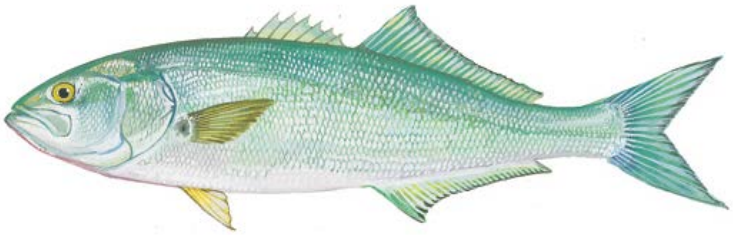
Monterey Bay Aquarium
Seafood Watch®

Bluefish

Pomatomus saltatrix



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United States

Bottom trawl, Bottom gillnet, Handline

December 12, 2013
Lindsey Feldman, Consulting Researcher

Disclaimer

Final Seafood Recommendation

Stock / Fishery	Impacts on the Stock	Impacts on other Spp.	Management	Habitat and Ecosystem	Overall Recommendation
Bluefish East coast North Atlantic - Gillnet, Bottom	Green (4.47)	Red (0.95)	Green (3.46)	Yellow (3.12)	**Good Alternative (2.604)**
Bluefish East coast North Atlantic - Handline	Green (4.47)	Green (5.00)	Green (4.00)	Green (3.97)	**Best Choice (4.341)**
Bluefish East coast North Atlantic - Trawl, Bottom	Green (4.47)	Red (1.00)	Green (3.46)	Yellow (2.60)	**Good Alternative (2.519)**

Scoring note – 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 = Final Score between 3.2 and 5, **and** no Red Criteria, **and** no Critical scores

Good Alternative = Final score between 2.2 and 3.199, **and** Management is not Red, **and** no more than one Red Criterion other than Management, **and** no Critical scores

Avoid = Final Score between 0 and 2.199, **or** Management is Red, **or** two or more Red Criteria, **or** one or more Critical scores.

Executive Summary

Atlantic bluefish is managed jointly by NOAA Fisheries, the Atlantic States Marine Fisheries Commission, and the Mid-Atlantic Fishery Management Council. Due to declines in the stock biomass, a rebuilding plan was implemented in 2000 and due to successful management strategies, the bluefish stock was declared rebuilt in 2009. According to the 2012 stock assessment update, the stock remains in good condition, is not overfished, and overfishing is not occurring.

While bluefish biomass has slightly declined, the decline does not appear to be due to overfishing, as fishing mortality rates are low, commercial landings have only exceeded the total landings quota once in the past 10 years, and the overage was relatively small compared to the total quota. Nevertheless, managers decreased the annual catch limits for the commercial bluefish fishery for 2013-2014, until the next benchmark stock assessment is conducted in 2014. Commercial bluefish landings are monitored weekly and catch has been consistently below the annual catch limit since 2000. Federally permitted bluefish vessels are required to submit monthly logbooks in order to maintain their federal permits and certain states, such as North Carolina, also have mandatory reporting systems for state permitted vessels. While there aren't any vessel monitoring system requirements for the bluefish fishery because there are no area based regulations specific to bluefish that require monitoring, some bluefish vessels may have monitoring units on board that are required by other fishery permits.

Bluefish is a mixed fishery in which many other species are targeted. The most common species caught on targeted bluefish trips include: spiny dogfish, striped bass, dusky smoothhound, and summer flounder. These fisheries, with the exception of dusky smoothhound, have recently been declared rebuilt and the most recent stock assessments and updates have found that the stocks are not overfished and overfishing is not occurring. The dusky smoothhound stock status is unknown because a stock assessment has not yet been completed. The following protected species are also known to interact with the Mid-Atlantic gillnet and trawl fisheries: Fin, Sei, Humpback, and North Atlantic Right whales, Loggerhead, Leatherback, Green, and Kemp's ridley sea turtles, and Atlantic sturgeon. While the bluefish fishery is not expected to cause jeopardy to any of these species, interactions can be significant, for example, with humpback whales in sink gillnets, loggerhead sea turtles in the bottom trawl fishery, and Atlantic sturgeon in sink gillnets. The bluefish gillnet fishery overlaps seasonally with migrations of humpback, fin, right, and sei whales, as well as sea turtles, from May through November and bluefish gillnets are most likely to have bycatch during this time. Gillnet gear is also known to capture Atlantic sturgeon, although it has been estimated that sturgeon mortality is greater in the monkfish, summer flounder, skate, scup, and black sea bass fisheries. The bottom trawl fishery is more likely to interact with sea turtles, however the use of turtle excluder devices (TED) in North Carolina and Virginia as required by the summer flounder fishery has greatly reduced the number of interactions in the Mid-Atlantic. As bluefish is often caught along with summer flounder, bluefish vessels often use TEDs to minimize sea turtle interactions. Handline gear used in the bluefish fishery is not known to interact with protected species.

While there are some interactions with protected species estimated to occur in the bluefish fishery, generally, bycatch is not considered a significant problem. This is reflected by the low discard to landings ratios estimated using observer data and the National Bycatch Report, although observer levels are very low, which make it difficult to understand the true nature of bycatch in the fishery, and the gillnet and trawl fisheries have the potential for interaction with vulnerable and protected species. There are no specific observer requirements for the bluefish fishery, and bluefish trips are only observed if a vessel fishing for bluefish is randomly selected by NOAA Fisheries for another reason such as to meet target coverage levels for a particular gear type. From the observer data that is available, discards are highest when using otter trawl gear, moderate when using gillnets, and nonexistent with the use of handlines.

Handline gear also has the least impact on bottom habitat, giving it the highest habitat score out of all the gear types. Handlines have little contact with the bottom and have shown to do minimal damage to bottom structure and bottom dwelling organisms. Sink gillnets have a greater potential to affect the bottom, but the only part of the gear that touches the bottom is the anchors used to sink the nets, and the weights on the bottom of the nets. The anchors and weights can damage bottom structures such as rocky outcrops and reefs when they are set and hauled back, but have a much lesser impact on sandy and muddy bottoms such as in the Mid-Atlantic region. The bluefish fishery operates primarily in the Mid-Atlantic where the bottom is sandy and there is little bottom structure for gillnets to damage. Even though bottom trawls are known to have significant impacts on bottom habitat, they cause less disturbance on muddy and sandy habitats in comparison with highly structured/rocky bottoms.

Bluefish plays a significant role in the Mid-Atlantic ecosystem as a predator and prey source and is considered a species of exceptional importance to the ecosystem. Bluefish are voracious predators with over 70 different species found in their stomachs and predation by bluefish is known to account of nearly all of the young-of-the-year striped bass mortality in the Hudson River estuary system. Bluefish also are known to feed on bay anchovy, long-finned squid, striped anchovy, butterfish, menhaden, round herring, amphipods, channeled whelk, and other invertebrates. Bluefish are a primary prey source for billfishes, sharks, and tunas, but especially for the shortfin mako shark, where they make up 80% or more of their diet. Ecosystem-based management of the bluefish fishery is a moderate concern because management currently does not account for the ecosystem role of bluefish, but management is investigating ways to incorporate ecosystem-based fishery management.

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Introduction

Scope of the analysis and ensuing recommendation

This report provides the recommendation for the commercial Atlantic bluefish (Pomatomus saltatrix) fishery, which operates in the Northwest Atlantic along the eastern coast of the United States. Although Atlantic bluefish is found in other parts of the world (ex. Black Sea, Mediterranean, etc.), this report covers Northwestern Atlantic bluefish only. This report analyzes the primary gears used in the bluefish fishery including gillnet, handline, and bottom trawl gear. Based on observer data from 2008-2011, gillnet gear makes up 85.6% of bluefish catch, bottom trawl makes up 13.6% of catch, handline gear is used for 0.05% of catch, and haul/beach seines are used for 0.7% of catch. Vessel reported bluefish landings from vessel trip reports show that 93% of catch is using gillnet gear and 5% is using handline gear. Therefore, gillnet, bottom trawl, and handline gear will be analyzed in this report.

Overview of the species and management bodies

Bluefish are found across the globe, but in the Northwest Atlantic, they are distributed from Nova Scotia to Florida. It is thought that there are two bluefish spawning events annually, one in the spring, and one in the summer, which results in two separate size classes recorded by bluefish surveys along the coast (Shepherd and Packer 2006). There is some evidence that the bimodal distribution in size classes may be due to one long spawning season and not two separate spawning events, however this has yet to be resolved (Smith et al. 1994) (Hare and Cowen 1995). Bluefish are found in shallow estuarine ecosystems, sandy beaches, and oyster beds as juveniles and move offshore as adults. Adult bluefish are known to travel in large schools and migrate seasonally following warmer waters. They are primarily found in the Mid-Atlantic Bight in the spring and summer and move offshore or into the South Atlantic in the fall.

Bluefish are voracious eaters preying on whatever is locally available. Over 70 species have been found in bluefish stomachs (MAFMC 1998), but the majority of prey is made up of copepods for juveniles, and bay anchovy (Able and Rowe 2003), herring, longfin squid, butterfish, menhaden, and other small fishes for adults (Buckel et al. 1999a). They grow quickly, up to a weight of 27 lbs (Bigelow and Schroeder 1953) and can live up to 12 years or older. Due to their size and speed, they are only preyed upon by sharks, tunas, and billfishes (Shepherd and Packer 2006); bluefish were found to make up over 80% of the diet of shortfin mako sharks (Stillwell and Kohler 1982),; (Wood et al. 2009), and are also a primary species in the diet of Bluefin tuna and swordfish (Chase 2002), (Stillwell and Kohler 1985).

The bluefish fishery is primarily a recreational fishery, with a small commercial component. Bluefish landings (commercial and recreational) peaked in the 1980's, and bluefish was one of the most sought after species by recreational fishermen on the East coast. Bluefish recreational landings exceeded (by weight) the landings of any other species from 1979 to 1987 (MAFMC 1998). Landings declined after their peak in 1986, which prompted the creation of the Bluefish Fishery Management Plan in 1990. Bluefish in the North Atlantic is managed as a single stock jointly between the National Oceanic and Atmospheric Administration (NOAA), the Mid-Atlantic Fishery Management Council (MAFMC), and

the Atlantic States Marine Fisheries Commission (ASMFC) (Shepherd and Packer 2006).

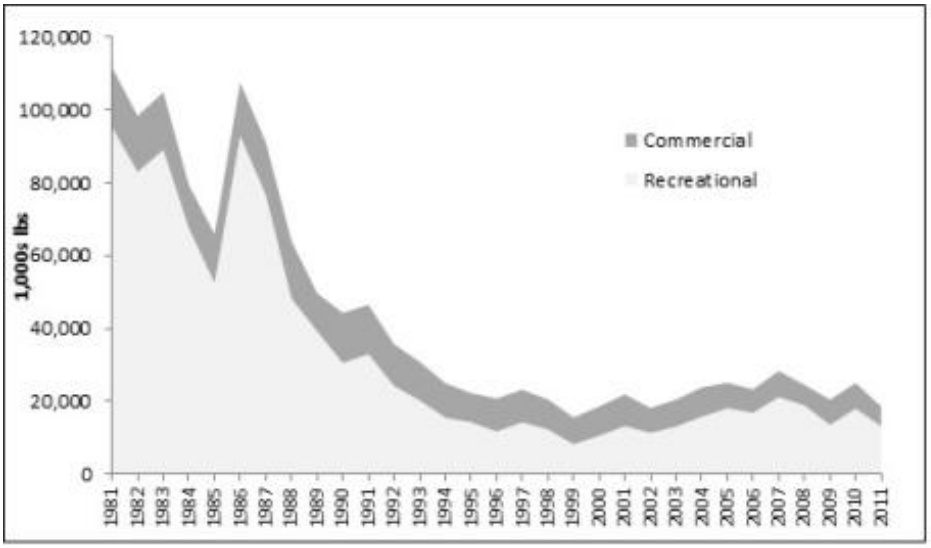

Figure 1: Bluefish commercial and recreational landings 1981-2011.

As bluefish stocks continued to decline, Amendment 1 to the Fishery Management Plan FMP was finalized in 2000 and implemented a nine year rebuilding plan with a target rebuilding year of 2010 (MAFMC 1998). Fishing mortality was limited as a part of the rebuilding plan, and the bluefish stock was declared rebuilt in 2009 (Kurkul 2009). The bluefish fishery currently operates primarily in the Mid-Atlantic region, with the bulk of commercial landings in North Carolina, New York, New Jersey, Massachusetts, and Rhode Island.

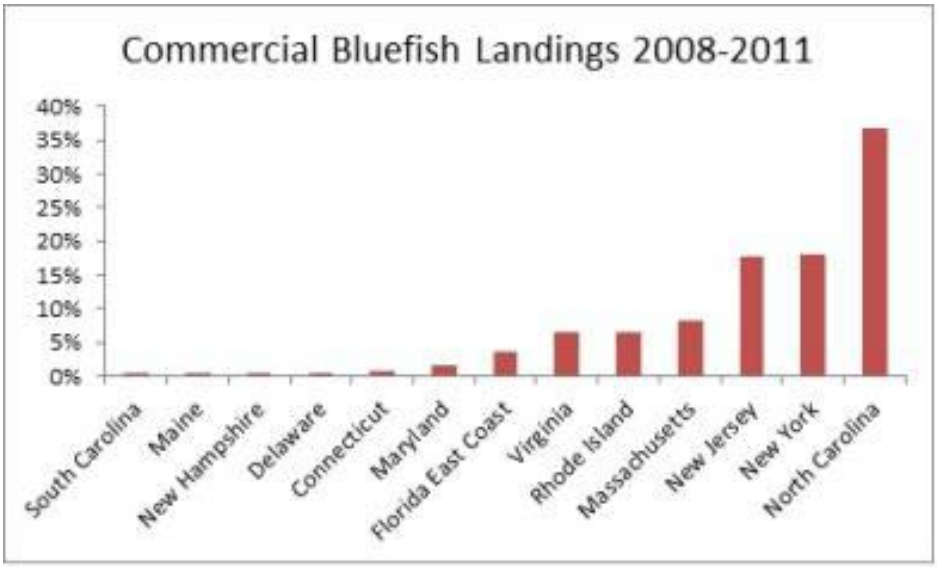

Figure 2: Commercial bluefish landings 2008-2011 by state.

