASFMC 2018).

Because New York has failed to implement the measures outlined within the IFMP, management strategy and implementation of Jonah and Atlantic rock crab in state waters is considered ineffective.

Factor 3.2 - Bycatch Strategy

Northwest Atlantic | Pots | United States | Maine | Massachusetts | New Hampshire | Non-FMP
Northwest Atlantic | Pots | United States | Maryland | Connecticut | New Jersey | Rhode Island | Non-FMP
Northwest Atlantic | Pots | United States | Maine | Massachusetts | New Hampshire
Northwest Atlantic | Pots | United States | Maryland | Connecticut | New Jersey | Rhode Island

Ineffective
The main by-catch concern in the U.S. lobster and Jonah crab fisheries relates to the risk of entanglement of western North Atlantic right whale (*Eubalaena glacialis*), a species that is considered "Endangered" under the Endangered Species Act (ESA) (Hayes et al. 2021) and "Critically Endangered" under the International Union for the Conservation of Nature (IUCN) Red List (see Criterion 2) (Cooke 2020). The species is one of the rarest of all large cetaceans and among the most endangered species in the world (NMFS 2021b). It is "considered to be facing an extremely high risk of extinction in the wild" (IUCN 2012).

Human sources are the leading cause of mortality of North Atlantic right whale; analysis of non-calf carcasses from 2003 to 2018 determined that all mortalities were the result of human activity (Sharp et al. 2019). Of mortalities and serious injuries (SIM) detected between 2010 and 2019, 57% occurred as a result of entanglement in fishing gear, 15% were caused by vessel strikes, and 3% were entrapments. The remaining 25% could not be attributed to a source (NMFS 2021b).

In recognition of the current high rate of human-caused mortality on North Atlantic right whale, the National Oceanic and Atmospheric Administration (NOAA) has declared an "Unusual Mortality Event" (UME) from 2017 to the present (2021). During the UME, to date, 34 dead whales have been found stranded (21 in Canada, 13 in the United States), with an additional 16 whales determined to be free-swimming but seriously injured (NOAA 2021).

When considering only entanglements in U.S. gear or entanglements first seen in U.S. waters, the potential biological removal (PBR) level [1] has been exceeded every year since 2010, except 2013 (NMFS 2021b). Actual mortalities and serious injuries of North Atlantic right whale in U.S. fisheries are likely higher than the number observed in the Stock Assessment Reports, with an estimated 64% of all mortalities going undetected between 1990 and 2017 (Pace et al. 2021). Despite the implementation of additional management measures to reduce the impacts on North Atlantic right whale (including the use of sinking groundlines) (2009), efforts to reduce the number of vertical buoy lines (2014), and an expansion of the Massachusetts Restricted Area (MRA) (2015), mortalities and serious injuries of North Atlantic right whale in U.S. gear and first seen in the U.S. persist at levels above the potential biological removal (PBR) (NMFS 2021b).

On September 17, 2021, NOAA published a final rule to amend the Atlantic Large Whale Take Reduction Plan (ALWTRP): the Risk Reduction Rule, including new measures to reduce risk to North Atlantic right whale entanglement mortality from the lobster and Jonah crab pot fisheries. NOAA initiated the rulemaking for U.S. lobster and Jonah crab fisheries first because they represent 93% of the vertical (buoy) lines in U.S. waters (NMFS 2021b). NOAA's intention is to also consider other fixed-gear fisheries in subsequent years (NMFS 2021b).

The Risk Reduction Rule is part of a new North Atlantic right whale Conservation Framework established in the May 27, 2021 biological opinion by NOAA that is estimated to reduce impacts from U.S. fisheries to low levels by 2030. Seafood Watch analyzed these measures through the Standard for Fisheries and determined a score of ineffective for Criteria 3.2. NOAA's measures do not meet the criteria for a moderately effective rating due to high uncertainty regarding their effectiveness and continued cumulative impacts to the North Atlantic right whale. Seafood Watch notes the following specific concerns:

- The risk reduction rule and Conservation Framework do not sufficiently reduce cumulative impacts of U.S. fisheries, because NOAA estimates it will take 9 years before mortality is projected to be below the current PBR (NMFS 2021a). The risk reduction rule is the first in a series of regulatory actions to reduce average mortality from all U.S. fisheries over the next decade as part of the Conservation Framework. The risk reduction rule specifies new regulations for the U.S. lobster and Jonah crab fisheries to protect North Atlantic right whale, and NOAA predicts that the risk reduction rule will reduce the risks from these fisheries by 69% (50 Federal Register 229 & 697 2021). NOAA has long recognized that

the mortality of even one North Atlantic right whale will likely impede the survival and recovery of the species (50 Federal Register 229 2001). Under the Conservation Framework, NOAA predicts continued serious injury and mortalities of North Atlantic right whale above PBR for 9 years, which Seafood Watch believes will exacerbate the situation.

