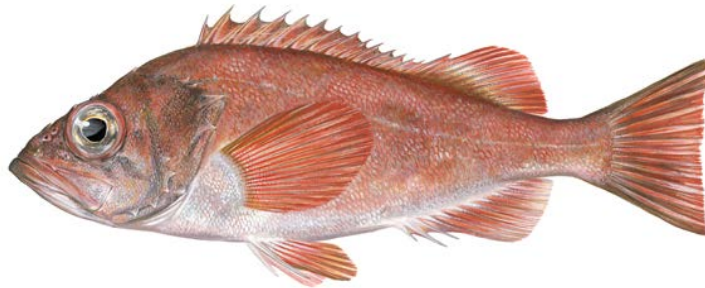




Monterey Bay Aquarium Seafood Watch®

Acadian Redfish

Sebastes fasciatus



(Image ©Scandinavian Fishing Yearbook / www.scandfish.com)

Northwest Atlantic

US

Bottom Trawl

10/06/15

Anne Simpson, Consulting Researcher

Disclaimer

Seafood Watch® strives to have all Seafood Reports reviewed for accuracy and completeness by external scientists with expertise in ecology, fisheries science and aquaculture. Scientific review, however, does not constitute an endorsement of the Seafood Watch® program or its recommendations on the part of the reviewing scientists. Seafood Watch® is solely responsible for the conclusions reached in this report.

About Seafood Watch®

Monterey Bay Aquarium's Seafood Watch® program evaluates the ecological sustainability of wild-caught and farmed seafood commonly found in the United States marketplace. Seafood Watch® defines sustainable seafood as originating from sources, whether wild-caught or farmed, which can maintain or increase production in the long-term without jeopardizing the structure or function of affected ecosystems. Seafood Watch® makes its science-based recommendations available to the public in the form of regional pocket guides that can be downloaded from www.seafoodwatch.org. The program's goals are to raise awareness of important ocean conservation issues and empower seafood consumers and businesses to make choices for healthy oceans.

Each sustainability recommendation on the regional pocket guides is supported by a Seafood Report. Each report synthesizes and analyzes the most current ecological, fisheries and ecosystem science on a species, then evaluates this information against the program's conservation ethic to arrive at a recommendation of "Best Choices," "Good Alternatives" or "Avoid." The detailed evaluation methodology is available upon request. In producing the Seafood Reports, Seafood Watch® seeks out research published in academic, peer-reviewed journals whenever possible. Other sources of information include government technical publications, fishery management plans and supporting documents, and other scientific reviews of ecological sustainability. Seafood Watch® Research Analysts also communicate regularly with ecologists, fisheries and aquaculture scientists, and members of industry and conservation organizations when evaluating fisheries and aquaculture practices. Capture fisheries and aquaculture practices are highly dynamic; as the scientific information on each species changes, Seafood Watch's sustainability recommendations and the underlying Seafood Reports will be updated to reflect these changes.

Parties interested in capture fisheries, aquaculture practices and the sustainability of ocean ecosystems are welcome to use Seafood Reports in any way they find useful. For more information about Seafood Watch® and Seafood Reports, please contact the Seafood Watch® program at Monterey Bay Aquarium by calling 1-877-229-9990.

Guiding Principles

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

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

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

Each criterion includes:

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

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

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

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

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

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

Summary

The following Seafood Watch report provides recommendations for Acadian redfish (*Sebastes fasciatus*) caught in the northwest Atlantic by U.S. fishing vessels using bottom trawls.

Domestically landed and imported, Acadian redfish are commonly marketed as “ocean perch,” a name that is frequently given to several other North Atlantic redfish species including deepwater redfish (*S. mentella*) and golden redfish (*S. norvegicus*) as well as unrelated species such as blackbelly rosefish (*Helicolenus dactylopterus*). Acadian redfish should not be confused with redfish from the Gulf of Mexico, which are a species of drum (Sciaenidae).

The life history characteristics of Acadian redfish make this species moderately vulnerable to fishing pressure and the U.S. Acadian redfish stock was once classified as overfished. Management actions designed to reduce overfishing and rebuild the stock have, over nearly 25 years, been successful and the population achieved ‘fully rebuilt’ status in June 2012.

At present, most Acadian redfish are captured by bottom trawls equipped with 6-6.5" mesh, the standard net size currently in use for the mixed groundfish fishery. In 2013, an exemption to the standard groundfish minimum mesh rule was passed allowing Acadian redfish to be targeted with trawl nets with 4.5" codend mesh. Bycatch studies conducted using the smaller codend mesh showed that the potential primary discard species in the small-mesh fishery would likely be spiny dogfish, sublegal Acadian redfish, and pollock. Observer bycatch records from groundfish trips targeting Acadian redfish with the standard 6.5" mesh documented similar discard species composition. From 2006 to 2010 groundfish trips targeting Acadian redfish consistently had discards that accounted <20% of redfish landings. Bottom trawl fisheries in the northeast U.S. region catch a wide variety of species, including non-target species and, occasionally, marine mammals.

Acadian redfish in the Gulf of Maine and Georges Bank are managed as a single stock by the New England Fisheries Management Council (NEFMC) under the Multispecies Fishery Management Plan (Multispecies FMP). This plan covers 20 groundfish stocks and 13 species. In 2010, the management system for the northeastern multispecies groundfish fishery moved from effort-based controls to a catch-shares system. Landings and discard data for the northeast multispecies groundfish fishery are reported by fishery participants and trained observers. Fisheries independent data are collected by regular surveys and are used, along with fisheries landings and discard data, for stock assessments. Management actions taken by NEFMC are mandated to maintain sustainable harvest levels and rebuild overfished stocks. Management decisions are based on the best available scientific information provided by stock assessments; however, in some cases, social and economic factors are also taken into consideration when setting harvest levels and rebuilding timelines. In addition to regulating the

impact of fishing on target stocks, the NEFMC is required to establish regulations that reduce impact of fishing activities on populations of non-target species. In the recent past, there have been concerns about illegal groundfish landings and unreported bycatch. The shift to a quota-based management system in 2010 may serve to reduce economic incentives for illegal fishing activities and fisheries discards. While there is a strong infrastructure in place to enforce regulations in the multispecies groundfish fisheries, historically, enforcement of fisheries regulations has been only moderately effective.

While most of the groundfish fishery in the Gulf of Maine occurs in depths less than 100 m, Acadian redfish in this region tend to occur in waters deeper than 100 m. This species is associated with both structurally complex, rocky habitats, and areas with fine sediments (e.g., muddy and mixed mud and sand bottoms). Interactions of bottom trawls with the seabed have been shown to cause damage to biogenic and non-biogenic habitat structures. Seafood Watch considers habitat impacts a high conservation concern for bottom trawl fisheries. There is a lack of ecologically relevant habitat data in areas occupied by redfish in the Gulf of Maine. There is evidence that sensitive habitats that harbor redfish (including areas with cold-water corals) fall outside of existing protected areas. Ecosystem-based management is currently being developed for the groundfish fishery in the northwest Atlantic and this process is expected to take a minimum of 5 years. Seafood Watch considers the management of the ecosystem in this region is a moderate conservation concern.

Table of Conservation Concerns and Overall Recommendations

Stock / Fishery	Impacts on the Stock	Impacts on other Spp.	Management	Habitat and Ecosystem	Overall Recommendation
Acadian Redfish United States Atlantic– Large-Mesh Bottom Trawl	Green (5.00)	Yellow (2.71)	Yellow (3.00)	Red (1.94)	Good Alternative (2.979)

Scoring Guide

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

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

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

- **Good Alternative/Yellow** = Final score >2.2-3.2, **and** neither Harvest Strategy (Factor 3.1) nor Bycatch Management Strategy (Factor 3.2) are Very High Concern², **and** no more than one Red Criterion, **and** no Critical scores
- **Avoid/Red** = Final Score <=2.2, **or** either Harvest Strategy (Factor 3.1) or Bycatch Management Strategy (Factor 3.2) is Very High Concern **or** two or more Red Criteria, **or** one or more Critical scores.

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

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Introduction

Scope of the Analysis and Ensuing Recommendation

This report evaluates the sustainability of Acadian redfish (*Sebastes fasciatus*) caught, (primarily) with otter trawls in the U.S. Northeastern multispecies groundfish fishery.

Overview of the Species and Management Bodies

Distribution and Life History

Acadian redfish (*Sebastes fasciatus*) occur in the northwest Atlantic along the shelf of North America, from approximately the latitude for Long Island, New York northward to Labrador. The range of this species extends eastward to Iceland, including the southern waters of Greenland (Hureau and Litvinenko 1986). Acadian redfish spend most of their lives close to the seabed. They show a preference for rocky substrate but may also occur over muddy bottoms, especially in the Bay of Fundy and Scotian Shelf region (Klein-MacPhee and Collette 2002 and references therein). This species has a temperature range from 0° to 13°C and prefers deeper waters down to 400 m (Klein-MacPhee and Collette 2002a). In the Gulf of Maine, Acadian redfish are most abundant in deeper waters of the Gulf from 128 to 366 m, and along the northern and southeastern slopes of Georges Bank and along the Great South Channel (Klein-MacPhee and Collette 2002a).

Acadian redfish are a relatively late maturing, long-lived species (up to 58 years) with moderately low fecundity (Klein-MacPhee and Collette 2002 and references therein)(Mayo et al. 1990). Females are ovoviviparous, releasing young as larvae (Pikanowski et al. 1999 and references therein). These life history characteristics render Acadian redfish populations more vulnerable to overfishing than highly fecund fish with a moderate life span, especially if immature individuals and pregnant females are retained in the catch. This species also exhibits a high incidence of lethal barotrauma when individuals captured at depth are brought to the surface (Lisovsky et al. 1995); therefore, Acadian redfish discarded in commercial fisheries are not likely to survive.

History of the Acadian Redfish Fishery

A modern commercial fishery for Acadian redfish off the northeastern U.S. coast was first established in the early 1930s. Redfish landings rose rapidly during this early period, peaking in 1942 at 56,000 metric tons (mt) in exploited areas of the Gulf of Maine and Georges Bank. Landings in these areas declined during the 1940s and 1950s and fishing effort moved

northwards onto the Scotian Shelf, into the Gulf of St. Lawrence, and eventually to the Grand Banks. Following heavy exploitation during the 1950s and 1960s, redfish landings throughout the northwest Atlantic declined. Gulf of Maine redfish experienced a brief surge in landings during the 1970s followed by a downward trend throughout the following two decades (Figure 1). Exploitation of the redfish stock in the Gulf of Maine has remained at relatively low levels following the declines in the late 20th century.

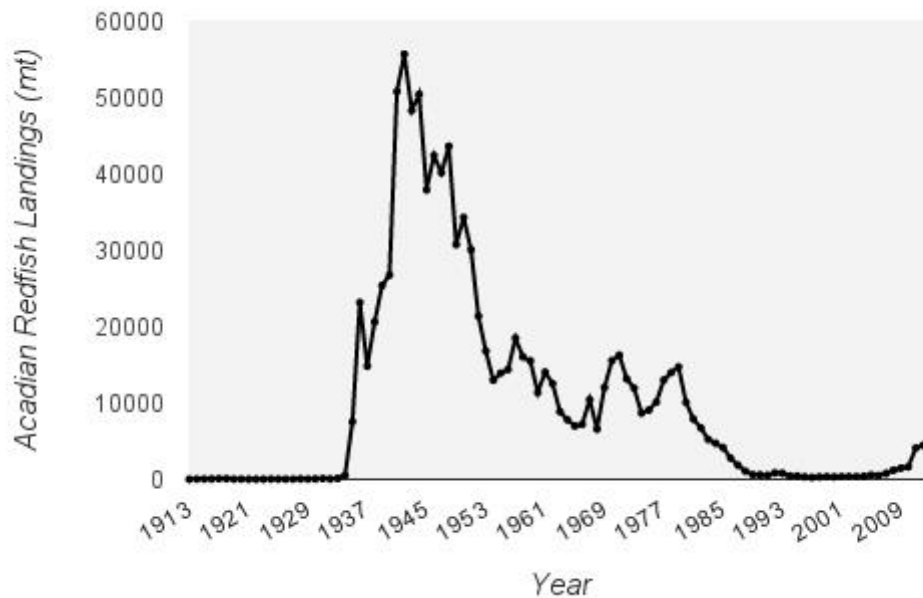


Figure 1. Commercial Landings of Georges Bank/Gulf of Maine Acadian Redfish (NAFO Subarea 5), 1913-2013 (Data extracted from NEFSC 2012a and NOAA Northeast Multispecies Fishery Year-End Reports 2011-2013).

