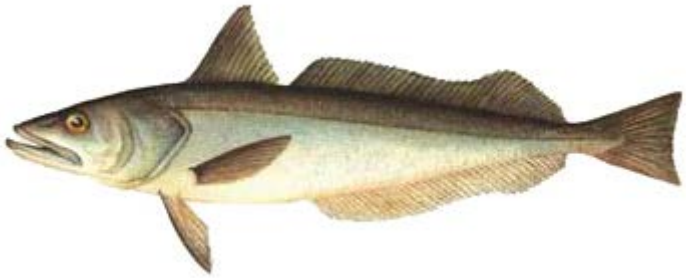
Monterey Bay Aquarium
Seafood Watch®

Offshore hake, Red hake, Silver hake

Merluccius albidus, Urophycis chuss, Merluccius bilinearis



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U.S. Atlantic

Bottom trawl

February 12, 2016
Michelle Cho, Consulting researcher

Disclaimer

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About Seafood Watch®

The Monterey Bay Aquarium Seafood Watch® program evaluates the ecological sustainability of wild-caught and farmed seafood commonly found in the North American 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 mission is to engage and empower consumers and businesses to purchase environmentally responsible seafood fished or farmed in ways that minimize their impact on the environment or are in a credible improvement project with the same goal.

Each sustainability recommendation is supported by a seafood report. Each report synthesizes and analyzes the most current ecological, fisheries and ecosystem science on a species, then evaluates this information against the program's Sustainability Criteria to arrive at a recommendation of "Best Choice," "Good Alternative," or "Avoid." In producing the seafood reports, Seafood Watch utilizes research published in academic, peer-reviewed journals whenever possible. Other sources of information include government technical publications, fishery management plans and supporting documents, and other scientific reviews of ecological sustainability. Seafood Watch research analysts also communicate with ecologists, fisheries and aquaculture scientists, and members of industry and conservation organizations when evaluating fisheries and aquaculture practices. Capture fisheries and aquaculture practices are highly dynamic; as the scientific information on each species changes, Seafood Watch's sustainability recommendations and the underlying seafood reports will be updated to reflect these changes. Both the detailed evaluation methodology and the scientific reports, are available on seafoodwatch.org.

For more information about Seafood Watch and seafood reports, please contact the Seafood Watch program at Monterey Bay Aquarium by calling 1-877-229-9990 or visit online at seafoodwatch.org.

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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 capture fisheries must possess to be considered sustainable by the Seafood Watch program:

- *Stocks are healthy and abundant.*
- *Fishing mortality does not threaten populations or impede the ecological role of any marine life.*
- *The fishery minimizes bycatch.*
- *The fishery is managed to sustain long-term productivity of all impacted species.*
- *The fishery is conducted such that impacts on the seafloor are minimized and the ecological and functional roles of seafloor habitats are maintained.*
- *Fishing activities should not seriously reduce ecosystem services provided by any fished species or result in harmful changes such as trophic cascades, phase shifts, or reduction of genetic diversity.*

Based on these guiding principles, Seafood Watch has developed a set of four sustainability criteria to evaluate capture fisheries for the purpose of developing a seafood recommendation for consumers and businesses. These criteria are:

1. Impacts on the species under assessment
2. Impacts on other species
3. Effectiveness of management
4. Habitat and ecosystem impacts

Each criterion includes:

- Factors to evaluate and score
- Evaluation guidelines to synthesize these factors and to produce a numerical score
- A resulting numerical score and rating for that criterion

Once a score and rating has been assigned to each criterion, an overall seafood recommendation is developed on additional evaluation guidelines. Criteria ratings and the overall recommendation are color-coded to correspond to the categories on the Seafood Watch pocket guide:

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

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

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

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

Summary

This report provides recommendations for three hake species caught in the small-mesh multispecies fishery in U.S. Atlantic waters: silver hake, red hake, and offshore hake (*Merluccius bilinearis, Urophycis chuss,* and *Merluccius albidus*). There are two stocks of silver hake and red hake and a single stock of offshore hake in U.S. Atlantic waters. Both stocks of silver and red hake are not overfished and overfishing is not occurring. The stock status of offshore hake is unknown.

Small-mesh trawl fisheries in the Northeast and Mid-Atlantic have some bycatch, which is mostly species that are also targeted with small-mesh: squids, Atlantic butterfish, and Atlantic mackerel. The small-mesh multispecies fishery is combined with the Northeast bottom trawl fishery and is classified as a Category II fishery for marine mammal takes due to interactions with the western North Atlantic stock of Atlantic white-sided dolphins. The lowest-scoring species under Criterion 2 are offshore hake, Atlantic mackerel, and shortfin squid in the mid-Atlantic area, and offshore hake in the New England area. Thus, these species' scores drive the Criterion 2 rankings. Bycatch within the fishery is a moderate conservation concern.

The small-mesh multispecies fishery is managed under a series of exemptions to the Northeast Multispecies Fishery Management Plan because the fishing industry was able to demonstrate that it could keep bycatch levels low enough not to negatively affect groundfish stocks. Managers follow scientific advice and work is ongoing to obtain better information on all these species. Management of retained species is considered moderately effective, while management of bycatch within the fishery is considered highly effective.

The small-mesh multispecies trawlers use modified gear in some areas with the intention of greatly reducing contact with the bottom. Furthermore, silver hake, red hake, and offshore hake are found over sand and mud bottom, which some studies have found are not heavily impacted by bottom trawls. The New England Fishery Management Council is in the process of developing ecosystem-based fishery management strategies for exceptional species caught in this fishery.

Table of Conservation Concerns and Overall Recommendations

Stock / Fishery	Impacts on the Stock	Impacts on other Spp.	Management	Habitat and Ecosystem	Overall Recommendation
Offshore hake United States US New England - Small mesh bottom trawl	Yellow (2.64)	Yellow (2.57)	Green (3.46)	Yellow (2.74)	**Good Alternative (2.835)**
Red hake United States US New England - Small mesh bottom trawl	Green (3.83)	Yellow (2.51)	Green (3.46)	Yellow (2.74)	**Good Alternative (3.091)**

Red hake United States US Mid Atlantic - Small mesh bottom trawl	Green (3.83)	Yellow (2.51)	Green (3.46)	Yellow (2.74)	**Good Alternative (3.091)**
Silver hake United States US New England - Small mesh bottom trawl	Green (3.83)	Yellow (2.51)	Green (3.46)	Yellow (2.74)	**Good Alternative (3.091)**
Silver hake United States US Mid Atlantic - Small mesh bottom trawl	Green (3.83)	Yellow (2.51)	Green (3.46)	Yellow (2.74)	**Good Alternative (3.091)**
Offshore hake United States US Mid Atlantic - Small mesh bottom trawl	Yellow (2.64)	Yellow (2.51)	Green (3.46)	Yellow (2.74)	**Good Alternative (2.817)**

Scoring Guide

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

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

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

- **Good Alternative/Yellow** = Final score >2.2-3.2, **and** neither Harvest Strategy (Factor 3.1) nor Bycatch Management Strategy (Factor 3.2) are Very High Concern[2], **and** no more than one Red Criterion, **and** no Critical scores
- **Avoid/Red** = Final Score <=2.2, **or** either Harvest Strategy (Factor 3.1) or Bycatch Management Strategy (Factor 3.2) is Very High Concern **or** two or more Red Criteria, **or** one or more Critical scores.

[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).

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Introduction

Scope of the analysis and ensuing recommendation

This report covers silver hake, offshore hake, and red hake. These species are caught in a small-mesh, multispecies otter trawl fishery in the Northeast and Mid-Atlantic regions. Two stock units are evaluated for red hake and silver hake: the Gulf of Maine/Northern Georges Bank stock landed in the New England fishery and the Southern Georges Bank/Mid-Atlantic stock landed in the U.S. Mid-Atlantic fishery. Prior to 1991, offshore hake were landed as silver hake in the southern region of the stock (Garcia-Vazquez et al. 2009). Since then, the extent to which the catches of both species are separated is unknown, so their numbers are combined for purposes such as assigning catch limits. This report covers the majority of silver, offshore, and red hake caught in the U.S. Atlantic, with over 95% of landings coming from the small-mesh otter trawl fishery.

Overview of the species and management bodies

Silver hake and offshore hake are collectively referred to as whiting, while red hake is referred to as ling (NEFMC 2012). The fishery for all three species is often referred to as the "whiting fishery"; but to prevent confusion, this report refers to the fishery as the small-mesh multispecies fishery.

Silver hake (*Merluccius bilinearis*) in the Northwest Atlantic is found from Newfoundland to South Carolina (NEFMC 2014b). The northern stock inhabits the Gulf of Maine to northern Georges Bank and the southern stock inhabits southern Georges Bank to the Mid-Atlantic Bight waters. Although no scientific evidence can be found to support a single or separate biological stock structure, the two stocks are used for scientific and management purposes. Silver hake is a nocturnal, semi-pelagic predator that migrates seasonally with the changes in water temperature. It can be found in warmer, shallower waters in spring, where it spawns through early summer. It returns to deeper, cooler water in the fall. Silver hake are almost all sexually mature by age 3. The maximum size is 70 cm (28 in.) and maximum age found is 14 years (NEFMC 2014b).

Red hake (*Urophycis chuss*) is found from the Gulf of St. Lawrence to North Carolina, with the highest abundance from northern Georges Bank to southern New England waters (NEFMC 2014b). There are northern and southern stocks of red hake, with the same boundaries as those of silver hake. This split is for management purposes. Red hake is a gadoid species that also migrates seasonally. Like silver hake, it can be found in warmer, shallower waters in spring, where it spawns from May to November. It returns to deeper, cooler water in the winter. Half the red hake population is sexually mature before age 2. The maximum size is 50 cm (20 in.) and maximum age found is also 14 years (NEFMC 2014b).

Not as much is known about the biology and population dynamics of offshore hake (*Merluccius albidus*). This species is found from the Northwest Atlantic to the Caribbean and Gulf of Mexico (NOAA Fisheries 1999). Spawning likely occurs from April through July in New England and from June through September in the Mid-Atlantic Bight. It is not known whether offshore hakes migrate—they have been found at constant depths around 200 m, and may migrate vertically in the water column at night.

Production Statistics

Silver and offshore hake landings decreased from a high in 1965 of 351,000 mt to a low of 16,100 mt in 1981 (NEFMC 2000). After this, landings remained relatively stable with a slight decline in the 1990s, and have declined by about half since 2000 (NOAA Office of Science and Technology 2015).

Red hake landings decreased from a high in 1956 of 4,746 mt to a low of 429.4 mt in 2005 and have been under 1,000 mt since 2002 (NOAA Office of Science and Technology 2015).

Small-mesh, multispecies-directed trip landings are primarily from MA, NY, and RI (the top five ports landing silver hake are Gloucester, MA; Provincetown, MA; Point Judith, RI; Montauk, NY; and New Bedford, MA). Landings are relatively stable throughout the year, with a slight increase in July, August, and September, and a low in November and December.

Importance to the U.S./North American market

About half the silver hake landed is exported, and the other half is consumed domestically (NEFMC 2000). Of the silver hake consumed domestically, most goes to the fresh market, where it is sold to restaurants and supermarkets for use in fried fish sandwiches, for corned (salted) hake traditionally in New England, or other whitefish dishes. The U.S. West Coast Pacific whiting fishery supplies cheaper frozen whiting, which may be part of the reason the frozen market for silver hake declined in the past few decades.

Offshore hake is caught in deeper waters than silver hake, but is usually sold with and as whiting (NEFMC 2000). But it is usually larger than silver hake, and people prefer smaller sizes. Its meat is generally softer than that of silver hake and, where it is separated, it is usually sold for a lower price. Point Judith is one of the only ports that separates offshore hake from silver hake.

Red hake meat does not last long, and cannot be frozen or successfully stored for long or transported far (NEFMC 2000). Because of this, there is no developed market for it, either domestically or internationally. There is a small fillet market in New York, Philadelphia, and Baltimore, and a small domestic whole ling market.

Common and market names

Silver and offshore hake are commonly referred to as whiting. Offshore hake can also commonly be referred to as black whiting. Red hake is most commonly referred to as ling, and sometimes as squirrel or mud hake. (NEFMC 2012)

Primary product forms

Whiting is found in the marketplace filleted, whole, and smoked. Bigger red hake is sold filleted and smaller red hake whole.

Assessment

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

Criterion 1: Stock for which you want a recommendation

This criterion evaluates the impact of fishing mortality on the species, given its current abundance. The inherent vulnerability to fishing rating influences how abundance is scored, when abundance is unknown. The final Criterion 1 score is determined by taking the geometric mean of the abundance and fishing mortality scores. The Criterion 1 rating is determined as follows:

- *Score >3.2=Green or Low Concern*
- *Score >2.2 and <=3.2=Yellow or Moderate Concern*
- *Score <=2.2=Red or High Concern*
  Rating is Critical if Factor 1.3 (Fishing Mortality) is Critical.

Criterion 1 Summary

OFFSHORE HAKE				
Region / Method	**Inherent Vulnerability**	**Stock Status**	**Fishing Mortality**	**Subscore**
United States US Mid Atlantic Small mesh bottom trawl	3.00:Low	3.00:Moderate Concern	2.33:Moderate Concern	**Yellow (2.644)**
United States US New England Small mesh bottom trawl	3.00:Low	3.00:Moderate Concern	2.33:Moderate Concern	**Yellow (2.644)**

RED HAKE				
Region / Method	**Inherent Vulnerability**	**Stock Status**	**Fishing Mortality**	**Subscore**
United States US Mid Atlantic Small mesh bottom trawl	2.00:Medium	4.00:Low Concern	3.67:Low Concern	**Green (3.831)**
United States US New England Small mesh bottom trawl	2.00:Medium	4.00:Low Concern	3.67:Low Concern	**Green (3.831)**

SILVER HAKE				
Region / Method	**Inherent Vulnerability**	**Stock Status**	**Fishing Mortality**	**Subscore**
United States US Mid Atlantic Small mesh bottom trawl	2.00:Medium	4.00:Low Concern	3.67:Low Concern	**Green (3.831)**
United States US New England Small mesh bottom trawl	2.00:Medium	4.00:Low Concern	3.67:Low Concern	**Green (3.831)**

Criterion 1 Assessment

OFFSHORE HAKE

Factor 1.1 - Inherent Vulnerability

Scoring Guidelines

- *Low—The FishBase vulnerability score for species is 0-35, OR species exhibits life history characteristics that make it resilient to fishing, (e.g., early maturing (*
- *Medium—The FishBase vulnerability score for species is 36-55, OR species exhibits life history characteristics that make it neither particularly vulnerable nor resilient to fishing, (e.g., moderate age at sexual maturity (5-15 years), moderate maximum age (10-25 years), moderate maximum size, and middle of food chain).*
- *High—The FishBase vulnerability score for species is 56-100, OR species exhibits life history characteristics that make is particularly vulnerable to fishing, (e.g., long-lived (>25 years), late maturing (>15 years), low reproduction rate, large body size, and top-predator).*
  Note: The FishBase vulnerability scores is an index of the inherent vulnerability of marine fishes to fishing based on life history parameters: maximum length, age at first maturity, longevity, growth rate, natural mortality rate, fecundity, spatial behaviors (e.g., schooling, aggregating for breeding, or consistently returning to the same sites for feeding or reproduction) and geographic range.