- The risk reduction rule does not account for all of the unknown fishing mortalities or other sources of mortality that have been observed and are predicted to continue to occur in the near future (NMFS 2021a)(Hayes et al. 2022). In developing the risk reduction rule, NOAA assigned 50% of the unknown entanglement incidents to U.S. fisheries, but then chose a risk reduction target (60%) that did not consider unobserved mortalities and serious injuries (50 Federal Register 229 & 697 2021). The 2021 Biological Opinion predicts that additional sources of mortality (i.e., Canadian fisheries mortality, unknown mortality, and vessel strikes) are expected, and this contributes to a high risk that PBR will be exceeded (NMFS 2021a).
- NOAA has acknowledged that there is a risk from pot, trap, and gillnet fisheries within the range of the North Atlantic right whale, including lobster and Jonah crab fisheries (50 Federal Register 229 & 697 2021)(NMFS 2021a)(NMFS 2021b)(NOAA 2021). Until there is more specific information available regarding which fisheries are responsible for unattributed entanglements, Seafood Watch considers that all relevant fisheries that may overlap with NARW pose risks.

In July 2022, a District Court ruled that the 2021 Risk Reduction Rule and 2021 Biological Opinion were invalid, partly 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}.

Considering NOAA's analysis and the potential impacts of the lobster and Jonah crab fisheries, the failure of the management system to reach compliance with the ESA and MMPA, and the District Court ruling to find the Risk Reduction Rule and 2021 BiOp invalid, Seafood Watch finds that the Risk Reduction Rule and the broader Conservation Framework will be insufficient to reduce the risk to the "Critically Endangered" North Atlantic right whale population in a reasonable timeframe. These significant concerns result in a Seafood Watch assessment of ineffective for Criteria 3.2.

[1] The potential biological removal (PBR) level is defined by the Marine Mammal Protection Act (MMPA) as the maximum number of animals, not including natural mortalities, that may be removed from a marine mammal stock while allowing that stock to reach or maintain its optimum sustainable population.

Justification:
Fish and invertebrates:

Management measures are in place to reduce the impacts of the American lobster fishery on fish and other invertebrate species caught as by-catch. Based on limited data, lobster trap gear is highly selective, so overall by-catch is low (<5% per species) (ASMFC 2014a). Regulations prohibit the

landing of juvenile lobster, ovigerous females, and lobster above maximum size limits. A biodegradable panel is mandatory to minimize ghost fishing in the event of trap loss.

Turtles:

In 2002, the Northeast Region Sea Turtle Disentanglement Network (STDN) was developed by NMFS to act as an event response network to disentangle sea turtles (NMFS 2014b). Currently, no mitigation measures have been implemented to reduce the impact of vertical line fisheries on sea turtles in U.S. waters. But, measures that are being implemented to reduce the risk to marine mammals by reducing the amount of gear in the water are likely to offer some benefit to sea turtles (NMFS and USFWS 2020).

Mammals:

In 1997, the Atlantic Large Whale Take Reduction Plan (ALWTRP) was developed under the Marine Mammal Protection Act (MMPA) to reduce serious injury and mortality (SIM) to whales due to incidental take in U.S. commercial fisheries that interact with strategic stocks, including the American lobster and Jonah crab fishery (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. are 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 PBR, and to a level approaching zero (the Zero Mortality Rate Goal). Historically, 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). 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" in 2015 (50 Federal Register 2014) are not fully understood due to limited data and analyses (the latest marine mammal stock assessments consider data from 2014 to 2018). There have also been challenges in confidently attributing entanglements to specific fisheries. In a study of rope diameters from entangled whales, 79% of rope used in the Maine lobster fishery was found to be less than 1/2 in. diameter while 81% of rope recovered from right whales was greater than 1/2 in. diameter (ME DMR 2019). But, for most entanglement interactions, gear is not recovered or is unidentifiable (77% of entanglements between 2000 and 2018) (NOAA 2019a).