Management of the Acadian Redfish Stock

Acadian redfish in the northeastern U.S. (including Gulf of Maine, Georges Bank and the Great South Channel) are managed as a single stock unit by the New England Fisheries Management Council (NEFMC) under the Northeast Multispecies Fishery Management Plan (NE Multispecies FMP). Originally implemented in 1986, this regulatory framework governs the management of 20 different stocks in the New England and mid-Atlantic region. NE Multispecies FMP has been amended several times to respond to changes in groundfish stocks and the multispecies groundfish fishery in the northeastern U.S. (NEFSC2012a). With the implementation of amendment 16 to the NE Multispecies FMP in 2010, most of the New England groundfish fleet moved from a days-at-sea (DAS) effort control program to a sector-based quota management system. Under the sector system, hard annual catch limits (ACL) are established for each stock, with portions of the catch limits divided among the sectors (Federal Register 2010).

As of the 2013 fishing year, the New England groundfish fleet has utilized less than half of the annual allocation for Acadian redfish despite the stock having achieved rebuilding targets (NOAA 2013b). Economic factors appear to be the primary factor driving the present low utilization of the Acadian redfish quota by the groundfish fleet. Special programs to allow the use of smaller mesh to catch redfish are being implemented in the Northeast region to increase quota utilization.

Production Statistics

With the adoption of ACLs under sector management system landings of Acadian redfish have been on the rise from 2010 to 2013 (Table 1).

Table 1. Landings data and ACL from NOAA Fisheries (Greater Atlantic Region) http://www.nero.noaa.gov/ro/fso/reports/Groundfish_Catch_Accounting.htm

Fishing Year	Landings (mt)	ACL (mt)	% ACL
2010	2009	7226	30.0
2011	2526	7959	35.7
2012	4113	8786	42.7
2013	4024	10462	38.5

At present, landings of Acadian redfish are dominated by vessels using otter trawl gear that meets the standard 6-6.5" (165 cm) minimum mesh requirement for targeted redfish trips and the multispecies groundfish fishery (Mayo et al. 2006). In 2013, NOAA Fisheries approved the use of 4.5" codend mesh for vessels targeting redfish that meet an additional set of established requirements (NMFS 2013a). The small mesh exemption for redfish is designed to improve the retention of redfish by trawl gear. Vessels using 4.5" minimum mesh trawl gear are mandated to carry an observer at the boat owner's expense. With the relatively low market price of Acadian redfish, this requirement presents a financial barrier to prosecution of a targeted redfish fishery. Currently, most sector participants are not fishing under the small mesh exemption; however, the groundfish industry is seeking assistance to fund the 100% observer coverage mandate (Raymond pers. comm. 2014).

Importance to the US/North American Market

As of 2012, Acadian redfish accounts for a relatively minor segment of the U.S. seafood marketplace with a reported catch of 8.5 million pounds (3,837 metric tons) out of a total of 9.6 billion pounds (4.4 million metric tons) of wild caught seafood product landed in the U.S. (NMFS 2012a). In addition to domestic landings, federal records show that the U.S. imports millions of pounds of “ocean perch,” a name for a species group that includes deepwater and Acadian redfish (*Sebastes* spp.) and often other related species, primarily from Canada and China (Figure 2).

Sources of US imports of Ocean Perch in 2013

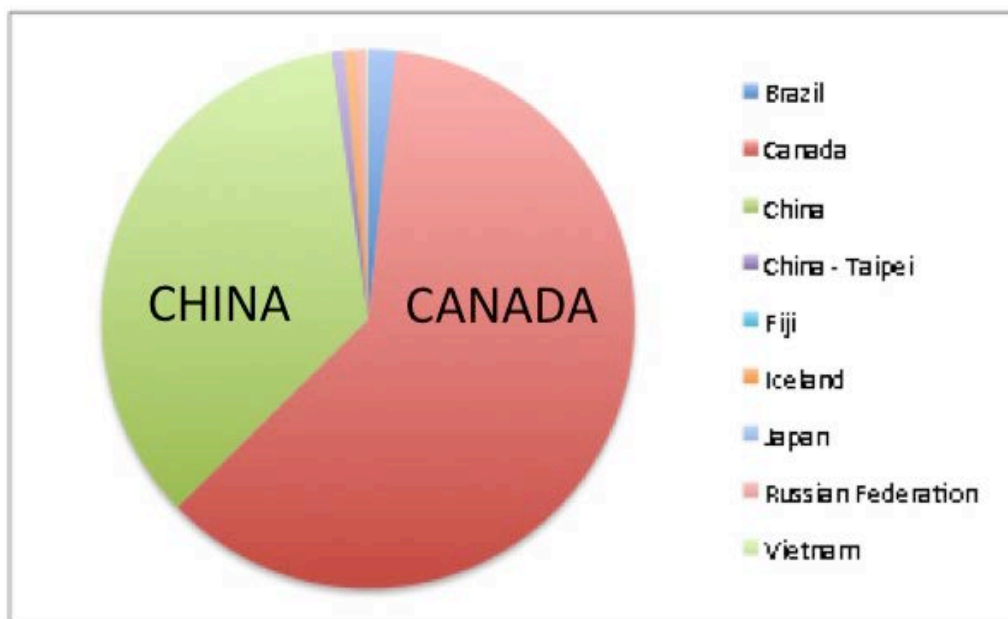


Figure 2. Sources of U.S. imports of ocean perch in 2013 (NOAA 2012h). Ocean perch imports from countries not located in the North Atlantic may represent product that has been exported for processing and then imported into the U.S.

“Ocean perch” from China and other countries outside the North Atlantic region is likely *Sebastes* spp., harvested from the North Atlantic, sent out of the region for processing and then exported back to North America (McDowell Group 2012). In 2012, ocean perch imports were close to 13.7 million pounds (6,214 metric tons) with the bulk of import from Canada and China (NOAA 2012h).

As one of the few New England groundfish stocks considered fully rebuilt and not subject to overfishing, landings of Acadian redfish have been increasing steadily since 2010 ((NEFSC2012a); Table 1). In FY2013, landings of this species accounted for a large part of the groundfish landings in the Northeast region and were second only to pollock in quantity (NOAA 2013a). While landings are increasing, Acadian redfish is being promoted by some in the fishing industry and seafood advocacy groups, as an underutilized resource (Bangor Daily News 2010). In 2010, the National Marine Fisheries Service (NOAA) awarded a Saltonstall-Kennedy (S-K) grant to the Gulf of Maine Research Institute to develop markets for “underutilized and underappreciated” species, including Acadian redfish (NOAA 2010). In the subsequent round S-K funding in 2013, the Cape Ann Seafood Exchange, Inc. was awarded a grant for the project “Sustaining Redfish” with the objectives of building “*a sustainable, fully utilized fishery for Gulf of Maine harvested redfish (Sebastes fasciatus)*” and realizing “*the full market potential value of this underutilized species, to include creating the capacity to process and market whole redfish fresh and frozen fillets that are competitively priced for new domestic and international markets*” (Saving Seafood 2013).

Common and Market Names

Acadian redfish (*Sebastes fasciatus*) is one of 3 commercially harvested species of redfish comprising the genus *Sebastes* in the North Atlantic. Other commercially harvested North Atlantic *Sebastes* species include deepwater redfish (*S. mentella*) and golden redfish (*S. norvegicus*). A fourth *Sebastes* species, Norway redfish (*S. viviparous*) occurs in the northeastern Atlantic but, due to its relatively small size, this species is not a target for commercial fisheries.

North Atlantic redfish, including Acadian redfish, are commonly called “Atlantic ocean perch” or “ocean perch.” This name may be applied to other closely related species such as blackbelly rosefish (*Helicolenus dactylopterus*).

Acadian and deepwater redfish are often referred to as “beaked redfish” due to presence of a prominent tubercle on their lower mandible (Klein-MacPhee and Collette 2002a). Other names for Acadian redfish are “redfish,” “Atlantic redfish,” “Labrador redfish,” and “rosefish.”

Redfish from the Gulf of Mexico are members of the group called (Sciaenidae) and should not be confused with *Sebastes* spp., like Acadian redfish that are Scorpaeniformids.

Primary Product Forms

Redfish from the Gulf of Maine and Georges Bank are available fresh as whole fish and fillets or frozen, skin-on fillets. Carcasses of redfish processed for the fillet market, known as “racks,” are a commercially valuable source as bait used in the lobster fishery (Wilson pers. comm. 2014). Compared to other popular groundfish species, such as cod and haddock, redfish are relatively small, with market size individuals usually not exceeding 18” or 3 lbs in weight.

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

ACADIAN REDFISH				
Region / Method	Inherent Vulnerability	Stock Status	Fishing Mortality	Subscore
United States Atlantic Large-Mesh Bottom Trawl	2.00:Medium	5.00:Very Low Concern	5.00:Very Low Concern	Green (5.000)

Certain life history characteristics of Acadian redfish, including relatively late onset of sexual maturity (4-5 years), low fecundity and release of young in the larval stage, render this species vulnerable to commercial exploitation by relatively non-size selective fishing gears, such as otter trawls. Discard survival rates of Acadian redfish are likely low because this species often suffers from barotrauma when brought to the surface from depth. Individuals with barotrauma float at the surface and are vulnerable to predation.

Criterion 1 Assessment

ACADIAN REDFISH

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 it particularly vulnerable to fishing, (e.g., long-lived (>25 years), late maturing (>15 years), low reproduction rate, large body size, and top-predator).*
- Note: The FishBase vulnerability scores is an index of the inherent vulnerability of marine fishes to fishing based on life history parameters: maximum length, age at first maturity, longevity, growth rate, natural mortality rate, fecundity, spatial behaviors (e.g., schooling, aggregating for breeding, or consistently returning to the same sites for feeding or reproduction) and geographic range.*

United States Atlantic, Large-Mesh Bottom Trawl

Medium

The FishBase vulnerability score for Acadian redfish is 44 (Froese and Pauly 2014). Acadian redfish exhibit life history characteristics that may limit the species' resilience to fisheries harvests, including relatively slow growth rate, late onset of sexual maturity, low fecundity, long lifespan, and limited spatial movement. Seafood Watch considers Acadian redfish to have a moderate inherent vulnerability to fishing pressure.

Rationale

Acadian redfish is a slow-growing, relatively late-maturing, long-lived species that tends to inhabit deeper continental shelf waters in the North Atlantic (Pikanowski et al. 1999). Acadian redfish are very similar in appearance to deepwater redfish, and these two 'beaked' redfish species may hybridize in certain areas of overlapping distribution off eastern Canada (Klein-MacPhee and Collette 2002a) (Pikanowski et al. 1999). The range of Acadian redfish extends from off New Jersey to Iceland, where it occurs most commonly in rocky, or silty/muddy bottom habitats (Pikanowski et al. 1999). It is a medium-sized fish that reaches a maximum size of up to 50 cm (19 inches) in the Gulf of Maine; however, larger individuals have been reported from more northern and eastern regions (Klein-MacPhee and Collette 2002a). This species is long-lived and may reach up to at 58 years of age (Klein-MacPhee and Collette 2002a). Age-at-maturity can vary among female Acadian redfish from Gulf of Maine and Georges Bank, ranging from 3 to 10 years, with median age of sexual maturity around 5.5 years (Klein-MacPhee and Collette 2002a). Acadian redfish exhibit relatively low fecundity compared to other species targeted in northeastern U.S. groundfish fisheries. Larger females produce 25,000-50,000 eggs annually, but this ovoviviparous species only ultimately extrudes 15,000-20,000 larvae (Klein-MacPhee and Collette 2002a). Fertilization of eggs occurs internally in redfish but relatively little else is

currently known about breeding habits (Pikanowski et al. 1999). Extruded larvae may undergo four or more months of pelagic development before adopting a more benthic existence (Pikanowski et al. 1999). Adult Acadian redfish appear to remain on, or near the seafloor, during daylight hours, and make nightly vertical migrations into the water column, presumably to feed on pelagic euphysiids (Pikanowski et al. 1999). This species is not known to undertake large-scale migrations but some groups of redfish may make limited seasonal movements (Klein-MacPhee and Collette 2002a). Acadian redfish are not generally very active swimmers and are known to use both biogenic (ex. anemones and corals) and non-biogenic (ex. boulders) structures for cover (Pikanowski et al. 1999) (Auster 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 Atlantic, Large-Mesh Bottom Trawl

Very Low Concern

The spawning stock biomass (SSB) of Acadian redfish currently exceeds targets set by the New England Fisheries Management Council (NEFSC 2012). The 2012 assessment update for the Gulf of Maine-Georges Bank Acadian redfish stock estimated $SSB_{2010} = 314,780\text{mt}$, which is higher than the target biomass level $SSB_{MSY} = 238,000\text{mt}$ (NEFSC 2012).

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 ($\leq 5\%$ 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 Atlantic, Large-Mesh Bottom Trawl

Very Low Concern

Fishing mortality is currently below target levels for this stock; thus, overfishing is not currently occurring (NEFSC 2012). The 2012 stock assessment update for the Gulf of Maine-Georges Bank Acadian redfish stock estimated fishing mortality ($F_{2010} = 0.006$) is equivalent to 15% of the rate that would maintain maximum sustainable yield ($F_{MSY} = 0.04$) (NEFSC 2012).