United States US Mid Atlantic, Small mesh bottom trawl

United States US New England, Small mesh bottom trawl

Low

Offshore hake is found on the outer part and upper slope of the continental shelf from Georges Bank to Suriname and French Guiana. This species has been found to be mature at 28 cm and have a maximum length of 70 cm, but is commonly found at 30–45 cm. These and other life-history parameters give offshore hake a “low” inherent vulnerability with a FishBase vulnerability score of 30 out of 100 (FishBase 2015b).

Rationale:
FishBase uses a paper by Cheung et al. to generate inherent vulnerability scores based on life-history parameters (Cheung et al. 2005). The life-history parameters used are maximum length, age at first maturity, longevity, von Bertalanffy growth parameter *K*, natural mortality rate, fecundity, strength of spatial behavior, and geographic range (Cheung et al. 2005).

Factor 1.2 - Stock Status

Scoring Guidelines

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

United States US Mid Atlantic, Small mesh bottom trawl

United States US New England, Small mesh bottom trawl

Moderate Concern

Stock status is unknown. According to the latest stock assessment (2011), there are insufficient fishery data to determine offshore hake stock status and survey trends cannot be relied upon to reflect the stock status (NEFSC 2011). The 2014 stock status update supports this and reiterates that the data are insufficient and the survey trends are unreliable (NEFSC 2014). Because stock status is unknown and inherent vulnerability is low, Seafood Watch considers offshore hake abundance to be of "moderate" conservation concern.

Rationale:
"The SARC-51 Review Panel concluded that sufficient information is not available to determine offshore hake stock status with confidence, because fishery data are insufficient and one cannot assume that survey data reflect stock trends. The Panel concluded that it is not possible at this time to provide a reliable definition for overfished and overfishing for this stock" (NEFSC 2011). In the 2014 stock status update, this status remains unchanged ("stock status determination remains undetermined because the fishery data were not sufficient and the survey trends did not reflect the stock trends" (NEFSC 2014)).

Factor 1.3 - Fishing Mortality

Scoring Guidelines

- *5 (Very Low Concern)—Highly likely that fishing mortality is below a sustainable level (e.g., below fishing mortality at maximum sustainable yield, FMSY), OR fishery does not target*

species and its contribution to the mortality of species is negligible (≤ 5% of a sustainable level of fishing mortality).

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

United States US Mid Atlantic, Small mesh bottom trawl

United States US New England, Small mesh bottom trawl

Moderate Concern

The rate of fishing mortality on offshore hake is unknown. According to the latest stock assessment (2011), there are insufficient fishery data to determine fishing mortality on offshore hake and survey trends cannot be relied upon (NEFSC 2011). The 2014 stock status update supports this and reiterates that the data are insufficient and the survey trends are unreliable (NEFSC 2014). Because fishing mortality is unknown relative to a sustainable level, Seafood Watch considers fishing mortality of offshore hake to be a “moderate” conservation concern.

Rationale:
“The SARC-51 Review Panel concluded that sufficient information is not available to determine offshore hake stock status with confidence, because fishery data are insufficient and one cannot assume that survey data reflect stock trends. The Panel concluded that it is not possible at this time to provide a reliable definition for overfished and overfishing for this stock” (NEFSC 2011). In the 2014 stock status update, this status remains unchanged (“stock status determination remains undetermined because the fishery data were not sufficient and the survey trends did not reflect the stock trends” (NEFSC 2014)).

RED HAKE

Factor 1.1 - Inherent Vulnerability

United States US Mid Atlantic, Small mesh bottom trawl

United States US New England, Small mesh bottom trawl

Medium

Red hake is found from the Gulf of St. Lawrence to North Carolina and has a maximum tail length (TL) of 63 cm for females and a maximum age of 14 years, but few are found older than 8 years or more than 50 cm TL (Steimle et al. 1999). This species grows and matures quickly between ages 1 and 2, after which the growth rate declines. These and other characteristics give red hake a “medium” inherent vulnerability with a FishBase vulnerability score of 51 out of 100 (FishBase 2015c).

Factor 1.2 - Stock Status

United States US New England, Small mesh bottom trawl

Low Concern

The northern stock of red hake is not overfished according to the most recent benchmark assessment in 2011 and the 2015 update assessment (NEFSC 2011) (GARFO & NEFSC 2015). This means that the average spring trawl survey biomass index (of the three most recent years for which the index is available) is over the threshold level of 1.27 kg/tow. In the 2011 stock assessment, the 2008–2010 average index was 2.42 kg/tow, which is over the threshold level and close to the target level of 2.53 kg/tow (NEFSC 2011). In the 2015 update, the average index for 2012–2014 is higher, at approximately 3.55 kg/tow (GARFO & NEFSC 2015). In the stock assessment, catches are a major source of uncertainty because of misidentification with white hake and possible hybridization of the two species, and natural mortality is unknown. Because the biomass is estimated to be above both the threshold level and the target level but there are uncertainties with the stock assessment, Seafood Watch considers abundance of northern red hake a “low” concern instead of a very low concern.

Rationale:
Based on new recommended biological reference points from SAW/SARC-51, the northern stock of red hake is not overfished. The three year arithmetic mean biomass index, based on NEFSC spring bottom trawl survey data in Albatross units for 2008–2010 (2.42 kg/tow), was above the proposed management threshold (1.27 kg/tow) and close to the target (2.53 kg/tow) (NEFSC 2011).

According to the 2015 stock status update, the 3-year average (2013-15) was approximately 3.55 kg/tow, and the northern stock of red hake is not overfished (GARFO & NEFSC 2015).

United States US Mid Atlantic, Small mesh bottom trawl

Low Concern

The southern stock of red hake is not overfished according to the most recent benchmark assessment in 2011 and the 2015 update assessment (NEFSC 2011) (GARFO & NEFSC 2015). This means that the average spring trawl survey biomass index (of the 3 most recent years for which the index is available) is over the threshold level of 0.51 kg/tow. In the 2011 stock assessment, the 2008–2010 average index was 0.95 kg/tow, which is over the threshold level and close to the target level of 1.02 kg/tow (NEFSC 2011). In the 2015 update, the average index for 2013–2015 is approximately 0.62 kg/tow, which is over the threshold level but not the target level (GARFO & NEFSC 2015). Catches are still a source of uncertainty because of misidentification with white hake and possible hybridization of the two species. Additionally, natural mortality is unknown. Because of these uncertainties with the stock assessment and the biomass index being above the threshold level but below the target level, Seafood Watch considers red hake abundance a "low" concern instead of a very low concern.

Rationale:
"...[T]he southern stock of red hake is not overfished and overfishing is not occurring. The three year arithmetic mean biomass index, based on NEFSC spring bottom trawl survey data in Albatross units for 2008–2010 (0.95 kg/tow), was above the proposed management threshold (0.51 kg/tow) and slightly below the target (1.02 kg/tow)" (NEFSC 2011).

According to the 2015 update, the southern stock of red hake is not overfished (GARFO & NEFSC 2015).

Factor 1.3 - Fishing Mortality

United States US New England, Small mesh bottom trawl

Low Concern

Overfishing is not occurring on the northern stock of red hake (GARFO & NEFSC 2015). This means that the exploitation index (the ratio of catch to the spring survey index) for the last of the three years (2014) was below the threshold level. It was 0.09 kt/kg and the threshold level is 0.16 kt/kg (GARFO & NEFSC 2015). Because it is probable that overfishing is not occurring but there is some uncertainty with estimating fishing mortality, Seafood Watch considers this a "low" concern instead of a very low concern.

Rationale:
The red hake assessment update indicates that overfishing is not occurring on the northern stock. The terminal year (2014) exploitation index based on the ratio of catch to the spring survey index for the northern stock (0.09 kt/kg) was below the management threshold (0.163 kt/kg in the north (GARFO & NEFSC 2015).

United States US Mid Atlantic, Small mesh bottom trawl

Low Concern

Overfishing is not occurring on the southern stock of red hake according to the most recent benchmark assessment in 2011 and the 2015 update assessment (NEFSC 2011) (GARFO & NEFSC 2015). This means that the exploitation index (the ratio of catch to the spring survey index) for the last of the three years (2014) was below the threshold level. It was 1.91 kt/kg and the threshold level in the south is 3.04 kt/kg (GARFO & NEFSC 2015). Because it is probable that overfishing is not occurring but there is some uncertainty with estimating fishing mortality, Seafood Watch considers this a "low" concern instead of a very low concern.

Rationale:
"Based on new biological reference points from SAW/SARC-51, overfishing is not occurring. The exploitation index (catch divided by biomass index) for 2009 (1.150 kt/kg) was below the threshold (3.038 kt/kg)" (NOAA 2011). The stock status remains unchanged in the 2015 stock status update: overfishing is not occurring on the southern stock of red hake (GARFO & NEFSC 2015). The biomass index used in the exploitation index is from the 1980–2009 spring survey numbers, based on an index method (AIM) analysis. AIM estimates a relative level of fishing mortality at which the population will likely remain stable.

The 2015 update shows the index is still below the threshold, but increasing.

SILVER HAKE

Factor 1.1 - Inherent Vulnerability

United States US Mid Atlantic, Small mesh bottom trawl

United States US New England, Small mesh bottom trawl

Medium

Silver hake is found in the western Atlantic Ocean from Newfoundland to the Bahamas, but commonly from Newfoundland to South Carolina. It has a maximum reported length of 76 cm and age of 12 years. Silver hake matures between 1.5 years and 2 years of age. Its FishBase vulnerability score is moderate (54 out of 100) (FishBase 2015a), which makes it a "medium" vulnerability score according to Seafood Watch assessment criteria.

Factor 1.2 - Stock Status

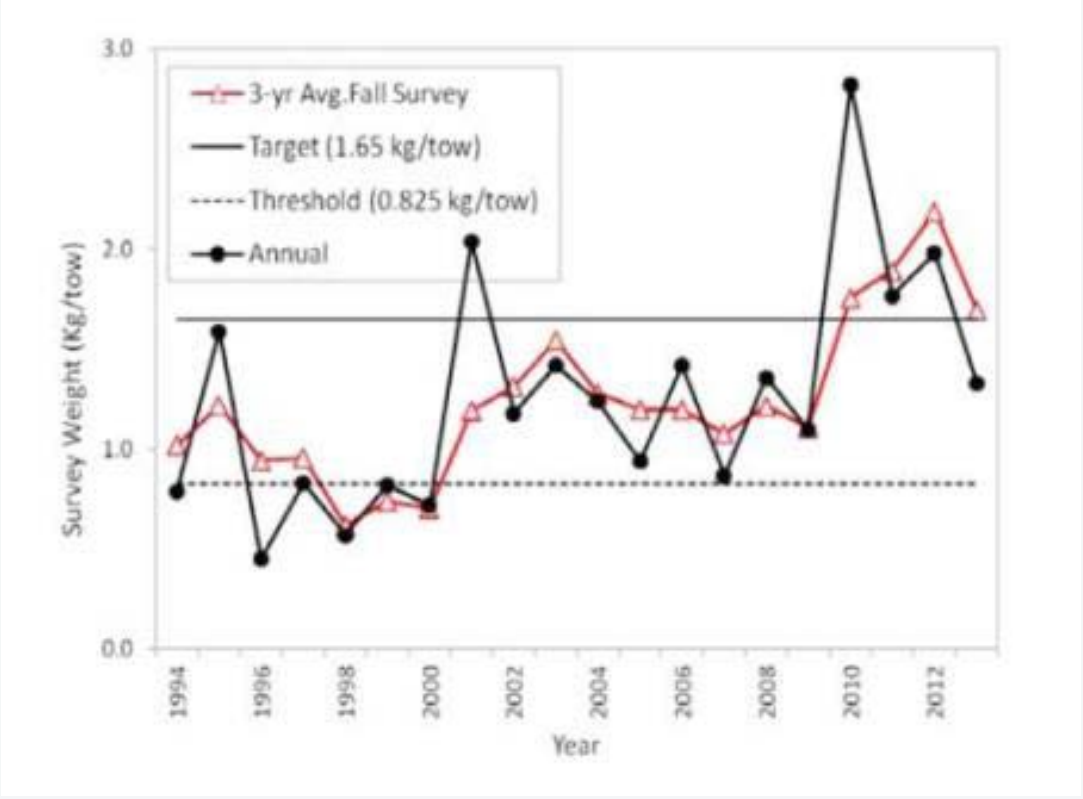
United States US New England, Small mesh bottom trawl

Low Concern

The northern stock of silver hake is not overfished according to the latest stock assessment (NEFSC 2011) and the stock status remains unchanged in the 2014 stock assessment update (NEFMC 2014b). This means that the average fall trawl survey biomass index (of the 3 most recent years for which the index is available) is over the threshold level of 3.21 kg/tow. In the 2011 stock assessment, the 2007–2009 average index was 6.20 kg/tow, which is over the threshold level and close to the target level of 6.42 kg/tow (NEFSC 2011). In the 2014 update, the average index for 2012–2014 is much higher: far over the threshold and target levels at approximately 15 kg/tow (NEFMC 2014b). Even though the biomass is estimated to be above the threshold and target levels, catches are a major source of uncertainty, so Seafood Watch considers abundance of northern silver hake a “low” concern instead of a very low concern.

Rationale:
“Based on the updated and accepted reference points from SAW/SARC-51 in 2010, the northern stock of silver hake is not overfished.... The three year arithmetic mean fall biomass index for 2007–2009 in Albatross units (6.20 kg/tow), was above the management threshold (3.21 kg/tow) but below the target (6.42 kg/tow)” (NEFSC 2011).

The 2014 update shows a steady increase since then, with the 2014 average index at approximately 15 kg/tow. However, catches are a major source of uncertainty when assessing the silver hake stocks (NEFMC 2014b).