In a lawsuit filed against the National Marine Fisheries Service regarding lobster and Jonah crab fisheries management, The Center for Biological Diversity, Defenders of Wildlife, The Humane Society of the United States, and the Conservation Law Foundation asserted that the take of North Atlantic right whale is in violation of the Endangered Species Act (ESA) and Marine Mammal Protection Act {Center for Biological Diversity et al. vs. Ross et al. 2018}. Plaintiffs stated that the 2014 Biological Opinion was outdated and lacked critical information regarding recent North Atlantic right whale population declines and reduced calving rates. Thus, plaintiffs determined that managers were failing to base the jeopardy determination on the best data available. In April 2020, the court ruled that NOAA's management of the American lobster fishery was in violation of the Endangered Species Act (ESA). The 2014 Biological Opinion was declared invalid under the ESA due to a failure

to include an incidental take statement for North Atlantic right whale, and the court ordered a briefing from both parties on a remedy. In May 2021, a new biological opinion was published that included an incidental take statement.

In September 2021, NOAA published the Risk Reduction Rule (50 Federal Register 229 & 697 2021) to reduce the risk posed by the U.S. lobster and Jonah crab trap fisheries to North Atlantic right whale and other large whales in the region (e.g., humpback whale, fin whale). The new rule requires fishers to increase the number of traps between buoys, known as "trawling up." This allows the same number of traps to be fished while reducing the threat of entanglement in vertical buoy lines. The minimum number of traps that must be fished per trawl varies by region and distance from shore (Table 1). In some management zones, fishers may opt to fish a lower number of traps per trawl and use only one vertical line (thus ensuring equivalency with the rule).

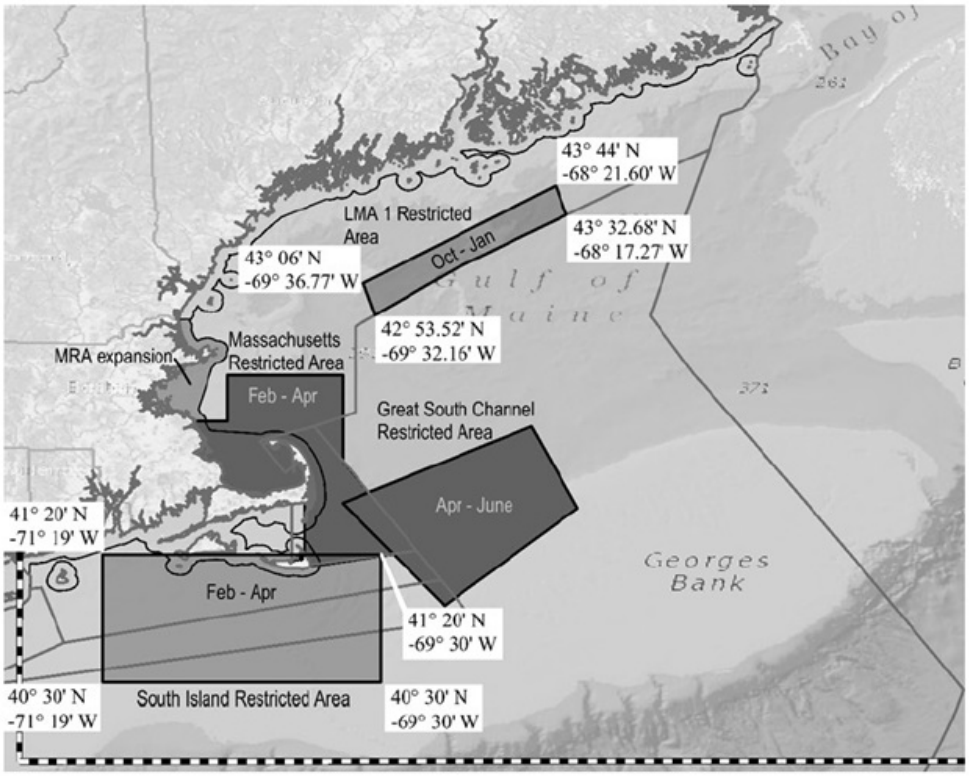
Table 1: Trap per trawl limits by management area for U.S. lobster and Jonah crab fisheries (adapted from (50 Federal Register 229 & 697 2021)).