Production Statistics

There are no data on the import or export of bluefish in the NMFS foreign trade database, as bluefish is categorized as “other species”. In a study by Dougherty and Brown in 1982, 1.4 million lb of bluefish were inspected by NMFS for export, and were shipped to Venezuela, Nigeria, and the West Indies. Bluefish are also found outside of the U.S. and are caught in the Mediterranean and Black Seas. Commercial landings for bluefish outside the U.S. have decreased from historic highs in the 1980’s, in some areas, to less than half. In Turkey, for example, bluefish landings decreased from 42 million to 15 million lbs from 1993 to 1995 (MAFMC 1998). In 1995, Turkey, Brazil, and the U.S. had the highest bluefish landings worldwide, with landings occurring in Venezuela and Portugal in lower numbers.

Importance to the US/North American market

In the U.S., bluefish landings vary by state, but overall landings and value are very low compared to other fisheries. Bluefish was valued at $0.43 per pound in 2010, and about 7 million lb of bluefish was landed, valued at approximately $3.14 million. Bluefish ranged from less than 0.01 % of the total value of commercial fisheries in Maine to a maximum of nearly 4.5% in North Carolina (MAFMC 2013). Since bluefish is primarily a recreational fishery, the recreational catch of bluefish has a significant impact on local markets where bluefish are caught. Recreational anglers were estimated to spend approximately $73 million on goods and services related to bluefish fishing in 2011 from Maine to Virginia (MAFMC 2013), (Gentner and Steinback 2008).

Common and market names

Blue, tailor, chopper, elf, fatback, greenfish, Hatteras blue, horse mackerel, rock salmon, skipjack, slammer, snapping mackerel, and snapper (small bluefish) (MAFMC 1998).

Primary product forms

Bluefish are available as fresh whole fish, fresh or frozen fillets, smoked fillets, and as pate (MAFMC 1998).

Analysis

Scoring Guide

- All scores result in a zero to five final score for the criterion and the overall final rank. A zero score indicates poor performance, while a score of five indicates high performance.
- The full Seafood Watch Fisheries Criteria that the following scores relate to are available on our website 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.

BLUEFISH				
Region / Method	**Inherent Vulnerability**	**Stock Status**	**Fishing Mortality**	**Subscore**
East coast North Atlantic Gillnet, Bottom	1.00:High	4.00:Low Concern	5.00:Very Low Concern	**Green (4.472)**
East coast North Atlantic Handline	1.00:High	4.00:Low Concern	5.00:Very Low Concern	**Green (4.472)**
East coast North Atlantic Trawl, Bottom	1.00:High	4.00:Low Concern	5.00:Very Low Concern	**Green (4.472)**

Justification of Ranking

Factor 1.1 - Inherent Vulnerability to Fishing

- Low = FishBase vulnerability score for species 0-35 OR species exhibits life history characteristics that make it resilient to fishing, e.g., early maturing (<5 years), short lived (< 10 years), small maximum size, and low on food chain.
- Medium = FishBase vulnerability score for species 36-55 OR life history characteristics that make it neither particularly vulnerable or 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 = FishBase vulnerability score for species 56-100 OR life history characteristics that make is particularly vulnerable to fishing, e.g. long-lived (>25 years), late maturing (>15 years), low reproduction rate, large body size, and top-predator.

Note: The FishBase vulnerability scores is an index of the inherent vulnerability of marine fishes to fishing based on life history parameters: maximum length, age at first maturity, longevity, growth rate, natural mortality rate, fecundity, spatial behaviors (e.g. schooling, aggregating for breeding, or consistently returning to the same sites for feeding or reproduction) and geographic range.

Factor 1.2 - Abundance

- 5 (Very Low Concern) = Strong evidence that 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 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 species has a high inherent vulnerability to fishing.
- 1 (Very High Concern) = Population is listed as threatened or endangered.

Factor 1.3 - Fishing Mortality

- 5 (Very Low Concern) = Highly likely that fishing mortality is below a sustainable level (e.g., below fishing mortality at maximum sustainable yield, FMSY) OR fishery does not target species and its contribution to the mortality of species is negligible (≤ 5% of a sustainable level of fishing mortality)
- 3.67 (Low Concern) = Probable (>50% chance) that fishing mortality is at or below a sustainable level, but some uncertainty 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.

Bluefish

1.1 - Inherent Vulnerability

East coast North Atlantic, Gillnet, Bottom

East coast North Atlantic, Handline

East coast North Atlantic, Trawl, Bottom

1.00 **High**

The FishBase vulnerability score is 58, corresponding to a high vulnerability score (Cheung et al. 2005)

1.2 - Stock Status

East coast North Atlantic, Gillnet, Bottom

East coast North Atlantic, Handline

East coast North Atlantic, Trawl, Bottom

4.00 **Low Concern**

Bluefish in the North Atlantic are not overfished. The biomass is estimated to be well above the limit reference point of 1/2 Bmsy, but below the target reference point of Bmsy. However, the estimate of Bmsy may be inflated due to a change in modeling approach, so biomass may actually be above Bmsy.

Rationale:
Bluefish in the North Atlantic is managed as a single stock jointly between the National Oceanic and Atmospheric Administration (NOAA), the Mid-Atlantic Fishery Management Council (MAFMC), and the Atlantic States Marine Fisheries Commission (ASMFC) (Shepherd and Packer 2006).

In response to a decline in abundance from historically high levels in the 1970's and 1980's, Amendment 1 to the Fishery Management Plan (FMP) was finalized in 2000, which implemented a nine year rebuilding plan with a target rebuilding year of 2010 (MAFMC 1998).

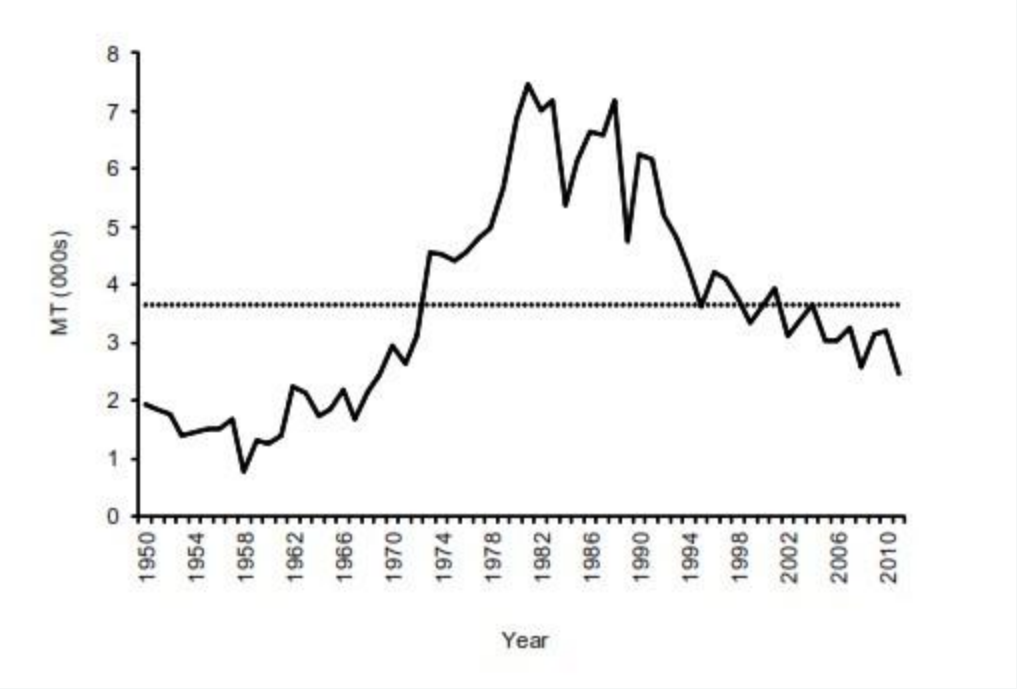

Figure 3: Commercial Bluefish Landings from 1950-2011. Landings peaked in 1979 and have been steadily declining since.

According to the FMP, the bluefish stock is considered overfished when biomass levels are below ½ B_{MSY}. The biomass reference point set in Amendment 1 was 237 million lb (1/2 B_{MSY}= 118.5 million lb). As the biomass estimate in 2000 was only 55.12 million lb, significantly below the target biomass level of 118.5 million lb, the stock was considered overfished. Subsequently, Amendment 1 set commercial and recreational harvest levels, limited commercial fish size, and implemented minimum mesh requirements, and recreational size, possession, and seasonal limits. The rebuilding plan also included a step-wise reduction in fishing mortality (MAFMC 1998). Bluefish assessments were conducted using a general surplus production model, until the 39th Northeast Fisheries Science Center Stock Assessment Review Committee meeting in 2004, (SARC 39) which declared the method to be inappropriate for assessing the bluefish stock (Shepherd and Packer 2006), (41st SAW 2006). Bluefish are difficult to assess due to their pelagic nature, and the fact that different sized fish use different habitats and have different migratory patterns. In addition, since the fishery is predominantly recreational in nature (+/- 80% of mortality), obtaining reliable data on fishing mortality is difficult. The bluefish assessment was rejected and managers were advised to be precautionary in setting bluefish catch limits until the assessment was updated (41st SAW 2006).

In 2005, a subsequent bluefish assessment was conducted using a new catch-at-age model, and presented for peer review at the SARC 41. This follow up assessment was also thought to be weak by some reviewers, and they questioned the data input and the uncertainty surrounding the model parameters. The bluefish reviewers met a second time to further review the bluefish model and determine new biological reference points, biomass, and fishing mortality updates. The reviewers

agreed that a catch-at-age model was more appropriate for the bluefish stock, and a new age structured assessment program (ASAP) model was accepted. The ASAP model redefined B_{MSY} at 324 million lb ($1/2B_{MSY}$ = 162.1 million lb) and F_{MSY} at 0.19. Since the biomass was estimated at SARC 41 to be 229.6 million lb, the bluefish stock was no longer considered overfished. The peer reviewers accepted this revised stock assessment for use in management, however, with some reservations due to the newness of the ASAP model and some uncertainty regarding its underlying parameters (41st SAW 2006).
The bluefish stock assessment sub-committee has since provided annual updates to the assessment using new catch-at-age information from various annual surveys. In 2007 and 2008, the bluefish biomass estimate (339 million lb and 360 million lb respectively) exceeded B_{MSY} (324 million lb) and the bluefish fishery was declared rebuilt in 2009 (Kurkul 2009). The stock assessment update in 2011 updated the bluefish mean weight at age model inputs, so that mean weight at age was significantly reduced. This reduction in mean weight at age could mean that previous estimates of B_{MSY} were inflated, however biological reference points are only updated in conjunction with a new assessment, which is not expected until 2014 (NOAA 2011). The most recent stock status update was conducted in 2012 in conjunction with setting the 2013-2014 bluefish specifications (NOAA 2012). Survey indices were updated through 2011 for the 2012 assessment update. The updated ASAP model indicated a slight decline in bluefish abundance due to poor year classes in 2009, 2010, and 2011 (NOAA 2012). The 2011 estimate of mean total biomass was 292.972 million lb, which is below B_{MSY} (324 million lb) but well above ½ B_{MSY} (162 million lb). As noted above, updates to the mean weight at age model inputs may mean that the current estimates of B_{MSY} are inflated. Therefore, managers are not overly concerned that the 2011 biomass estimates fall below B_{MSY} and the assessment update concluded that bluefish is still not overfished, and overfishing is not occurring. The trending decline in biomass does not appear to be due to fishing mortality and may be from other sources such as the change in the NOAA survey vessel from the R/V Bigelow to the Albatross, uncertainty in the ASAP model as well as limited information on the recreational fishery, bluefish age, and reliable discard information (NOAA 2012). Nevertheless, the bluefish biomass has declined and more information will not be available until the next bluefish assessment, which is expected in 2014 (NOAA 2012).Due to the reduction in biomass, total allowable landings have been reduced from 28.267 to 23.861 and 23.446 million lb respectively, for the 2013 and 2014 fishing years to ensure that biomass remains above or close to the target biomass level and that there is a low probability of overfishing occurring. While specifications could have been set for up to 5 years, they were only set for 2, as the next assessment is expected in 2014.

1.3 - Fishing Mortality

East coast North Atlantic, Gillnet, Bottom

East coast North Atlantic, Handline

East coast North Atlantic, Trawl, Bottom

5.00 **Very Low Concern**

The most recent stock status update was conducted in 2012 in conjunction with setting the 2013-2014 bluefish specifications (NOAA 2012). Survey indices were updated through 2011 for the 2012 assessment update. The updated ASAP model, using the most recent survey indices, estimated a fishing mortality rate of 0.114 (NOAA 2012), well below F_{MSY} (0.19) and the target F (0.17), with very little retrospective bias. The assessment update concluded that bluefish is still not overfished, and overfishing is not occurring. While the stock biomass was found to be declining, high fishing mortality does not appear to be the contributing factor to the decline.