Abundance of southern stock of silver hake according to the 2014 update.

United States US Mid Atlantic, Small mesh bottom trawl

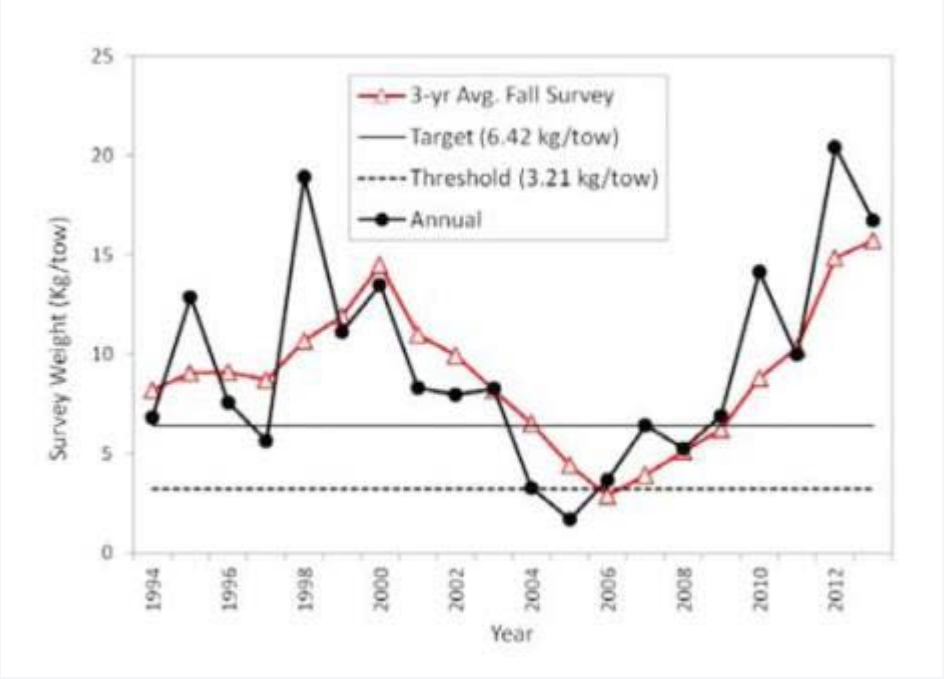
Low Concern

In the 2014 stock status update, the stock status remains unchanged from the 2011 stock assessment: the southern stock of silver hake is not overfished (NEFMC 2014b). This means that the average fall trawl survey biomass index (of the 3 most recent years for which the index is available) is over the threshold level of 0.83 kg/tow. In the 2011 stock assessment, the 2007–2009 average index was 1.11 kg/tow, which is over the threshold level and close to the target level of 1.65 kg/tow (NEFSC 2011). In the 2014 update, the average index for 2012–2014 is higher: over the threshold and just above the target level at approximately 1.7 kg/tow (NEFMC 2014b). Even though the biomass is estimated to be above the threshold and target levels, catches are a major source of uncertainty, so Seafood Watch considers abundance of southern silver hake a “low” concern instead of a very low concern.

Rationale:
“In the south, silver hake is also not overfished. The three year average arithmetic mean biomass, also based on the NESFC fall bottom trawl survey data for 2007–2009 in Albatross units (1.11 kg/tow), was above the biomass threshold (0.83 kg/tow) but below the target (1.65 kg/tow)” (NEFSC 2011).

According to the 2014 stock status update, the southern stock of silver hake is above the threshold and target levels. However, catches are a major source of uncertainty when assessing the silver hake stocks

(NEFMC 2014b).



Abundance of northern silver hake according to the 2014 update.

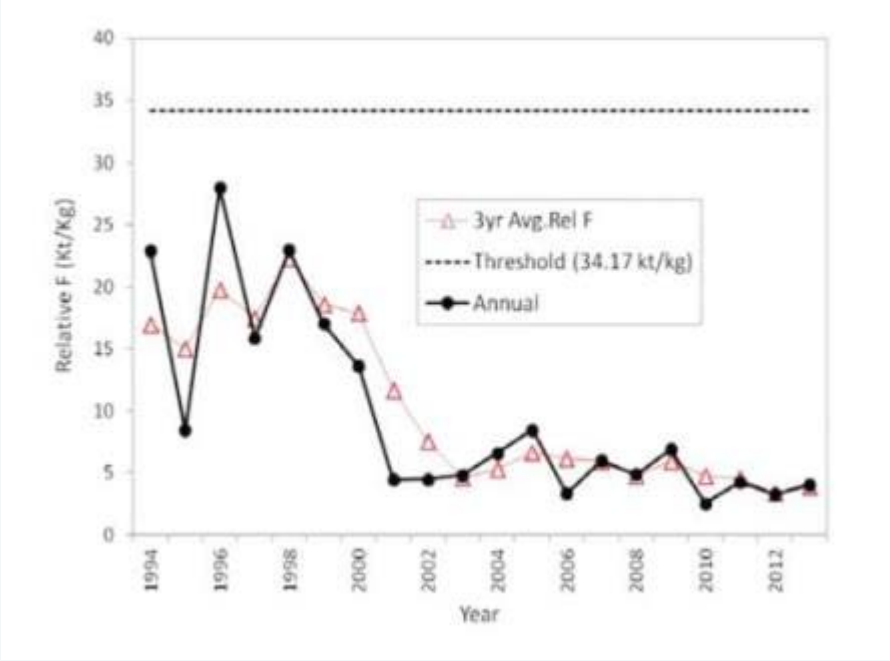
Factor 1.3 - Fishing Mortality

United States US New England, Small mesh bottom trawl

Low Concern

Overfishing is not occurring on the northern stock of silver hake (NOAA Fisheries 2015). This means that the average index for the 3 most recent years (2012–2014) used to measure fishing mortality is below the threshold level of 2.77 kt/kg (NEFMC 2014b). It is considerably lower, at approximately 0.15 kt/kg. Because it is probable that overfishing is not occurring but there is some uncertainty with estimating fishing mortality, Seafood Watch considers this a “low” concern instead of a very low concern.

Rationale:
According to the 2014 stock status update, silver hake population trends continue to increase and the proposed overfishing limit suggests that silver hake can withstand higher catches without exceeding the F_{MSY} proxy. However, catches are a major source of uncertainty when assessing the silver hake stocks (NEFMC 2014b).



Exploitation index of southern stock of silver hake according to the 2014 update.

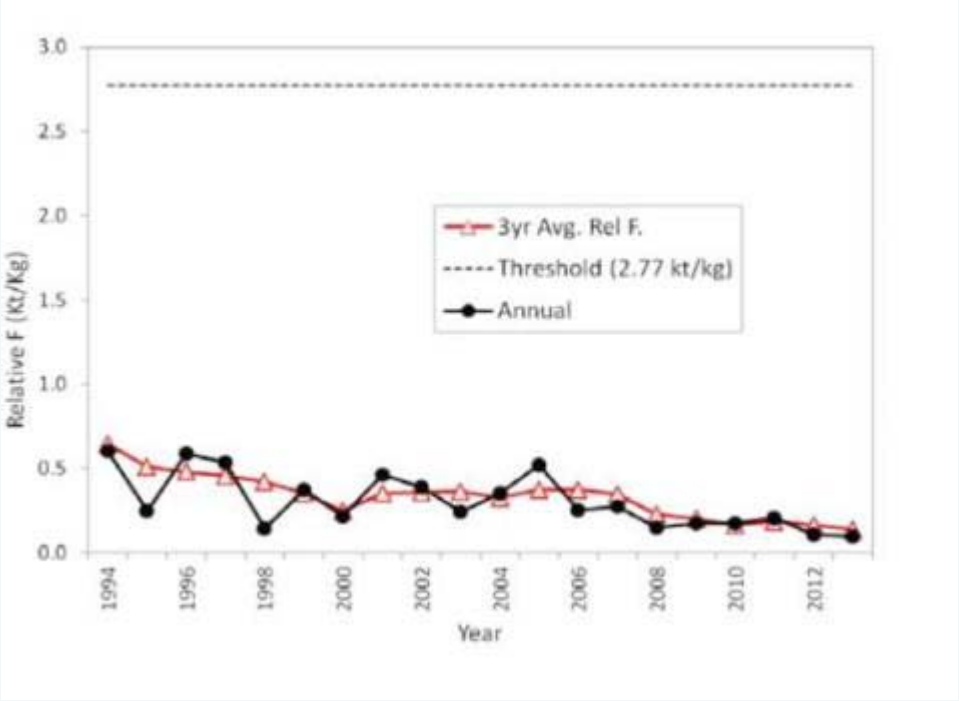
United States US Mid Atlantic, Small mesh bottom trawl

Low Concern

Overfishing is not occurring on the southern stock of silver hake (NOAA Fisheries 2015). This means that the average index for the 3 most recent years (2012-2014) used to measure fishing mortality is below the threshold level of 34.17 kt/kg (NEFSC 2014). It is considerably lower, at approximately 0.45 kt/kg. Because it is probable that overfishing is not occurring but there is some uncertainty with estimating fishing mortality, Seafood Watch considers this a “low” concern instead of a very low concern.

Rationale:

According to the 2014 stock status update, silver hake population trends continue to increase and the proposed overfishing limit suggests that silver hake can withstand higher catches without exceeding the F_{MSY} proxy. However, catches are a major source of uncertainty when assessing the silver hake stocks (NEFSC 2014).



Exploitation index for northern silver hake according to the 2014 update.

Criterion 2: Impacts on Other Species

All main retained and bycatch species in the fishery are evaluated in the same way as the species under assessment were evaluated in Criterion 1. Seafood Watch® defines bycatch as all fisheries-related mortality or injury to species other than the retained catch. Examples include discards, endangered or threatened species catch, and ghost fishing. To determine the final Criterion 2 score, the score for the lowest scoring retained/bycatch species is multiplied by the discard rate score (ranges from 0-1), which evaluates the amount of non-retained catch (discards) and bait use relative to the retained catch. The Criterion 2 rating is determined as follows:

- *Score >3.2=Green or Low Concern*
- *Score >2.2 and <=3.2=Yellow or Moderate Concern*
- *Score <=2.2=Red or High Concern*
  Rating is Critical if Factor 2.3 (Fishing Mortality) is Critical.

Criterion 2 Summary

Offshore hake: United States US Mid Atlantic, Small mesh bottom trawl

Subscore:: **2.644** **Discard Rate:** **0.95** **C2 Rate:** **2.512**

Species	Inherent Vulnerability	Stock Status	Fishing Mortality	Subscore
ATLANTIC MACKEREL	Medium	3.00: Moderate Concern	2.33: Moderate Concern	**2.644**
OFFSHORE HAKE	Low	3.00: Moderate Concern	2.33: Moderate Concern	**2.644**
SHORTFIN SQUID	Low	3.00: Moderate Concern	2.33: Moderate Concern	**2.644**
ATLANTIC WHITE-SIDED DOLPHIN	High	2.00: High Concern	3.67: Low Concern	**2.709**
PILOT WHALE, LONG-FINNED: WESTERN NORTH ATLANTIC	High	2.00: High Concern	3.67: Low Concern	**2.709**
LONGFIN SQUID	Low	4.00: Low Concern	2.33: Moderate Concern	**3.053**
RED HAKE	Medium	4.00: Low Concern	3.67: Low Concern	**3.831**
SILVER HAKE	Medium	4.00: Low Concern	3.67: Low Concern	**3.831**
BUTTERFISH	Low	5.00: Very Low Concern	5.00: Very Low Concern	**5.000**

Offshore hake: United States US New England, Small mesh bottom trawl

Subscore:: 2.709 **Discard Rate:** 0.95 **C2 Rate:** 2.574

Species	Inherent Vulnerability	Stock Status	Fishing Mortality	Subscore
OFFSHORE HAKE	Low	3.00: Moderate Concern	2.33: Moderate Concern	**2.644**
ATLANTIC WHITE-SIDED DOLPHIN	High	2.00: High Concern	3.67: Low Concern	**2.709**
PILOT WHALE, LONG-FINNED: WESTERN NORTH ATLANTIC	High	2.00: High Concern	3.67: Low Concern	**2.709**
RED HAKE	Medium	4.00: Low Concern	3.67: Low Concern	**3.831**
SILVER HAKE	Medium	4.00: Low Concern	3.67: Low Concern	**3.831**

Red hake: United States US Mid Atlantic, Small mesh bottom trawl

Subscore:: 2.644 **Discard Rate:** 0.95 **C2 Rate:** 2.512

Species	Inherent Vulnerability	Stock Status	Fishing Mortality	Subscore
ATLANTIC MACKEREL	Medium	3.00: Moderate Concern	2.33: Moderate Concern	**2.644**
OFFSHORE HAKE	Low	3.00: Moderate Concern	2.33: Moderate Concern	**2.644**
SHORTFIN SQUID	Low	3.00: Moderate Concern	2.33: Moderate Concern	**2.644**
ATLANTIC WHITE-SIDED DOLPHIN	High	2.00: High Concern	3.67: Low Concern	**2.709**
PILOT WHALE, LONG-FINNED: WESTERN NORTH ATLANTIC	High	2.00: High Concern	3.67: Low Concern	**2.709**
LONGFIN SQUID	Low	4.00: Low Concern	2.33: Moderate Concern	**3.053**
RED HAKE	Medium	4.00: Low Concern	3.67: Low Concern	**3.831**
SILVER HAKE	Medium	4.00: Low Concern	3.67: Low Concern	**3.831**
BUTTERFISH	Low	5.00: Very Low Concern	5.00: Very Low Concern	**5.000**

Red hake: United States US New England, Small mesh bottom trawl

Subscore:: 2.644 **Discard Rate:** 0.95 **C2 Rate:** 2.512

Species	Inherent Vulnerability	Stock Status	Fishing Mortality	Subscore
OFFSHORE HAKE	Low	3.00: Moderate Concern	2.33: Moderate Concern	**2.644**
ATLANTIC WHITE-SIDED DOLPHIN	High	2.00: High Concern	3.67: Low Concern	**2.709**
PILOT WHALE, LONG-FINNED: WESTERN NORTH ATLANTIC	High	2.00: High Concern	3.67: Low Concern	**2.709**
RED HAKE	Medium	4.00: Low Concern	3.67: Low Concern	**3.831**
SILVER HAKE	Medium	4.00: Low Concern	3.67: Low Concern	**3.831**