Undersize redfish (<7" minimum size limit) represent around 5% of the discards for trips that target this species with otter trawls (NOAA 2013). In 2010, redfish discards from the groundfish large-mesh otter trawl fishery were equivalent to approximately 10% of the total weight in landings of this species for all gear types (NMFS 2013b).

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 ghostfishing. 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

Acadian Redfish: United States Atlantic, Large-Mesh Bottom Trawl					
Subscore:	2.709	Discard Rate:	1.00	C2 Rate:	2.709
Species	Inherent Vulnerability	Stock Status	Fishing Mortality	Subscore	
ATLANTIC WHITE-SIDED DOLPHIN: WESTERN NORTH ATLANTIC	High	2.00: High Concern	3.67: Low Concern	2.709	
ATLANTIC HALIBUT	High	2.00: High Concern	5.00: Very Low Concern	3.162	
BOTTLENOSE DOLPHIN: WESTERN NORTH ATLANTIC, OFFSHORE	High	2.00: High Concern	5.00: Very Low Concern	3.162	
HARBOR PORPOISE: GULF OF MAINE/BAY OF FUNDY	High	2.00: High Concern	5.00: Very Low Concern	3.162	
HARBOR SEAL: WESTERN NORTH ATLANTIC	High	2.00: High Concern	5.00: Very Low Concern	3.162	
HARP SEAL: WESTERN NORTH ATLANTIC	High	2.00: High Concern	5.00: Very Low Concern	3.162	
PILOT WHALE (UNSPECIFIED)	High	2.00: High Concern	5.00: Very Low Concern	3.162	
SHORT-BEAKED COMMON DOLPHIN: WESTERN NORTH ATLANTIC	High	2.00: High Concern	5.00: Very Low Concern	3.162	
GRAY SEAL: WESTERN NORTH ATLANTIC	High	4.00: Low Concern	5.00: Very Low Concern	4.472	
ACADIAN REDFISH	Medium	5.00: Very Low Concern	5.00: Very Low Concern	5.000	

The species included under Criterion 2 (Impacts of the Fishery on Bycatch and Other Retained Species) were selected based on bycatch and marine mammal take records for the groundfish large-mesh otter trawl fishery (including trips targeting Acadian redfish) and bycatch records from an experimental Acadian redfish fishery in the Gulf of Maine using trawl nets with 4.5" codend mesh. Only species that met at least one of the following criteria were evaluated in this section: (1) the species represents >5% of the fishery's total catch; (2) the species represents >1% of the fishery's catch and the fishery causes >5% of that species' total mortality across all fisheries; (3) the species represents <1% of the fishery's catch and the fishery causes >20% of that species' mortality across all fisheries; (4) the species is overfished, depleted, a stock of concern, endangered, threatened, IUCN Near Threatened, US MMPA strategic species; (5) the species is subject to overfishing and the fishery causes >1% of the species' total mortality across all fisheries. Bycatch species are rated based on stock status and fishing mortality. Species that received the lowest relative score for these assessment areas limit the overall score for the Acadian redfish fishery in this criterion. A number of finfish species that were reported as bycatch in the Acadian redfish fishery were considered for inclusion in the bycatch analysis. These species included: Atlantic cod, Atlantic halibut, Atlantic wolffish, haddock, spiny dogfish, witch flounder, and white hake. It was determined that only Atlantic halibut met the criteria for inclusion for scoring in the bycatch analysis.

Criterion 2 Assessment

ATLANTIC HALIBUT

Factor 2.1—Inherent Vulnerability

Scoring Guidelines (same as Factor 1.1 above)

United States Atlantic, Large-Mesh Bottom Trawl

High

Atlantic halibut has a FishBase vulnerability score of 88 (Froese and Pauly 2014). Atlantic halibut spawn synchronously in groups, a behavior that renders them vulnerable to exploitation by commercial fisheries (Klein-MacPhee 2002a). Additionally, certain life history characteristics of this species, including large body size and late onset of sexual maturity, may hamper its resilience to fisheries harvests. Seafood Watch considers Atlantic halibut to have a high inherent vulnerability to fishing pressure.

Rationale

Atlantic halibut are a large, late-maturing, highly fecund, and relatively long-lived flatfish species. The range of Atlantic halibut extends around the North Atlantic basin from approximately Virginia northward to Greenland and down the eastern side of the Atlantic to the Bay of Biscay (Klein-MacPhee 2002a). This species occurs on sandy or mixed sandy mud bottom habitats, generally in deeper offshore waters

(Klein-MacPhee 2002a). Atlantic halibut reach reproductive maturity from 6 to 12 years in age and exhibit very high levels of fecundity, with large individuals producing up to 7 million eggs (Klein-MacPhee 2002a). Eggs are pelagic but drift at some depth (at least 54-90 m or 177-295 ft) from the surface. Juveniles are known to undertake long migrations (Cargnelli et al. 1999b). Adults may have more limited dispersal, undertaking annual migrations to spawning ground (Cargnelli et al. 1999b).

Factor 2.2—Stock Status

Scoring Guidelines (same as Factor 1.2 above)

United States Atlantic, Large-Mesh Bottom Trawl

High Concern

The spawning stock biomass of the Atlantic halibut stock is currently below the minimum threshold set by the New England Fisheries Management Council and the stock is considered to be overfished (NEFSC 2012). The 2012 assessment for Atlantic halibut estimated $SSB_{2010} = 1,700\text{mt}$, which is only 7% of the threshold biomass target ($SSB_{\text{THRESHOLD}} = 24,000$) (NEFSC 2012).

Rationale

It has been estimated that the Atlantic halibut stock has been at very low levels for more than a century (Figure 3). Atlantic halibut is listed by National Marine Fisheries Service (NMFS) as a species-of-concern (NMFS 2009a).

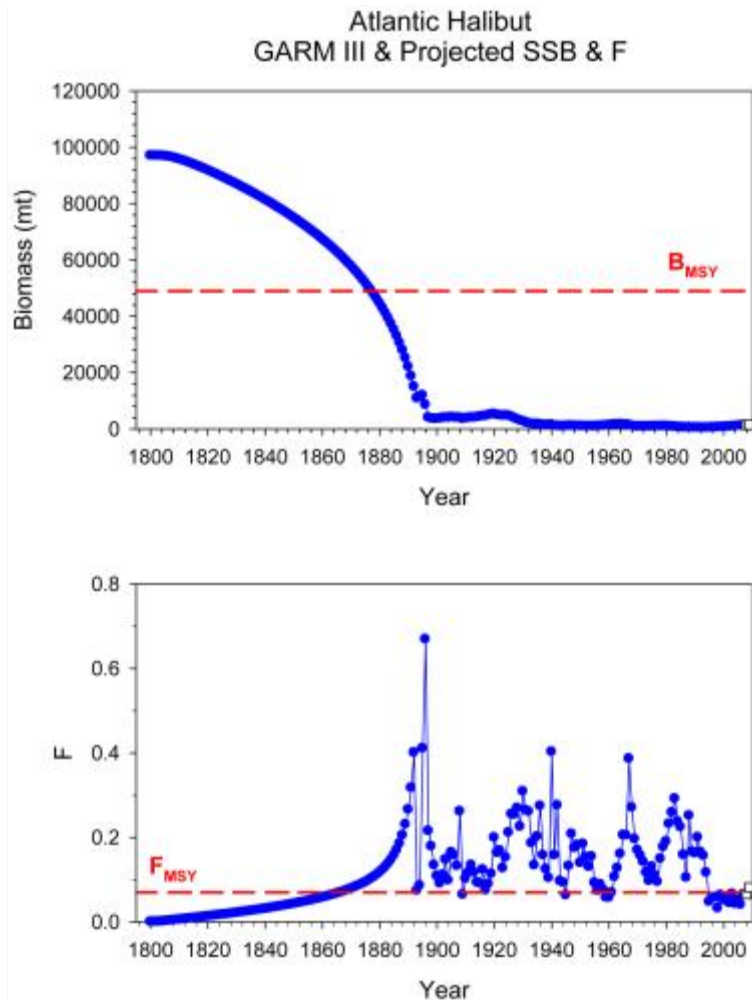


Figure 3. Gulf of Maine/Georges Bank Atlantic halibut biomass (B) and fishing mortality (F) estimates during 1800-2007 from GARM III assessment in 2008 (blue circles) with 80% confidence intervals for 2007. Open squares show projected SSB and F with 80% confidence intervals (NEFSC 2008).

Factor 2.3—Fishing Mortality

Scoring Guidelines (same as Factor 1.3 above)

United States Atlantic, Large-Mesh Bottom Trawl

Very Low Concern

Fishing mortality is currently below target levels for this stock; thus, overfishing is not currently occurring (NEFSC2012a). The 2012 stock assessment update for Atlantic halibut estimated fishing mortality ($F_{2010} = 0.032$) is equivalent to about 43% of the rate that would maintain MSY ($F_{MSY} = 0.0731$) (NEFSC2012a). The target fishing pressure if the stock is to be rebuilt ($F_{REBUILD}$) by 2056, is 0.044 (Col and Legault 2009). Fishing mortality exceeded $F_{REBUILD}$ in six of the last ten years for which data were

available (Figure 3). The average value of F for the past 10 year period was 0.0504 (NEFSC2012a).

Total discards of Atlantic halibut now outweigh landings for this species (NEFSC2012a)(NMFS 2013b). For the 2010 fishing year discards of Atlantic halibut in the large-mesh otter trawl fishery for groundfish were equivalent to 79.8% of reported total landings for the species for all gear types (NMFS 2011b)(NOAA 2012b). This high discard rate is due, in part, to increases in minimum size limits in 1999 and 2004, and the introduction of the retention limit (NEFSC2012a).

Seafood Watch considers fishing mortality to be a very low concern for this species because the impact of the redfish fishery is thought to be minimal relative to other fisheries in the region.

Rationale

Gulf of Maine/Georges Bank Atlantic halibut is in year eight of a 52-year rebuilding plan (NMFS 2012c). A possession limit of one fish per trip for this species has been in effect since 2009 (NEFSC2012a). No directed fishery for Atlantic halibut exists in federal waters but a limited fishery is permitted in Maine's state waters. FREBUILD and the rebuilding timeframe may represent a highly optimistic projection (Col and Legault 2009). The model makes the assumption that the population grows at its maximum rate, even though there are currently no indications that this is the case. Additionally, it does not account for the lag time associated with maturation of fish to reproductive age resulting response to management measures, which is expected to produce a slower rebuilding trajectory than projected. Lastly, the currently assessed Gulf of Maine-Georges Bank stock is likely a small portion of a larger US-Canadian Atlantic halibut stock. There is evidence that halibut are capable of both long distance and transboundary movements, which is not accounted for by the current model (Col and Legault 2009).

Factor 2.4–Discard Rate

United States Atlantic, Large-Mesh Bottom Trawl

< 20%

Acadian redfish is both directly targeted and captured incidentally in the large-mesh, otter trawl fishery for groundfish in the northeastern U.S. Spiny dogfish and various skate species represent the largest portion of discards in this fishery (NMFS 2011b). Skate discards, collectively reported as a “skate complex” accounted for approximately 40% of the bycatch in 2010, while second highest volume bycatch species, spiny dogfish, accounted for approximately 5% of total reported discards (NMFS 2011b). For groundfish trips targeting redfish, spiny dogfish and undersize redfish represented the highest reported discard species from 2007 to 2013 (NOAA 2013). In 2012, NOAA approved the use of smaller codend mesh (4.5” compared to the standard 6.5” mesh currently used in the groundfish multispecies large-mesh otter trawl fishery) for vessels targeting Acadian redfish that meet certain requirements (NMFS 2013a). Bycatch from a pilot experimental Acadian redfish fishery using trawl nets with recently approved smaller codend mesh was similar to groundfish trips targeting redfish with

standard groundfish trawl nets. The highest reported bycatch species for this experimental fishery was spiny dogfish, which accounted for approximately 11% of landed weight of legal redfish. Pollock and sublegal redfish both accounted for about 5% of the landed weight of legal redfish with all other retained species each accounted for >1% (Kanwit et al. 2012).

The fisheries targeting Acadian redfish with both large and smaller mesh trawl gear have fewer discarded species and lower discard-to-landings ratios compared to reported bycatch in the multispecies large-mesh groundfish fishery (NMFS 2011b)(Kanwit et al. 2012). From 2006 to 2010, groundfish trips targeting Acadian redfish had discards that consistently accounted for <20% of redfish landings. For the experimental redfish fishery using 4.5" codend mesh, bycatch accounted for approximately 24% of the weight of legal size redfish (Kanwit et al. 2012).

ATLANTIC WHITE-SIDED DOLPHIN: WESTERN NORTH ATLANTIC

Factor 2.1–Inherent Vulnerability

Scoring Guidelines (same as Factor 1.1 above)

United States Atlantic, Large-Mesh Bottom Trawl

High

Seafood Watch considers all marine mammals to have a high vulnerability to fishing pressure (Seafood Watch 2013).