Rationale:
Amendment 1 to the bluefish FMP established that the long-term target fishing mortality rate (target F) is 90 percent of the fishing mortality rate at the maximum sustainable yield (F_{MSY}). While fishing mortality steadily declined from 0.34 in 1987 to 0.12 in 1999, it has remained relatively steady since 2000 with an average fishing mortality rate of 0.14 (NOAA 2012). In 2004, the fishing mortality rate was estimated to be 0.15, and based on a target F of 0.17, the stock was not experiencing overfishing (Shepherd and Packer 2006), (41st SAW 2006). The most recent bluefish stock assessment was conducted in 2005 and presented for peer review at the 41st Northeast Fisheries Science Center Stock Assessment Review Committee meeting (SARC 41). An update to the bluefish assessment model (using an age structured assessment program (ASAP) at SARC 41 defined F_{MSY} as 0.19 (NOAA 2012). The peer reviewers accepted the stock assessment for use in management, and the bluefish stock assessment sub-committee has since provided annual updates to the assessment.

The 2012 assessment update ran five different fishing mortality scenarios ranging from a low rate of 0.10 to the target F at 90% of FMSY (0.17). As yield declined with increases in the fishing mortality rate, the bluefish Science and Statistical Committee (SSC) recommended acceptable biological catch (ABC) levels based on a low fishing mortality rate of 0.132, well below the target F.

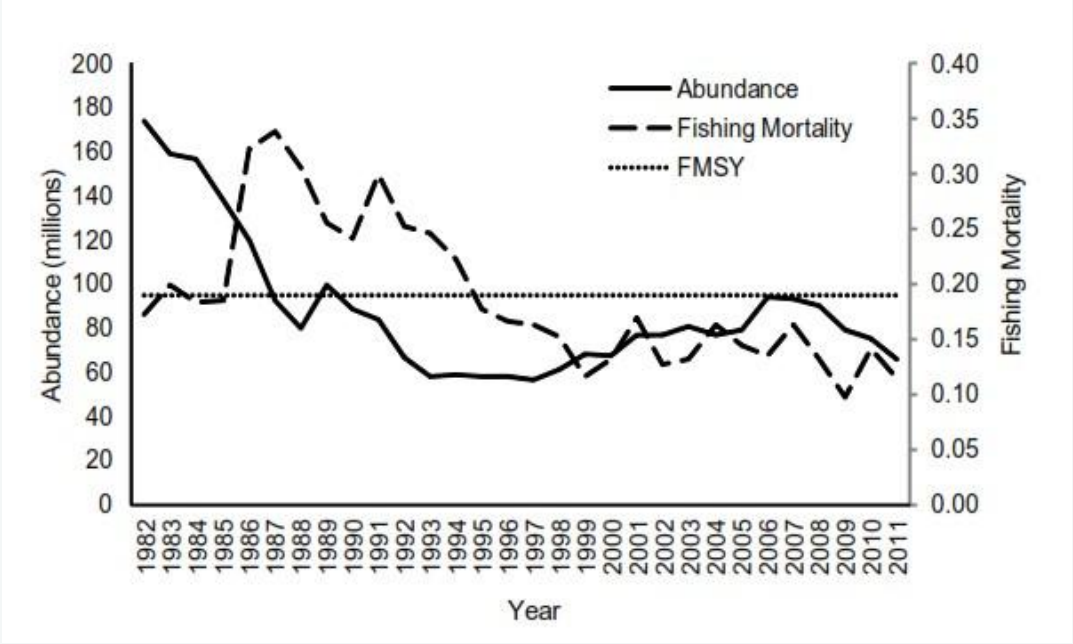

Figure 4: Total bluefish abundance and fishing mortality as estimated in ASAP model. FMSY indicated by dotted horizontal line (NOAA 2012).

Criterion 2: Impacts on other retained and bycatch stocks

All retained and primary 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 other than the retained catch. Examples include discards, endangered or threatened species catch, and ghost fishing. To determine the final Criterion 2 score, the score for the lowest scoring retained/bycatch species is multiplied by the discard rate score (ranges from 0-1), which evaluates the amount of non-retained catch (discards) and bait use relative to the retained catch.

Bluefish: East coast North Atlantic, Gillnet, Bottom

Subscore:: **1.000** **Discard Rate:** **0.95** **C2 Rate:** **0.950**

Species	Inherent Vulnerability	Stock Status	Fishing Mortality	Subscore
HUMPBACK WHALE	1.00: High	1.00: Very High Concern	1.00: High Concern	**1.000**
LOGGERHEAD TURTLE	1.00: High	1.00: Very High Concern	2.33: Moderate Concern	**1.526**
NORTH ATLANTIC RIGHT WHALE	1.00: High	1.00: Very High Concern	2.33: Moderate Concern	**1.526**
SEI WHALE	1.00: High	1.00: Very High Concern	2.33: Moderate Concern	**1.526**
FIN WHALE	1.00: High	1.00: Very High Concern	3.67: Low Concern	**1.916**
ATLANTIC STURGEON	1.00: High	1.00: Very High Concern	5.00: Very Low Concern	**2.236**
GREEN TURTLE:	1.00: High	1.00: Very High Concern	5.00: Very Low Concern	**2.236**
KEMP'S RIDLEY TURTLE	1.00: High	1.00: Very High Concern	5.00: Very Low Concern	**2.236**
DUSKY SMOOTHHOUND (SMOOTH DOGFISH)	1.00: High	3.00: Moderate Concern	3.67: Low Concern	**3.318**
BLUEFISH	1.00: High	4.00: Low Concern	5.00: Very Low Concern	**4.472**
ATLANTIC STRIPED BASS	1.00: High	5.00: Very Low Concern	5.00: Very Low Concern	**5.000**
SPINY DOGFISH	1.00: High	5.00: Very Low Concern	5.00: Very Low Concern	**5.000**

Bluefish: East coast North Atlantic, Handline

Subscore:: 5.000 **Discard Rate:** 1.00 **C2 Rate:** 5.000

Species	Inherent Vulnerability	Stock Status	Fishing Mortality	Subscore
BLUEFISH	1.00: High	4.00: Low Concern	5.00: Very Low Concern	**4.472**

Bluefish: East coast North Atlantic, Trawl, Bottom

Subscore:: 1.000 **Discard Rate:** 1.00 **C2 Rate:** 1.000

Species	Inherent Vulnerability	Stock Status	Fishing Mortality	Subscore
LOGGERHEAD TURTLE	1.00: High	1.00: Very High Concern	1.00: High Concern	**1.000**
GREEN TURTLE:	1.00: High	1.00: Very High Concern	5.00: Very Low Concern	**2.236**
KEMP'S RIDLEY TURTLE	1.00: High	1.00: Very High Concern	5.00: Very Low Concern	**2.236**
LEATHERBACK TURTLE	1.00: High	1.00: Very High Concern	5.00: Very Low Concern	**2.236**
BLUEFISH	1.00: High	4.00: Low Concern	5.00: Very Low Concern	**4.472**
SUMMER FLOUNDER	2.00: Medium	5.00: Very Low Concern	5.00: Very Low Concern	**5.000**

Justification of Ranking

Only species that scored 'red' are included here. All other species evaluations are in Appendix 1. See criterion 1 for scoring definitions.

ATLANTIC STRIPED BASS

2.1 - Inherent Vulnerability

East coast North Atlantic, Gillnet, Bottom

1.00 **High**

The FishBase vulnerability score is 61, corresponding to a high vulnerability ranking (Cheung et al. 2005)

2.2 - Stock Status

East coast North Atlantic, Gillnet, Bottom

5.00 **Very Low Concern**

Striped bass is managed by the Atlantic States Marine Fisheries Commission (ASMFC). The most recent stock assessment was conducted by the ASMFC in 2007, and found that the striped bass stock is not overfished and overfishing is not occurring (ASMFC 2011). The stock assessment is updated annually with new information until the next benchmark stock assessment, which is expected in June 2013.

Rationale:
While striped bass biomass estimates have been declining since they peaked in 2004, spawning stock biomass (SSB) was estimated at 50,548 mt in 2010, which is a slight decline from the 2008 assessment, but above the threshold SSB of 36,881 mt and the target SSB of 46,101 mt. SSB and projected striped bass landings are expected to decrease through 2017, especially in the Chesapeake and Hudson Bay regions due to a period of low recruitment. Even with a decline in biomass, the striped bass stock is not expected to be overfished in the near term (ASMFC 2011).

2.3 - Fishing Mortality

East coast North Atlantic, Gillnet, Bottom

5.00 **Very Low Concern**

The striped bass FMP was created in 1981 due to declining recruitment and landings and implemented commercial and recreational harvest restrictions such as size limits and closed areas in order to limit fishing mortality and rebuild the stock. After stringent regulations on size and moratoriums on striped bass catch in several states, the striped bass stock began to increase to more sustainable levels. State fisheries reopened in 1990 under a constrained target fishing mortality of 0.25 and due to increases in biomass the striped bass stock was declared rebuilt by the ASMFC in 1995 (ASMFC 2011). The target fishing mortality rate was then increased to 0.33 to allow for the restoration of commercial and recreational fishing operations (ASMFC 2011). Fishing mortality has declined steadily since 1997 and rates have remained relatively consistent since 2008. The most recent fishing mortality estimates were 0.23 for ages 8-11, and 0.16 for ages 3-8, well below the threshold F of 0.34 and the target F of 0.30 (ASMFC 2011).

2.4 - Discard Rate

East coast North Atlantic, Gillnet, Bottom

0.95	20-40%

The discard rate was calculated using data from the Northeast Fisheries Observer Program on trips targeting bluefish from 2008-2011. The discard rate was calculated by dividing total discards, where all discards are assumed to be dead, by total landings.

ATLANTIC STURGEON

2.1 - Inherent Vulnerability

East coast North Atlantic, Gillnet, Bottom

1.00	High

The New York Bight, Chesapeake Bay, Carolina, and South Atlantic DPSs of Atlantic sturgeon are listed as “endangered,” and the Gulf of Maine DPS as “threatened” (NMFS 2013).

2.2 - Stock Status

East coast North Atlantic, Gillnet, Bottom

1.00	Very High Concern

Atlantic sturgeon populations have declined dramatically since their peak primarily due overfishing for the harvest of caviar (NMFS 2013). Sturgeon are thought to have peaked prior to the caviar market at around 100,000 females for the Delaware River alone and at least 10,000 females for other spawning stocks in over 35 rivers (NMFS 2013). Now, there are only 17 rivers that are known to support populations of spawning female sturgeon and while the true total coast wide population of sturgeon is unknown, 863 mature adults were estimated for the Hudson River, and 342 for the Altamaha River, GA. Model estimates based on these two populations show the coast wide population to be around 67,776 adults based on data collected through the Northeast Atlantic Marine Assessment Program (NEMAP) survey, a significant decline from their peak (NMFS 2013). NMFS recently listed all of the sturgeon DPSs as endangered, except the Gulf of Maine DPS, which was listed as threatened. Current threats include fisheries bycatch, vessel strikes, poor water quality, dams, dredging, and lack of regulations protecting the sturgeon (NMFS 2013).

2.3 - Fishing Mortality

East coast North Atlantic, Gillnet, Bottom

5.00 **Very Low Concern**

Atlantic sturgeon are particularly sensitive to bycatch mortality because they are long-lived, have an older age at maturity, low maximum fecundity, and egg production occurs later in life. The greatest mortality of Atlantic sturgeon is bycatch in sink gillnets (NMFS 2013). Sturgeon bycatch in Northeast Federal fisheries from 2006-2010 was estimated to be around 1,500 interactions per year in gillnet and trawl fisheries (3,000 total). Mortality rates in gillnet gear are approximately 20%, and are around 5% in bottom trawl gear (NMFS 2013). While there are many federal and state laws prohibiting possession of Atlantic sturgeon throughout their range, such measures have not been sufficient at reducing bycatch mortality. Since Atlantic sturgeon has only recently been listed under the Endangered Species Act, further measures to limit bycatch are currently in development (NMFS 2013). While sink gillnet gear is known to have the greatest impact on Atlantic sturgeon, the most recent biological opinion found that sturgeon bycatch mortality is relatively low in the bluefish fishery compared to other gillnet fisheries such as monkfish or spiny dogfish, resulting in just 4 mortalities out of 46 entanglements since 1996. Therefore,the continued operation of the bluefish fishery will not jeapordize the Atlantic sturgeon stock, and sturgeon interactions are more likely to occur in other gillnet fisheries in the Northeast and Mid-Atlantic (NMFS 2013).