Silver hake: United States US Mid Atlantic, Small mesh bottom trawl

Subscore:: 2.644 **Discard Rate:** 0.95 **C2 Rate:** 2.512

Species	Inherent Vulnerability	Stock Status	Fishing Mortality	Subscore
ATLANTIC MACKEREL	Medium	3.00: Moderate Concern	2.33: Moderate Concern	**2.644**
OFFSHORE HAKE	Low	3.00: Moderate Concern	2.33: Moderate Concern	**2.644**
SHORTFIN SQUID	Low	3.00: Moderate Concern	2.33: Moderate Concern	**2.644**
ATLANTIC WHITE-SIDED DOLPHIN	High	2.00: High Concern	3.67: Low Concern	**2.709**
PILOT WHALE, LONG-FINNED: WESTERN NORTH ATLANTIC	High	2.00: High Concern	3.67: Low Concern	**2.709**
LONGFIN SQUID	Low	4.00: Low Concern	2.33: Moderate Concern	**3.053**
RED HAKE	Medium	4.00: Low Concern	3.67: Low Concern	**3.831**
SILVER HAKE	Medium	4.00: Low Concern	3.67: Low Concern	**3.831**
BUTTERFISH	Low	5.00: Very Low Concern	5.00: Very Low Concern	**5.000**

Silver hake: United States US New England, Small mesh bottom trawl					
Subscore::	**2.644**	**Discard Rate:**	**0.95**	**C2 Rate:**	**2.512**

Species	Inherent Vulnerability	Stock Status	Fishing Mortality	Subscore
OFFSHORE HAKE	Low	3.00: Moderate Concern	2.33: Moderate Concern	**2.644**
ATLANTIC WHITE-SIDED DOLPHIN	High	2.00: High Concern	3.67: Low Concern	**2.709**
PILOT WHALE, LONG-FINNED: WESTERN NORTH ATLANTIC	High	2.00: High Concern	3.67: Low Concern	**2.709**
RED HAKE	Medium	4.00: Low Concern	3.67: Low Concern	**3.831**
SILVER HAKE	Medium	4.00: Low Concern	3.67: Low Concern	**3.831**

The finfish and invertebrate species included in this section were chosen because they averaged more than 5% of total observed catch (both kept and discarded) from the years 2009–2014 or were part of a complex of species that averaged more than 5% of observed bycatch in the small-mesh multispecies fishery (pers. comm., L. Alade). The data used to determine the percentages were provided by Dr. Larry Alade, Research Fishery Biologist, Population Dynamics Branch, Northeast Fishery Science Center.

The mammal species were included because they were listed in NOAA's 2015 List of Fisheries under Northeast bottom trawl or Mid-Atlantic bottom trawl fisheries (the small-mesh multispecies fishery was not separated from these fisheries) *and* these trawl fisheries were potentially responsible for more than 5%–20% of total mortality to these species according to the marine mammal stock assessments.

The lowest-scoring species under Criterion 2 are offshore hake, Atlantic mackerel, and shortfin squid for the mid-Atlantic area and offshore hake for the New England area. Thus, these species' scores drive the Criterion 2 rankings.

Criterion 2 Assessment

ATLANTIC MACKEREL

Factor 2.1 - Inherent Vulnerability

Scoring Guidelines (same as Factor 1.1 above)

United States US Mid Atlantic, Small mesh bottom trawl
Medium

Atlantic mackerel is found in cold and temperate shelf and coastal waters in the North Atlantic Ocean and the Mediterranean Ocean (FishBase 2015e). It is a pelagic species that forms schools near the surface and lives for a maximum of 17 years. In the U.S., this species matures before age 2. Atlantic mackerel has a moderate inherent vulnerability score (40 out of 100) according to FishBase (FishBase 2015e). A FishBase moderate inherent vulnerability score results in a Seafood Watch "medium" inherent vulnerability score.

Rationale:
FishBase uses a paper by Cheung et al. to generate inherent vulnerability scores based on life-history parameters (Cheung et al. 2005). The life-history parameters used are maximum length, age at first maturity, longevity, von Bertalanffy growth parameter *K*, natural mortality rate, fecundity, strength of spatial behavior, and geographic range (Cheung et al.).

Factor 2.2 - Stock Status

Scoring Guidelines (same as Factor 1.2 above)

United States US Mid Atlantic, Small mesh bottom trawl

Moderate Concern

Atlantic mackerel stock status is unknown, and the inherent vulnerability is moderate. The stock was assessed in 2010, and the biomass level or exploitation rates could not be determined (MAFMC 2015). Updated reference points were not set, either. Because the stock status is unknown and the inherent vulnerability is moderate, Seafood Watch considers this a "moderate" concern.

Factor 2.3 - Fishing Mortality

Scoring Guidelines (same as Factor 1.3 above)

United States US Mid Atlantic, Small mesh bottom trawl

Moderate Concern

Atlantic mackerel fishing mortality rate is unknown. The stock was assessed in 2010, and the biomass level or exploitation rates could not be determined (MAFMC 2015). Updated reference points were not set, either. The stock status is unknown as well, but the Mid-Atlantic Fishery Management Council (MAFMC) manages this fishery by limiting access and requiring monitoring and reporting. As of May 2015, the Council is also trying to increase observer coverage in the fishery (MAFMC 2015b). Because the fishing mortality is unknown and the stock status is unknown, Seafood Watch rates this as a "moderate" concern.

Factor 2.4 - Discard Rate

United States US Mid Atlantic, Small mesh bottom trawl

20-40%

In the National Bycatch Report, which used data from 2005, the New England small-mesh trawl fishery bycatch ratio was 0.32 and the Mid-Atlantic small-mesh trawl fishery bycatch ratio was 0.23 (NMFS 2011). In comparison, the report showed a national average of 0.17 (NMFS 2011).

Using the data from observed small-mesh trawl trips, the average ratio of discards to landings from 2009–2014 was 39%. However, the data used for this ratio were only from observed trips, which may not accurately portray the whole fishery. Additionally, the majority of landings of silver, offshore, and red hake is from small-mesh trawl vessel trips, so data from trips made by vessels using other gear types were not used. Therefore, the ratios from these data should not be considered reliable estimates of the optimization of marine resource utilization in this fishery, and they use different data than the data used in the National Bycatch Report. But the range of 20%–40% is likely to be a near estimate, given the ratios in that report.

ATLANTIC WHITE-SIDED DOLPHIN

Factor 2.1 - Inherent Vulnerability

Scoring Guidelines (same as Factor 1.1 above)

United States US Mid Atlantic, Small mesh bottom trawl

United States US New England, Small mesh bottom trawl

High

This marine mammal species has a high vulnerability (Seafood Watch Criteria document, p. 9), which is a “high” concern.

Factor 2.2 - Stock Status

Scoring Guidelines (same as Factor 1.2 above)

United States US Mid Atlantic, Small mesh bottom trawl

United States US New England, Small mesh bottom trawl

High Concern

The small-mesh multispecies fishery is included with the Northeast bottom trawl fishery, which is a Category II fishery, according to the 2015 List of Fisheries (NOAA Fisheries Office of Protected Resources 2015). This categorization is due to the fishery's interactions with the Western North Atlantic stock of white-sided dolphins. The status of the stock is unknown, but white-sided dolphins are not endangered or threatened, and they are not considered a strategic stock under the Marine Mammal Protection Act (MMPA) (NOAA Fisheries 2014c).

Because the stock status is unknown and inherent vulnerability for this stock is high (as scored in factor 2.1), Seafood Watch considers this a "high" concern.

Rationale:
"White-sided dolphins are not listed as threatened or endangered under the Endangered Species Act, and the Western North Atlantic stock is not considered strategic under the Marine Mammal Protections Act. The status of white-sided dolphins, relative to OSP, in the U.S. Atlantic EEZ is unknown. A trend analysis has not been conducted for this species" (NOAA Fisheries 2014c).

Factor 2.3 - Fishing Mortality

Scoring Guidelines (same as Factor 1.3 above)

United States US Mid Atlantic, Small mesh bottom trawl

United States US New England, Small mesh bottom trawl

Low Concern

The small-mesh multispecies fishery is included with the Northeast bottom trawl fishery, which is a Category II fishery, according to the 2015 List of Fisheries (NOAA Fisheries Office of Protected Resources 2015). This categorization is due to the fishery's interactions with the Western North Atlantic stock of white-sided dolphins. According to the latest stock assessment (2014), white-sided dolphins are not endangered or threatened, and they are not a strategic stock under the MMPA. Estimated average mortalities caused by humans from 2007–2011 did not exceed the potential biological removal (PBR) level of 304 animals. Because the estimated mortalities and injuries specific to the Northeast bottom trawl fishery were not less than 10% of the PBR level (annual average of 73 mortalities), this fishery is a Category II fishery.

Although fishery mortality is approximately 24% of the PBR, it is still under 50%, and the Western North Atlantic stock of Atlantic white-sided dolphins is not considered a strategic stock under the Marine Mammal Protection Act (MMPA). Therefore, Seafood Watch considers this a "low" concern.

Rationale:
"White-sided dolphins are not listed as threatened or endangered under the Endangered Species Act, and the Western North Atlantic stock is not considered strategic under the Marine Mammal Protections Act. The 2007–2011 estimated average annual human related mortality does not exceed PBR. The total U.S. fishery-related mortality and serious injury for this stock is not less than 10% of the calculated PBR and, therefore, cannot be considered to be insignificant and approaching zero mortality and serious injury rate" (NOAA Fisheries 2014c). The Northeast bottom trawl fishery is estimated to be responsible for an average of 73 mortalities annually from 2007–2011 (NOAA Fisheries 2014c). The PBR level is 304 animals (NOAA Fisheries 2014c).

Factor 2.4 - Discard Rate

United States US Mid Atlantic, Small mesh bottom trawl

United States US New England, Small mesh bottom trawl

20-40%

In the National Bycatch Report, which used data from 2005, the New England small-mesh trawl fishery bycatch ratio was 0.32 and the Mid-Atlantic small-mesh trawl fishery bycatch ratio was 0.23 (NMFS 2011). In comparison, the report showed a national average of 0.17 (NMFS 2011).

Using the data from observed small-mesh trawl trips, the average ratio of discards to landings from 2009-2014 was 39%. However, the data used for this ratio were only from observed trips, which may not accurately portray the whole fishery. Additionally, the majority of landings of silver, offshore, and red hake is from small-mesh trawl vessel trips, so data from trips made by vessels using other gear types were not used. Therefore, the ratios from these data should not be considered reliable estimates of the optimization of marine resource utilization in this fishery, and they use different data than the data used in the National Bycatch Report. But the range of 20%–40% is likely to be a near estimate, given the ratios in that report.

BUTTERFISH

Factor 2.1 - Inherent Vulnerability

Scoring Guidelines (same as Factor 1.1 above)

United States US Mid Atlantic, Small mesh bottom trawl

Low

Atlantic butterfish is found in the western Atlantic Ocean from Newfoundland to Palm Beach, FL and in

the Gulf of Mexico (FishBase 2015d). Butterfish matures early, before age 1 (0.9), and has been found to have a maximum length of 30 cm. These and other life-history characteristics give it a low inherent vulnerability (30 out of 100), according to FishBase (FishBase 2015d), which means Seafood Watch considers this a “low” concern.

Factor 2.2 - Stock Status

Scoring Guidelines (same as Factor 1.2 above)

United States US Mid Atlantic, Small mesh bottom trawl

Very Low Concern

Butterfish is not overfished. According to the latest stock assessment, the spawning stock biomass is estimated to be 79,451 mt, which is greater than biomass at maximum sustainable yield (SSB_{MSY}), 45,616 mt (NEFSC 2014b). SSB is the biomass level where 50% of the individuals are mature, so SSB_{MSY} is the level of SSB needed to produce MSY. The threshold level is half of that, or 22,808 mt. Abundance of butterfish is a “very low” concern for Seafood Watch.

Rationale:
“The accepted biomass reference point SSB_{MSY} proxy is 45,616 mt (100.6 million lb); CV = 0.25. $SSB_{threshold}$ is one half the SSB_{MSY} proxy, or 22,808 mt (50.3 million lb). SSB_{2012} is estimated to be 79,451 mt (175.2 million lb), which is well above the $SSB_{threshold}$” (NEFSC 2014b).

Factor 2.3 - Fishing Mortality

Scoring Guidelines (same as Factor 1.3 above)

United States US Mid Atlantic, Small mesh bottom trawl

Very Low Concern

Overfishing is not occurring on butterfish. The accepted overfishing reference point is 0.81, which means that if fishing is occurring at a lower rate, overfishing is not occurring. According to the latest stock assessment, the 2012 fishing mortality is 0.02, which is well below the reference point (NEFSC 2014b). Because of this, the fishing mortality on Atlantic butterfish is considered a “very low” concern by Seafood Watch.

Rationale:
“The current fishing mortality (F_{2012} = 0.02) is well below the accepted overfishing reference point....[of 0.81]” (NEFSC 2014b).

Factor 2.4 - Discard Rate

United States US Mid Atlantic, Small mesh bottom trawl

20-40%

In the National Bycatch Report, which used data from 2005, the New England small-mesh trawl fishery bycatch ratio was 0.32 and the Mid-Atlantic small-mesh trawl fishery bycatch ratio was 0.23 (NMFS 2011). In comparison, the report showed a national average of 0.17 (NMFS 2011).

Using the data from observed small-mesh trawl trips, the average ratio of discards to landings from 2009–2014 was 39%. However, the data used for this ratio were only from observed trips, which may not accurately portray the whole fishery. Additionally, the majority of landings of silver, offshore, and red hake is from small-mesh trawl vessel trips, so data from trips made by vessels using other gear types were not used. Therefore, the ratios from these data should not be considered reliable estimates of the optimization of marine resource utilization in this fishery, and they use different data than the data used in the National Bycatch Report, But the range of 20%–40% is likely to be a near estimate, given the ratios in that report.

LONGFIN SQUID

Factor 2.1 - Inherent Vulnerability

Scoring Guidelines (same as Factor 1.1 above)

United States US Mid Atlantic, Small mesh bottom trawl

Low

Longfin squid has been found with a maximum mantle length of 50 cm, but is commonly found at sizes of 10–20 cm (NEFSC 2005). It matures rapidly, with a lifespan of less than 1 year, is highly fecund (150–200 eggs per capsule, with each female laying 20–30 capsules per spawning event), is a demersal egg layer, and its population likely does not exhibit compensatory or depensatory dynamics (NEFSC 2005).