Area	Traps per trawl
Maine 3–6 nm*, Zone A West	8 traps/trawl per two buoy lines; 4 traps/trawl per one buoy line.
Maine 3–6 nm*, Zone B	5 traps/trawl per one buoy line.
Maine 3–6 nm*, Zones C, D, E, F, G	10 traps/trawl per two buoy lines; 5 traps/trawl per one buoy line.
Maine 3–12 nm, Zone A East	20 traps/trawl per two buoy lines; 10 traps/trawl per one buoy line.
Maine 6*–12 nm, Zone A West	15 traps/trawl per two buoy lines; 8 traps/trawl per one buoy line.
Maine 6*–12 nm, Zones B, D, E, F	10 traps/trawl per two buoy lines; 5 traps/trawl per one buoy line (status quo in D, E, F).
Maine 6*–12 nm, Zones C, G	20 traps/trawl per two buoy lines; 10 traps/trawl per one buoy line.
Maine Lobster Management Area (LMA) 1, 6*–12 nm	15 traps/trawl
LMA1 and Outer Cape Cod (OCC) 3–12 nm	15 traps/trawl
LMA1 over 12 nm	25 traps/trawl
LMA3, north of 50 fathom line on south end of Georges Bank	45 traps/trawl, increase maximum trawl length from 1.5 nm to 1.75 nm.
LMA3, south of 50 fathom line on south end of Georges Bank	35 traps/trawl, increase maximum trawl length from 1.5 nm to 1.75 nm.
LMA3, Georges Basin Restricted Area	50 traps/trawl, increase maximum trawl length from 1.5 nm to 1.75 nm.

The Risk Reduction Rule also introduces two new closed areas, increases the coverage of an existing area, and adjusts the fishing activities permitted in existing area closures. The LMA 1 Restricted Area and the South Island Restricted Area (see Figure 10) will be closed seasonally to lobster and crab fishing using persistent buoy lines. Also, the rule modified existing closures, the Massachusetts Restricted Area (MRA), and the Great South Channel Restricted Area, resulting in seasonal closure to lobster and crab fishing using persistent buoy lines (previously, harvest of any lobster and crab using traps was prohibited). This modification has been made to allow fishers to harvest lobster and crab when trialing "ropeless" technologies that may further reduce the risk to North Atlantic right whale. The MRA is also extended northward to the New Hampshire border. In addition to these mandated closures, in 2022 NMFS announced a temporary emergency closure between the Massachusetts Restricted Area North and the Massachusetts Restricted Area from April 1 to April 30,

2022 to protect whales that were expected to be leaving the Cape Cod Bay area through an area that saw high densities of gear in 2022 {50 Federal Register 229 2022}.

Figure 10: Restricted fishing areas implemented under the Risk Reduction Rule (50 Federal Register 229 & 697 2021)



In addition to the trawling up requirements and the restricted fishing areas, the Risk Reduction Rule also requires all vertical lines to include a weak rope or weak insert, reducing the breaking strength of the vertical line to 1,700 lb. The specific requirements vary, depending on the area fished and the distance from shore (Table 2).

Table 2: Weakened rope requirements by management area as required by the Risk Reduction Rule (adapted from (50 Federal Register 229 & 697 2021)).

Area	Weak Rope or Weak Insert
Northeast Region	For all buoy lines incorporating weak line or weak insertions, remove weak link requirement at the surface system.
Maine state waters outside of exemption line	One weak insertion 50% down the line.
Maine state waters	Fully weak line or weak inserts every 60 ft in top 75% of line.
New Hampshire state waters	One weak insertion 50% down the line.
Rhode Island state waters	Fully weak line or weak inserts every 60 ft in top 75% of line.
Maine Zone A West, B, C, D, E; federal waters 3–12 nm	Two weak insertions, at 25% and 50% down the line.
Maine Zone A East, F, and G; federal waters 3–12 nm	One weak insertion 33% down the line.