Factor 2.2–Stock Status

Scoring Guidelines (same as Factor 1.2 above)

United States Atlantic, Large-Mesh Bottom Trawl

High Concern

The western North Atlantic white-sided dolphin population is no longer considered a strategic stock and the species is not currently listed as threatened or endangered (NMFS 2008)(Waring et al. 2014). Current abundance of this stock is estimated at 48,819 individuals (Waring et al. 2014). The population status of western North Atlantic white-sided dolphin relative to the OSP (optimum sustainable population) is unknown so it is not possible to determine whether the current population is at a sustainable level (Waring et al. 2014).

Due to the current lack of an established OSP and high inherent vulnerability of this species, Seafood Watch considers the population status of the western North Atlantic white-sided dolphin stock to be a

high concern.

Factor 2.3–Fishing Mortality

Scoring Guidelines (same as Factor 1.3 above)

United States Atlantic, Large-Mesh Bottom Trawl

Low Concern

From 2007 to 2011, estimated total annual average fishery-related mortality and serious injury for the western North Atlantic white-sided dolphin stock was 116 individuals (CV=0.16) (Waring et al. 2014). For the same time period, estimated average annual mortality for this species in the northeast bottom trawl fishery was 73 animals (Waring et al. 2014). No white-sided dolphin mortalities were recorded by observers for groundfish trip targeting Acadian redfish from 2006 to 2013 (NOAA 2013).

Currently, levels of fishery-related mortalities and serious injury do not appear to exceed the established potential biological removal (PBR) for this stock, which is set at 304 individuals. However, with fatalities above 10% of PBR, fishery-related mortality and serious injury for this stock are not considered to be “insignificant and the approaching zero mortality and serious injury rate” for the population (Waring et al. 2014). With annual fishing-related mortality currently below established PBR, fishing mortality in the Acadian redfish fishery and northeast multispecies groundfish bottom trawl fishery is of low concern for the western North Atlantic white-sided dolphin stock.

Factor 2.4–Discard Rate

United States Atlantic, Large-Mesh Bottom Trawl

< 20%

Acadian redfish is both directly targeted and captured incidentally in large-mesh, otter trawl fishery for groundfish in the northeastern U.S. Spiny dogfish and various skate species represent the largest portion of discards in this fishery (NMFS 2011b). Skate discards, collectively reported as a “skate complex” accounted for approximately 40% of the bycatch in 2010, while second highest volume bycatch species, spiny dogfish, accounted for approximately 5% of total reported discards (NMFS 2011b). For groundfish trips targeting redfish, spiny dogfish and undersize redfish represented the highest reported discard species from 2007 to 2013 (NOAA 2013). In 2012, NOAA approved the use of smaller codend mesh (4.5” compared to the standard 6.5” mesh currently used in the groundfish multispecies large mesh otter trawl fishery) for vessels targeting Acadian redfish that meet certain requirements (NMFS 2013a). Bycatch from a pilot experimental Acadian redfish fishery using trawl nets with recently approved smaller codend mesh was similar to groundfish trips targeting redfish with standard groundfish trawl

nets. The highest reported bycatch species for this experimental fishery was spiny dogfish, which accounted for approximately 11% of landed weight of legal redfish. Pollock and sublegal redfish both accounted for about 5% of the landed weight of legal redfish with all other retained species each accounted for >1% (Kanwit et al. 2012).

The fisheries targeting Acadian redfish with both large and smaller mesh trawl gear have fewer discarded species and lower discard to landings ratios compared to reported bycatch in the multispecies large mesh groundfish fishery (NMFS 2011b)(Kanwit et al. 2012). From 2006 to 2010 groundfish trips targeting Acadian redfish consistently had discards that accounted <20% of redfish landings. For the experimental redfish fishery using 4.5" codend mesh, bycatch accounted for approximately 24% of the weight of legal size redfish (Kanwit et al. 2012).

BOTTLENOSE DOLPHIN: WESTERN NORTH ATLANTIC, OFFSHORE

Factor 2.1–Inherent Vulnerability

Scoring Guidelines (same as Factor 1.1 above)

United States Atlantic, Large-Mesh Bottom Trawl

High

Seafood Watch considers all marine mammals to have a high vulnerability to fishing pressure (Seafood Watch 2013).

Factor 2.2–Stock Status

Scoring Guidelines (same as Factor 1.2 above)

United States Atlantic, Large-Mesh Bottom Trawl

High Concern

The western North Atlantic offshore bottlenose dolphin population is not classified as a strategic stock and the species is not currently listed as threatened or endangered (NMFS 2008) (Waring et al. 2014). Current abundance of this stock is estimated at a minimum of 77,532 individuals (Waring et al. 2014). The optimum sustainable population (OSP) has not been calculated for this stock so it is not possible to determine whether the current population is at a sustainable level (Waring et al. 2014).

Due to the current lack of an established OSP and high inherent vulnerability of this species, Seafood Watch considers the status of the western North Atlantic offshore population of bottlenose dolphin to

be a high concern.

Factor 2.3–Fishing Mortality

Scoring Guidelines (same as Factor 1.3 above)

United States Atlantic, Large-Mesh Bottom Trawl

Very Low Concern

Incidental takes of bottlenose dolphins are extremely rare in the northeast groundfish fishery. From 2007 to 2011, estimated annual mortality in the northeast bottom trawl fishery was 20 individuals (Waring et al. 2014). Total fisheries-related mortality and serious injury for the western North Atlantic offshore bottlenose dolphin stock is estimated at <10% of the PBR, which is set at 561 individuals (Waring et al. 2014). This estimated level of fishing mortality is considered to be “insignificant and approaching the zero mortality and serious injury rate” for the population (Waring et al. 2014).

Seafood Watch considers fishing-related mortality to be of very low concern for the western North Atlantic offshore bottlenose dolphin population.

Factor 2.4–Discard Rate

United States Atlantic, Large-Mesh Bottom Trawl

< 20%

Acadian redfish is both directly targeted and incidentally captured in large-mesh, otter trawl fishery for groundfish in the northeastern U.S. Spiny dogfish and various skate species represent the largest portion of discards in this fishery (NMFS 2011b). Skate discards, collectively reported as a “skate complex” accounted for approximately 40% of the bycatch in 2010, while the second highest volume bycatch species, spiny dogfish, accounted for approximately 5% of total reported discards (NMFS 2011b). For groundfish trips targeting redfish, spiny dogfish and undersized redfish represented the highest reported discard species from 2007 to 2013 (NOAA 2013). In 2012, NOAA approved the use of smaller codend mesh (4.5” compared to the standard 6.5” mesh currently used in the groundfish multispecies large mesh otter trawl fishery) for vessels targeting Acadian redfish that meet certain requirements (NMFS 2013a). Bycatch from a pilot experimental Acadian redfish fishery using trawl nets with recently approved smaller codend mesh was similar to groundfish trips targeting redfish with standard groundfish trawl nets. The highest reported bycatch species for this experimental fishery was spiny dogfish, which accounted for approximately 11% of landed weight of legal redfish. Pollock and sublegal redfish both accounted for about 5% of the landed weight of legal redfish with all other retained species each accounted for >1% (Kanwit et al. 2012).

The fisheries targeting Acadian redfish with both large and smaller mesh trawl gear have fewer discarded species and lower discard-to-landings ratios compared to reported bycatch in the multispecies large-mesh groundfish fishery (NMFS 2011b)(Kanwit et al. 2012). From 2006 to 2010, groundfish trips targeting Acadian redfish consistently had discards that accounted <20% of redfish landings. For the experimental redfish fishery using 4.5” codend mesh, bycatch accounted for approximately 24% of the weight of legal size redfish (Kanwit et al. 2012).

GRAY SEAL: WESTERN NORTH ATLANTIC

Factor 2.1–Inherent Vulnerability

Scoring Guidelines (same as Factor 1.1 above)

United States Atlantic, Large-Mesh Bottom Trawl

High

Seafood Watch considers all marine mammals to have a high vulnerability to fishing pressure (Seafood Watch 2013).

Factor 2.2–Stock Status

Scoring Guidelines (same as Factor 1.2 above)

United States Atlantic, Large-Mesh Bottom Trawl

Low Concern

The western North Atlantic gray seal population is not classified as a strategic stock and this species is not currently listed as threatened or endangered (Waring et al. 2014). No current estimates of the total population of western Atlantic gray seals are available; however, the population is thought to be increasing (Waring et al. 2014).

Factor 2.3–Fishing Mortality

Scoring Guidelines (same as Factor 1.3 above)

United States Atlantic, Large-Mesh Bottom Trawl

Very Low Concern

The potential biological removal (PBR) has not been estimated for the western North Atlantic gray seal population; however, there are indications that the abundance of this species is increasing in U.S. waters under current levels of fishing mortality (Waring et al. 2014). From 2007 to 2011, estimated total annual average fishery-related mortality and serious injury for the western North Atlantic gray seal stock was 4959 individuals (Waring et al. 2014). Incidental takes of gray seals are rare in the northeast groundfish fishery, and total fisheries-related mortality and serious injury is low relative to population size (Waring et al. 2014)

Since the population of this species appears to be stable or increasing under current levels of fishing pressure, it is likely that fishing mortality levels would not exceed PBR once established, and this stock likely merits a very low level of conservation concern.

Rationale

Occasional gray seal takes occur in the northeast otter trawl fishery (Waring et al. 2014). In 2011, two gray seal takes were documented for trips targeting Acadian redfish (NOAA 2013).

Factor 2.4—Discard Rate

United States Atlantic, Large-Mesh Bottom Trawl

< 20%

Acadian redfish is both directly targeted and incidentally captured in large-mesh, otter trawl fishery for groundfish in the northeastern U.S. Spiny dogfish and various skate species represent the largest portion of discards in this fishery (NMFS 2011b). Skate discards, collectively reported as a “skate complex” accounted for approximately 40% of the bycatch in 2010, while the second highest volume bycatch species, spiny dogfish, accounted for approximately 5% of total reported discards (NMFS 2011b). For groundfish trips targeting redfish, spiny dogfish and undersize redfish represented the highest reported discard species from 2007 to 2013 (NOAA 2013). In 2012, NOAA approved the use of smaller codend mesh (4.5” compared to the standard 6.5” mesh currently used in the groundfish multispecies large-mesh otter trawl fishery) for vessels targeting Acadian redfish that meet certain requirements (NMFS 2013a). Bycatch from a pilot experimental Acadian redfish fishery using trawl nets (with recently approved smaller codend mesh) was similar to groundfish trips targeting redfish with standard groundfish trawl nets. The highest reported bycatch species for this experimental fishery was spiny dogfish, which accounted for approximately 11% of landed weight of legal redfish. Pollock and sublegal redfish both accounted for about 5% of the landed weight of legal redfish with all other retained species each accounting for >1% (Kanwit et al. 2012).

The fisheries targeting Acadian redfish with both large and smaller mesh trawl gear have fewer

discarded species and lower discard-to-landings ratios compared to reported bycatch in the multispecies large-mesh groundfish fishery (NMFS 2011b)(Kanwit et al. 2012). From 2006 to 2010, groundfish trips targeting Acadian redfish consistently had discards that accounted <20% of redfish landings. For the experimental redfish fishery using 4.5” codend mesh, bycatch accounted for approximately 24% of the weight of legal size redfish (Kanwit et al. 2012).

HARBOR PORPOISE: GULF OF MAINE/BAY OF FUNDY

Factor 2.1–Inherent Vulnerability

Scoring Guidelines (same as Factor 1.1 above)

United States Atlantic, Large-Mesh Bottom Trawl

High

Seafood Watch considers all marine mammals to have a high vulnerability to fishing pressure (Seafood Watch 2013).

Factor 2.2–Stock Status

Scoring Guidelines (same as Factor 1.2 above)

United States Atlantic, Large-Mesh Bottom Trawl

High Concern

The Gulf of Maine/Bay of Fundy harbor porpoise population is listed as strategic stock--as defined under the Marine Mammal Protection Act. This species is not currently classified as threatened or endangered (Waring et al. 2014). The current abundance estimate for this stock is 79,883 individuals (CV=0.32) (Waring et al. 2014). The population status of the harbor porpoise relative to the OSP (optimum sustainable population) is unknown so it is not possible to determine whether the current population is at a sustainable level (Waring et al. 2014). No abundance trends are available for this species (Waring et al. 2014).

Due to the lack of an established OSP and high inherent vulnerability of this species, Seafood Watch considers the status of the Gulf of Maine/Bay of Fundy harbor porpoise stock to be a high concern.