Table 2.1: Determining vulnerability of longfin squid

Factor	Longfin Squid	Score	Source
Average age at maturity	≈3 months	3	(SeaLifeBase2015a) (Hatfield and Cadrin 2002)
Average maximum age	< 9 months	3	(SeaLifeBase 2015a) (Macy and Brodziak 2001)
Reproductive strategy	Demersal egg layer	2	(SeaLifeBase 2015a)
Density dependence	No depensatory or compensatory dynamics demonstrated or likely	2	(SeaLifeBase 2015a)
Score (mean of		**2.5.**	

factor scores)		**Low**	

These characteristics give it a low inherent vulnerability (Seafood Watch Criteria doc., p. 5), which means it is a “low” concern for Seafood Watch.

Factor 2.2 - Stock Status

Scoring Guidelines (same as Factor 1.2 above)

United States US Mid Atlantic, Small mesh bottom trawl

Low Concern

From the latest stock assessment of longfin squid (2011), the stock is not overfished. The stock is considered overfished when the biomass (B) is < $^1/_2$ of the biomass level estimated to produce the maximum sustainable yield (B_{MSY}). The 2010 B estimate was 54,442 mt, and the B_{MSY} level is 42,405 mt ($B_{threshold}$ is 21,203 mt). Although the status is “not overfished,” it is worth noting that multiple generations of longfin squid have turned over since the latest stock assessment. Additionally, there was some scientific dissent about the appropriateness of the approach used in the stock assessment. Therefore, Seafood Watch considers the abundance of longfin squid a “low” concern instead of a very low concern.

Factor 2.3 - Fishing Mortality

Scoring Guidelines (same as Factor 1.3 above)

United States US Mid Atlantic, Small mesh bottom trawl

Moderate Concern

Longfin squid fishing mortality (F) cannot be determined because new reference points could not be recommended, but the fishing mortality was low, and it is unlikely that overfishing is occurring (NEFSC 2011). However, because the overfishing status is unknown and the stock is highly susceptible to the fishery, Seafood Watch rates the fishing mortality a “moderate” concern.

Rationale:
“Based on the current fishing mortality reference point threshold, overfishing was not occurring because the 2009 exploitation index (estimated using the method from SARC 34, Oct-Dec. catch over q-adjusted fall survey swept-area biomass) was 0.063 compared to the $F_{threshold}$ (i.e., 75th percentile of the exploitation indices during 1987–2009) which is 0.277. However, the current F reference point is inappropriate for the lightly exploited Loligo stock. In addition, the new exploitation indices used in the current assessment are not comparable to the existing fishing mortality reference points because of

differences in computation methods and input data. The overfishing status during 2009 is unknown because new fishing mortality reference points could not be recommended in the current assessment due to the lack of evidence that fishing impacted annual biomass levels during 1975–2009. The 2009 exploitation index of 0.176 (catch in 2009 divided by the average of the spring and fall survey biomass during 2008–2009; 80% CI = 0.124–0.232) was slightly below the 1987–2008 median of 0.237" (NEFSC 2011).

Factor 2.4 - Discard Rate

United States US Mid Atlantic, Small mesh bottom trawl

20-40%

In the National Bycatch Report, which used data from 2005, the New England small-mesh trawl fishery bycatch ratio was 0.32 and the Mid-Atlantic small-mesh trawl fishery bycatch ratio was 0.23 (NMFS 2011). In comparison, the report showed a national average of 0.17 (NMFS 2011).

Using the data from observed small-mesh trawl trips, the average ratio of discards to landings from 2009–2014 was 39%. However, the data used for this ratio were only from observed trips, which may not accurately portray the whole fishery. Additionally, the majority of landings of silver, offshore, and red hake is from small-mesh trawl vessel trips, so data from trips made by vessels using other gear types were not used. Therefore, the ratios from these data should not be considered reliable estimates of the optimization of marine resource utilization in this fishery, and they use different data than the data used in the National Bycatch Report. But the range of 20%–40% is likely to be a near estimate, given the ratios in that report.

PILOT WHALE, LONG-FINNED: WESTERN NORTH ATLANTIC

Factor 2.1 - Inherent Vulnerability

Scoring Guidelines (same as Factor 1.1 above)

United States US Mid Atlantic, Small mesh bottom trawl

United States US New England, Small mesh bottom trawl

High

Seafood Watch considers marine mammals to have a high vulnerability to fishing activities (SFW criteria document, p. 9), which is a "high" concern.

Factor 2.2 - Stock Status

Scoring Guidelines (same as Factor 1.2 above)

United States US Mid Atlantic, Small mesh bottom trawl

United States US New England, Small mesh bottom trawl

High Concern

The small-mesh multispecies fishery is included with the Northeast bottom trawl fishery, which is a Category II fishery, according to the 2015 List of Fisheries (NOAA Fisheries Office of Protected Resources 2015). The most recent stock assessment (2015) of long-finned pilot whales determined that mortalities and serious injuries to long-finned pilot whales from fisheries ranged from an estimated 13–55 in the period 2008–2012 (NOAA Fisheries 2015b). Data are insufficient to determine the stock status of long-finned pilot whales; however, total mortalities and serious injuries due to fishing activities are not higher than the potential biological removal (PBR) level for this species. Because the stock status is unknown and inherent vulnerability for this stock is high (as scored in Factor 2.1), Seafood Watch considers this a "high" concern.

Rationale:
"The long-finned pilot whale is not listed as threatened or endangered under the Endangered Species Act, and the western North Atlantic stock is not considered strategic under the Marine Mammal Protection Act. The total U.S. fishery-related mortality and serious injury for long-finned pilot whales does not exceed PBR. The total U.S. fishery-related mortality and serious injury for this stock is not less than 10% of the calculated PBR and, therefore, cannot be considered to be insignificant and approaching zero mortality and serious injury rate. The status of this stock relative to OSP in the U.S. Atlantic EEZ is unknown. There are insufficient data to determine the population trends for this stock" (NOAA Fisheries 2015b).

Factor 2.3 - Fishing Mortality

Scoring Guidelines (same as Factor 1.3 above)

United States US Mid Atlantic, Small mesh bottom trawl

United States US New England, Small mesh bottom trawl

Low Concern

The small-mesh multispecies fishery is included with the Northeast bottom trawl fishery, which is a Category II fishery, according to the 2015 List of Fisheries (NOAA Fisheries Office of Protected Resources 2015). The total mortality to long-finned pilot whales caused by human activity likely does not exceed

the PBR level. The most recent stock assessment (2014) reports that the number of fishery-related mortalities are unknown, because long-finned pilot whales cannot easily be distinguished from short-finned pilot whales; however, fishery related mortalities and serious injuries may add up to more than 10% of the PBR level, making this a Category II fishery.

Although fishery mortality is unknown, it is a Category II fishery and the Western North Atlantic stock of long-finned pilot whales is not considered a strategic stock under the Marine Mammal Protection Act (MMPA). Therefore, Seafood Watch considers this a “low” concern.

Rationale:
“The long-finned pilot whale is not listed as threatened or endangered under the Endangered Species Act, and the western North Atlantic stock is not considered strategic under the Marine Mammal Protection Act. The total U.S. fishery-related mortality and serious injury for long-finned pilot whales is unknown, since it is not always possible to partition mortality estimates between the long-finned and short-finned pilot whales and mortality estimates for the bottom and midwater trawl fisheries in 2011 are not available. However, it is most likely not less than 10% of the calculated PBR and therefore cannot be considered to be insignificant and approaching zero mortality and serious injury rate. It is unlikely that total human caused mortality exceeds PBR. However, the inability to partition mortality estimates in the midwater and bottom trawl fisheries between the species limits the ability to adequately assess the status of this stock” (NOAA Fisheries 2015b). This differs from the previous stock assessment, where long-finned pilot whales were considered a strategic stock under the MMPA because of fishery mortalities in the pelagic longline fishery; however, all these mortalities or serious injuries occurred in areas where only short-finned pilot whales occur, and so were attributed only to the short-finned pilot whale stock.

Factor 2.4 - Discard Rate

United States US Mid Atlantic, Small mesh bottom trawl

United States US New England, Small mesh bottom trawl

20-40%

In the National Bycatch Report, which used data from 2005, the New England small-mesh trawl fishery bycatch ratio was 0.32 and the Mid-Atlantic small-mesh trawl fishery bycatch ratio was 0.23 (NMFS 2011). In comparison, the report showed a national average of 0.17 (NMFS 2011).

Using the data from observed small-mesh trawl trips, the average ratio of discards to landings from 2009–2014 was 39%. However, the data used for this ratio were only from observed trips, which may not accurately portray the whole fishery. Additionally, the majority of landings of silver, offshore, and red hake is from small-mesh trawl vessel trips, so data from trips made by vessels using other gear

types were not used. Therefore, the ratios from these data should not be considered reliable estimates of the optimization of marine resource utilization in this fishery, and use different data than the data used in the National Bycatch Report. But the range of 20%–40% is likely to be a near estimate, given the ratios in that report.

SHORTFIN SQUID

Factor 2.1 - Inherent Vulnerability

Scoring Guidelines (same as Factor 1.1 above)

United States US Mid Atlantic, Small mesh bottom trawl

Low

Shortfin squid is found in the Atlantic Ocean from Greenland and Iceland to the British Isles in the east and from Newfoundland to Florida in the west. It has a maximum length of 27–31 cm in the northern part of its range but is smaller in the south (SeaLifeBase 2015b). This species, like other squid species, lives for less than 1 year and has a high natural mortality rate (NEFSC 2004). It is highly fecund, with females able to produce multiple egg balloons, each of which may contain 10,000–100,000 eggs. The population likely does not exhibit compensatory or depensatory dynamics.

Table 2.2: Determining vulnerability for shortfin squid

Factor	Shortfin Squid	Score	Source
Average age at maturity	<1 year	3	(Hendrickson 2004)
Average maximum age	1 year	3	(Hendrickson 2006)
Reproductive strategy	Open substrate spawner	2	(Hendrickson 2004)
Density dependence	No depensatory or compensatory dynamics demonstrated or likely	2	(Dawe et al. 2000)
Score (mean of factor scores)		**2.5, Low**	

These life-history parameters give this species a low inherent vulnerability (Seafood Watch Criteria doc., p. 5), which makes it a “low” concern.

Factor 2.2 - Stock Status

Scoring Guidelines (same as Factor 1.2 above)

United States US Mid Atlantic, Small mesh bottom trawl

Moderate Concern

The stock status of shortfin squid is unknown. According to the latest stock assessment (2006), not enough reliable information exists to accurately assess the stock, and even though fisheries data and biological data from research projects in the past can be used, the lack of data on attributes like seasonal age, growth, and maturity limits the model and prevents determination of stock status. Despite the unknown stock status, Seafood Watch considers this a “moderate” concern because of the low inherent vulnerability of shortfin squid.

Rationale:
“This is a data-poor stock, and because there are no reliable research survey indices for *Illex* inhabiting the U.S. Shelf, the assessment relies on fisheries data, in particular, catch per unit effort (CPUE) indices and biological data collected during prior cooperative research projects. Due to its short lifespan and the short fishing season, *Illex* was assessed using an in-season (weekly) model. Estimates of natural mortality were included in the in-season model and in a weekly per-recruit model. Although the Working Groups felt the model formulations were sound, it was decided that the use of the results from the three models was premature, mainly due to a lack of seasonal age, growth and maturity data, which greatly affect the model results. Due to the lack of adequate data regarding fishing mortality rates and absolute biomass, stock status could not be determined for 2003 or 2004” (NEFSC 2006).

Factor 2.3 - Fishing Mortality

Scoring Guidelines (same as Factor 1.3 above)

United States US Mid Atlantic, Small mesh bottom trawl

Moderate Concern

The fishing mortality rate on shortfin squid is unknown. According to the latest stock assessment (2006), not enough reliable information exists to accurately assess the stock, and even though fisheries data and biological data from research projects in the past can be used, the lack of data on attributes like seasonal age, growth, and maturity limits the model and prevents determination of stock status. Because the fishing mortality rate and stock status are unknown, but there is management in place, Seafood Watch considers this a “moderate” concern.

Rationale:
“This is a data-poor stock, and because there are no reliable research survey indices for *Illex* inhabiting the U.S. Shelf, the assessment relies on fisheries data, in particular, catch per unit effort (CPUE) indices and biological data collected during prior cooperative research projects. Due to its short lifespan and the short fishing season, *Illex* was assessed using an in-season (weekly) model. Estimates of natural mortality were included in the in-season model and in a weekly per-recruit model. Although the Working Groups felt the model formulations were sound, it was decided that the use of the results from the three models was premature, mainly due to a lack of seasonal age, growth and maturity data, which

greatly affect the model results. Due to the lack of adequate data regarding fishing mortality rates and absolute biomass, stock status could not be determined for 2003 or 2004" (NEFSC 2006).

Factor 2.4 - Discard Rate

United States US Mid Atlantic, Small mesh bottom trawl

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Using the data from observed small-mesh trawl trips, the average ratio of discards to landings from 2009–2014 was 39%. However, the data used for this ratio were only from observed trips, which may not accurately portray the whole fishery. Additionally, the majority of landings of silver, offshore, and red hake is from small-mesh trawl vessel trips, so data from trips made by vessels using other gear types were not used. Therefore, the ratios from these data should not be considered reliable estimates of the optimization of marine resource utilization in this fishery, and use different data than the data used in the National Bycatch Report. But the range of 20%–40% is likely to be a near estimate, given the ratios in that report.

Criterion 3: Management effectiveness

Management is separated into management of retained species (harvest strategy) and management of non-retained species (bycatch strategy).

The final score for this criterion is the geometric mean of the two scores. The Criterion 3 rating is determined as follows:

- *Score >3.2=Green or Low Concern*
- *Score >2.2 and <=3.2=Yellow or Moderate Concern*
- *Score <=2.2 or either the Harvest Strategy (Factor 3.1) or Bycatch Management Strategy (Factor 3.2) is Very High Concern = Red or High Concern*
  Rating is Critical if either or both of Harvest Strategy (Factor 3.1) and Bycatch Management Strategy (Factor 3.2) ratings are Critical.