Maine and New Hampshire LMA 1, OCC; federal waters 3–12 nm	Two weak insertions, at 25% and 50% down the line.
LMA 1 & OCC over 12 nm	One weak insertion 33% down the line.
LMA 2	Fully weak line or weak inserts every 60 ft in top 75% of line.
LMA 3	One buoy line weak to 75%.

The Risk Reduction Rule introduces new requirements for the marking of gear in the lobster and crab fisheries, establishing state-specific colors for Maine (purple), New Hampshire (yellow), Massachusetts (red), and Rhode Island (silver/gray), except for vessels fishing in LMA 3, which retain the black mark. A large, 3-ft. mark is required within the surface system, and an additional 1-ft. green mark is required within 6 in. of the area mark to distinguish gear fished in state versus federal waters. In LMA 3, the green mark will distinguish vessels fishing the Northeast region from those fishing the southern and western regions of the area. Further detail on the gear marking requirements can be found in Table 3. The new gear marking regulations are not anticipated to directly reduce the risk or severity of entanglement. Rather, they aim to provide greater clarity on the source of an individual entanglement, which will enable managers to better resolve the issue of whale entanglement by more accurately attributing the fisheries responsible for whale entanglements (NMFS 2021b).

Table 3: Gear marking requirements implemented through the Risk Reduction Rule (adapted from (50 Federal Register 229 & 697 2021)).

Area	Northeast Region Lobster and Jonah Crab Trap/Pot Gear Marking Requirement
State waters	One 3-ft. state-specific colored mark (based on principal port state) in surface system within 2 fathoms of the buoy. At least two 1-ft. marks in the state (principal port) color in the primary buoy line: one in the top half and one in the bottom half. Maine exempt waters will be regulated by Maine and not included in federal regulations.
All Northeast Region federal waters, except LMA 3	A 3-ft. state-specific colored mark within 2 fathoms of the buoy. At least three 1-ft. marks in the state (principal port) color on the top, middle, and bottom of the primary buoy line. Additional Northeast Region federal mark within 6 in. of each state-specific color: 1-ft. long green marks. For dual-permitted vessels, state regulations will determine whether green federal markings can remain on gear being fished in state waters.
LMA 3	A 3-ft. black mark within 2 fathoms of the buoy. At least three 1-ft. black marks on the top, middle, and bottom of the primary buoy line. Additional Northeast Region federal water mark within 6 in. of each black mark: 1-ft. green marks within 6 in.

The Risk Reduction Rule developed by NOAA was devised to reduce the impact of the U.S. lobster and Jonah crab fisheries by 69%. In developing the rule, a 60% reduction target was developed by adding the known impact of U.S. lobster and Jonah crab fisheries (0.2 North Atlantic right whale SIMs per year, averaged from 2009 to 2018) and then attributing 50% of the unknown impact (2.0 North Atlantic right whale SIMs per year, averaged from 2009 to 2018), resulting in an estimated impact of 2.2 North Atlantic right whale SIMs per year. A 69% reduction in the risk of U.S. lobster and Jonah crab fisheries results in 0.68 North Atlantic right whale SIMs per year, below the PBR of 0.8. But the impact of the lobster and Jonah crab fisheries cannot be considered independent of other factors—including the remaining 50% of unattributed entanglements, vessel strikes, and entrapment—because, cumulatively, these impacts exceed PBR.

The Risk Reduction Rule and its associated Conservation Framework will initiate additional regulatory actions between 2021 and 2030. 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 0.7) (Table 4). 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 timeframe 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 4: Actions to be taken under the ALWTRP Conservation Framework (adapted from (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 rulemaking, 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/SI on average annually to 2.69. Implementation for certain measures will begin in 2021; others will be phased over time.
2	2023	NMFS implements rulemaking to reduce M/SI in federal gillnet and other pot/trap fisheries (i.e., other than lobster and Jonah crab fisheries included in Phase 1) 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 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 rulemaking 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 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 that 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 1.0 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 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 NARW in Massachusetts state waters effective from May 1, 2021 (Massachusetts Register 2022). A seasonal closure has been implemented that prohibits 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 NARW 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 (Table 3), 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).