DUSKY SMOOTHHOUND (SMOOTH DOGFISH)

2.1 - Inherent Vulnerability

East coast North Atlantic, Gillnet, Bottom

1.00 **High**

The FishBase vulnerability score is 87, corresponding to a high vulnerability ranking (Cheung et al. 2005)

2.2 - Stock Status

East coast North Atlantic, Gillnet, Bottom

3.00 **Moderate Concern**

Smoothhound sharks (formerly known as smooth dogfish) have not been assessed and the stock status is unknown. However, smoothhound sharks are managed as part of the coastal sharks complex by the ASMFC and are expected to be managed federally under the Highly Migratory Species FMP in the near future. In anticipation of Federal management, the ASMFC reviewed historical smoothhound landings

to set state by state allocations when a coast-wide smoothhound quota is determined NMFS is likely to implement several management measures for smoothhounds in the near future including: establishing a federal permit requirement for the commercial and recreational retention of smoothhound sharks in federal waters; requiring smoothhound shark fins to be naturally attached to the carcass; prohibiting at-sea processing (filleting); requiring commercial smoothhound vessels holding a smoothhound federal permit to carry an observer, if selected; requiring commercial fishermen to sell smoothhound landings to federally permitted dealers; requiring all federally-permitted dealers buying smoothhound to report those landings; and establishing commercial and set-aside quotas (NMFS 2012). Smooth dogfish is scored as moderate due to the lack of any formal assessment and the unknown status of the stock.

2.3 - Fishing Mortality

East coast North Atlantic, Gillnet, Bottom

3.67 **Low Concern**

Coast-wide landings have been around 1 million pounds annually from 1996-2007 and have increased to around 2 million pounds since 2007 (ASMFC 2013).From 2006-2010 the majority of smoothhound shark landings came from North Carolina (45.7 percent), Virginia (22.2 percent), and New Jersey (15.4 percent) (NMFS 2012). Smooth dogfish is scored as low concern as the impact of the bluefish fishery on the dusky smoothhound population is unknown, but the population is not believed to be depleted.

2.4 - Discard Rate

East coast North Atlantic, Gillnet, Bottom

0.95 **20-40%**

The discard rate was calculated using data from the Northeast Fisheries Observer Program on trips targeting bluefish from 2008-2011. The discard rate was calculated by dividing total discards, where all discards are assumed to be dead, by total landings.

FIN WHALE

2.1 - Inherent Vulnerability

East coast North Atlantic, Gillnet, Bottom

1.00 **High**

Fin whales are listed as endangered under the ESA and are considered depleted under the MMPA.

2.2 - Stock Status

East coast North Atlantic, Gillnet, Bottom

1.00 **Very High Concern**

Fin whales are listed as endangered under the U.S. Endangered Species Act throughout their range. Fin whales are commonly sighted from North Carolina to Nova Scotia and in aerial surveys from 1978-1982, fin whales accounted for 46% of all large cetaceans sighted (NMFS 2013). The most recent estimate was 3,522 fin whales in the Western North Atlantic, although this is thought to be an extremely conservative estimate considering their abundance in these waters (NMFS 2013). There are insufficient data to determine the current population trend of fin whales (NMFS 2012a).

2.3 - Fishing Mortality

East coast North Atlantic, Gillnet, Bottom

3.67 **Low Concern**

The major known sources of injury and mortality is from ship strikes and fishing gear entanglement. From 2006-2010, mortality and injury averaged 2.0 whales annually, and fin whales were involved in 15 entanglement events during the same time period in the Gulf of Maine (NMFS 2013). The Mid-Atlantic gillnet fishery is listed as a Category 1 fishery in the NMFS List of Fisheries, and Potential Biological Removal (PBR) is 5.6 fin whales annually. Since the gillnet fishery takes less than 50% of PBR, it was ranked as low concern (NMFS 2012a).

2.4 - Discard Rate

East coast North Atlantic, Gillnet, Bottom

0.95 **20-40%**

The discard rate was calculated using data from the Northeast Fisheries Observer Program on trips targeting bluefish from 2008-2011. The discard rate was calculated by dividing total discards, where all discards are assumed to be dead, by total landings.

GREEN SEA TURTLE

2.1 - Inherent Vulnerability

East coast North Atlantic, Gillnet, Bottom

East coast North Atlantic, Trawl, Bottom

1.00 **High**

Green sea turtles are listed as endangered under the ESA.

2.2 - Stock Status

East coast North Atlantic, Gillnet, Bottom

East coast North Atlantic, Trawl, Bottom

1.00 **Very High Concern**

Green turtles appear to be on the decline worldwide, but in the western Atlantic, nesting groups are considered to be doing well as the number of nests increasing is greater than the number of nests decreasing (NMFS 2013).

2.3 - Fishing Mortality

East coast North Atlantic, Gillnet, Bottom

East coast North Atlantic, Trawl, Bottom

5.00 **Very Low Concern**

Green turtles have been observed captured in the pelagic driftnet, longline, shrimp trawl, and Mid-Atlantic trawl and gillnet fisheries. While the shrimp trawl fishery is known to have the highest amount of incidental capture and mortalities, from 1995-2006, five green sea turtles were observed interacting with Mid-Atlantic sink gillnet gear used in the bluefish fishery, although none of the interactions resulted in turtle mortalities. In the Atlantic, a mean estimate of 300 green turtles had some type interactions with fishing gear (NMFS 2013).

2.4 - Discard Rate

East coast North Atlantic, Gillnet, Bottom

0.95	20-40%

The discard rate was calculated using data from the Northeast Fisheries Observer Program on trips targeting bluefish from 2008-2011. The discard rate was calculated by dividing total discards, where all discards are assumed to be dead, by total landings.

East coast North Atlantic, Trawl, Bottom

1.00	< 20%

The discard rate in the bluefish fishery was estimated as 0.04 in the National Bycatch Report. The low bycatch rate has been confirmed by bluefish managers that bycatch in the bluefish fishery is not a significant concern.

HUMPBACK WHALE

2.1 - Inherent Vulnerability

East coast North Atlantic, Gillnet, Bottom

1.00	High

Humpback whales are listed as endangered under the ESA and are considered depleted under the MMPA.

2.2 - Stock Status

East coast North Atlantic, Gillnet, Bottom

1.00	Very High Concern

Humpback whales are listed as endangered under the ESA and are considered depleted under the MMPA. The most recent estimate for the Gulf of Maine stock is 823 whales, derived from a 2008 mark and recapture study. The growth rate from 1979-1991 was 6.5% and while the growth rate from 1992-2000 declined to around 4%, current information suggests that the population is still steadily increasing (NMFS 2013).

2.3 - Fishing Mortality

East coast North Atlantic, Gillnet, Bottom

1.00 **High Concern**

The major known sources of injury and mortality is from ship strikes and fishing gear entanglement. From 2006-2010, mortality and injury averaged 7.8 whales annually, and humpback whales were involved in 101 entanglement events during the same time period in the Gulf of Maine (NMFS 2013). The Mid-Atlantic gillnet fishery is listed as a Category 1 fishery in the NMFS List of Fisheries, and Potential Biological Removal (PBR) is 2.7 humpback whales annually. Since the gillnet fishery has the potential to take greater than PBR, it was ranked as high concern (NMFS 2012a).

2.4 - Discard Rate

East coast North Atlantic, Gillnet, Bottom

0.95 **20-40%**

The discard rate was calculated using data from the Northeast Fisheries Observer Program on trips targeting bluefish from 2008-2011. The discard rate was calculated by dividing total discards, where all discards are assumed to be dead, by total landings.

KEMP'S RIDLEY TURTLE

2.1 - Inherent Vulnerability

East coast North Atlantic, Gillnet, Bottom

East coast North Atlantic, Trawl, Bottom

1.00 **High**

Kemp’s ridley turtles are listed as endangered under the ESA.

2.2 - Stock Status

East coast North Atlantic, Gillnet, Bottom

East coast North Atlantic, Trawl, Bottom

1.00 **Very High Concern**

The majority of Kemp's ridley turtles nest in Mexico, where nests have been increasing by 14-16% annually due to conservation efforts by the U.S. and Mexico such as eliminating egg harvests, protecting eggs and hatchlings, and reducing sea turtle bycatch in fisheries (NMFS 2013). There were 5,500 nests estimated in 2007, and over 17,000 in 2008 in Mexico suggesting a dramatic population increase. Likewise, only 6 nests were documented in Texas in 1996, while 195 were found in 2008 (NMFS 2013).

2.3 - Fishing Mortality

East coast North Atlantic, Gillnet, Bottom

East coast North Atlantic, Trawl, Bottom

5.00 **Very Low Concern**

Kemp's ridley turtles have the highest number of fishery interactions of all sea turtles, with an estimated mean annual mortality of 2,700 turtles (NMFS 2013). Up to 98% of all fishery interactions with kemp's ridley sea turtles occur with the U.S. Southeast/Gulf of Mexico shrimp trawl fishery. The rest of the interactions occur in Mid-Atlantic trawl and sink gillnet fisheries where three and eight turtles were documented by observers between 1994 and 2008 (NMFS 2013). There have not been any Kemp's ridleys observed as bycatch in the bluefish fishery from 1998-2011. Kemp's ridleys are included here, however, as they were listed as potentially interacting with the bluefish fishery in the most recent NMFS Biological Opinion (NMFS 2013).

2.4 - Discard Rate

East coast North Atlantic, Gillnet, Bottom

0.95 **20-40%**

The discard rate was calculated using data from the Northeast Fisheries Observer Program on trips targeting bluefish from 2008-2011. The discard rate was calculated by dividing total discards, where all discards are assumed to be dead, by total landings.

East coast North Atlantic, Trawl, Bottom

1.00 **< 20%**

The discard rate in the bluefish fishery was estimated as 0.04 in the National Bycatch Report. The low

bycatch rate has been confirmed by bluefish managers that bycatch in the bluefish fishery is not a significant concern.

LEATHERBACK TURTLE

2.1 - Inherent Vulnerability

East coast North Atlantic, Trawl, Bottom

1.00 **High**

Leatherback turtles are listed as endangered under the ESA.

2.2 - Stock Status

East coast North Atlantic, Trawl, Bottom

1.00 **Very High Concern**

A Florida nesting survey documented an increase in nesting leatherbacks from 98 nests in 1988 to 850 nests in the early 2000s and 1,712 in 2012 (NMFS 2013). Nest numbers, and the overall population appears to be steadily increasing in size (NMFS 2013).

2.3 - Fishing Mortality

East coast North Atlantic, Trawl, Bottom

5.00 **Very Low Concern**

Leatherback sea turtles are the most vulnerable to entanglement in fishing gear, especially trap/pot gear due to their large size, flippers, behavior, and distributional overlap with fishing gear (NMFS 2013). They are also known to have some amount of interaction with longline, trawl and gillnet fishing gear, although in much less quantities than with trap/pot gear. Leatherbacks are most often taken in the Atlantic shrimp trawl fishery, but the mandatory use of TEDs specifically designed to minimize leatherback mortality is projected to result in fewer lethal interactions. While bottom trawl gear is not known to have high levels of interactions with leatherbacks, gillnet fisheries in the Mid-Atlantic, such as the bluefish fishery, can injure and/or result in the death of leatherbacks when the fishery overlaps with the seasonal distribution of the turtle (NMFS 2013). However, there have not been any observed leatherback interactions with the bluefish fishery from 2008-2011 and since the majority of the bluefish fishery operates using gillnet gear, and only a small percentage uses bottom trawl gear, leatherback turtles were ranked as very low concern due to estimated low levels of interactions with the

bluefish fishery (SFW Criterian Guidance).

2.4 - Discard Rate

East coast North Atlantic, Trawl, Bottom

1.00 **< 20%**

The discard rate in the bluefish fishery was estimated as 0.04 in the National Bycatch Report. The low bycatch rate has been confirmed by bluefish managers that bycatch in the bluefish fishery is not a significant concern.

LOGGERHEAD TURTLE

2.1 - Inherent Vulnerability

East coast North Atlantic, Gillnet, Bottom

East coast North Atlantic, Trawl, Bottom

1.00 **High**

High vulnerability (SFW Criteria Document). Loggerhead turtles are listed under the Endangered Species Act as threatened in the Northwest Atlantic distinct population segment (DPS), and endangered or threatened in every other DPS.

2.2 - Stock Status

East coast North Atlantic, Gillnet, Bottom

East coast North Atlantic, Trawl, Bottom

1.00 **Very High Concern**

The majority of loggerhead sea turtle nesting occurs on beaches in the southeastern U.S. There appeared to be an overall decline in nesting based on a few different studies in 2008 and 2009, but from 2008-2012, nesting appears to be increasing significantly. In 2009, a study estimated the female adult loggerhead population to be between 16,847 and 89,649, with a median size of 30,050 females. Another study in 2011 estimated 588,000 loggerheads on the entire U.S. Atlantic coast, but the estimates are considered preliminary and in need of further analysis (NMFS 2013).

2.3 - Fishing Mortality

East coast North Atlantic, Gillnet, Bottom

2.33 **Moderate Concern**

Mortality from gillnets, longlines, and trawl fishing gear is a known to be a major issue facing loggerhead turtles in the Northwest Atlantic (Conant et al. 2009). The shrimp trawl fishery accounts for the largest percentage of loggerhead mortality in the Northwest Atlantic, but there are also significant interactions with the scallop dredge and summer flounder trawl fisheries. While loggerhead interactions are higher in other gear types, there are still an average of 300 of interactions in Mid-Atlantic gillnet fisheries annually (Finkbeiner et al. 2011). While there have not been any recorded mortalities of loggerheads directly attributable to the bluefish fisheyr,loggerhead turtles were ranked as moderate concern due to a potential moderate, but not high levels of interactions with gillnet gear (SFW Criterian Guidance)

East coast North Atlantic, Trawl, Bottom

1.00 **High Concern**

Mortality from gillnets, longlines, and trawl fishing gear is a known to be a major issue facing loggerhead turtles in the Northwest Atlantic (Conant et al. 2009). The shrimp trawl fishery accounts for the largest percentage of loggerhead mortality in the Northwest Atlantic, but there are also significant interactions with the scallop dredge and summer flounder trawl fisheries. There are currently mandatory regulations for the summer flounder fishery in the Mid-Atlantic to use turtle excluder devices (TEDs), which have been shown to decrease mortality rates of turtles caught in bottom trawl fishing gear. Even so, the Mid-Atlantic bottom trawl fishery, which includes a small percentage of the bluefish fishery, had an estimated average annual bycatch of 616 loggerhead turtles during 1996-2004 (Conant et al. 2009). A more recent analysis found that bycatch of loggerhead turtles has declined due to mitigation measures such as observer coverage, TEDs, and adequate bycatch handling methods (NMFS 2013). but 500-600 annual loggerhead turtle interactions were still documented from 1990-2007 after such regulations were put into place (Finkbeiner et al. 2011). The number of predicted average annual loggerhead interactions for 2005-2008 was 292, with an additional 61 loggerheads interacting with trawls but, being released through a TED (NMFS 2013). Loggerhead turtles were ranked as high concern due to high levels of interactions with bottom trawl gear (SFW Criterian Guidance).