Criterion 3 Summary

Region / Method	Management of Retained Species	Management of Non-Retained Species	Overall Recommendation
United States US Mid Atlantic Small mesh bottom trawl	3.000	4.000	Green(3.464)
United States US New England Small mesh bottom trawl	3.000	4.000	Green(3.464)

Factor 3.1: Harvest Strategy

Scoring Guidelines

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

- *5 (Very Low Concern)—Rated as 'highly effective' for all seven subfactors considered.*
- *4 (Low Concern)—Management Strategy and Recovery of Species of Concern rated 'highly effective' and all other subfactors rated at least 'moderately effective.'*
- *3 (Moderate Concern)—All subfactors rated at least 'moderately effective.'*
- *2 (High Concern)—At minimum, meets standards for 'moderately effective' for Management Strategy and Recovery of Species of Concern, but at least one other subfactor rated 'ineffective.'*

- *1 (Very High Concern)—Management exists, but Management Strategy and/or Recovery of Species of Concern rated 'ineffective.'*
- *0 (Critical)—No management exists when there is a clear need for management (i.e., fishery catches threatened, endangered, or high concern species), OR there is a high level of Illegal, unregulated, and unreported fishing occurring.*

Factor 3.1 Summary

Factor 3.1: Management of fishing impacts on retained species							
Region / Method	**Strategy**	**Recovery**	**Research**	**Advice**	**Enforce**	**Track**	**Inclusion**
United States US Mid Atlantic Small mesh bottom trawl	Moderately Effective	Highly Effective	Moderately Effective	Highly Effective	Highly Effective	Moderately Effective	Highly Effective
United States US New England Small mesh bottom trawl	Moderately Effective	Highly Effective	Moderately Effective	Highly Effective	Highly Effective	Moderately Effective	Highly Effective

The New England Fisheries Management Council manages silver hake, red hake, and offshore hake with a series of exemptions from the Northeast Multispecies FMP. The vessels that fish for these three species are allowed to by being exempt from complying with the minimum mesh size while fishing in designated areas. These designated areas fall in the Gulf of Maine, Georges Bank, Southern New England, and Mid-Atlantic regulated mesh areas (for maps of these areas, see section 3.1.1).

Subfactor 3.1.1 – Management Strategy and Implementation

Considerations: What type of management measures are in place? Are there appropriate management goals, and is there evidence that management goals are being met? To achieve a highly effective rating, there must be appropriate management goals, and evidence that the measures in place have been successful at maintaining/rebuilding species.

United States US Mid Atlantic, Small mesh bottom trawl

United States US New England, Small mesh bottom trawl

Moderately Effective

The small-mesh multispecies fishery (targeting silver hake, offshore hake, and red hake) is managed by the New England Fisheries Management Council (NEFMC). A comprehensive approach to the management of these species was first adopted in early 2000 with the implementation of Amendment 12 to the Northeast Multispecies Fishery Management Plan (FMP). These three species compose the Northeast small-mesh multispecies complex within this FMP. Because vessels participating in this fishery use small-mesh nets, they are regulated through a series of exemptions from the Northeast Multispecies FMP. They are allowed to fish for these species using small-mesh only within the designated areas in the Gulf of Maine and Georges Bank regulated mesh areas and in the entire Southern New England and Mid-Atlantic regulated mesh areas (see maps of whiting exemption areas

below, and possession limits and fishing seasons by area in Table 1). These vessels may fish for the small-mesh multispecies complex in these areas provided they comply with all the other requirements and conditions. They must possess either an open access or limited access Northeast Multispecies permit to land species that make up the small-mesh multispecies complex, and the appropriate permits to retain any other species that are allowed (see Table 1).

After Amendment 12, Amendment 19 (2012) to the plan established catch limits in the small mesh fishery where there previously were none and created a process and framework for setting small-mesh multispecies catch specifications (NEFMC 2012). Additionally, this amendment set the ACLs for all four stocks at 95% of the ABCs to allow a 5% buffer for uncertainty, which the Council finds adequate due to the stable catches over the last 10 years. If catches exceed the ACL, the fishery will be subject to a post-season accountability measure.

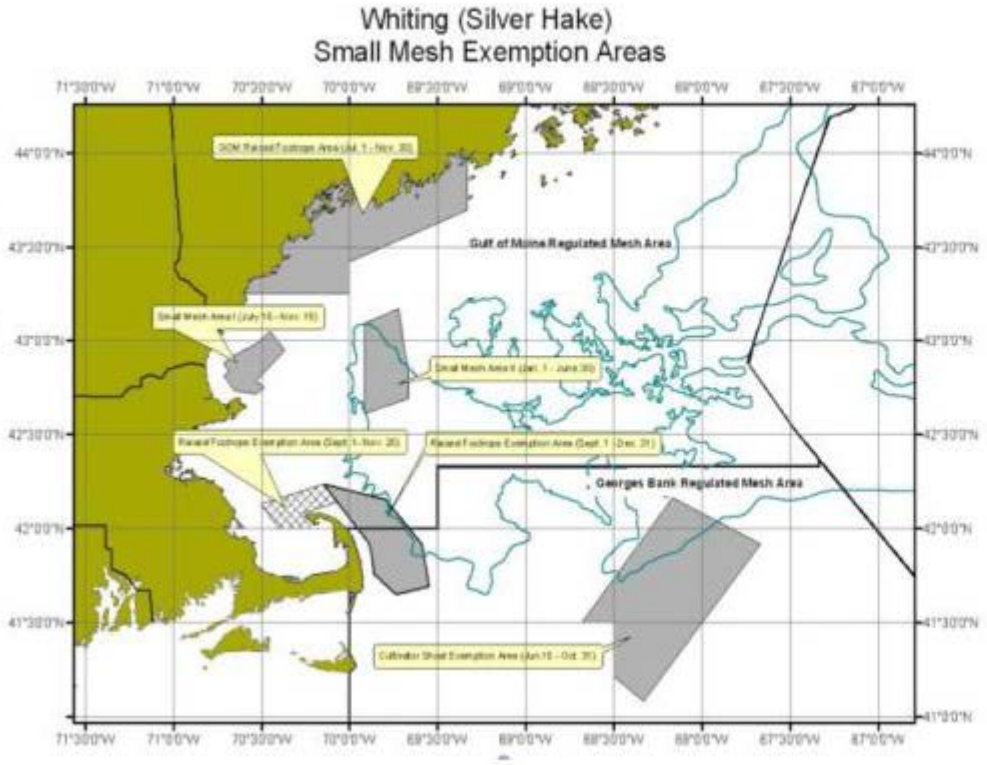
Landings of the northern stock of red hake have exceeded catch limits, and this final rule also lowered the possession limit and implemented an additional possession limit trigger reduction to ensure that catches will not exceed the ACL in the future (NOAA Fisheries 2015).

This management strategy is considered to be "moderately effective" because even though overfishing was ended on northern red hake, it remains to be seen if it will be successful at keeping all stocks healthy and fishing mortality at healthy rates.

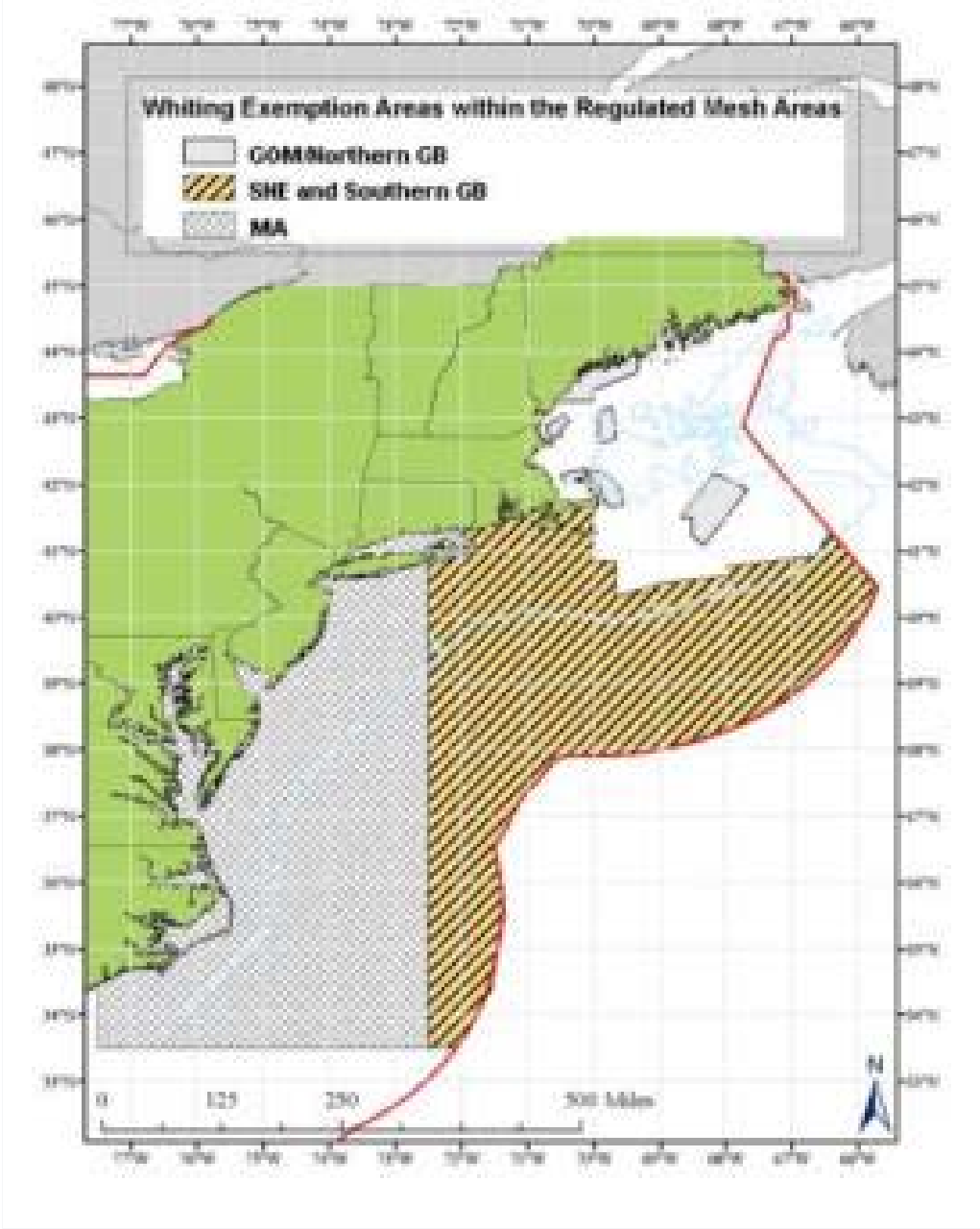
Rationale:
"As in other NEFMC managed stocks, including NE Multispecies, the ACLs for all four stocks or stock groups are equal to 95 percent of the corresponding ABC to allow a buffer for management uncertainty.... The fishery is and will be relatively heavily regulated and monitored and subject to a post-season accountability measure if catches exceed the ACL. Catches in the fishery have also demonstrated remarkable stability over the last decade or so, related to trip limits, the unique fishing characteristics, limited market demand, and prices. Although some of these factors may change, the Council believes that there is and will be sufficient safeguards that a 5% buffer to account for management uncertainty will be adequate. Setting the ACL at 95% of ABC is also being used to account for management uncertainty in other large mesh groundfish stocks, which have similar monitoring procedures. The Council may revisit this buffer in a future specification if it is found to be inadequate." (NEFMC 2012)

The southern whiting ABC is raised by 4% to include offshore hake, because this is the average percentage of the catch that has been found to be offshore hake. Not enough information exists to set distinct catch limits for offshore hake; also, it is not feasible for fishers to separate out the two species (NEFMC 2012).

Exemptions within the GOM/GB Regulated Mesh Area: (§ 648.80(a))
Vessels may fish in the following GOM/GB exempted fisheries in the area specified, provided they comply with requirements and conditions listed for each fishery, as follows:



Map of designated areas where whiting fishing is allowed in the Gulf of Maine (GOM) and Georges Bank (GB) regulated mesh areas (RMA).



Map of all designated areas where vessels with the appropriate permits may fish for whiting.

Table 1. Small-mesh Multispecies Exemption Areas and Corresponding Possession Limits, Fishing Seasons, and Additional Permitted Retained Species {NOAA Fisheries 2014d}

Small-mesh Multispecies Exemption Area		**Combined Silver Hake and Offshore Hake Possession Limits***	**Red Hake Possession Limit***	**Season****	**Additional Species Permitted for Retention*****
GOM Grate Raised Footrope Trawl		up to 7,500 lb	5,000 lb	July 1 – November 30	Butterfish, Atlantic herring, squid, alewife, Atlantic mackerel
Cultivator Shoal		up to 30,000 lb	5,000 lb	June 15 – October 31, unless otherwise specified by notification in the Federal Register	Atlantic herring, longhorn sculpin, squid, butterfish, Atlantic mackerel, spiny dogfish, monkfish and monkfish parts up to 10% by weight of all other species onboard or 50 lb tail weight (146 lb whole weight), whichever is less, American lobster up to 10% by weight of all other species on board up to 200 lobsters, whichever is less, unless otherwise restricted.
Small Mesh Area 1 & 2	Codend mesh size <2.5"	3,500 lb	5,000 lb	SMA 1: July 15 – November 15; SMA 2: January 1 – June 30	Butterfish, spiny dogfish, Atlantic herring, Atlantic mackerel, scup, squid
	Codend mesh size 2.5">3.0"	7,500 lb			
	Codend mesh size ≥3.0"	30,000 lb			
SNE	Codend mesh size <2.5"	3,500 lb	5,000 lb	Open continually (year round)	Butterfish, spiny dogfish (trawl), Atlantic herring, Atlantic mackerel, scup, shrimp, squid, summer flounder, weakfish, Conger eels, searobins, black sea bass, tautog (blackfish), blowfish, cunner, John Dory, mullet, bluefish, tilefish, longhorn sculpin, fourspot flounder, alewife, hickory shad, American shad, blueback herring, sea ravens, Atlantic croaker, spot, swordfish, monkfish and monkfish parts up to 10% by weight of all other species on board, or 50 lb tail-weight (146 lb wholeweight), whichever is less, American lobster up to 10% by weight of all other species on board, up to 100 lobsters for trips of 24 hours or less, or 200 lobsters for trips longer than 24 hours, whichever is less, skate and skate parts up to 10% by weight of all other species on board
	Codend mesh size 2.5">3.0"	7,500 lb			
	Codend mesh size ≥3.0"	40,000 lb			
MA	Codend mesh size <2.5"	3,500 lb	5,000 lb	Open continually (year round)	
	Codend mesh size 2.5">3.0"	7,500 lb			
	Codend mesh size ≥3.0"	30,000 lb			
*Possession limits may be reduced to 2,000 lb for whiting and 400 lb for red hake if the in-season possession limit trigger is reached.					
**Vessels are subject to any state regulations when fishing in state waters.					
***Vessels must have the appropriate permit(s) to retain additional species					

As of May 28, 2015, the specifications for all five stocks for fishing years 2015–2017 were set (NOAA Fisheries 2015). They are summarized in Table 2, below.