In Maine, additional gear marking requirements were introduced in 2020. Gear within the exemption line (waters within one mile of the coast have previously been exempted from the requirements of the ALWTRP) are required to show a 3-ft. purple mark in the top two fathoms of

the buoy line, a 1-ft. purple mark at the midway point, and a 1-ft. purple mark at the bottom of the buoy line (lines shorter than 100 ft. do not need to show the mark at the midpoint) (MDMR 2020). Gear fished between the exemption line and 3 nm (referred to as "the sliver"), and in federal waters outside of 3 nm must be marked with four purple marks and one green mark (a 3-ft. purple mark and a 6-in. green mark in the top two fathoms, and 1-ft. purple marks at the top, midpoint, and bottom of the buoy line) (MDMR 2020).

There is a need for improved cooperation between U.S. 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 United States 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 7.7 SIMs per year from 2015 to 2019), particularly on SIMs from unknown sources (3.7 SIMs), remain far above the levels required to recover the population (PBR = 0.7) (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 United States and Canadian waters.

New scientific data indicate additional risks that have not been addressed in the risk reduction rule or the Conservation Framework: specifically, risks related to entanglements that do not result in SIMs (Stewart 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 (Stewart 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 impacts of entanglements are avoided.

Northwest Atlantic | Pots | United States | New York | Non-FMP
Northwest Atlantic | Pots | United States | New York

Ineffective
Management measures are in place to reduce the impacts of the Jonah and Atlantic rock crab fisheries on by-catch. Based on limited data from the American lobster fishery, trap gear is highly selective, so overall by-catch is considered to be low (<5% per species) {ASMFC 2014b}. A biodegradable panel is mandatory to prevent ghost fishing in the event of trap loss.

The Atlantic Large Whale Take Reduction Plan (ALWTRP) was developed under the Marine Mammal Protection Act (MMPA) in 1997 to reduce mortality and serious injury to whales due to incidental

take in U.S. commercial fisheries (including the Jonah crab and Atlantic rock crab fisheries) that interact with strategic stocks (NOAA 2012)(NOAA 2018). 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 and Swails 2017)(NOAA 2018). 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). 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 mortality and serious injury due to entanglement continues to exceed the potential biological removal (PBR) (Hayes et al. 2020). 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 2013 to 2017). But, for most entanglement interactions, gear is not recovered, and though the Jonah and rock crab fishery has not been identified specifically in recent interactions, most interactions cannot be attributed to a specific fishery (Hayes et al. 2020).

Because management measures to prevent by-catch are insufficient, given the potential impacts of the fishery on endangered North Atlantic right whale, with evidence that the U.S. MMPA Take Reduction Plan is ineffective in reducing mortality and serious injury rates below PBR, by-catch strategy is rated ineffective.

Factor 3.3 - Scientific Research And Monitoring

Northwest Atlantic | Pots | United States | New York | Non-FMP
Northwest Atlantic | Pots | United States | Maine | Massachusetts | New Hampshire | Non-FMP
Northwest Atlantic | Pots | United States | Maryland | Connecticut | New Jersey | Rhode Island | Non-FMP
Northwest Atlantic | Pots | United States | New York
Northwest Atlantic | Pots | United States | Maine | Massachusetts | New Hampshire
Northwest Atlantic | Pots | United States | Maryland | Connecticut | New Jersey | Rhode Island

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 | Pots | United States | New York | Non-FMP
Northwest Atlantic | Pots | United States | Maine | Massachusetts | New Hampshire | Non-FMP

Northwest Atlantic | Pots | United States | Maryland | Connecticut | New Jersey | Rhode Island | Non-FMP
Northwest Atlantic | Pots | United States | New York
Northwest Atlantic | Pots | United States | Maine | Massachusetts | New Hampshire
Northwest Atlantic | Pots | United States | Maryland | Connecticut | New Jersey | Rhode Island

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 | Pots | United States | New York | Non-FMP
Northwest Atlantic | Pots | United States | Maine | Massachusetts | New Hampshire | Non-FMP
Northwest Atlantic | Pots | United States | Maryland | Connecticut | New Jersey | Rhode Island | Non-FMP
Northwest Atlantic | Pots | United States | New York
Northwest Atlantic | Pots | United States | Maine | Massachusetts | New Hampshire
Northwest Atlantic | Pots | United States | Maryland | Connecticut | New Jersey | Rhode Island