2.4 - Discard Rate

East coast North Atlantic, Gillnet, Bottom

0.95 **20-40%**

The discard rate was calculated using data from the Northeast Fisheries Observer Program on trips targeting bluefish from 2008-2011. The discard rate was calculated by dividing total discards, where all discards are assumed to be dead, by total landings.

East coast North Atlantic, Trawl, Bottom

1.00 **< 20%**

The discard rate in the bluefish fishery was estimated as 0.04 in the National Bycatch Report. The low bycatch rate has been confirmed by bluefish managers that bycatch in the bluefish fishery is not a significant concern.

NORTH ATLANTIC RIGHT WHALE

2.1 - Inherent Vulnerability

East coast North Atlantic, Gillnet, Bottom

1.00 **High**

The North Atlantic right whale has been listed as endangered under the ESA since 1973. In a review in 2008, NMFS confirmed the endangered species status (NMFS 2013).

2.2 - Stock Status

East coast North Atlantic, Gillnet, Bottom

1.00 **Very High Concern**

There is no known population estimate for North Atlantic right whales prior to exploitation. The most recent population estimate found a minimum of 444 whales in 2009, and the rate of calf production from 1993-2010 was estimated to be 17.5/year (NMFS 2013). Data from 1990-2009 show a slow increase in the North Atlantic right whale population with a growth rate of around 2.6% (NMFS 2012a). For the period 2006 through 2010, the minimum rate of annual human-caused mortality and serious injury to right whales averaged 3.0 per year. However, significant regulations since 2010 may lead to a decrease in anthropogenic mortality and a slight increase in the right whale growth rate. These regulations include the prohibition on floating ground line in lobster pot gear and the changing of Boston shipping lanes which previously overlapped with right whale migration routes (NMFS 2012a).

2.3 - Fishing Mortality

East coast North Atlantic, Gillnet, Bottom

2.33 **Moderate Concern**

Right whales are especially sensitive to interactions with fishing gear due to their small population size and low annual reproductive rate (NMFS 2013). Due to the low population level, no right whale mortality can be considered insignificant. From 2006-2010, there were 3 average human-caused mortalities, which is likely an underestimate, caused by ship strikes and entanglement in fishing gear, including longlines, gillnets, and discarded trawl net gear. The Mid-Atlantic gillnet fishery is listed as a Category 1 fishery in the NMFS List of Fisheries, and Potential Biological Removal (PBR) is 0.9 right whales annually (NMFS 2012a). Although it is difficult to determine the impact of the bluefish fishery specifically on the right whale population, it is likely that the bluefish fishery is responsible for less than 50% of PBR and is therefore ranked as of moderate concern.

2.4 - Discard Rate

East coast North Atlantic, Gillnet, Bottom

0.95 **20-40%**

The discard rate was calculated using data from the Northeast Fisheries Observer Program on trips targeting bluefish from 2008-2011. The discard rate was calculated by dividing total discards, where all discards are assumed to be dead, by total landings.

SEI WHALE

2.1 - Inherent Vulnerability

East coast North Atlantic, Gillnet, Bottom

1.00 **High**

Sei whales are listed as endangered under the ESA and are considered depleted under the MMPA.

2.2 - Stock Status

East coast North Atlantic, Gillnet, Bottom

1.00 **Very High Concern**

The minimum population estimate for the sei whale stock is 279 whales, but a shipboard and aerial survey estimate in 2011 estimated 467 whales, which is considered the best estimate for the Nova Scotia stock (NMFS 2013). Both estimates are considered to be extremely conservative because of the lack of survey information for sei whales. There is not enough data to determine the population trend for the sei whale stock (NMFS 2013).

2.3 - Fishing Mortality

East coast North Atlantic, Gillnet, Bottom

2.33 **Moderate Concern**

The major known sources of injury and mortality is from ship strikes and fishing gear entanglement. From 2006-2010, mortality and injury averaged 1.2 whales annually, and sei whales were involved in 3 entanglement events during the same time period in the Gulf of Maine (NMFS 2013). The Mid-Atlantic gillnet fishery is listed as a Category 1 fishery in the NMFS List of Fisheries, and Potential Biological Removal (PBR) is unknown. Although it is difficult to attribute any mortality specifically to the bluefish fishery, the fishery is not likely to contribute greater than 50% of the total annual fishery mortalities (NMFS 2012a).

2.4 - Discard Rate

East coast North Atlantic, Gillnet, Bottom

0.95 **20-40%**

The discard rate was calculated using data from the Northeast Fisheries Observer Program on trips targeting bluefish from 2008-2011. The discard rate was calculated by dividing total discards, where all discards are assumed to be dead, by total landings.

SPINY DOGFISH

2.1 - Inherent Vulnerability

East coast North Atlantic, Gillnet, Bottom

1.00 **High**

The FishBase vulnerability score is 69, corresponding to a high vulnerability ranking (Cheung et al. 2005)

2.2 - Stock Status

East coast North Atlantic, Gillnet, Bottom

5.00 **Very Low Concern**

The spiny dogfish stock is not overfished and overfishing is not occurring. A rebuilding program for spiny dogfish was implemented in 2000, which eliminated the directed fishery for female spiny dogfish and limited catch to incidental take in other fisheries (MAFMC 2013a).

Rationale:

The spiny dogfish stock is not overfished and overfishing is not occurring. A rebuilding program for spiny dogfish was implemented in 2000, which eliminated the directed fishery for female spiny dogfish and limited catch to incidental take in other fisheries (MAFMC 2013). The Transboundary Resource Assessment Committee (TRAC) conducted a benchmark stock assessment for spiny dogfish in 2010, which ultimately resulted in the stock being declared rebuilt (75 Federal Register 121, 2010). While the TRAC was unable to determine appropriate biological reference points for the spiny dogfish stock, they recommended that a group of peer reviewers should review the stock status and recommend reference points for the purposes of U.S. management (75 Federal Register 121, 2010). The peer reviewers accepted a newly defined biomass target and determined that biomass estimates in 2010 exceeded that target level indicating that the stock was no longer overfished and could be declared rebuilt. In the spiny dogfish fishery, the B_{MSY} proxy is the spawning stock biomass (SSB) that maximizes recruitment. In 2010, SSB_{MAX} was set at 159,288 mt, and biomass was estimated at 163,256 mt (75 Federal Register 121, 2010). Since 2009, biomass has continued to increase and the commercial quota has been increased accordingly (MAFMC 2013).

The most recent spiny dogfish assessment update in 2012 used catch data from 2011 and estimated SSB at 215,744 mt, about 35-percent above the SSB_{MAX}. Therefore, the biomass is well above the B_{MSY} proxy, and there is a high probability that the spiny dogfish stock is not overfished (MAFMC 2013a).

2.3 - Fishing Mortality

East coast North Atlantic, Gillnet, Bottom

5.00 **Very Low Concern**

The most recent spiny dogfish assessment update redefined the fishing mortality reference point that defines when overfishing is occurring (F_{MSY}) as 0.2439. For the most recent assessment year (2010), all sources of spiny dogfish removals, including U.S. commercial landings, Canadian commercial landings, U.S. dead discards, and U.S. recreational landings were approximately 32.113 million lb, which

corresponds to an F estimate of 0.114, well below F_{MSY} of 0.2439 (MAFMC 2013a). In its assessment update, the NEFSC estimated a 100% probability that overfishing was not occurring.

2.4 - Discard Rate

East coast North Atlantic, Gillnet, Bottom

0.95 **20-40%**

The discard rate was calculated using data from the Northeast Fisheries Observer Program on trips targeting bluefish from 2008-2011. The discard rate was calculated by dividing total discards, where all discards are assumed to be dead, by total landings.

SUMMER FLOUNDER

2.1 - Inherent Vulnerability

East coast North Atlantic, Trawl, Bottom

2.00 **Medium**

The FishBase vulnerability score is 47, corresponding to a medium vulnerability ranking (Cheung et al. 2005)

2.2 - Stock Status

East coast North Atlantic, Trawl, Bottom

5.00 **Very Low Concern**

The summer flounder FMP was implemented in 1988 due to declining biomass levels. A rebuilding program was created in 1993 that established commercial quotas, recreational harvest limits, size limits, gear restrictions, permits, and reporting requirements (NOAA 2012). In 2006, the rebuilding program deadline was extended to 2013, but in 2010, the summer flounder stock was declared rebuilt, based on the 2011 assessment update. The most recent stock assessment confirmed that summer flounder is not overfished and overfishing is not occurring. However, biomass has declined slightly and subsequently, catch limits were reduced in 2013 and 2014 to ensure the stock remains in a rebuilt condition. The stock assessment in 2012 was conducted using an ASAP model, which estimated SSB at 57,020 mt, which is 95% of SSB_{MSY} (60,074 mt), and significantly above the threshold biomass level of 30,037 mt (Terceiro 2012). The ASAP model used for the summer flounder stock assessment has exhibited a retrospective pattern that has recently overestimated SSB; the 2011 estimate of the 2009 year class was found to be

about 50% smaller than the initial estimate in the 2010 assessment. Since the retrospective pattern is not fully accounted for in the assessment outputs, SSB may be overestimated from year to year. Nevertheless, biomass levels are high enough above the SSB threshold to remain confident that the stock is not overfished (Terceiro 2012). Other than the retrospective inconsistencies, stock assessment reviewers have been confident in the assessment results. Sources of uncertainty are minimal and include underreporting of commercial and recreational landings, the current estimate of natural mortality (which is common in many other assessments), and some sex specific differences in life history which aren't taken into account (NOAA 2012).

2.3 - Fishing Mortality

East coast North Atlantic, Trawl, Bottom

5.00 **Very Low Concern**

In 2011, the fishing mortality rate was estimated to be 0.241, below the fishing mortality threshold of 0.310 (Terceiro 2012). The ASAP model used for the summer flounder stock assessment has exhibited a retrospective pattern and consistently underestimated the fishing mortality rate, however, for the past 6 years, the fishing mortality rate has been overestimated, meaning that fishing mortality is likely even lower than estimated in the 2011 assessment update (Terceiro 2012).

2.4 - Discard Rate

East coast North Atlantic, Trawl, Bottom

1.00 **< 20%**

The discard rate in the bluefish fishery was estimated as 0.04 in the National Bycatch Report. The low bycatch rate has been confirmed by bluefish managers that bycatch in the bluefish fishery is not a significant concern.

Criterion 3: Management effectiveness

Management is separated into management of retained species and management of non-retained species/bycatch. The final score for this criterion is the geometric mean of the two scores.

Region / Method	Management of Retained Species	Management of Non-Retained Species	Overall Recommendation
East coast North Atlantic Gillnet, Bottom	4.000	3.000	Green(3.464)
East coast North Atlantic Handline	4.000	4.000	Green(4.000)
East coast North Atlantic Trawl, Bottom	4.000	3.000	Green(3.464)

Factor 3.1: Management of fishing impacts on retained species							
Region / Method	**Strategy**	**Recovery**	**Research**	**Advice**	**Enforce**	**Track**	**Inclusion**
East coast North Atlantic Gillnet, Bottom	Highly Effective	N/A	Highly Effective	Highly Effective	Highly Effective	Moderately Effective	Highly Effective
East coast North Atlantic Handline	Highly Effective	N/A	Highly Effective	Highly Effective	Highly Effective	Moderately Effective	Highly Effective
East coast North Atlantic Trawl, Bottom	Highly Effective	N/A	Highly Effective	Highly Effective	Highly Effective	Moderately Effective	Highly Effective

Justification of Ranking

Factor 3.1: Management of Fishing Impacts on Retained Species

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 a clear need for management exists (i.e., fishery catches threatened, endangered, or high concern species) OR there is a high level of Illegal, Unregulated, and Unreported Fishing occurring.

3.1.0 - Critical?

East coast North Atlantic, Gillnet, Bottom

East coast North Atlantic, Handline

East coast North Atlantic, Trawl, Bottom

0.00 **No**

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.

East coast North Atlantic, Gillnet, Bottom

East coast North Atlantic, Handline

East coast North Atlantic, Trawl, Bottom

3.00 **Highly Effective**

The bluefish fishery remains an open access fishery with unlimited entry. However, there hasn't been a need to establish a limited access fishery, as the commercial bluefish quota is consistently under harvested (Armstrong 2013). The bluefish fishery is considered a mixed species fishery, which also could make a limited entry program difficult to implement. Management of the bluefish fishery has been lauded as a success, as the stock was declared rebuilt in 2009 due to constraining fishing mortality under a rebuilding program (Kurkul 2009). While the bluefish stock appears to be healthy and fully recovered, there are still some sources of uncertainty in bluefish management that need to be addressed moving forward (MAFMC 2013).