Table 2. {NOAA Fisheries 2015}

Summary of the Small-Mesh Multispecies Specifications for 2015-2017							
Stock	Overfishing limit (OFL) (mt)	ABC (mt)	ACL (mt)	Percent change from 2012-2014	Discard rate (percent)	TAL	Percent change from 2012-2014
N. Silver Hake	43,608	24,383	23,161	85	11.2	19,948.7	122.3
N. Red Hake	331	287	273	2.6	60.6	104.2	15.4
S. Whiting *	60,148	31,180	29,621	−8.2	17.1	23,833.4	−12.6
S. Red Hake	3,400	3,179	3,021	−2.4	55.3	1,309.4	−2.0
* Southern whiting includes southern silver hake and offshore hake							

Subfactor 3.1.2 – Recovery of Species of Concern

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

United States US Mid Atlantic, Small mesh bottom trawl

United States US New England, Small mesh bottom trawl

Highly Effective

None of the hake stocks targeted in the small-mesh multispecies fishery are overfished, depleted, endangered, or threatened.

Subfactor 3.1.3 – Scientific Research and Monitoring

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

United States US Mid Atlantic, Small mesh bottom trawl

United States US New England, Small mesh bottom trawl

Moderately Effective

Data are collected on all five stocks of these three species in order to perform science-based stock assessments. However, there are some uncertainties and insufficient data (in the case of offshore hake) that make it challenging for managers to maintain stock levels with confidence. Because of this, Seafood Watch considers scientific research and monitoring of this fishery to be "moderately effective."

Rationale:
"The SARC-51 Review Panel concluded that sufficient information is not available to determine offshore hake stock status with confidence, because fishery data are insufficient and one cannot assume that survey data reflect stock trends" (NEFSC 2011). This is upheld in the 2014 stock status update for offshore hake. Additionally, uncertainties around the red hake stock structure and catches of silver hake are laid out in this update (NEFMC 2014b).

Subfactor 3.1.4 – Management Record of Following Scientific Advice

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

United States US Mid Atlantic, Small mesh bottom trawl

United States US New England, Small mesh bottom trawl

Highly Effective

The NEFMC takes scientific advice into account when setting quotas and developing management strategies for small-mesh species. With the exception of red hake, landings of these species do not come near their quotas, so there is little reason to expect the NEFMC to stop incorporating scientific advice into management of this fishery. Because of this, scientific advice is considered "highly effective."

Subfactor 3.1.5 – Enforcement of Management Regulations

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

United States US Mid Atlantic, Small mesh bottom trawl

United States US New England, Small mesh bottom trawl

Highly Effective

A variety of enforcement measures are in place in the small-mesh multispecies fishery. Small-mesh trawl vessels targeting whiting and red hake must possess a permit for the Northeast multispecies fishery, and all vessels fishing in the multispecies fishery are required to be fitted with a vessel monitoring system (VMS) (Federal Register 2006). However, these vessels are not required to use VMS when fishing for whiting and red hake, but they must send the "Declare Out of Fishery" code from their VMS unit, which is monitored by the OLE and Coast Guard (GARFO 2015). Additionally, the whiting fishing areas were developed where the traditional whiting grounds are, so there is little reason to suspect much fishing outside of these areas. OLE officers conduct dockside inspections and inspect fish processing plants (OLE webpage), while the Coast Guard occasionally inspects vessels at sea. OLE enforces fisheries legislation including retention of prohibited species and gear restrictions. Violation of such management measures can result in criminal or civil actions and fines or imprisonment for more serious cases. Under Amendment 16 of the Multispecies Fishery Management Plan, accountability measures (AM) were established for the large mesh groundfish fleet (Federal Register 2010). A secretarial amendment and then Amendment 19 extended AM to the small-mesh multispecies fleet. AM are required to ensure accountability within the fishery and to prevent overfishing. Proactive AM are designed to prevent allowable catch limits (ACL) from being exceeded, whereas reactive AM are designed to correct any overages if they occur (Federal Register 2012). In 2012 and 2013, overfishing occurred on the northern stock of red hake, and catches exceeded the ACL and ABC. As a result, the Council reduced the northern red hake possession trip limit (from 5,000 lb to 3,000 lb) and created a new trigger point so that when landings reach 45% of the TAL, the possession limit is further reduced to 1,500 lb (NOAA Fisheries 2015). Overfishing did not occur on the northern stock of red hake in FY 2014 (GARFO & NEFSC 2015). These measures were finalized and implemented in May 2015. Because this monitoring and the resulting revisions of management measures can be viewed as proof that regulations are enforced, Seafood Watch considers enforcement in this fishery to be "highly effective."

Subfactor 3.1.6 – Management Track Record

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

United States US Mid Atlantic, Small mesh bottom trawl

United States US New England, Small mesh bottom trawl

Moderately Effective

The NEFMC began to separately and comprehensively manage small-mesh multispecies in 2000. Since then, the stocks have rebuilt, but overfishing occurred on the northern stock of red hake in 2012 and 2013. Management measures ended overfishing on this stock in 2014. However, the stock status of offshore hake is unknown. Because of this, the track record is uncertain and the management strategy is therefore considered "moderately effective."

Subfactor 3.1.7 – Stakeholder Inclusion

Considerations: Are stakeholders involved/included in the decision-making process? Stakeholders are individuals/groups/organizations that have an interest in the fishery or that may be affected by the management of the fishery (e.g., fishermen, conservation groups, etc.). A Highly Effective rating is given if the management process is transparent and includes stakeholder input.

United States US Mid Atlantic, Small mesh bottom trawl

United States US New England, Small mesh bottom trawl

Highly Effective

The NEFMC has an open and transparent policy that allows stakeholder participation and feedback through meetings and scoping hearings throughout their affected areas. Also, the Council utilizes industry advisory panels that provide information during the development of FMPs. Public meeting schedules for the NEFMC are online at http://www.nefmc.org/calendar/index.html. Because the management process is transparent and includes stakeholder input, it is considered "highly effective."

Bycatch Strategy

Factor 3.2: Management of fishing impacts on bycatch species						
Region / Method	**All Kept**	**Critical**	**Strategy**	**Research**	**Advice**	**Enforce**
United States US Mid Atlantic Small mesh bottom trawl	No	No	Highly Effective	Moderately Effective	Highly Effective	Highly Effective
United States US New England Small mesh bottom trawl	No	No	Highly Effective	Moderately Effective	Highly Effective	Highly Effective

Subfactor 3.2.1 – Management Strategy and Implementation

Considerations: What type of management strategy/measures are in place to reduce the impacts of the fishery on bycatch species and how successful are these management measures? To achieve a Highly Effective rating, the primary bycatch species must be known and there must

be clear goals and measures in place to minimize the impacts on bycatch species (e.g., catch limits, use of proven mitigation measures, etc.).

United States US Mid Atlantic, Small mesh bottom trawl

United States US New England, Small mesh bottom trawl

Highly Effective

Small-mesh fisheries are managed through a series of exemptions, and "exemption programs must have demonstrated that incidental catch of regulated species is less than 5 percent of the total catch, by weight, and that the exemption will not jeopardize fishing mortality objectives" (NOAA Fisheries 2014d). Small-mesh multispecies fishery vessels are allowed to retain some of the following species, depending on the area, but they must possess the appropriate permits:
Butterfish, spiny dogfish, Atlantic herring, Atlantic mackerel, scup, shrimp, squid, summer flounder, weakfish, Conger eels, searobins, black sea bass, tautog (blackfish), blowfish, cunner, John Dory, mullet, bluefish, tilefish, longhorn sculpin, fourspot flounder, alewife, hickory shad, American shad, blueback herring, sea ravens, Atlantic croaker, spot, swordfish; monkfish and monkfish parts; American lobster; skate and skate parts. They must also comply with any corresponding FMP and state regulations (if fishing in state waters) for these retained species. In general, when targeting whiting and red hake, vessels do not have many bycatch issues. The fishery is categorized with the Northeast bottom trawl fishery as a Category II fishery for marine mammal takes, so vessel owners or operators must report all marine mammal incidental injuries and mortalities, register with the marine mammal authorization program, carry a fisheries observer upon request, and comply with the marine mammal take reduction plan.

This strategy is considered "highly effective" because the fishery has a track record of low bycatch, and must continue to in order to keep operating.

Subfactor 3.2.2 – Scientific Research and Monitoring

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

United States US Mid Atlantic, Small mesh bottom trawl

United States US New England, Small mesh bottom trawl

Moderately Effective

Observers are trained biologists who collect data on fishing activities onboard commercial vessels to provide robust data to support science and management programs. Observers in the Northeast Fisheries Observer Program (NEFOP) record weights of kept and discarded fish and invertebrate species on observed hauls, as well as biological information (length, age, sex, and tags) from all species caught, including marine mammals and seabirds. When figuring out how much observer coverage is needed to estimate bycatch levels, the goal is usually to achieve a desired level of precision (Babcock & Pikitch 2003). In the Greater Atlantic Region, this level of precision is measured as the coefficient of variation (CV), or the ratio of the square root of the variance of the bycatch estimate (i.e., standard error) to the estimate itself. It is useful for comparing the degree of variation from one data series to another, even when the averages vary by a lot.

In 2014, the councils in this region adopted a revised Standardized Bycatch Reporting Methodology (SBRM) amendment, which replaced the previous one that was remanded by the courts in 2011. This amendment was accepted by NMFS in March 2015 and implemented by final rule on June 30, 2015. According to this revised SBRM amendment, it "...proposes to ensure that the data collected under the SBRM are sufficient to produce a coefficient of variation (CV) of the discard estimate of no more than 30 percent, in order to ensure that the effectiveness of the SBRM can be measured, tracked, and utilized to effectively allocate the appropriate number of observer sea days. Each year, the Regional Administrator and the Science and Research Director would, subject to available resources, allocate at-sea observer coverage to the applicable fisheries of the Greater Atlantic Region sufficient to achieve a level of precision (measured as the CV) no greater than 30 percent for each applicable species and/or species group..." (Federal Register 2015). This means that a CV of 0.30 is necessary.

In 2012, observer coverage was reported to be close to 30% (NMFS 2013), which is higher than in 2006–2008, when the average was below 10% for the small-mesh multispecies trawl fishery (NMFS 2011). In FY 2015, the number of observed sea days needed for a CV of 0.30 of total discards was determined to be 11,204 days.

Electronic monitoring research has been underway to replace human observers but would come at a high cost (Archipelago Marine Research Ltd., 2014). Funding for the observer program in 2015 and 2016 is lacking, and it is unclear how the necessary number of sea days will be covered since the current funding allocations are running out. In a memo dated April 23, 2015, adequate funding for fishing year 2015 was not yet secure (Karp 2015). In June 2015, however, NOAA regional administrator John Bullard suggested using federal fisheries disaster aid for the $2.5 million needed to fund the observer program for the remainder of FY 2015.

In the 2013 National Bycatch Report Edition 1 update, NMFS says, "the Northeast Cooperative Research Program (NCRP) has continued to support collaborative projects aimed at reducing the bycatch and discard mortality of finfish," (NMFS 2013b) and "Additional work is focused on the technology transfer of gear designs to reduce bycatch in the whiting and Northern shrimp fisheries. With the implementation of quota-based catch shares management in the Northeast Multispecies fishery in

2010, managing the bycatch of non-target and undersized fish has become even more critical. Thus, the NCRP has developed extensive network groups of researchers, fishermen, net makers, and managers to help fishermen develop modified gear and fishing strategies to fish more selectively. Some projects are focusing primarily on modifications for trawl and gillnet gear to target species based on fish behavior, body type, and size. Other projects are taking a temporal-spatial approach and studying the environmental and oceanographic variables that influence species distribution. These projects are providing data and mapping tools to help fishermen fish more strategically based on factors such as water temperature and other species-specific habitat markers" (NMFS 2013b).

Because of the questions surrounding the observer program and the appropriate level of coverage, the management system does not achieve the highest score for scientific research and monitoring but is rated "moderately effective."

Rationale:
"For fish/invertebrate species groups, the number of sea days needed to achieve a 30% CV of total discards for each species group was derived for 56 fleets by using data collected during July 2013 through June 2014 (Wigley et al. 2015). Based on that sample size analysis, a total of 11,204 sea days is needed for the 14 fish and invertebrate species groups:" (NEFSC 2015).

Subfactor 3.2.3 – Management Record of Following Scientific Advice

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

United States US Mid Atlantic, Small mesh bottom trawl

United States US New England, Small mesh bottom trawl

Highly Effective

Scientific advice appears to be followed in minimizing bycatch levels. The fleet has to prove that bycatch levels are minimal in order to continue to be exempt from the minimum mesh size regulations, so bycatch has always been low in the fishery. But managers also follow scientific advice to try to prevent overfishing of species caught with small-mesh trawl nets and to keep bycatch levels low. The gear modifications required in some areas reduce contact with the seafloor, which helps minimize capture of flatfish and other groundfish, and restricting the fishing to designated areas also helps keep bycatch levels low. Because of this, Seafood Watch considers scientific advice in this fishery to be "highly effective."

Subfactor 3.2.4 – Enforcement of Management Regulations

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

United States US Mid Atlantic, Small mesh bottom trawl

United States US New England, Small mesh bottom trawl

Highly Effective

A variety of enforcement measures are in place in the small-mesh multispecies fishery. Small-mesh trawl vessels targeting whiting and red hake must possess a permit for the Northeast multispecies fishery and all vessels fishing in the multispecies fishery are required to be fitted with a vessel monitoring system (VMS) (Federal Register 2006). However, these vessels are not required to use VMS when fishing for whiting, but they must send the "Declare Out of Fishery" code from their VMS unit, which is monitored by the OLE and Coast Guard (GARFO 2015). Additionally, the whiting fishing areas were developed where the traditional whiting grounds are, so there is little reason to suspect much fishing outside of these areas. OLE officers conduct dockside inspections and inspect fish processing plants (OLE webpage), while the Coast Guard occasionally inspects vessels at sea. OLE enforces fisheries legislation including retention of prohibited species and gear restrictions. Violation of such management measures can result in criminal or civil actions and fines or imprisonment for more serious cases. Under Amendment 16 of the Multispecies Fishery Management Plan, accountability measures (AM) were established (Federal Register 2010). AM are required to ensure accountability within the fishery and to prevent overfishing. Proactive AM are designed to prevent allowable catch limits (ACL) from being exceeded, whereas reactive AM are designed to correct any overages if they occur (Federal Register 2012).