Factor 2.3–Fishing Mortality

Scoring Guidelines (same as Factor 1.3 above)

United States Atlantic, Large-Mesh Bottom Trawl

Very Low Concern

Estimated total annual average fishery-related mortality and serious injury for the Gulf of Maine/Bay of Fundy harbor porpoise stock is 709 individuals (Waring et al. 2014), which exceeds the established potential biological removal (PBR) of 706 animals. From 2007 to 2011, it was estimated that the northeast sink gillnet fishery accounted for the bulk of harbor porpoise mortality and serious injury, with an estimated average of 462 animals affected annually (Waring et al. 2014). The estimated average annual mortality in the northeast bottom trawl from 2006 to 2010 was 4.5 animals (Waring et al. 2014). No harbor porpoise mortalities were recorded by observers for groundfish trips targeting Acadian redfish from 2006 to 2013 (NOAA 2013). Since the northeast bottom trawl fishery accounts for <5% of PBR, fishing mortality is considered to be of very low concern.

Factor 2.4—Discard Rate

United States Atlantic, Large-Mesh Bottom Trawl

< 20%

Acadian redfish is both directly targeted and incidentally captured in large-mesh, otter trawl fisheries for groundfish in the northeastern U.S. Spiny dogfish and various skate species represent the largest portion of discards in this fishery (NMFS 2011b). Skate discards, collectively reported as a “skate complex” accounted for approximately 40% of the bycatch in 2010, while the second highest volume bycatch species, spiny dogfish, accounted for approximately 5% of total reported discards (NMFS 2011b). For groundfish trips targeting redfish, spiny dogfish and undersized redfish represented the highest reported discard species from 2007 to 2013 (NOAA 2013). In 2012, NOAA approved the use of smaller codend mesh (4.5” compared to the standard 6.5” mesh currently used in the groundfish multispecies large mesh otter trawl fishery) for vessels targeting Acadian redfish that meet certain requirements (NMFS 2013a). Bycatch from a pilot experimental Acadian redfish fishery using trawl nets with recently approved smaller codend mesh was similar to groundfish trips targeting redfish with standard groundfish trawl nets. The highest reported bycatch species for this experimental fishery was spiny dogfish, which accounted for approximately 11% of landed weight of legal redfish. Pollock and sublegal redfish both accounted for about 5% of the landed weight of legal redfish with all other retained species each accounted for >1% (Kanwit et al. 2012).

The fisheries targeting Acadian redfish with both large and smaller mesh trawl gear have fewer discarded species and lower discard-to-landings ratios compared to reported bycatch in the multispecies large-mesh groundfish fishery (NMFS 2011b)(Kanwit et al. 2012). From 2006 to 2010 groundfish trips targeting Acadian redfish consistently had discards that accounted <20% of redfish landings. For the experimental redfish fishery using 4.5” codend mesh, bycatch accounted for approximately 24% of the

weight of legal size redfish (Kanwit et al. 2012).

HARBOR SEAL: WESTERN NORTH ATLANTIC

Factor 2.1–Inherent Vulnerability

Scoring Guidelines (same as Factor 1.1 above)

United States Atlantic, Large-Mesh Bottom Trawl

High

Seafood Watch considers all marine mammals to have a high vulnerability to fishing pressure (Seafood Watch 2013).

Factor 2.2–Stock Status

Scoring Guidelines (same as Factor 1.2 above)

United States Atlantic, Large-Mesh Bottom Trawl

High Concern

The western North Atlantic harbor seal population is not considered a strategic stock as defined by the Marine Mammal Protection Act and the species is not currently listed as threatened or endangered. Current abundance of the stock is estimated at 70,142 individuals (CV=0.29) (Waring et al. 2014). The optimum sustainable population (OSP) has not been calculated for this stock so it is not possible to determine whether the current population is at a sustainable level (Waring et al. 2014). No abundance trends are available for this species (Waring et al. 2014).

With the current stock status unknown relative to OSP, and high inherent vulnerability of this species, Seafood Watch considers the Western North Atlantic Harbor seal population to be a high concern.

Factor 2.3–Fishing Mortality

Scoring Guidelines (same as Factor 1.3 above)

United States Atlantic, Large-Mesh Bottom Trawl

Very Low Concern

Estimated total annual average fishery-related mortality and serious injury for the western North

Atlantic harbor seal stock is 409 individuals (Waring et al. 2014). Mortality and serious injury is less than the established potential biological removal (PBR) of 1662 animals. Incidental takes of harbor seals are very rare in the northeast bottom trawl fishery. From 2007 to 2011, 4 mortalities or serious injuries were documented; however, estimated annual mortality rates for this fishery have not been calculated (Waring et al. 2014). No harbor seal mortalities were recorded by observers for groundfish trips targeting Acadian redfish from 2006-2013 (NOAA 2013).

Total fisheries-related mortality and serious injury for the western North Atlantic harbor seal stock is estimated at >10% of PBR of 1662 individuals, and therefore, cannot be considered "insignificant and approaching the zero mortality and serious injury rate" for the population (Waring et al. 2014); however fishery specific mortality is estimated at <1% of PBR. Seafood Watch considers fishing-related mortality in the northeast bottom trawl fishery for Acadian redfish and other groundfish to be a very low concern for the western North Atlantic harbor seal population.

Factor 2.4—Discard Rate

United States Atlantic, Large-Mesh Bottom Trawl

< 20%

Acadian redfish is both directly targeted and incidentally captured in large-mesh, otter trawl fishery for groundfish in the northeastern U.S. Spiny dogfish and various skate species represent the largest portion of discards in this fishery (NMFS 2011b). Skate discards, collectively reported as a "skate complex," accounted for approximately 40% of the bycatch in 2010, while second highest volume bycatch species, spiny dogfish, accounted for approximately 5% of total reported discards (NMFS 2011b). For groundfish trips targeting redfish, spiny dogfish and undersize redfish represented the highest reported discard species from 2007 to 2013 (NOAA 2013). In 2012, NOAA approved the use of smaller codend mesh (4.5" compared to the standard 6.5" mesh currently used in the groundfish multispecies large mesh otter trawl fishery) for vessels targeting Acadian redfish that meet certain requirements (NMFS 2013a). Bycatch from a pilot experimental Acadian redfish fishery using trawl nets with recently approved smaller codend mesh was similar to groundfish trips targeting redfish with standard groundfish trawl nets. The highest reported bycatch species for this experimental fishery was spiny dogfish, which accounted for approximately 11% of landed weight of legal redfish. Pollock and sublegal redfish both accounted for about 5% of the landed weight of legal redfish with all other retained species each accounting for >1% (Kanwit et al. 2012).

The fisheries targeting Acadian redfish with both large and smaller mesh trawl gear have fewer discarded species and lower discard to landings ratios compared to reported bycatch in the multispecies large mesh groundfish fishery (NMFS 2011b)(Kanwit et al. 2012). From 2006 to 2010, groundfish trips targeting Acadian redfish consistently had discards that accounted <20% of redfish landings. For the experimental redfish fishery using 4.5" codend mesh, bycatch accounted for approximately 24% of the

weight of legal size redfish (Kanwit et al. 2012).

HARP SEAL: WESTERN NORTH ATLANTIC

Factor 2.1–Inherent Vulnerability

Scoring Guidelines (same as Factor 1.1 above)

United States Atlantic, Large-Mesh Bottom Trawl

High

Seafood Watch considers all marine mammals to have a high vulnerability to fishing pressure (Seafood Watch 2013).

Factor 2.2–Stock Status

Scoring Guidelines (same as Factor 1.2 above)

United States Atlantic, Large-Mesh Bottom Trawl

High Concern

The western North Atlantic harp seal population is not considered a strategic stock as defined by the Marine Mammal Protection Act and the species is not currently listed as threatened or endangered (Waring et al. 2014). The abundance of harp seals is thought to be close to 7.1 million individuals, although the proportion of the population residing in U.S. waters is unknown (Waring et al. 2014). The OSP has not been calculated for this population therefore it is unclear whether the population is at a sustainable level, although it does appear to have stabilized in recent years (Waring et al. 2014).

Due to a lack of current population abundance estimates in U.S. waters, and high inherent vulnerability of this species, Seafood Watch considers the population status of the western North Atlantic harp seal stock to be of high concern.

Factor 2.3–Fishing Mortality

Scoring Guidelines (same as Factor 1.3 above)

United States Atlantic, Large-Mesh Bottom Trawl

Very Low Concern

Potential biological removal (PBR) has not been estimated for the western North Atlantic harp seal population, however, it is thought that the level of human-induced mortality and serious injury in U.S. waters is low relative to total stock size (Waring et al. 2014). Estimated total annual average fishery-related mortality and serious injury for the western North Atlantic harp seal stock from 2007 to 2011 is 306,082 individuals (Waring et al. 2014). Incidental takes of harp seals are very rare in the northeast bottom trawl fishery. From 2002 to 2011, 5 mortalities or serious injuries were documented, however, estimated annual mortality rates for this fishery have not been calculated (Waring et al. 2014). No harp seal mortalities were recorded by observers for groundfish trips targeting Acadian redfish 2006-2013 (NOAA 2013).

The population size of harp seals appears stable. Fishery-related mortality for this stock in U.S. waters is currently considered insignificant and approaching the zero mortality and serious injury rate. Since the population of this species appears to be stable, it is likely that fishing mortality levels would not exceed PBR once established and, thus, this stock merits a very low level of conservation concern.

Factor 2.4–Discard Rate

United States Atlantic, Large-Mesh Bottom Trawl

< 20%

Acadian redfish is both directly targeted and captured incidentally in large-mesh, otter trawl fishery for groundfish in the northeastern U.S. Spiny dogfish and various skate species represent the largest portion of discards in this fishery (NMFS 2011b). Skate discards, collectively reported as a “skate complex” accounted for approximately 40% of the bycatch in 2010, while the second highest volume bycatch species, spiny dogfish, accounted for approximately 5% of total reported discards (NMFS 2011b). For groundfish trips targeting redfish, spiny dogfish and undersize redfish represented the highest reported discard species from 2007 to 2013 (NOAA 2013). In 2012, NOAA approved the use of smaller codend mesh (4.5” compared to the standard 6.5” mesh currently used in the groundfish multispecies large mesh otter trawl fishery) for vessels targeting Acadian redfish that meet certain requirements (NMFS 2013a). Bycatch from a pilot experimental Acadian redfish fishery using trawl nets with recently approved smaller codend mesh was similar to groundfish trips targeting redfish with standard groundfish trawl nets. The highest reported bycatch species for this experimental fishery was spiny dogfish, which accounted for approximately 11% of landed weight of legal redfish. Pollock and sublegal redfish both accounted for about 5% of the landed weight of legal redfish with all other retained species each accounting for >1% (Kanwit et al. 2012).

The fisheries targeting Acadian redfish with both large and smaller mesh trawl gear have fewer discarded species and lower discard-to-landings ratios compared to reported bycatch in the multispecies

large mesh groundfish fishery (NMFS 2011b)(Kanwit et al. 2012). From 2006 to 2010, groundfish trips targeting Acadian redfish consistently had discards that accounted <20% of redfish landings. For the experimental redfish fishery using 4.5” codend mesh, bycatch accounted for approximately 24% of the weight of legal size redfish (Kanwit et al. 2012).

PILOT WHALE (UNSPECIFIED)

Factor 2.1–Inherent Vulnerability

Scoring Guidelines (same as Factor 1.1 above)

United States Atlantic, Large-Mesh Bottom Trawl

High

Seafood Watch considers all marine mammals to have a high vulnerability to fishing pressure (Seafood Watch 2013)

Factor 2.2–Stock Status

Scoring Guidelines (same as Factor 1.2 above)

United States Atlantic, Large-Mesh Bottom Trawl

High Concern

Two pilot whale species, long-finned and short-finned, inhabit western North Atlantic waters. The stock assessment process for these two populations is complicated by difficulties in differentiating between the two species (Waring et al. 2014). These pilot whale populations are not currently considered strategic stocks and neither species is listed as threatened or endangered. The current estimate of the U.S. Atlantic population of long-finned pilots whales is 26,535 individuals. The total abundance of this species is likely underestimated because the population assessment did not include certain known areas of its range (Waring et al. 2014). Abundance estimates of short-finned pilot whales are based on surveys of *Globicephala* sp. within the range expected to be occupied by this species. The short-finned pilot whales population is currently estimated at 21,515 individuals (Waring et al. 2014).

There is no established OSP or fisheries-related mortality and serious injury estimates for pilot whale stocks (Waring et al. 2014). Due to the current lack of an established OSP for pilot whales, unknown levels of fisheries-related mortality, and high inherent vulnerability of these species, Seafood Watch considers the population status of pilot whale stocks in U.S. Atlantic water to be of high concern.

Factor 2.3–Fishing Mortality

Scoring Guidelines (same as Factor 1.3 above)

United States Atlantic, Large-Mesh Bottom Trawl

Very Low Concern

Due to a lack of data, estimates of serious injury and mortality rates are available only for the two pilot whale species combined. From 2007 to 2010, estimated average annual fishery-related serious injury or mortality of pilot whales in the U.S. Atlantic was 44 animals (Waring et al. 2014). Annual PBR for the long-finned pilot whale is currently set at 199 individuals (Waring et al. 2014). Annual PBR for short-finned pilot whales is 159 individuals (Waring et al. 2014).