Rationale:

Bluefish reference points were updated at the last full stock assessment in 2005 (41st SAW 2006) using a catch-at-age model (ASAP) more appropriate for the bluefish stock. Although it was agreed upon that

the ASAP model was more accurate for the bluefish stock, reviewers still expressed some concern about the certainty of the reference points. While the reference points were accepted for use in management at SARC 41, some reviewers suggested that managers should act precautionary when using the assessment results for defining annual catch levels for the commercial and recreational fisheries (41st SAW 2006). Since 2005, there have been annual assessment updates that are used for determining the commercial and recreational harvest limits and any other management adjustments for the following year (MAFMC 2013). Updates to the assessment, including new weight at age information, have increased model accuracy; however there are still some overall concerns about the relationship between length at age and age data is still a limiting factor in model inputs (NOAA 2012). In addition, both offshore NMFS surveys and inshore surveys conducted by various states only sample a subset of the bluefish population at a particular time, which may not be representative of the population as a whole (NOAA 2012). Bluefish are also believed to spawn twice a year, and while biannual spawning is somewhat integrated into the ASAP model using a bimodal distribution pattern, it is generally thought of as a source of uncertainty (NOAA 2012). The Atlantic States Marine Fisheries Commission has implemented a cooperative coast wide bluefish biological monitoring program, which will improve age data for the next benchmark stock assessment (ASMFC 2012). Bluefish specifications have been set annually, with the exception of the most recent specifications, which were set for 2 years from 2013-2014 (MAFMC 2013). The most recent bluefish amendment (Amendment 3/the Omnibus Amendment) established annual catch limits (ACLs) and accountability measures (AMs) according to the requirements of the 2007 Reauthorization of the Magnuson-Stevens Act (MSA), as well as a risk policy for the MAFMC to use as guidance in setting ACLs and AMs each year. Amendment 2 set the annual specification process so that the acceptable biological catch (ABC), which is equal to the ACL, is reduced from the overfishing limit (OFL) to account for scientific uncertainty. The commercial and recreational annual catch targets (ACTs) are then reduced from the ABC/ACL to account for management uncertainty. In setting the 2013-2014 specifications, the ABC is approximately 11 million lb less than the OFL to account for scientific uncertainty in the assessment discussed above. Due to the consistent under harvest of the bluefish quota, the bluefish Monitoring Committee determined that no deduction for management uncertainty was necessary (MAFMC 2013). The commercial and recreational total allowable landings (TAL) limit is set by subtracting discards, as appropriate from the ACTs. The discard estimate for the recreational fishery is estimated as a 3-year average of discards reported through the Marine Recreational Fisheries Statistics Survey (now the Marine Recreational Information Program) (3.6 million lb) (MAFMC 2013). However, Fabrizio et al. (Fabrizio et al. 2008) found that the currently assumed recreational discard mortality rate of 15% may be an underestimate. Using a longer research period (21 vs. 3 days in other studies), he found that post-release mortality is approximately 40%. Based on that information, the recreational discard mortality rate appears to be low and should be reevaluated in the next benchmark assessment (NOAA 2012). In addition, discards for the commercial fishery are not calculated and are assumed to be zero. While the lack of commercial discard information is concerning, the reduction from the OFL to the ABC to account for in scientific uncertainty, includes the lack of commercial discard information (MAFMC 2013).

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.

East coast North Atlantic, Gillnet, Bottom

East coast North Atlantic, Handline

East coast North Atlantic, Trawl, Bottom

-1.00 **N/A**

The bluefish stock was declared rebuilt in 2009 (Kurkul 2009).

Rationale:

The 2012 assessment found that there was a slight decline in bluefish abundance due to poor year classes in 2009, 2010, and 2011 (NOAA 2012). However, the 2011 estimate of mean total biomass was 292.972 million lb, which is below B_{MSY} (324 million lb) but well above ½ B_{MSY} of 162 million lb, ensuring that the bluefish stock is still not overfished. In addition, the trending decline in biomass does not appear to be due to fishing mortality and may be from other sources such as the change in the NOAA survey vessel from the R/V Bigelow to the Albatross, uncertainty in the ASAP model as well as limited information on the recreational fishery, bluefish age, and reliable discard information (NOAA 2012). A new bluefish benchmark stock assessment is expected in 2014 (NOAA 2012).Due to the reduction in biomass, total allowable landings have been reduced from 28.267 to 23.861 and 23.446 million lb respectively, for the 2013 and 2014 fishing years to ensure that biomass remains above or close to the target biomass level and that there is a low probability of overfishing occurring. While according to the FMP, specifications could have been set for up to 5 years, they were only set for 2, as the next assessment is expected in 2014.

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 receive a highly effective score, population assessments must be conducted regularly and they must be robust enough to reliably determine the population status.

East coast North Atlantic, Gillnet, Bottom

East coast North Atlantic, Handline

East coast North Atlantic, Trawl, Bottom

3.00 **Highly Effective**

The bluefish assessment is updated annually, with data from the previous year and is presented to the Science and Stastistical Committee for review (NOAA 2012). The assessment update includes updates to both fisheries dependent and independent data sources.Fisheries dependent data sources include: Commercial landings from Maine to Virginia, North Carolina commercial landings, Florida commercial landings, coast-wide recreational landings and coast-wide recreational discards. Length samples are collected on an annual basis as a part of the NMFS monitoring program, and monitoring programs in North Carolina and Florida. Recreational landings are sampled for length as part of the NMFS Marine Recreational Information Program (MRIP). In addition, the 2012 assessment included lengths taken as a part of the American Littoral Society tagging program and age data was provided by the Virginia Marine Resources Commission and Old Dominion University ageing lab. Fisheries independent data included the NMFS bottom trawl, the Southeast Area Monitoring and Assessment Program (SEAMAP) trawl survey, New Jersey, Delaware, and Connecticut bottom trawl surveys, and MRIP (NOAA 2012).

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.

East coast North Atlantic, Gillnet, Bottom

East coast North Atlantic, Handline

East coast North Atlantic, Trawl, Bottom

3.00 **Highly Effective**

The bluefish management process has been relatively uncontroversial since the inception of the FMP. The MAFMC has always heeded the advice of the SSC and used the assessment results to set management measure for the fishery (James Armstrong, personal communication). The lack of bluefish age data has led to uncertainty in model estimates and some disagreements between peer reviewers in charge of approving the assessment outcome. In 1996, SARC 23, the assessment workshop used to define the rebuilding program and catch limits implemented in Amendment 1, was fraught with controversy regarding the age information used in the assessment. The Bluefish Technical Committee had trouble agreeing on how the age-length data available should be used, as well as whether age should be calculated using scales and not otoliths. In the end, three different models were put before the bluefish SSC, and the SSC determined the ASPIC model was provided the most accurate information about the stock, given the uncertainties about bluefish age (Wilson and Degnbol 2002). The ASPIC

model was used to assess the bluefish stock, recognizing the limitations in age data, but without much controversy, until SARC 41, where it was replaced with the ASAP model, which was deemed more appropriate for bluefish (41st SAW 2006). In addition, state biological sampling programs have increased the amount of age data that is input into the assessment updates and uncertainty in the model has decreased (ASMFC 2012, James Armstrong, personal communication).Even with the model uncertainties, bluefish management measures were set conservatively enough that allowed for the stock to rebuild by 2009 (Kurkul 2009). Bluefish landings have only exceeded the total landings quota once in the past 10 years (in 2007), and the overage was relatively small compared to the total quota.

Subfactor 3.1.5 - 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 regular enforcement of regulations and verification of compliance.

East coast North Atlantic, Gillnet, Bottom

East coast North Atlantic, Handline

East coast North Atlantic, Trawl, Bottom

3.00 **Highly Effective**

Annual catch limits (ACLs) and accountability measures (AMs) for the bluefish fishery were implemented with Amendment 2 (the Omnibus Amendment) to comply with the requirements of the MSA. Even before the implementation of ACLs and AMs, bluefish landings have consistently remained below the annual quota. Bluefish landings are monitored by the National Marine Fisheries Service on a weekly basis. When bluefish landings in a particular state exceed that state's allocation, the state fishery is closed for the season (NMFS 2013). States are permitted to transfer quota to avoid overages, which occurs with some frequency each year. In addition, any quota overage accrued by each state will be deduced from that state's quota the following year. There is also an overage deduction provision for the bluefish recreational fishery in the FMP. There are no specific vessel monitoring system (VMS) requirements for the bluefish fishery, although many vessels targeting bluefish are required to have VMS on board their vessel as a requirement of other fishery permits. Vessel Trip Reports (VTR/Logbooks) must be submitted to NMFS on a monthly basis. Vessels that are not compliant with sending in all VTRs will not be issued any federal permit the following year.

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 will be given if measures enacted by management have been shown to result in the long-term maintenance of species overtime.

East coast North Atlantic, Gillnet, Bottom

East coast North Atlantic, Handline

East coast North Atlantic, Trawl, Bottom

2.00 **Moderately Effective**

The bluefish stock was rebuilt in 2009 and biomass has consistently remained above the target since then. In addition, the bluefish fishery often remains under harvested at the end of the fishing year. Although the bluefish stock appears to be in great condition, the most recent stock assessment update indicates a slight decline in bluefish biomass due to poor recruitment.. While the most recent bluefish specifications could have been set for up to 5 years, they were only set for 2, as the next assessment is expected in 2014. Catch levels were reduced for 2013-2014 to account for the decline in biomass (NOAA 2012). The current management measures appear to be ensuring that the bluefish stock is not overfished and is not experiencing overfishing in the short term, however they have not been in place long enough to ensure long term maintenance of the stock. More information on the current stock condition will be available after the next benchmark stock assessment in 2014.

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 will be given if the management process is transparent and includes stakeholder input.

East coast North Atlantic, Gillnet, Bottom

East coast North Atlantic, Handline

East coast North Atlantic, Trawl, Bottom

3.00 **Highly Effective**

Bluefish is managed jointly by the MAFMC, NMFS, and the ASMFC. The management process is public and there are multiple opportunities for stakeholder input throughout the development and prior to the implementation of any new management measures. All management measures are developed jointly and ultimately approved by the MAFMC and the ASMFC. At all MAFMC and ASMFC meetings, public comments are encouraged, accepted, and considered when developing management measures (ASMFC 2013a). Public comments are also accepted in writing via mail or email at any time. The MAFMC and ASMFC both have advisory panels that are made up of representatives from the commercial, charter

boat, and recreational fishing industries, as well as conservation interests, that have the opportunity to provide comments throughout the entire management process. In addition, NMFS publishes all proposed management measures in the Federal Register to receive public comment. All comments from the public are considered and directly responded to before the management measure are finalized and implemented.

Factor 3.2: Management of fishing impacts on bycatch species				
Region / Method	**Strategy**	**Research**	**Advice**	**Enforce**
East coast North Atlantic Gillnet, Bottom	No	Moderately Effective	Moderately Effective	Highly Effective
East coast North Atlantic Handline	No	Highly Effective	Moderately Effective	Highly Effective
East coast North Atlantic Trawl, Bottom	No	Moderately Effective	Moderately Effective	Highly Effective

Justification of Ranking

Factor 3.2: Management of Fishing Impacts on Bycatch Species

Four subfactors are evaluated: Management Strategy, Scientific Research/Monitoring, Following of Scientific Advice, and Enforcement of Regulations. Each is rated as 'ineffective', 'moderately effective', or 'highly effective'. Unless reason exists to rank Scientific Research/Monitoring, Following of Scientific Advice, and Enforcement of Regulations differently, these ranks are the same as in 3.1.

- 5 (Very Low Concern) = Rated as 'highly effective' for all four subfactors considered
- 4 (Low Concern) = Management Strategy rated 'highly effective' and all other subfactors rated at least 'moderately effective'.
- 3 (Moderate Concern) = All subfactors rates at least 'moderately effective'.
- 2 (High Concern) = At minimum meets standards for 'moderately effective' for Management Strategy but some other factors rated 'ineffective'.
- 1 (Very High Concern) = Management exists, but Management Strategy rated 'ineffective'
- 0 (Critical) = No bycatch management even when overfished, depleted, endangered or threatened species are known to be regular components of bycatch and are substantially impacted by the fishery.

3.2.0 - All Species Retained?

East coast North Atlantic, Gillnet, Bottom

East coast North Atlantic, Handline

East coast North Atlantic, Trawl, Bottom

0.00 **No**

3.2.0 - Critical?

East coast North Atlantic, Gillnet, Bottom

East coast North Atlantic, Handline

East coast North Atlantic, Trawl, Bottom

0.00 **No**

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.).