These measures are viewed as "highly effective" by Seafood Watch.

Criterion 4: Impacts on the habitat and ecosystem

This Criterion assesses the impact of the fishery on seafloor habitats, and increases that base score if there are measures in place to mitigate any impacts. The fishery's overall impact on the ecosystem and food web and the use of ecosystem-based fisheries management (EBFM) principles is also evaluated. Ecosystem Based Fisheries Management aims to consider the interconnections among species and all natural and human stressors on the environment.

The final score is the geometric mean of the impact of fishing gear on habitat score (plus the mitigation of gear impacts score) and the Ecosystem Based Fishery Management score. The Criterion 2 rating is determined as follows:

- *Score >3.2=Green or Low Concern*
- *Score >2.2 and <=3.2=Yellow or Moderate Concern*
- *Score <=2.2=Red or High Concern*
  Rating cannot be Critical for Criterion 4.

Criterion 4 Summary

Region / Method	Gear Type and Substrate	Mitigation of Gear Impacts	EBFM	Overall Recomm.
United States US Mid Atlantic Small mesh bottom trawl	2.00:Moderate Concern	0.50:Moderate Mitigation	3.00:Moderate Concern	**Yellow (2.739)**
United States US New England Small mesh bottom trawl	2.00:Moderate Concern	0.50:Moderate Mitigation	3.00:Moderate Concern	**Yellow (2.739)**

Justification of Ranking

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

Scoring Guidelines

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

- *0 (Very High)—Dredge or trawl fished on biogenic habitat, (e.g., deep-sea corals, eelgrass and maerl)*
  Note: When multiple habitat types are commonly encountered, and/or the habitat classification is uncertain, the score will be based on the most sensitive, plausible habitat type.

United States US Mid Atlantic, Small mesh bottom trawl

United States US New England, Small mesh bottom trawl

Moderate Concern

Silver hake is found over all substrates from gravel to fine silt and clay, but most commonly over silt and clay (Morse et al. 1999), which are more resilient to disturbance from fishing activities. It can be inferred from this that whiting and red hake are mostly caught with gear that is fishing on these types of substrate. Studies on the effects of trawling on the seabed have found no evidence of impact on sandy areas on Georges Bank that are 60 m or shallower (Lindholm et al. 2015). Seafood Watch considers the effects of bottom trawls on sand, gravel, and mud habitats to be of “moderate” conservation concern.

Rationale:
Concern over the effects of trawling on benthic ecosystems grew during the 1990s, and a host of scientific papers have since documented the damage to benthic communities from these fishing methods. (For reviews, see Watling and Norse 1998, and Thrush and Dayton 2002.) Bottom trawls not only remove an extensive amount of biomass, they destroy biogenic habitat structures such as sponges and tubes (Schwinghamer et al. 1988) (Thrush and Dayton 2002) (Watling and Norse 1998) (Dinmore et al. 2003). These impacts led to the comparison of dredging with forest clearcutting (Watling and Norse 1998)(Zeller and Russ 2004). As with forest clearing, benthic ecosystems can be slow to recover, and recovery times will vary with the exact species, habitat, and depth considered (Watling and Norse 1998) (Dinmore et al. 2003). The Georges Bank has been trawled for decades, and the effects on the benthic megafauna on gravel habitat have been studied by Collie et al. (1997). At nontrawl sites, the authors found an abundance of organisms, and that biomass and species diversity were 104 significantly greater than at trawled sites (Collie et al. 1997). Besides removing biomass and biogenic structures, mobile fishing gear (i.e., trawls) alter physical habitat. Even in sandy areas, where dredge impacts are expected to be minimal, experimental dredging has revealed significant changes to the physical habitat, such as the loss of topographic relief (Schwinghamer et al. 1988). The whiting fishery utilizes a gear modification in exemption areas that fall in the Gulf of Maine and on Georges Bank. These modifications are designed to prevent bottom contact. Even if contact still occurs, it is reduced in these areas (NEFMC 2012).

Factor 4.2 – Mitigation of Gear Impacts

Scoring Guidelines

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

United States US Mid Atlantic, Small mesh bottom trawl

United States US New England, Small mesh bottom trawl

Moderate Mitigation

The alteration of marine habitats by fishing gear can be lessened through the reduction of fishing effort, implementation of spatial closures that protect vulnerable habitats, or modifications to the gear that reduce bottom contact or severity of contact.

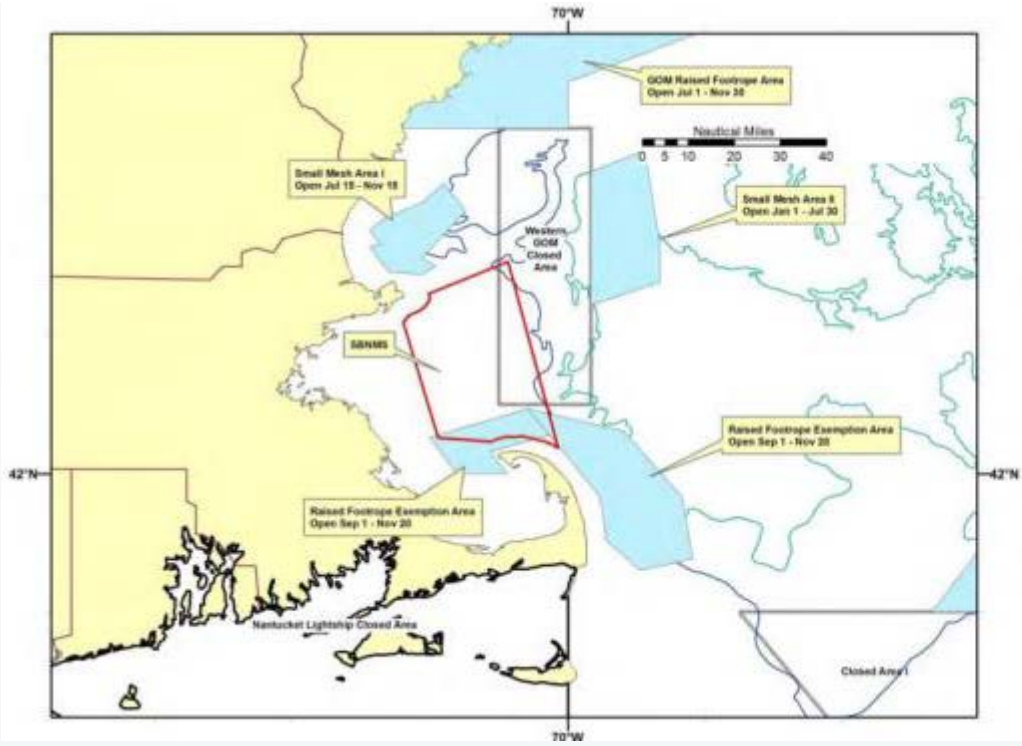
A number of permanent and temporary spatial closures are in place in the Gulf of Maine and Georges Bank. Under Amendment 13 of the multispecies FMP, seven permanent closures are established to protect essential fish habitat (EFH) from the impacts of bottom trawling (Federal Register 2004). Five additional year-round closures are designated through the multispecies FMP, along with five rolling closures in the Gulf of Maine and a seasonal closure in Georges Bank. These closures are designed primarily to protect important spawning grounds and juvenile fish. Additionally, the gear modifications required in the whiting exemption areas in the Gulf of Maine and Georges Bank are in place to prevent contact with the bottom (NOAA Fisheries 2014d).

The gear used in the small-mesh multispecies fishery is otter trawl gear, which, like groundfish trawls, has contact with the seafloor. However, the modifications to the gear that allow vessels to target whiting and red hake are considered moderately effective at reducing impacts on the seafloor (SFW Criteria, p. 73). A raised footrope trawl is required in several of the exempted fishing programs. "Vessels fishing in the Raised Footrope Trawl Exempted Whiting Fishery (GOM or adjacent to Cape Cod), Small Mesh Area 1, or Small Mesh Area 2 must configure the trawl gear in such a way that, when towed, the footrope is not in contact with the ocean bottom" (NOAA Fisheries 2014d). And from Amendment 19: "The raised footrope trawl has less impact on habitat than a traditional otter trawl. Small-mesh

multispecies fishing effort will continue to occur in areas that are open to mobile bottom-tending gears or by gears that have been determined to not adversely impact EFH in a manner that is more than minimal and less than temporary in nature" (NEFMC 2012) (p. 8-205). Additionally, for the vessels fishing in the southern areas where these gear modifications are not required, many do modify their gear based on experience to better target whiting and avoid bycatch of other species. For example, they may use a larger mesh belly panel to reduce flounder bycatch (pers. comm., M. Kelly, May 2015).

Rationale:
According to the NEFMC website (www.nefmc.org), "Prior efforts to minimize the adverse effects of Council-managed fisheries on essential fish habitat (EFH) were largely developed and implemented plan by plan, although fishery effects on EFH are cumulative across fishery management plans because fish and fishery distributions overlap across both species and plans. In 1999, NOAA Fisheries implemented the first Habitat Omnibus Amendment that addressed new Magnuson Fishery Conservation and Management Act mandates in most New England Council FMPs. The amendment also identified and described EFH for the 18 species managed by the Council, major threats to EFH from both fishing and non-fishing related activities, and proposed conservation and enhancement measures and designated Habitat Areas of Particular Concern for Atlantic salmon and Atlantic cod. EFH Omnibus Amendment 2 is currently in development...." As of July 2015, EFH Omnibus Amendment 2 has been finalized and is awaiting approval from NOAA, for implementation sometime in 2016.

To mitigate and minimize potential damage to EFH, NEFMC has implemented spatial closures, introduced limited permit schemes, and placed restrictions on the gear that can be used when trawling (Orphanides and Magnusson 2007). Besides the year-round and rolling closures mentioned above, there are restricted gear areas (RGA) (e.g., the Inshore Restricted Roller Gear Area) that provide protection from particular gear types. Approximately 20% of the Georges Bank and Gulf of Maine seabed is protected from trawling activities through the variety of closures, although only 9.7% of the seabed is permanently protected through EFH closures (NOAA Fisheries 2013). In June 2015, the NEFMC voted on Habitat Omnibus Amendment 2 to reduce closed areas on Georges Bank from 7,000 mi^2 to 2,000 mi^2 (NEFMC 2015b). These closures generally are supposed to cover more complex seafloor habitat than existing closures do, and at the same time give the groundfish fleet more access to healthy stocks and the scallop fleet access to areas with scallops that have not been fished since 1994. These changes have not undergone final approval by NMFS, but if they are approved, they will be implemented sometime in 2016. Framework Adjustment (FA) 48 to the MSFMP prevents an exemption to year-round fishing mortality area closures from being made to areas that overlap with closures created to protect essential fish habitat (Federal Register 2013).



Map of whiting fishing areas in relation to Stellwagen Bank National Marine Sanctuary (NEFMC 2014).

Factor 4.3 – Ecosystem-Based Fisheries Management

Scoring Guidelines

- *5 (Very Low Concern)—Substantial efforts have been made to protect species' ecological roles and ensure fishing practices do not have negative ecological effects (e.g., large proportion of fishery area is protected with marine reserves, and abundance is maintained at sufficient levels to provide food to predators).*
- *4 (Low Concern)—Studies are underway to assess the ecological role of species and measures are in place to protect the ecological role of any species that plays an exceptionally large role in the ecosystem. Measures are in place to minimize potentially negative ecological effect if hatchery supplementation or fish aggregating devices (FADs) are used.*
- *3 (Moderate Concern)—Fishery does not catch species that play an exceptionally large role in the ecosystem, or if it does, studies are underway to determine how to protect the ecological role of these species, OR negative ecological effects from hatchery supplementation or FADs are possible and management is not place to mitigate these impacts.*

- *2 (High Concern)—Fishery catches species that play an exceptionally large role in the ecosystem and no efforts are being made to incorporate their ecological role into management.*
- *1 (Very High Concern)—Use of hatchery supplementation or fish aggregating devices (FADs) in the fishery is having serious negative ecological or genetic consequences, OR fishery has resulted in trophic cascades or other detrimental impacts to the food web.*

United States US Mid Atlantic, Small mesh bottom trawl

United States US New England, Small mesh bottom trawl

Moderate Concern

Ecosystem-based management in the United States has been given recent attention with the new National Ocean Policy, established under presidential order on July 19, 2010 (White House 2010). The New England Fishery Management Council (NEFMC) is beginning implementation of a 5-year strategy of transitioning to ecosystem-based management of fisheries. Such management is expected to replace individual management plans with holistic, integrated plans for defined ecological regions, with predator-prey relationships, competition, habitat status and gear impacts, and protected species all taken into account under the umbrella plan. Efforts are underway by the New England Fishery Management Council to develop ecosystem-based fishery management (EBFM) in three phases: establish goals and objectives, identify management and scientific requirements to implement EBFM in the region, and implement EBFM using quota-based management in all ecosystem production units (NEFMC 2011). As of May 2015, policy development is still underway.

According to the MAFMC website (www.mafmc.org/eafm), “The Council is currently developing an Ecosystem Approach to Fisheries Management (EAFM) Guidance Document. Rather than drastically change the Council’s management approach, the final product will serve as a non-regulatory umbrella document to guide policy decisions as the Council transitions from single-species management toward an ecosystem-based approach. The Council defines EAFM as a fishery management approach which recognizes the biological, economic, social, and physical interactions among the components of ecosystems and attempts to manage fisheries to achieve optimum yield taking those interactions into account.” As of May 2015, development of the guidance document is still underway.

Additionally, the small-mesh multispecies fishery catches Atlantic mackerel, longfin squid, and shortfin squid, all of which are considered by Seafood Watch as “exceptional species,” which means they are important forage species. Despite their roles in the ecosystem, there is still much to be learned about their roles in regional food webs. The MAFMC commissioned a white paper to help them manage the forage fisheries in the mid-Atlantic region, including Atlantic mackerel, shortfin squid, and longfin squid (Houde, Guichas, and Seagraves 2014). The white paper sheds light on the role of forage fish in marine ecosystems, identifies those in the mid-Atlantic region and their predators, and determines their importance in the food web based on this information. The purpose of this white paper (and others) is to give managers the information and advice they need to effectively implement ecosystem

management. Because Atlantic mackerel, longfin squid, and shortfin squid are caught in the small-mesh multispecies fishery and ecosystem-based management policy development is underway, Seafood Watch considers this to be of “moderate” conservation concern.

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

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