Incidental takes of pilot whales have been recorded in the northeast bottom trawl fishery. From 2007 to 2010, the average estimated annual mortality of pilot whales in this fishery was 10 animals (Waring et al. 2014). Total fisheries-related mortality and serious injury rates remain unknown for pilot whales in U.S. East Coast waters due to lack of data for individual species. Presently, total human-induced mortality is unlikely to exceed PBR for these species but the status of pilot whale stocks cannot be determined accurately due to data limitations (Waring et al. 2014). With annual mortality from the groundfish bottom trawl fishery estimated at 10 individuals, and overall human-induced mortality estimates below PBR for both pilot whale species, Seafood Watch considers fishing mortality in the Acadian redfish fishery to be a very low concern for the pilot whale populations.

Factor 2.4–Discard Rate

United States Atlantic, Large-Mesh Bottom Trawl

< 20%

Acadian redfish is both directly targeted and incidentally captured in large-mesh, otter trawl fishery for groundfish in the northeastern U.S. Spiny dogfish and various skate species represent the largest portion of discards in this fishery (NMFS 2011b). Skate discards, collectively reported as a “skate complex” accounted for approximately 40% of the bycatch in 2010, while second highest volume bycatch species, spiny dogfish, accounted for approximately 5% of total reported discards (NMFS 2011b). For groundfish trips targeting redfish, spiny dogfish and undersize redfish represented the highest reported discard species from 2007 to 2013 (NOAA 2013). In 2012, NOAA approved the use of smaller codend mesh (4.5” compared to the standard 6.5” mesh currently used in the groundfish multispecies large mesh otter trawl fishery) for vessels targeting Acadian redfish that meet certain requirements (NMFS 2013a). Bycatch from a pilot experimental Acadian redfish fishery using trawl nets with recently approved smaller codend mesh was similar to groundfish trips targeting redfish with standard groundfish trawl nets. The highest reported bycatch species for this experimental fishery was spiny dogfish, which

accounted for approximately 11% of landed weight of legal redfish. Pollock and sublegal redfish both accounted for about 5% of the landed weight of legal redfish with all other retained species each accounting for >1% (Kanwit et al. 2012).

The fisheries targeting Acadian redfish with both large and smaller mesh trawl gear have fewer discarded species and lower discard to landings ratios compared to reported bycatch in the multispecies large mesh groundfish fishery (NMFS 2011b)(Kanwit et al. 2012). From 2006 to 2010, groundfish trips targeting Acadian redfish consistently had discards that accounted <20% of redfish landings. For the experimental redfish fishery using 4.5” codend mesh, bycatch accounted for approximately 24% of the weight of legal size redfish (Kanwit et al. 2012).

SHORT-BEAKED COMMON DOLPHIN: WESTERN NORTH ATLANTIC

Factor 2.1–Inherent Vulnerability

Scoring Guidelines (same as Factor 1.1 above)

United States Atlantic, Large-Mesh Bottom Trawl

High

Seafood Watch considers all marine mammals to have a high vulnerability to fishing pressure (Seafood Watch 2013).

Factor 2.2–Stock Status

Scoring Guidelines (same as Factor 1.2 above)

United States Atlantic, Large-Mesh Bottom Trawl

High Concern

The western North Atlantic short-beaked common dolphin population is not considered a strategic stock and the species is not currently listed as threatened or endangered (Waring et al. 2014). Current abundance of this stock is estimated at 173,486 individuals (Waring et al. 2014). The population status of the western North Atlantic short-beaked common dolphin relative to the OSP (optimum sustainable population) is unknown so it is not possible to determine whether the current population is at a sustainable level (Waring et al. 2014).

Due to the current lack of an established OSP and high inherent vulnerability of this species Seafood Watch considers the population status of the western North Atlantic short-beaked common dolphin

stock to be a high concern.

Factor 2.3–Fishing Mortality

Scoring Guidelines (same as Factor 1.3 above)

United States Atlantic, Large-Mesh Bottom Trawl

Very Low Concern

Total annual average fishery-related mortality or serious injury for the western North Atlantic short-beaked common dolphin stock from 2007 to 2011 was estimated at 170 individuals (CV=0.13) (Waring et al. 2014). For the same period, average annual mortality in the northeast bottom trawl fishery from 2007 to 2010 was estimated at 19 animals (Waring et al. 2014). No white-sided dolphin mortalities were recorded by observers for groundfish trip targeting Acadian redfish from 2006 to 2013 (NOAA 2013).

Currently, levels of fishery-related mortality and serious injury do not appear to exceed the established potential biological removal (PBR) for short-beaked common dolphins, which is set at 1125 individuals. The total fisheries-related mortality and serious injury rate for this stock is currently <10% of PBR, which is considered to be insignificant and approaching zero for this species (Waring et al. 2014)

Seafood Watch considers fishing-related mortality to be of very low concern for the western North Atlantic short-beaked common dolphin stock.

Factor 2.4–Discard Rate

United States Atlantic, Large-Mesh Bottom Trawl

< 20%

Acadian redfish is both directly targeted and incidentally captured in large-mesh, otter trawl fishery for groundfish in the northeastern U.S. Spiny dogfish and various skate species represent the largest portion of discards in this fishery (NMFS 2011b). Skate discards, collectively reported as a “skate complex” accounted for approximately 40% of the bycatch in 2010, while second highest volume bycatch species, spiny dogfish, accounted for approximately 5% of total reported discards (NMFS 2011b). For groundfish trips targeting redfish, spiny dogfish and undersize redfish represented the highest reported discard species from 2007 to 2013 (NOAA 2013). In 2012, NOAA approved the use of smaller codend mesh (4.5” compared to the standard 6.5” mesh currently used in the groundfish multispecies large mesh otter trawl fishery) for vessels targeting Acadian redfish that meet certain requirements (NMFS 2013a). Bycatch from a pilot experimental Acadian redfish fishery using trawl nets with recently approved smaller codend mesh was similar to groundfish trips targeting redfish with standard groundfish trawl

nets. The highest reported bycatch species for this experimental fishery was spiny dogfish, which accounted for approximately 11% of landed weight of legal redfish. Pollock and sublegal redfish both accounted for about 5% of the landed weight of legal redfish with all other retained species each accounting for >1% (Kanwit et al. 2012).

The fisheries targeting Acadian redfish with both large and smaller mesh trawl gear have fewer discarded species and lower discard to landings ratios compared to reported bycatch in the multispecies large mesh groundfish fishery (NMFS 2011b)(Kanwit et al. 2012). From 2006 to 2010 groundfish trips targeting Acadian redfish consistently had discards that accounted <20% of redfish landings. For the experimental redfish fishery using 4.5" codend mesh, bycatch accounted for approximately 24% of the weight of legal size redfish (Kanwit et al. 2012).

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 Atlantic Large-Mesh Bottom Trawl	3.000	3.000	Yellow(3.000)

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 Atlantic Large-Mesh Bottom Trawl	Moderately Effective	Moderately Effective	Moderately Effective	Moderately Effective	Moderately Effective	Moderately Effective	Highly Effective

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 Atlantic, Large-Mesh Bottom Trawl

Moderately Effective

The U.S. Acadian redfish fishery is managed by the New England Fisheries Management Council (NEFMC) through the Northeast Multispecies (Large Mesh/Groundfish) Fishery Management Plan (NE Multispecies FMP), along with 12 other species of flatfish and groundfish (NEFSC2012a). Originally enacted in 1985, the NE Multispecies FMP has been amended a number of times to improve the management of the affected stocks, including the introduction of gear restrictions (e.g., mesh size, number of nets/hooks etc.), seasonal closures, spatial closures, minimum landing sizes, trip limits on poundage of fish landed, limited access (a restriction on the number of vessels able to work within the fishery), effort limits based on a days at sea (DAS) system, and more recently, a system based on transferable quotas (i.e., catch shares) set against a hard annual catch limit (ACL). In 2010, Amendment 16 to the NE Multispecies FMP greatly expanded the catch share management system with the expansion of sectors. Fishing sectors function essentially as cooperatives, as they are self-selecting and largely self-regulating, albeit within a framework designated and closely monitored by federal agencies. The sectors are exempt from many of the effort controls previously used to manage the fisheries; instead, they adhere to an overall hard quota known as an ACL, which is subdivided into annual catch entitlements (ACE) allocated to each sector. The shift to output management instead of effort based controls increases operational efficiency. While the sectors are optional to join, the majority of fishers have chosen to participate. Sector vessels made up 65% of all NE Multispecies landings in 2010, including 98% of groundfish and 54% of non-groundfish (Kitts et al. 2011)(Labaree 2012)(Federal Register 2012). Under the requirements of the Magnuson-Stevens Act, the annual catch limit (ACL) for a

stock must be set less than or equal to the acceptable biological catch (ABC) (to account for management uncertainty), which must be set less than or equal to the overfishing level (OFL) (to account for any scientific uncertainty in the stock assessment) (Figure 4) (Federal Register 2009). ACL's are set for each stock independently based on achieving MSY in the long term. For stocks that are overfished (and may also be subject to overfishing), the target fishing mortality is set at a level which will have a reasonable probability (>50%) of ensuring rebuilding of the stock within the timeline set for that stock's rebuilding program (see "Recovery of Stocks of Concern," below). If a sector approaches the ACE for one of the target stocks, then the area inhabited by that stock is closed to all gears capable of catching that stock, resulting in a potential underutilization of more abundant stocks occurring in the same area. The sector system allows fishers to share, trade or lease quota within a fishery, reducing the chance of overfishing depleted stocks while targeting more abundant stocks. If a sector is nearing its quota for a particular species it may be possible to lease it from another sector. There have been some concerns with efficacy groundfish management in the northeastern U.S. in the past, particularly with respect to depleted stocks (see "Recovery of Stocks of Concern" below). In the past, some fishing mortality targets have been set too high due to errors in stock assessments. Changes to the management system under Amendment 16 are expected to result in more sustainable fisheries harvests and improve overall conservation of the marine environment. For example, discarding under the new management system appears to have been reduced because fisheries now rely on hard ACLs (which include discards) rather than target total allowable catch (TAC), reducing the likelihood of exceeding sustainable fishing mortality rates for targeted stocks. To date, fishing sectors have not exceeded their ACEs, while in the past it was possible for target TACs to be exceeded, due to regulations being based on effort control (DAS) rather than output control (Kitts et al. 2011).

The new management regime has not been in place long enough to fully assess its impact on all groundfish stocks. It is important to note that prior to the implementation of these new management measures a few groundfish stocks, including the Acadian redfish, successfully met management targets and are considered fully rebuilt (NEFSC2012a). NOAA recently approved a rule permitting groundfish vessels participating in sectors to target Acadian redfish with 4.5" codend mesh in addition to the approved 6.5" mesh used to harvest most species of groundfish under the NE Multispecies FMP (Federal Register 2013). This so called "small mesh exemption" stipulates that participating sector vessels must comply with certain requirements including the one that states 80% of the catch must be redfish and groundfish discards may not exceed 5% (NMFS 2013a).

In 2013, the minimum size limit for Acadian redfish was lowered from 9 inches to 7 inches. Length-at-maturity data for this species suggest an L50 of 22.3 cm or 9 inches for females in the Gulf of Maine (O'Brian et al. 1993). The reduced size limit will allow for more immature fish to be legally landed in the fishery. Removal of more immature individuals for the population have the potential to negatively impact reproductive output of the stock unless management measures are enacted to adjust for this change.

Past concerns about the efficacy of groundfish management strategies and the unknown outcome of

the recent changes in the groundfish multispecies FMP on the Acadian redfish stock prevent this management system from achieving the highest possible score for management strategy and implementation.