East coast North Atlantic, Gillnet, Bottom

2.00 **Moderately Effective**

The most recent biological opinion for the bluefish fishery was completed by NMFS in 2010. While interactions were documented and thought to continue to occur with humpback, fin, right, and sei whales and loggerhead, leatherback, Kemp's ridley, and green sea turtles, NMFS did not believe that such interactions with bluefish fishery would jeopardize their existence (NMFS 2010). Nevertheless, NMFS was required to, and described reasonable and prudent measures (RPMs) to minimize these interactions and reduce any injury and mortality that may occur. Such measures included good handling practices, adequate observer coverage, accurate reporting of interactions with sea turtles and/or marine mammals, conducting research on gear modifications, and investigating if there are areas where interactions with the bluefish fishery are more or less likely to occur (NMFS 2010). While the majority of these measures have been addressed by NMFS, since there are no mandatory observer coverage requirements, it is unclear whether observer coverage is adequate in the bluefish fishery to monitor sea turtle or marine mammal interactions. On February 6, 2012 NMFS issued two final rules listing five populations of Atlantic sturgeon along the U.S. East Coast as either threatened or endangered

species. The Gulf of Maine Distinct Population Segments (DPS) of Atlantic sturgeon is listed as threatened, while the New York Bight, Chesapeake Bay, Carolina, and South Atlantic DPSs of Atlantic sturgeon are listed as endangered. Due to the listing of Atlantic sturgeon, the biological opinions for multiple fisheries known to have interactions with Atlantic sturgeon were reinitiated in order to determine what, if any, measures are required to reduce fishery interactions of Atlantic sturgeon.Due to the listing of Atlantic sturgeon under the Endangered Species Act, NMFS published a draft bluefish biological opinion May 20, 2013, for public comment. NMFS determined that the continued operation of the bluefish fishery may adversely affect, but is not likely to jeopardize, the continued existence of North Atlantic right whales, humpback whales, fin whales, and sei whales, or loggerhead (specifically, the Northwest Atlantic DPS), leatherback, Kemp's ridley, and green sea turtles, any of the five DPSs of Atlantic sturgeon, or GOM DPS Atlantic salmon. In addition, the bluefish fishery is not likely to adversely affect hawksbill sea turtles, shortnose sturgeon, smalltooth sawfish DPS, *Acroporid* corals, Johnson's seagrass, sperm whales, blue whales, designated critical habitat for right whales in the Northwest Atlantic, or designated critical habitat for GOM DPS Atlantic salmon. Accordingly, NMFS has proposed reasonable and prudent management measures in order to minimize interactions with any of the above mentioned species (NMFS 2013). Since bluefish is often targeted along with other species, it is difficult to calculate observer coverage specifically in the bluefish fishery. In addition, there are no specific observer coverage requirements for the bluefish fishery, as there are for other Northeast and Mid-Atlantic fisheries. As the fishery primarily uses gillnet gear to target bluefish, all Mid-Atlantic gillnet trips have the chance of encountering bluefish. Observer coverage of Mid-Atlantic gillnet fisheries is generally low, and averaged only about 2% from 2004-2008 (NOAA 2011a). Fish species:Since bluefish is often targeted with other species, it is difficult to determine what species are bycatch on fishing trips where bluefish are landed. Observer data shows the following fish species are also caught in gillnet gear on trips identified as targeting bluefish: striped bass, Atlantic bonito, dusky smoothhound, spiny dogfish, scup, little skate, weakfish, and summer flounder. In general, sink and drift gillnet gear have the potential for high levels of finfish bycatch and midwater gillnets have been known to result in high shark bycatch, as well as result in incidental capture of sea birds and sea turtles (Chuenpagdee et al. 2003). Atlantic sturgeon are known to be captured in sink gillnet, drift gillnet, and otter trawl gear (NMFS 2013). Of these gear types, sink gillnet gear poses the greatest known risk of mortality for bycaught sturgeon, and this is the primary gear used to harvest bluefish. However, the draft biological opinion found that Atlantic sturgeon interactions were more likely to occur in other fisheries such as the monkfish, skate, and summer flounder, scup, and black sea bass fisheries, than the bluefish fishery (NMFS 2013). In setting the 2013-2014 bluefish specifications, it was assumed that there are no commercial discards in the bluefish fishery (MAFMC 2013). Marine mammals and sea turtles:

Although there are many species protected under the Endangered Species Act and Marine Mammal Protection Act that inhabit the region where the bluefish fishery operates, there have not been any observed interactions with protected species on trips where bluefish was being targeted since 2008 (MAFMC 2013). Nevertheless, all fishing gears are required to meet gear restrictions as required under the Atlantic Large Whale Take Reduction Plan (ALWTRP) and Harbor Porpoise Take Reduction Plan (HPTRP). These plans contain measures designed to reduce interactions/impacts associated with fishing

gears.The 2013 List of Fisheries lists the Mid-Atlantic gillnet fishery as Category 1 (78 Federal Register 77 2013), which means that there is frequent incidental mortality or serious injury of marine mammals and annual mortality has been estimated at greater than or equal to 50 percent of the potential biological removal level (NMFS 2013a). This fishery has the potential to interact with bottlenose, common, and white-sided dolphins; gray, harbor, and harp seals; humpback, short and long-finned pilot, and minke whales. Large whales can become entangled in gillnet gear by their head, flippers, or fluke, especially when floating polypropylene lines between the buoy and anchor lines are used (NMFS 2010). Humpback, fin, right, and sei whales, as well as sea turtles, overlap seasonally with the bluefish fishery from May through November and are most likely to interact with gillnets used in the bluefish fishery at this time. While gillnet gear used in the bluefish fishery has the capability to seriously injure large whales and sea turtles, it is difficult to attribute any mortality to a specific fishery. While interactions have been documented and are likely to continue to occur, NMFS does not believe that the bluefish fishery will jeopardize the existence of any endangered species or marine mammals (NMFS 2010). Even so, since there are no mandatory observer regulations for the bluefish fishery, and coverage levels tend to be low, it is unclear whether marine mammal and sea turtle bycatch is adequately accounted for.

East coast North Atlantic, Handline

3.00 **Highly Effective**

Finfish:Bycatch using hook and line gear is relatively low, and although catch of non-target species does occur, mortality rates for such species are usually low (Chuenpagdee et al. 2003). Marine mammals and sea turtles:The 2013 List of Fisheries lists the Northeast and Mid-Atlantic bottom longline/hook and line fishery as a Category 3 fishery(78 Federal Register 77 2013), which means that a remote likelihood of or no known incidental mortality or serious injury of marine mammals and annual mortality has been estimated at less than 1% of the potential biological removal level (NOAA 2013a). No documented interactions with protected species have occurred in the last 5 years. Although there were 6 documented humpback whale interactions with hook and line gear in the Northeast, none resulted in injury or mortality (NMFS 2010).

East coast North Atlantic, Trawl, Bottom

2.00 **Moderately Effective**

The most recent biological opinion for the bluefish fishery was completed by NMFS in 2010. While interactions were documented and thought to continue to occur with humpback, fin, right, and sei whales and loggerhead, leatherback, Kemp's ridley, and green sea turtles, NMFS did not believe that such interactions with bluefish fishery would jeopardize their existence (NMFS 2010). Nevertheless, NMFS was required to, and described reasonable and prudent measures (RPMs) to minimize these

interactions and reduce any injury and mortality that may occur. Such measures included good handling practices, adequate observer coverage, accurate reporting of interactions with sea turtles and/or marine mammals, conducting research on gear modifications, and investigating if there are areas where interactions with the bluefish fishery are more or less likely to occur (NMFS 2010). While the majority of these measures have been addressed by NMFS, since there are no mandatory observer coverage requirements, it is unclear whether observer coverage is adequate in the bluefish fishery to monitor sea turtle or marine mammal interactions. On February 6, 2012 NMFS issued two final rules listing five populations of Atlantic sturgeon along the U.S. East Coast as either threatened or endangered species. The Gulf of Maine Distinct Population Segments (DPS) of Atlantic sturgeon is listed as threatened, while the New York Bight, Chesapeake Bay, Carolina, and South Atlantic DPSs of Atlantic sturgeon are listed as endangered. Due to the listing of Atlantic sturgeon, the biological opinions for multiple fisheries known to have interactions with Atlantic sturgeon were reinitiated in order to determine what, if any, measures are required to reduce fishery interactions of Atlantic sturgeon.Due to the listing of Atlantic sturgeon under the Endangered Species Act, NMFS published a draft bluefish biological opinion May 20, 2013, for public comment. NMFS determined that the continued operation of the bluefish fishery may adversely affect, but is not likely to jeopardize, the continued existence of North Atlantic right whales, humpback whales, fin whales, and sei whales, or loggerhead (specifically, the Northwest Atlantic DPS), leatherback, Kemp's ridley, and green sea turtles, any of the five DPSs of Atlantic sturgeon, or GOM DPS Atlantic salmon. In addition, the bluefish fishery is not likely to adversely affect hawksbill sea turtles, shortnose sturgeon, smalltooth sawfish DPS, *Acroporid* corals, Johnson's seagrass, sperm whales, blue whales, designated critical habitat for right whales in the Northwest Atlantic, or designated critical habitat for GOM DPS Atlantic salmon. Accordingly, NMFS has proposed reasonable and prudent management measures in order to minimize interactions with any of the above mentioned species (NMFS 2013). Since bluefish is often targeted along with other species, it is difficult to calculate observer coverage specifically in the bluefish fishery. In addition, there are no specific observer coverage requirements for the bluefish fishery, as there are for other Northeast and Mid-Atlantic fisheries. As the fishery primarily uses gillnet gear to target bluefish, all Mid-Atlantic gillnet trips have the chance of encountering bluefish. Observer coverage of Mid-Atlantic gillnet fisheries is generally low, and averaged only about 2% from 2004-2008 (NOAA 2011a). Fish species:Since bluefish is often targeted with other species, it is difficult to determine what species are bycatch on fishing trips where bluefish are landed. Observer data shows the following fish species are also caught in gillnet gear on trips identified as targeting bluefish: striped bass, Atlantic bonito, dusky smoothhound, spiny dogfish, scup, little skate, weakfish, and summer flounder. In general, sink and drift gillnet gear have the potential for high levels of finfish bycatch and midwater gillnets have been known to result in high shark bycatch, as well as result in incidental capture of sea birds and sea turtles (Chuenpagdee et al. 2003). Atlantic sturgeon are known to be captured in sink gillnet, drift gillnet, and otter trawl gear (NMFS 2013). Of these gear types, sink gillnet gear poses the greatest known risk of mortality for bycaught sturgeon, and this is the primary gear used to harvest bluefish. However, the draft biological opinion found that Atlantic sturgeon interactions were more likely to occur in other fisheries such as the monkfish, skate, and summer flounder, scup, and black sea bass fisheries, than the bluefish fishery (NMFS 2013). In setting the 2013-2014 bluefish specifications, it was assumed that there are no

commercial discards in the bluefish fishery (MAFMC 2013). Marine mammals and sea turtles:

Although there are many species protected under the Endangered Species Act and Marine Mammal Protection Act that inhabit the region where the bluefish fishery operates, there have not been any observed interactions with protected species on trips where bluefish was being targeted since 2008 (MAFMC 2013). Nevertheless, all fishing gears are required to meet gear restrictions as required under the Atlantic Large Whale Take Reduction Plan (ALWTRP) and Harbor Porpoise Take Reduction Plan (HPTRP). These plans contain measures designed to reduce interactions/impacts associated with fishing gears.The 2013 List of Fisheries lists the Mid-Atlantic gillnet fishery as Category 1 (78 Federal Register 77 2013), which means that there is frequent incidental mortality or serious injury of marine mammals and annual mortality has been estimated at greater than or equal to 50 percent of the potential biological removal level (NMFS 2013a). This fishery has the potential to interact with bottlenose, common, and white-sided dolphins; gray, harbor, and harp seals; humpback, short and long-finned pilot, and minke whales. Large whales can become entangled in gillnet gear by their head, flippers, or fluke, especially when floating polypropylene lines between the buoy and anchor lines are used (NMFS 2010). Humpback, fin, right, and sei whales, as well as sea turtles, overlap seasonally with the bluefish fishery from May through November and are most likely to interact with gillnets used in the bluefish fishery at this time. While gillnet gear used in the bluefish fishery has the capability to seriously injure large whales and sea turtles, it is difficult to attribute any mortality to a specific fishery. While interactions have been documented and are likely to continue to occur, NMFS does not believe that the bluefish fishery will jeopardize the existence of any endangered species or marine mammals (NMFS 2010). Even so, since there are no mandatory observer regulations for the bluefish fishery, and coverage levels tend to be low, it is unclear whether marine mammal and sea turtle bycatch is adequately accounted for.

East coast North Atlantic, Trawl, Bottom

2.00 **Moderately Effective**

Fish species:Observer data shows that the following species are also caught using bottom otter trawl gear on trips targeting bluefish: summer and winter flounder, hakes, and black sea bass. In addition, Atlantic sturgeon were found to frequently interact with both bottom trawl and gillnet gear, although interactions with bottom trawl gear are fewer (NMFS 2013).Marine mammals and sea turtles:The 2013 List of Fisheries lists the Mid-Atlantic bottom trawl fishery as Category 2 (78 Federal Register 77 2013), which means that there is occasional incidental mortality or serious injury of marine mammals annual mortality has been estimated between 1 and 50% of the potential biological removal level (NOAA 2013a). This fishery has the potential to interact with bottlenose, common, and white-sided dolphins; short- and long-finned pilot whales. Large whales are not likely to be injured in bottom trawl gear, and there have been no observed large whale interactions with the Northeast bottom trawl fishery. Sea turtles, however, feed on bottom dwelling organisms and are known to hunker down to the bottom in response to noise, and are therefore, subject to mortality from bottom trawl gear (NMFS 2010). The use

of Turtle Excluder Devices in bottom otter trawls has been shown to minimize the injury and mortality of sea turtles that come into contact with bottom trawl gear (NMFS 2010). Sea turtles are protected in North Carolina and Virginia by the mandatory use of turtle excluder devices (TEDs) in bottom trawl gear used for the summer flounder fishery. The majority of sea turtle interactions with bottom trawl gear have occurred in southern New England and the mid-Atlantic where fisheries overlap with abundant sea turtle populations. While it is difficult to estimate sea turtle takes directly attributable to the bluefish fishery, since the majority of the fishery occurs in the mid-Atlantic, there is a greater likelihood of sea turtle interactions. According to data collected from the Northeast Fisheries Observer Program (NEFOP), there was only one documented incidental take of a sea turtle from 2000-2009, a leatherback turtle in gillnet gear, that was attributed to the bluefish fishery. However, that is likely an underestimate since we are only aware of takes on observed trips and observer rates are relatively low in the bluefish fishery. A new estimate of loggerhead sea turtle bycatch in bottom otter trawl gear using observer data from 1996 to 2008 estimated four incidents of loggerhead sea turtle bycatch per year (NMFS 2013). Even so, since there are no mandatory observer regulations for the bluefish fishery, and coverage levels tend to be low, it is unclear whether marine mammal and sea turtle bycatch is adequately accounted for.