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
Northwest Atlantic | Pots | United States | Maine | Massachusetts | New Hampshire	Score: 3	Score: 0	Moderate Concern	**Yellow (3.000)**
Northwest Atlantic | Pots | United States | Maine | Massachusetts | New Hampshire | Non-FMP	Score: 3	Score: 0	Moderate Concern	**Yellow (3.000)**
Northwest Atlantic | Pots | United States | Maryland | Connecticut | New Jersey | Rhode Island	Score: 3	Score: 0	Moderate Concern	**Yellow (3.000)**
Northwest Atlantic | Pots | United States | Maryland | Connecticut | New Jersey | Rhode Island | Non-FMP	Score: 3	Score: 0	Moderate Concern	**Yellow (3.000)**
Northwest Atlantic | Pots | United States | New York	Score: 3	Score: 0	Moderate Concern	**Yellow (3.000)**
Northwest Atlantic | Pots | United States | New York | Non-FMP	Score: 3	Score: 0	Moderate Concern	**Yellow (3.000)**

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 | Pots | United States | New York | Non-FMP
Northwest Atlantic | Pots | United States | Maine | Massachusetts | New Hampshire | Non-FMP
Northwest Atlantic | Pots | United States | Maryland | Connecticut | New Jersey | Rhode Island | Non-FMP
Northwest Atlantic | Pots | United States | New York
Northwest Atlantic | Pots | United States | Maine | Massachusetts | New Hampshire
Northwest Atlantic | Pots | United States | Maryland | Connecticut | New Jersey | Rhode Island

Score: 3

The Jonah and Atlantic rock crab trap/pot fisheries are carried out on a variety of benthic habitats, including complex, hard rocky bottoms and mud, sand, and gravel bottoms. Although single traps are generally accepted as low impact gear (NMFS 2011), the sheer volume of traps being fished can have cumulative effects on bottom habitats (Smolowitz 1998). The impact of the crab traps is scored a 3.

Factor 4.2 - Modifying Factor: Mitigation of Gear Impacts

Northwest Atlantic | Pots | United States | New York | Non-FMP
Northwest Atlantic | Pots | United States | Maine | Massachusetts | New Hampshire | Non-FMP
Northwest Atlantic | Pots | United States | Maryland | Connecticut | New Jersey | Rhode Island | Non-FMP
Northwest Atlantic | Pots | United States | New York
Northwest Atlantic | Pots | United States | Maine | Massachusetts | New Hampshire
Northwest Atlantic | Pots | United States | Maryland | Connecticut | New Jersey | Rhode Island

Score: 0

Trap gear is generally considered to have low impact on benthic habitats compared to mobile gear (such as trawl gear) and is deployed in less vulnerable habitats. Although both NMFS and ASMFC have measures in place to control fishing effort in the region, there is no specific mitigation of gear impacts on benthic habitats for the Jonah crab and Atlantic rock crab fisheries. Because management measures do not protect >20% of habitat from trap fishing and gear modifications do not reduce direct impact to habitat, mitigation of gear impacts is rated 0.

Factor 4.3 - Ecosystem-based Fisheries Management

Northwest Atlantic | Pots | United States | New York | Non-FMP
Northwest Atlantic | Pots | United States | Maine | Massachusetts | New Hampshire | Non-FMP
Northwest Atlantic | Pots | United States | Maryland | Connecticut | New Jersey | Rhode Island | Non-FMP
Northwest Atlantic | Pots | United States | New York
Northwest Atlantic | Pots | United States | Maine | Massachusetts | New Hampshire
Northwest Atlantic | Pots | United States | Maryland | Connecticut | New Jersey | Rhode Island

Moderate Concern

In terms of fully assessing the ecological impacts of the fishery, there are no extensive measures in place other than fishing effort reduction via trap limits. Knowledge of the ecological interactions of Jonah crab and Atlantic rock crab (as predator and prey) is lacking for developing robust ecological-based fisheries management (Bannister et al. 2013). The relative importance of *Cancer* crab species in coastal ecosystems has increased in the past decade, with the decline in green sea urchin (Leland 2002)(Steneck et al. 2004)(Bannister et al. 2013). Because some ecosystem-based management is in place but with the possibility of detrimental food web effects requiring more research or stronger policies to fully protect the ecological role of harvested species, ecosystem-based management is rated a moderate concern.

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

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