Rationale

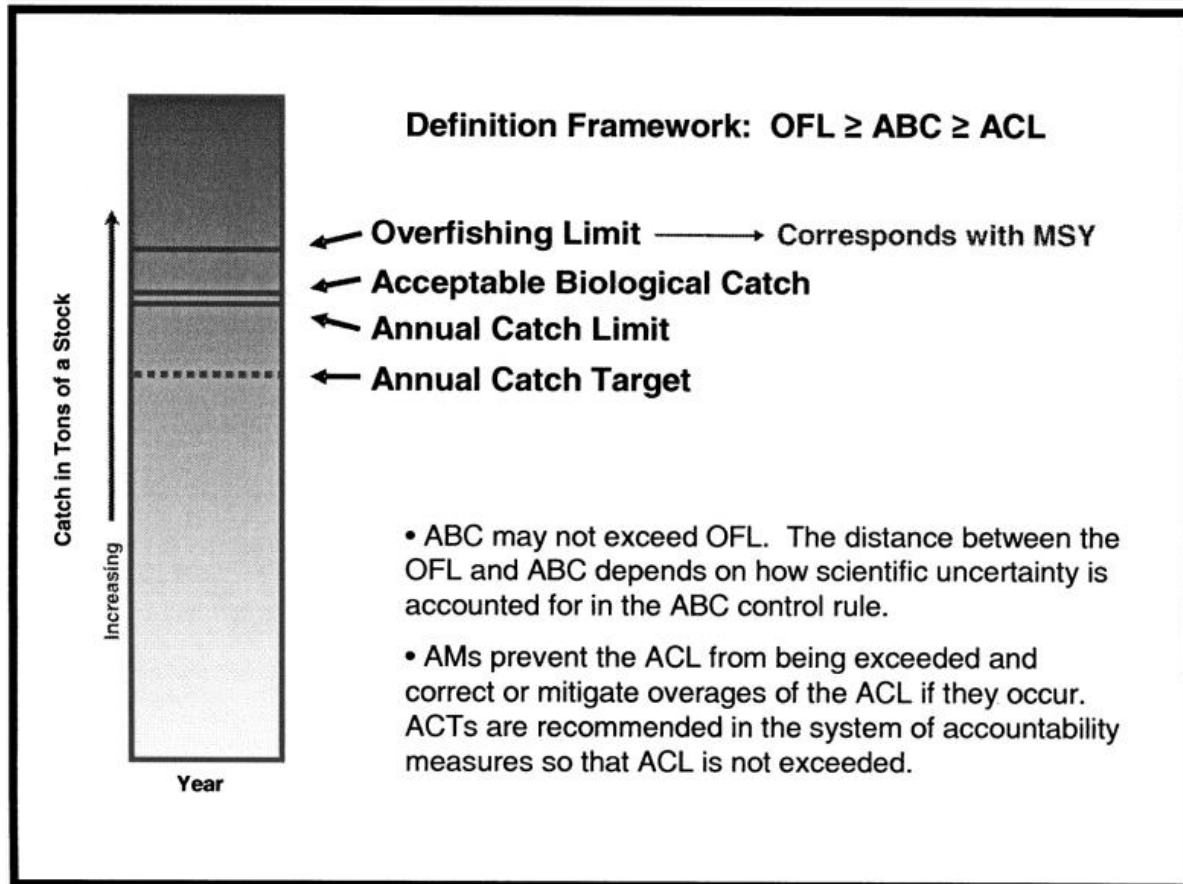


Figure 4. Relationship between OFL, ABC, ACL, and ACT as described by the National Marine Fisheries Service for Annual Catch Limits, National Standards Guidelines (Federal Register 2009).

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 Atlantic, Large-Mesh Bottom Trawl

Moderately Effective

There are a number of stocks managed under the NE Multispecies FMP that meet the definition of “overfished.” In accordance with the Magnuson-Stevens Act (MSA), overfished stocks are subject to rebuilding programs that aim to rebuild stock biomass within a given timeframe. Amendment 16 to the NE Multispecies FMP, adopted in 2010, establishes rebuilding targets for most overfished stocks in the multispecies groundfish fishery. Fishing mortality targets have been developed (F_{REBUILD}) that are expected to ensure stocks rebuild within the target timeframe (Federal Register 2010). During the rebuilding process, fishing mortality is limited to F_{REBUILD} or 75% of F_{MSY} , whichever is lower.

Harvest limits for all stocks are restricted by an acceptable biological catch (ABC) control rule that requires an ABC limit is established for each stock. For stocks that cannot be rebuilt within established rebuilding periods, ABC is set based on incidental bycatch levels, which include a reduction in existent bycatch rates. For stocks where the status is unknown, ABC is determined by NEMFC Scientific and Statistical Committee (SSC) on an individual basis (Federal Register 2010).

A number of stocks have rebuilt prior to the end of their previously established rebuilding periods (typically due to strong recruitment and good survival of abundant year-classes during periods of reduced exploitation). These stocks include Georges Bank haddock, Gulf of Maine haddock, Acadian redfish, and pollock among others (NMFS 2011a)(NEFSC2012a). The most recent stock assessments have also shown that a number of stocks of concern have not yet been rebuilt and that the targets set within the rebuilding programs have not been met (e.g., Georges Bank cod, Gulf of Maine cod, Cape Cod yellowtail flounder) (NMFS 2011a)(NEFSC2012a).

With the recent adoption of the new sector-based management system, it is too early to determine whether the rebuilding targets will be met by the end of the rebuilding period. While the Acadian redfish has achieved rebuilding targets under the management regime for the groundfish, other stocks have failed to rebuild. The mixed success of the stock recovery programs prevents this management system from achieving the highest possible score.

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 Atlantic, Large-Mesh Bottom Trawl

Moderately Effective

There is on-going scientific research and monitoring of the NE multispecies groundfish fisheries, including fisheries observer programs, regular stock assessments, gear modification trials, and tagging experiments to monitor fish populations. Tagging studies and related research efforts on life history and behavior have tended to focus on stocks that remain low in abundance, such as cod. Less biological research emphasis has been placed on some of the more abundant stocks, like redfish, which have not yet been subject to tagging studies. The bulk of scientific research and monitoring is carried out by the Northeast Fisheries Science Center (NEFSC), which provides the NEFMC with scientific advice to guide the management of the fishery. Two fisheries observer programs cover species harvested in the NE multispecies groundfish fisheries: the Northeast Fisheries Observer Program (NEFOP) and the At-Sea Monitoring (ASM) program. The level of observer coverage aims to ensure precision in the catch levels of each managed stock based on a methodology set out in the Standard Bycatch Reporting Methodology (SBRM). In 2011, the SBRM was vacated by the courts because it contained provisions that allow observer coverage to be below levels required to meet an acceptable standard of precision ($CV < 30$). A new SBRM establishing observer coverage levels for the NE multispecies groundfish fishery went into effect in June 2014. The recently approved small-mesh (4.5" codend) fishery targeting Acadian redfish has 100% mandated observer coverage (NMFS 2013a); however, this fishery does not appear to be actively prosecuted at this time. In the past, concerns have been raised over certain stock abundance estimates generated in the fisheries assessment process (NEFSC 2009a). It appears that abundance has been overestimated, and consequently fishing mortality has been underestimated for some stocks. This is a result of assessment model retrospective biases that rely heavily on terminal year estimates for abundance (NEFSC 2013a). The questions surrounding retrospective bias in stock assessment models and the on-going need for biological research for a number of stocks in the multispecies groundfish fishery prevents management system from achieving the highest possible score for scientific research and monitoring.

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 Atlantic, Large-Mesh Bottom Trawl

Moderately Effective

The NEFMC takes scientific advice into account when setting quotas and developing management strategies for Acadian redfish and other northeastern groundfish stocks. Under the Magnuson-Stevens Act, the NEFMC also has a duty to consider the social and economic consequences of quota levels.

While NEFMC follows scientific guidance on a regular basis, there is room for potential improvement

through the adoption of a more precautionary approach, particularly with regard to the potential retrospective bias discussed in Section 3.1.3. In the Acadian redfish fishery assessment, recent progress has been made toward minimizing retrospective bias (Nies 2014, pers. comm.).

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 Atlantic, Large-Mesh Bottom Trawl

Moderately Effective

Concerns have been raised about the prevalence of illegal landings in the northeast multispecies groundfish fishery. Results from a 2007 survey of fishermen, managers, scientists, and enforcement officials suggested that, at that time, the illegal harvest of groundfish was estimated between 12% and 24% of total landings (King and Sutinen 2010). Noncompliance with regulations in the groundfish fishery may result when economic gains outweigh penalties for violations (King and Sutinen 2010). The 2010 change from a days-at-sea, effort-based-management structure to an output-control-based catch-shares system reduces economic incentives for overfishing. Additionally, Amendment 16 to the groundfish multispecies FMP establishes accountability measures (AMs) to mandate accountability within the fishery with the aim of preventing overfishing (Federal Register 2010). Proactive AMs are designed to prevent ACLs from being exceeded, whereas reactive AMs are designed to correct any overages should they occur (Federal Register 2012). AMs can result in reduction or complete loss of quota for a sector that regularly or greatly exceeds its quota (Federal Register 2010).

Enforcement of fisheries legislation at sea is a cooperative operation between coastal states, the NOAA Office of Law Enforcement (OLE), and the United States Coast Guard. OLE officers conduct dockside inspections and inspect fish processing plants ([OLE webpage](#)), while the Coast Guard inspects vessels at sea (Nies, T. 2014). The OLE enforces fisheries legislation including minimum landing sizes, retention of prohibited species, gear restrictions etc. Violation of such management measures can result in criminal or civil actions, fines, loss of quota, and imprisonment in some cases.

The history of illegal landings and the yet unknown effects of recent management measures to control illegal fishing prevents enforcement from receiving the highest possible score.

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 Atlantic, Large-Mesh Bottom Trawl

Moderately Effective

Groundfish stocks off the northeastern U.S. coast have been subject to fishing pressure for centuries, and many have become significantly depleted. In 1977, the New England Fisheries Management Council was created by the Magnuson-Stevens Fishery Conservation and Management Act (MSA) (then called the Magnuson Fishery Conservation and Management Act 1976), and was given the authority to manage the fisheries in this region.

During the early years under NEFMC management, many stocks underwent declines in biomass, which corresponded with the increased fishing mortalities including Acadian redfish, Georges Bank cod, and Gulf of Maine cod (NEFSC 2008). In recent years, following revision of the MSA to require that fisheries management councils to establish rebuilding programs, the biomass of a number of these stocks, most notably Acadian redfish, has been increasing (NEFSC 2008). In 2010, a sector-based management system was implemented; however, it is too soon to determine whether these recent changes will enable stocks to fully rebuild and stabilize at sustainable levels.

The past history of stock depletion and unknown outcome of new management measures prevent this management system from achieving the highest possible score for track record.

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 Atlantic, Large-Mesh Bottom Trawl

Highly Effective

The New England Fisheries Management Council has a good track record of including stakeholders in the development of legislation, with oral and written comments on each draft amendment or framework

adjustment to the FMP. The NEFMC also responds to each of the comments in the Federal Register documents to show transparency of process (e.g., Federal Register 2010 (Federal Register 2012)).

Bycatch Strategy

Factor 3.2: Management of fishing impacts on bycatch species						
Region / Method	All Kept	Critical	Strategy	Research	Advice	Enforce
United States Atlantic Large-Mesh Bottom Trawl	No	No	Moderately Effective	Highly Effective	Moderately Effective	Moderately 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 Atlantic, Large-Mesh Bottom Trawl

Moderately Effective

The Magnuson-Stevens Act (MSA) requires that fisheries’ management prevent overfishing and rebuild overfished and depleted stocks. Marine mammals are protected under the 1972 Marine Mammal Protection Act (MMPA) which requires the maintenance of marine mammal populations above their optimum sustainable levels. The 1973 Endangered Species Act provides protection for species that are endangered or threatened with extinction, including fish, marine mammals, turtles, and seabirds. These three pieces of legislation provide a framework directed at ensuring that the NE multispecies groundfish FMP is designed and implemented in such a way that prevents overfishing and allows recovery of stocks caught within these fisheries whether they are targeted or caught incidentally.

Additionally, the MSA requires that all management measures must minimize bycatch to the extent practicable, and minimize mortality of bycatch when it is unavoidable. To comply with this mandate, a standardized bycatch reporting methodology (SBRM) is required in all FMPs. Prompted by successful lawsuits brought by Oceana, the Conservation Law Foundation, and the Natural Resources Defense Council, the NEFMC and the Mid-Atlantic Fisheries Management Council (MAFMC) jointly developed an SBRM omnibus amendment to “establish, maintain, and utilize biological sampling programs designed to minimize bias to the extent practicable, thus promoting accuracy while maintaining sufficiently high levels of precision” (Federal Register 2008). Subsequent to its adoption, the SBRM amendment was considered inadequate and was vacated by the courts in 2011 and new SBRM was developed and adopted by the NEFMC and MAFMC in 2014. Currently, NMFS is in the process of implementing this

replacement action. Under the sector-based management system established by Amendment 16, sectors must submit an operations plan to the regional administrator (NEFMC) detailing how bycatch of regulated species and ocean pout will be avoided to prevent allowable catch entitlement overages. To date, this has not occurred as NMFS is currently funding both the Northeast Fisheries Observer Program (NEFOP) and the at-sea monitoring program (ASM) to monitor bycatch levels. Sector operation plans will be required when the financial burden for ASM passes from NMFS to the individual sectors. The lack of the required sector bycatch plans prevents the management system from achieving the highest possible score for strategy and implementation of a plan for bycatch species.

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 Atlantic, Large-Mesh Bottom Trawl

Highly Effective

Fishery observers are required in groundfish fisheries under the Northeast Groundfish Multispecies FMP and by the MMPA and ESA (NMFS 2011b). Observers are trained biologists who collect data on fishing activities onboard commercial vessels to support science and management programs. Observers in the Northeast Fisheries Observer Program (NEFOP) record weights of kept and discarded fish and crustacean species on observed hauls, as well as biological information (length, age, sex, and tags) from all species caught including marine mammals and seabirds. Levels of observer coverage are established to ensure accurate monitoring of catch levels of each managed stock, based on methodology set out in the Standard Bycatch Reporting Methodology (SBRM). Due to the rarity of some bycatch species, the level of observer coverage that is sufficient for monitoring retained species may not always be adequate for monitoring some bycatch species.