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.

East coast North Atlantic, Gillnet, Bottom

East coast North Atlantic, Handline

East coast North Atlantic, Trawl, Bottom

2.00 **Moderately Effective**

Observer coverage in the bluefish fishery has not been estimated, but is assumed to be extremely low. There are no specific requirements for observers on vessels targeting bluefish, although all Federal vessels are required to carry an observer on board if randomly selected by NMFS. The Standardized Bycatch Reporting Methodology report, which allocates observer sea days through the Northeast Fisheries Observer Program, uses three importance filters to determine whether observers will be allocated to that fishery. The filters are based on the important of discards as a fraction of total mortality in a particular fishery. The bluefish fishery was filtered out, meaning that discards were not significant and allocating observers to the bluefish fishery was not a priority (NOAA 2011a). Often, fisheries that do not have any specific observer requirements are observed anyway due to regulations in other fisheries. However, even though bluefish is a mixed species fishery, there are no Federal observer

requirements for the other species often targeted along with bluefish, such as summer flounder, croaker, and menhaden. Therefore, although trips targeting bluefish are occasionally randomly selected by NMFS for observer coverage, coverage is minimal. Since observer coverage is so infrequent, it is difficult to adequately quantify bycatch in the bluefish fishery.

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.

East coast North Atlantic, Gillnet, Bottom

East coast North Atlantic, Handline

East coast North Atlantic, Trawl, Bottom

3.00 **Highly Effective**

There is no evidence that that scientifc advice for bycatch species is different than for harvest measures as described in 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 regular enforcement of regulations and verification of compliance.

East coast North Atlantic, Gillnet, Bottom

East coast North Atlantic, Handline

East coast North Atlantic, Trawl, Bottom

3.00 **Highly Effective**

There is no evidence that that enforcement of bycatch measures is different than for harvest measures as described in 3.1.

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 EBFM score.

Region / Method	Gear Type and Substrate	Mitigation of Gear Impacts	EBFM	Overall Recomm.
East coast North Atlantic Gillnet, Bottom	3.00:Low Concern	0.25:Minimal Mitigation	3.00:Moderate Concern	**Yellow (3.123)**
East coast North Atlantic Handline	5.00:None	0.25:Minimal Mitigation	3.00:Moderate Concern	**Green (3.969)**
East coast North Atlantic Trawl, Bottom	2.00:Moderate Concern	0.25:Minimal Mitigation	3.00:Moderate Concern	**Yellow (2.598)**

Justification of Ranking

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

- 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* (<25% of the time) or purse seine known to commonly contact bottom
- 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

East coast North Atlantic, Gillnet, Bottom

3.00 **Low Concern**

Bottom gillnets are the predominant gear used in the bluefish fishery (MAFMC 2013). Sink gillnets have very little contact with the bottom and therefore, have little impact on habitat. Anchors used to sink the nets, as well as the weights on the bottom of the nets, are the only part of the fishing gear that touches the bottom (Stevenson et al. 2004). While Grizzle et al. (Grizzle et al. 2009) found that gillnets had a significant impact on bottom fauna in the Gulf of Maine, the bottom in the Gulf of Maine is primarily rocky gravel and gillnet gear can easily get hung up on bottom structure. While the bluefish fishery does operate in the Gulf of Maine, the majority of landings occur in the Mid-Atlantic (New York, New Jersey, and North Carolina) where the bottom is sandy and gillnets have little impact on the bottom (MAFMC 2013).

East coast North Atlantic, Handline

5.00 **None**

Handline gear does not touch the bottom and therefore does not have any negative impact on bottom habitat.

East coast North Atlantic, Trawl, Bottom

3.00 **Low Concern**

Bottom gillnets are the predominant gear used in the bluefish fishery (MAFMC 2013). Sink gillnets have very little contact with the bottom and therefore, have little impact on habitat. Anchors used to sink the nets, as well as the weights on the bottom of the nets, are the only part of the fishing gear that touches the bottom (Stevenson et al. 2004). While Grizzle et al. (Grizzle et al. 2009) found that gillnets had a significant impact on bottom fauna in the Gulf of Maine, the bottom in the Gulf of Maine is primarily rocky gravel and gillnet gear can easily get hung up on bottom structure. While the bluefish fishery does operate in the Gulf of Maine, the majority of landings occur in the Mid-Atlantic (New York, New Jersey, and North Carolina) where the bottom is sandy and gillnets have little impact on the bottom (MAFMC 2013).

East coast North Atlantic, Trawl, Bottom

2.00 **Moderate Concern**

The bottom trawl fishery for bluefish makes up a very small percentage of overall catch. However, bottom trawls are known to have a significant impact on bottom habitat (Chuenpagdee et al. 2003). The impacts of bottom otter trawls on habitat are dependent on the configuration of the gear and the type of habitat in which the gear is used. The least impact occurs in muddy/sandy habitats, while the highest impacts would occur on a gravel/hard bottom with vertical structures such as clay outcroppings that can

be destroyed by the movement of the gear over the ground (Stevenson et al. 2004). The Mid-Atlantic Bight region, where the bluefish fishery operates, is primarily sand with some gravel, silt, and clay (Stevenson et al. 2004).

Factor 4.2 - Mitigation of Gear Impacts

- +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 in place, e.g., vulnerable habitats protected but other habitats not protected; 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.

East coast North Atlantic, Gillnet, Bottom

East coast North Atlantic, Handline

East coast North Atlantic, Trawl, Bottom

0.25 **Minimal Mitigation**

The use of an annual coastwide quota that is divided among the states on the Eastern seaboard controls effort in the bluefish fishery. While bluefish harvest in some states may exceed their quota allocation, the coastwide bluefish quota has been consistently under harvested since at least 2000. As the bluefish stock is not overfished or experiencing overfishing there are no efforts to significantly reduce effort. There are no areas designated as Habitat of Particular Concern for the bluefish fishery (MAFMC 1998)(MAFMC 2013).

Factor 4.3 – Ecosystem-Based Fisheries Management

- 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 protected with marine reserves, 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. If hatchery supplementation or fish aggregating devices (FADs) are used, measures are in place to minimize potential negative ecological effects.
- 3 (Moderate Concern) = Fishery does not catch species that play an exceptionally large role in the ecosystem, or if it does, studies are underway to determine how to protect the ecological role of these species. OR negative ecological effects from hatchery supplementation or FADs are possible and management is not place to mitigate these impacts.
- 2 (High Concern) = The 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) = The 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.

East coast North Atlantic, Gillnet, Bottom

East coast North Atlantic, Handline

East coast North Atlantic, Trawl, Bottom

3.00 **Moderate Concern**

Considering the important role of bluefish in the Mid-Atlantic ecosystem as a predator and a prey species for mako sharks, bluefish are considered a species of exceptional importance. Although the ecosystem role of bluefish is recognized, there are currently no ecosystem considerations taken into account in the stock assessment or in the development of management measures. Ecosystem considerations are were not explicitly taken into consideration during SARC 41, the most recent bluefish stock assessment, which is consistent with other fishery stock assessments at the time (SAW 41, 2006). The use of ecosystem components in fisheries stock assessments is relatively new and continues to expand as ecosystem models are further developed (Link et al. 2011). Adequately accounting for natural mortality of bluefish due to predation and other factors is one method of accounting for the role of bluefish in the Mid-Atlantic ecosystem during the assessment process. The current bluefish assessment assumes natural morality to be static, which is the common approach across fisheries assessments (NOAA 2012). However, predation rates on bluefish are dependent on both the size of the age of the fish, as well as population estimates of known predators. There are however, plans toinvestigate ecosystem considerations in the next stock assessment (Wood, 2013). In addition, the MAFMC Ecosystem Committee is examining how to best integrate ecosystem based management

practices into decision making in the future (MAFMC 2013b)
Bluefish as prey:Due to bluefish size and speed, they are primarily preyed upon by large sharks, billfishes, and tunas. Shortfin makos migrate inshore along the northeast coast of the U.S. every spring to feed on bluefish that make up the majority of their prey (Wood et al. 2009). Large, schooling populations of herring and mackerel are known to attract adult bluefish, and subsequently, the makos (Stillwell and Kohler 1982). Stillwell and Kohler (Stillwell and Kohler 1982) estimated that bluefish made up nearly 80 percent of the diet of Northeast shortfin mako sharks and an updated analysis by Wood et al. (Wood et al. 2009) found that bluefish remain the dominant prey item for shortfin makos, accounting for 92.6 percent of their diet by weight. Wood et al.(Wood et al. 2009) analyzed historical bluefish predation(1982-1997) and found that although bluefish biomass levels were historically low, bluefish still represented a substantial proportion of the diet of shortfin makos (55.6% of their diet by number and 86.9% by volume). The population of shortfin makos may have been smaller at the time (there is little population data on shortfin makos), or there may have remained enough bluefish that the sharks were still able to feed exclusively on bluefish when they were available during the spring. Ecosystem modeling studies have shown that since bluefish is a primary prey item for the makos, bluefish biomass levels are directly correlated with shortfin mako populations (Harford 2013). When fishing effort on bluefish is increased, shortfin mako populations appear to decrease. While Wood et al. (Wood et al. 2009) suggested that shark predation may be a significant factor in reductions in bluefish biomass, Harford (Harford 2013) found that fluctuation in bluefish populations with increases in shark fishing effort was minimal. Model results found indications of bottom-up control between shortfin mako and bluefish, but top down control of the shark on bluefish was not apparent. Therefore, bluefish clearly is an important ecosystem component for the survival of shortfin mako shark populations on the Northeast coast. In addition, bluefish are known to be of the top prey items for Northwestern Atlantic Bluefin tuna and swordfish, making up 7% of prey by weight on average (Chase 2002) and 4% of prey by volume (Stillwell and Kohler 1985) respectively. Bluefish as predators:Bluefish are voracious predators and over 70 different species have been found in their stomachs (MAFMC 1998). The east coast bluefish population has been estimated to consume 8 times its own biomass in prey in a one year period (Buckel et al. 1999a). Predation by bluefish is known to account of nearly all of the young-of-the-year striped bass mortality in the Hudson River estuary system in the (Buckel et al. 1999b). While the diets of spring and summer spawned bluefish may vary, the dominant prey item was found to be the bay anchovy, followed by long-finned squid, striped anchovy, butterfish, menhaden, round herring, amphipods, channeled whelk, and other invertebrates. Invertebrates dominated the diets of juvenile bluefish, while adult bluefish primarily consumed larger fish such as butterfish, squid, and herrings (Buckel et al. 1999a) (Buckel et al. 1999b). Bluefish predation on these species (with the exemption of menhaden) was higher than the annual fisheries landings of the same species from 1984-1992. In 1999, bluefish predation on longfin squid was nearly five times the target yield (Buckel et al. 1999a). Bluefish share prey resources with striped bass, weakfish, Spanish mackerel, spotted sea trout, and mackerels (Fay et al. 1983), as well as the common and roseate tern (Safina and Burger 1989). Bluefish abundance is thought to be inversely correlated with terns, and Safina (Safina 1990) believed that bluefish could potentially be considered an indicator species for tern population abundance.Bluefish and striped bass:Bluefish and striped bass have opposite trends in abundance; when bluefish are abundant and are

landed by commercial and recreational fisheries in great numbers, striped bass appear to be absent in the ecosystem and landings are extremely low. The opposite is true when striped bass are abundant. The relationship between the two fisheries, if any, has not been determined (MAFMC 1998). Studies comparing diets between the two have found little evidence to suggest an overlap in dietary preferences between juvenile striped bass and bluefish, as prey items are primarily invertebrates or fish respectively (Buckel and McKown 2002). However, further studies in adult fishes may yield different results as striped bass are known to prey on more fish species as they mature.

Bycatch in the bluefish fishery:

The main bycatch species caught in the bluefish fishery can not be classified as exceptional species and thererefore there are no specific policies in place to protect the ecosystem function of such species.

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

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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 fished[1] or farmed, that can maintain or increase production in the long-term without jeopardizing the structure or function of affected ecosystems.

The following **guiding principles** illustrate the qualities that capture fisheries must possess to be considered sustainable by the Seafood Watch program:

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

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

1. Impacts on the species/stock for which you want a recommendation
2. Impacts on other species
3. Effectiveness of management
4. Habitat and ecosystem impacts

Each criterion includes:

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

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

Best Choices/Green: Are well managed and caught or farmed in environmentally friendly ways.

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

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

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