Currently, observer coverage in the multispecies groundfish fishery exceed levels required by the SBRM (Nies 2014, pers. comm.). Vessels targeting Acadian redfish under the small-mesh exemption (4.5" codend mesh) must have 100% observer coverage (NMFS 2013b).

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 Atlantic, Large-Mesh Bottom Trawl

Moderately Effective

See Section 3.1

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 Atlantic, Large-Mesh Bottom Trawl

Moderately Effective

Vessels in the multispecies groundfish fleet, which includes Acadian redfish, are required to utilize a vessel monitoring system (VMS) that tracks and transmits time and position data to allow the location of fishing boats to be monitored; however, for groundfish trips without observer coverage, there is no means of independently tracking and verifying bycatch and resulting discards. The 100% observer coverage requirement for the fishery targeting Acadian redfish with 4.5" codend mesh is exempt from concerns about independent verification of bycatch levels.

Non-compliance with fisheries’ regulations for groundfish has been an historic, and likely, on-going problem that may hinder recovery of some damaged stocks (King and Sutinen 2010).

Enforcement of fisheries legislation at sea is a cooperative operation between coastal states, the NOAA Office of Law Enforcement (OLE), and the United States Coast Guard.

The lack of independent verification of bycatch for trips without observers and the history of non-compliance with fishing regulations in the northeast multispecies groundfish fishery prevent this enforcement for bycatch from receiving the highest score possible. With the expected shift toward a small-mesh fishery for Acadian redfish with 100% observer coverage, enforcement for bycatch species is on track to achieve the highest score.

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 Atlantic Large-Mesh bottom Trawl	1.00:High Concern	0.25:Minimal Mitigation	3.00:Moderate Concern	Red (1.937)

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 Atlantic, Large-Mesh Bottom Trawl

High Concern

Otter trawls, the primary gear used in the U.S. redfish fishery, are known to have adverse impacts on seafloor habitats, especially in areas harboring communities with structural forming organisms, like corals (National Research Council 2002)(Heifetz et al. 2009) (Watling and Norse 1998). In the Gulf of Maine, Acadian redfish are known to aggregate over both soft sediments and rocky habitats, including areas with coral and other epifaunal cover (Auster 2005) (Klein-MacPhee and Collette 2002a). Recent work in parts of Jordan Basin and the Outer Schootic Ridges has documented redfish in habitats with large rocky outcrops that support some of the densest coral communities currently known in the region (Auster et al. 2014). Trawling for redfish in relatively deep, sand and muddy habitats in the Gulf of Maine may create disturbance that has the potential to alter the benthic community structures in these environments where the frequency and intensity of natural disturbance is often low (National Research Council 2002). Anecdotal accounts suggest that currently most of the redfish fishery occurs over soft sediments, where trawling impacts may be a more limited temporal effect compared to other bottom habitat types (Lindholm et al. 2015). While anecdotal accounts suggest that the current redfish fishery occurs primarily in areas with sandy and muddy substrates, precise spatial data documenting fishing locations is not readily available for public dissemination due to confidentiality requirements. Vessels fishing under the redfish exemption are required to use VMS; however, spatial data on fishing effort for the trip is limited to a single point daily (B. Alger 2014 pers. comm.) There is also a lack of high resolution, ecologically relevant, habitat data for many fishing grounds in the New England region. Both the lack of detailed habitat maps and precise spatial fishing-effort data make it difficult to document fishing activity in relation to bottom habitat type. A course overlay of redfish catch by statistical area relative to bottom type shows that fishing for redfish occurs in statistical areas that have open, complex bottom (including boulder, cobble, and gravel habitats) (Figure 5). Communities comprised of relatively slow-growing, biogenic structure forming communities such as corals and sponges, as documented by Auster et al. (2014), are found outside currently closed areas in the Gulf of Maine. Habitat disturbance from fishing activity, including bottom trawling, has been recently observed in some of these vulnerable, unprotected habitats (Auster et al. 2014). While it is not possible to determine if redfish fishing caused the damage to these complex bottom communities, redfish are known to be present in these habitats (Auster et al. 2014). With the steady increases in redfish landings over the past few years, lack of fully utilized quota, and increasing market demand, the fishery appears poised for further expansion in the near future. It is probable that such an expansion could result in the search for additional redfish biomass in new areas. In the Gulf of Maine, some habitats harboring redfish, like the recently documented “coral gardens,” are known to be highly vulnerable to damage from mobile fishing gear like trawls used to capture redfish. At present, these sensitive habitats are not protected from trawling activities and there is justifiable concern that any expansion of the redfish fishery into these areas could cause significant habitat damage. Due to the high risk of disturbance to vulnerable and low energy

habitats, Seafood Watch considers the interaction between fishing gear and substrate to be a 'High Concern.'

Rationale

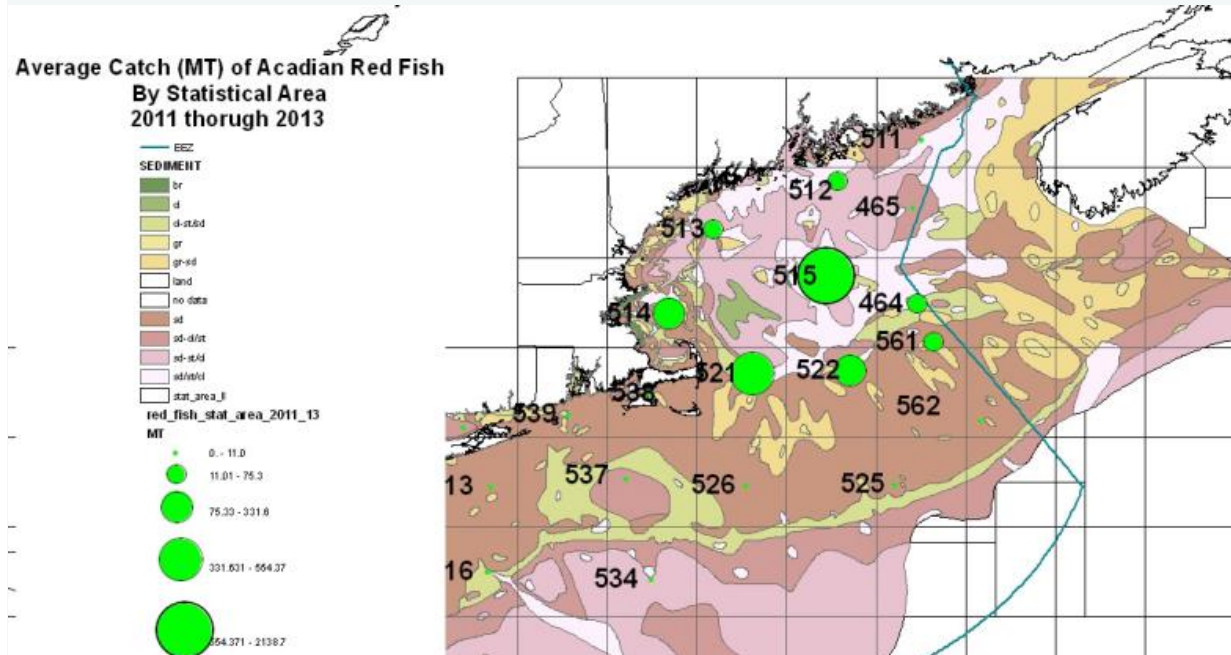


Figure 5. Redfish Catch by Statistical Fishing Area 2011-2013 with Bottom Type Overlay (Data Source: NOAA Fisheries).

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 Atlantic, Large-Mesh Bottom Trawl

Minimal Mitigation

The impact of bottom-contact fishing gear on marine habitats can be reduced through gear modifications, reductions in fishing effort (i.e., swept area), and spatial closures that protect vulnerable habitats. Recent changes in regulations for the Acadian redfish fishery allow for gear modifications that permit the use of smaller mesh to target redfish (NMFS 2013a). While these changes do not specifically alter fishing gear to reduce the nature of bottom contact, they are designed to increase the retention efficiency for redfish, and thus have the potential to reduce gear impacts by decreasing the swept-area footprint. Pending the approval of the Omnibus Essential Fish Habitat Amendment 2, there are currently 7 year-round closures in place that were established to protect fish and fish habitat. There are also 5 rolling closures in the Gulf of Maine and a seasonal closure on Georges Bank that are designed to protect important spawning grounds and juvenile fish. Additionally, there is a designated area (Inshore Restricted Roller Gear Area) where the use of roller gear is prohibited; however, other types of mobile gear that have the potential to cause disturbance in benthic habitats are still permitted. It is important to note that, to date, no regulatory actions have been taken to permanently close currently protected areas to fishing. Furthermore, some closures have been made with the intent to reduce commercial fisheries mortality and are not designated to protect habitat from fishing gear impacts. Based on the lack of permanent closures for habitats considered to be at high risk for damage from commercial fishing activities, Seafood Watch finds that there are minimal measures in place to mitigate the impact of fishing gear on the environment.

Rationale

The requirement for fisheries management plans to minimize, to the extent practicable, the adverse effects of fishing on essential fish habitat was set forth in the Sustainable Fisheries Act of 1996 (SFA). Amendment 11 of the multispecies FMP established EFH for the species covered by the plan and established areas where bottom-tending gears were to be prohibited in order to protect the marine habitats (NEFMC & NMFS 1998). In order to mitigate and minimize potential damage to EFH, NEFMC has implemented spatial closures, introduced limited permit schemes, and placed restrictions on the gears that can be used when trawling (Orphanides and Magnusson 2007). In addition to the year-round and rolling closures mentioned above, there are also restricted gear areas (RGAs) that provide protection from particular gear types (for example, the Inshore Restricted Roller Gear Area). Currently, approximately 20% of the Georges Bank and Gulf of Maine seabed is protected from trawling activities through a variety of closures, although only 9.7% of the seabed is permanently protected by EFH closures (see [Multispecies Closed Area Regulations](#)). Framework Adjustment (FA) 48 to the Groundfish Multispecies FMP provides sectors with the opportunity to request exemptions to year-round fishing mortality area closures, which has raised concerns among fishing industry stakeholders and environmental groups about potential impacts on protected habitats. However, the rule set forth in Framework 48 prevents an exemption from being made to areas that overlap with closures that were created to protect essential fish habitat (Federal Register 2013).

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 in 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 Atlantic, Large-Mesh Bottom Trawl

Moderate Concern

In 2008, the NEFMC began the process of developing and implementing Ecosystem Based Fisheries Management (EBFM). At the onset of plan development, it was anticipated that the process of moving from the current management system to EBFM would take a minimum of 5 years. The current multispecies FMP that includes Acadian redfish contains elements of EBFM as it adopts a multiple species approach rather than traditional single species fisheries management. Moving forward, future EBFM plans are expected to incorporate environmental dynamics such as with predator-prey relationships, competition, habitat status and gear impacts, and protected species for a given ecosystem region, such as the Western Gulf of Maine (NEFMC SSC 2010).

The development and implementation of EBFM in the northeast region is proceeding through three phases: (1) establish goals and objectives; (2) identify management and scientific requirements to implement EBFM; (3) implement using quota-based management in all ecosystem production units.

Rationale

Ecosystem-based management, established by executive order in July 2010, has been established as a priority by the first U.S. national policy on stewardship of the oceans, coasts, and Great Lakes (NEFMC SSC 2010). The current legislative framework governing ocean fisheries policy, which includes the Magnuson-Stevens Fishery Conservation and Management Act, the National Environmental Policy Act, the Endangered Species Act, the Marine Mammal Protection Act, and the Coastal Zone Management Act, requires fisheries managers to take into account the impact of fishery operations on the ecosystem (NEFMC SSC 2010).

Based on U.S. national ocean policy priorities and fisheries legislative mandates, Seafood Watch considers the development and implementation of ecosystems-based fisheries management a management priority with the explicit goal that “All stocks are maintained at levels that allow them to fulfill their ecological role and to maintain a functioning ecosystem and food web.” Currently, EBFM for the northeastern U.S. region is in the planning and development stages. This region was the first in the nation to form a regional planning body (RPB) as called for by the National Ocean Policy. This group includes representatives from the six New England states, ten federally recognized tribes, ten federal agencies, and the New England Fishery Management Council. As part of its comprehensive ocean planning mission, the Northeast RPB hosts ecosystem-based management (EBM) workshops that include discussion of fisheries resources, with aim to “define and implement EBM” in the region. The NEFMC has an active EBFM oversight committee that meets regularly and is working toward identifying and evaluating management approaches to develop EBFM policies. This committee also gathers stakeholder input on EBFM planning and development efforts.

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